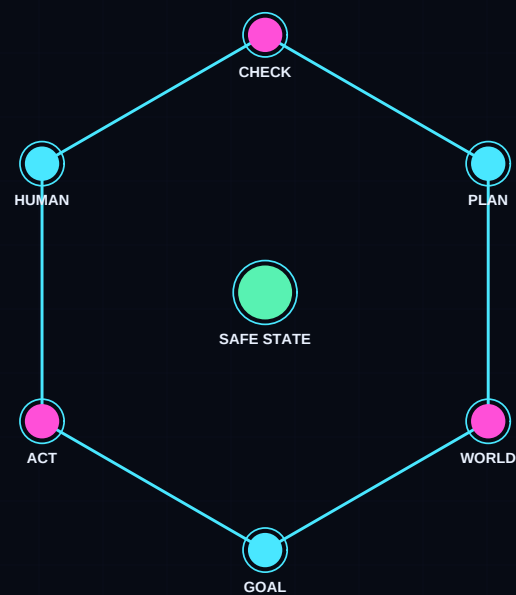
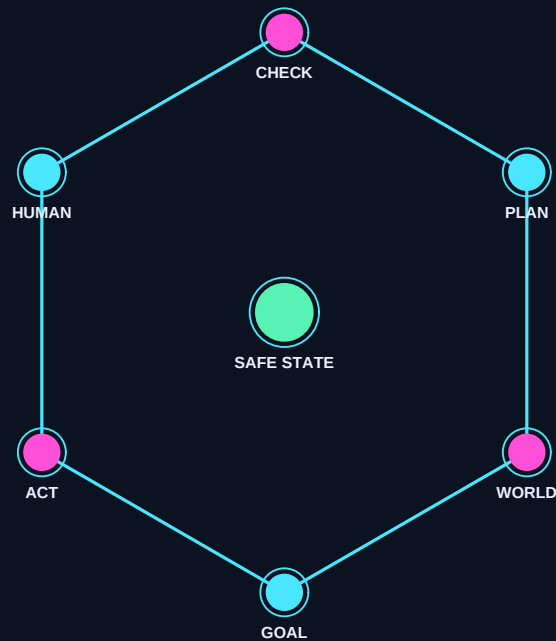


Robotics and Autonomous Systems Standards Portfolio



Architecture & Assurance Map

A compact reasoning model for implementation, assessment, and evidence review.



OPERATING POSITION

Physical AI must remain bounded by safety, authority, uncertainty, and recoverability.

EVIDENCE PATH

sense -> interpret -> plan -> authorize -> act -> observe -> recover

READINESS SIGNALS

hazard controls, human override, perception confidence, geofence, fail-safe state

PERMANENT PUBLICATION IDENTITY

Robotics and Autonomous Systems Standards Portfolio			DOCUMENT ID MYTHOS-ROB-PORT-0001
			VERSION 1.0.0-candidate
			STATUS Portfolio Edition
			PUBLISHER Mythos Systems
			PUBLICATION DATE 2026-07-24
			SCHEDULED REVIEW 2027-01-24
			CLASSIFICATION Public
0 ATOMIC CRITERIA	6 ASSURANCE VIEWS	4 IMPLEMENTATION PROFILES	1 PERMANENT IDENTITY

Publication doctrine. This publication establishes durable requirements for its defined scope. Interpretation must preserve the permanent document identity, required evidence, controlled exceptions, source currency, and formal revision history.

EMERGING TECHNOLOGY AND ASSURANCE TOPOLOGY

Robotics and Autonomous Systems

A trustworthy robotics and autonomous systems standards portfolio program is a governed path from research claim through baseline, experiment, safety and security challenge, transition decision, bounded operation, and preserved evidence.

CLASSIFY

Separate established practice, candidate standard, reproduced result, vendor claim, implementation hypothesis, and open research.

EXPERIMENT

Declare baseline, configuration, uncertainty, scenario coverage, stop conditions, and independent reproduction before conclusions.

CONSTRAIN

Identity, policy, safety envelopes, physical boundaries, cryptographic authority, and human intervention limit consequence.

TRANSITION

Adoption, pilot, production, rollback, supplier exit, lifecycle, and retirement decisions remain evidence-bearing and reversible.

EVIDENCE - BOUND TRANSITION FLOW



No novelty claim becomes an operational claim without reproduced evidence and an explicit authority decision

INTERPRETATION AND ASSURANCE

How to apply this publication

Normative intent

Requirements define outcomes and constraints. Implementations may vary, but evidence must demonstrate equivalent control.

Evidence over assertion

Vendor documentation and design intent are not equivalent to reproduced behavior. Record evidence grade and uncertainty.

Risk-proportional depth

Higher consequence, autonomy, sensitivity, and irreversibility require stronger isolation, review, verification, and recovery.

Controlled exception

Exceptions require an owner, rationale, compensating control, residual-risk acceptance, expiration, and reevaluation trigger.

Normalized assessment scale

0	1	2	3	4	5
ABSENT	AD HOC	PARTIAL	OPERATIONAL	ADVANCED	LEADING

A numeric score must never hide a failed mandatory gate, missing evidence, untested workload, or unacceptable residual risk.

MYTHOS-ROB-PORT-0001 / ROBOTICS AND AUTONOMY

Portfolio Position

Permanent standards portfolio for robotics and autonomous systems.

OPERATING POSITION

This portfolio consolidates 6 permanent standards for robotics and autonomous systems.

- Use it to establish a shared control vocabulary, implementation sequence, evidence profile, and adoption roadmap.
- Individual standards remain independently identifiable and citable.

MYTHOS-ROB-PORT-0001 / ROBOTICS AND AUTONOMY

Portfolio Register

OPERATING POSITION

MYTHOS-ROB-0001 - Robotics System Safety, Security, and Lifecycle Standard

- MYTHOS-ROB-0002 - Autonomous Decision, Planning, and Human Oversight Standard
- MYTHOS-ROB-0003 - Industrial Robotics, Collaborative Robot, and Cell Integration Standard
- MYTHOS-ROB-0004 - Mobile Robot, Drone, and Autonomous Fleet Operations Standard
- MYTHOS-ROB-0005 - Robot Perception, Sensor Fusion, and Simulation Assurance Standard
- MYTHOS-ROB-0006 - Embodied AI, Foundation Model, and Robot Skill Learning Standard

Control Architecture

OPERATING POSITION

Reasoning proposes; policy authorizes; deterministic systems execute; evidence records.

- State, identity, sources, and learning remain governed throughout the lifecycle.
- High-consequence use requires stronger isolation, approval, reproducibility, and recovery.

Assurance Model

OPERATING POSITION

Six assurance views: governance, architecture, security, operations, privacy/rights, and human/societal impact.

- Three implementation profiles: Foundational, Advanced, and High Assurance.
- Atomic criteria receive pass, partial, fail, not-applicable, or controlled-exception disposition.

MYTHOS-ROB-PORT-0001 / ROBOTICS AND AUTONOMY

Adoption Sequence

OPERATING POSITION

Establish ownership and inventory.

- Classify consequence and select profile.
- Create enforceable identity, policy, execution, and data boundaries.
- Evaluate representative workloads and adversarial cases.
- Release gradually with rollback and evidence.
- Operate, reassess, and retire with preserved records.

MYTHOS-ROB-PORT-0001 / ROBOTICS AND AUTONOMY

11. Source Authority and Reference Register

Primary sources informing interpretation; verify current status at assessment time

NIST CSF 2.0

Cybersecurity Framework 2.0

<https://doi.org/10.6028/NIST.CSWP.29>

Enterprise governance and cybersecurity outcome framework.

ISO 13482

Robots and Robotic Devices - Safety Requirements for Personal Care Robots

<https://www.iso.org/standard/53820.html>

Safety framework for service and personal-care robot classes.

NIST SP 800-53 Rev. 5

Security and Privacy Controls for Information Systems and Organizations

<https://doi.org/10.6028/NIST.SP.800-53r5>

Broad organizational control baseline for technology systems and services.

NIST AI RMF 1.0

Artificial Intelligence Risk Management Framework

<https://doi.org/10.6028/NIST.AI.100-1>

Risk management structure for trustworthy AI capabilities used in autonomous systems.

ISO 10218-1:2025

Robotics - Safety Requirements - Industrial Robots

<https://www.iso.org/standard/73933.html>

Current industrial robot design and inherent-safety requirements.

NIST Response Robot Test Methods

Standard Test Methods for Response Robots

<https://www.nist.gov/el/intelligent-systems-division-73500/standard-test-methods-response-robots>

Repeatable mobility, sensing, manipulation, endurance, and operator-proficiency tests.

ISO 10218-2:2025

Robotics - Safety Requirements - Industrial Robot Applications and Cells

<https://www.iso.org/standard/73934.html>

Current integration, commissioning, operation, maintenance, and disposal requirements.

Source currency rule: authorities, specifications, laws, provider services, hardware, protocols, standards status, and research evidence MUST be checked at assessment time. This publication records a 2026-07-24 source snapshot.



ENGINEERING STANDARDS LIBRARY / ROBOTICS AND AUTONOMOUS SYSTEMS

Robotics System Safety, Security, and Lifecycle Standard

Robot system boundaries, hazard analysis, safety functions, cybersecurity, commissioning, validation, operation, maintenance, change, and retirement.

PERMANENT DOCUMENT ID

MYTHOS-ROB-0001

PUBLICATION

Candidate Standard
Version 1.0.0-candidate

ASSURANCE PROFILE

Research / Pilot / Operational
High Assurance

PERMANENT PUBLICATION IDENTITY

Robotics System Safety, Security, and Lifecycle Standard			DOCUMENT ID MYTHOS-ROB-0001 VERSION 1.0.0-candidate STATUS Candidate Standard PUBLISHER Mythos Systems PUBLICATION DATE 2026-07-24 SCHEDULED REVIEW 2027-01-24 CLASSIFICATION Public
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INTERACTIVE NAVIGATION

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Navigation doctrine

Bookmarks and internal links are conveniences. Permanent document identity, criterion identifiers, evidence references, and revision history remain authoritative.

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

0. Executive Mandate

Research value, transition discipline, and non-negotiable evidence boundaries

MANDATE

Organizations evaluating robotics system safety and security **MUST** separate research from operational authority, establish a reproducible baseline, constrain safety and security consequence, disclose uncertainty, and require a documented transition or rejection decision.

Required outcomes

- Establish a durable, product-neutral evidence system for robotics system safety and security.
- Prevent novelty, investment, vendor prestige, roadmap language, or laboratory success from substituting for operational proof.
- Require representative performance, adversarial, failure, recovery, safety, privacy, and lifecycle evidence.
- Keep pilots bounded by identity, authority, environment, duration, budget, stop conditions, and rollback.
- Preserve rejected alternatives, limitations, residual risk, source currency, and reassessment triggers.

Decision boundary: conformance supports a bounded engineering assurance position. It does not prove scientific consensus, regulatory approval, universal safety, quantum advantage, cryptographic perfection, autonomous competence, or commercial viability.

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

1. Scope and Applicability

Research, pilot, transition, operational, and retirement boundaries

IN SCOPE

- Research, architecture, acquisition, experiment, pilot, transition, operation, and retirement of robotics system safety and security.
- Hardware, software, models, data, protocols, facilities, people, suppliers, providers, physical processes, and evidence.
- Laboratory, simulation, testbed, shadow, pilot, canary, production, and field deployment states.
- Claims, benchmarks, uncertainty, safety, security, privacy, economics, interoperability, support, and exit.

OUT OF SCOPE

- Scientific truth inferred from a single benchmark, simulation, provider, hardware generation, or laboratory configuration.
- Safety, regulatory, export, spectrum, airspace, clinical, cryptographic, or standards approval not granted by the responsible authority.
- Roadmap forecasts, token price, patent counts, press releases, or investment treated as engineering evidence.
- Hidden production use of research components outside the declared transition and assurance boundary.

Applicability triggers

- The capability is novel, rapidly changing, weakly standardized, difficult to reproduce, or dependent on immature suppliers.
- A claim concerns safety, security, privacy, physical action, critical infrastructure, cryptographic trust, or consequential autonomy.
- The system requires specialized facilities, scarce hardware, spectrum, foundry, cryogenic, optical, robotics, or field-test dependencies.
- Failure or lock-in may create long-lived data, capital, infrastructure, workforce, or regulatory consequences.
- A research component is proposed for pilot, customer, production, public, or externally relied-upon use.

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

2. Definitions and Taxonomy

Controlled language for architecture, governance, and assessment

AUTHORITY

The right to approve, deny, constrain, or execute an action. Model output is not authority.

EVIDENCE

A reproducible source, trace, measurement, test, record, signed artifact, or documented observation supporting a claim.

ASSURANCE VIEW

A defined perspective such as governance, architecture, security, operations, privacy, or human oversight.

ATOMIC CRITERION

A uniquely identified requirement that can be assessed, evidenced, excepted, and revised independently.

IMPLEMENTATION PROFILE

A risk-proportional set of required depth, evidence, and gates for a class of use.

CONTROLLED EXCEPTION

A time-bounded deviation with owner, rationale, compensating control, residual risk, expiration, and review trigger.

DETERMINISTIC MECHANISM

A component whose inputs, policy, state transition, and side effects can be constrained and verified.

SOURCE AUTHORITY

The documented basis for treating a source as reliable for a defined claim, context, jurisdiction, and time.

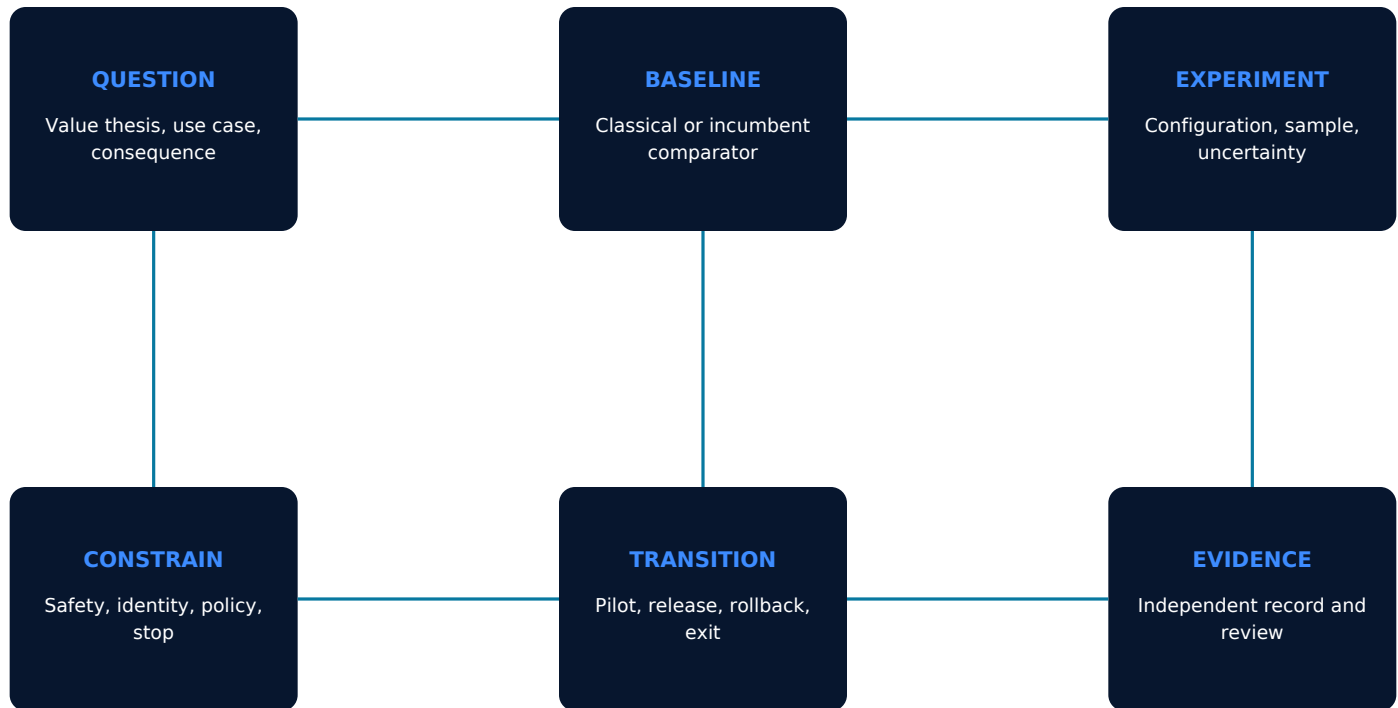
REASSESSMENT TRIGGER

A change, incident, drift signal, dependency revision, or time boundary requiring renewed evaluation.

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

3. Architecture and Trust Model

Separation of research, authority, physical systems, runtime, and evidence



Mandatory trust boundaries

- Research systems **MUST NOT** inherit production identity, secrets, authority, data, networks, or physical control by convenience.
- Claims **MUST** retain the exact hardware, software, model, protocol, calibration, environment, workload, and observation boundary.
- Safety, cryptographic, physical, spectrum, autonomy, and human-intervention constraints **MUST** remain independently enforceable.
- Transition **MUST** have a named decision authority, acceptance criteria, monitored pilot, rollback, supplier exit, and retirement path.
- Evidence **MUST** remain reviewable when a vendor, cloud, token network, laboratory, model, robot, or quantum backend is unavailable.

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

4. Governance and Accountability

Decision rights, separation of duties, and lifecycle ownership

ACCOUNTABLE OWNER

Accepts scope, risk tolerance, funding, and residual risk.

SYSTEM OWNER

Maintains architecture, inventory, operating boundaries, and change control.

SECURITY / PRIVACY

Defines threat, identity, data, isolation, monitoring, and incident requirements.

EVALUATION AUTHORITY

Designs representative tests, gates releases, and preserves reproducibility.

OPERATIONS

Maintains availability, rollback, recovery, evidence, and incident handling.

HUMAN OVERSIGHT

Reviews consequential decisions, exceptions, disputed outcomes, and harm signals.

DECISION PRINCIPLE

No single actor should be able to define the objective, grant authority, execute the consequential action, suppress evidence, and approve the result. Separation must be technical where consequence requires it.

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 01-04 of 18

MYTHOS-ROB-0001-C01 Robot, Application, Cell, and Environment Boundary

The organization **MUST** define, implement, verify, and maintain robot, application, cell, and environment boundary for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0001-C02 Intended Use, Reasonably Foreseeable Misuse, and ODD

The organization **MUST** define, implement, verify, and maintain intended use, reasonably foreseeable misuse, and odd for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0001-C03 Hazard Analysis and Risk Reduction

The organization **MUST** define, implement, verify, and maintain hazard analysis and risk reduction for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0001-C04 Safety Function, Performance Level, and Independence

The organization **MUST** define, implement, verify, and maintain safety function, performance level, and independence for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 05-08 of 18

MYTHOS-ROB-0001-C05

Emergency Stop, Protective Stop, and Safe State

The organization MUST define, implement, verify, and maintain emergency stop, protective stop, and safe state for the declared robotics system safety and security boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0001-C06

Human Detection, Separation, and Collaborative Operation

The organization MUST define, implement, verify, and maintain human detection, separation, and collaborative operation for the declared robotics system safety and security boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0001-C07

Mechanical, Electrical, Thermal, Chemical, and Energy Hazards

The organization MUST define, implement, verify, and maintain mechanical, electrical, thermal, chemical, and energy hazards for the declared robotics system safety and security boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0001-C08

Control System, Network, and Remote Access Security

The organization MUST define, implement, verify, and maintain control system, network, and remote access security for the declared robotics system safety and security boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 09-12 of 18

MYTHOS-ROB-0001-C09**Identity, Authorization, and Command Integrity**

The organization **MUST** define, implement, verify, and maintain identity, authorization, and command integrity for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0001-C10**Sensor, Actuator, Tool, Payload, and End-Effector Safety**

The organization **MUST** define, implement, verify, and maintain sensor, actuator, tool, payload, and end-effector safety for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0001-C11**Software, Firmware, Model, and Configuration Provenance**

The organization **MUST** define, implement, verify, and maintain software, firmware, model, and configuration provenance for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0001-C12**Simulation, Test, Commissioning, and Acceptance**

The organization **MUST** define, implement, verify, and maintain simulation, test, commissioning, and acceptance for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 13-15 of 18

MYTHOS-ROB-0001-C13 Operation, Inspection, Preventive Maintenance, and Calibration

The organization **MUST** define, implement, verify, and maintain operation, inspection, preventive maintenance, and calibration for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0001-C14 Incident, Near Miss, Forensics, and Corrective Action

The organization **MUST** define, implement, verify, and maintain incident, near miss, forensics, and corrective action for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0001-C15 Change, Reprogramming, Tooling, and Revalidation

The organization **MUST** define, implement, verify, and maintain change, reprogramming, tooling, and revalidation for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 16-18 of 18

MYTHOS-ROB-0001-C16**Recovery, Manual Override, and Degraded Operation**

The organization **MUST** define, implement, verify, and maintain recovery, manual override, and degraded operation for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0001-C17**Decommissioning, Disposal, and Residual Energy**

The organization **MUST** define, implement, verify, and maintain decommissioning, disposal, and residual energy for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0001-C18**Conformance Evidence and Periodic Reassessment**

The organization **MUST** define, implement, verify, and maintain conformance evidence and periodic reassessment for the declared robotics system safety and security boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

6. Evidence and Assessment

Reproduce, compare, challenge, observe, and trace

EXAMINE

Research papers, standards, designs, bills of material, protocols, source, models, data, calibration, configurations, contracts, and claims.

REPRODUCE

Repeat the experiment or assessment with captured versions, seeds, parameters, environment, uncertainty, and acceptance criteria.

COMPARE

Use an honest incumbent, classical, manual, or alternative baseline with equivalent outcome, data, scale, and resource accounting.

CHALLENGE

Apply adversarial input, environmental variation, dependency loss, fault injection, safety cases, security tests, and boundary conditions.

OBSERVE

Measure field or production-like quality, latency, energy, drift, physical behavior, interventions, failures, maintenance, and user impact.

TRACE

Link claim, authority, experiment, configuration, evidence, decision, pilot, change, incident, rollback, and reassessment.

Evidence grades

A

Independently reproduced, current, representative, uncertainty-bounded, integrity-protected, and operationally relevant.

B

Reproduced by the implementing organization with strong provenance, comparator, challenge, and declared limitations.

C

Partial, laboratory-only, simulation-heavy, inherited, or indirect evidence with material uncertainty and dependencies.

D

Roadmap, assertion, demonstration, benchmark excerpt, patent, token metric, press release, or vendor statement without...

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

7. Assurance Views

Six perspectives required for a complete assurance claim

GOVERNANCE

Ownership, purpose, risk tolerance, policy, exception, and decision rights.

ARCHITECTURE

Boundaries, dependencies, failure modes, state, data flow, and portability.

SECURITY

Identity, authorization, isolation, secrets, abuse resistance, and incident response.

OPERATIONS

Reliability, performance, cost, observability, change, recovery, and support.

PRIVACY / RIGHTS

Purpose limitation, minimization, consent, access, correction, deletion, and egress.

HUMAN / SOCIETAL

Usability, accessibility, disclosure, contestability, impact, and human control.

Conformance requires a defensible position across every applicable view. A strong aggregate score cannot compensate for an unowned system, a failed mandatory gate, untested recovery, or evidence below the accepted grade.

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

7.2 Evaluation Metrics and Decision Gates

Measures expose utility, uncertainty, safety, physical limits, transition cost, and lifecycle burden

UTILITY

Task outcome, comparator delta, coverage, quality, accuracy, mission success, and stakeholder value.

UNCERTAINTY

Confidence, calibration, variance, sample coverage, reproducibility, sensitivity, and unresolved assumptions.

PERFORMANCE

Latency, throughput, fidelity, range, precision, bandwidth, scale, density, and availability.

SAFETY / SECURITY

Hazard exposure, unsafe action, exploitability, spoofing, physical consequence, intervention, and containment.

RESOURCE

Energy, power, cooling, spectrum, shots, qubits, memory, materials, facility, operator, and maintenance demand.

MATURITY

Standards state, supply chain, interoperability, tooling, skills, support, qualification, and lifecycle readiness.

ECONOMICS

Acquisition, operation, provider, token, facility, migration, insurance, support, and opportunity cost.

TRANSITION

Pilot escape, rollback time, incumbent fallback, portability, lock-in, retirement, and evidence completeness.

Decision gate: thresholds **MUST** be declared before assessment, include an incumbent baseline and uncertainty statement, and identify any safety, security, cryptographic, physical, reproducibility, or rollback failure that blocks transition.

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

8. Failure Modes and Adversarial Scenarios

Challenge assumptions before the system is trusted with consequential work

UNSAFE AUTONOMY

The robot acts outside its operational design domain or safety envelope.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

PERCEPTION COLLAPSE

Occlusion, weather, spoofing, drift, calibration, or domain shift produces hazardous state estimates.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

HUMAN INTERVENTION FAILURE

Operators cannot understand, stop, take over, or recover the system in time.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

CYBER-PHYSICAL COMMAND ABUSE

Compromised identity, network, software, model, or tool issues unsafe motion or process actions.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

FLEET-CORRELATED FAILURE

A map, model, update, scheduler, battery, cloud, or communications dependency affects many robots at once.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

LEARNING REGRESSION

A model or skill update degrades safety, task quality, fairness, explainability, or recovery behavior.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

Adversarial testing MUST protect people and production systems. Use isolated environments, synthetic or minimized data, bounded authority, kill switches, explicit legal and ethical review, and documented stop conditions.

9. Implementation Profiles

Risk-proportional implementation without weakening mandatory boundaries

FOUNDATIONAL	ADVANCED	HIGH ASSURANCE
TYPICAL SCOPE Low consequence, limited autonomy, non-sensitive data, reversible outputs.	TYPICAL SCOPE Business-critical workflow, sensitive data, multiple tools or providers, moderate autonomy.	TYPICAL SCOPE Safety, security, regulated, financial, identity, or broadly consequential use.
MINIMUM DEPTH Named owner; inventory; basic evaluation; access control; logging; rollback; annual review.	MINIMUM DEPTH Formal threat model; representative evaluation; approval gates; isolated execution; tested recovery; quarterly review.	MINIMUM DEPTH Independent challenge; strongest identity; deterministic enforcement; comprehensive evidence; canary release; continuous monitoring.

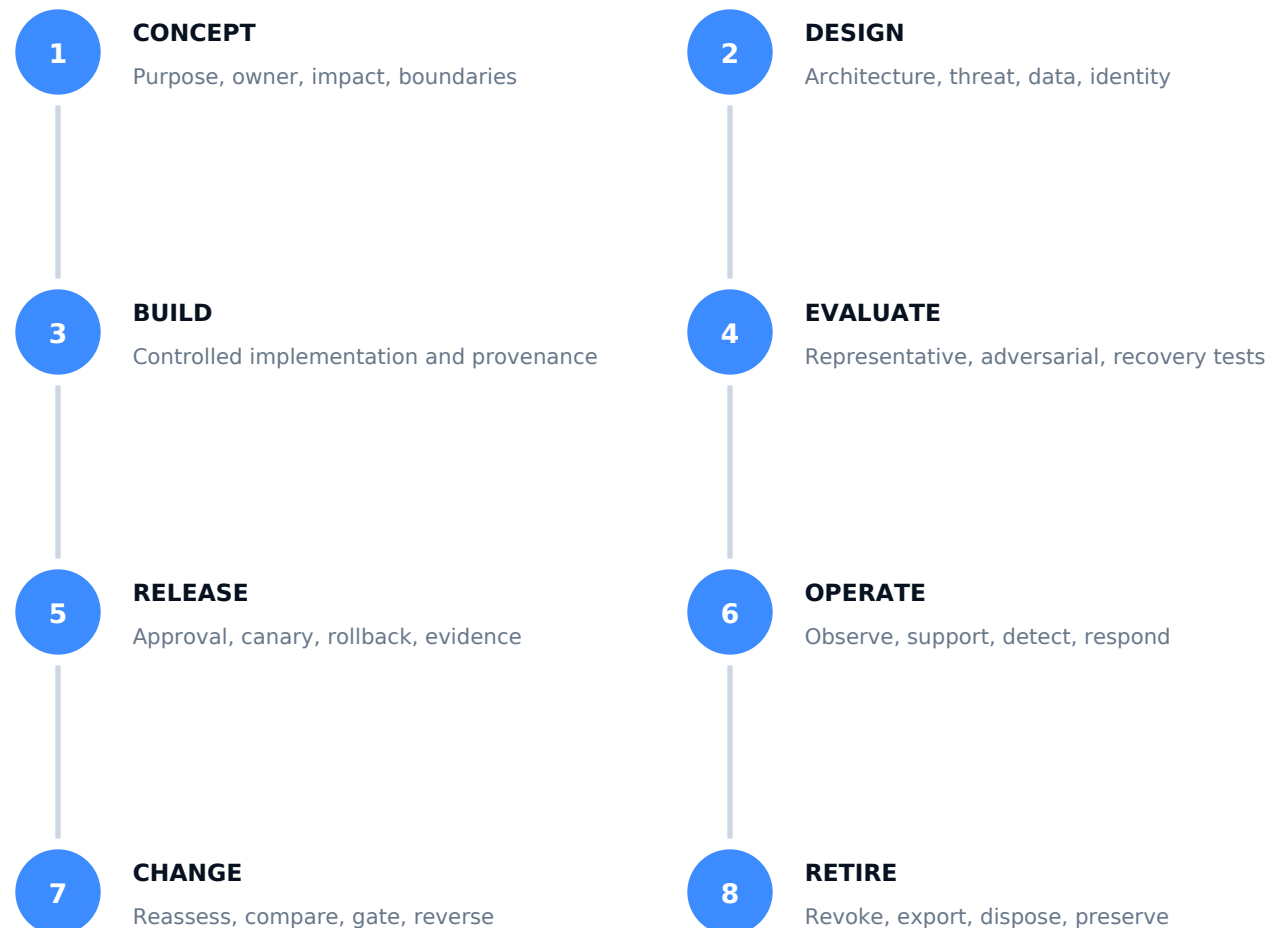
Profile selection rule

Choose the highest profile triggered by consequence, autonomy, sensitivity, scale, irreversibility, external dependency, or inability to rapidly detect and recover. Tailoring may strengthen controls; it may not erase a mandatory gate without a controlled exception.

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

9.2 Operational Lifecycle

Evidence-bearing operation from concept through retirement



LIFECYCLE INVARIANT

Every stage **MUST** leave sufficient evidence for the next authority to understand what was intended, what changed, what was tested, what failed, what was accepted, what remains uncertain, and how to recover or exit.

MYTHOS-ROB-0001 / ROBOTICS AND AUTONOMY

10. Adoption Roadmap

A sequenced path from uncontrolled capability to evidence-bearing operation

0-30 DAYS**Establish ownership and truth**

Inventory systems and dependencies; classify risk; freeze unsupported claims; identify immediate privilege, data, and evidence gaps.

31-90 DAYS**Create enforceable boundaries**

Define policy; isolate execution; implement identity and approval gates; establish representative evaluation and baseline telemetry.

3-6 MONTHS**Prove recovery and operating control**

Exercise failure, rollback, revocation, incident, provider exit, and state-recovery scenarios; mature evidence packaging.

6-12 MONTHS**Scale assurance**

Automate control checks; expand workload coverage; independent challenge; portfolio metrics; controlled exception expiry; continuous reassessment.

Adoption is complete only when operating evidence demonstrates the selected profile in the actual deployment context. Documentation alone is not conformance.

10.2 Conformance and Exception Statement

What an assurance claim must contain

SYSTEM / SERVICE Named, versioned capability and deployment boundary.	PROFILE Foundational, Advanced, or High Assurance with trigger rationale.
SCOPE Workloads, users, data, tools, regions, providers, and exclusions.	CRITERIA Pass, partial, fail, not applicable, and exception status for every criterion.
EVIDENCE Artifact references, evidence grade, date, environment, and reproducibility.	LIMITATIONS Known failure modes, unsupported workloads, uncertainty, and residual risk.
EXCEPTIONS Owner, rationale, compensating control, expiration, and approval.	VALIDITY Assessment date, change boundary, review date, and reassessment triggers.

Prohibited claim: “compliant” without the named scope, profile, evidence date, limitations, exceptions, and authority accepting residual risk.

11. Source Authority and Reference Register

Primary sources informing interpretation; verify current status at assessment time

NIST CSF 2.0

Cybersecurity Framework 2.0

<https://doi.org/10.6028/NIST.CSWP.29>

Enterprise governance and cybersecurity outcome framework.

ISO 13482

Robots and Robotic Devices - Safety Requirements for Personal Care Robots

<https://www.iso.org/standard/53820.html>

Safety framework for service and personal-care robot classes.

NIST SP 800-53 Rev. 5

Security and Privacy Controls for Information Systems and Organizations

<https://doi.org/10.6028/NIST.SP.800-53r5>

Broad organizational control baseline for technology systems and services.

NIST AI RMF 1.0

Artificial Intelligence Risk Management Framework

<https://doi.org/10.6028/NIST.AI.100-1>

Risk management structure for trustworthy AI capabilities used in autonomous systems.

ISO 10218-1:2025

Robotics - Safety Requirements - Industrial Robots

<https://www.iso.org/standard/73933.html>

Current industrial robot design and inherent-safety requirements.

NIST Response Robot Test Methods

Standard Test Methods for Response Robots

<https://www.nist.gov/el/intelligent-systems-division-73500/standard-test-methods-response-robots>

Repeatable mobility, sensing, manipulation, endurance, and operator-proficiency tests.

ISO 10218-2:2025

Robotics - Safety Requirements - Industrial Robot Applications and Cells

<https://www.iso.org/standard/73934.html>

Current integration, commissioning, operation, maintenance, and disposal requirements.

Source currency rule: authorities, specifications, laws, provider services, hardware, protocols, standards status, and research evidence MUST be checked at assessment time. This publication records a 2026-07-24 source snapshot.

11.2 Revision History and Decision Register

Permanent identity, controlled change, and publication integrity

VERSION	DATE	STATE	SUMMARY
1.0.0-candidate	2026-07-24	Candidate	Permanent-publication edition; source refresh; expanded criteria, evidence, assurance, and lifecycle guidance.
Next review	2027-01-24	Scheduled	Review source currency, threat evolution, operating evidence, adoption feedback, and proposed revisions.

Publication decisions

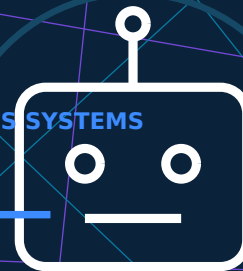
- PERMANENT IDENTITY** The document ID remains stable across revisions; batch or production sequence metadata is not public identity.
- CHANGE CONTROL** Normative changes require rationale, impact analysis, affected-criterion mapping, and approval.
- SUPERSESION** A superseded edition remains traceable; current routes and catalogs identify the active edition.
- CORRECTION** Material errors require a recorded correction, affected-evidence analysis, and notification appropriate to impact.
- ARCHIVAL INTEGRITY** Published artifacts receive hashes, metadata, and a release manifest sufficient for independent verification.

END OF PERMANENT PUBLICATION / MYTHOS-ROB-0001
MYTHOS SYSTEMS / ENGINEERING STANDARDS LIBRARY



ENGINEERING STANDARDS LIBRARY / ROBOTICS AND AUTONOMOUS SYSTEMS

Autonomous Decision, Planning, and Human Oversight Standard



Operational design domain, autonomy levels, planning, constraints, uncertainty, human supervision, intervention, contestability, verification, and evidence.

PERMANENT DOCUMENT ID

MYTHOS-ROB-0002

PUBLICATION

Candidate Standard
Version 1.0.0-candidate

ASSURANCE PROFILE

Research / Pilot / Operational
High Assurance

PERMANENT PUBLICATION IDENTITY

Autonomous Decision, Planning, and Human Oversight Standard			DOCUMENT ID MYTHOS-ROB-0002 VERSION 1.0.0-candidate STATUS Candidate Standard PUBLISHER Mythos Systems PUBLICATION DATE 2026-07-24 SCHEDULED REVIEW 2027-01-24 CLASSIFICATION Public
18 ATOMIC CRITERIA	6 ASSURANCE VIEWS	4 IMPLEMENTATION PROFILES	1 PERMANENT IDENTITY

Publication doctrine. This publication establishes durable requirements for its defined scope. Interpretation must preserve the permanent document identity, required evidence, controlled exceptions, source currency, and formal revision history.

EMERGING TECHNOLOGY AND ASSURANCE TOPOLOGY

Robotics and Autonomous Systems

A trustworthy autonomous decision and planning program is a governed path from research claim through baseline, experiment, safety and security challenge, transition decision, bounded operation, and preserved evidence.

CLASSIFY

Separate established practice, candidate standard, reproduced result, vendor claim, implementation hypothesis, and open research.

EXPERIMENT

Declare baseline, configuration, uncertainty, scenario coverage, stop conditions, and independent reproduction before conclusions.

CONSTRAIN

Identity, policy, safety envelopes, physical boundaries, cryptographic authority, and human intervention limit consequence.

TRANSITION

Adoption, pilot, production, rollback, supplier exit, lifecycle, and retirement decisions remain evidence-bearing and reversible.

EVIDENCE - BOUND TRANSITION FLOW



No novelty claim becomes an operational claim without reproduced evidence and an explicit authority decision

INTERPRETATION AND ASSURANCE

How to apply this publication

Normative intent

Requirements define outcomes and constraints. Implementations may vary, but evidence must demonstrate equivalent control.

Evidence over assertion

Vendor documentation and design intent are not equivalent to reproduced behavior. Record evidence grade and uncertainty.

Risk-proportional depth

Higher consequence, autonomy, sensitivity, and irreversibility require stronger isolation, review, verification, and recovery.

Controlled exception

Exceptions require an owner, rationale, compensating control, residual-risk acceptance, expiration, and reevaluation trigger.

Normalized assessment scale



A numeric score must never hide a failed mandatory gate, missing evidence, untested workload, or unacceptable residual risk.

INTERACTIVE NAVIGATION

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Navigation doctrine

Bookmarks and internal links are conveniences. Permanent document identity, criterion identifiers, evidence references, and revision history remain authoritative.

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

0. Executive Mandate

Research value, transition discipline, and non-negotiable evidence boundaries

MANDATE

Organizations evaluating autonomous decision and planning **MUST** separate research from operational authority, establish a reproducible baseline, constrain safety and security consequence, disclose uncertainty, and require a documented transition or rejection decision.

Required outcomes

- Establish a durable, product-neutral evidence system for autonomous decision and planning.
- Prevent novelty, investment, vendor prestige, roadmap language, or laboratory success from substituting for operational proof.
- Require representative performance, adversarial, failure, recovery, safety, privacy, and lifecycle evidence.
- Keep pilots bounded by identity, authority, environment, duration, budget, stop conditions, and rollback.
- Preserve rejected alternatives, limitations, residual risk, source currency, and reassessment triggers.

Decision boundary: conformance supports a bounded engineering assurance position. It does not prove scientific consensus, regulatory approval, universal safety, quantum advantage, cryptographic perfection, autonomous competence, or commercial viability.

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

1. Scope and Applicability

Research, pilot, transition, operational, and retirement boundaries

IN SCOPE

- Research, architecture, acquisition, experiment, pilot, transition, operation, and retirement of autonomous decision and planning.
- Hardware, software, models, data, protocols, facilities, people, suppliers, providers, physical processes, and evidence.
- Laboratory, simulation, testbed, shadow, pilot, canary, production, and field deployment states.
- Claims, benchmarks, uncertainty, safety, security, privacy, economics, interoperability, support, and exit.

OUT OF SCOPE

- Scientific truth inferred from a single benchmark, simulation, provider, hardware generation, or laboratory configuration.
- Safety, regulatory, export, spectrum, airspace, clinical, cryptographic, or standards approval not granted by the responsible authority.
- Roadmap forecasts, token price, patent counts, press releases, or investment treated as engineering evidence.
- Hidden production use of research components outside the declared transition and assurance boundary.

Applicability triggers

- The capability is novel, rapidly changing, weakly standardized, difficult to reproduce, or dependent on immature suppliers.
- A claim concerns safety, security, privacy, physical action, critical infrastructure, cryptographic trust, or consequential autonomy.
- The system requires specialized facilities, scarce hardware, spectrum, foundry, cryogenic, optical, robotics, or field-test dependencies.
- Failure or lock-in may create long-lived data, capital, infrastructure, workforce, or regulatory consequences.
- A research component is proposed for pilot, customer, production, public, or externally relied-upon use.

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

2. Definitions and Taxonomy

Controlled language for architecture, governance, and assessment

AUTHORITY

The right to approve, deny, constrain, or execute an action. Model output is not authority.

EVIDENCE

A reproducible source, trace, measurement, test, record, signed artifact, or documented observation supporting a claim.

ASSURANCE VIEW

A defined perspective such as governance, architecture, security, operations, privacy, or human oversight.

ATOMIC CRITERION

A uniquely identified requirement that can be assessed, evidenced, excepted, and revised independently.

IMPLEMENTATION PROFILE

A risk-proportional set of required depth, evidence, and gates for a class of use.

CONTROLLED EXCEPTION

A time-bounded deviation with owner, rationale, compensating control, residual risk, expiration, and review trigger.

DETERMINISTIC MECHANISM

A component whose inputs, policy, state transition, and side effects can be constrained and verified.

SOURCE AUTHORITY

The documented basis for treating a source as reliable for a defined claim, context, jurisdiction, and time.

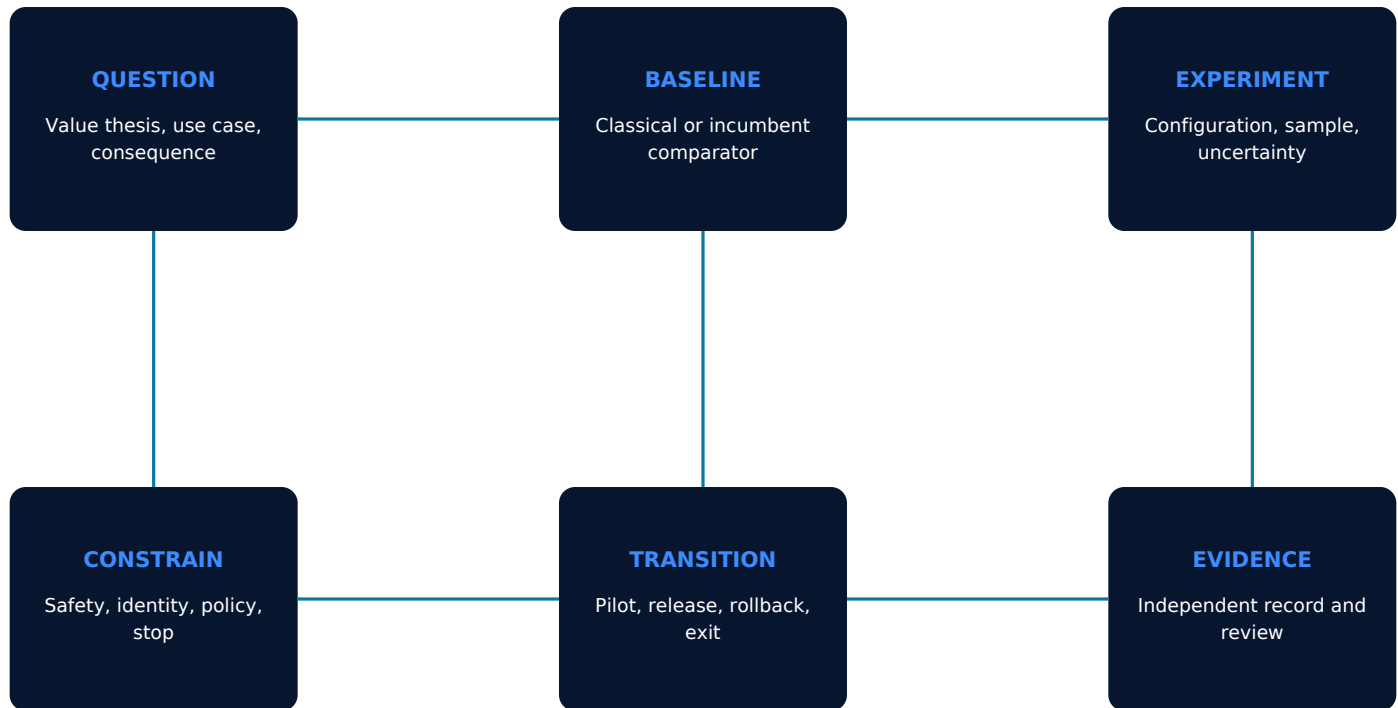
REASSESSMENT TRIGGER

A change, incident, drift signal, dependency revision, or time boundary requiring renewed evaluation.

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

3. Architecture and Trust Model

Separation of research, authority, physical systems, runtime, and evidence



Mandatory trust boundaries

- Research systems **MUST NOT** inherit production identity, secrets, authority, data, networks, or physical control by convenience.
- Claims **MUST** retain the exact hardware, software, model, protocol, calibration, environment, workload, and observation boundary.
- Safety, cryptographic, physical, spectrum, autonomy, and human-intervention constraints **MUST** remain independently enforceable.
- Transition **MUST** have a named decision authority, acceptance criteria, monitored pilot, rollback, supplier exit, and retirement path.
- Evidence **MUST** remain reviewable when a vendor, cloud, token network, laboratory, model, robot, or quantum backend is unavailable.

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

4. Governance and Accountability

Decision rights, separation of duties, and lifecycle ownership

ACCOUNTABLE OWNER

Accepts scope, risk tolerance, funding, and residual risk.

SYSTEM OWNER

Maintains architecture, inventory, operating boundaries, and change control.

SECURITY / PRIVACY

Defines threat, identity, data, isolation, monitoring, and incident requirements.

EVALUATION AUTHORITY

Designs representative tests, gates releases, and preserves reproducibility.

OPERATIONS

Maintains availability, rollback, recovery, evidence, and incident handling.

HUMAN OVERSIGHT

Reviews consequential decisions, exceptions, disputed outcomes, and harm signals.

DECISION PRINCIPLE

No single actor should be able to define the objective, grant authority, execute the consequential action, suppress evidence, and approve the result. Separation must be technical where consequence requires it.

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 01-04 of 18

MYTHOS-ROB-0002-C01

Autonomy Scope, Authority, and Decision Boundary

The organization **MUST** define, implement, verify, and maintain autonomy scope, authority, and decision boundary for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0002-C02

Operational Design Domain and Exclusion Conditions

The organization **MUST** define, implement, verify, and maintain operational design domain and exclusion conditions for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0002-C03

Goal, Utility, Constraint, and Safety Specification

The organization **MUST** define, implement, verify, and maintain goal, utility, constraint, and safety specification for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0002-C04

World Model, State Estimation, and Belief Uncertainty

The organization **MUST** define, implement, verify, and maintain world model, state estimation, and belief uncertainty for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 05-08 of 18

MYTHOS-ROB-0002-C05

Planner, Policy, Search, and Optimization Governance

The organization **MUST** define, implement, verify, and maintain planner, policy, search, and optimization governance for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0002-C06

Action Feasibility and Safety-Envelope Enforcement

The organization **MUST** define, implement, verify, and maintain action feasibility and safety-envelope enforcement for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0002-C07

Human Role, Supervision, and Responsibility

The organization **MUST** define, implement, verify, and maintain human role, supervision, and responsibility for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0002-C08

Intervention, Takeover, Stop, and Safe-State Behavior

The organization **MUST** define, implement, verify, and maintain intervention, takeover, stop, and safe-state behavior for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 09-12 of 18

MYTHOS-ROB-0002-C09

Confidence, Abstention, and Out-of-Distribution Detection

The organization **MUST** define, implement, verify, and maintain confidence, abstention, and out-of-distribution detection for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0002-C10

Explainability, Decision Trace, and Contestability

The organization **MUST** define, implement, verify, and maintain explainability, decision trace, and contestability for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0002-C11

Reward, Objective, Proxy, and Goodhart Risk

The organization **MUST** define, implement, verify, and maintain reward, objective, proxy, and goodhart risk for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0002-C12

Adversarial, Deceptive, and Conflicting Instruction Handling

The organization **MUST** define, implement, verify, and maintain adversarial, deceptive, and conflicting instruction handling for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 13-15 of 18

MYTHOS-ROB-0002-C13 Simulation, Formal Analysis, and Scenario Coverage

The organization **MUST** define, implement, verify, and maintain simulation, formal analysis, and scenario coverage for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0002-C14 Field Trial, Shadow Mode, and Progressive Release

The organization **MUST** define, implement, verify, and maintain field trial, shadow mode, and progressive release for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0002-C15 Monitoring, Drift, Learning, and Update Control

The organization **MUST** define, implement, verify, and maintain monitoring, drift, learning, and update control for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 16-18 of 18

MYTHOS-ROB-0002-C16**Failure Recovery, Mission Abort, and Post-Incident Review**

The organization **MUST** define, implement, verify, and maintain failure recovery, mission abort, and post-incident review for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0002-C17**Legal, Ethical, Rights, and Public-Impact Review**

The organization **MUST** define, implement, verify, and maintain legal, ethical, rights, and public-impact review for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0002-C18**Decision Evidence, Approval Gate, and Reassessment**

The organization **MUST** define, implement, verify, and maintain decision evidence, approval gate, and reassessment for the declared autonomous decision and planning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

6. Evidence and Assessment

Reproduce, compare, challenge, observe, recover, and trace

EXAMINE

Research papers, standards, designs, bills of material, protocols, source, models, data, calibration, configurations, contracts, and claims.

REPRODUCE

Repeat the experiment or assessment with captured versions, seeds, parameters, environment, uncertainty, and acceptance criteria.

COMPARE

Use an honest incumbent, classical, manual, or alternative baseline with equivalent outcome, data, scale, and resource accounting.

CHALLENGE

Apply adversarial input, environmental variation, dependency loss, fault injection, safety cases, security tests, and boundary conditions.

OBSERVE

Measure field or production-like quality, latency, energy, drift, physical behavior, interventions, failures, maintenance, and user impact.

TRACE

Link claim, authority, experiment, configuration, evidence, decision, pilot, change, incident, rollback, and reassessment.

Evidence grades

A

Independently reproduced, current, representative, uncertainty-bounded, integrity-protected, and operationally relevant.

B

Reproduced by the implementing organization with strong provenance, comparator, challenge, and declared limitations.

C

Partial, laboratory-only, simulation-heavy, inherited, or indirect evidence with material uncertainty and dependencies.

D

Roadmap, assertion, demonstration, benchmark excerpt, patent, token metric, press release, or vendor statement without...

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

7. Assurance Views

Six perspectives required for a complete assurance claim

GOVERNANCE

Ownership, purpose, risk tolerance, policy, exception, and decision rights.

ARCHITECTURE

Boundaries, dependencies, failure modes, state, data flow, and portability.

SECURITY

Identity, authorization, isolation, secrets, abuse resistance, and incident response.

OPERATIONS

Reliability, performance, cost, observability, change, recovery, and support.

PRIVACY / RIGHTS

Purpose limitation, minimization, consent, access, correction, deletion, and egress.

HUMAN / SOCIETAL

Usability, accessibility, disclosure, contestability, impact, and human control.

Conformance requires a defensible position across every applicable view. A strong aggregate score cannot compensate for an unowned system, a failed mandatory gate, untested recovery, or evidence below the accepted grade.

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

7.2 Evaluation Metrics and Decision Gates

Measures expose utility, uncertainty, safety, physical limits, transition cost, and lifecycle burden

UTILITY

Task outcome, comparator delta, coverage, quality, accuracy, mission success, and stakeholder value.

UNCERTAINTY

Confidence, calibration, variance, sample coverage, reproducibility, sensitivity, and unresolved assumptions.

PERFORMANCE

Latency, throughput, fidelity, range, precision, bandwidth, scale, density, and availability.

SAFETY / SECURITY

Hazard exposure, unsafe action, exploitability, spoofing, physical consequence, intervention, and containment.

RESOURCE

Energy, power, cooling, spectrum, shots, qubits, memory, materials, facility, operator, and maintenance demand.

MATURITY

Standards state, supply chain, interoperability, tooling, skills, support, qualification, and lifecycle readiness.

ECONOMICS

Acquisition, operation, provider, token, facility, migration, insurance, support, and opportunity cost.

TRANSITION

Pilot escape, rollback time, incumbent fallback, portability, lock-in, retirement, and evidence completeness.

Decision gate: thresholds **MUST** be declared before assessment, include an incumbent baseline and uncertainty statement, and identify any safety, security, cryptographic, physical, reproducibility, or rollback failure that blocks transition.

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

8. Failure Modes and Adversarial Scenarios

Challenge assumptions before the system is trusted with consequential work

UNSAFE AUTONOMY

The robot acts outside its operational design domain or safety envelope.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

PERCEPTION COLLAPSE

Occlusion, weather, spoofing, drift, calibration, or domain shift produces hazardous state estimates.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

HUMAN INTERVENTION FAILURE

Operators cannot understand, stop, take over, or recover the system in time.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

CYBER-PHYSICAL COMMAND ABUSE

Compromised identity, network, software, model, or tool issues unsafe motion or process actions.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

FLEET-CORRELATED FAILURE

A map, model, update, scheduler, battery, cloud, or communications dependency affects many robots at once.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

LEARNING REGRESSION

A model or skill update degrades safety, task quality, fairness, explainability, or recovery behavior.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

Adversarial testing MUST protect people and production systems. Use isolated environments, synthetic or minimized data, bounded authority, kill switches, explicit legal and ethical review, and documented stop conditions.

9. Implementation Profiles

Risk-proportional implementation without weakening mandatory boundaries

FOUNDATIONAL TYPICAL SCOPE Low consequence, limited autonomy, non-sensitive data, reversible outputs. MINIMUM DEPTH Named owner; inventory; basic evaluation; access control; logging; rollback; annual review.	ADVANCED TYPICAL SCOPE Business-critical workflow, sensitive data, multiple tools or providers, moderate autonomy. MINIMUM DEPTH Formal threat model; representative evaluation; approval gates; isolated execution; tested recovery; quarterly review.	HIGH ASSURANCE TYPICAL SCOPE Safety, security, regulated, financial, identity, or broadly consequential use. MINIMUM DEPTH Independent challenge; strongest identity; deterministic enforcement; comprehensive evidence; canary release; continuous monitoring.
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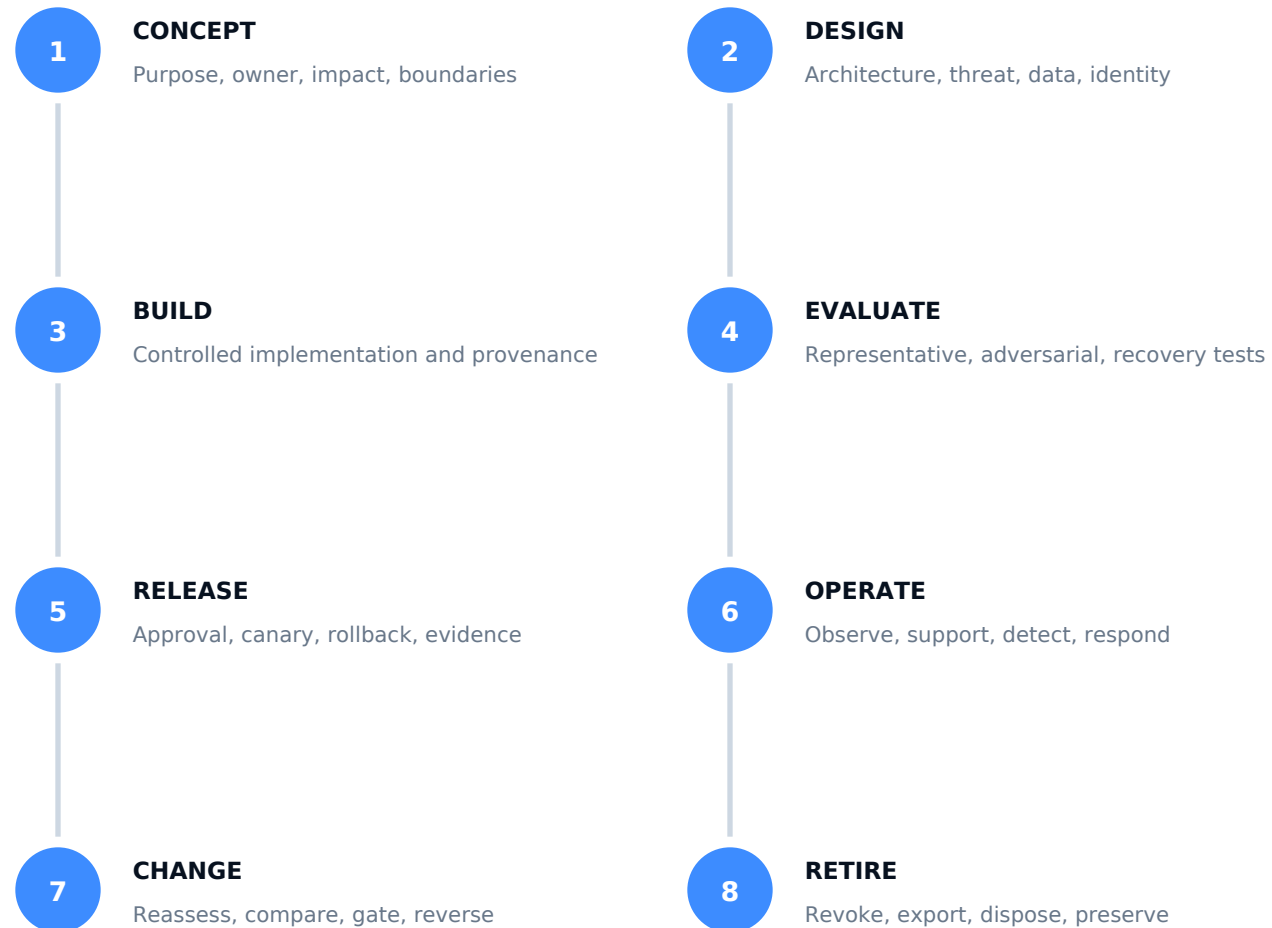
Profile selection rule

Choose the highest profile triggered by consequence, autonomy, sensitivity, scale, irreversibility, external dependency, or inability to rapidly detect and recover. Tailoring may strengthen controls; it may not erase a mandatory gate without a controlled exception.

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

9.2 Operational Lifecycle

Evidence-bearing operation from concept through retirement



LIFECYCLE INVARIANT

Every stage **MUST** leave sufficient evidence for the next authority to understand what was intended, what changed, what was tested, what failed, what was accepted, what remains uncertain, and how to recover or exit.

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

10. Adoption Roadmap

A sequenced path from uncontrolled capability to evidence-bearing operation

0-30 DAYS**Establish ownership and truth**

Inventory systems and dependencies; classify risk; freeze unsupported claims; identify immediate privilege, data, and evidence gaps.

31-90 DAYS**Create enforceable boundaries**

Define policy; isolate execution; implement identity and approval gates; establish representative evaluation and baseline telemetry.

3-6 MONTHS**Prove recovery and operating control**

Exercise failure, rollback, revocation, incident, provider exit, and state-recovery scenarios; mature evidence packaging.

6-12 MONTHS**Scale assurance**

Automate control checks; expand workload coverage; independent challenge; portfolio metrics; controlled exception expiry; continuous reassessment.

Adoption is complete only when operating evidence demonstrates the selected profile in the actual deployment context. Documentation alone is not conformance.

MYTHOS-ROB-0002 / ROBOTICS AND AUTONOMY

10.2 Conformance and Exception Statement

What an assurance claim must contain

SYSTEM / SERVICE

Named, versioned capability and deployment boundary.

PROFILE

Foundational, Advanced, or High Assurance with trigger rationale.

SCOPE

Workloads, users, data, tools, regions, providers, and exclusions.

CRITERIA

Pass, partial, fail, not applicable, and exception status for every criterion.

EVIDENCE

Artifact references, evidence grade, date, environment, and reproducibility.

LIMITATIONS

Known failure modes, unsupported workloads, uncertainty, and residual risk.

EXCEPTIONS

Owner, rationale, compensating control, expiration, and approval.

VALIDITY

Assessment date, change boundary, review date, and reassessment triggers.

Prohibited claim: “compliant” without the named scope, profile, evidence date, limitations, exceptions, and authority accepting residual risk.

11. Source Authority and Reference Register

Primary sources informing interpretation; verify current status at assessment time

NIST CSF 2.0

Cybersecurity Framework 2.0

<https://doi.org/10.6028/NIST.CSWP.29>

Enterprise governance and cybersecurity outcome framework.

ISO 13482

Robots and Robotic Devices - Safety Requirements for Personal Care Robots

<https://www.iso.org/standard/53820.html>

Safety framework for service and personal-care robot classes.

NIST SP 800-53 Rev. 5

Security and Privacy Controls for Information Systems and Organizations

<https://doi.org/10.6028/NIST.SP.800-53r5>

Broad organizational control baseline for technology systems and services.

NIST AI RMF 1.0

Artificial Intelligence Risk Management Framework

<https://doi.org/10.6028/NIST.AI.100-1>

Risk management structure for trustworthy AI capabilities used in autonomous systems.

ISO 10218-1:2025

Robotics - Safety Requirements - Industrial Robots

<https://www.iso.org/standard/73933.html>

Current industrial robot design and inherent-safety requirements.

NIST Response Robot Test Methods

Standard Test Methods for Response Robots

<https://www.nist.gov/el/intelligent-systems-division-73500/standard-test-methods-response-robots>

Repeatable mobility, sensing, manipulation, endurance, and operator-proficiency tests.

ISO 10218-2:2025

Robotics - Safety Requirements - Industrial Robot Applications and Cells

<https://www.iso.org/standard/73934.html>

Current integration, commissioning, operation, maintenance, and disposal requirements.

Source currency rule: authorities, specifications, laws, provider services, hardware, protocols, standards status, and research evidence MUST be checked at assessment time. This publication records a 2026-07-24 source snapshot.

11.2 Revision History and Decision Register

Permanent identity, controlled change, and publication integrity

VERSION	DATE	STATE	SUMMARY
1.0.0-candidate	2026-07-24	Candidate	Permanent-publication edition; source refresh; expanded criteria, evidence, assurance, and lifecycle guidance.
Next review	2027-01-24	Scheduled	Review source currency, threat evolution, operating evidence, adoption feedback, and proposed revisions.

Publication decisions

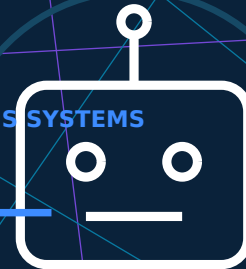
- PERMANENT IDENTITY** The document ID remains stable across revisions; batch or production sequence metadata is not public identity.
- CHANGE CONTROL** Normative changes require rationale, impact analysis, affected-criterion mapping, and approval.
- SUPERSESION** A superseded edition remains traceable; current routes and catalogs identify the active edition.
- CORRECTION** Material errors require a recorded correction, affected-evidence analysis, and notification appropriate to impact.
- ARCHIVAL INTEGRITY** Published artifacts receive hashes, metadata, and a release manifest sufficient for independent verification.

END OF PERMANENT PUBLICATION / MYTHOS-ROB-0002
MYTHOS SYSTEMS / ENGINEERING STANDARDS LIBRARY



ENGINEERING STANDARDS LIBRARY / ROBOTICS AND AUTONOMOUS SYSTEMS

Industrial Robotics, Collaborative Robot, and Cell Integration Standard



Industrial robot integration, collaborative operation, safeguarding, tooling, process hazards, commissioning, production monitoring, maintenance, and evidence.

PERMANENT DOCUMENT ID

MYTHOS-ROB-0003

PUBLICATION

Candidate Standard
Version 1.0.0-candidate

ASSURANCE PROFILE

Research / Pilot / Operational
High Assurance

PERMANENT PUBLICATION IDENTITY

Industrial Robotics, Collaborative Robot, and Cell Integration Standard			DOCUMENT ID MYTHOS-ROB-0003 VERSION 1.0.0-candidate STATUS Candidate Standard PUBLISHER Mythos Systems PUBLICATION DATE 2026-07-24 SCHEDULED REVIEW 2027-01-24 CLASSIFICATION Public
18 ATOMIC CRITERIA	6 ASSURANCE VIEWS	4 IMPLEMENTATION PROFILES	1 PERMANENT IDENTITY

Publication doctrine. This publication establishes durable requirements for its defined scope. Interpretation must preserve the permanent document identity, required evidence, controlled exceptions, source currency, and formal revision history.

EMERGING TECHNOLOGY AND ASSURANCE TOPOLOGY

Robotics and Autonomous Systems

A trustworthy industrial robotics and collaborative cells program is a governed path from research claim through baseline, experiment, safety and security challenge, transition decision, bounded operation, and preserved evidence.

CLASSIFY

Separate established practice, candidate standard, reproduced result, vendor claim, implementation hypothesis, and open research.

EXPERIMENT

Declare baseline, configuration, uncertainty, scenario coverage, stop conditions, and independent reproduction before conclusions.

CONSTRAIN

Identity, policy, safety envelopes, physical boundaries, cryptographic authority, and human intervention limit consequence.

TRANSITION

Adoption, pilot, production, rollback, supplier exit, lifecycle, and retirement decisions remain evidence-bearing and reversible.

EVIDENCE - BOUND TRANSITION FLOW



No novelty claim becomes an operational claim without reproduced evidence and an explicit authority decision

INTERPRETATION AND ASSURANCE

How to apply this publication

Normative intent

Requirements define outcomes and constraints. Implementations may vary, but evidence must demonstrate equivalent control.

Evidence over assertion

Vendor documentation and design intent are not equivalent to reproduced behavior. Record evidence grade and uncertainty.

Risk-proportional depth

Higher consequence, autonomy, sensitivity, and irreversibility require stronger isolation, review, verification, and recovery.

Controlled exception

Exceptions require an owner, rationale, compensating control, residual-risk acceptance, expiration, and reevaluation trigger.

Normalized assessment scale

0	1	2	3	4	5
ABSENT	AD HOC	PARTIAL	OPERATIONAL	ADVANCED	LEADING

A numeric score must never hide a failed mandatory gate, missing evidence, untested workload, or unacceptable residual risk.

INTERACTIVE NAVIGATION

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Navigation doctrine

Bookmarks and internal links are conveniences. Permanent document identity, criterion identifiers, evidence references, and revision history remain authoritative.

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

0. Executive Mandate

Research value, transition discipline, and non-negotiable evidence boundaries

MANDATE

Organizations evaluating industrial robotics and collaborative cells **MUST** separate research from operational authority, establish a reproducible baseline, constrain safety and security consequence, disclose uncertainty, and require a documented transition or rejection decision.

Required outcomes

- Establish a durable, product-neutral evidence system for industrial robotics and collaborative cells.
- Prevent novelty, investment, vendor prestige, roadmap language, or laboratory success from substituting for operational proof.
- Require representative performance, adversarial, failure, recovery, safety, privacy, and lifecycle evidence.
- Keep pilots bounded by identity, authority, environment, duration, budget, stop conditions, and rollback.
- Preserve rejected alternatives, limitations, residual risk, source currency, and reassessment triggers.

Decision boundary: conformance supports a bounded engineering assurance position. It does not prove scientific consensus, regulatory approval, universal safety, quantum advantage, cryptographic perfection, autonomous competence, or commercial viability.

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

1. Scope and Applicability

Research, pilot, transition, operational, and retirement boundaries

IN SCOPE

- Research, architecture, acquisition, experiment, pilot, transition, operation, and retirement of industrial robotics and collaborative cells.
- Hardware, software, models, data, protocols, facilities, people, suppliers, providers, physical processes, and evidence.
- Laboratory, simulation, testbed, shadow, pilot, canary, production, and field deployment states.
- Claims, benchmarks, uncertainty, safety, security, privacy, economics, interoperability, support, and exit.

OUT OF SCOPE

- Scientific truth inferred from a single benchmark, simulation, provider, hardware generation, or laboratory configuration.
- Safety, regulatory, export, spectrum, airspace, clinical, cryptographic, or standards approval not granted by the responsible authority.
- Roadmap forecasts, token price, patent counts, press releases, or investment treated as engineering evidence.
- Hidden production use of research components outside the declared transition and assurance boundary.

Applicability triggers

- The capability is novel, rapidly changing, weakly standardized, difficult to reproduce, or dependent on immature suppliers.
- A claim concerns safety, security, privacy, physical action, critical infrastructure, cryptographic trust, or consequential autonomy.
- The system requires specialized facilities, scarce hardware, spectrum, foundry, cryogenic, optical, robotics, or field-test dependencies.
- Failure or lock-in may create long-lived data, capital, infrastructure, workforce, or regulatory consequences.
- A research component is proposed for pilot, customer, production, public, or externally relied-upon use.

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

2. Definitions and Taxonomy

Controlled language for architecture, governance, and assessment

AUTHORITY

The right to approve, deny, constrain, or execute an action. Model output is not authority.

EVIDENCE

A reproducible source, trace, measurement, test, record, signed artifact, or documented observation supporting a claim.

ASSURANCE VIEW

A defined perspective such as governance, architecture, security, operations, privacy, or human oversight.

ATOMIC CRITERION

A uniquely identified requirement that can be assessed, evidenced, excepted, and revised independently.

IMPLEMENTATION PROFILE

A risk-proportional set of required depth, evidence, and gates for a class of use.

CONTROLLED EXCEPTION

A time-bounded deviation with owner, rationale, compensating control, residual risk, expiration, and review trigger.

DETERMINISTIC MECHANISM

A component whose inputs, policy, state transition, and side effects can be constrained and verified.

SOURCE AUTHORITY

The documented basis for treating a source as reliable for a defined claim, context, jurisdiction, and time.

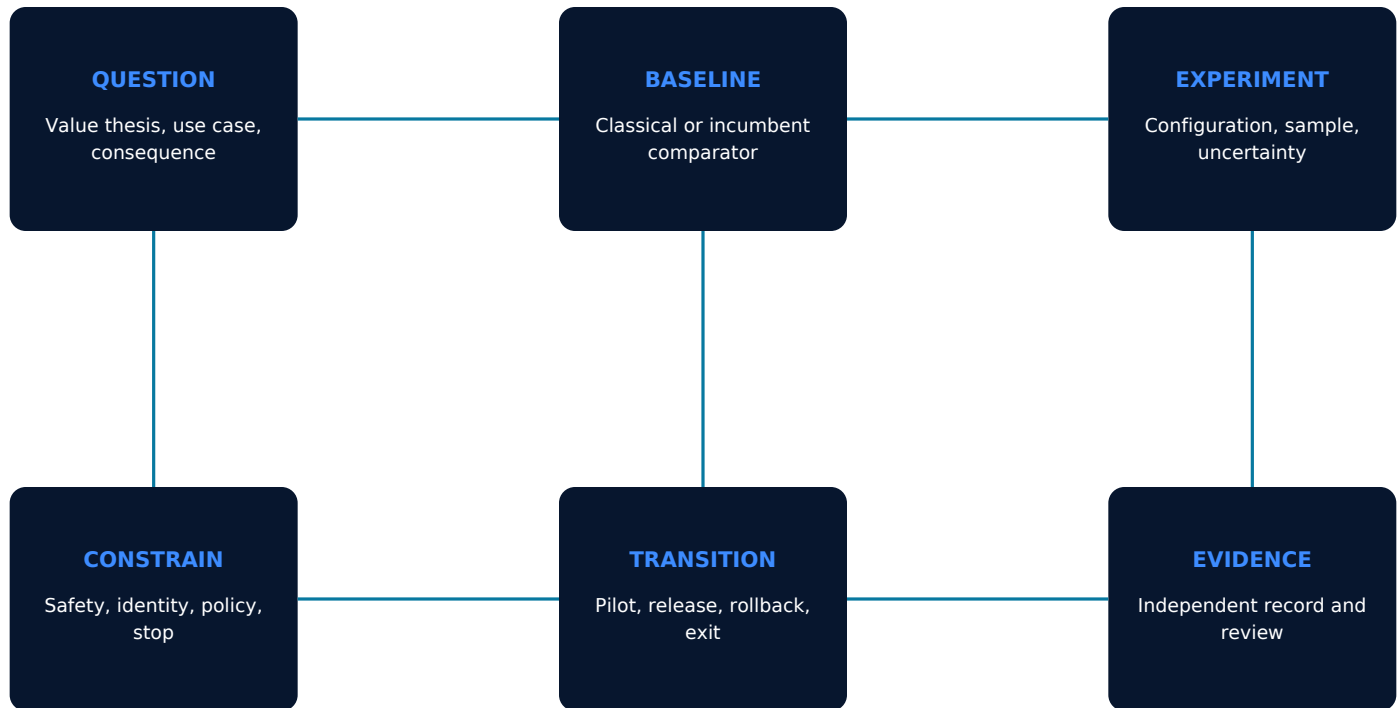
REASSESSMENT TRIGGER

A change, incident, drift signal, dependency revision, or time boundary requiring renewed evaluation.

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

3. Architecture and Trust Model

Separation of research, authority, physical systems, runtime, and evidence



Mandatory trust boundaries

- Research systems **MUST NOT** inherit production identity, secrets, authority, data, networks, or physical control by convenience.
- Claims **MUST** retain the exact hardware, software, model, protocol, calibration, environment, workload, and observation boundary.
- Safety, cryptographic, physical, spectrum, autonomy, and human-intervention constraints **MUST** remain independently enforceable.
- Transition **MUST** have a named decision authority, acceptance criteria, monitored pilot, rollback, supplier exit, and retirement path.
- Evidence **MUST** remain reviewable when a vendor, cloud, token network, laboratory, model, robot, or quantum backend is unavailable.

4. Governance and Accountability

Decision rights, separation of duties, and lifecycle ownership

ACCOUNTABLE OWNER

Accepts scope, risk tolerance, funding, and residual risk.

SYSTEM OWNER

Maintains architecture, inventory, operating boundaries, and change control.

SECURITY / PRIVACY

Defines threat, identity, data, isolation, monitoring, and incident requirements.

EVALUATION AUTHORITY

Designs representative tests, gates releases, and preserves reproducibility.

OPERATIONS

Maintains availability, rollback, recovery, evidence, and incident handling.

HUMAN OVERSIGHT

Reviews consequential decisions, exceptions, disputed outcomes, and harm signals.

DECISION PRINCIPLE

No single actor should be able to define the objective, grant authority, execute the consequential action, suppress evidence, and approve the result. Separation must be technical where consequence requires it.

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 01-04 of 18

MYTHOS-ROB-0003-C01 Robot and Cell Integration Responsibility

The organization **MUST** define, implement, verify, and maintain robot and cell integration responsibility for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0003-C02 Machine, Process, Material, and Tool Hazard Inventory

The organization **MUST** define, implement, verify, and maintain machine, process, material, and tool hazard inventory for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0003-C03 Layout, Access, Guarding, and Safeguarding

The organization **MUST** define, implement, verify, and maintain layout, access, guarding, and safeguarding for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0003-C04 Collaborative Application and Contact-Risk Assessment

The organization **MUST** define, implement, verify, and maintain collaborative application and contact-risk assessment for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 05-08 of 18

MYTHOS-ROB-0003-C05**Speed and Separation Monitoring**

The organization MUST define, implement, verify, and maintain speed and separation monitoring for the declared industrial robotics and collaborative cells boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0003-C06**Power and Force Limiting**

The organization MUST define, implement, verify, and maintain power and force limiting for the declared industrial robotics and collaborative cells boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0003-C07**Hand Guiding and Monitored Stop**

The organization MUST define, implement, verify, and maintain hand guiding and monitored stop for the declared industrial robotics and collaborative cells boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0003-C08**Safety-Rated Control, Interlock, and Reset Logic**

The organization MUST define, implement, verify, and maintain safety-rated control, interlock, and reset logic for the declared industrial robotics and collaborative cells boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 09-12 of 18

MYTHOS-ROB-0003-C09

Tool Change, End-Effector, Fixture, and Payload Control

The organization **MUST** define, implement, verify, and maintain tool change, end-effector, fixture, and payload control for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0003-C10

Process-Specific Heat, Fume, Pressure, Sharp, and Chemical Risk

The organization **MUST** define, implement, verify, and maintain process-specific heat, fume, pressure, sharp, and chemical risk for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0003-C11

Teaching, Programming, Maintenance, and Bypass Modes

The organization **MUST** define, implement, verify, and maintain teaching, programming, maintenance, and bypass modes for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0003-C12

Network, Remote Support, and Engineering Access

The organization **MUST** define, implement, verify, and maintain network, remote support, and engineering access for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 13-15 of 18

MYTHOS-ROB-0003-C13**Commissioning, Validation, and Acceptance Test**

The organization **MUST** define, implement, verify, and maintain commissioning, validation, and acceptance test for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0003-C14**Production Quality, Cycle, Fault, and Safety Monitoring**

The organization **MUST** define, implement, verify, and maintain production quality, cycle, fault, and safety monitoring for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0003-C15**Operator Training, Procedure, and Competency**

The organization **MUST** define, implement, verify, and maintain operator training, procedure, and competency for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 16-18 of 18

MYTHOS-ROB-0003-C16**Modification, Relocation, and Revalidation**

The organization **MUST** define, implement, verify, and maintain modification, relocation, and revalidation for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0003-C17**Rescue, Recovery, Lockout, and Stored Energy**

The organization **MUST** define, implement, verify, and maintain rescue, recovery, lockout, and stored energy for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0003-C18**Lifecycle Evidence and Periodic Inspection**

The organization **MUST** define, implement, verify, and maintain lifecycle evidence and periodic inspection for the declared industrial robotics and collaborative cells boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

6. Evidence and Assessment

Reproduce, compare, challenge, observe, and trace

EXAMINE

Research papers, standards, designs, bills of material, protocols, source, models, data, calibration, configurations, contracts, and claims.

REPRODUCE

Repeat the experiment or assessment with captured versions, seeds, parameters, environment, uncertainty, and acceptance criteria.

COMPARE

Use an honest incumbent, classical, manual, or alternative baseline with equivalent outcome, data, scale, and resource accounting.

CHALLENGE

Apply adversarial input, environmental variation, dependency loss, fault injection, safety cases, security tests, and boundary conditions.

OBSERVE

Measure field or production-like quality, latency, energy, drift, physical behavior, interventions, failures, maintenance, and user impact.

TRACE

Link claim, authority, experiment, configuration, evidence, decision, pilot, change, incident, rollback, and reassessment.

Evidence grades

A

Independently reproduced, current, representative, uncertainty-bounded, integrity-protected, and operationally relevant.

B

Reproduced by the implementing organization with strong provenance, comparator, challenge, and declared limitations.

C

Partial, laboratory-only, simulation-heavy, inherited, or indirect evidence with material uncertainty and dependencies.

D

Roadmap, assertion, demonstration, benchmark excerpt, patent, token metric, press release, or vendor statement without...

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

7. Assurance Views

Six perspectives required for a complete assurance claim

GOVERNANCE

Ownership, purpose, risk tolerance, policy, exception, and decision rights.

ARCHITECTURE

Boundaries, dependencies, failure modes, state, data flow, and portability.

SECURITY

Identity, authorization, isolation, secrets, abuse resistance, and incident response.

OPERATIONS

Reliability, performance, cost, observability, change, recovery, and support.

PRIVACY / RIGHTS

Purpose limitation, minimization, consent, access, correction, deletion, and egress.

HUMAN / SOCIETAL

Usability, accessibility, disclosure, contestability, impact, and human control.

Conformance requires a defensible position across every applicable view. A strong aggregate score cannot compensate for an unowned system, a failed mandatory gate, untested recovery, or evidence below the accepted grade.

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

7.2 Evaluation Metrics and Decision Gates

Measures expose utility, uncertainty, safety, physical limits, transition cost, and lifecycle burden

UTILITY

Task outcome, comparator delta, coverage, quality, accuracy, mission success, and stakeholder value.

UNCERTAINTY

Confidence, calibration, variance, sample coverage, reproducibility, sensitivity, and unresolved assumptions.

PERFORMANCE

Latency, throughput, fidelity, range, precision, bandwidth, scale, density, and availability.

SAFETY / SECURITY

Hazard exposure, unsafe action, exploitability, spoofing, physical consequence, intervention, and containment.

RESOURCE

Energy, power, cooling, spectrum, shots, qubits, memory, materials, facility, operator, and maintenance demand.

MATURITY

Standards state, supply chain, interoperability, tooling, skills, support, qualification, and lifecycle readiness.

ECONOMICS

Acquisition, operation, provider, token, facility, migration, insurance, support, and opportunity cost.

TRANSITION

Pilot escape, rollback time, incumbent fallback, portability, lock-in, retirement, and evidence completeness.

Decision gate: thresholds MUST be declared before assessment, include an incumbent baseline and uncertainty statement, and identify any safety, security, cryptographic, physical, reproducibility, or rollback failure that blocks transition.

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

8. Failure Modes and Adversarial Scenarios

Challenge assumptions before the system is trusted with consequential work

UNSAFE AUTONOMY

The robot acts outside its operational design domain or safety envelope.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

PERCEPTION COLLAPSE

Occlusion, weather, spoofing, drift, calibration, or domain shift produces hazardous state estimates.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

HUMAN INTERVENTION FAILURE

Operators cannot understand, stop, take over, or recover the system in time.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

CYBER-PHYSICAL COMMAND ABUSE

Compromised identity, network, software, model, or tool issues unsafe motion or process actions.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

FLEET-CORRELATED FAILURE

A map, model, update, scheduler, battery, cloud, or communications dependency affects many robots at once.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

LEARNING REGRESSION

A model or skill update degrades safety, task quality, fairness, explainability, or recovery behavior.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

Adversarial testing MUST protect people and production systems. Use isolated environments, synthetic or minimized data, bounded authority, kill switches, explicit legal and ethical review, and documented stop conditions.

9. Implementation Profiles

Risk-proportional implementation without weakening mandatory boundaries

FOUNDATIONAL TYPICAL SCOPE Low consequence, limited autonomy, non-sensitive data, reversible outputs. MINIMUM DEPTH Named owner; inventory; basic evaluation; access control; logging; rollback; annual review.	ADVANCED TYPICAL SCOPE Business-critical workflow, sensitive data, multiple tools or providers, moderate autonomy. MINIMUM DEPTH Formal threat model; representative evaluation; approval gates; isolated execution; tested recovery; quarterly review.	HIGH ASSURANCE TYPICAL SCOPE Safety, security, regulated, financial, identity, or broadly consequential use. MINIMUM DEPTH Independent challenge; strongest identity; deterministic enforcement; comprehensive evidence; canary release; continuous monitoring.
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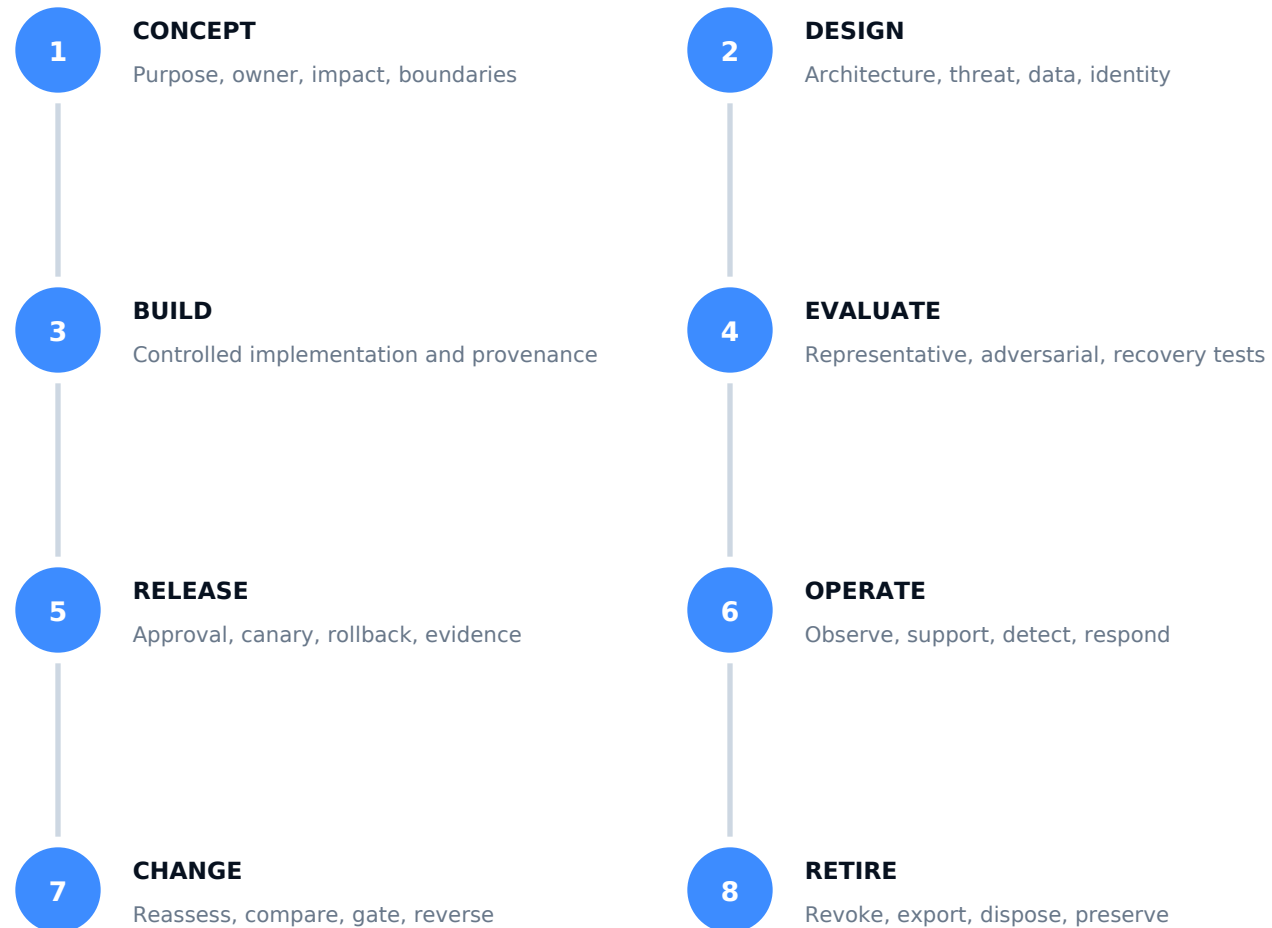
Profile selection rule

Choose the highest profile triggered by consequence, autonomy, sensitivity, scale, irreversibility, external dependency, or inability to rapidly detect and recover. Tailoring may strengthen controls; it may not erase a mandatory gate without a controlled exception.

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

9.2 Operational Lifecycle

Evidence-bearing operation from concept through retirement



LIFECYCLE INVARIANT

Every stage **MUST** leave sufficient evidence for the next authority to understand what was intended, what changed, what was tested, what failed, what was accepted, what remains uncertain, and how to recover or exit.

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

10. Adoption Roadmap

A sequenced path from uncontrolled capability to evidence-bearing operation

0-30 DAYS**Establish ownership and truth**

Inventory systems and dependencies; classify risk; freeze unsupported claims; identify immediate privilege, data, and evidence gaps.

31-90 DAYS**Create enforceable boundaries**

Define policy; isolate execution; implement identity and approval gates; establish representative evaluation and baseline telemetry.

3-6 MONTHS**Prove recovery and operating control**

Exercise failure, rollback, revocation, incident, provider exit, and state-recovery scenarios; mature evidence packaging.

6-12 MONTHS**Scale assurance**

Automate control checks; expand workload coverage; independent challenge; portfolio metrics; controlled exception expiry; continuous reassessment.

Adoption is complete only when operating evidence demonstrates the selected profile in the actual deployment context. Documentation alone is not conformance.

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

10.2 Conformance and Exception Statement

What an assurance claim must contain

SYSTEM / SERVICE

Named, versioned capability and deployment boundary.

PROFILE

Foundational, Advanced, or High Assurance with trigger rationale.

SCOPE

Workloads, users, data, tools, regions, providers, and exclusions.

CRITERIA

Pass, partial, fail, not applicable, and exception status for every criterion.

EVIDENCE

Artifact references, evidence grade, date, environment, and reproducibility.

LIMITATIONS

Known failure modes, unsupported workloads, uncertainty, and residual risk.

EXCEPTIONS

Owner, rationale, compensating control, expiration, and approval.

VALIDITY

Assessment date, change boundary, review date, and reassessment triggers.

Prohibited claim: “compliant” without the named scope, profile, evidence date, limitations, exceptions, and authority accepting residual risk.

MYTHOS-ROB-0003 / ROBOTICS AND AUTONOMY

11. Source Authority and Reference Register

Primary sources informing interpretation; verify current status at assessment time

NIST CSF 2.0

Cybersecurity Framework 2.0

<https://doi.org/10.6028/NIST.CSWP.29>

Enterprise governance and cybersecurity outcome framework.

ISO 13482

Robots and Robotic Devices - Safety Requirements for Personal Care Robots

<https://www.iso.org/standard/53820.html>

Safety framework for service and personal-care robot classes.

NIST SP 800-53 Rev. 5

Security and Privacy Controls for Information Systems and Organizations

<https://doi.org/10.6028/NIST.SP.800-53r5>

Broad organizational control baseline for technology systems and services.

NIST AI RMF 1.0

Artificial Intelligence Risk Management Framework

<https://doi.org/10.6028/NIST.AI.100-1>

Risk management structure for trustworthy AI capabilities used in autonomous systems.

ISO 10218-1:2025

Robotics - Safety Requirements - Industrial Robots

<https://www.iso.org/standard/73933.html>

Current industrial robot design and inherent-safety requirements.

NIST Response Robot Test Methods

Standard Test Methods for Response Robots

<https://www.nist.gov/el/intelligent-systems-division-73500/standard-test-methods-response-robots>

Repeatable mobility, sensing, manipulation, endurance, and operator-proficiency tests.

ISO 10218-2:2025

Robotics - Safety Requirements - Industrial Robot Applications and Cells

<https://www.iso.org/standard/73934.html>

Current integration, commissioning, operation, maintenance, and disposal requirements.

Source currency rule: authorities, specifications, laws, provider services, hardware, protocols, standards status, and research evidence MUST be checked at assessment time. This publication records a 2026-07-24 source snapshot.

11.2 Revision History and Decision Register

Permanent identity, controlled change, and publication integrity

VERSION	DATE	STATE	SUMMARY
1.0.0-candidate	2026-07-24	Candidate	Permanent-publication edition; source refresh; expanded criteria, evidence, assurance, and lifecycle guidance.
Next review	2027-01-24	Scheduled	Review source currency, threat evolution, operating evidence, adoption feedback, and proposed revisions.

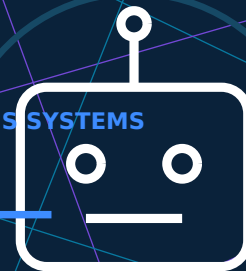
Publication decisions

- PERMANENT IDENTITY** The document ID remains stable across revisions; batch or production sequence metadata is not public identity.
- CHANGE CONTROL** Normative changes require rationale, impact analysis, affected-criterion mapping, and approval.
- SUPERSESION** A superseded edition remains traceable; current routes and catalogs identify the active edition.
- CORRECTION** Material errors require a recorded correction, affected-evidence analysis, and notification appropriate to impact.
- ARCHIVAL INTEGRITY** Published artifacts receive hashes, metadata, and a release manifest sufficient for independent verification.



ENGINEERING STANDARDS LIBRARY / ROBOTICS AND AUTONOMOUS SYSTEMS

Mobile Robot, Drone, and Autonomous Fleet Operations Standard



Fleet identity, geofencing, navigation, communications, traffic, airspace, batteries, remote operations, recovery, maintenance, and mission evidence.

PERMANENT DOCUMENT ID

MYTHOS-ROB-0004

PUBLICATION

Candidate Standard
Version 1.0.0-candidate

ASSURANCE PROFILE

Research / Pilot / Operational
High Assurance

PERMANENT PUBLICATION IDENTITY

Mobile Robot, Drone, and Autonomous Fleet Operations Standard			DOCUMENT ID MYTHOS-ROB-0004 VERSION 1.0.0-candidate STATUS Candidate Standard PUBLISHER Mythos Systems PUBLICATION DATE 2026-07-24 SCHEDULED REVIEW 2027-01-24 CLASSIFICATION Public
18 ATOMIC CRITERIA	6 ASSURANCE VIEWS	4 IMPLEMENTATION PROFILES	1 PERMANENT IDENTITY

Publication doctrine. This publication establishes durable requirements for its defined scope. Interpretation must preserve the permanent document identity, required evidence, controlled exceptions, source currency, and formal revision history.

EMERGING TECHNOLOGY AND ASSURANCE TOPOLOGY

Robotics and Autonomous Systems

A trustworthy mobile robots, drones, and autonomous fleets program is a governed path from research claim through baseline, experiment, safety and security challenge, transition decision, bounded operation, and preserved evidence.

CLASSIFY

Separate established practice, candidate standard, reproduced result, vendor claim, implementation hypothesis, and open research.

EXPERIMENT

Declare baseline, configuration, uncertainty, scenario coverage, stop conditions, and independent reproduction before conclusions.

CONSTRAIN

Identity, policy, safety envelopes, physical boundaries, cryptographic authority, and human intervention limit consequence.

TRANSITION

Adoption, pilot, production, rollback, supplier exit, lifecycle, and retirement decisions remain evidence-bearing and reversible.

EVIDENCE - BOUND TRANSITION FLOW



No novelty claim becomes an operational claim without reproduced evidence and an explicit authority decision

INTERPRETATION AND ASSURANCE

How to apply this publication

Normative intent

Requirements define outcomes and constraints. Implementations may vary, but evidence must demonstrate equivalent control.

Evidence over assertion

Vendor documentation and design intent are not equivalent to reproduced behavior. Record evidence grade and uncertainty.

Risk-proportional depth

Higher consequence, autonomy, sensitivity, and irreversibility require stronger isolation, review, verification, and recovery.

Controlled exception

Exceptions require an owner, rationale, compensating control, residual-risk acceptance, expiration, and reevaluation trigger.

Normalized assessment scale

0	1	2	3	4	5
ABSENT	AD HOC	PARTIAL	OPERATIONAL	ADVANCED	LEADING

A numeric score must never hide a failed mandatory gate, missing evidence, untested workload, or unacceptable residual risk.

INTERACTIVE NAVIGATION

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Navigation doctrine

Bookmarks and internal links are conveniences. Permanent document identity, criterion identifiers, evidence references, and revision history remain authoritative.

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

0. Executive Mandate

Research value, transition discipline, and non-negotiable evidence boundaries

MANDATE

Organizations evaluating mobile robots, drones, and autonomous fleets **MUST** separate research from operational authority, establish a reproducible baseline, constrain safety and security consequence, disclose uncertainty, and require a documented transition or rejection decision.

Required outcomes

- Establish a durable, product-neutral evidence system for mobile robots, drones, and autonomous fleets.
- Prevent novelty, investment, vendor prestige, roadmap language, or laboratory success from substituting for operational proof.
- Require representative performance, adversarial, failure, recovery, safety, privacy, and lifecycle evidence.
- Keep pilots bounded by identity, authority, environment, duration, budget, stop conditions, and rollback.
- Preserve rejected alternatives, limitations, residual risk, source currency, and reassessment triggers.

Decision boundary: conformance supports a bounded engineering assurance position. It does not prove scientific consensus, regulatory approval, universal safety, quantum advantage, cryptographic perfection, autonomous competence, or commercial viability.

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

1. Scope and Applicability

Research, pilot, transition, operational, and retirement boundaries

IN SCOPE

- Research, architecture, acquisition, experiment, pilot, transition, operation, and retirement of mobile robots, drones, and autonomous fleets.
- Hardware, software, models, data, protocols, facilities, people, suppliers, providers, physical processes, and evidence.
- Laboratory, simulation, testbed, shadow, pilot, canary, production, and field deployment states.
- Claims, benchmarks, uncertainty, safety, security, privacy, economics, interoperability, support, and exit.

OUT OF SCOPE

- Scientific truth inferred from a single benchmark, simulation, provider, hardware generation, or laboratory configuration.
- Safety, regulatory, export, spectrum, airspace, clinical, cryptographic, or standards approval not granted by the responsible authority.
- Roadmap forecasts, token price, patent counts, press releases, or investment treated as engineering evidence.
- Hidden production use of research components outside the declared transition and assurance boundary.

Applicability triggers

- The capability is novel, rapidly changing, weakly standardized, difficult to reproduce, or dependent on immature suppliers.
- A claim concerns safety, security, privacy, physical action, critical infrastructure, cryptographic trust, or consequential autonomy.
- The system requires specialized facilities, scarce hardware, spectrum, foundry, cryogenic, optical, robotics, or field-test dependencies.
- Failure or lock-in may create long-lived data, capital, infrastructure, workforce, or regulatory consequences.
- A research component is proposed for pilot, customer, production, public, or externally relied-upon use.

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

2. Definitions and Taxonomy

Controlled language for architecture, governance, and assessment

AUTHORITY

The right to approve, deny, constrain, or execute an action. Model output is not authority.

EVIDENCE

A reproducible source, trace, measurement, test, record, signed artifact, or documented observation supporting a claim.

ASSURANCE VIEW

A defined perspective such as governance, architecture, security, operations, privacy, or human oversight.

ATOMIC CRITERION

A uniquely identified requirement that can be assessed, evidenced, excepted, and revised independently.

IMPLEMENTATION PROFILE

A risk-proportional set of required depth, evidence, and gates for a class of use.

CONTROLLED EXCEPTION

A time-bounded deviation with owner, rationale, compensating control, residual risk, expiration, and review trigger.

DETERMINISTIC MECHANISM

A component whose inputs, policy, state transition, and side effects can be constrained and verified.

SOURCE AUTHORITY

The documented basis for treating a source as reliable for a defined claim, context, jurisdiction, and time.

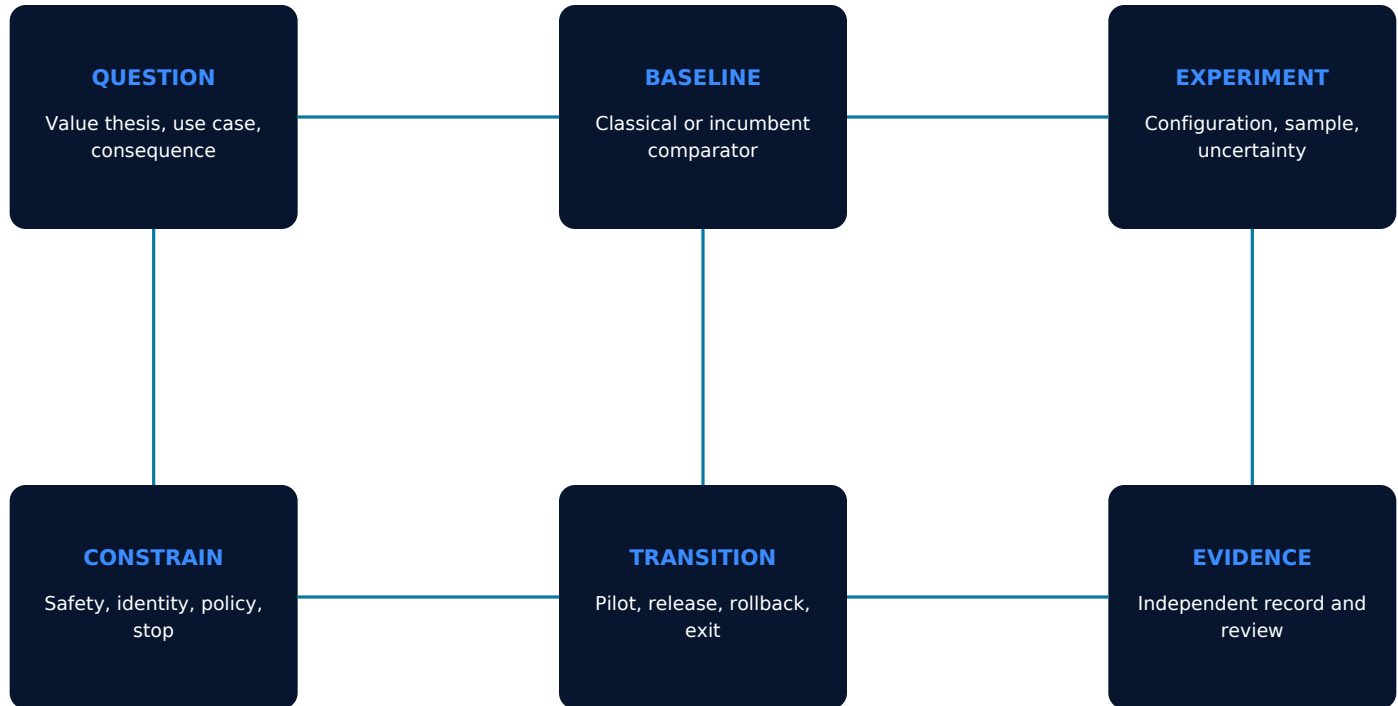
REASSESSMENT TRIGGER

A change, incident, drift signal, dependency revision, or time boundary requiring renewed evaluation.

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

3. Architecture and Trust Model

Separation of research, authority, physical systems, runtime, and evidence



Mandatory trust boundaries

- Research systems **MUST NOT** inherit production identity, secrets, authority, data, networks, or physical control by convenience.
- Claims **MUST** retain the exact hardware, software, model, protocol, calibration, environment, workload, and observation boundary.
- Safety, cryptographic, physical, spectrum, autonomy, and human-intervention constraints **MUST** remain independently enforceable.
- Transition **MUST** have a named decision authority, acceptance criteria, monitored pilot, rollback, supplier exit, and retirement path.
- Evidence **MUST** remain reviewable when a vendor, cloud, token network, laboratory, model, robot, or quantum backend is unavailable.

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

4. Governance and Accountability

Decision rights, separation of duties, and lifecycle ownership

ACCOUNTABLE OWNER

Accepts scope, risk tolerance, funding, and residual risk.

SYSTEM OWNER

Maintains architecture, inventory, operating boundaries, and change control.

SECURITY / PRIVACY

Defines threat, identity, data, isolation, monitoring, and incident requirements.

EVALUATION AUTHORITY

Designs representative tests, gates releases, and preserves reproducibility.

OPERATIONS

Maintains availability, rollback, recovery, evidence, and incident handling.

HUMAN OVERSIGHT

Reviews consequential decisions, exceptions, disputed outcomes, and harm signals.

DECISION PRINCIPLE

No single actor should be able to define the objective, grant authority, execute the consequential action, suppress evidence, and approve the result. Separation must be technical where consequence requires it.

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 01-04 of 18

MYTHOS-ROB-0004-C01

Vehicle, Fleet, Mission, and Operating Area Boundary

The organization **MUST** define, implement, verify, and maintain vehicle, fleet, mission, and operating area boundary for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0004-C02

Registration, Identity, Ownership, and Remote Identification

The organization **MUST** define, implement, verify, and maintain registration, identity, ownership, and remote identification for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0004-C03

Operational Design Domain, Geofence, and Route Authority

The organization **MUST** define, implement, verify, and maintain operational design domain, geofence, and route authority for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0004-C04

Localization, Mapping, Navigation, and Obstacle Avoidance

The organization **MUST** define, implement, verify, and maintain localization, mapping, navigation, and obstacle avoidance for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 05-08 of 18

MYTHOS-ROB-0004-C05**Traffic, Airspace, Right-of-Way, and Coordination**

The organization **MUST** define, implement, verify, and maintain traffic, airspace, right-of-way, and coordination for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0004-C06**Command, Control, Telemetry, and Link Resilience**

The organization **MUST** define, implement, verify, and maintain command, control, telemetry, and link resilience for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0004-C07**Remote Pilot, Supervisor, and Intervention Authority**

The organization **MUST** define, implement, verify, and maintain remote pilot, supervisor, and intervention authority for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0004-C08**Payload, Cargo, Tool, and Mission-Specific Risk**

The organization **MUST** define, implement, verify, and maintain payload, cargo, tool, and mission-specific risk for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 09-12 of 18

MYTHOS-ROB-0004-C09

Battery, Charging, Fuel, Thermal, and Energy Safety

The organization MUST define, implement, verify, and maintain battery, charging, fuel, thermal, and energy safety for the declared mobile robots, drones, and autonomous fleets boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0004-C10

Weather, Terrain, Lighting, RF, and Environmental Limits

The organization MUST define, implement, verify, and maintain weather, terrain, lighting, rf, and environmental limits for the declared mobile robots, drones, and autonomous fleets boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0004-C11

Cybersecurity, Spoofing, Jamming, and Hijack Resistance

The organization MUST define, implement, verify, and maintain cybersecurity, spoofing, jamming, and hijack resistance for the declared mobile robots, drones, and autonomous fleets boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0004-C12

Fleet Scheduler, Dispatch, and Resource Conflict

The organization MUST define, implement, verify, and maintain fleet scheduler, dispatch, and resource conflict for the declared mobile robots, drones, and autonomous fleets boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 13-15 of 18

MYTHOS-ROB-0004-C13**Lost Link, Lost Localization, Flyaway, and Safe Recovery**

The organization **MUST** define, implement, verify, and maintain lost link, lost localization, flyaway, and safe recovery for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0004-C14**Maintenance, Inspection, Calibration, and Airworthiness**

The organization **MUST** define, implement, verify, and maintain maintenance, inspection, calibration, and airworthiness for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0004-C15**Incident, Near Miss, Flight or Mission Record**

The organization **MUST** define, implement, verify, and maintain incident, near miss, flight or mission record for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 16-18 of 18

MYTHOS-ROB-0004-C16**Software, Map, Model, and Configuration Update**

The organization **MUST** define, implement, verify, and maintain software, map, model, and configuration update for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0004-C17**Privacy, Recording, Public Interaction, and Rights**

The organization **MUST** define, implement, verify, and maintain privacy, recording, public interaction, and rights for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0004-C18**Fleet Evidence, Reassessment, and Retirement**

The organization **MUST** define, implement, verify, and maintain fleet evidence, reassessment, and retirement for the declared mobile robots, drones, and autonomous fleets boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

6. Evidence and Assessment

Reproduce, compare, challenge, observe, recover, and trace

EXAMINE

Research papers, standards, designs, bills of material, protocols, source, models, data, calibration, configurations, contracts, and claims.

REPRODUCE

Repeat the experiment or assessment with captured versions, seeds, parameters, environment, uncertainty, and acceptance criteria.

COMPARE

Use an honest incumbent, classical, manual, or alternative baseline with equivalent outcome, data, scale, and resource accounting.

CHALLENGE

Apply adversarial input, environmental variation, dependency loss, fault injection, safety cases, security tests, and boundary conditions.

OBSERVE

Measure field or production-like quality, latency, energy, drift, physical behavior, interventions, failures, maintenance, and user impact.

TRACE

Link claim, authority, experiment, configuration, evidence, decision, pilot, change, incident, rollback, and reassessment.

Evidence grades

A

Independently reproduced, current, representative, uncertainty-bounded, integrity-protected, and operationally relevant.

B

Reproduced by the implementing organization with strong provenance, comparator, challenge, and declared limitations.

C

Partial, laboratory-only, simulation-heavy, inherited, or indirect evidence with material uncertainty and dependencies.

D

Roadmap, assertion, demonstration, benchmark excerpt, patent, token metric, press release, or vendor statement without...

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

7. Assurance Views

Six perspectives required for a complete assurance claim

GOVERNANCE

Ownership, purpose, risk tolerance, policy, exception, and decision rights.

ARCHITECTURE

Boundaries, dependencies, failure modes, state, data flow, and portability.

SECURITY

Identity, authorization, isolation, secrets, abuse resistance, and incident response.

OPERATIONS

Reliability, performance, cost, observability, change, recovery, and support.

PRIVACY / RIGHTS

Purpose limitation, minimization, consent, access, correction, deletion, and egress.

HUMAN / SOCIETAL

Usability, accessibility, disclosure, contestability, impact, and human control.

Conformance requires a defensible position across every applicable view. A strong aggregate score cannot compensate for an unowned system, a failed mandatory gate, untested recovery, or evidence below the accepted grade.

7.2 Evaluation Metrics and Decision Gates

Measures expose utility, uncertainty, safety, physical limits, transition cost, and lifecycle burden

UTILITY

Task outcome, comparator delta, coverage, quality, accuracy, mission success, and stakeholder value.

UNCERTAINTY

Confidence, calibration, variance, sample coverage, reproducibility, sensitivity, and unresolved assumptions.

PERFORMANCE

Latency, throughput, fidelity, range, precision, bandwidth, scale, density, and availability.

SAFETY / SECURITY

Hazard exposure, unsafe action, exploitability, spoofing, physical consequence, intervention, and containment.

RESOURCE

Energy, power, cooling, spectrum, shots, qubits, memory, materials, facility, operator, and maintenance demand.

MATURITY

Standards state, supply chain, interoperability, tooling, skills, support, qualification, and lifecycle readiness.

ECONOMICS

Acquisition, operation, provider, token, facility, migration, insurance, support, and opportunity cost.

TRANSITION

Pilot escape, rollback time, incumbent fallback, portability, lock-in, retirement, and evidence completeness.

Decision gate: thresholds **MUST** be declared before assessment, include an incumbent baseline and uncertainty statement, and identify any safety, security, cryptographic, physical, reproducibility, or rollback failure that blocks transition.

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

8. Failure Modes and Adversarial Scenarios

Challenge assumptions before the system is trusted with consequential work

UNSAFE AUTONOMY

The robot acts outside its operational design domain or safety envelope.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

PERCEPTION COLLAPSE

Occlusion, weather, spoofing, drift, calibration, or domain shift produces hazardous state estimates.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

HUMAN INTERVENTION FAILURE

Operators cannot understand, stop, take over, or recover the system in time.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

CYBER-PHYSICAL COMMAND ABUSE

Compromised identity, network, software, model, or tool issues unsafe motion or process actions.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

FLEET-CORRELATED FAILURE

A map, model, update, scheduler, battery, cloud, or communications dependency affects many robots at once.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

LEARNING REGRESSION

A model or skill update degrades safety, task quality, fairness, explainability, or recovery behavior.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

Adversarial testing MUST protect people and production systems. Use isolated environments, synthetic or minimized data, bounded authority, kill switches, explicit legal and ethical review, and documented stop conditions.

9. Implementation Profiles

Risk-proportional implementation without weakening mandatory boundaries

FOUNDATIONAL TYPICAL SCOPE Low consequence, limited autonomy, non-sensitive data, reversible outputs. MINIMUM DEPTH Named owner; inventory; basic evaluation; access control; logging; rollback; annual review.	ADVANCED TYPICAL SCOPE Business-critical workflow, sensitive data, multiple tools or providers, moderate autonomy. MINIMUM DEPTH Formal threat model; representative evaluation; approval gates; isolated execution; tested recovery; quarterly review.	HIGH ASSURANCE TYPICAL SCOPE Safety, security, regulated, financial, identity, or broadly consequential use. MINIMUM DEPTH Independent challenge; strongest identity; deterministic enforcement; comprehensive evidence; canary release; continuous monitoring.
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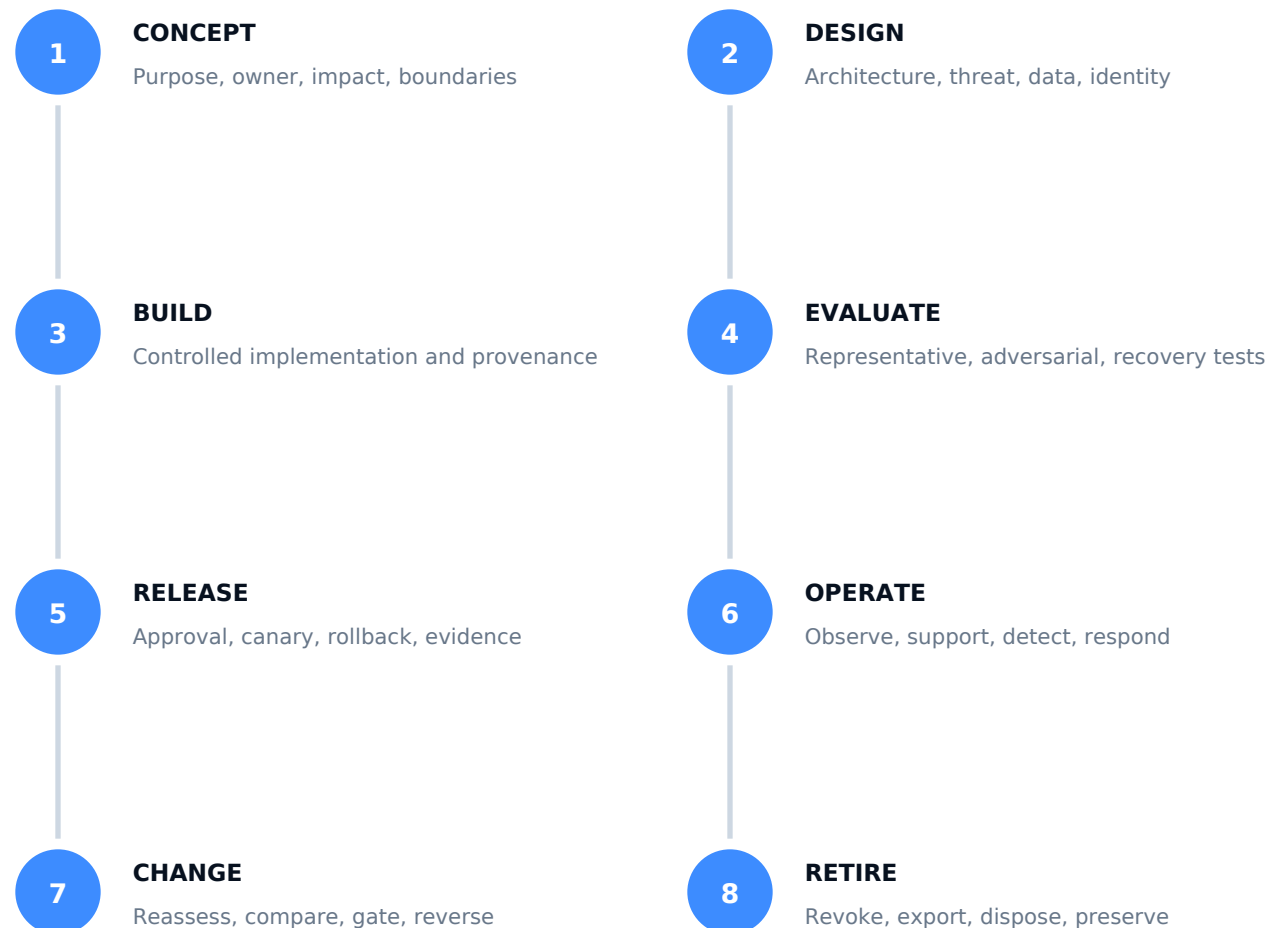
Profile selection rule

Choose the highest profile triggered by consequence, autonomy, sensitivity, scale, irreversibility, external dependency, or inability to rapidly detect and recover. Tailoring may strengthen controls; it may not erase a mandatory gate without a controlled exception.

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

9.2 Operational Lifecycle

Evidence-bearing operation from concept through retirement



LIFECYCLE INVARIANT

Every stage **MUST** leave sufficient evidence for the next authority to understand what was intended, what changed, what was tested, what failed, what was accepted, what remains uncertain, and how to recover or exit.

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

10. Adoption Roadmap

A sequenced path from uncontrolled capability to evidence-bearing operation

0-30 DAYS**Establish ownership and truth**

Inventory systems and dependencies; classify risk; freeze unsupported claims; identify immediate privilege, data, and evidence gaps.

31-90 DAYS**Create enforceable boundaries**

Define policy; isolate execution; implement identity and approval gates; establish representative evaluation and baseline telemetry.

3-6 MONTHS**Prove recovery and operating control**

Exercise failure, rollback, revocation, incident, provider exit, and state-recovery scenarios; mature evidence packaging.

6-12 MONTHS**Scale assurance**

Automate control checks; expand workload coverage; independent challenge; portfolio metrics; controlled exception expiry; continuous reassessment.

Adoption is complete only when operating evidence demonstrates the selected profile in the actual deployment context. Documentation alone is not conformance.

MYTHOS-ROB-0004 / ROBOTICS AND AUTONOMY

10.2 Conformance and Exception Statement

What an assurance claim must contain

SYSTEM / SERVICE

Named, versioned capability and deployment boundary.

PROFILE

Foundational, Advanced, or High Assurance with trigger rationale.

SCOPE

Workloads, users, data, tools, regions, providers, and exclusions.

CRITERIA

Pass, partial, fail, not applicable, and exception status for every criterion.

EVIDENCE

Artifact references, evidence grade, date, environment, and reproducibility.

LIMITATIONS

Known failure modes, unsupported workloads, uncertainty, and residual risk.

EXCEPTIONS

Owner, rationale, compensating control, expiration, and approval.

VALIDITY

Assessment date, change boundary, review date, and reassessment triggers.

Prohibited claim: “compliant” without the named scope, profile, evidence date, limitations, exceptions, and authority accepting residual risk.

11. Source Authority and Reference Register

Primary sources informing interpretation; verify current status at assessment time

NIST CSF 2.0

Cybersecurity Framework 2.0

<https://doi.org/10.6028/NIST.CSWP.29>

Enterprise governance and cybersecurity outcome framework.

ISO 13482

Robots and Robotic Devices - Safety Requirements for Personal Care Robots

<https://www.iso.org/standard/53820.html>

Safety framework for service and personal-care robot classes.

NIST SP 800-53 Rev. 5

Security and Privacy Controls for Information Systems and Organizations

<https://doi.org/10.6028/NIST.SP.800-53r5>

Broad organizational control baseline for technology systems and services.

NIST AI RMF 1.0

Artificial Intelligence Risk Management Framework

<https://doi.org/10.6028/NIST.AI.100-1>

Risk management structure for trustworthy AI capabilities used in autonomous systems.

ISO 10218-1:2025

Robotics - Safety Requirements - Industrial Robots

<https://www.iso.org/standard/73933.html>

Current industrial robot design and inherent-safety requirements.

NIST Response Robot Test Methods

Standard Test Methods for Response Robots

<https://www.nist.gov/el/intelligent-systems-division-73500/standard-test-methods-response-robots>

Repeatable mobility, sensing, manipulation, endurance, and operator-proficiency tests.

ISO 10218-2:2025

Robotics - Safety Requirements - Industrial Robot Applications and Cells

<https://www.iso.org/standard/73934.html>

Current integration, commissioning, operation, maintenance, and disposal requirements.

Source currency rule: authorities, specifications, laws, provider services, hardware, protocols, standards status, and research evidence MUST be checked at assessment time. This publication records a 2026-07-24 source snapshot.

11.2 Revision History and Decision Register

Permanent identity, controlled change, and publication integrity

VERSION	DATE	STATE	SUMMARY
1.0.0-candidate	2026-07-24	Candidate	Permanent-publication edition; source refresh; expanded criteria, evidence, assurance, and lifecycle guidance.
Next review	2027-01-24	Scheduled	Review source currency, threat evolution, operating evidence, adoption feedback, and proposed revisions.

Publication decisions

- PERMANENT IDENTITY** The document ID remains stable across revisions; batch or production sequence metadata is not public identity.
- CHANGE CONTROL** Normative changes require rationale, impact analysis, affected-criterion mapping, and approval.
- SUPERSESSION** A superseded edition remains traceable; current routes and catalogs identify the active edition.
- CORRECTION** Material errors require a recorded correction, affected-evidence analysis, and notification appropriate to impact.
- ARCHIVAL INTEGRITY** Published artifacts receive hashes, metadata, and a release manifest sufficient for independent verification.

END OF PERMANENT PUBLICATION / MYTHOS-ROB-0004
MYTHOS SYSTEMS / ENGINEERING STANDARDS LIBRARY



ENGINEERING STANDARDS LIBRARY / ROBOTICS AND AUTONOMOUS SYSTEMS

Robot Perception, Sensor Fusion, and Simulation Assurance Standard

Sensors, calibration, perception models, fusion, uncertainty, datasets, simulation validity, adversarial conditions, monitoring, and runtime evidence.

PERMANENT DOCUMENT ID

MYTHOS-ROB-0005

PUBLICATION

Candidate Standard
Version 1.0.0-candidate

ASSURANCE PROFILE

Research / Pilot / Operational
High Assurance

PERMANENT PUBLICATION IDENTITY

Robot Perception, Sensor Fusion, and Simulation Assurance Standard			DOCUMENT ID MYTHOS-ROB-0005 VERSION 1.0.0-candidate STATUS Candidate Standard PUBLISHER Mythos Systems PUBLICATION DATE 2026-07-24 SCHEDULED REVIEW 2027-01-24 CLASSIFICATION Public
18 ATOMIC CRITERIA	6 ASSURANCE VIEWS	4 IMPLEMENTATION PROFILES	1 PERMANENT IDENTITY

Publication doctrine. This publication establishes durable requirements for its defined scope. Interpretation must preserve the permanent document identity, required evidence, controlled exceptions, source currency, and formal revision history.

EMERGING TECHNOLOGY AND ASSURANCE TOPOLOGY

Robotics and Autonomous Systems

A trustworthy robot perception and sensor fusion program is a governed path from research claim through baseline, experiment, safety and security challenge, transition decision, bounded operation, and preserved evidence.

CLASSIFY

Separate established practice, candidate standard, reproduced result, vendor claim, implementation hypothesis, and open research.

EXPERIMENT

Declare baseline, configuration, uncertainty, scenario coverage, stop conditions, and independent reproduction before conclusions.

CONSTRAIN

Identity, policy, safety envelopes, physical boundaries, cryptographic authority, and human intervention limit consequence.

TRANSITION

Adoption, pilot, production, rollback, supplier exit, lifecycle, and retirement decisions remain evidence-bearing and reversible.

EVIDENCE - BOUND TRANSITION FLOW



No novelty claim becomes an operational claim without reproduced evidence and an explicit authority decision

INTERPRETATION AND ASSURANCE

How to apply this publication

Normative intent

Requirements define outcomes and constraints. Implementations may vary, but evidence must demonstrate equivalent control.

Evidence over assertion

Vendor documentation and design intent are not equivalent to reproduced behavior. Record evidence grade and uncertainty.

Risk-proportional depth

Higher consequence, autonomy, sensitivity, and irreversibility require stronger isolation, review, verification, and recovery.

Controlled exception

Exceptions require an owner, rationale, compensating control, residual-risk acceptance, expiration, and reevaluation trigger.

Normalized assessment scale

0	1	2	3	4	5
ABSENT	AD HOC	PARTIAL	OPERATIONAL	ADVANCED	LEADING

A numeric score must never hide a failed mandatory gate, missing evidence, untested workload, or unacceptable residual risk.

INTERACTIVE NAVIGATION

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Navigation doctrine

Bookmarks and internal links are conveniences. Permanent document identity, criterion identifiers, evidence references, and revision history remain authoritative.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

0. Executive Mandate

Research value, transition discipline, and non-negotiable evidence boundaries

MANDATE

Organizations evaluating robot perception and sensor fusion **MUST** separate research from operational authority, establish a reproducible baseline, constrain safety and security consequence, disclose uncertainty, and require a documented transition or rejection decision.

Required outcomes

- Establish a durable, product-neutral evidence system for robot perception and sensor fusion.
- Prevent novelty, investment, vendor prestige, roadmap language, or laboratory success from substituting for operational proof.
- Require representative performance, adversarial, failure, recovery, safety, privacy, and lifecycle evidence.
- Keep pilots bounded by identity, authority, environment, duration, budget, stop conditions, and rollback.
- Preserve rejected alternatives, limitations, residual risk, source currency, and reassessment triggers.

Decision boundary: conformance supports a bounded engineering assurance position. It does not prove scientific consensus, regulatory approval, universal safety, quantum advantage, cryptographic perfection, autonomous competence, or commercial viability.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

1. Scope and Applicability

Research, pilot, transition, operational, and retirement boundaries

IN SCOPE

- Research, architecture, acquisition, experiment, pilot, transition, operation, and retirement of robot perception and sensor fusion.
- Hardware, software, models, data, protocols, facilities, people, suppliers, providers, physical processes, and evidence.
- Laboratory, simulation, testbed, shadow, pilot, canary, production, and field deployment states.
- Claims, benchmarks, uncertainty, safety, security, privacy, economics, interoperability, support, and exit.

OUT OF SCOPE

- Scientific truth inferred from a single benchmark, simulation, provider, hardware generation, or laboratory configuration.
- Safety, regulatory, export, spectrum, airspace, clinical, cryptographic, or standards approval not granted by the responsible authority.
- Roadmap forecasts, token price, patent counts, press releases, or investment treated as engineering evidence.
- Hidden production use of research components outside the declared transition and assurance boundary.

Applicability triggers

- The capability is novel, rapidly changing, weakly standardized, difficult to reproduce, or dependent on immature suppliers.
- A claim concerns safety, security, privacy, physical action, critical infrastructure, cryptographic trust, or consequential autonomy.
- The system requires specialized facilities, scarce hardware, spectrum, foundry, cryogenic, optical, robotics, or field-test dependencies.
- Failure or lock-in may create long-lived data, capital, infrastructure, workforce, or regulatory consequences.
- A research component is proposed for pilot, customer, production, public, or externally relied-upon use.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

2. Definitions and Taxonomy

Controlled language for architecture, governance, and assessment

AUTHORITY

The right to approve, deny, constrain, or execute an action. Model output is not authority.

EVIDENCE

A reproducible source, trace, measurement, test, record, signed artifact, or documented observation supporting a claim.

ASSURANCE VIEW

A defined perspective such as governance, architecture, security, operations, privacy, or human oversight.

ATOMIC CRITERION

A uniquely identified requirement that can be assessed, evidenced, excepted, and revised independently.

IMPLEMENTATION PROFILE

A risk-proportional set of required depth, evidence, and gates for a class of use.

CONTROLLED EXCEPTION

A time-bounded deviation with owner, rationale, compensating control, residual risk, expiration, and review trigger.

DETERMINISTIC MECHANISM

A component whose inputs, policy, state transition, and side effects can be constrained and verified.

SOURCE AUTHORITY

The documented basis for treating a source as reliable for a defined claim, context, jurisdiction, and time.

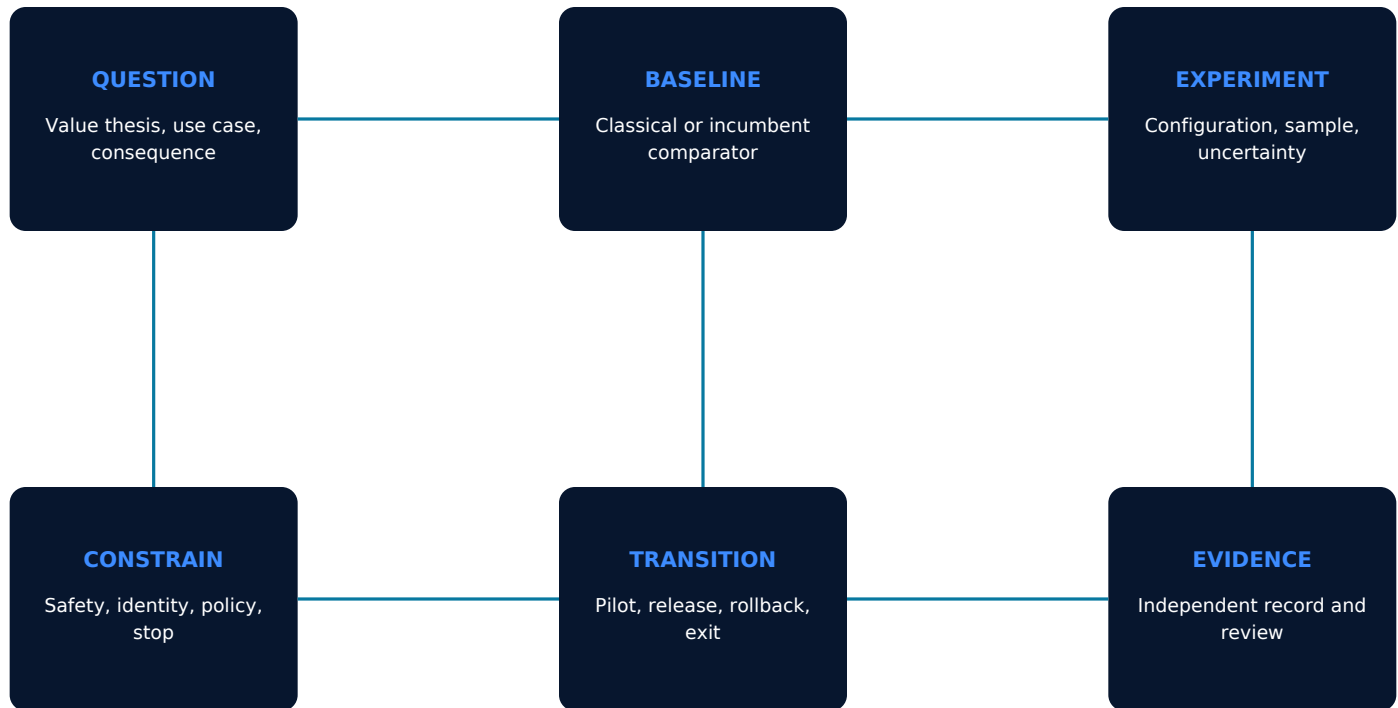
REASSESSMENT TRIGGER

A change, incident, drift signal, dependency revision, or time boundary requiring renewed evaluation.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

3. Architecture and Trust Model

Separation of research, authority, physical systems, runtime, and evidence



Mandatory trust boundaries

- Research systems **MUST NOT** inherit production identity, secrets, authority, data, networks, or physical control by convenience.
- Claims **MUST** retain the exact hardware, software, model, protocol, calibration, environment, workload, and observation boundary.
- Safety, cryptographic, physical, spectrum, autonomy, and human-intervention constraints **MUST** remain independently enforceable.
- Transition **MUST** have a named decision authority, acceptance criteria, monitored pilot, rollback, supplier exit, and retirement path.
- Evidence **MUST** remain reviewable when a vendor, cloud, token network, laboratory, model, robot, or quantum backend is unavailable.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

4. Governance and Accountability

Decision rights, separation of duties, and lifecycle ownership

ACCOUNTABLE OWNER

Accepts scope, risk tolerance, funding, and residual risk.

SYSTEM OWNER

Maintains architecture, inventory, operating boundaries, and change control.

SECURITY / PRIVACY

Defines threat, identity, data, isolation, monitoring, and incident requirements.

EVALUATION AUTHORITY

Designs representative tests, gates releases, and preserves reproducibility.

OPERATIONS

Maintains availability, rollback, recovery, evidence, and incident handling.

HUMAN OVERSIGHT

Reviews consequential decisions, exceptions, disputed outcomes, and harm signals.

DECISION PRINCIPLE

No single actor should be able to define the objective, grant authority, execute the consequential action, suppress evidence, and approve the result. Separation must be technical where consequence requires it.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 01-04 of 18

MYTHOS-ROB-0005-C01

Perception Task, Object, Event, and Environment Definition

The organization **MUST** define, implement, verify, and maintain perception task, object, event, and environment definition for the declared robot perception and sensor fusion boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0005-C02

Sensor Modality, Placement, Field of View, and Redundancy

The organization **MUST** define, implement, verify, and maintain sensor modality, placement, field of view, and redundancy for the declared robot perception and sensor fusion boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0005-C03

Intrinsic, Extrinsic, Temporal, and Online Calibration

The organization **MUST** define, implement, verify, and maintain intrinsic, extrinsic, temporal, and online calibration for the declared robot perception and sensor fusion boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0005-C04

Data Collection, Consent, Rights, and Provenance

The organization **MUST** define, implement, verify, and maintain data collection, consent, rights, and provenance for the declared robot perception and sensor fusion boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 05-08 of 18

MYTHOS-ROB-0005-C05

Label, Ground Truth, Scenario, and Coverage Authority

The organization MUST define, implement, verify, and maintain label, ground truth, scenario, and coverage authority for the declared robot perception and sensor fusion boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0005-C06

Model Architecture, Training, and Version Provenance

The organization MUST define, implement, verify, and maintain model architecture, training, and version provenance for the declared robot perception and sensor fusion boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0005-C07

Fusion Architecture and Cross-Sensor Consistency

The organization MUST define, implement, verify, and maintain fusion architecture and cross-sensor consistency for the declared robot perception and sensor fusion boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0005-C08

Detection, Tracking, Segmentation, Pose, and Prediction Metrics

The organization MUST define, implement, verify, and maintain detection, tracking, segmentation, pose, and prediction metrics for the declared robot perception and sensor fusion boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 09-12 of 18

MYTHOS-ROB-0005-C09

Uncertainty, Confidence, and Abstention Behavior

The organization MUST define, implement, verify, and maintain uncertainty, confidence, and abstention behavior for the declared robot perception and sensor fusion boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0005-C10

Weather, Lighting, Occlusion, Reflectivity, and Domain Shift

The organization MUST define, implement, verify, and maintain weather, lighting, occlusion, reflectivity, and domain shift for the declared robot perception and sensor fusion boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0005-C11

Adversarial Object, Spoofing, Injection, and Sensor Failure

The organization MUST define, implement, verify, and maintain adversarial object, spoofing, injection, and sensor failure for the declared robot perception and sensor fusion boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0005-C12

Simulation, Digital Twin, and Reality-Gap Validation

The organization MUST define, implement, verify, and maintain simulation, digital twin, and reality-gap validation for the declared robot perception and sensor fusion boundary. The record MUST identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence MUST be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 13-15 of 18

MYTHOS-ROB-0005-C13**Synthetic Data and Scenario Generation Governance**

The organization **MUST** define, implement, verify, and maintain synthetic data and scenario generation governance for the declared robot perception and sensor fusion boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0005-C14**Runtime Health, Drift, Degradation, and Sensor Isolation**

The organization **MUST** define, implement, verify, and maintain runtime health, drift, degradation, and sensor isolation for the declared robot perception and sensor fusion boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0005-C15**Fail-Safe Decision Interface and Safety Envelope**

The organization **MUST** define, implement, verify, and maintain fail-safe decision interface and safety envelope for the declared robot perception and sensor fusion boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 16-18 of 18

MYTHOS-ROB-0005-C16**Regression, Replay, Field Trial, and Acceptance**

The organization **MUST** define, implement, verify, and maintain regression, replay, field trial, and acceptance for the declared robot perception and sensor fusion boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0005-C17**Incident Reconstruction and Evidence Preservation**

The organization **MUST** define, implement, verify, and maintain incident reconstruction and evidence preservation for the declared robot perception and sensor fusion boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0005-C18**Change Control and Periodic Revalidation**

The organization **MUST** define, implement, verify, and maintain change control and periodic revalidation for the declared robot perception and sensor fusion boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

6. Evidence and Assessment

Reproduce, compare, challenge, observe, and trace

EXAMINE

Research papers, standards, designs, bills of material, protocols, source, models, data, calibration, configurations, contracts, and claims.

REPRODUCE

Repeat the experiment or assessment with captured versions, seeds, parameters, environment, uncertainty, and acceptance criteria.

COMPARE

Use an honest incumbent, classical, manual, or alternative baseline with equivalent outcome, data, scale, and resource accounting.

CHALLENGE

Apply adversarial input, environmental variation, dependency loss, fault injection, safety cases, security tests, and boundary conditions.

OBSERVE

Measure field or production-like quality, latency, energy, drift, physical behavior, interventions, failures, maintenance, and user impact.

TRACE

Link claim, authority, experiment, configuration, evidence, decision, pilot, change, incident, rollback, and reassessment.

Evidence grades

A

Independently reproduced, current, representative, uncertainty-bounded, integrity-protected, and operationally relevant.

B

Reproduced by the implementing organization with strong provenance, comparator, challenge, and declared limitations.

C

Partial, laboratory-only, simulation-heavy, inherited, or indirect evidence with material uncertainty and dependencies.

D

Roadmap, assertion, demonstration, benchmark excerpt, patent, token metric, press release, or vendor statement without...

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

7. Assurance Views

Six perspectives required for a complete assurance claim

GOVERNANCE

Ownership, purpose, risk tolerance, policy, exception, and decision rights.

ARCHITECTURE

Boundaries, dependencies, failure modes, state, data flow, and portability.

SECURITY

Identity, authorization, isolation, secrets, abuse resistance, and incident response.

OPERATIONS

Reliability, performance, cost, observability, change, recovery, and support.

PRIVACY / RIGHTS

Purpose limitation, minimization, consent, access, correction, deletion, and egress.

HUMAN / SOCIETAL

Usability, accessibility, disclosure, contestability, impact, and human control.

Conformance requires a defensible position across every applicable view. A strong aggregate score cannot compensate for an unowned system, a failed mandatory gate, untested recovery, or evidence below the accepted grade.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

7.2 Evaluation Metrics and Decision Gates

Measures expose utility, uncertainty, safety, physical limits, transition cost, and lifecycle burden

UTILITY

Task outcome, comparator delta, coverage, quality, accuracy, mission success, and stakeholder value.

UNCERTAINTY

Confidence, calibration, variance, sample coverage, reproducibility, sensitivity, and unresolved assumptions.

PERFORMANCE

Latency, throughput, fidelity, range, precision, bandwidth, scale, density, and availability.

SAFETY / SECURITY

Hazard exposure, unsafe action, exploitability, spoofing, physical consequence, intervention, and containment.

RESOURCE

Energy, power, cooling, spectrum, shots, qubits, memory, materials, facility, operator, and maintenance demand.

MATURITY

Standards state, supply chain, interoperability, tooling, skills, support, qualification, and lifecycle readiness.

ECONOMICS

Acquisition, operation, provider, token, facility, migration, insurance, support, and opportunity cost.

TRANSITION

Pilot escape, rollback time, incumbent fallback, portability, lock-in, retirement, and evidence completeness.

Decision gate: thresholds **MUST** be declared before assessment, include an incumbent baseline and uncertainty statement, and identify any safety, security, cryptographic, physical, reproducibility, or rollback failure that blocks transition.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

8. Failure Modes and Adversarial Scenarios

Challenge assumptions before the system is trusted with consequential work

UNSAFE AUTONOMY

The robot acts outside its operational design domain or safety envelope.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

PERCEPTION COLLAPSE

Occlusion, weather, spoofing, drift, calibration, or domain shift produces hazardous state estimates.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

HUMAN INTERVENTION FAILURE

Operators cannot understand, stop, take over, or recover the system in time.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

CYBER-PHYSICAL COMMAND ABUSE

Compromised identity, network, software, model, or tool issues unsafe motion or process actions.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

FLEET-CORRELATED FAILURE

A map, model, update, scheduler, battery, cloud, or communications dependency affects many robots at once.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

LEARNING REGRESSION

A model or skill update degrades safety, task quality, fairness, explainability, or recovery behavior.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

Adversarial testing MUST protect people and production systems. Use isolated environments, synthetic or minimized data, bounded authority, kill switches, explicit legal and ethical review, and documented stop conditions.

9. Implementation Profiles

Risk-proportional implementation without weakening mandatory boundaries

FOUNDATIONAL TYPICAL SCOPE Low consequence, limited autonomy, non-sensitive data, reversible outputs. MINIMUM DEPTH Named owner; inventory; basic evaluation; access control; logging; rollback; annual review.	ADVANCED TYPICAL SCOPE Business-critical workflow, sensitive data, multiple tools or providers, moderate autonomy. MINIMUM DEPTH Formal threat model; representative evaluation; approval gates; isolated execution; tested recovery; quarterly review.	HIGH ASSURANCE TYPICAL SCOPE Safety, security, regulated, financial, identity, or broadly consequential use. MINIMUM DEPTH Independent challenge; strongest identity; deterministic enforcement; comprehensive evidence; canary release; continuous monitoring.
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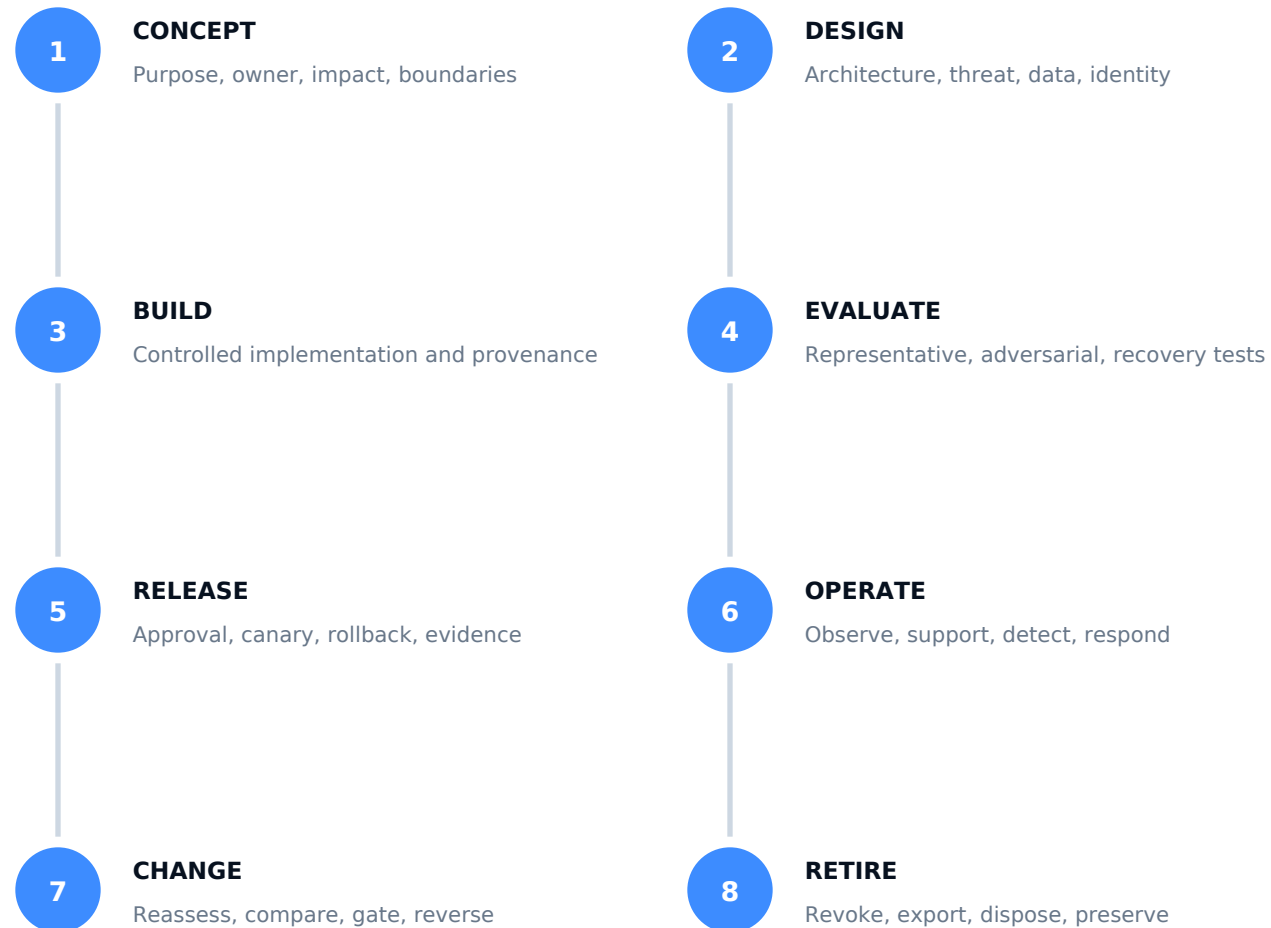
Profile selection rule

Choose the highest profile triggered by consequence, autonomy, sensitivity, scale, irreversibility, external dependency, or inability to rapidly detect and recover. Tailoring may strengthen controls; it may not erase a mandatory gate without a controlled exception.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

9.2 Operational Lifecycle

Evidence-bearing operation from concept through retirement



LIFECYCLE INVARIANT

Every stage **MUST** leave sufficient evidence for the next authority to understand what was intended, what changed, what was tested, what failed, what was accepted, what remains uncertain, and how to recover or exit.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

10. Adoption Roadmap

A sequenced path from uncontrolled capability to evidence-bearing operation

0-30 DAYS**Establish ownership and truth**

Inventory systems and dependencies; classify risk; freeze unsupported claims; identify immediate privilege, data, and evidence gaps.

31-90 DAYS**Create enforceable boundaries**

Define policy; isolate execution; implement identity and approval gates; establish representative evaluation and baseline telemetry.

3-6 MONTHS**Prove recovery and operating control**

Exercise failure, rollback, revocation, incident, provider exit, and state-recovery scenarios; mature evidence packaging.

6-12 MONTHS**Scale assurance**

Automate control checks; expand workload coverage; independent challenge; portfolio metrics; controlled exception expiry; continuous reassessment.

Adoption is complete only when operating evidence demonstrates the selected profile in the actual deployment context. Documentation alone is not conformance.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

10.2 Conformance and Exception Statement

What an assurance claim must contain

SYSTEM / SERVICE

Named, versioned capability and deployment boundary.

PROFILE

Foundational, Advanced, or High Assurance with trigger rationale.

SCOPE

Workloads, users, data, tools, regions, providers, and exclusions.

CRITERIA

Pass, partial, fail, not applicable, and exception status for every criterion.

EVIDENCE

Artifact references, evidence grade, date, environment, and reproducibility.

LIMITATIONS

Known failure modes, unsupported workloads, uncertainty, and residual risk.

EXCEPTIONS

Owner, rationale, compensating control, expiration, and approval.

VALIDITY

Assessment date, change boundary, review date, and reassessment triggers.

Prohibited claim: “compliant” without the named scope, profile, evidence date, limitations, exceptions, and authority accepting residual risk.

MYTHOS-ROB-0005 / ROBOTICS AND AUTONOMY

11. Source Authority and Reference Register

Primary sources informing interpretation; verify current status at assessment time

NIST CSF 2.0

Cybersecurity Framework 2.0

<https://doi.org/10.6028/NIST.CSWP.29>

Enterprise governance and cybersecurity outcome framework.

ISO 13482

Robots and Robotic Devices - Safety Requirements for Personal Care Robots

<https://www.iso.org/standard/53820.html>

Safety framework for service and personal-care robot classes.

NIST SP 800-53 Rev. 5

Security and Privacy Controls for Information Systems and Organizations

<https://doi.org/10.6028/NIST.SP.800-53r5>

Broad organizational control baseline for technology systems and services.

NIST AI RMF 1.0

Artificial Intelligence Risk Management Framework

<https://doi.org/10.6028/NIST.AI.100-1>

Risk management structure for trustworthy AI capabilities used in autonomous systems.

ISO 10218-1:2025

Robotics - Safety Requirements - Industrial Robots

<https://www.iso.org/standard/73933.html>

Current industrial robot design and inherent-safety requirements.

NIST Response Robot Test Methods

Standard Test Methods for Response Robots

<https://www.nist.gov/el/intelligent-systems-division-73500/standard-test-methods-response-robots>

Repeatable mobility, sensing, manipulation, endurance, and operator-proficiency tests.

ISO 10218-2:2025

Robotics - Safety Requirements - Industrial Robot Applications and Cells

<https://www.iso.org/standard/73934.html>

Current integration, commissioning, operation, maintenance, and disposal requirements.

Source currency rule: authorities, specifications, laws, provider services, hardware, protocols, standards status, and research evidence MUST be checked at assessment time. This publication records a 2026-07-24 source snapshot.

11.2 Revision History and Decision Register

Permanent identity, controlled change, and publication integrity

VERSION	DATE	STATE	SUMMARY
1.0.0-candidate	2026-07-24	Candidate	Permanent-publication edition; source refresh; expanded criteria, evidence, assurance, and lifecycle guidance.
Next review	2027-01-24	Scheduled	Review source currency, threat evolution, operating evidence, adoption feedback, and proposed revisions.

Publication decisions

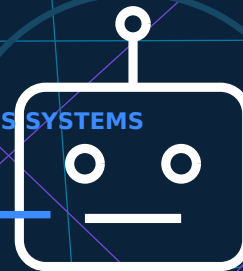
- PERMANENT IDENTITY** The document ID remains stable across revisions; batch or production sequence metadata is not public identity.
- CHANGE CONTROL** Normative changes require rationale, impact analysis, affected-criterion mapping, and approval.
- SUPERSESION** A superseded edition remains traceable; current routes and catalogs identify the active edition.
- CORRECTION** Material errors require a recorded correction, affected-evidence analysis, and notification appropriate to impact.
- ARCHIVAL INTEGRITY** Published artifacts receive hashes, metadata, and a release manifest sufficient for independent verification.

END OF PERMANENT PUBLICATION / MYTHOS-ROB-0005
MYTHOS SYSTEMS / ENGINEERING STANDARDS LIBRARY



ENGINEERING STANDARDS LIBRARY / ROBOTICS AND AUTONOMOUS SYSTEMS

Embodied AI, Foundation Model, and Robot Skill Learning Standard



Vision-language-action models, demonstrations, skill learning, grounding, tool use, memory, safety constraints, evaluation, updates, and operational evidence.

PERMANENT DOCUMENT ID

MYTHOS-ROB-0006

PUBLICATION

Candidate Standard
Version 1.0.0-candidate

ASSURANCE PROFILE

Research / Pilot / Operational
High Assurance

PERMANENT PUBLICATION IDENTITY

Embodied AI, Foundation Model, and Robot Skill Learning Standard			DOCUMENT ID MYTHOS-ROB-0006 VERSION 1.0.0-candidate STATUS Candidate Standard PUBLISHER Mythos Systems PUBLICATION DATE 2026-07-24 SCHEDULED REVIEW 2027-01-24 CLASSIFICATION Public
18 ATOMIC CRITERIA	6 ASSURANCE VIEWS	4 IMPLEMENTATION PROFILES	1 PERMANENT IDENTITY

Publication doctrine. This publication establishes durable requirements for its defined scope. Interpretation must preserve the permanent document identity, required evidence, controlled exceptions, source currency, and formal revision history.

EMERGING TECHNOLOGY AND ASSURANCE TOPOLOGY

Robotics and Autonomous Systems

A trustworthy embodied AI and robot skill learning program is a governed path from research claim through baseline, experiment, safety and security challenge, transition decision, bounded operation, and preserved evidence.

CLASSIFY

Separate established practice, candidate standard, reproduced result, vendor claim, implementation hypothesis, and open research.

EXPERIMENT

Declare baseline, configuration, uncertainty, scenario coverage, stop conditions, and independent reproduction before conclusions.

CONSTRAIN

Identity, policy, safety envelopes, physical boundaries, cryptographic authority, and human intervention limit consequence.

TRANSITION

Adoption, pilot, production, rollback, supplier exit, lifecycle, and retirement decisions remain evidence-bearing and reversible.

EVIDENCE - BOUND TRANSITION FLOW



No novelty claim becomes an operational claim without reproduced evidence and an explicit authority decision

INTERPRETATION AND ASSURANCE

How to apply this publication

Normative intent

Requirements define outcomes and constraints. Implementations may vary, but evidence must demonstrate equivalent control.

Evidence over assertion

Vendor documentation and design intent are not equivalent to reproduced behavior. Record evidence grade and uncertainty.

Risk-proportional depth

Higher consequence, autonomy, sensitivity, and irreversibility require stronger isolation, review, verification, and recovery.

Controlled exception

Exceptions require an owner, rationale, compensating control, residual-risk acceptance, expiration, and reevaluation trigger.

Normalized assessment scale

0	1	2	3	4	5
ABSENT	AD HOC	PARTIAL	OPERATIONAL	ADVANCED	LEADING

A numeric score must never hide a failed mandatory gate, missing evidence, untested workload, or unacceptable residual risk.

INTERACTIVE NAVIGATION

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Navigation doctrine

Bookmarks and internal links are conveniences. Permanent document identity, criterion identifiers, evidence references, and revision history remain authoritative.

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

0. Executive Mandate

Research value, transition discipline, and non-negotiable evidence boundaries

MANDATE

Organizations evaluating embodied AI and robot skill learning **MUST** separate research from operational authority, establish a reproducible baseline, constrain safety and security consequence, disclose uncertainty, and require a documented transition or rejection decision.

Required outcomes

- Establish a durable, product-neutral evidence system for embodied AI and robot skill learning.
- Prevent novelty, investment, vendor prestige, roadmap language, or laboratory success from substituting for operational proof.
- Require representative performance, adversarial, failure, recovery, safety, privacy, and lifecycle evidence.
- Keep pilots bounded by identity, authority, environment, duration, budget, stop conditions, and rollback.
- Preserve rejected alternatives, limitations, residual risk, source currency, and reassessment triggers.

Decision boundary: conformance supports a bounded engineering assurance position. It does not prove scientific consensus, regulatory approval, universal safety, quantum advantage, cryptographic perfection, autonomous competence, or commercial viability.

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

1. Scope and Applicability

Research, pilot, transition, operational, and retirement boundaries

IN SCOPE

- Research, architecture, acquisition, experiment, pilot, transition, operation, and retirement of embodied AI and robot skill learning.
- Hardware, software, models, data, protocols, facilities, people, suppliers, providers, physical processes, and evidence.
- Laboratory, simulation, testbed, shadow, pilot, canary, production, and field deployment states.
- Claims, benchmarks, uncertainty, safety, security, privacy, economics, interoperability, support, and exit.

OUT OF SCOPE

- Scientific truth inferred from a single benchmark, simulation, provider, hardware generation, or laboratory configuration.
- Safety, regulatory, export, spectrum, airspace, clinical, cryptographic, or standards approval not granted by the responsible authority.
- Roadmap forecasts, token price, patent counts, press releases, or investment treated as engineering evidence.
- Hidden production use of research components outside the declared transition and assurance boundary.

Applicability triggers

- The capability is novel, rapidly changing, weakly standardized, difficult to reproduce, or dependent on immature suppliers.
- A claim concerns safety, security, privacy, physical action, critical infrastructure, cryptographic trust, or consequential autonomy.
- The system requires specialized facilities, scarce hardware, spectrum, foundry, cryogenic, optical, robotics, or field-test dependencies.
- Failure or lock-in may create long-lived data, capital, infrastructure, workforce, or regulatory consequences.
- A research component is proposed for pilot, customer, production, public, or externally relied-upon use.

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

2. Definitions and Taxonomy

Controlled language for architecture, governance, and assessment

AUTHORITY

The right to approve, deny, constrain, or execute an action. Model output is not authority.

EVIDENCE

A reproducible source, trace, measurement, test, record, signed artifact, or documented observation supporting a claim.

ASSURANCE VIEW

A defined perspective such as governance, architecture, security, operations, privacy, or human oversight.

ATOMIC CRITERION

A uniquely identified requirement that can be assessed, evidenced, excepted, and revised independently.

IMPLEMENTATION PROFILE

A risk-proportional set of required depth, evidence, and gates for a class of use.

CONTROLLED EXCEPTION

A time-bounded deviation with owner, rationale, compensating control, residual risk, expiration, and review trigger.

DETERMINISTIC MECHANISM

A component whose inputs, policy, state transition, and side effects can be constrained and verified.

SOURCE AUTHORITY

The documented basis for treating a source as reliable for a defined claim, context, jurisdiction, and time.

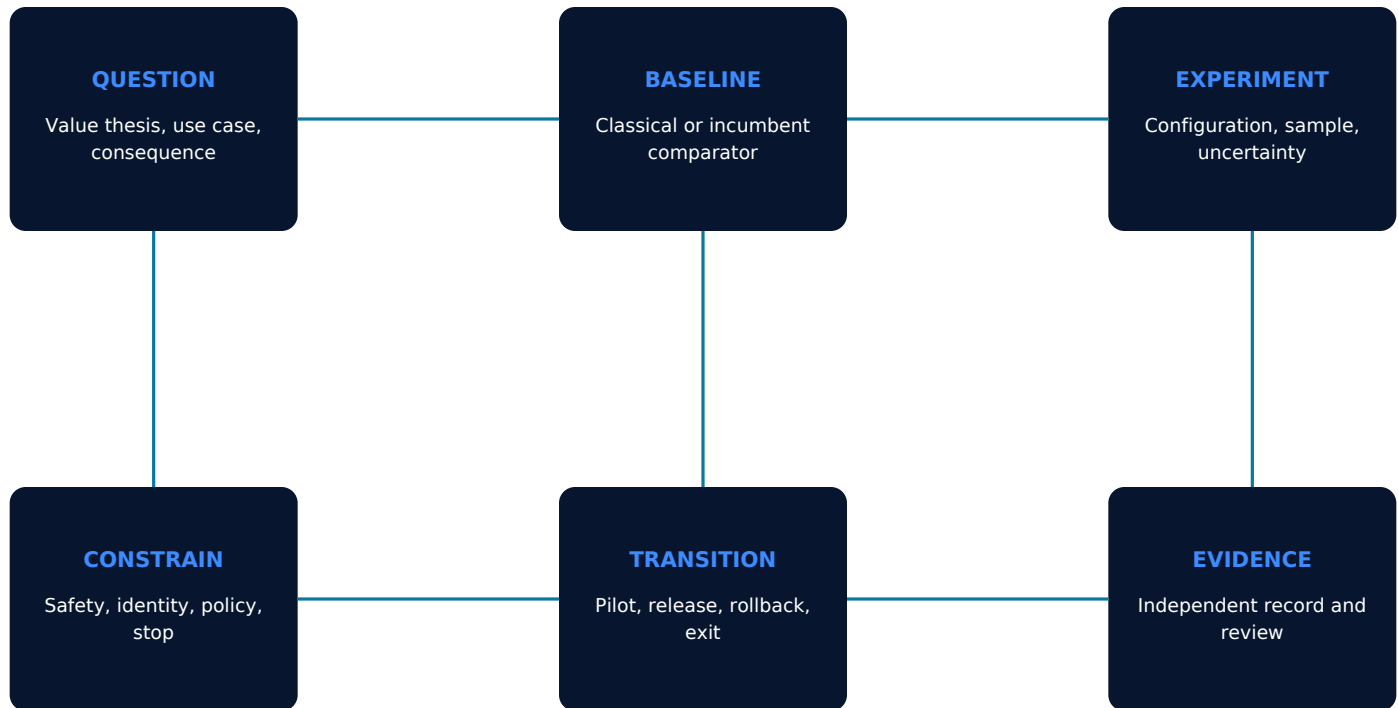
REASSESSMENT TRIGGER

A change, incident, drift signal, dependency revision, or time boundary requiring renewed evaluation.

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

3. Architecture and Trust Model

Separation of research, authority, physical systems, runtime, and evidence



Mandatory trust boundaries

- Research systems **MUST NOT** inherit production identity, secrets, authority, data, networks, or physical control by convenience.
- Claims **MUST** retain the exact hardware, software, model, protocol, calibration, environment, workload, and observation boundary.
- Safety, cryptographic, physical, spectrum, autonomy, and human-intervention constraints **MUST** remain independently enforceable.
- Transition **MUST** have a named decision authority, acceptance criteria, monitored pilot, rollback, supplier exit, and retirement path.
- Evidence **MUST** remain reviewable when a vendor, cloud, token network, laboratory, model, robot, or quantum backend is unavailable.

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

4. Governance and Accountability

Decision rights, separation of duties, and lifecycle ownership

ACCOUNTABLE OWNER

Accepts scope, risk tolerance, funding, and residual risk.

SYSTEM OWNER

Maintains architecture, inventory, operating boundaries, and change control.

SECURITY / PRIVACY

Defines threat, identity, data, isolation, monitoring, and incident requirements.

EVALUATION AUTHORITY

Designs representative tests, gates releases, and preserves reproducibility.

OPERATIONS

Maintains availability, rollback, recovery, evidence, and incident handling.

HUMAN OVERSIGHT

Reviews consequential decisions, exceptions, disputed outcomes, and harm signals.

DECISION PRINCIPLE

No single actor should be able to define the objective, grant authority, execute the consequential action, suppress evidence, and approve the result. Separation must be technical where consequence requires it.

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 01-04 of 18

MYTHOS-ROB-0006-C01

Embodied Model Purpose, Authority, and Prohibited Use

The organization **MUST** define, implement, verify, and maintain embodied model purpose, authority, and prohibited use for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0006-C02

Observation, Language, Action, and State Interface

The organization **MUST** define, implement, verify, and maintain observation, language, action, and state interface for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0006-C03

Training Data, Demonstration, Teleoperation, and Rights

The organization **MUST** define, implement, verify, and maintain training data, demonstration, teleoperation, and rights for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0006-C04

World Grounding, Object Affordance, and Spatial Semantics

The organization **MUST** define, implement, verify, and maintain world grounding, object affordance, and spatial semantics for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 05-08 of 18

MYTHOS-ROB-0006-C05

Action Token, Trajectory, Controller, and Timing Contract

The organization **MUST** define, implement, verify, and maintain action token, trajectory, controller, and timing contract for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0006-C06

Skill Library, Preconditions, Postconditions, and Composition

The organization **MUST** define, implement, verify, and maintain skill library, preconditions, postconditions, and composition for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0006-C07

Memory, Context, Personalization, and Retention

The organization **MUST** define, implement, verify, and maintain memory, context, personalization, and retention for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0006-C08

Tool, API, Device, and External-System Authority

The organization **MUST** define, implement, verify, and maintain tool, api, device, and external-system authority for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 09-12 of 18

MYTHOS-ROB-0006-C09

Safety Filter, Constraint, Shield, and Runtime Monitor

The organization **MUST** define, implement, verify, and maintain safety filter, constraint, shield, and runtime monitor for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0006-C10

Uncertainty, Abstention, Clarification, and Human Escalation

The organization **MUST** define, implement, verify, and maintain uncertainty, abstention, clarification, and human escalation for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0006-C11

Generalization, Transfer, Novel Object, and Novel Environment Test

The organization **MUST** define, implement, verify, and maintain generalization, transfer, novel object, and novel environment test for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE sensor calibration; dataset provenance; simulation validity; scenario and field-test coverage

MYTHOS-ROB-0006-C12

Reward, Preference, Imitation, and Reinforcement Governance

The organization **MUST** define, implement, verify, and maintain reward, preference, imitation, and reinforcement governance for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE identity, command, network, remote-access, software, firmware, model, and update evidence

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 13-15 of 18

MYTHOS-ROB-0006-C13**Simulation-to-Real, Domain Randomization, and Adaptation**

The organization **MUST** define, implement, verify, and maintain simulation-to-real, domain randomization, and adaptation for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE normal, degraded, adversarial, lost-link, lost-localization, and recovery test results

MYTHOS-ROB-0006-C14**Adversarial Instruction, Prompt Injection, and Deception**

The organization **MUST** define, implement, verify, and maintain adversarial instruction, prompt injection, and deception for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE operator training; human factors; takeover, rescue, maintenance, and incident procedure

MYTHOS-ROB-0006-C15**Model Update, Continual Learning, and Regression Protection**

The organization **MUST** define, implement, verify, and maintain model update, continual learning, and regression protection for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE fleet telemetry, mission record, decision trace, near-miss, maintenance, and change history

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

5. Normative Control System

Atomic criteria 16-18 of 18

MYTHOS-ROB-0006-C16**Latency, Compute, Energy, Connectivity, and Degraded Mode**

The organization **MUST** define, implement, verify, and maintain latency, compute, energy, connectivity, and degraded mode for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE acceptance, revalidation, regulatory review, residual risk, retirement, and evidence archive

MYTHOS-ROB-0006-C17**Representative Task, Recovery, and Human Baseline Evaluation**

The organization **MUST** define, implement, verify, and maintain representative task, recovery, and human baseline evaluation for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE robot and application boundary; ODD; hazard analysis; safety and cybersecurity ownership

MYTHOS-ROB-0006-C18**Release Gate, Runtime Evidence, and Reassessment**

The organization **MUST** define, implement, verify, and maintain release gate, runtime evidence, and reassessment for the declared embodied AI and robot skill learning boundary. The record **MUST** identify accountable ownership, evidence state, exact configuration, assumptions, affected people and systems, failure and recovery behavior, uncertainty, transition authority, and reassessment triggers. The operational design domain, hazard controls, human intervention, safe state, physical consequence, field validation, and incident evidence **MUST** be testable.

MINIMUM EVIDENCE safety function validation; stop, intervention, safe-state, and stored-energy tests

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

6. Evidence and Assessment

Reproduce, compare, challenge, observe, recover, and trace

EXAMINE

Research papers, standards, designs, bills of material, protocols, source, models, data, calibration, configurations, contracts, and claims.

REPRODUCE

Repeat the experiment or assessment with captured versions, seeds, parameters, environment, uncertainty, and acceptance criteria.

COMPARE

Use an honest incumbent, classical, manual, or alternative baseline with equivalent outcome, data, scale, and resource accounting.

CHALLENGE

Apply adversarial input, environmental variation, dependency loss, fault injection, safety cases, security tests, and boundary conditions.

OBSERVE

Measure field or production-like quality, latency, energy, drift, physical behavior, interventions, failures, maintenance, and user impact.

TRACE

Link claim, authority, experiment, configuration, evidence, decision, pilot, change, incident, rollback, and reassessment.

Evidence grades

A

Independently reproduced, current, representative, uncertainty-bounded, integrity-protected, and operationally relevant.

B

Reproduced by the implementing organization with strong provenance, comparator, challenge, and declared limitations.

C

Partial, laboratory-only, simulation-heavy, inherited, or indirect evidence with material uncertainty and dependencies.

D

Roadmap, assertion, demonstration, benchmark excerpt, patent, token metric, press release, or vendor statement without...

MYTHOS-ROB-0006 / ROBOTICS AND AUTONOMY

7. Assurance Views

Six perspectives required for a complete assurance claim

GOVERNANCE

Ownership, purpose, risk tolerance, policy, exception, and decision rights.

ARCHITECTURE

Boundaries, dependencies, failure modes, state, data flow, and portability.

SECURITY

Identity, authorization, isolation, secrets, abuse resistance, and incident response.

OPERATIONS

Reliability, performance, cost, observability, change, recovery, and support.

PRIVACY / RIGHTS

Purpose limitation, minimization, consent, access, correction, deletion, and egress.

HUMAN / SOCIETAL

Usability, accessibility, disclosure, contestability, impact, and human control.

Conformance requires a defensible position across every applicable view. A strong aggregate score cannot compensate for an unowned system, a failed mandatory gate, untested recovery, or evidence below the accepted grade.

7.2 Evaluation Metrics and Decision Gates

Measures expose utility, uncertainty, safety, physical limits, transition cost, and lifecycle burden

UTILITY

Task outcome, comparator delta, coverage, quality, accuracy, mission success, and stakeholder value.

UNCERTAINTY

Confidence, calibration, variance, sample coverage, reproducibility, sensitivity, and unresolved assumptions.

PERFORMANCE

Latency, throughput, fidelity, range, precision, bandwidth, scale, density, and availability.

SAFETY / SECURITY

Hazard exposure, unsafe action, exploitability, spoofing, physical consequence, intervention, and containment.

RESOURCE

Energy, power, cooling, spectrum, shots, qubits, memory, materials, facility, operator, and maintenance demand.

MATURITY

Standards state, supply chain, interoperability, tooling, skills, support, qualification, and lifecycle readiness.

ECONOMICS

Acquisition, operation, provider, token, facility, migration, insurance, support, and opportunity cost.

TRANSITION

Pilot escape, rollback time, incumbent fallback, portability, lock-in, retirement, and evidence completeness.

Decision gate: thresholds **MUST** be declared before assessment, include an incumbent baseline and uncertainty statement, and identify any safety, security, cryptographic, physical, reproducibility, or rollback failure that blocks transition.

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8. Failure Modes and Adversarial Scenarios

Challenge assumptions before the system is trusted with consequential work

UNSAFE AUTONOMY

The robot acts outside its operational design domain or safety envelope.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

PERCEPTION COLLAPSE

Occlusion, weather, spoofing, drift, calibration, or domain shift produces hazardous state estimates.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

HUMAN INTERVENTION FAILURE

Operators cannot understand, stop, take over, or recover the system in time.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

CYBER-PHYSICAL COMMAND ABUSE

Compromised identity, network, software, model, or tool issues unsafe motion or process actions.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

FLEET-CORRELATED FAILURE

A map, model, update, scheduler, battery, cloud, or communications dependency affects many robots at once.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

LEARNING REGRESSION

A model or skill update degrades safety, task quality, fairness, explainability, or recovery behavior.

REQUIRED: PREVENT | DETECT | CONTAIN | RECOVER | EVIDENCE

Adversarial testing MUST protect people and production systems. Use isolated environments, synthetic or minimized data, bounded authority, kill switches, explicit legal and ethical review, and documented stop conditions.

9. Implementation Profiles

Risk-proportional implementation without weakening mandatory boundaries

FOUNDATIONAL	ADVANCED	HIGH ASSURANCE
TYPICAL SCOPE Low consequence, limited autonomy, non-sensitive data, reversible outputs.	TYPICAL SCOPE Business-critical workflow, sensitive data, multiple tools or providers, moderate autonomy.	TYPICAL SCOPE Safety, security, regulated, financial, identity, or broadly consequential use.
MINIMUM DEPTH Named owner; inventory; basic evaluation; access control; logging; rollback; annual review.	MINIMUM DEPTH Formal threat model; representative evaluation; approval gates; isolated execution; tested recovery; quarterly review.	MINIMUM DEPTH Independent challenge; strongest identity; deterministic enforcement; comprehensive evidence; canary release; continuous monitoring.

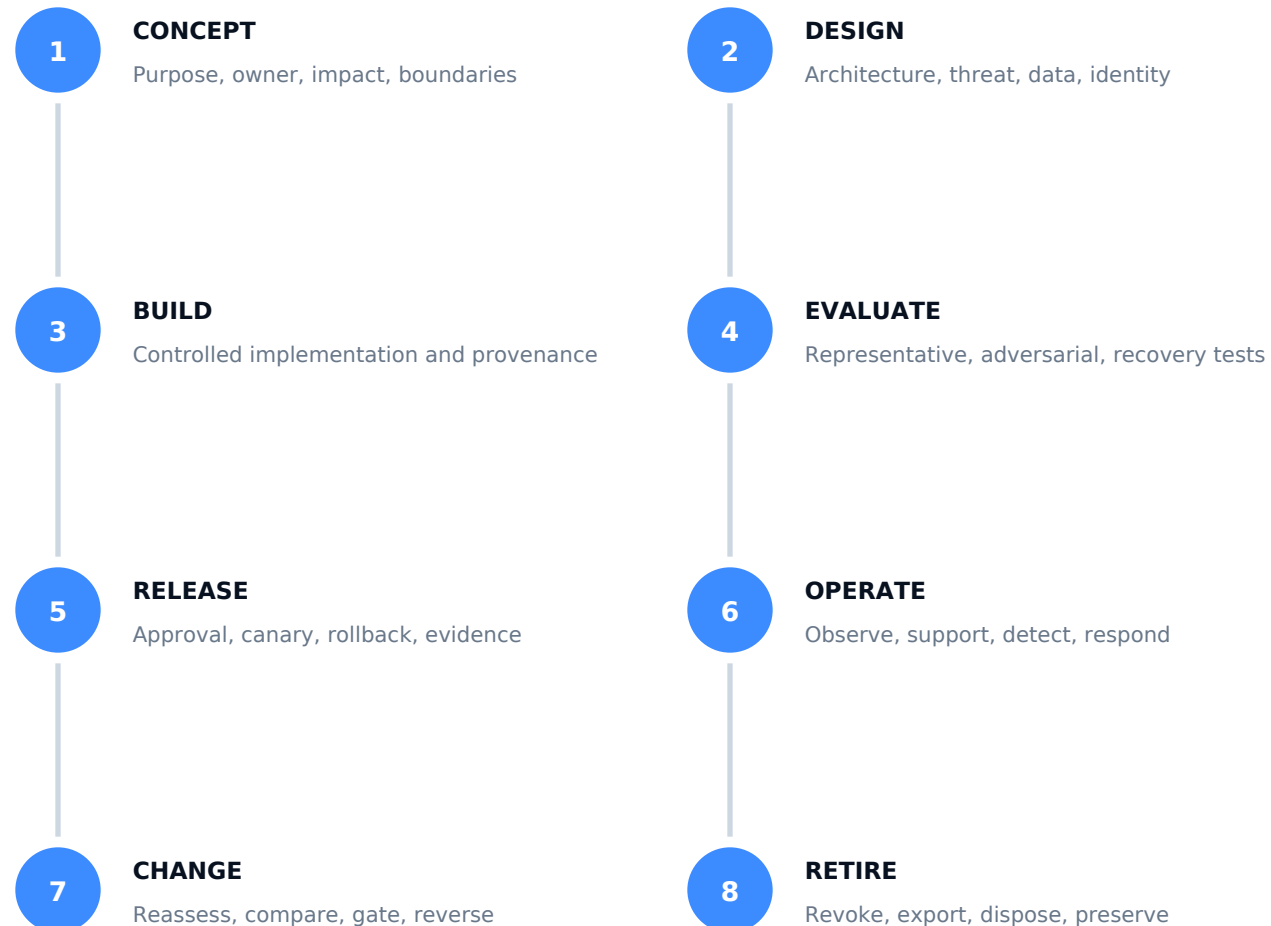
Profile selection rule

Choose the highest profile triggered by consequence, autonomy, sensitivity, scale, irreversibility, external dependency, or inability to rapidly detect and recover. Tailoring may strengthen controls; it may not erase a mandatory gate without a controlled exception.

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9.2 Operational Lifecycle

Evidence-bearing operation from concept through retirement



LIFECYCLE INVARIANT

Every stage **MUST** leave sufficient evidence for the next authority to understand what was intended, what changed, what was tested, what failed, what was accepted, what remains uncertain, and how to recover or exit.

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10. Adoption Roadmap

A sequenced path from uncontrolled capability to evidence-bearing operation

0-30 DAYS**Establish ownership and truth**

Inventory systems and dependencies; classify risk; freeze unsupported claims; identify immediate privilege, data, and evidence gaps.

31-90 DAYS**Create enforceable boundaries**

Define policy; isolate execution; implement identity and approval gates; establish representative evaluation and baseline telemetry.

3-6 MONTHS**Prove recovery and operating control**

Exercise failure, rollback, revocation, incident, provider exit, and state-recovery scenarios; mature evidence packaging.

6-12 MONTHS**Scale assurance**

Automate control checks; expand workload coverage; independent challenge; portfolio metrics; controlled exception expiry; continuous reassessment.

Adoption is complete only when operating evidence demonstrates the selected profile in the actual deployment context. Documentation alone is not conformance.

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10.2 Conformance and Exception Statement

What an assurance claim must contain

SYSTEM / SERVICE

Named, versioned capability and deployment boundary.

PROFILE

Foundational, Advanced, or High Assurance with trigger rationale.

SCOPE

Workloads, users, data, tools, regions, providers, and exclusions.

CRITERIA

Pass, partial, fail, not applicable, and exception status for every criterion.

EVIDENCE

Artifact references, evidence grade, date, environment, and reproducibility.

LIMITATIONS

Known failure modes, unsupported workloads, uncertainty, and residual risk.

EXCEPTIONS

Owner, rationale, compensating control, expiration, and approval.

VALIDITY

Assessment date, change boundary, review date, and reassessment triggers.

Prohibited claim: “compliant” without the named scope, profile, evidence date, limitations, exceptions, and authority accepting residual risk.

11. Source Authority and Reference Register

Primary sources informing interpretation; verify current status at assessment time

NIST CSF 2.0

Cybersecurity Framework 2.0

<https://doi.org/10.6028/NIST.CSWP.29>

Enterprise governance and cybersecurity outcome framework.

ISO 13482

Robots and Robotic Devices - Safety Requirements for Personal Care Robots

<https://www.iso.org/standard/53820.html>

Safety framework for service and personal-care robot classes.

NIST SP 800-53 Rev. 5

Security and Privacy Controls for Information Systems and Organizations

<https://doi.org/10.6028/NIST.SP.800-53r5>

Broad organizational control baseline for technology systems and services.

NIST AI RMF 1.0

Artificial Intelligence Risk Management Framework

<https://doi.org/10.6028/NIST.AI.100-1>

Risk management structure for trustworthy AI capabilities used in autonomous systems.

ISO 10218-1:2025

Robotics - Safety Requirements - Industrial Robots

<https://www.iso.org/standard/73933.html>

Current industrial robot design and inherent-safety requirements.

NIST Response Robot Test Methods

Standard Test Methods for Response Robots

<https://www.nist.gov/el/intelligent-systems-division-73500/standard-test-methods-response-robots>

Repeatable mobility, sensing, manipulation, endurance, and operator-proficiency tests.

ISO 10218-2:2025

Robotics - Safety Requirements - Industrial Robot Applications and Cells

<https://www.iso.org/standard/73934.html>

Current integration, commissioning, operation, maintenance, and disposal requirements.

Source currency rule: authorities, specifications, laws, provider services, hardware, protocols, standards status, and research evidence MUST be checked at assessment time. This publication records a 2026-07-24 source snapshot.

11.2 Revision History and Decision Register

Permanent identity, controlled change, and publication integrity

VERSION	DATE	STATE	SUMMARY
1.0.0-candidate	2026-07-24	Candidate	Permanent-publication edition; source refresh; expanded criteria, evidence, assurance, and lifecycle guidance.
Next review	2027-01-24	Scheduled	Review source currency, threat evolution, operating evidence, adoption feedback, and proposed revisions.

Publication decisions

- PERMANENT IDENTITY** The document ID remains stable across revisions; batch or production sequence metadata is not public identity.
- CHANGE CONTROL** Normative changes require rationale, impact analysis, affected-criterion mapping, and approval.
- SUPERSESSION** A superseded edition remains traceable; current routes and catalogs identify the active edition.
- CORRECTION** Material errors require a recorded correction, affected-evidence analysis, and notification appropriate to impact.
- ARCHIVAL INTEGRITY** Published artifacts receive hashes, metadata, and a release manifest sufficient for independent verification.

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