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CROSSWALK / SUPERSESSION MAPPING

GAISSF Domain 9 to PAI-SF Control Crosswalk

Crosswalk / Supersession Mapping

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Document Control

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1. Decision Summary

Decision: GAISSF Domain 9 should be retained for citation continuity but marked superseded/expanded by PAI-SF™ v1.0 once the GAISSF Ecosystem documentation is updated. This crosswalk identifies where each D9 control lands in the PAI-SF control register.

Numbering note: MEMO-PAISF-003 is already assigned to the documentation maturity gap assessment. This crosswalk therefore uses CSX-PAISF-004 as the next PAI-SF documentation artifact.

Claim boundary: This document does not state that the live GAISSF site has already been changed. It records the mapping required to execute that change correctly.

2. Source Basis

- **GAISSF source reviewed:** GAISSF v1.0 publication text, Domain D9: Physical AI Safety, D9-CTL-01 through D9-CTL-07. *(D9 control names confirmed accurate by ODA3 Institute — see revision note below.)*
- **PAI-SF source reviewed:** ODA3-2026-07-TCR-PAISF-001; Appendix A lists 41 controls across 12 domains.
- **Evidence posture:** internal ODA3 source material and framework crosswalk analysis. No regulator, standards body, laboratory, or customer validation is claimed.
- **Execution dependency:** the public GAISSF page must still be updated separately to mark Domain 9 as superseded/expanded by PAI-SF.

3. Control-by-Control Crosswalk

Mapping rule: A D9 control is not treated as deleted. Each is mapped to the narrower PAI-SF controls that preserve, split, or strengthen its intent. Where PAI-SF adds coverage not present in D9, that expansion is identified in the rationale.

GAISSF D9	D9 Control	Primary PAI-SF Controls	Disposition	Mapping Rationale
D9-CTL-01	Physical Harm Boundary Enforcement	PAI-SF-ACT-001; PAI-SF-SAF-001; PAI-SF-ENV-003; PAI-SF-FSI-002	Expanded	D9's broad harm-boundary requirement becomes separate PAI-SF controls for independent kinematic limits, defined safe-state responses, human-proximity zone design, and mapping to applicable safety-integrity obligations.
D9-CTL-02	Safe State and Graceful Degradation	PAI-SF-SAF-001; PAI-SF-SAF-002; PAI-SF-SAF-003; PAI-SF-SAF-004; PAI-SF-DEG-001	Expanded	PAI-SF splits the D9 safe-state concept into credible failure-mode definition, model-drift triggers, compute-compromise independence, verified fallback control law, and degraded-mode entry/exit criteria.
D9-CTL-03	Human Override and Emergency Stop	PAI-SF-HOV-001; PAI-SF-HOV-002; PAI-SF-HOV-003; PAI-SF-AUT-004	Expanded	PAI-SF preserves independent override but adds operator familiarity, reset integrity after override, and authenticated control-handoff integrity between autonomous and human modes.
D9-CTL-04	Cyber-Physical Attack Detection	PAI-SF-SEN-003; PAI-SF-ACT-003; PAI-SF-TEL-001; PAI-SF-TEL-002; PAI-SF-TEL-003; PAI-SF-IRP-001	Expanded	D9's detection layer is decomposed into adversarial physical-input detection, actuator divergence monitoring, telemetry integrity and independence, threat-model coverage validation, and containment playbooks.
D9-CTL-05	Physical	PAI-SF-SEN-001;	Expanded	PAI-SF separates

GAISSF D9	D9 Control	Primary PAI-SF Controls	Disposition	Mapping Rationale
	Environment Integrity Monitoring	PAI-SF-SEN-002; PAI-SF-ENV-001; PAI-SF-ENV-002; PAI-SF-ENV-003; PAI-SF-AUT-002		sensor trust from operating-environment specification: sensor fusion and calibration live in Domain 1, while environment specification, change detection, proximity zones, and ODD governance are explicit controls.
D9-CTL-06	Actuator Command Verification	PAI-SF-ACT-001; PAI-SF-ACT-002; PAI-SF-ACT-003; PAI-SF-SAF-003; PAI-SF-FSI-004	Expanded	PAI-SF turns actuator verification into a command-safety cluster: independent bounds, replay/timing protection, divergence monitoring, independence under compute compromise, and exception escalation for uncovered safety-case gaps.
D9-CTL-07	Physical Incident Evidence Preservation	PAI-SF-TEL-001; PAI-SF-TEL-004; PAI-SF-IRP-002; PAI-SF-IRP-003; PAI-SF-SUP-002	Expanded	PAI-SF maps evidence preservation into telemetry integrity/custody, volatile physical evidence preservation, hardware-in-the-loop revalidation before return-to-service, and staged update regression evidence.

4. Consolidated Theme View

The table below groups the seven D9 controls into the major assurance themes now expressed across PAI-SF's 12-domain architecture.

Theme	D9 Source	PAI-SF Landing Zone	Why It Matters
Sensor trust	D9-CTL-04; D9-CTL-05	SEN-001, SEN-002, SEN-003	D9 blended detection and environmental reliability; PAI-SF separates validation, calibration, and adversarial input

Theme	D9 Source	PAI-SF Landing Zone	Why It Matters
			detection.
Actuation trust	D9-CTL-01; D9-CTL-06	ACT-001, ACT-002, ACT-003	PAI-SF treats physical command safety as its own domain with replay/timing and divergence controls.
Autonomy boundary	D9-CTL-02; D9-CTL-03; D9-CTL-05	AUT-001, AUT-002, AUT-003, AUT-004	PAI-SF adds autonomy-level governance and ODD change control that D9 only implied.
Safe/degraded operation	D9-CTL-02	SAF-001 to SAF-004; DEG-001	D9's single control becomes a full safe-state and degraded-mode control family.
Telemetry/evidence	D9-CTL-04; D9-CTL-07	TEL-001 to TEL-004; IRP-002	PAI-SF distinguishes runtime monitoring fitness from post-incident evidence custody.
Functional safety interface	D9-CTL-01; D9-CTL-06	FSI-001 to FSI-004	PAI-SF states the security/safety boundary and escalates uncovered AI-driven hazards without claiming safety certification ownership.

5. Implementation Guidance

- In GAISSE documentation, retain D9 as a historical/citation-continuity domain and add a pointer: superseded/expanded by PAI-SF™ v1.0.
- Do not remove D9 control numbers from prior GAISSE materials; existing citations should remain intelligible.
- Use PAI-SF controls as the authoritative physical-AI security assurance source for new assessments, publications, training, and partner material.
- Where an assessment already cites D9, migrate evidence requests to the mapped PAI-SF controls and record the D9 citation as historical source lineage.
- Do not imply PAI-SF is a safety certification scheme. Functional safety, product safety, and sector-specific certification remain external regimes.

6. Notably Absent

- No claim that the public GAISSE site has already implemented the D9 stub/supersession pointer.
- No claim of regulator, ISO, IEC, UL, TÜV, automotive, aviation, medical-device, or industrial-safety-body endorsement.
- No certification decision logic, scoring method, auditor checklist, red-team method, lab procedure, or scenario library is disclosed.
- No claim that all D9 evidence artifacts automatically satisfy PAI-SF evidence expectations; mapped controls may require additional evidence.

- No safety-ownership claim: PAI-SF remains a physical-AI security assurance framework interfacing with, not replacing, functional safety.

7. Open Items

1. Update GAISSF Ecosystem metadata to add PAI-SF as the fourth core framework.
2. Update GAISSF Domain 9 public/documentation text to the decided superseded/expanded posture.
3. Confirm whether a public-safe version of this crosswalk should be published once the GAISSF site update is complete, or whether it remains Controlled indefinitely.

Revision Note (01 August 2026)

The GAISSF D9 control names and content in Section 3 (D9-CTL-01 through D9-CTL-07) were flagged in an earlier review round as unverified — this analysis had only confirmed GAISSF Domain 9's existence and control count (7), not the individual control titles. ODA3 Institute has since confirmed these names are accurate. This document is accordingly treated as verified, not provisional, as of this revision.