SENTINEL AUTHORITY

ODDC Regulatory Mapping

Regulatory Framework Alignment

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ODDC Regulatory Mapping shows how the Operational Design Domain Conformance framework maps to existing and emerging regulatory frameworks for autonomous system oversight. ODDC does not replace existing regulatory authority. It provides the independent, continuous behavioral verification data that regulators need to exercise their existing authority over autonomous systems effectively. Intended for regulators, policy staff, and procurement officials.

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Independent conformance determination. Sentinel Authority is not a regulator. This document does not constitute legal advice or regulatory guidance. Regulatory applicability varies by jurisdiction.

1. Regulatory Alignment Matrix

Each row identifies a regulatory framework, what it currently requires, the gap ODDC addresses, and the specific ODDC component that fills it. Every framework below verifies either design intent, management process, or point-in-time assessment. None provides continuous, independent verification that an autonomous system operates within its declared boundaries after deployment.

Framework	Current Requirement	Gap	ODDC Component
NHTSA (United States)	Voluntary Safety Self-Assessment (VSSA). No mandatory behavioral verification for ADS.	No independent verification that autonomous systems operate within declared boundaries at runtime.	ENVELO Interlock provides continuous runtime boundary enforcement. CAT-72 validates 72 hours of enforcement data. Public registry provides real-time compliance status.
Transport Canada (CCMTA Guidelines)	Guidelines for Testing Automated Driving Systems. Provincial jurisdiction for deployment.	No standardized method for provinces to verify ODD compliance post-deployment.	ODDC certificate provides provinces with a standardized, independently verified conformance determination. Registry enables cross-provincial visibility.
EU AI Act (Regulation 2024/1689)	High-risk AI systems require conformity assessment, post-market monitoring, and registration.	Conformity assessment verifies management systems and documentation, not runtime behavioral compliance.	Behavioral attestation layer complementing EU conformity assessment. Continuous telemetry satisfies post-market monitoring obligations under Art. 72.
UNECE WP.29 (R155 / R156 / R157)	Type approval for ALKS. Requires ODD declaration and system safety case.	Type approval is point-in-time. No continuous verification of ODD compliance post-deployment.	Continuous post-approval ODD conformance monitoring. ENVELO enforces declared boundaries in real time. Deviation triggers automatic non-conformance.
ISO/SAE 21434 (Cybersecurity)	Cybersecurity engineering lifecycle for road vehicles. Risk assessment and monitoring.	Focuses on cybersecurity threats, not operational boundary enforcement.	ENVELO telemetry is cryptographically signed with hash-chain integrity, providing tamper-evident audit records complementing cybersecurity monitoring.
ISO 42001 (AI Management)	AI management system standard. Process-level controls, risk assessment, documentation.	Verifies that management processes exist. Does not verify runtime behavior within boundaries.	ODDC is the behavioral verification layer. ISO 42001 attests to process. ODDC attests to behavior. Complementary, not competing.

Framework	Current Requirement	Gap	ODDC Component
NIST AI RMF (AI 100-1)	Voluntary risk management framework. Govern, Map, Measure, Manage functions.	Provides structure but no mechanism for continuous runtime verification.	Operationalizes Measure and Manage with continuous enforcement data. Registry and telemetry provide auditable evidence for Govern.
ASTM F3269-21 (Run-Time Assurance)	Standard practice for runtime assurance using the Simplex architecture.	Defines the architecture but provides no certification, verification, or public registry.	ENVELO implements Simplex RTA. ODDC provides the independent certification and registry layer that F3269 does not address.

2. Integration Model

2.1 Adoption Mechanisms

ODDC is designed to be adopted by reference, not to require new legislation. Regulators can integrate ODDC into their existing authority through three mechanisms:

Mechanism	Description
Condition of Deployment Permit	Jurisdictions issuing autonomous vehicle deployment permits can require active ODDC certification as a permit condition. The public registry provides real-time verification that the condition is met. No new statutory authority is required — this falls within existing permitting power.
Procurement Specification	Government agencies procuring autonomous systems (transit, defense, infrastructure) can specify ODDC certification in RFP requirements. This requires no regulatory action — it is a procurement decision using existing purchasing authority.
Insurance Requirement	Regulators can require that autonomous system operators maintain liability insurance, and insurers can require ODDC certification as an underwriting condition. This creates market-driven adoption without direct regulatory mandate.

2.2 Jurisdictional Readiness

Jurisdiction	Current Posture	Adoption Path	Readiness
United States	Fragmented state-level AV regulation. Federal VSSA voluntary. NHTSA exploring ADS framework.	State DOTs adopt as permit condition. Federal adoption through NHTSA standing general order or updated FMVSS.	High
Canada	Provincial jurisdiction. CCMTA guidelines non-binding. TC exploring national framework.	Provincial adoption as testing/deployment permit condition. TC endorsement as recommended practice.	High
European Union	AI Act enacted. UNECE type approval. Strong regulatory infrastructure.	Complement existing conformity assessment under AI Act Art. 43. Notified body recognition pathway.	Medium
United Kingdom	Automated Vehicles Act 2024. ASDE regulatory framework in development.	Align with ASDE authorization scheme. ODDC provides continuous monitoring component.	High

Jurisdiction	Current Posture	Adoption Path	Readiness
Japan	Revised Road Traffic Act permits Level 4. MLIT type designation system.	Complement MLIT type designation with continuous post-approval behavioral verification.	Medium
Singapore	LTA regulatory sandbox for AVs. CETRAN testing facility operational.	Supplement sandbox exit criteria with continuous ODDC certification for production deployment.	High

3. The Regulatory Proposition

3.1 What ODDC Gives Regulators

Capability	Description
Independent Verification	ODDC is operated by Sentinel Authority, structurally independent from system manufacturers and operators. Conformance determinations are based on enforcement telemetry, not self-reported data.
Continuous Monitoring	Unlike point-in-time certification, ODDC provides continuous post-deployment behavioral verification. Systems are monitored for the entire duration of their certification, not just at initial assessment.
Public Registry	All conformance determinations are recorded in a public, tamper-evident registry. Regulators, insurers, fleet operators, and the public can verify any system's certification status in real time.
Automatic Non-Conformance	Systems that violate declared operational boundaries are automatically flagged as non-conformant. No human approval is required for enforcement. Reinstatement requires documented human authorization.
Safety Independence	The ENVELO Interlock is a safety enforcement mechanism. Sentinel Authority never disables, degrades, or modifies the Interlock for any non-safety reason, including billing disputes or contract termination. Enforcement consequences are exclusively reputational and regulatory — through the public registry.

3.2 Key Principle

Every regulatory framework currently in effect verifies either design intent, management process, or point-in-time assessment. None provides continuous, independent verification that an autonomous system actually operates within its declared boundaries after deployment. ODDC fills this structural gap without replacing or competing with any existing framework.

4. Related Documents

Document	Version	Description
ODDC Standard Specification	v1.0	Authoritative specification for the ODD Conformance Determination program
Governance & Independence Statement	v1.0	Structural separation between the ODDC standard and the certifying body
ENVELO Interlock Requirements	v3.0	Technical requirements for the Enforced Non-Violable Execution-Limit Override interlock
CAT-72 Procedure	v4.0	Sustained cumulative verification of enforcement mechanisms
ODDC Certification Guide	v5.0	Complete process guide from inquiry through continued monitoring

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