

ARCO REGULATORY DETERMINATION CASE  
Deterministic Risk Classification Under the EU AI Act

System Evaluated: Sentinel-ID (Reference Instance)  
Assessment Framework: ARCO (Assurance & Regulatory Classification Ontology)  
Regulatory Regime: EU Artificial Intelligence Act  
Relevant Provisions: Article 6, Annex III  
Assessment Type: Formal Ontological Determination  
Assessment Date: [Insert Date]

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## 1. Purpose

This document records a formal regulatory classification produced using the ARCO Assurance Framework.

It answers one question:

Does the evaluated system fall under the EU AI Act's High-Risk classification as a matter of logical necessity, and can that conclusion be deterministically justified and audited?

This determination is not probabilistic, advisory, or a subjective legal opinion.

It is the result of formal ontological representation, structural validation, and deterministic logical inference.

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## 2. System Under Evaluation

### 2.1 System Description

Sentinel-ID is a reference AI-enabled system used to demonstrate regulatory determination mechanics.

The system includes material components that bear dispositions enabling:

- capture of human facial features
- extraction of biometric templates
- comparison against identity representations

The system may be deployed in controlled-access environments.

### 2.2 Realization vs. Capability

The system is not assumed to be actively configured for biometric identification.

ARCO explicitly distinguishes between:

- **Realized Functions:** what the system is currently configured to do
- **Dispositions (Capabilities):** what the system is capable of doing by virtue of its structure

Regulatory classification under the EU AI Act depends on capability, not intent or configuration.

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### **3. Regulatory Criterion**

Under Article 6 and Annex III, AI systems that bear the disposition to perform biometric identification of natural persons in regulated contexts are classified as High-Risk.

This criterion applies regardless of whether the capability is currently enabled.

The regulatory question evaluated is:

Does Sentinel-ID bear a biometric identification disposition as defined under Annex III?

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### **4. ARCO Determination Pipeline**

#### **4.1 Ontological Representation**

System components, capabilities, and relations are encoded as instances in the ARCO Knowledge Graph, aligned to BFO distinctions between:

- Material Entities
- Dispositions
- Realizations

#### **4.2 Structural Validation (SHACL)**

SHACL constraints enforce:

- completeness of system documentation
- explicit declaration of sensing and processing components
- prohibition of implicit or assumed capabilities

Only structurally admissible system representations proceed to evaluation.

#### **4.3 Deterministic Evaluation (SPARQL ASK)**

Boolean ASK queries test whether the encoded system satisfies the necessary and sufficient conditions for Annex III classification.

#### **4.4 Logical Inference (OWL)**

OWL reasoning derives latent regulatory consequences from the declared system capabilities.

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### **5. Determination Logic and Results**

#### **5.1 Structural Validation Result**

All required system components passed SHACL validation.

This confirms:

- the system description is structurally complete
- no required regulatory attributes are missing
- no classification is derived from assumed documentation gaps

## 5.2 Deterministic Query Result

SPARQL ASK Query:

Does the system instantiate a biometric identification disposition as defined under Annex III?

Result: **TRUE**

This result follows from the presence of:

- facial feature capture capability
- biometric template extraction capability
- comparison or matching capability against identity representations

## 5.3 Ontological Consequence

Given:

- a system that bears a biometric identification disposition
- a regulatory framework that classifies such dispositions as High-Risk

It follows by logical necessity that:

Sentinel-ID is classified as a High-Risk AI System under Article 6 and Annex III of the EU AI Act.

This conclusion is invariant under deployment configuration or stated intent.

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# 6. Determination Outcome

## 6.1 Regulatory Status

Final Determination: **HIGH-RISK AI SYSTEM**

This determination is:

- deterministic
- reproducible

- auditable
- independent of discretionary human judgment after encoding

## 6.2 Triggering Conditions

The classification is triggered by:

- latent biometric identification capability
  - structural sufficiency to perform regulated biometric tasks
  - ontological alignment with Annex III criteria
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## 7. Traceability and Reproducibility

### 7.1 Audit Trace

The determination is supported by:

- SHACL validation logs confirming structural admissibility
- SPARQL ASK query outputs demonstrating satisfaction of risk criteria
- ontological mappings linking system capabilities to regulatory concepts

### 7.2 Independent Reproduction

Any third party with access to the following artifacts can independently reproduce this determination:

- the ARCO ontology
- the Sentinel-ID instance data
- the associated SHACL and SPARQL artifacts

No proprietary heuristics or opaque judgment is involved.

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## 8. Scope Note

This determination:

- establishes regulatory classification
- does not recommend mitigation measures
- does not assess proportionality or exemptions
- does not substitute for legal counsel

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## **9. Conclusion**

This Determination Case demonstrates that ARCO produces regulatory classifications as formal consequences of system structure.

The result is grounded in ontological commitments, derived through deterministic logic, and auditable at every inferential step.

This document serves as the reference determination against which all supporting ARCO artifacts derive their purpose.