

ARTEFACT 2

System and DPI Architecture Overview

Satellite Profiling & Data Infrastructure

1. Architecture Overview

The Satellite Profiling Platform is structured as a modular, requirements-traceable DPI system. The architecture clusters Spacecap functional requirements into interoperable domains that support mission onboarding, profiling, lifecycle governance, compliance management, and executive oversight.

A. Mission & Asset Registration Domain

This domain is responsible for establishing the authoritative system-of-record for all satellite missions and assets.

Core functions:

- Satellite technical parameter capture (payload, orbit, mass, frequency bands)
- Orbital and mission classification metadata
- Ownership, custodianship, and institutional attribution
- Mission objective and deployment data entry

Architectural Role

Creates structured baseline data required for downstream validation, compliance checks, and lifecycle tracking.

B. Profiling & Validation Domain

This is the core profiling engine that transforms raw data into verified operational profiles.

Core functions:

- Technical parameter validation
- Completeness verification workflows
- Regulatory compliance rule checks
- Readiness status classification

Architectural Role:

Ensures that only validated and compliant satellite profiles move forward into operational lifecycle management.

C. Mission Readiness & Lifecycle Management Domain

Tracks satellite assets from pre-launch through operational deployment and post-mission phases.

Core functions:

- Pre-launch readiness assessment
- Operational status tracking
- Incident and anomaly logging
- Status transitions and audit history

Architectural Role:

Provides traceability of mission state changes, ensuring institutional memory and operational accountability.

D. Regulatory & Inter-Agency Coordination Domain

Enables structured external engagement and statutory compliance

Core functions:

- Spectrum coordination data preparation
- Regulatory documentation generation
- Internal filing support
- Secure data exchange with authorised partners

Architectural Role:

Transforms validated internal data into compliance-ready external artefacts.

E. Analytics & Decision Support Domain

Converts validated satellite data into operational intelligence.

Core functions:

- Mission readiness dashboards
- Compliance risk indicators
- Executive reporting views

Architectural Role:

Provides strategic visibility for leadership and enables evidence-based decision-making.

F. Governance & Security Layer (Cross-cutting)

This layer spans all functional domains

Core Controls:

- Role-based Access Control (RBAC)

- Data versioning
- Audit logging and traceability
- Data ownership and custodian enforcement
- Secure data retention policies

Architectural Role:

Ensures integrity, accountability, and trust in sensitive satellite data asset.

2. DPI Principles Applied

The architecture operationalizes Digital Public Infrastructure principles in the following ways:

1. Reusable National Asset

Designed to support multiple satellite missions without duplication of core systems.

1. Interoperable by design

Structured data models and APIs enable integration with national and international space governance systems.

2. Secure

Access control, auditability, and custodianship rules are embedded at the architecture level.

3. 4. Centrally Governed

A single data backbone supports multiple institutional stakeholders while maintaining governance consistency.

4. 5. Scalable Model

Supports mission growth, portfolio expansion, and future satellite capability additions without redesign.

Why this matters:

This Architecture ensured that sensitive satellite data could be safely reused across teams and missions without duplication, while supporting long-term scalability and public-sector resilience.