Proposal for OGC Spatial Data Infrastructure Modernization Project (2025–2026)

Submitted by: Voyager Search
Topic Area: Data & Technology
Title: Unlocking Interoperability and Insight: Enriching and Connecting Geospatial Data through AI, Standards, and Smart Discovery

Contact: Alex Bostic, abostic@voyagersearch.com
Atita Arora, atita@voyagersearch.com
Brian Goldin, brian@voyagersearch.com

Overview

Voyager Search proposes an in-kind contribution to deliver a demonstrator that showcases how modern SDIs can become intelligent, self-updating, and interoperable through the integration of AI-driven metadata enrichment, flexible data connectivity, and standards-aligned architecture. Our COTS platform automates the ingestion, enrichment, and cataloging of data from virtually any format or source, transforming siloed content into accessible, analysis-ready resources.

Voyager functions as a metadata processing and discovery platform that integrates, standardizes, and exposes geospatial content through OGC-compliant services. It also supports the association of data with models, enabling users to not only find datasets but also understand what tools can operate on them.

Technical Innovation

- **Flexible Data Access**: Voyager connects to cloud storage, enterprise APIs, file systems, and OGC data and web services—automatically harvesting and updating metadata.
- **AI/ML Enrichment**: Our indexing pipeline applies natural language processing and machine learning to extract keywords, classify content, detect spatial and temporal features, and assess data quality.
- **Self-Updating Catalogs**: Continuously monitors for changes and reprocesses content in real time to keep catalogs current.
- **Intelligent Search**: Supports semantic, spatial, and natural language queries for intuitive discovery across large, diverse collections.
- **Model-Ready Metadata**: Datasets can be tagged with unique identifiers and associated with compatible analytical models, improving reuse and reproducibility.
- **Automated Lineage and Validation Tags**: Metadata includes lineage, provenance, and validation scores, ensuring transparency and trust.

Standards and Interoperability

Voyager both consumes and exposes OGC-compliant services:

- Ingests OGC standard formats and services, including WMS, WFS, STAC, and others.
- Publishes enriched metadata through OGC Web APIs and DCAT-compliant feeds.
- Metadata is transformed into common schemas (ISO 19115, DCAT), enabling integration into other catalogs, applications, and national SDIs.

Deliverables

1. **New Public Demonstrator**: A public metadata catalog that:
    a. Ingests diverse datasets from multiple formats and sources;
    b. Applies automated enrichment and standardization;
    c. Supports intelligent, natural language search;
    d. Published via OGC-compliant APIs.
2. **Best Practice Brief**: A paper describing:
    a. AI/ML enrichment workflows and outputs;
    b. Use of microservices and indexing agents for automated enrichment and standardization;
    c. Support for model-data linkage, metadata validation, and reuse;
    d. Real-world applications from USDA, NGA, and DOT projects.

Alignment with SDI Goals

This work will demonstrate the ability to deliver scalable, intelligent, and standards-compliant SDI capabilities that enable geospatial data to be:

- Seamlessly accessed and enriched;
- Discoverable through intuitive, user-friendly search;
- Aligned with trusted metadata practices for automation, governance, and analysis.

This contribution offers a proven solution for SDI modernization that bridges cutting-edge technology with operational impact.