Advanced Tracking and Logistics Analysis System (ATLAS)
Explainable AI-Enabled Decision Support

A Modular Decision Support Foundation with a Maritime Use Case

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Executive Summary

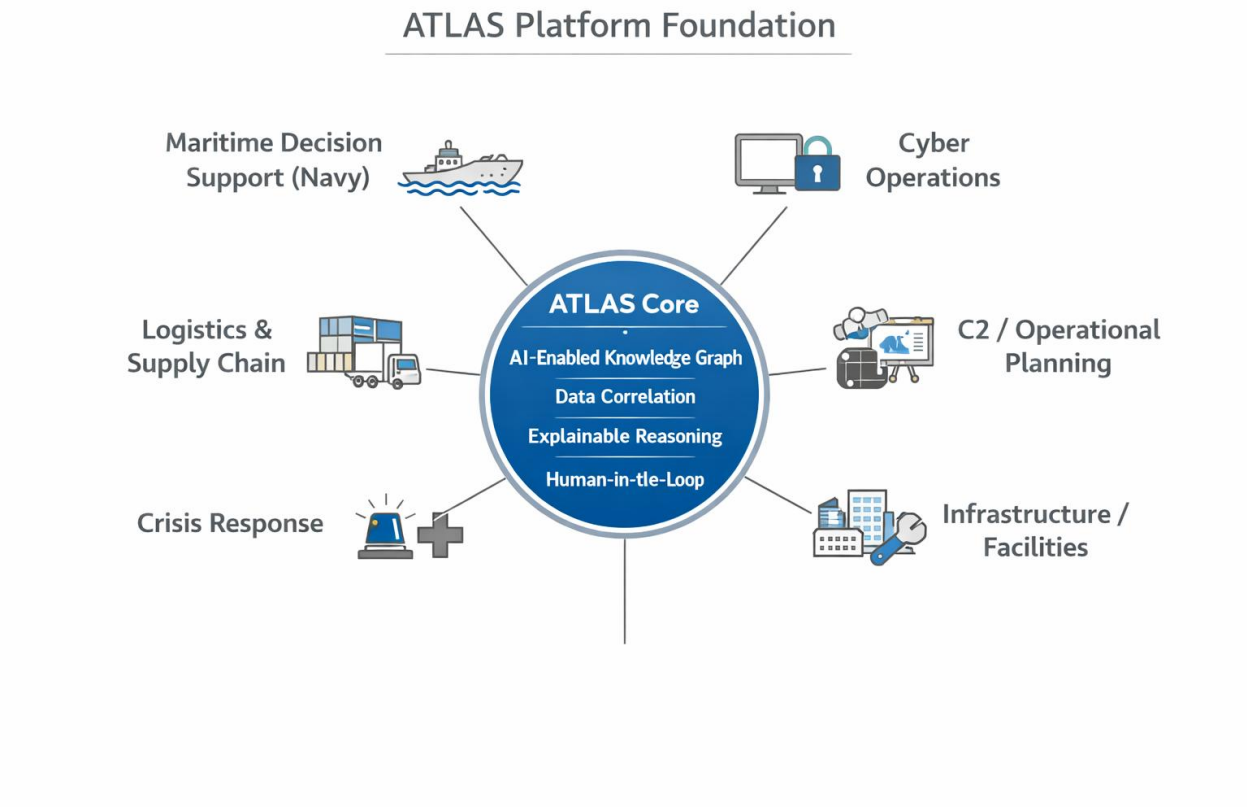
Advanced Tracking and Logistics Analysis System (**ATLAS**) is an advanced, cross-domain intelligence The Advanced Tracking and Logistics Analysis System (ATLAS) is an AI-enabled, ontology-driven decision support platform designed to help human operators understand complex, dynamic environments where data is fragmented, relationships are non-obvious, and time-critical decisions must be made with confidence.

At its core, ATLAS provides a **domain-agnostic decision support foundation** that fuses disparate structured and unstructured data into an explainable knowledge graph. Rather than automating decisions, ATLAS is designed to **support human judgment** by revealing relationships, context, and patterns that would otherwise remain hidden across siloed systems.

This whitepaper presents ATLAS in two layers:

1. **A reusable AI-Enabled Decision Support foundation** applicable across mission domains
2. **A maritime decision support instantiation** aligned to U.S. Navy operational and analytical needs

This approach demonstrates how a single technical foundation can pivot across use cases while remaining grounded in real operational contexts.

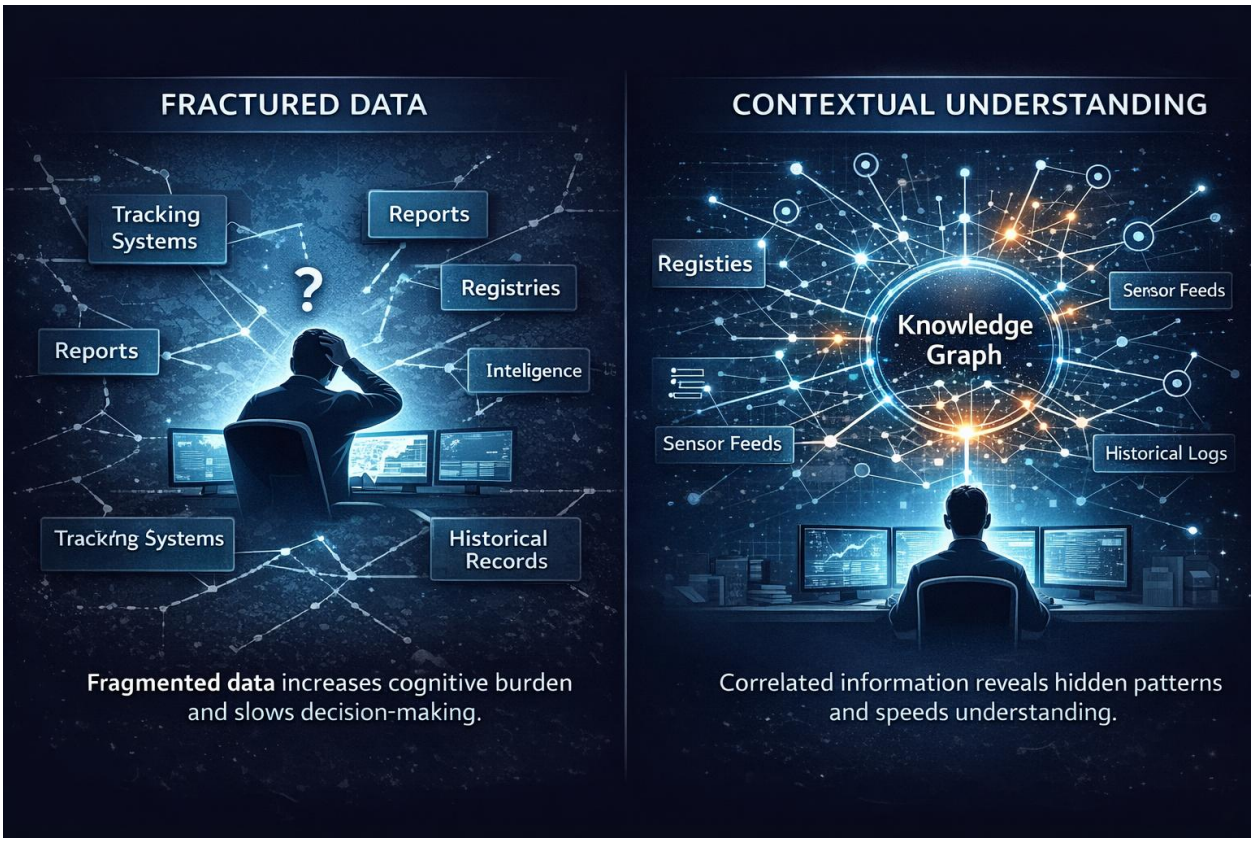


The Decision Support Challenge in Complex Domains

Across government and industry, decision-makers face a common challenge: **too much data, not enough context**.

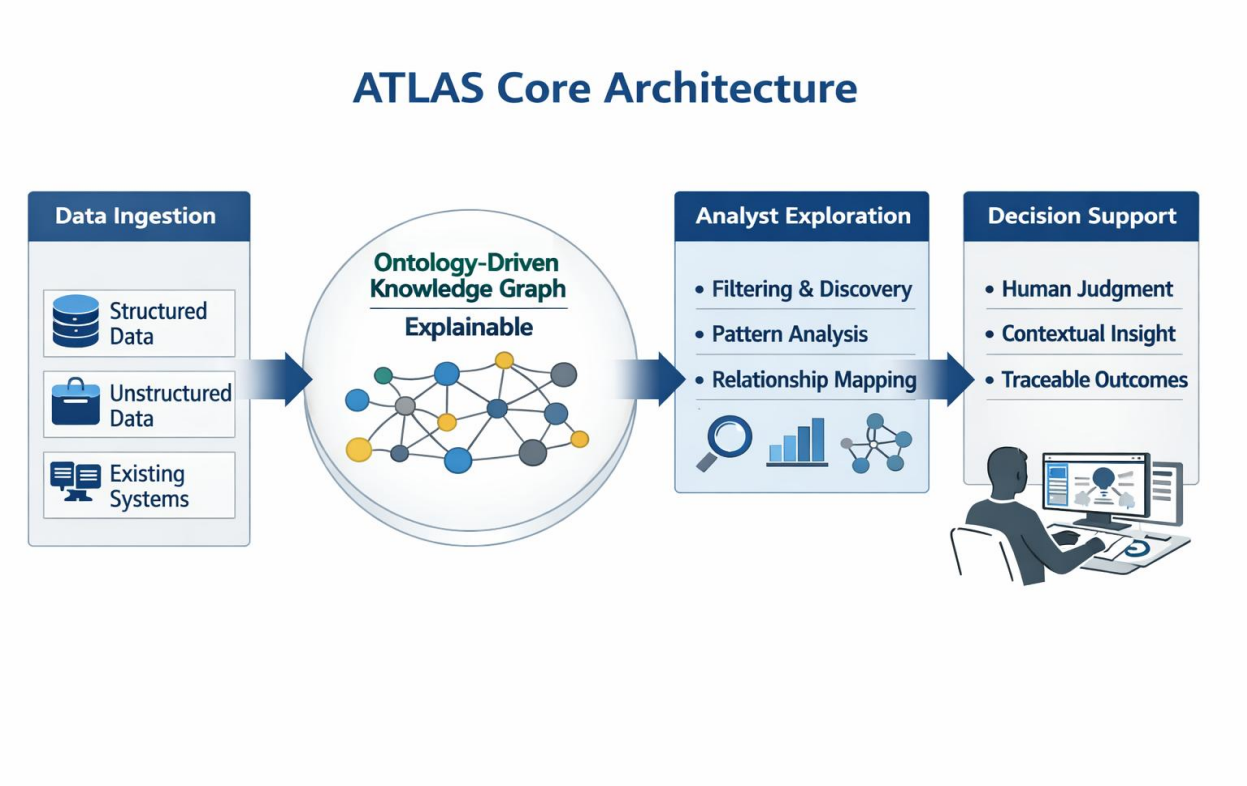
Whether in maritime operations, logistics, emergency response, cybersecurity, or infrastructure monitoring, analysts are required to:

- Pull data from multiple disconnected systems
- Manually correlate entities, events, and timelines
- Reconstruct situational context under time pressure
- Explain and justify decisions to leadership



The limitation is rarely a lack of data. Instead, the challenge lies in **sense-making** — understanding how disparate pieces of information relate, evolve, and influence outcomes.

ATLAS was designed to address this challenge by providing a **decision-centric analytical layer** that sits above existing systems and data sources.



ATLAS Core Architecture.
Disparate data sources are ingested and correlated within a knowledge graph, enabling human-centered exploration and explainable decision support across mission contexts.

ATLAS Core: A Reusable AI-Enabled Decision Support Foundation

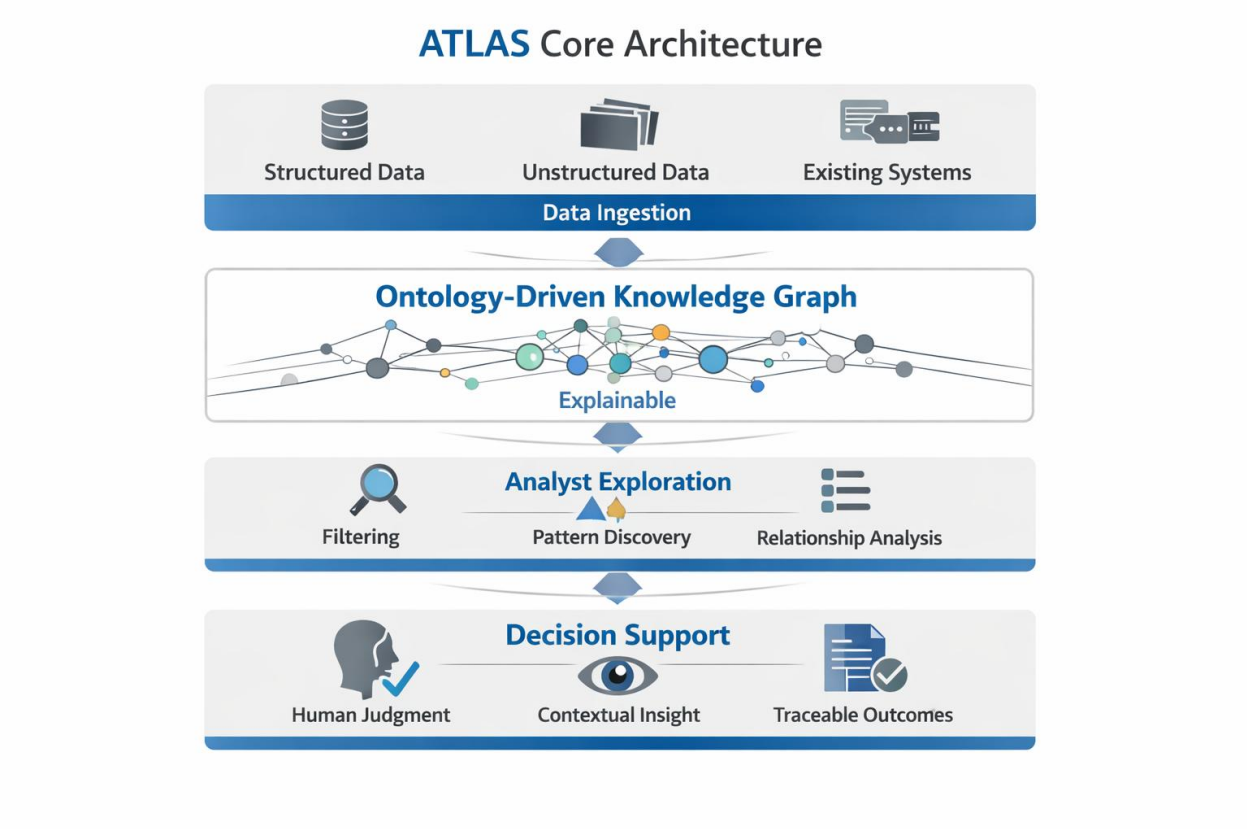
The ATLAS core is intentionally **mission agnostic**. It does not encode domain-specific rules or prescriptive outcomes. Instead, it provides a flexible framework that can be tailored to different operational environments.

Core Design Principles

- **Human-in-the-Loop by Design**
  ATLAS supports decisions; it does not make them.
- **Explainability and Traceability**
  All insights are grounded in data relationships that can be explored and validated.
- **Integration Over Replacement**
  ATLAS complements existing systems rather than displacing them.
- **Domain Adaptability**
  Ontologies, data models, and workflows can be adapted without changing the core architecture.

Core Functional Components

- Data ingestion for structured and unstructured sources
- Ontology-driven knowledge graph
- Relationship discovery and correlation services
- Analyst-driven exploration and visualization
- Natural-language interaction mapped to explainable graph queries



Pivoting ATLAS Across Use Cases

Because ATLAS is built on a modular, ontology-driven foundation, the same decision support capabilities can be applied across different mission domains by adapting:

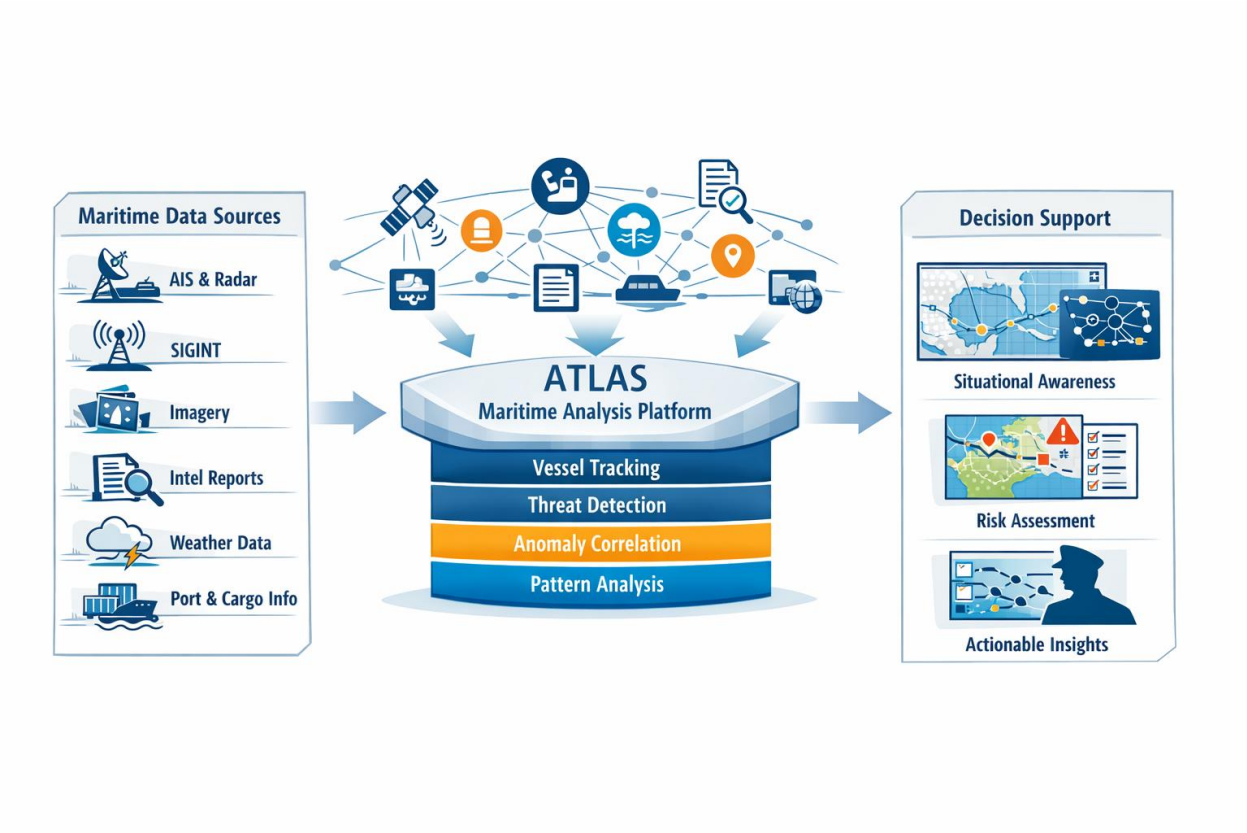
- The data sources
- The domain ontology
- The analyst workflows

Example Application Areas

- Maritime situational awareness
- Supply chain and logistics monitoring

- Cybersecurity and network risk analysis
- Emergency management and disaster response
- Critical infrastructure monitoring

In each case, ATLAS provides **contextual awareness**, not automation — enabling operators to understand *why* something matters, not just *what* happened.



Maritime Decision Support Use Case: Navy Context

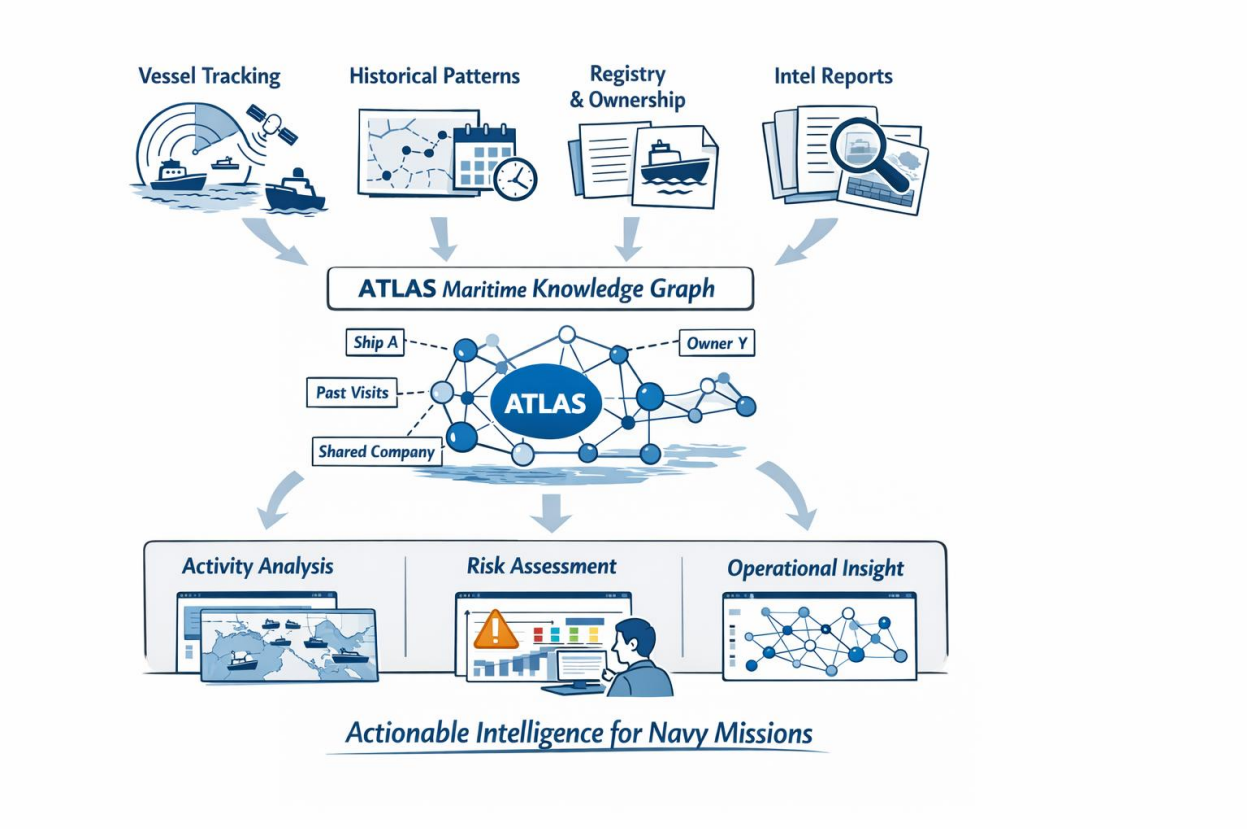
To illustrate how the ATLAS foundation can be instantiated for a specific mission, this whitepaper focuses on a **maritime decision support use case** relevant to U.S. Navy stakeholders.

In the maritime domain, analysts must synthesize:

- Vessel tracking and movement data
- Historical patterns and behaviors
- Registry, ownership, and logistical context
- Operational reporting and unstructured information

These data sources often exist in separate systems, making correlation slow and cognitively demanding.

ATLAS applies its decision support foundation to maritime data, enabling analysts to explore vessel behavior, regional activity, and relationships within a unified, explainable operational picture.



Analyst-Centered Maritime Exploration

Within the maritime instantiation, ATLAS allows analysts to move fluidly between different levels of context:

- Regional activity and clustering
- Pattern-based grouping of vessels or entities
- Entity-level exploration of individual vessels

This workflow supports hypothesis-driven analysis, where analysts can refine questions, filter relationships, and validate findings against source data.

ATLAS Correlating maritime activity and historical context within a unified operational graph

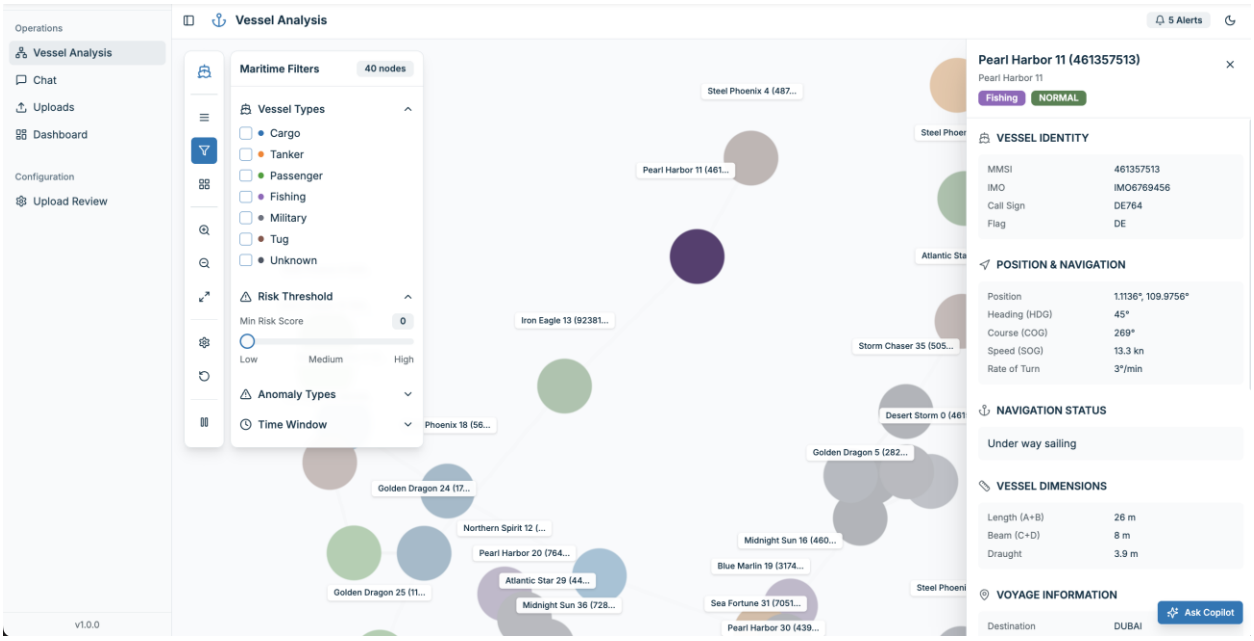
Explainability and Governance

A central requirement for Navy adoption is trust. ATLAS reinforces trust by ensuring that:

- Insights are explainable, not opaque
- Data provenance is visible
- Analysts retain control over interpretation

Natural-language interaction is used to reduce friction, but results are always presented as relationships and evidence rather than conclusions.

ATLAS is designed to align with governance expectations for transparency, auditability, and responsible AI use.



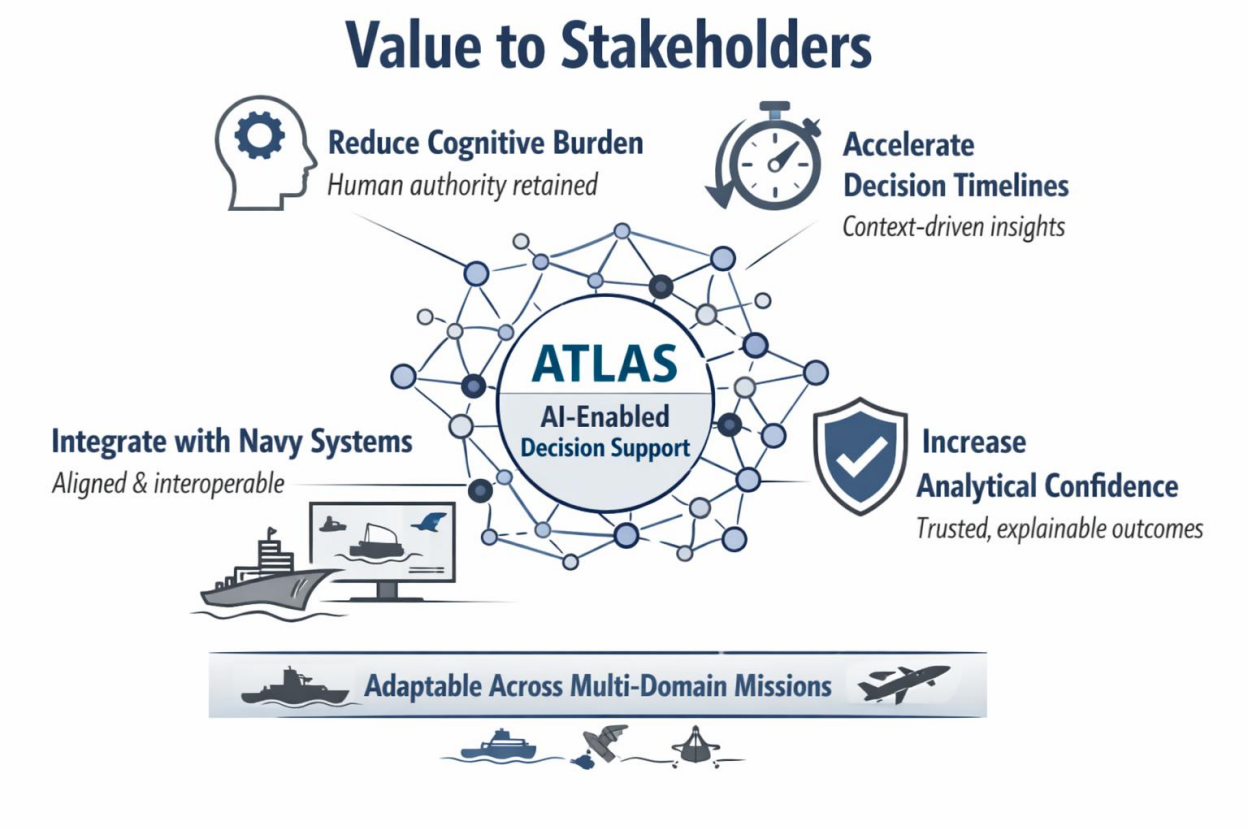
ATLAS Entity Detail View

Value to Stakeholders

For analysts, operators, and program managers, ATLAS demonstrates how AI can:

- Reduce cognitive burden without reducing human authority
- Compress decision timelines through better context
- Improve confidence in analytical judgments
- Integrate alongside existing Navy systems and workflows

Importantly, the maritime use case is **one instantiation** of a broader decision support capability — allowing Navy stakeholders to envision how the same foundation could support adjacent missions.



Decision Support Capabilities (Illustrative Examples)

- **Correlation of multi-source structured and unstructured data** into a unified, missionfocused operational graph
- **Analyst-driven exploration of relationships, patterns, and anomalies** across complex environments
- **Configurable risk and pattern assessment** aligned to mission context and operator priorities
- **Explainable insights with traceability** to authoritative source data and governing guidance
- **Role-aware workflows** supporting governance, review, and human-in-the-loop decision-making
- **Integration alongside existing systems** without replacing established tools or processes

Summary: ATLAS Decision Support Capabilities

Across the maritime use case presented in this whitepaper, ATLAS demonstrates a set of enduring decision support capabilities that are applicable across mission domains. These capabilities are not tied to a single operational context, but instead reflect a reusable foundation for analyst-centered decision support.

ATLAS enables:

- Correlation of structured and unstructured data into a unified, explainable operational picture
- Human-centered exploration of relationships, patterns, and behaviors across entities and time
- Analyst-controlled refinement of hypotheses and lines of inquiry
- Traceability of insights back to underlying data sources
- Integration alongside existing systems, workflows, and analytical tools

While this whitepaper focuses on a maritime decision support instantiation relevant to Navy stakeholders, the same foundation can be adapted to support adjacent mission areas where analysts must synthesize complex, multi-source information under time pressure.

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