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DEFINING THE FUTURE

Persistent Universal Layered Sensor Exploitation Network (PULSENet™)

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PULSENet: Interoperable Sensor Networks

PULSENet provides a standards-based sensor web framework for discovery, access, display, dissemination and control of widely dispersed and disparate sensor assets and their data.

PULSENet is based on web service architecture principles and Open Geospatial Consortium (OGC) standards.



PULSENet enables:

- Remote discovery of sensors and capabilities
- Access, visualization and analysis of multiple sensor observation sources
- Subscription to desired sensor alerts
- Ability to remotely task sensors
- Working in temporal and geospatial dimensions
- Seamless interfaces to data processing and analysis services
- Integrate sensor observations with forecast modeling and decision support systems

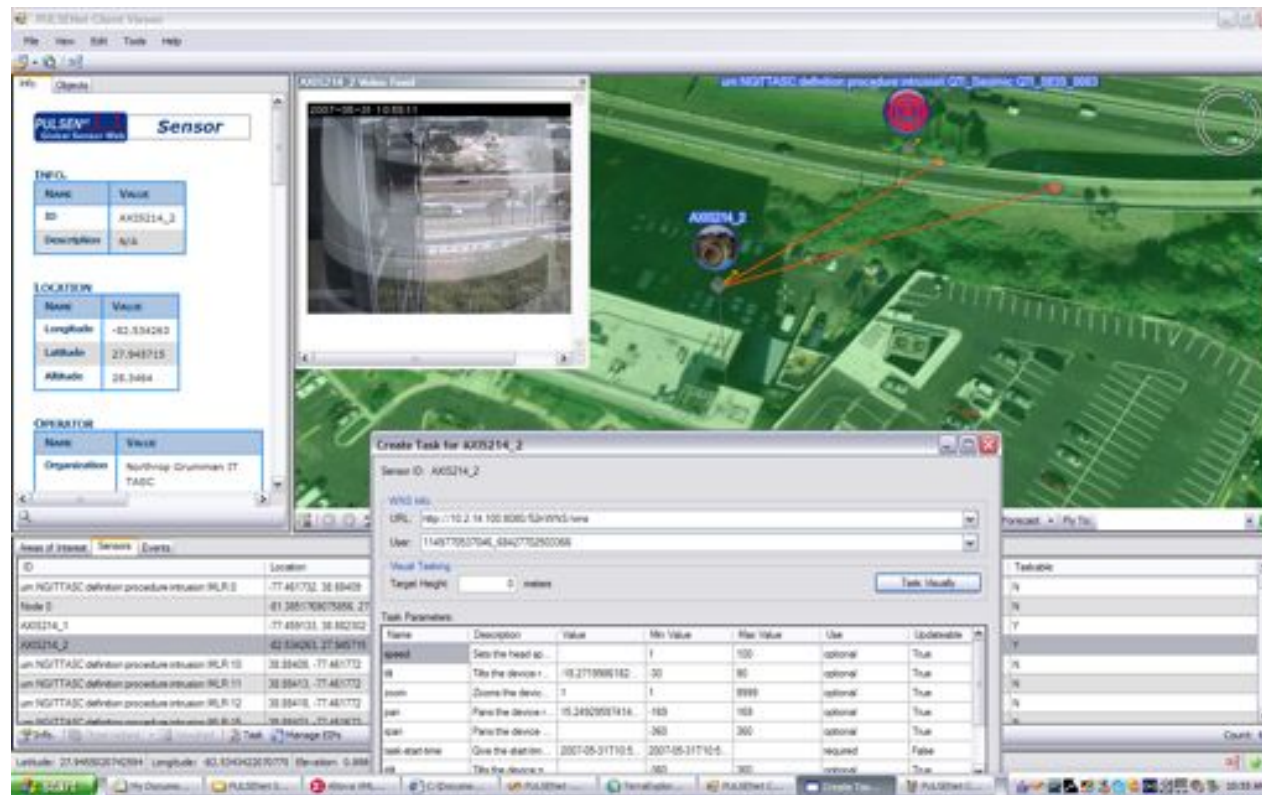
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Supported Standards

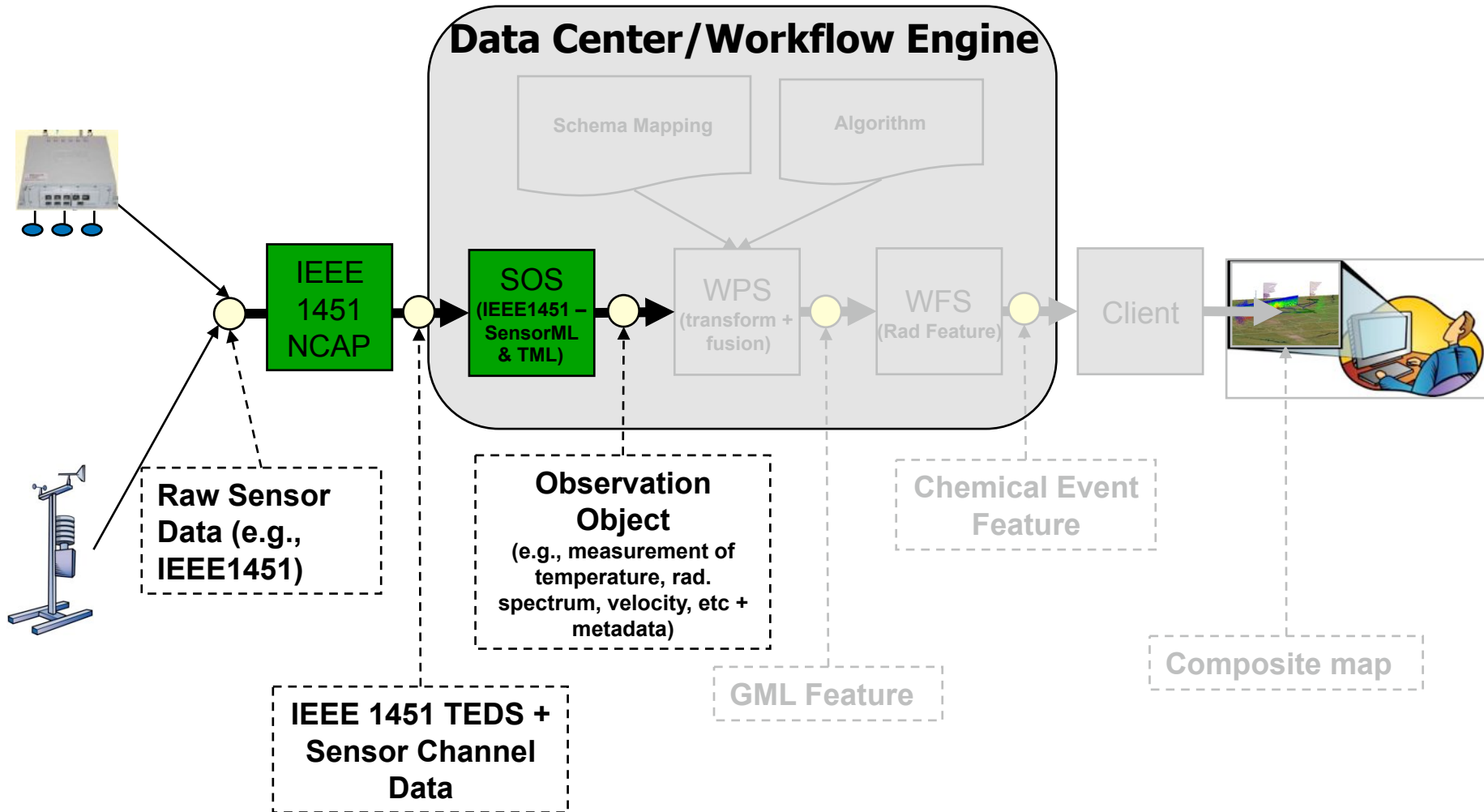


Service/Encoding	Supported Version(s)
SOS	0.0.31, 1.0
SPS	0.0.30, 1.0
SAS	0.2.0, 0.0
WNS	0.1.1, 0.0
WMS	1.1.1
WFS	1.0.0
CS-W	2.0.1
SensorML	1.0.30, 1.0, 1.0.1
O & M	0.11.0, 1.0
TML	1.0
GML	3.11
Common Alerting Protocol (CAP)	1.0, 1.1
Cursor on Target (CoT)	2.0

PULSENet Client Demo



IEEE 1451 & SOS Interoperability



PULSENet: Essential Data Integrated within a Sensor Web

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graph LR; HM[Hazard Mapping NOAA NESDIS] --> FD[Fire Detections]; EO1L[EO-1 Satellite NASA Goddard] --> FD; UASL[UAS NASA Ames] --> FD; FD --> FDAQS[Fire Detection Analysis Service NGC]; FDAQS --> IM[Initiate Model]; IM --> SFS[Smoke Forecast Services NGC w/ Forest Service]; SFS --> RT[Re-task Sensors for Updated Fires, Model Validation, Air Quality Impacts]; RT --> EO1R[EO-1 Satellite]; RT --> UASR[UAS];
```

The diagram illustrates the PULSENet architecture, a sensor web for fire detection and smoke forecasting. It features a central hub for **Fire Detections** and **Smoke Forecast Services**, with data flowing from various sensors and services.

Sensors and Data Sources:

- Hazard Mapping:** NOAA NESDIS
- EO-1 Satellite:** NASA Goddard
- UAS:** NASA Ames

Central Services:

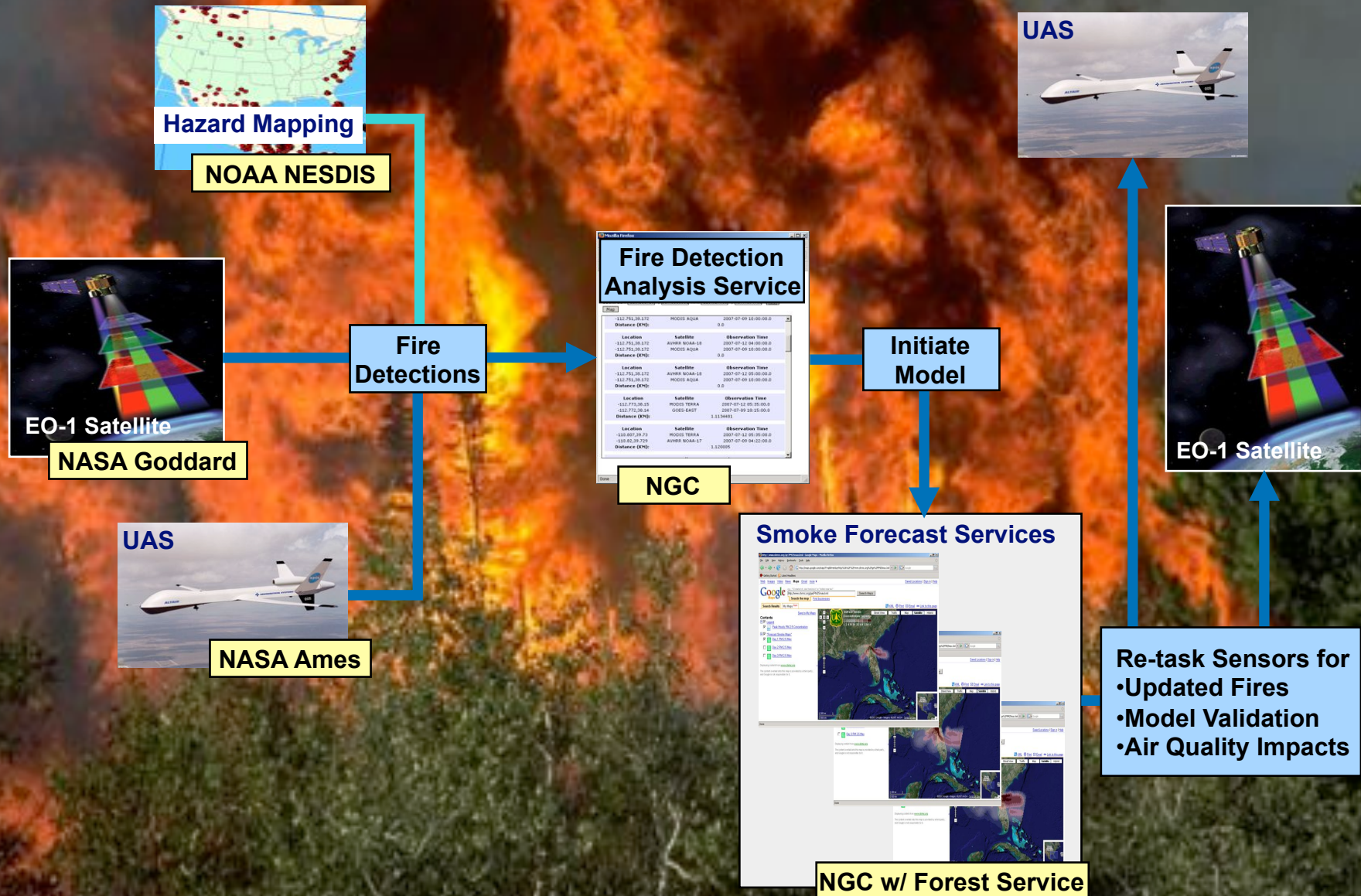
- Fire Detection Analysis Service:** NGC
- Smoke Forecast Services:** NGC w/ Forest Service

Workflow:

- Fire Detections:** Data from the sensors is processed by the Fire Detection Analysis Service.
- Initiate Model:** The service initiates the smoke forecast model.
- Smoke Forecast Services:** The model generates smoke forecasts, which are then used to re-task sensors for updated fires, model validation, and air quality impacts.

Re-task Sensors for:

- Updated Fires
- Model Validation
- Air Quality Impacts



GeoEnterprise Architecture

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Enterprise Management

Security/Access Control

Governance

Compliance

Enterprise Service Bus

Orchestration/Workflow

Performance Management

Enterprise Applications



Enterprise Services

INFORMATION
MANAGEMENT SERVICES

DISCOVERY
SERVICES

PORTRAYAL
SERVICES

PROCESSING
SERVICES

APPLICATION
SERVICES

Enterprise Information & Data Management

Enterprise Information Exchange

GML

SensorML,
O&M,TML

KML

Ontologies

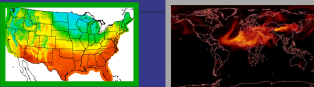
Rules

GeoRSS/RSS

SENSORS



FORECAST MODELS



INTERNAL DATA STORES

Image Libraries

Geospatial
Products

Environmental
Data

Unstructured
Text

SEMANTICALLY ENABLED DATA

EXTERNAL DATA STORES

Other Databases

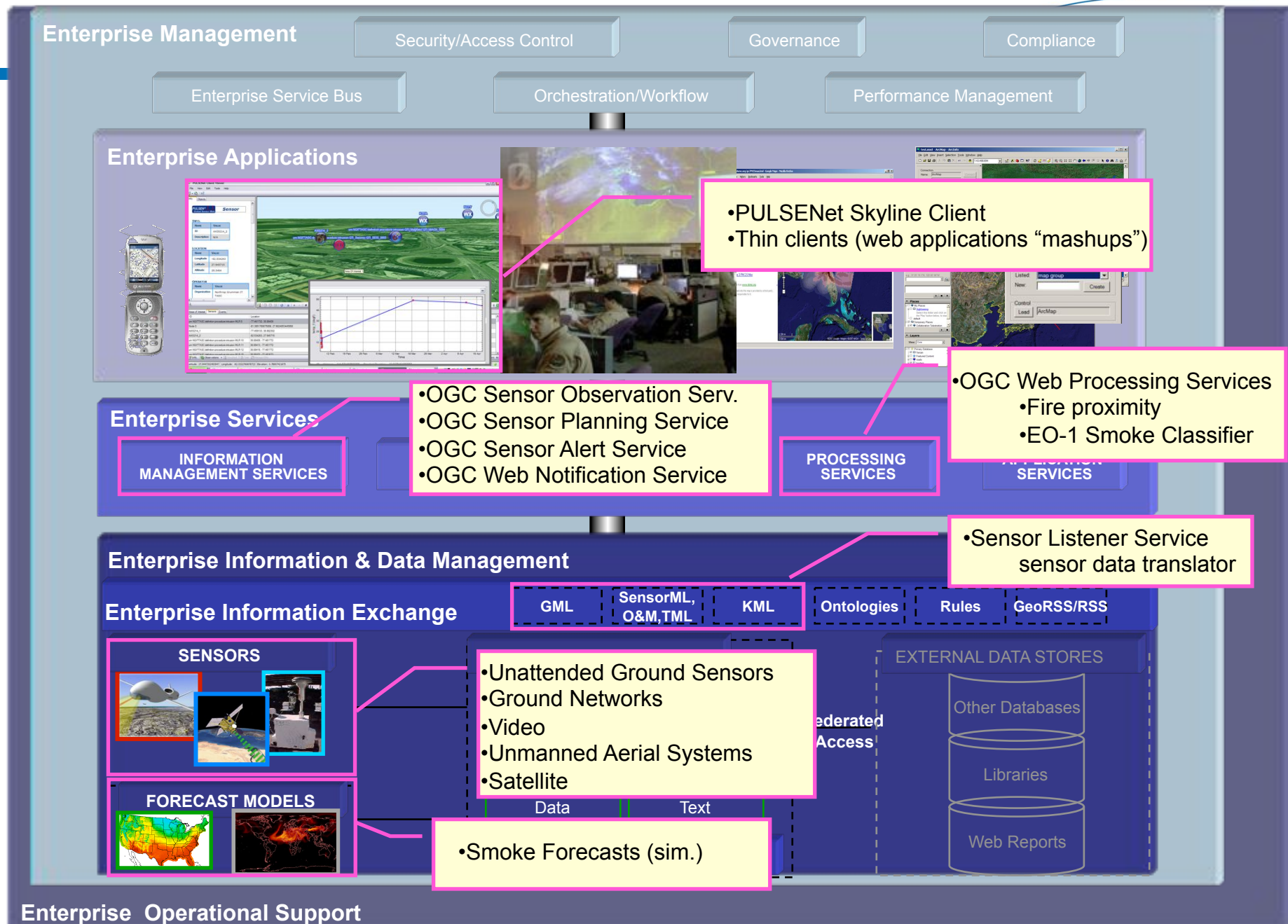
Libraries

Web Reports

Federated
Access

PULSENet in GeoEnterprise Architecture

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