



knowledgesmarts™

Geospatial Semantic Technology

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Image Matters LLC





Agenda

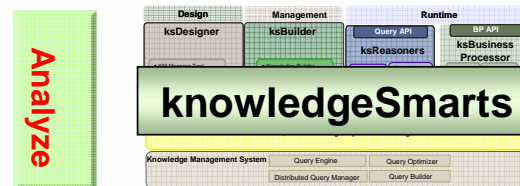
- What is knowledgeSmarts?
- KS Capabilities
- KS Architecture
- KS Products
- Roles and Applications
- Current IC Solution Prototypes

knowledgeSmarts™ Product Description

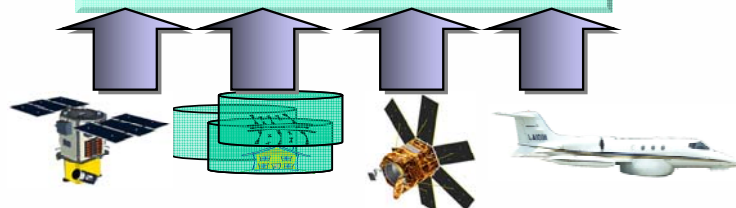
Web-enabled middleware that uses semantic and geospatial technology to create a rich homogeneous layer of knowledge to provide smart access and business processing involving distributed, heterogeneous geospatial data sources and services.



Deliver



Fuse

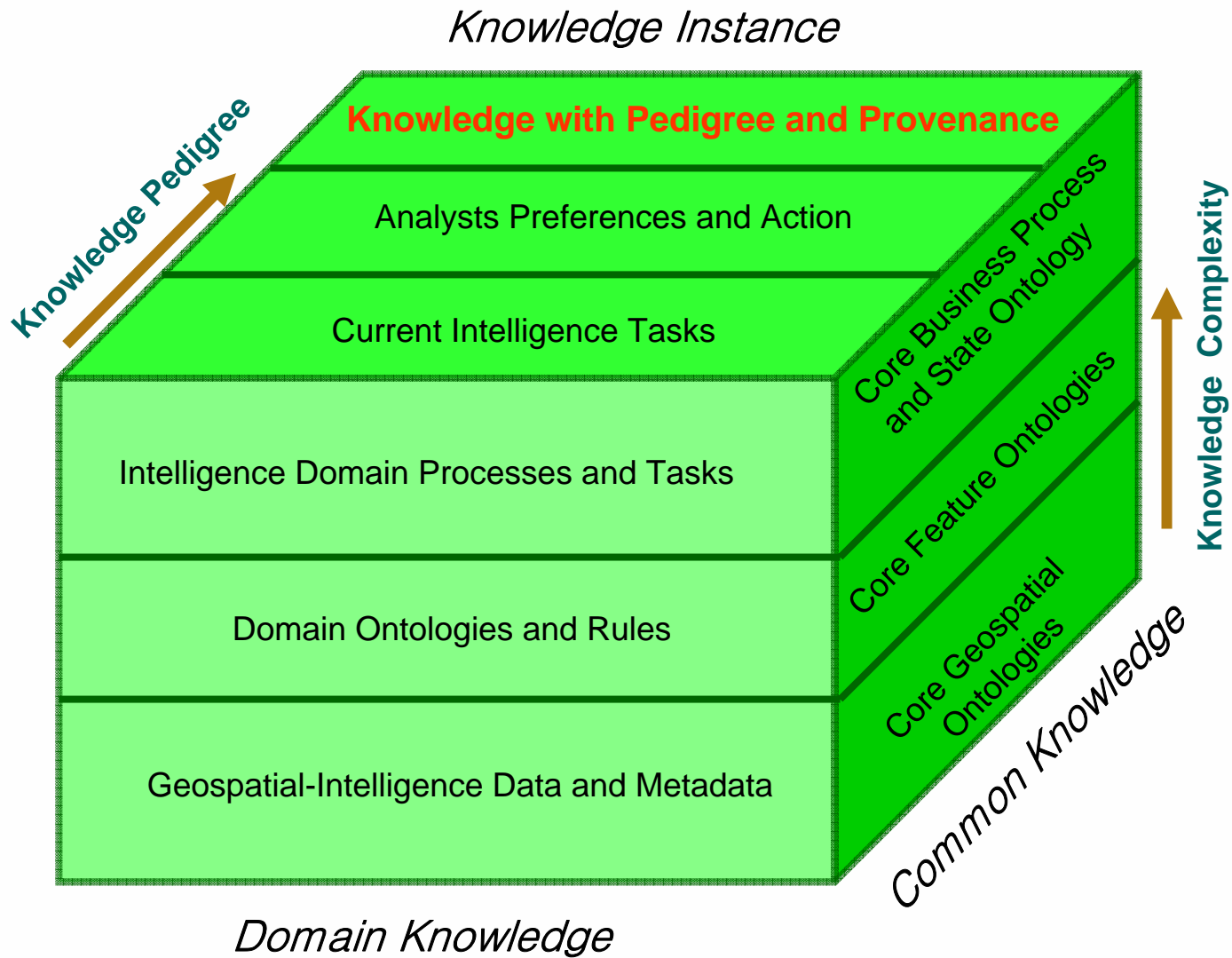




KnowledgeSmarts™ (KS)

- Supplements GIS or image analysis tools
- Bridges between the Semantic Web and legacy geospatial data stores: ArcSDE, Shapefiles, MySQL Spatial, Oracle Spatial, and WFS
- Provides unified virtual semantic view of the underlying data stores
- Combines geospatial semantic reasoning with traditional geo-analysis
- Users are able to query and analyze the geospatial knowledge layer
- Supports latest W3C semantic Web standards (OWL, SPARQL)

knowledgeSmarts Knowledge Cube

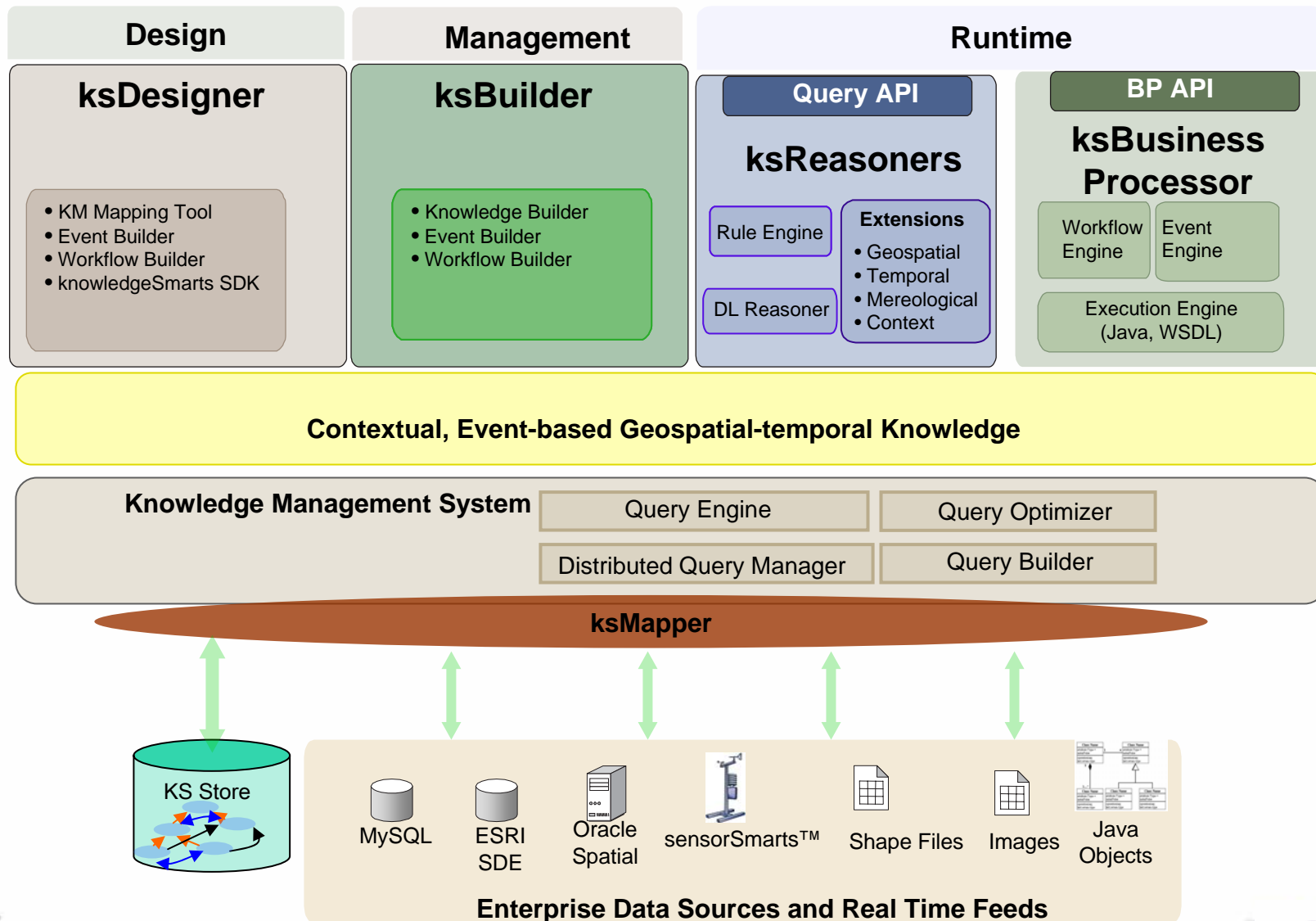




knowledgeSmarts Capabilities

- Geospatial Knowledge Query
 - Access through Java API and Web query service
 - context-based dynamic filtering
- Enterprise Data Integration and Sharing
 - Enables semantic integration, sharing, and manipulation of heterogeneous legacy geospatial stores (Oracle Spatial, ArcSDE, MySQL, Shapefiles, GML, WMS, WFS, etc.)
 - Dynamically translates queries on the knowledge layer to native data stores
- Enterprise Business Process
 - Enables semantic-based business flow execution with dynamic process binding
 - Event-driven business process execution
 - Event notification through multiple delivery channels
- Application Development Framework
 - A comprehensive AJAX-based development framework to enable developers to build dynamic web applications.
- Enterprise Strength Technology
 - Supports Semantic Web standards (OWL, SPARQL, SWRL)
 - Cross-platform 100% Java-based technology

knowledgeSmarts Architecture





knowledgeSmarts Products

- **KS-SDK:** A Java API that includes an API set and tools to allow developers to write and run custom applications.
- **KSEE:** A knowledge server that enables the enterprise to integrate its heterogeneous data sources (spatial and non-spatial) with a unified knowledge representation and query language.
- **AJAKS:** A comprehensive AJAX-based development framework to enable developers to build dynamic web applications.



KS Potential Functional Roles

- Enabling users to spend more time solving problems and less time searching and integrating data
- Providing unified virtual semantic view of the underlying multi-source, multi-format, geospatial-temporal data
- Reducing data overload by providing context-sensitive dynamic filtering of massive geospatial knowledge bases
- Combining geospatial semantic reasoning with traditional geo-analysis
- Fusing business processes with data and metadata through the knowledge layer
- Maintaining the pedigree of evolving knowledge (e.g., to support Auditing, QC)



Current Applications

- Problem Responsive Knowledge Discovery and Retrieval
- Information Triage

Project Focus

NGA holds massive amounts of data, locating geospatial intelligence products is time consuming

Intelligence Analysts work under intense time pressure

Queries are based on the nature of data and metadata rather than on the nature of intelligence problems

Data are heterogeneous, distributed, and lack semantics

Timely access to relevant new data is critical



Knowledge model = Data + Metadata + Semantics

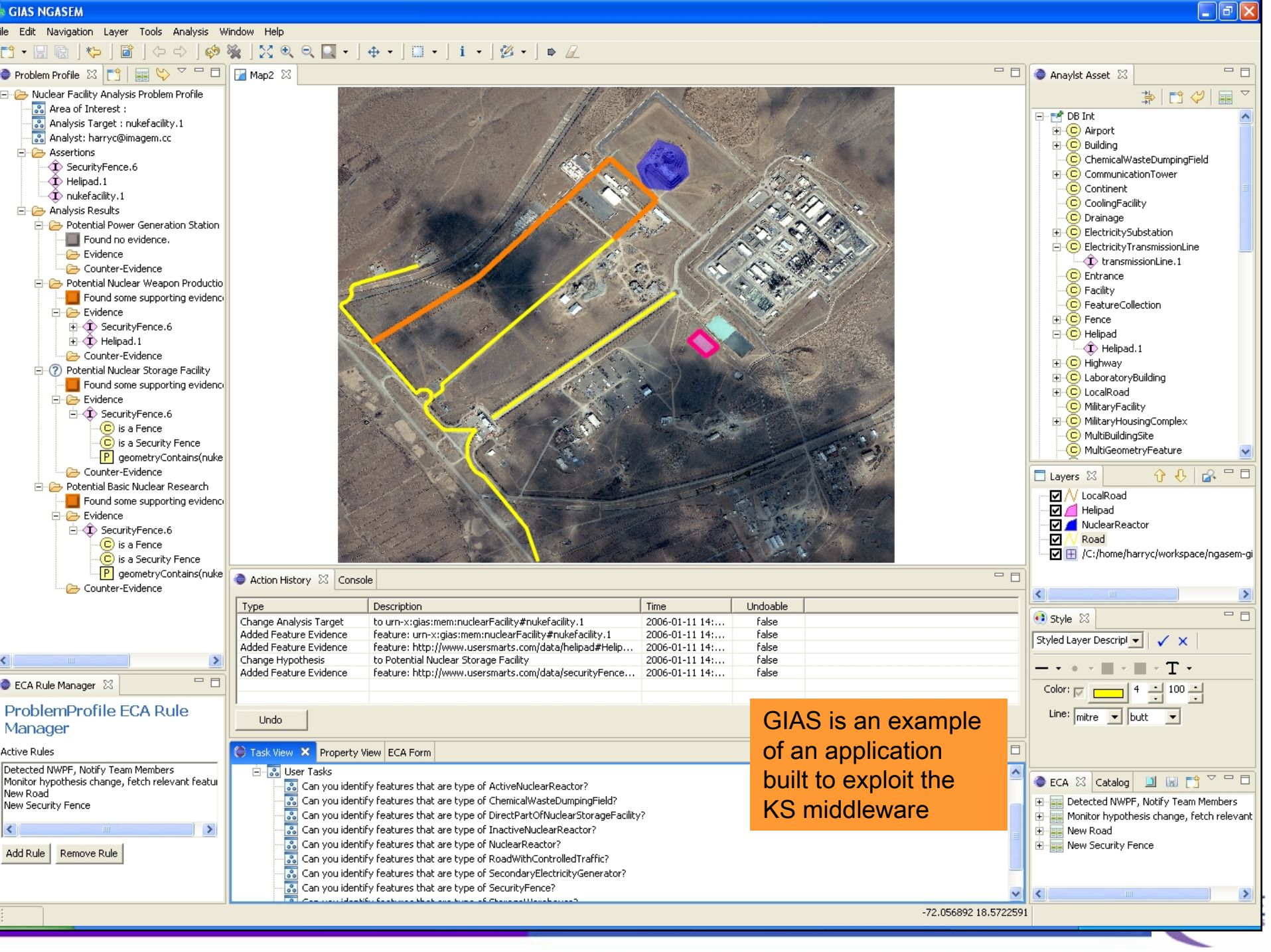
Unified Geospatial Knowledge Layer

Knowledge Layer of Tasks and Mechanism to dynamically bind to data

Context Aware (Situation Awareness)

Dynamic Filtering

Event Based Notification



Map2

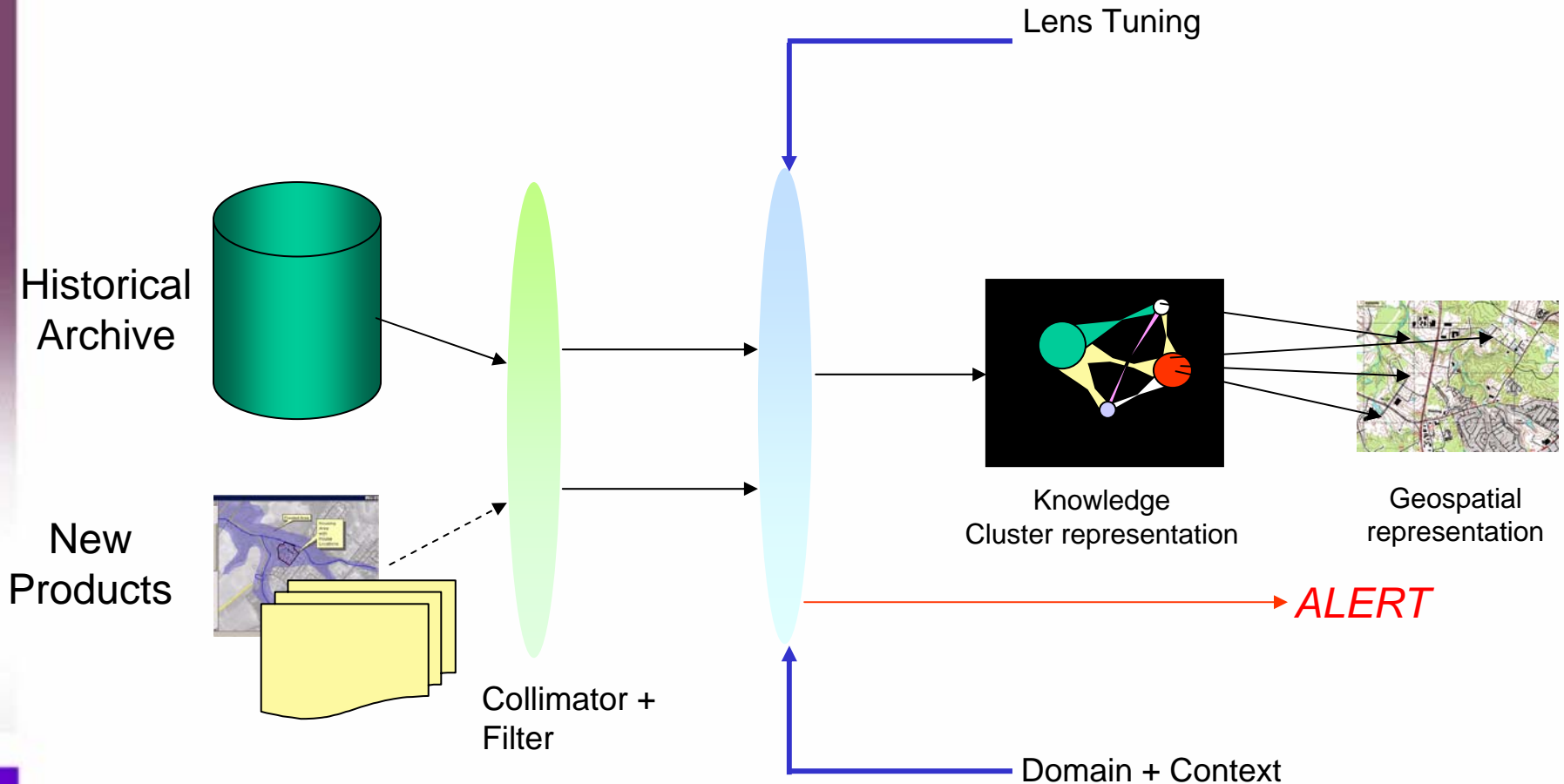


Type	Description	Time	Undoable
Change Analysis Target	to urn-x:gias:mem:nuclearFacility#nukefacility.1	2006-01-11 14:...	false
Added Feature Evidence	feature: urn-x:gias:mem:nuclearFacility#nukefacility.1	2006-01-11 14:...	false
Added Feature Evidence	feature: http://www.usersmarts.com/data/helipad#Helip...	2006-01-11 14:...	false
Change Hypothesis	to Potential Nuclear Storage Facility	2006-01-11 14:...	false
Added Feature Evidence	feature: http://www.usersmarts.com/data/securityFence...	2006-01-11 14:...	false

- Undo
- Task View
- User Tasks
 - Can you identify features that are type of ActiveNuclearReactor?
 - Can you identify features that are type of ChemicalWasteDumpingField?
 - Can you identify features that are type of DirectPartOfNuclearStorageFacility?
 - Can you identify features that are type of InactiveNuclearReactor?
 - Can you identify features that are type of NuclearReactor?
 - Can you identify features that are type of RoadWithControlledTraffic?
 - Can you identify features that are type of SecondaryElectricityGenerator?
 - Can you identify features that are type of SecurityFence?
 - Can you identify features that are type of StorageHouse?

GIAS is an example of an application built to exploit the KS middleware

Triage Lens Model



Triage Works^(R)

Main Menu

- Home
- Mission Inbox
- Search
- Notifications
- Preferences
- Log Out

Mission Inbox

- Green Echo Mission
- Red Barron Mission**
 - Sarghoda Airbase
 - Taji Weapon Factory
- Jiuquan Space Center**
 - Add New iFolder...
 - Add New Mission...

Active Lenses

- ↕ Find Relevant Data
- ↕ Filter Result Set
- ↕ Group Result Set
- ↕ Monitor Date Change

Main Photos Videos Features Reports **Map** Logs

Location: Red Barron Mission -> Jiuquan Space Center (Target Case Folder)

Map:

Map showing Leesburg, VA area. Key locations include Ida Lee Park, Union Cemetery, Robinson Park, Leesburg, Leesburg Corner Premium Outlets, and Leesburg Muni Airport-godfrey Field. Major roads 15, 287, and 7 are visible. A scale bar indicates 1.00 mi at 39 deg. Coordinates: longitude: -077° 30' 43.200", latitude: 039° 07' 08.400"

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Mission Inbox

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Main Photos Videos Features Reports Map Logs

Location: Red Barron Mission -> Taji Weapon Factory (Target Case Folder)

Photos for Taji Missile Factory, Iraq



Annotation Type Information

Name:

Type:

Description:

Keywords:

Image Annotations

- Launch Platform
- Uranium Factory**
- Add New Annotation
-
-
-
-
-



Conclusions

- Our approach has provided our customers with concrete solutions that demonstrate geospatial semantic knowledge management can be applied in operational intelligence settings
 - Won the 2005 GeoInt award for Innovative Technology
- knowledgeSmarts is a productized Geospatial Semantic technology.
- Currently available under Image Matters' Early Adopter Program



Questions and Discussion

Thank You