Leveraging Semantic Technology for Improved Enterprise Search and Knowledge Discovery

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Houston, TX
OR

**GIS as a part of an Integrated, Dynamic Information Model**
Why?

Research, intelligence, life science, security, identity, energy (natural gas)

Selective and easy access to data, metadata and knowledge from anywhere, ability to annotate and relate, analyze and report
Use, share and re-process information assets
Collect project relevant data into application independent projects (shoeboxes)
Develop and test evolving models, pose hypothesis and analyze
Capture “recipes” for knowledge transfer and re-use

In dynamic (often spatially oriented) environments
Expanding the Reach of GIS

- Dedicated users
- Periodic users - need familiar metaphors, integration with other applications/known environments and data and compelling reasons to use spatial data -

Google Earth

Google - Expectation that all information is searchable, transcends physical and application boundaries

Gmail - no explicit location for information. Flickr,.. Tagging metaphor gaining momentum
Search and Tag

Limits of Web search today - lack semantics/meaningful tags:

Houston
- Houston, TX
- Whitney Houston

Refine search with synonyms - ranked by Google, author is often unknown, purpose for document often unknown

Semantic web - what it is (metadata) and what it means (semantics).

Houston - place
Semantics

Semantic approaches now in the enterprise -
Allow communities to describe their terms and relationships
Expand search capability
Allow the capture of context of information
Enable identification of evolving knowledge trends

Who uses them?
Communities that want to eliminate and support ambiguity
Communities with evolving knowledge models
Communities who want to use their own language and relationships for accessing information
Metadata aren’t static

- Gain insight with time based views, filtering,..
- Collecting more data and metadata isn’t enough
  - DATA DEMANDS ATTENTION - DELIVERING MORE DATA CAN PREVENT USERS FROM DOING ANALYSIS
  - INFORMATION NEEDS TO BE TIMELY AND RELEVANT
- Communities will not agree on a single metadata/knowledge description
  - DIFFERENT PROBLEMS REQUIRE DIFFERENT DESCRIPTIONS and EVER CHANGING, PROBLEM SPECIFIC RELATIONSHIPS
Knowledge

Need to capture, share and re-use knowledge

- Know more about data when it is captured or created
  - Automate metadata capture
  - Evolve through usage
  - Search and access using familiar terms
  - Easily find and relate information
Tags

Semantic descriptions

- Dictionaries of categories, properties and relationships
  - Problem focused
  - Could have different dictionaries for different roles or activities
  - Interconnectable
Thetus

Develops knowledge modeling and discovery infrastructure software for customers who:

- Have high-value data not easily structured using traditional database technology
  - Has evolving meaning
  - Has no single representation
- Need automated processing, notification and search
- Need recorded history of information
- Want to do predictive modeling
- NEED to use a semantic approach
Bridging the Knowledge Gap

DATA

HYPOTHESIS AND ANALYSIS

TESTING AND VERIFICATION

TOOLS AND METHODS

Defensible Tracking, Reporting, and Publishing

Observation Modeling Experimentation Structured Data
Metadata Lineage

- Search
- Reporting
- Automated Re-Processing
- Modeling

Thetus
Knowledge Modeling Infrastructure Software

DISTRIBUTED DATA STORAGE

DATA COLLECTION
Cross Application Knowledge
GIS Connection: Knowledge Analyst

Knowledge Select
Select and:
- Search
- Search Similar
- Search Related
- Get Report

Knowledge Identify
Similar to Arc
Identify tool, provides quick KM report for items.

Relate Tool
Allows users to relate items on the map with items not represented spatially and relate map items.

Knowledge Search
Brings up search interface to browse knowledge structure and search on categories and properties.

Quick Search
Launches Quick Search. (See quick search web interface)

KM Client Launch
Opens KM Client, if not present launches web page.
Knowledge Sharing and Re-use
Use Spatial Information
Connecting Across Domains
Context-Specific Access to Knowledge

Policy-Based Access
Dynamically-Evolving Knowledge Bases
Rich Networks of Relationships

Hidden Trends, Patterns, and Relationships among Data

Explicit and Implicit
Examples of Gas Utility Applications

- Damage Loss Prevention
- Gas Loss Identification
- Service Management
- Pipeline Integrity Management
- Asset Management
Damage Loss Problem

- Lots of Pipe - close to surface in high density areas
- Lots of Construction - not all permitted
- 50% of Damage caused when no Locate (call before you dig) request made
- No single source for information - inside and outside the enterprise
- Different views of information needed
- Need predictive model to prevent damage through education, inspection - not just penalties
Questions

- Are certain types of contractors more likely to cause damage?
  - How can we prevent?
  - Can I be notified when ‘at risk’ contractors are about to start work?

- Does damage happen more often under certain types of conditions
  - Economic
  - Weather
Hazardous Condition Worker Monitoring
Web Portals

Related Service Personnel Portal

Emergency Personnel Portal

Management / Leadership

Planners

Analysts

INTERNET

Data Integration Layer for Real-Time Monitoring, Reporting, and Modeling

JSP Server

Mission / Service Data

Task Servers

External Data Sources

TenXsys Databases

Thetus Publisher Evolving Knowledge Bases

Additional Sensor Data

Wireless Sensors

- Heart Rate
- Motion
- Skin Temperature

Web Portals

Data Sources

Web Portals

Web Portals

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