

knowledgeSmarts™

Adding the semantics of space and time to the enterprise

A Spatial-Semantics Knowledge Management & Reasoning System

knowledgeSmarts is a revolutionary middleware platform for building knowledge-centric applications that enhance business processes by adding and exploiting relevant business "intelligence", thereby enhancing the productivity of users. Through its robust knowledge and reasoning framework *knowledgeSmarts* tackles the problems of information overload, data interoperability, and data integration for distributed, disparate data.

Dealing with Information Overload

An imposing challenge for today's businesses is how to quickly extract hidden knowledge from an increasing volume, complexity, and diversity of distributed digital information sources. Important information are often scattered in different places (e.g., in different databases, digital documents, web servers, metadata, and legacy systems). Because of this, it is usually very difficult to integrate the information, monitor real-time changes, and extract tacit knowledge. *knowledgeSmarts* addresses these problems by adding a "layer" of semantics with commensurate reasoning, event handling, and workflow capabilities that can be used to formulate intelligent business processes.

Location & Time in Business

Location and time are two intrinsic properties of everyday business knowledge. *knowledgeSmarts* provides robust support for spatial and temporal knowledge representation and processing, allowing application developers to create better knowledge-centric applications that more closely represent the real world. This includes ontologies for common spatial and temporal modeling, logical inference engines for spatial and temporal reasoning, and an extensible API for accessing and manipulating standard spatial databases and formats.

Enterprise Data Interoperability & Integration

The *ksKnowledgeManager* enables real-time and seamless semantic interoperability, data integration, and manipulation of heterogeneous, distributed spatial-temporal data sources. Databases do not have to be transformed or reconfigured. *ksKnowledgeManager* performs semantic query optimization by dynamically translating semantic queries to native data store queries. It also supports automatic translation and propagation of transactions between its knowledge layer and underlying data stores.

Building & Exploiting Corporate Knowledgebases

knowledgeSmarts exploits ontologies, a set of shared vocabularies with explicitly represented semantics, to enable knowledge integration and knowledge sharing. Built-in support for logical inference allows developers to define customized rules to reason over information acquired from different sources. In addition, the platform provides a semantic-based event monitoring and execution system for building "smart" business processes.

Spatial & Semantic-Enabled Enterprise Business Processes

The *ksBusinessProcessor* enables semantic-based business process execution with dynamic task grounding. Also, it supports spatially-enabled workflow and event-driven process execution. The event-driven business processor enables rapid development of event-based applications that exploit spatial-semantic knowledge and business processes. An event notification capability supports knowledge update notifications through multiple delivery channels, as well as automatic and semi-automatic process execution.

AJAX Applications with Spatial-Semantics

AJAX (Asynchronous JavaScript And XML) web development techniques provide the means for rapid development of rich, dynamic web applications that run faster, and are more interactive and useable. *knowledgeSmarts* provides a comprehensive AJAX development framework called AJAKS. With AJAKS, developers are relieved from having to directly implement complex AJAX data management and communication software that interact with backend spatial-semantic data stores. Using AJAKS, developers will be more productive and more focused on solving application problems.

Smarter Applications and Services

knowledgeSmarts' spatial-temporal knowledge management and reasoning capabilities enhance user productivity and experience. *knowledgeSmarts* is especially valuable for use in time-sensitive, complex applications. For example, it can be used in the following enhanced applications:

Intelligent, dynamic filtering. *knowledgeSmarts* employs user and business context to intelligently filter multiple, heterogeneous data sources.

Intelligent watch. Users can establish semantic "watch" conditions and actions for any information feed (e.g., an RSS feed with sensor data).

Intelligent delivery. Reasoning with business and user contexts can be used to proactively "push" crucial near real time actionable information (e.g., weather alerts from a weather information provider).

Intelligent discovery. Users can make sense about fused spatial-temporal events, given user-problem context (e.g., what an external event or change to a database means to a user working a given problem).

Context-sensitive situation awareness. Provides autonomous and semi-autonomous decision support for rapidly evolving dynamic events (e.g., what information should each member of a team of collaborating first responders see given their roles and one or more incidents with rapidly changing context).

Standards-Based High Performance Technology

knowledgeSmarts uses scalable high performance technology that implements caching, indexing, query optimization, and clustering. *knowledgeSmarts* is built on Semantic Web Standards (RDF, OWL, SPARQL, SWRL) and is a cross-platform 100% Java-based technology.

