

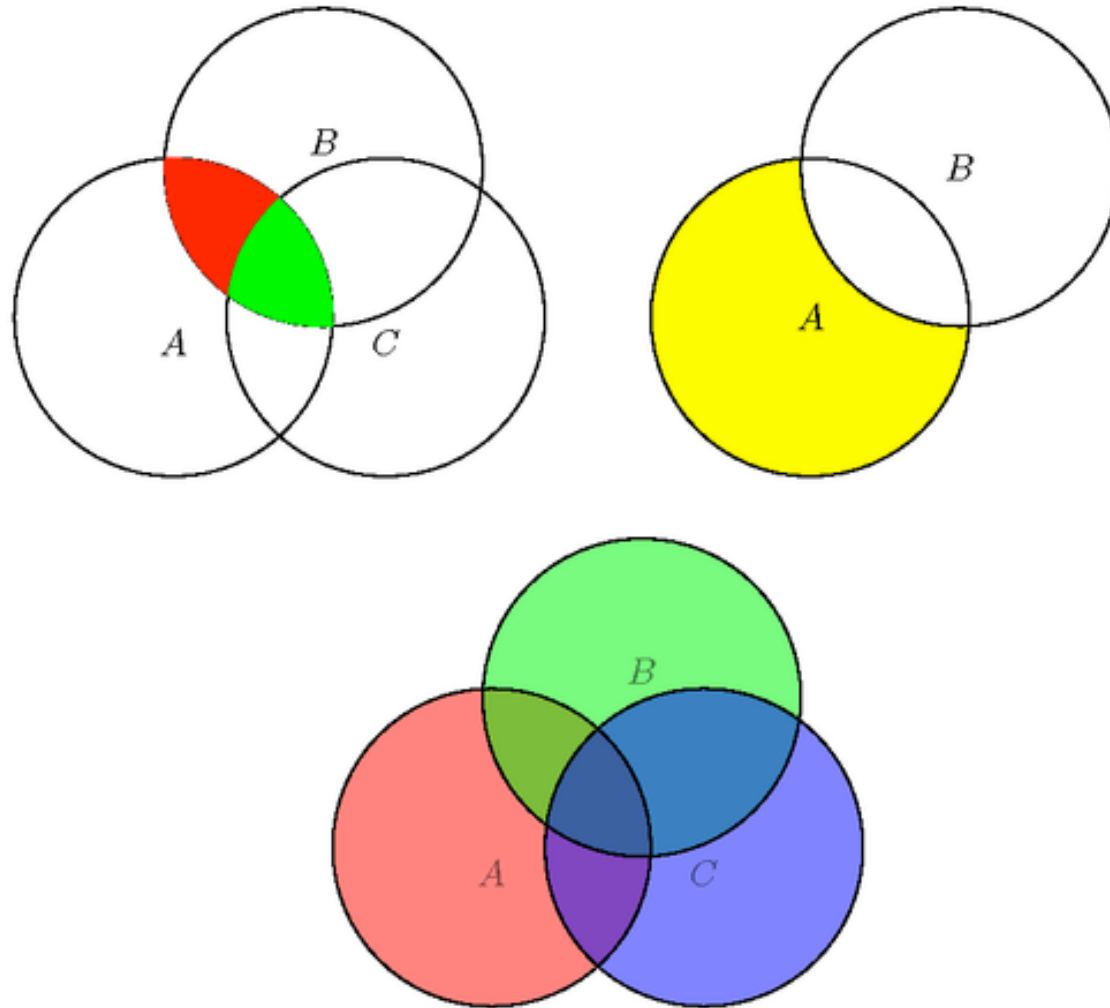


Experiencing The Semantic Web

Applying Dynamic Context To Search, Display, and Workflow

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Semantic Mnemonic



- **My Context**
- **Why Semantic Technology**
 - What Are Semantics?
 - What Are Semantic Technologies?
 - Why Should I Care?
 - What Next?
- **Applied Semantics:**
 - Demonstration Technology
 - Search (demo)
 - Display (demo)
 - Workflow (demo)
- **Questions**

- **Culture**
- **Information Technology**
- **Domain Expertise**
- **Applied Analytics**

- **What is Context?**

“Concentrations of influence interacting in time and space”

- Boundaries (Concepts)
- Interactions (Relationships)
- Boundary/Interaction Causation (Rules)
- Influence = Meaning

- **What are Semantics?**

“Aspects of meaning expressed as language”

- Logic (framework)
 - Axioms: “Things exist”
 - Concepts: “A car is a type of thing”
 - Rules: “If a thing has four wheels, a propelling motor, and weighs less than 5000 lbs, it is a car”

- **Semantic Technologies**

- Machine-readable representations of meaning
 - Based on Description Logics (math-based logic)
 - Implemented as an ontology
 - An internally consistent model of concepts and their relationships
 - Typically domain-specific, e.g. “Pizza” (Toppings, Spiciness, Cheese, Bread)
 - Expressed in a standard format (W3C)
 - RDF (Resource Description Language)
 - OWL (Web Ontology Language)
 - SWRL (Semantic Web Reasoning Language)
- Inference engines
 - Categorize concepts, relationships, and data based on rules
 - Discover implicit connections between concepts
 - Enable the “dynamic” in “dynamic context”

- **Vietnam = Impedance Mismatch**
 - Narrative did not fit reality
 - Successful corrective action was bottom-up
 - Redefined terms, introduced new ones
 - New characters (roles)
 - Adapted technology to fit narrative and local reality
- **Iraq = Impedance Mismatch**
 - Micromanaged narrative, changing reality
 - Corrective action reached political/military boundaries
 - Technology constraints
 - Successes:
 - CIDNE
 - Human Terrain System

- **More Expressive**
 - Separate Data From Concept Model
 - Multiple Hierarchy Types
 - “is a”
 - “part of”
 - Powerful Relationship Properties:
 - Transitive
 - Symmetric
- **New Capabilities**
 - Inference-based Operations
 - Search
 - Display
 - Workflow
 - Concept Access Control
 - Concept Evolution

- **Implications**

- User-Driven Concept Management
- Connect Diverse Communities
 - Federation
 - Integration
 - Association
- Flexible/Sustainable Data Mapping
- Shareable Models
 - Evolutionary Information Management
 - Case-Based Reasoning

Demonstration Technology



Changing the rules of business

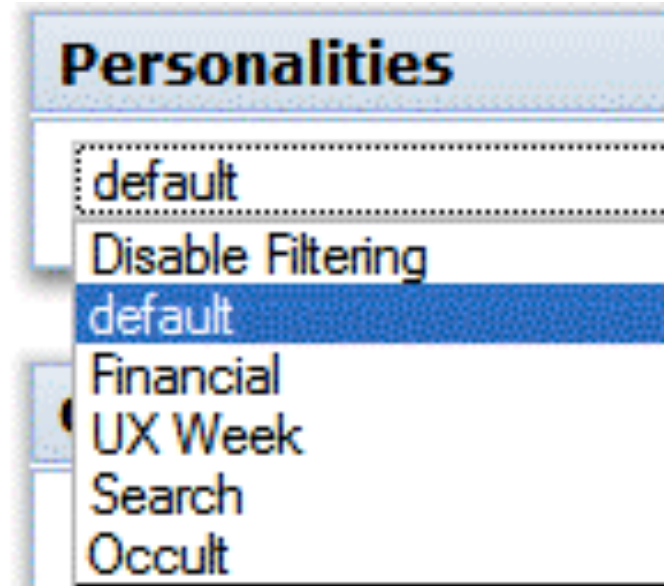
- JViews Diagrammer
- Interactive AJAX Portlet



- Metadata Management
- Lineage
- Policy
- Workflow

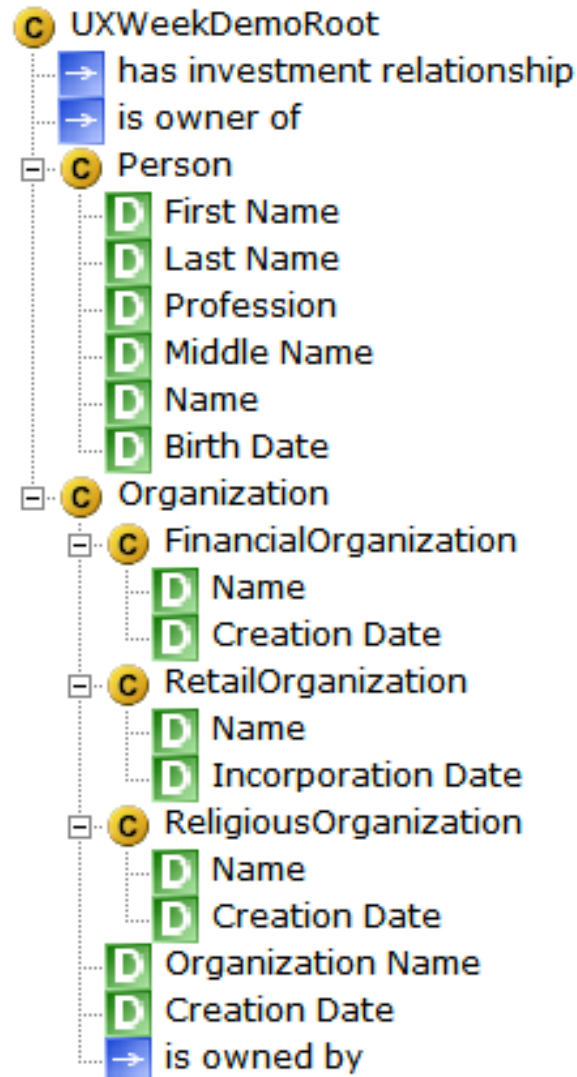


- Open Source Portal
- JSR-168 Compliant



- **A Personality is a collection of ontologies and data**
- **Provides foundational context for search, display, and workflow**

Applied Semantics: Search – Core Data Ontology



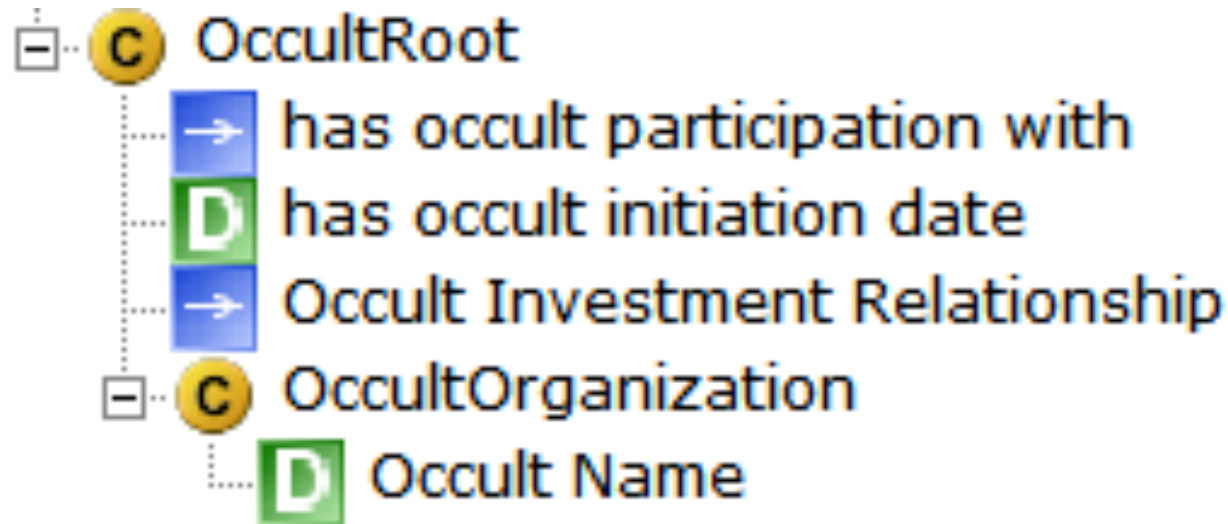
Applied Semantics: Search – Interface

Search

<p>Constraints</p> <p>Type Equals Person</p> <p>has investments in company Any Of</p> <div style="border: 1px solid #ccc; padding: 2px; display: inline-block;"> Yeats Construction Company Yeats Eats Yeats Investments Golden Dawn </div> <p>Birth Date Greater Than <input type="text" value="1800"/></p>	<p>Parameters</p> <p>Type Search Must Meet ALL Constraints</p> <p>Start <input type="text" value="0"/></p> <p>Results <input type="text" value="25"/></p> <p>Format Tree Grid</p>									
<input type="button" value="Search"/> <input type="button" value="Clear"/>										
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="width: 40%;">Description</th> <th style="width: 30%;">Property</th> <th style="width: 30%;">Value</th> </tr> </thead> <tbody> <tr> <td colspan="3" style="background-color: #f2f2f2;"> <div style="display: flex; align-items: center;"> <div style="margin-right: 5px;">[-]</div> <div style="font-size: 1.2em;">📁</div> Search Results </div> </td> </tr> <tr> <td style="background-color: #e6f2ff;"> <div style="display: flex; align-items: center;"> <div style="margin-right: 5px;">[+]</div> <div style="font-size: 1.2em;">📄</div> William Butler Yeats </div> </td> <td></td> <td></td> </tr> </tbody> </table>		Description	Property	Value	<div style="display: flex; align-items: center;"> <div style="margin-right: 5px;">[-]</div> <div style="font-size: 1.2em;">📁</div> Search Results </div>			<div style="display: flex; align-items: center;"> <div style="margin-right: 5px;">[+]</div> <div style="font-size: 1.2em;">📄</div> William Butler Yeats </div>		
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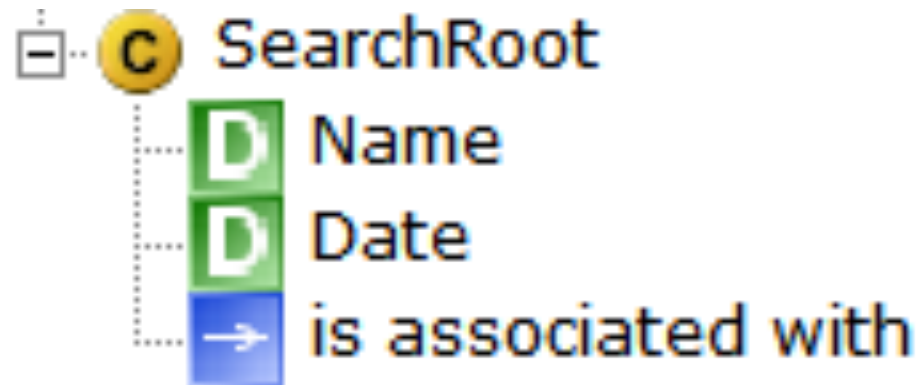
- Constraints can be concepts, properties (and their values), and instances.
- Individual search result items return dynamic property lists

- **Basic Search Demo**



- **Unique ontology/datastore**
 - Provides concept model evolution
 - Allows for protected access to concepts/data
 - Can be merged with other concept models

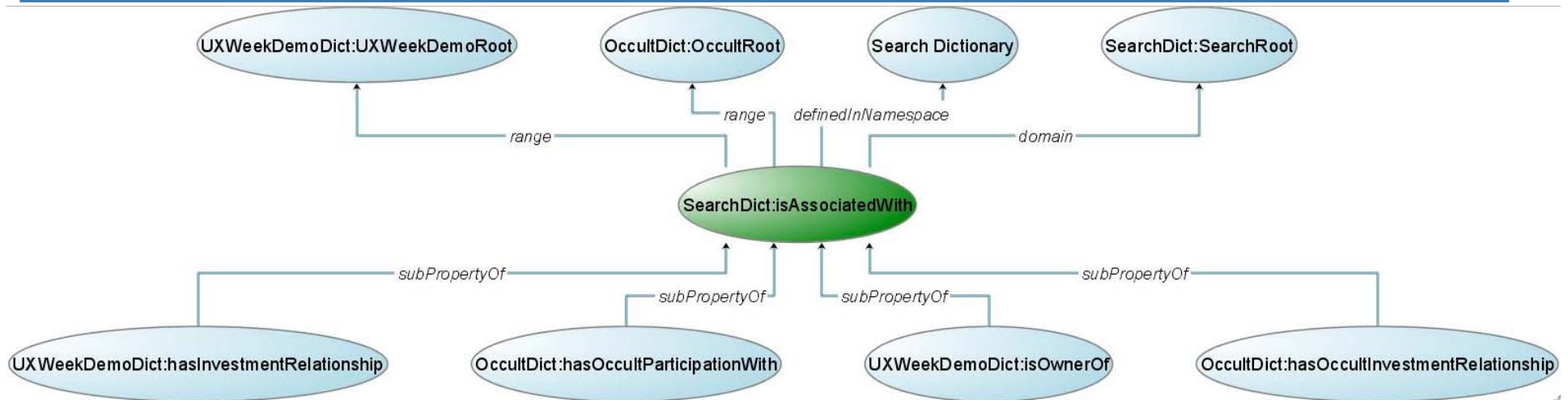
- **Cross-Domain Search Demo**



- **Abstract concept model**

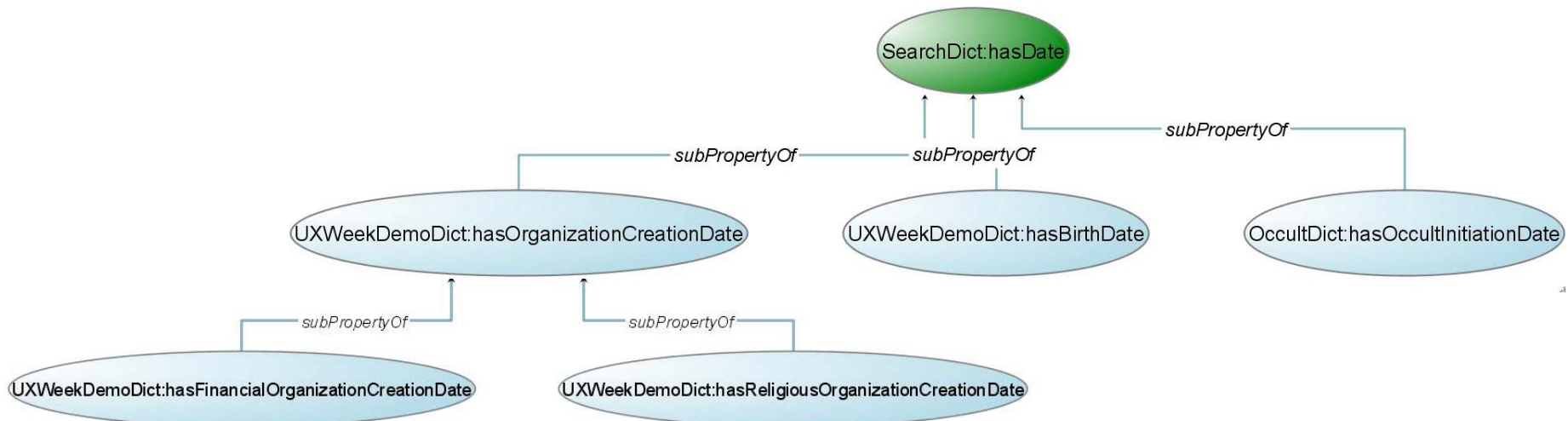
- Maps to sub-concepts/sub-properties across multiple domains (nested properties must be of the same data type)
- Supports simplified search interface and criteria
- Add subordinate concepts (and data sources) with no refactoring

Applied Semantics: Search – Abstract Relationship Property



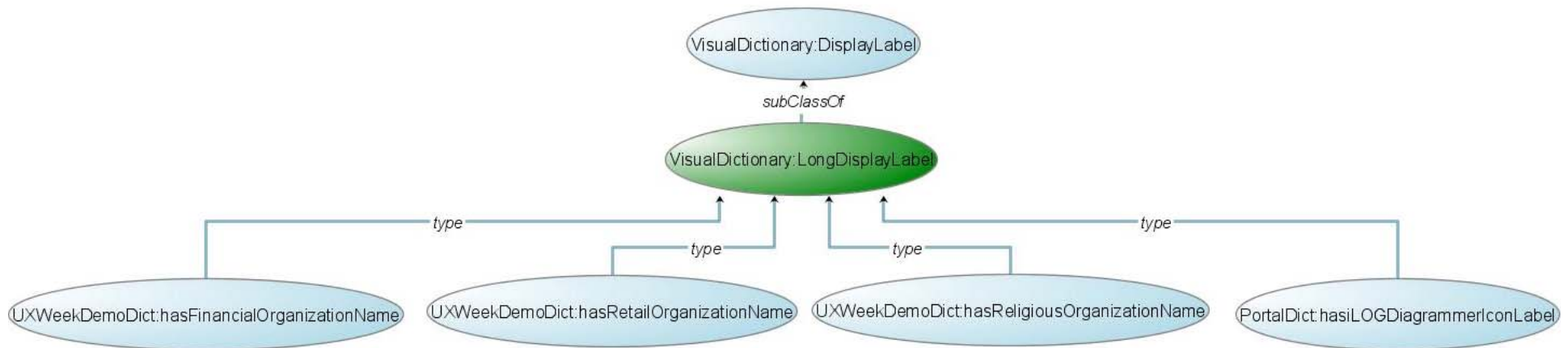
- Groups similar concept relationships across otherwise disparate domains
- Discover inferred relationships

Applied Semantics: Search – Abstract Data Property



- Abstract properties link distinct knowledge domains
- All sub-properties must be of the same data type

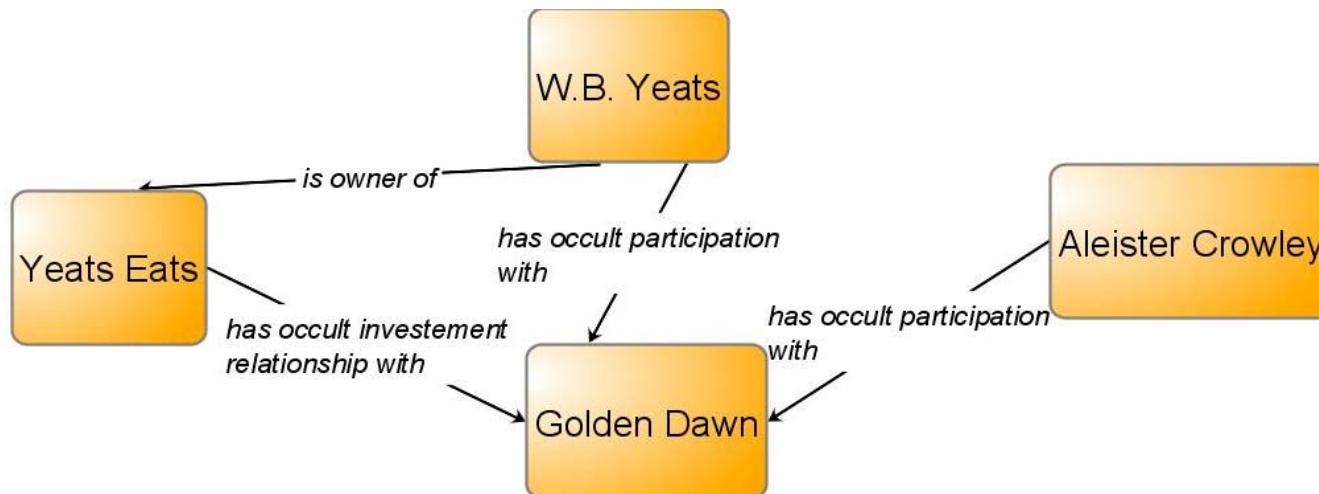
- **Abstract Search Demo**

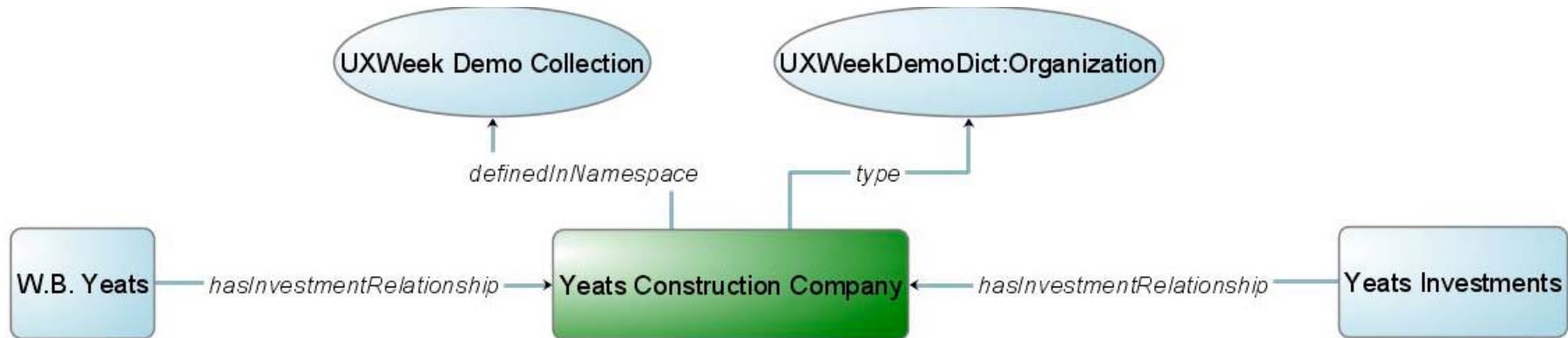


- **Defines relationship between portlet, display concepts and data elements**
- **Context-specific display values are dynamically inferred**
- **Goal: extend to portlet collections (inferred functional/workflow dependency)**

Applied Semantics: Display – Short Label/Long Label Comparison

Search		
Constraints		Parameters
Last Name	Equals <input type="text" value="Yeats"/>	Type: Search Must Meet ALL Constraints
		Start: 0
		Results: 25
		Format: Tree Grid
<input type="button" value="Search"/> <input type="button" value="Clear"/>		
Description	Property	Value
<input type="checkbox"/> Search Results		
<input type="checkbox"/> William Butler Yeats		





- **Explicit relationships**
- **Inferred relationships**
- **Only shows concepts and relationships from visible models and data stores**

- **Live Demo**

- **Current Problem**
 - Gap between business model (BPM/BPMN) and execution model (BPEL/UML/Java/JavaScript)
- **Solution: Semantic Workflow**
 - Semantic Mediation: Map business model to execution model via intermediate ontologies
 - Today: Ontologies/Inference Engines = Dynamic Classification
 - Tomorrow: Business Rules + Semantic Concepts = Contextual Workflow

- **Define/Code Trigger Event**
 - Create an abstract category called “Workflow Category”
 - When a user adds a new property type to the “Person” category, assign a “Draft” workflow category to the property.
 - When a user adds a new property type to the “Organization” category, assign a “Provisional” workflow category to the property.
- **Map Workflow To Visualization Ontology**
 - Categorize “Workflow” as a “New Property Indicator”
- **Map Visualization To Portal Ontology**
 - Assert the “Has Property Highlight Color” property (“Search Result Portlet”) on “New Property Indicator”. Set the value to “Red”.
- **Configure Workflow Engine**
 - Create “Supervisor” task to reflag all “Draft” categories as “Under Review”.
 - Create “Admin” task to reflag all “Provisional” categories as “Under Admin Review”.
 - Each task sends a message to users categorized as “Supervisor” or “Admin” in the ontology.

- **Live Demo**