**SIM-TBASSCO – Semantic Interoperability Measures**: Template-based Assurance of Semantic Interoperability in Software Composition

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**Testbed: GeoWorlds Geospatial Information Analysis (GeoTopics “Hot News” Portal)**

Create/adapt special-purpose information analysis applications

- GeoWorlds supplies component library
- Supports end users and application developers
- “Wire together” apps using semantic scripting tool

News Sources  
Extracted Articles  
Document Analyses  
News Compilation Results

- Document filtering
- Topic and place name extractions
- Topic and place-based document classifications
- Topic ranking and sorting
- Cross-product between topics and places
- Geographical mapping of the articles

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**Faults Overcome via Semantic Adaptation and Semantically-Invariant Transformation**

**Dataflow Architecture View**

- Load dataflow architecture; extend it at run-time
- Update dataflow architecture to replace malfunctioning service at run-time

**System Architectural View**

- Detect overloaded server; re-host the service
- Update system architecture automatically to reflect re-hosted service

- Real World: Service Failure Due to Host Crash
- Model Adaptation: Run-time Service Substitution (92% speedup; 2 hrs to 10 min)

- Real World: Automatically Detect Overloaded Host
- Model Transformation: Migrate Servers from the Overloaded Host (99% speedup of architectural revision; hours to seconds)

**Acme dataflow architecture view** depicts connections and dependencies among component services for the GeoTopics application

**Acme system architecture view** depicts connection hierarchy among GeoWorlds component servers

**Dynamic view of distributed system environment:** hosts, servers, and jobs

- Semantic adaptations adjust the application
  - Find alternative service types
  - Modify dataflow

**Dynamic view of execution progress:**

- Overall application and individual components
- Semantic adaptations adjust the application

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**Multiple architectural views of application to enable monitoring and analysis of distributed systems**

- Uses Acme-based description to ensure tool interoperability

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