5.4 Decision Support and Reasoning

This section includes the following:

- 5.4.1 Decision Support Functions

Decision Support and Reasoning

One of the primary reasons for having structured data is to provide the ability to automate decision support and reasoning across information models, data types, and the terminology associated with the attributes of each data type. For the ECCF registry to provide maximal value to end users, it is necessary to support common decision support functions across the enterprise and to extend that through services to the end users. In effect the semantic infrastructure must provide the tools to support Decision Support solutions:

Identify sources of valued information. Using the semantic metadata as a source, reasoning systems need to be able to identify the sources of information which are key to a given decision support solution. The services, models, and annotations provide definitions which can identify candidate sources for integration.

Common representations and transformations. To make decision support services viable, it is necessary that information be consistent and provide the ability to transform data for use in various tools and reasoning solutions.

Support for classification. The system provides for data classification, discovering new knowledge about key elements. This classification process is based on description logic and business rules which process the semantic structures of artifacts. Classification information should be added to the pool of knowledge about given structures and related information

Support for expert system rule processing and choreography. Using systems such as the OWL classifiers (Pellet, Fact++, Hermit), rule based expert systems (Jess, Drools), and work with RDF (Resource Description Framework) choreography languages (SPIN), the decision support system should be able to be applied in a choreographed layered fashion. Key to this process is a choreography engine which matches data with rules and a reasoning environment. Because of the complexity of the reasoning requirements, the OWL 2 specification is required in order to support the Semantic Infrastructure 2.0 requirements.

Integration with service registries. Since the artifact metadata provides definitions of data, the service registry provides the data access needed to process information. If a given artifact is a service, the decision support system determines the necessary definitions to integrate a service into decision support for the gathering of data.

The requirements listed above are derived from the following use cases:

- *Translational Medicine*
- *Research and Personalized Medicine*
- *Life Sciences*
- *Terminologies Use Cases for Clinical Trials*
- *Electronic Health Records*

5.4.1 Decision Support Functions

Decision support functions include the ability to:

- Query artifact metadata to locate useful artifacts for decision support
- Query service metadata to locate services matching artifacts and metadata definitions
- Create a decision support definition
- Create a decision support session
- Provide scheduling and access information to choreographer
- Select rules and rule system environment
- Execute reasoning systems against gathered data providing additional insight.

The requirements listed above are derived from the following use cases:

- *Electronic Health Records*
- *Clinical Trials*