

6.2 - Overview of Semantic Infrastructure 2.0 Capabilities and Services

Current Working Draft

These Semantic Infrastructure 2.0 Capabilities and Services Profile pages include the following. These pages are described below.

- [0 - Core Semantic Infrastructure Capabilities and Services Profile To Requirement Map](#)
- [1 - Artifact Management](#)
- [2 - caGRID 2.0 Platform and Terminology Integration](#)
- [3 - Clinical Data Forms Definition and Modeling](#)
- [4 - Conformance Testing](#)
- [5 - Service Discovery and Governance](#)

This document describes all the central Semantic Infrastructure 2.0 capabilities and services, organized by functional profiles that address the following requirements:

- Artifact Management
- Terminology and Platform Integration
- Forms Modeling
- Conformance Testing
- Service Discovery and Governance
- Reasoning and Inference

The functional decomposition of Semantic Infrastructure 2.0 reflects the structure of the requirements. Each functional profile is a grouping of capabilities corresponding to identified Semantic Infrastructure requirements. In addition all requirements identified during Gap Analysis (which immediately preceded roadmap development) have been merged into relevant functional profiles as capabilities with appropriate traceability to the Gap Analysis requirements.

The Semantic Infrastructure is a Semantic Service Oriented Architecture that conforms with the principles and guidelines specified by the corresponding OASIS Reference Models, Ontologies, and Architectures. Within this document, these standards are represented as Semantic Profiles. Conformance with these standards has architectural implications for the business-oriented functional profiles. These architectural implications are reflected as extended capabilities of each functional profile, with traceability to the appropriate Semantic Profile conceptual model for Service-Oriented Architecture (SOA). This traceability, and the associated contextual description, help provide a bridge between the domain-specific terminology used to express requirements and the terminology used to describe the Semantic Infrastructure architecture.

The functional profiles are organized by the **Semantic Infrastructure Requirements** as follows:

- [1 - Artifact Management](#) The Semantic Infrastructure supports management, analysis, annotation, publication, query, and transformation of artifacts, including static and dynamic models.
 - [1.1 - Administer Artifacts](#) Artifact lifecycle management defines profiles to manage the lifecycle, governance, provenance, versioning, and representation of artifacts, as well as the relationships between artifacts.
 - [1.2 - Analyze Artifacts](#) Analyze Artifacts defines profiles supporting the analysis of artifacts utilizing semantic queries, reasoning, and rules.
 - [1.3 - Model and Annotate](#) Model and Annotate defines profiles supporting models, including model maintenance, constraints, bindings, extensions, and semantic annotations.
 - [1.4 - Publish](#) The ability to publish and discover information models will be supported by the semantic infrastructure, and the platform will leverage these capabilities.
 - [1.5 - Search and Access](#) The Semantic Infrastructure enables integrated access, search, and visualization of artifacts using a variety of search criteria, model serialization formats, and user interaction empowerment tools.
 - [1.6 - Transform](#) Transform defines profiles for management and application of transformations to support multiple views, serialization formats, inter-operability, semantic convergence, model migration, model merge and compare, and provisioning of target artifacts.
- [2 - caGRID 2.0 Platform and Terminology Integration](#) The Semantic Infrastructure supports seamless integration with the caGRID 2.0 platform.
 - [2.1 - Export](#) Event Processing and Notifications enables monitoring of services in the ecosystem and provides for asynchronous updates by services, effectively allowing a loose coordination of services that both provide and respond to conditions (possibly defined in business rules).
 - [2.2 - Search and Access](#) This group of capabilities focuses on enabling developers of composite services and applications to discover, compose, and invoke services. This includes the discovery of published services based on service metadata and the generation of client APIs in multiple languages to provide cross-platform access to existing services.
- [3 - Case Report Forms Definition and Modeling](#) Case Report Forms are the primary channel for capturing information in the healthcare and clinical domain. Forms also play a key role in information exchange and are critical to supporting interoperability in healthcare.
 - [3.1 - Administer Forms](#)
 - [3.2 - Create Forms](#) Tools and services for defining form templates.
 - [3.3 - Search and Access Forms](#) - Access models and reusable segments to support Case Report Form Definitions (not yet posted).
- [4 - Conformance Testing](#) Services specifications developed by NCI and the community have to be testable to ensure that the implementation conforms to the specification.
 - [4.1 - Create Conformance Statements](#)
 - [4.2 - Search and Access Conformance Statements](#) Conformance testing leverages the artifact and service metadata to validate that an implementation adequately addresses the requirements stated in the service specification. An example of service requirement is the ability to specify a response time in the specification (design time) and validate that this response time is valid for an implementation of the service. Additional test points include but are not limited to binding to specific terminologies and domain models.
 - [4.3 - Test for Conformance](#) Testing for SOA combines the typical challenges of software testing and certification with the additional needs of accommodating the distributed nature of the resources, the greater access of a more unbounded consumer population, and the desired flexibility to create new solutions from existing components over which the solution developer has little if any control. The purpose of testing is to demonstrate a required level of reliability, correctness, and effectiveness that enable prospective consumers to have adequate confidence in using a service.

- [5 - Service Discovery and Governance](#) Service discovery and governance allows service developers to specify rich metadata about services. This enables better discovery, and governance of services.
 - [5.1 - Administer Services](#) Administer Services defines profiles for management of service metadata and service classification schemes.
 - [5.2 - Analyze Services](#) Analyze Services defines profiles for service analysis, providing support for determining characteristics including service interaction dependencies, service reuse, service conformance assessment, heterogeneous data interchange, and service collaboration compatibility.
 - [5.3 - Search and Access Services](#) Search and Access Services defines profiles supporting the discovery and visualization of services.
 - [5.4 - Service Governance and workflows](#) This includes predefined templates, workflows, and governance policies for governing the service lifecycle as well as an approval and review process for service specifications and the ability to promote services through the stages of the service lifecycle.
 - [5.5 - Service Policies](#) Service policies help establish constraints on the service specifications and mandate an approach. Policies can be specified around governance, access control and other design and runtime constraints.
- 6 - Reasoning and Inference: Refer to [NCI Enterprise Services Inventory Blueprint](#), Utility section, box U18 "Semantic Decision Support."

The semantic infrastructure capabilities and services address requirements and use cases for each domain. In addition to the domain specific use-cases, the capabilities also address CBIIT internal development and architecture requirements. Specifically, CBIIT has standardized on Service-Oriented Architecture as the foundational principle for applications architecture and interoperability. CBIIT has also adopted a formal approach (Enterprise Conformance and Compliance Framework) for defining service specifications. The capabilities address both the requirements for supporting semantic interoperability, and the need to publish formal specifications that can be adopted by external organizations and vendors.

The search and access profiles for each requirement are different as they are customized to access specific information in a defined format. For example, platform tools like the orchestration engine will leverage specific metadata to determine compatibility between two services.