

# Computationally Independent Model and Service Specification

LexEVS 6.0

1.5

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# 1 Overview and Business Case

## 1.1 Service Description and Purpose

LexEVS 6.0 represents the next generation of NCI Enterprise Vocabulary Services. LexEVS is a mechanism for the standard storage of controlled vocabularies and ontologies defining a flexible format for accurately representing a wide variety of vocabularies and other lexically-based resources in several different server storage repositories as well as a XML format. LexEVS provides a powerful and robust API and tool suite which permits access to controlled vocabulary content represented in the LexEVS model. This allows terminologies from a wide variety of resources such as RRF, OWL, and OBO to be represented and loaded to a single data base management system and accessed with a common set of tools and interfaces.

LexEVS is based off the LexGRID database schema and LexBIG API objects, where LexGRID defines how the terminologies are structured in the database and LexBIG defines how the terminology service looks as objects to the user. LexEVS provides optimizing query code that retrieves LexBIG objects, allows the user to tailor calls to the terminology service in such a way that a discrete set of values is returned increasing utility and interoperability.

One of the requirements of LexEVS 6.0 is to align the LexEVS Analytical Grid Services component operations - including Search and Query Operations for Code Systems and Associations but excluding other LexEVS capabilities for querying and loading Value Sets, Concept Domains and Usage Contexts – to international efforts at developing common terminology service interfaces, specifically, the [Health Level Seven \(HL7\) Common Terminology Services – Release 2 \(CTS 2\)](#) standard.

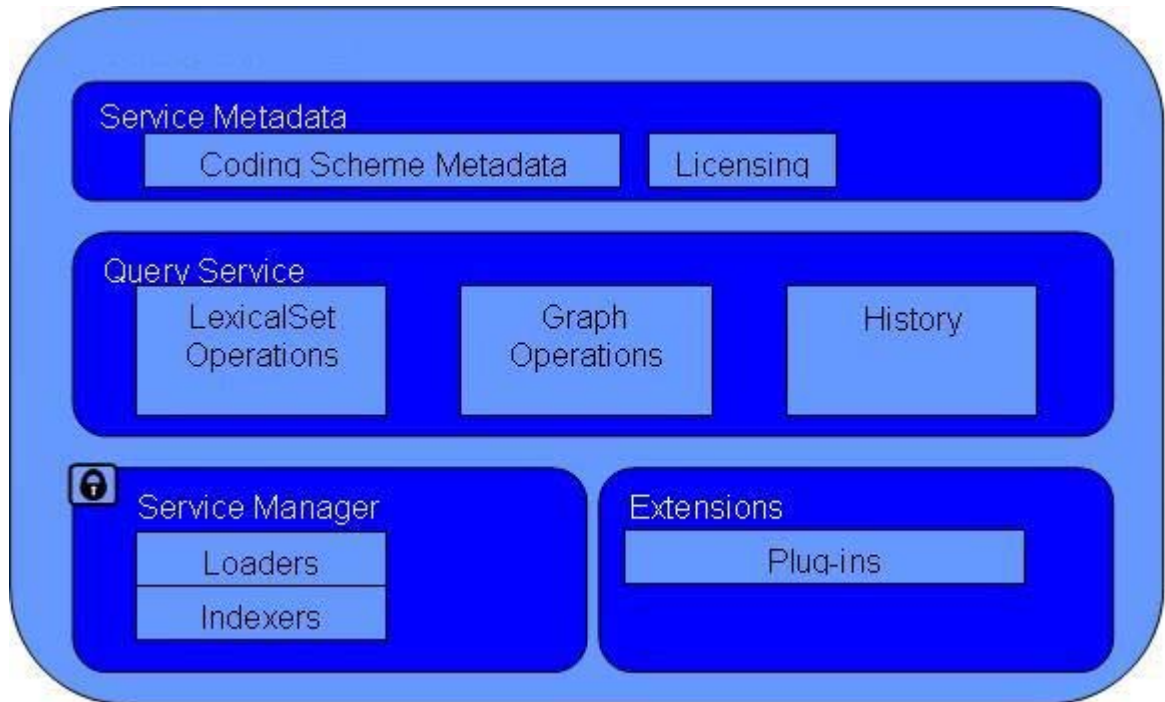
**NOTE:** *For the purpose of this document, the terms “Code System” and “Coding Scheme” are synonymous.*

## 1.2 Scope

The scope of this CIM is constrained to the Analytical Grid Services components for LexEVS 6.0. Analytical Grid Services are those interfaces that are exposed on the Grid, and include the LexBIG domains of:

- LexBIGService – service identification interfaces
- CodedNodeGraph – A virtual graph where the edges represent associations and the nodes represent concept codes
- CodedNodeSet – A coded node set represents a flat list of coded entries
- HistoryService – Service reference to the history API servicing the given coding scheme

- LexBIGServiceConvenienceMethods – service methods to be implemented as a generic extension of the LexEVS
- LexBIGServiceMetadata – Interface to perform system-wide query over optionally loaded metadata for loaded code systems and providers



These service interfaces provide query and filtering support to the core LexBIGService interface, allowing code system content to be queried and grouped according to the different attributes and properties of code system content.

There are however, components of LexEVS that are purposely excluded from the Analytical Grid Services, such as terminology authoring and administration, value domain query and concept domain query. This section outlines the scope of LexEVS CIM with respect to the scope of the Analytical Grid Services.

<b>Items</b>	<b>In Scope / Out of Scope</b>	<b>Source</b>
All Administration operations such as: <ul style="list-style-type: none"><li>• Import Code System</li><li>• Import Code System Revision</li><li>• Import Value Set Version</li><li>• Import Association Version</li><li>• Export Association</li><li>• Export Code System Content</li><li>• Change Code System Status</li><li>• Register for Notification</li><li>• Update Notification Registration</li><li>• Update Notification Registration Status</li></ul>	Out of Scope	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
All Code System Query Operations such as: <ul style="list-style-type: none"><li>• Return Code System Details</li><li>• List Code System Concepts</li><li>• Return Concept Details</li><li>• List Association Types</li></ul>	In Scope	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>

- Return Association Type Details

All Value Set Query Operations such as:                      Out of Scope                      [CTS2 and LexEVS 6.0 Analytical Grid Services.xls](#)

- List Value Set
- Return Value Set Details
- List Value Set Contents
- Check Value Set Subsumption
- Check Concept Value Set Membership

All Concept Domain operations such as:                      Out of Scope                      [CTS2 and LexEVS 6.0 Analytical Grid Services.xls](#)

- List Concept Domains
- Return Concept Domain Details
- List Usage Contexts
- Return Usage Context Details
- List Concept Domain Bindings
- Check Concept to Concept Domain Association

Association Query operations including:                      In scope                      [CTS2 and LexEVS 6.0 Analytical Grid Services.xls](#)

- List Associations
- Return Association Details



Association Query operation including	Out of Scope	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
<ul style="list-style-type: none"><li>• Determine Transitive Concept Relationship</li><li>• Compute Subsumption Relationship</li></ul>		
All terminology authoring operations	Out of Scope	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>

### 1.3 Assumptions

The following assumptions were made in developing this document. These assumptions were derived from the various wiki pages and documents pertaining to LexEVS Analytical Grid Services.

Assumption	Affects	Source
It is assumed that this service will be constrained to the LexEVS Analytical Grid Services	<p>Terminology authoring, value domain operations and administrative operations will not be supported.</p> <p>This constrains the storyboards and actors accordingly.</p>	<p>LexEVS Scope Document</p> <p><a href="https://wiki.nci.nih.gov/display/EVS/LexEVS+6.0+Scope+Document">https://wiki.nci.nih.gov/display/EVS/LexEVS+6.0+Scope+Document</a></p>
When an Analytical Grid Service functional capability intersects with a HL7 CTS 2 function capability, the Analytical Grid Service function	Provides a limited standardized interface to LexEVS Analytical Grid Service functions.	<p>LexEVS Scope Document</p> <p><a href="https://wiki.nci.nih.gov/display/EVS/LexEVS+6.0+Scope+Document">https://wiki.nci.nih.gov/display/EVS/LexEVS+6.0+Scope+Document</a></p>

<p>will conform to the CTS 2 functional capability.</p>		
<p>The ISO 21090 Health Informatics - Harmonized data types for information interchange will be used for data interoperability</p>	<p>ISO 21090 data types provide a harmonized set of data type definitions for representing and exchanging healthcare related information.</p> <p>LexEVS 6.0 will interchange information using the 21090 data type specifications</p>	<p><a href="http://www.kith.no/upload/4414/ISODIS21090.pdf">http://www.kith.no/upload/4414/ISODIS21090.pdf</a></p>

## 2 Business Storyboards

### 2.1 Storyboards Overview

These storyboards are focused on Search and Query Service (SQS) operations as specified by the scope of the LexEVS 6.0 Analytical Grid Service operations. When a storyboard or actor outline intersects with a known standardized functional component – for example from HL7’s CTS 2 Specification – the cross reference is noted.

### 2.2 Primary Actors

The actors defined for the LexEVS 6.0 CIM are constrained to actors necessary to perform query operations as per the scope of LexEVS Analytical Grid Services.

#### 2.2.1 People Actors

Name	Role	Notes
Terminology user	An actor such as a subject matter expert or terminologist requiring access to controlled terminology content.	<i>Terminology User</i> activities include, but are not limited to, querying for specific concept codes and code system related content.  Standards Link: This Actor correlates to the HL7 CTS 2 “ <b>Terminology User</b> ” Actor

#### 2.2.2 System Actors

Name	Notes
LexEVS Service	LexEVS Analytical Grid Service APIs

## 2.3 Story Boards

### 2.3.1 SQS-SB1 – Retrieve Code Systems

<b>Outline</b>	Code System Search /Query Scenario – List Code Systems
<b>Detail</b>	A <i>Terminology User</i> queries the LexEVS Service to obtain a set of code systems available to the service, as well as the metadata pertaining to each code system in the set.

	Standards Link: This SB correlates to the HL7 CTS 2 “ <b>Retrieve Available Code Systems</b> ”
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### 2.3.2 SQS-SB2 – Retrieve Code System Details

<b>Outline</b>	Code System Search /Query Scenario – Return Code System Details
<b>Detail</b>	<p>A <i>Terminology User</i> queries the LexEVS Service to obtain the metadata for a specified code system available to the LexEVS service.</p> <p>Standards Link: This SB correlates to the HL7 CTS 2 “<b>Retrieve Available Code Systems</b>”</p>

### 2.3.1 SQS-SB3 – Retrieve Code System Concepts

<b>Outline</b>	Code System Search /Query Scenario – List Code System Concepts
<b>Detail</b>	<p>A <i>Terminology User</i> queries the LexEVS Service to obtain a set of concepts available for a specified code system.</p> <p>Standards Link: This SB correlates to the HL7 CTS 2 “<b>Retrieve Coded Concepts from Code System</b>”</p>

### 2.3.2 SQS-SB4 – Retrieve Concept Details

<b>Outline</b>	Code System Search /Query Scenario – Return Concept Details
<b>Detail</b>	<p>A <i>Terminology User</i> queries the LexEVS Service to obtain the details (concept identifier, attributes, and other associated metadata) for a set of code system concepts for a given code system.</p> <p>Standards Link: This SB correlates to the HL7 CTS 2 “<b>Retrieve Coded Concepts from Code System</b>”</p>

### 2.3.1 SQS-SB5 – Retrieve Association Types

<b>Outline</b>	LexEVS Service Search /Query Scenario – List Association Types
<b>Detail</b>	<p>A <i>Terminology User</i> queries the LexEVS Service to obtain the set of association types available to the LexEVS service for a given set of code systems.</p> <p>Standards Link: This SB correlates to the HL7 CTS 2 “<b>Enumerate</b>”</p>

	<b>Association Types”</b>
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### 2.3.2 SQS-SB6 – Retrieve Association Type Details

<b>Outline</b>	LexEVS Service Search /Query Scenario – List Association Type Details
<b>Detail</b>	<p>A <i>Terminology User</i> queries the LexEVS Service to obtain the metadata for a specified association type.</p> <p>Standards Link: This SB correlates to the HL7 CTS 2 “<b>Enumerate Association Types</b>”</p>

### 2.3.3 SQS-SB7 – Retrieve Associations

<b>Outline</b>	LexEVS Service Search /Query Scenario – List Associations
<b>Detail</b>	<p>A <i>Terminology User</i> queries the LexEVS Service to obtain the associations available for a specified concept for a specific code system.</p> <p>Standards Link: This SB correlates to the HL7 CTS 2 “<b>Identify / Retrieve Associations for a Single Concept</b>”, “<b>Identify / Retrieve Associations between Two or More Coded Concepts</b>”</p>

### 2.3.4 SQS-SB8 – Retrieve Association Details

<b>Outline</b>	LexEVS Service Search /Query Scenario – Return Association Details
<b>Detail</b>	<p>A <i>Terminology User</i> queries the LexEVS Service to obtain the metadata for a specified associations for a specific code system.</p> <p>Standards Link: This SB correlates to the HL7 CTS 2 “<b>Identify / Retrieve Associations for a Single Concept</b>”, “<b>Identify / Retrieve Associations between Two or More Coded Concepts</b>”</p>

### 2.3.5 SQS-SB9 – Retrieve Service Information

<b>Outline</b>	LexEVS Service Search /Query Scenario – Retrieve Service Information.
<b>Detail</b>	<p>A <i>Terminology User</i> queries the LexEVS Service to obtain information about the service</p> <p>Standards Link: N/A</p>

### 2.3.6 SQS-SB10 – Retrieve Sort Algorithm

<b>Outline</b>	LexEVS Service Search /Query Scenario – Retrieve Sort Algorithm.
<b>Detail</b>	<p>A <i>Terminology User</i> queries the LexEVS Service to obtain the sort algorithms available to the service.</p> <p>Standards Link: N/A</p>

### 2.3.7 SQS-SB11 – Retrieve Match Algorithm

<b>Outline</b>	LexEVS Service Search /Query Scenario – Retrieve Match Algorithm.
<b>Detail</b>	<p>A <i>Terminology User</i> queries the LexEVS Service to obtain the match algorithms available to the service.</p> <p>Standards Link: N/A</p>

### 3 Detailed Functional Model

#### 3.1 Structure of the Service

The LexEVS 6.0 Analytical grid service includes operations for the search and query of code system content. These operations provide query and filtering capabilities to the core LexBIGService interface, allowing code system content to be queried and grouped according to the different attributes and properties of code system content.

At a conceptual level, the structure of the LexEVS Analytical Grid services includes the following capabilities:

Name	Description
Get Code System Concepts	This function is used retrieve the set of all concepts in a specified code system.
Get Concept Details	This function returns information for a specified concept.
Get Service Metadata	This function is used to return the metadata about the LexEVS service.
Get Supported Coding Schemes	This function returns a list of code system and code system versions supported by the service.
Get Last Update Time	This query returns the last time that content of this service changed,
Get Coding Scheme	This query returns detailed code system information for a specified code system.
Get Node Graph	This query the node graph as represented in the particular relationship set in the code system.
Get Generic Extensions	This query returns a description of all registered extensions used to implement application-specific behavior that is centrally accessible from a LexEVS service.
Get Generic Extension	This query returns an instance of an application specific extension on the LexEVS service registered with a specified name.



<b>Name</b>	<b>Description</b>
Get History Service	This query resolves a reference to the history API servicing the given code System.
Get Sort Algorithms	This query returns a description of all registered extensions used to provide additional sorting of query results.
Get Coding Scheme Copyright	This query returns code system copyright information for a specific code system version.
Get Filter	This query returns an instance of the filter extension registered with the given name.
Get Sort Algorithm	This query returns an instance of the sort extension registered with the given name.
Get Filter Extensions	This query returns a description of all registered extensions used to provide additional filtering of query results.
List Association Types	This function returns the types of associations available to a given code system.
List Associations	This function returns an instance of a set of specified of associations.
List Association Details	This function returns metadata for a specified association.
Get Match Algorithms	This function returns the match algorithms available to be used for code system query on the service.

## **3.2 Detail of the Capabilities**

### **3.2.1 Get Code System Concepts**

<b>Name [M]</b>	Get Code System Concepts
<b>Description [M]</b>	This function is used retrieve the set of all concepts in a specified code system.
<b>Pre-Conditions [M]</b>	1. LexEVS Service is Running

	2. Code System is installed on LexEVS Service
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged in and has valid privileges and licenses to access the code system being queried.
<b>Inputs [M]</b>	<ol style="list-style-type: none"> <li>1. Code System Identifier</li> <li>2. Filter Criteria</li> <li>3. Sort Criteria</li> </ol>
<b>Outputs [M]</b>	1. Set of Coded Concept References
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. Invalid identifier(s)</li> <li>2. Invalid Filter Criteria?</li> <li>3. Invalid Sort Criteria?</li> </ol>
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: This capability correlates to the HL7 CTS 2 “ <b>List Code System Concepts</b> ” detailed functional model.

### 3.2.2 Get Concept Details

<b>Name [M]</b>	Get Concept Details
<b>Description [M]</b>	This function returns information for a specified concept.
<b>Pre-Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. LexEVS Service is Running</li> <li>2. Code System is installed on LexEVS Service</li> </ol>
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged in and has valid privileges and licenses to access the code system being queried.
<b>Inputs [M]</b>	<ol style="list-style-type: none"> <li>1. Code System Identifier</li> </ol>

	2. Concept Identifier
<b>Outputs [M]</b>	1. Coded concept details
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	1. Invalid identifier(s)
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: This capability correlates to the HL7 CTS 2 “Return Code System Details” detailed functional model.

### 3.2.3 Get Service Metadata

<b>Name [M]</b>	Get Service Metadata
<b>Description [M]</b>	This function is used to return the metadata about the LexEVS service.
<b>Pre-Conditions [M]</b>	1. LexEVS Service is Running
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged in and has access permissions to the service.
<b>Inputs [M]</b>	None
<b>Outputs [M]</b>	1. Service descriptive metadata
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: N/A

### 3.2.4 Get Supported Code Systems

<b>Name [M]</b>	Get Supported Code Systems
<b>Description [M]</b>	This function returns a list of code system and code system versions supported by the service.
<b>Pre-Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. LexEVS Service is Running</li> <li>2. A minimum of one code system is installed on the LexEVS Service</li> </ol>
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged in and has valid privileges and licenses to access the code systems being queried.
<b>Inputs [M]</b>	None
<b>Outputs [M]</b>	<ol style="list-style-type: none"> <li>1. The code systems available to the service that the user has permissions and license to access.</li> </ol>
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: This capability correlates to the HL7 CTS 2 “ <b>List Code Systems</b> ” detailed functional model.

### 3.2.5 Get Last Update Time

<b>Name [M]</b>	Get Last Update Time
<b>Description [M]</b>	This query returns the last time that content of this service changed,
<b>Pre-Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. LexEVS Service is Running</li> </ol>
<b>Security Pre-</b>	Access control mechanism needs to be in place to ensure that

<b>Conditions [M]</b>	the user is logged into the service.
<b>Inputs [M]</b>	None
<b>Outputs [M]</b>	The last time that the content of this service was changed; null if no changes have occurred.
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	1. None
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: N/A

### 3.2.6 Get Code System

<b>Name [M]</b>	Get Code System
<b>Description [M]</b>	This query returns detailed code system information for a specified code system.
<b>Pre-Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. LexEVS Service is Running</li> <li>2. The code system is loaded on the service</li> </ol>
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged in and has valid privileges and licenses to access the code system being queried.
<b>Inputs [M]</b>	<ol style="list-style-type: none"> <li>1. Code system identifier</li> <li>2. Code system version?</li> </ol>
<b>Outputs [M]</b>	1. Detailed code system information (metadata)
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	1. Invalid Identifier
<b>Aspects left for</b>	

<b>Technical Bindings</b> [O]	
<b>Notes</b> [O]	Standards Link: This capability correlates to the HL7 CTS 2 “ <b>Return Code Systems</b> ” detailed functional model.

### 3.2.7 Get Node Graph

<b>Name</b> [M]	Get Node Graph
<b>Description</b> [M]	This query returns a virtual graph where the edges represent associations and the nodes represent coded entries. A CodedNodeGraph describes a graph that can be combined with other graphs, queried or resolved into an actual graph rendering.
<b>Pre-Conditions</b> [M]	<ol style="list-style-type: none"> <li>1. LexEVS Service is Running</li> <li>2. The code system being resolved is loaded on the service</li> </ol>
<b>Security Pre-Conditions</b> [M]	Access control mechanism needs to be in place to ensure that the user is logged in and has valid privileges and licenses to access the code system being queried.
<b>Inputs</b> [M]	<ol style="list-style-type: none"> <li>1. Code system identifier</li> <li>2. Code system version</li> <li>3. Relation Identifier</li> </ol>
<b>Outputs</b> [M]	<ol style="list-style-type: none"> <li>1. The coded node graph</li> </ol>
<b>Post-Conditions</b> [O]	
<b>Exception Conditions</b> [M]	<ol style="list-style-type: none"> <li>1. Invalid identifier(s)</li> <li>2. Invalid version</li> <li>3. Invalid Relation Identifier</li> </ol>
<b>Aspects left for Technical Bindings</b> [O]	
<b>Notes</b> [O]	Standards Link: This capability correlates to the HL7 CTS 2 “ <b>Determine Transitive Concept Relationship</b> ” detailed

	functional model.
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### 3.2.8 Get Match Algorithms

<b>Name [M]</b>	Get Match Algorithms
<b>Description [M]</b>	This query returns the match algorithms available to be used for code system query on the service.
<b>Pre-Conditions [M]</b>	1. LexEVS Service is Running
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged into the service.
<b>Inputs [M]</b>	None
<b>Outputs [M]</b>	1. Match Algorithm List
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	1. None
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: N/A

### 3.2.9 Get Generic Extensions

<b>Name [M]</b>	Get Generic Extensions
<b>Description [M]</b>	This query returns a description of all registered extensions used to implement application-specific behavior that is centrally accessible from a LexEVS service.
<b>Pre-Conditions [M]</b>	1. LexEVS Service is Running
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged into the service.

<b>Inputs [M]</b>	None
<b>Outputs [M]</b>	1. Extension description list
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: N/A

### 3.2.10 Get Generic Extension

<b>Name [M]</b>	Get Generic Extension
<b>Description [M]</b>	This query returns an instance of an application specific extension on the LexEVS service registered with a specified name.
<b>Pre-Conditions [M]</b>	1. LexEVS Service is Running
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged into the service.
<b>Inputs [M]</b>	1. Extension identifier
<b>Outputs [M]</b>	1. Extension
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	1. Invalid Extension Identifier
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: N/A



**3.2.11 Get History Service**

<b>Name [M]</b>	Get History Service
<b>Description [M]</b>	This query resolves a reference to the history API servicing the given code System.
<b>Pre-Conditions [M]</b>	1. LexEVS Service is Running
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged into the service.
<b>Inputs [M]</b>	1. Code System Identifier
<b>Outputs [M]</b>	1. History Service Reference
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	1. Invalid identifier
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: N/A

**3.2.12 Get Sort Algorithm**

<b>Name [M]</b>	Get Sort Algorithms
<b>Description [M]</b>	This query returns a description of all registered extensions used to provide additional sorting of query results.
<b>Pre-Conditions [M]</b>	1. LexEVS Service is Running
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged into the service.
<b>Inputs [M]</b>	None
<b>Outputs [M]</b>	1. List of available sort algorithms
<b>Post-Conditions [O]</b>	

<b>Exception Conditions [M]</b>	1. None
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: N/A

### 3.2.13 Get Coding Scheme Copyright

<b>Name [M]</b>	Get coding scheme copyright
<b>Description [M]</b>	This query returns code system copyright information for a specific code system version.
<b>Pre-Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. LexEVS Service is Running</li> <li>2. The code system being resolved is loaded on the service</li> </ol>
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged in and has valid privileges and licenses to access the code system being queried.
<b>Inputs [M]</b>	<ol style="list-style-type: none"> <li>1. Code system identifier</li> </ol>
<b>Outputs [M]</b>	<ol style="list-style-type: none"> <li>1. Code system copyright information</li> </ol>
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. Invalid identifier</li> </ol>
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: This capability correlates to the HL7 CTS 2 “ <b>Return Code Systems</b> ” detailed functional model.

**3.2.14 Get Filter**

<b>Name [M]</b>	Get Filter
<b>Description [M]</b>	This query returns an instance of the filter extension registered with the given name.
<b>Pre-Conditions [M]</b>	1. LexEVS Service is Running
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged into the service.
<b>Inputs [M]</b>	1. Extension identifier
<b>Outputs [M]</b>	1. Filter reference
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	1. Invalid extension identifier
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: N/A

**3.2.15 Get Sort Algorithm**

<b>Name [M]</b>	Get Sort Algorithm
<b>Description [M]</b>	This query returns an instance of the sort extension registered with the given name.
<b>Pre-Conditions [M]</b>	1. LexEVS Service is Running
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged into the service.
<b>Inputs [M]</b>	1. Extension identifier
<b>Outputs [M]</b>	1. Sort reference

<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	1. Invalid identifier
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: N/A

### 3.2.16 Get Filter Extension

<b>Name [M]</b>	Get Filter Extension
<b>Description [M]</b>	This query returns a description of all registered extensions used to provide additional filtering of query results.
<b>Pre-Conditions [M]</b>	1. LexEVS Service is Running
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged into the service.
<b>Inputs [M]</b>	None
<b>Outputs [M]</b>	1. Extension Description List
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	None
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: N/A

### 3.2.17 List Association Types

<b>Name [M]</b>	Get Association Types
<b>Description [M]</b>	This function returns the types of associations available to a

	given code system.
<b>Pre-Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. LexEVS Service is Running</li> <li>2. Code system being queried is loaded on the service</li> </ol>
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged in and has valid privileges and licenses to access the code system being queried.
<b>Inputs [M]</b>	<ol style="list-style-type: none"> <li>1. Code system identifier</li> </ol>
<b>Outputs [M]</b>	<ol style="list-style-type: none"> <li>1. Association types for the code system</li> </ol>
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. Invalid identifier</li> </ol>
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: This capability correlates to the HL7 CTS 2 “ <b>List Association Types</b> ” detailed functional model.

### 3.2.18 List Associations

<b>Name [M]</b>	List Associations
<b>Description [M]</b>	This function returns an instance of a set of specified associations for a concept
<b>Pre-Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. LexEVS Service is Running</li> <li>2. Code system being queried is loaded on the service</li> </ol>
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged in and has valid privileges and licenses to access the code system being queried.
<b>Inputs [M]</b>	<ol style="list-style-type: none"> <li>1. Code system identifier</li> </ol>

	<ol style="list-style-type: none"> <li>2. Code system version?</li> <li>3. Concept identifier</li> </ol>
<b>Outputs [M]</b>	<ol style="list-style-type: none"> <li>1. Associations for a given concept</li> </ol>
<b>Post-Conditions [O]</b>	
<b>Exception Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. Invalid identifier(s)</li> </ol>
<b>Aspects left for Technical Bindings [O]</b>	
<b>Notes [O]</b>	Standards Link: This capability correlates to the HL7 CTS 2 “ <b>List Associations</b> ” detailed functional model.

### 3.2.19 List Association Details

<b>Name [M]</b>	List Association Details
<b>Description [M]</b>	This function returns metadata for a specified association
<b>Pre-Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. LexEVS Service is Running</li> <li>2. Code system being queried is loaded on the service</li> </ol>
<b>Security Pre-Conditions [M]</b>	Access control mechanism needs to be in place to ensure that the user is logged in and has valid privileges and licenses to access the code system being queried.
<b>Inputs [M]</b>	<ol style="list-style-type: none"> <li>1. Code system identifier</li> <li>2. Association identifier</li> <li>3. Optional code system version identifier</li> </ol>
<b>Outputs [M]</b>	<ol style="list-style-type: none"> <li>1. Metadata details pertaining to the provided association</li> </ol>
<b>Post-Conditions [O]</b>	None
<b>Exception Conditions [M]</b>	<ol style="list-style-type: none"> <li>1. Invalid identifier(s)</li> </ol>
<b>Aspects left for</b>	

<b>Technical Bindings</b> [O]	
<b>Notes [O]</b>	Standards Link: This capability correlates to the HL7 CTS 2 “ <b>Return Association Type Details, Return Association Details</b> ” detailed functional model.

## 4 Profiles

### 4.1 Functional Profiles

A Functional Profile is a grouping of capabilities for conformance management purposes. Essentially, a FP is a named list of operations that are subset to define conformance.

Functional Profile No.	Functional Profile Name	Functional Profile Description	Capability Name
			<ul style="list-style-type: none"> <li>•</li> </ul>
LE-FP2	LexEVS Content Query Profile	This profile contains query operations specific to determining information pertaining to terminology content loaded in the service.	<ul style="list-style-type: none"> <li>• Get Supported Code Systems</li> <li>• Resolve Code System</li> <li>• Get Code System Concepts</li> <li>• Get Concept Details</li> <li>• Get Node Graph</li> <li>• Get Match Algorithms</li> <li>• Get Generic Extension(s)</li> <li>• Get History Service</li> <li>• Get Sort Algorithms</li> <li>• Get Coding Scheme Copyright</li> <li>• Get filter</li> <li>• Get Filter extensions</li> <li>• List Association Types</li> <li>• List Associations</li> <li>• List Association Details</li> </ul>



LE-FP1	LexEVS Service Query Profile	This profile contains query operations specific to determining information specific to the service	<ul style="list-style-type: none"> <li>• Get Service Metadata</li> <li>• Get Last Update Time</li> <li>• Get Coding Scheme Copyright</li> </ul>
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## 4.2 Semantic Profiles

Semantic Profile No.	Semantic Profile Name	Constrained Information Model	Semantic Profile Description
LE-SP1	CTS 2 Semantic Profile	<p>HL7 CTS 2 Query Mature Terminology Conformance Profile</p> <p>For reference, the CTS 2 Conceptual Model is part of the <a href="#">HL7 Service Functional Model</a> on page 24.</p> <p>The LexEVS 6.0 Information Model can be found <a href="#">here</a>.</p>	This semantic profile aligns with a subset of the CTS 2 Query Mature Terminology Conformance Profile (omitting value set and concept domain query). This profile permits definition and implementation of any desired datatype specification (i.e. ISO 21090).

## 4.3 Conformance Profiles

<b>Conformance No</b>	LE-CP1
<b>Conformance Name</b>	LexEVS 21090 Content Query Conformance Profile
<b>Description</b>	This conformance profile defines only the query capabilities for LexEVS coding schemes Analytical Grid Services.

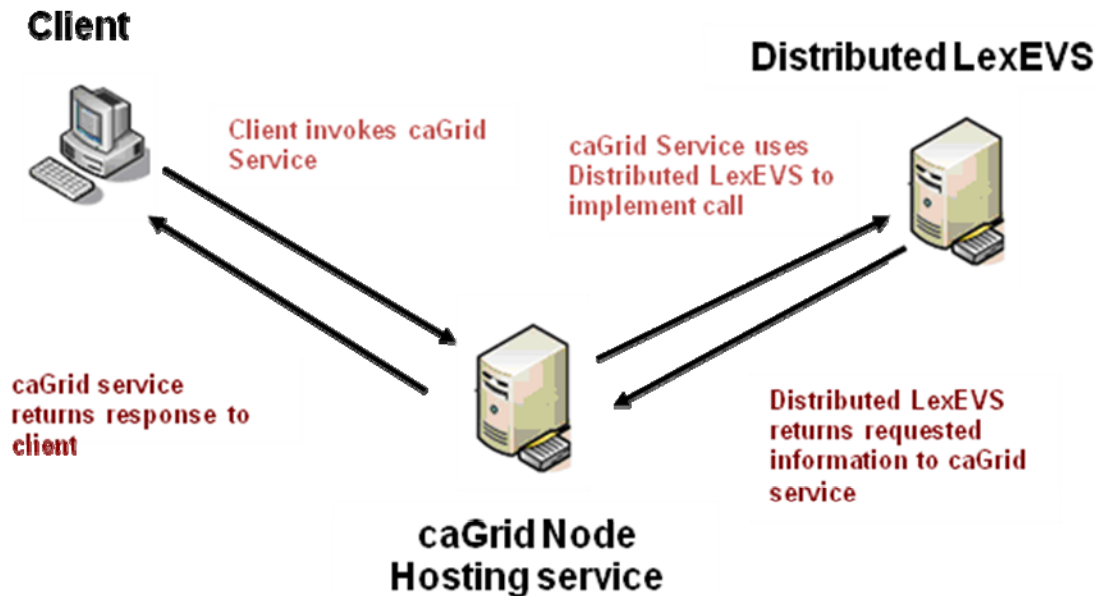
<b>Usage Context</b>	This conformance profile is invoked when LexEVS Analytical Grid Services are called to query terminology content and return that content in ISO 21090 data types.
<b>Mandatory</b>	Yes
<b>Functional Profile(s)</b>	LE-FP2 : LexEVS Content Query
<b>Semantic Profile(s)</b>	LE-SP1 : CTS 2 Semantic Profile

<b>Conformance No</b>	LE-CP2
<b>Conformance Name</b>	LexEVS 21090 Full Query Conformance Profile
<b>Description</b>	This conformance profile defines only the query capabilities for LexEVS coding scheme and service related data for LexEVS Analytical Grid Services.
<b>Usage Context</b>	This conformance profile is invoked when LexEVS Analytical Grid Services are called to query either service specific information or terminology content and return that content in ISO 21090 data types.
<b>Mandatory</b>	No
<b>Functional Profile(s)</b>	LE-FP2: LexEVS Content Query LE-FP1: LexEVS Service Query
<b>Semantic Profile(s)</b>	LE-SP1 : CTS 2 Semantic Profile

## 5 System Implementation Details

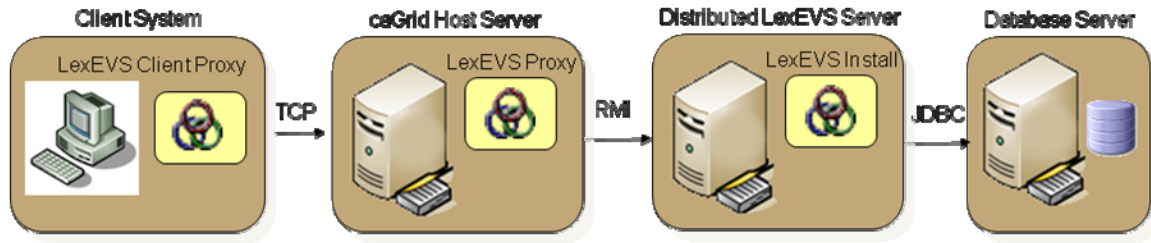
### 5.1 System Runtime Interaction Details

The caGrid Service consists of client system, caGrid Host Server, and Distributed LexEVS Server. Client interactions with LexEVS are made through a caGrid node Hosting Service, whereby the Hosting Service uses the grid enables LexEVS service to implement specific terminology service calls and return the requested terminology information to the client.



### 5.2 Implementation/Deployment Considerations

In the grid services environment, the client application makes calls the grid services interfaces which in turn call the distributed LexEVS API to access content in LexEVS. LexEVS for Analytical Grid Services consists of client system, caGrid Host Server, Distributed LexEVS server and database server. The client system is responsible for making calls to access controlled terminology content from the caGrid Host Server. The caGrid Host Server is responsible for routing information both to and from the client system from the LexEVS server. The LexEVS server is responsible for serving up structured terminology content represented in the LexGrid enabled repository (database server). Lastly, the database server houses the code systems available on LexEVS.



Implementation Considerations	Impacts
<p>LexEVS Grid Services need the ability to make stateful calls to the server</p> <p>The original intent is to keep the Grid Service API identical to the Java API, so that users who were familiar with LexEVS would be able to use the Grid Service. Given some of the things that caGrid provided (mainly, ServiceContexts and the idea of stateful "resources" being held on the server), it was a way for us to keep the LexEVS API consistent from the local Java level up to the Grid level.</p> <p>The reason we must maintain state is a user can incrementally 'build' a query -- adding restrictions incrementally over a period of time, then finally resolving. This is a pattern that many services within LexEVS use. So, when a user starts a LexEVS query, this query is held in state on the server, and the client references it in future calls.</p> <p>Most of this could be done statelessly -- for example, a user could send a query with all requested restrictions at once in one HTTP/SOAP request -- but that would require different method signatures and/or a different logical model, and consistency of API across the levels is important.</p>	<p>Create a query on the server, add restrictions and limits with subsequent calls, and finally execute the query and retrieve the results.</p>

## 6 Conformance and Compliance

### 6.1 Compliance and Conformance Statements

Name	Type	Viewpoint	Description	Test method
Grid Deployment	Obligation	Technology	The LexEVS Service should be deployed only within organization boundary restricting access and visibility to the external world	1. Test cases to be defined to test for network access
Secured Access	Obligation	Engineering	The LexEVS Content Query FP should be deployed only within organizational boundaries that restrict access to the terminology content to licensed terminology users where applicable	1. Design review 2. Test cases to be defined for security
Standardized Functionality	Permission	Informational	The LexEVS 6.0 service will provide standardized interfaces to code system query functionality as specified in the HL7 CTS 2 standard where such an interface exists	1. Design Review
Semantic Model	Obligation	Informational	The LexEVS service must support all terminologies represented in the LexGrid Model for all code system operations	1. Design Review

## 7 Appendix A - Relevant Standards

Name	Description	Location
HL7 CTS 2	<p>HL7's CTS 2 specification specifies functional model (CIM) outlining HL7's consensus requirement for terminology services.</p> <p>For the LexEVS CIM, only the terminology and association query components of HL7 CTS 2 is considered to be in scope.</p> <p>LexEVS will ultimately implement much of the CTS 2 functionality, and as such, early identification of potential points of alignment is necessary.</p>	<p><a href="#">Health Level Seven (HL7) Common Terminology Services – Release 2 (CTS 2)</a></p>
ISO 21090 Health Informatics – Harmonized data types for information interchange	<p>ISO 21090 data types provide a harmonized set of data type definitions for representing and exchanging healthcare related information.</p> <p>LexEVS 6.0 will interchange information using the 21090 data type specifications</p>	<p><a href="http://www.kith.no/upload/4414/ISODIS21090.pdf">http://www.kith.no/upload/4414/ISODIS21090.pdf</a></p>

## 8 Appendix B - References

Name	Description	Location
LexEVS 5.x Analytical Grid Services API	API for LexEVS Analytical Grid Services Version 5.x	<a href="https://cabig-kc.nci.nih.gov/Vocab/KC/index.php/LexEVS_5.x_Analytical_Grid_Service_API">https://cabig-kc.nci.nih.gov/Vocab/KC/index.php/LexEVS_5.x_Analytical_Grid_Service_API</a>
LexEVS Project		<a href="http://gforge.nci.nih.gov/projects/lexevs">http://gforge.nci.nih.gov/projects/lexevs</a>
Design and Implementation Specification 1.1 for LexEVS Grid service for caGrid 1.2	The detailed design and implementation of LexBIG Enterprise Vocabulary Service (LexEVS) caGrid Service	<a href="https://gforge.nci.nih.gov/docman/view.php/491/13735/LexEVS%20Grid%20Service%204.2%20Design%20and%20Implementation">https://gforge.nci.nih.gov/docman/view.php/491/13735/LexEVS%20Grid%20Service%204.2%20Design%20and%20Implementation</a>
LexEVS 6.0 Scope Document	The high-level needs and features of the National Cancer Institute Center for Biomedical Informatics and Information Technology (NCI CBIIT) caCORE LexEVS Release 6.0, focusing on the functionalities proposed by the product stakeholders and target users.	<a href="https://wiki.nci.nih.gov/display/EVS/LexEVS+6.0+Scope+Document">https://wiki.nci.nih.gov/display/EVS/LexEVS+6.0+Scope+Document</a>
HL7 CTS 2	HL7's CTS 2 specification specifies functional model (CIM) outlining HL7's consensus requirement for terminology services.  For the LexEVS CIM, only the terminology and	<a href="#">Health Level Seven (HL7) Common Terminology Services – Release 2 (CTS 2)</a>

	<p>association query components of HL7 CTS 2 is considered to be in scope.</p> <p>LexEVS will ultimately implement much of the CTS 2 functionality, and as such, early identification of potential points of alignment is necessary.</p>	
<p>ISO 21090 Health Informatics – Harmonized data types for information interchange</p>	<p>ISO 21090 data types provide a harmonized set of data type definitions for representing and exchanging healthcare related information.</p> <p>LexEVS 6.0 will interchange information using the 21090 data type specifications</p>	<p><a href="http://www.kith.no/upload/4414/ISODIS21090.pdf">http://www.kith.no/upload/4414/ISODIS21090.pdf</a></p>



## 9 Appendix C - Glossary

Term	Description
Association	A binary relation from a set of entities to a set of entities and/or data.
Coding Scheme	A resource that makes assertions about a collection of terminological entities.
Property	A description, definition, annotation or other attribute that serves to further define or identify an resource.
RRF	UMLS Metathesaurus – Rich Release Format (RRF) ( <a href="http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=nlmums&amp;part=ch03">http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=nlmums&amp;part=ch03</a> )
OWL	Web Ontology Language
OBO	The OBO flat file format is an ontology representation language.
Relation Identifier	A unique identifier of a relationship.
Registered Extensions	Used to implement application-specific behavior that is centrally accessible from a LexEVS service.
Service Reference (History, Coded Node Set, Coded Node Graph, Service Metadata)	A Service Reference is an abstract reference to a grouping of like functionality. A Service Reference will define intended behavior and capabilities of the Service, as well and provide a entry point for execution. Examples of a Service Reference would be a Java Interface, Web Service Endpoint Reference, an RMI (Remote Method Invocation) Endpoint, or any other abstract functional endpoint.

## 10 Appendix D – Cross Reference Tables

### 10.1 List of Storyboards

#	Name	Description	Source
SQS-SB1	List Code Systems	A terminology user queries the service to obtain a list of the code systems available to the service	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
SQS-SB2	Return Code System Details	A terminology user queries the service to obtain the metadata for a given code system	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
SQS-SB3	List Code System Concepts	A terminology user queries the service to obtain an optionally filtered list of concepts available for a given code system	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
SQS-SB4	Return Concept Details	A terminology user queries the service to obtain an optionally filtered list of details for a concept from a specified code system	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
SQS-SB5	List Association Types	A terminology user queries the service to obtain a list of association types for a specified code system	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
SQS-SB6	List Association Type Details	A terminology user queries the service to obtain an optionally filtered list of details for an association from a specified code system	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
SQS-SB7	List Associations	A terminology user queries the service to obtain a list of associations for a specified code system concept	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
SQS-SB8	Return Association Details	A terminology user queries the service to obtain an optionally filtered list of details for an association for a specified concept from a specified code system	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
SQS-SB9	Retrieve Service Information	A terminology user queries the service to obtain metadata information for the LexEVS service	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
SQS-SB10	Retrieve Sort Algorithm	A terminology user queries the service to obtain the available sort algorithms for ordering code system queries	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>
SQS-SB11	Retrieve Match Algorithm	A terminology user queries the service to obtain the available match algorithms for querying code system contents	<a href="#">CTS2 and LexEVS 6.0 Analytical Grid Services.xls</a>

**10.2 Storyboards to Capabilities Mapping**

#	Storyboard	Capabilities	Functional Profiles
SQS-SB1	List Code Systems	Get Supported Coding Schemes  Resolve Coding Scheme	LE-FP2 Content Query
SQS-SB2	Return Code System Details	Get History Service	LE-FP2 Content Query
SQS-SB3	List Code System Concepts	Get Code System Concepts	LE-FP2 Content Query
SQS-SB4	Return Concept Details	Get Concept Details	LE-FP2 Content Query
SQS-SB5	List Association Types	List Association Types	LE-FP2 Content Query
SQS-SB6	List Association Type Details	Get Node Graph	LE-FP2 Content Query
SQS7-SB	List Associations	List Associations	LE-FP2 Content Query
SQS8-SB	Return Association Details	List Association Details	LE-FP2 Content Query
SQS9-SB	Retrieve Service Information	Get Service Metadata  Get Last Update Time  Get Coding Scheme Copyright	LE-FP1 Service Query
SQS10-	Retrieve Sort Algorithm	Get Sort Algorithm	LE-FP2 Content

SB		Get Sort Algorithms Get Generic Extensions Get Filter Get Filter Extensions	Query
SQS-SB11	Retrieve Match Algorithm	Get Match Get Match Algorithms Get Filter Get Filter Extensions Get Generic Extension	LE-FP2 Content Query

### 10.3 Actors

Actors	Functional Profile	Type	Operations used
Terminology User	QS-FP1 : QS Service Query	Client	Query LexEVS for service specific metadata
Terminology User	QS-FP2: QS Content Query	Client	Query LexEVS for terminology content (concepts, associations, attributes, etc.)