BEL Framework V1.2 Annotation Types and Namespaces User Guide

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Introduction

The BEL Framework provides a set of Annotation Types and Namespaces that are made available over the Internet for use with the BEL Framework. This document identifies and describes the 22 Annotation Types and 21 Namespaces as well as supported equivalences between Namespaces that are provided as part of the BEL Framework 1 release.

Other components of the BEL Framework include:

- BEL Workbench
- BEL Framework Compiler/Assembler
- BEL Framework Java API
- BEL Framework Web API

These components are documented separately.

Version Changes

There are no version changes associated with this document.

Annotation Types

Annotation Types are types of annotations that can be used to annotate BEL Statements in a BEL Document. The BEL Framework provides 2 intrinsic and 19 externally defined Annotation Types that are commonly used to annotate BEL Statements and are provided and maintained as part of the BEL Framework for general use.

Intrinsic Annotation Types are defined as part of the BEL Framework and do not need to be defined before being used in a BEL Document. The other externally defined Annotation Types need to be defined as part of the BEL Document header before they can be used within a BEL Document.

BodyRegion

The BodyRegion Annotation Type is used to annotate a BEL Statement with a body region that the corresponding BEL Statements were observed in. The BEL Framework BodyRegion Annotation Type uses the Body Regions [A01] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition

BEL Script

```
DEFINE ANNOTATION BodyRegion AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-body-
region.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="BodyRegion "
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-body-
region.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET BodyRegion = "Breast"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="BodyRegion">Breast</ns1:annotation>
</ns1:annotationGroup>
```

CellLine

The CellLine Annotation Type is used to annotate a BEL Statement with a cell line that the corresponding BEL Statements were observed in. The BEL Framework CellLine Annotation Type uses American Type Culture Collection (ATCC) Cell Lines.

Definition
BEL Script

```
DEFINE ANNOTATION CellLine AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/atcc-cell-
line.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="CellLine"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/atcc-cell-
line.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET CellLine = "Calu-6"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="CellLine">Calu-6</ns1:annotation>
</ns1:annotationGroup>
```

CardiovascularSystem

The CardiovascularSystem Annotation Type is used to annotate a BEL Statement with a part of the cardiovascular system that the corresponding BEL Statements were observed in. The BEL Framework CardiovascularSystem Annotation Type uses the Cardiovascular System [A07] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION CardiovascularSystem AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-cardiovascular-
system.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="CardiovascularSystem"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-
cardiovascular-system.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET CardiovascularSystem = "Endocardium"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="CardiovascularSystem ">Endocardium</ns1:annotation>
</ns1:annotationGroup>
```

Cell

The Cell Annotation Type is used to annotate a BEL Statement with a cell type that the corresponding BEL Statements were observed in. The BEL Framework Cell Annotation Type uses the Cell [A11] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch excluding [A11.284].

Definition
BEL Script

```
DEFINE ANNOTATION Cell AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-cell.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="Cell"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-
cell.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET Cell = "Epithelial"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="Cell">Epithelial</ns1:annotation>
</ns1:annotationGroup>
```

CellStructure

The CellStructure Annotation Type is used to annotate a BEL Statement with a cellular substructure that the corresponding BEL Statements were observed in. The BEL Framework CellStructure Annotation Type uses the Cell Structure [A11.284] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION CellStructure AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-cell-
structure.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="CellStructure"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-cell-
structure.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET CellStructure = "Cell Nucleus"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="CellStructure">Cell Nuclueus</ns1:annotation>
</ns1:annotationGroup>
```

Citation

The Citation Annotation Type is used to annotate a BEL Statement with a citation such as a book or article published though PubMed. The Citation Annotation Type is different from other Annotation Types provided by the BEL Framework in that it requires an ordered list of elements to define an annotation and is defined intrinsically so it does not need to be defined in either BEL or XBEL type documents.

The Citation annotation is composed of a comma separated list containing up to 6 fields.

Field	Required	Contents
1	Yes	Type of Citation. This is one of the following strings "Book", "PubMed", "Journal", "Online Reference", or "Other"
2	Yes	Name of the Citation. This is typically the journal reference or book name.
3	Yes	Reference. This is an identifier that can be used to link to the citation. For books this is usually the ISBN number, for PubMeds this would be the PubMed ID and for other types it could be a URL pointing to the reference such as Wikipedia page.
4	No	Date of publication in ISO8061 format (YYYY-MM-DD).
5	No	Authors. This is a "|" delimited list of authors for the reference.
6	No	Comments. This is optional information such as an abstract that can be stored along with the reference. Limit is 4000 characters.

Definition
Not required.

Examples
BEL Script

```
SET Citation = {"PubMed", "Nat Med 2001 May 7(5) 575-83", "11329059", "2007-04-15"}
```

XBEL

```
<ns1:citation ns1:type="PubMed">
    <ns1:reference>11329059</ns1:reference>
    <ns1:name> Nat Med 2001 May 7(5) 575-83</ns1:name>
    <ns1:date>2007-04-15</ns1:date>
</ns1:citation>
```

DigestiveSystem

The DigestiveSystem Annotation Type is used to annotate a BEL Statement with a component of the digestive system that the corresponding BEL Statements were observed in. The BEL Framework DigestiveSystem Annotation Type uses the Digestive System [A03] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION DigestiveSystem AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-digestive-
system.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="DigestiveSystem"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-digestive-
system.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET DigestiveSystem = "Intestine, Large"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="DigestiveSystem">Intestine, Large</ns1:annotation>
</ns1:annotationGroup>
```

Disease

The Disease Annotation Type is used to annotate a BEL Statement with a disease that the corresponding BEL Statements were associated with. The BEL Framework Disease Annotation Type uses the Diseases [C] branch of the Medical Subject Headings (MeSH).

Definition
BEL Script

```
DEFINE ANNOTATION Disease AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-
disease.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="Disease"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-
disease.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET Disease = "Cardiomyopathies"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="Disease">Cardiomyopathies</ns1:annotation>
</ns1:annotationGroup>
```

EmbryonicStructure

The EmbryonicStructrure Annotation Type is used to annotate a BEL Statement with an embryonic structure that the corresponding BEL Statements were observed within. The BEL Framework EmbryonicStructure Annotation Type uses the Embryonic Structures [A16] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION EmbryonicStructure AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-embryonic-
structure.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="EmbryonicStructure"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-embryonic-
strucuture.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET EmbryonicStructure = "Amniotic Fluid"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="EmbryonicStructure">Amniotic Fluid</ns1:annotation>
</ns1:annotationGroup>
```

EndocrineSystem

The EndocrineSystem Annotation Type is used to annotate a BEL Statement with the endocrine system that the corresponding BEL Statements were observed within. The BEL Framework EndocrineSystem Annotation Type uses the Endocrine System [A06] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION EndocrineSystem AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-endocrine-
system.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="EndocrineSystem"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-endocrine-
system.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET EndocrineSystem = "Adrenal Cortex"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="EndocrineSystem">Adrenal Cortex</ns1:annotation>
</ns1:annotationGroup>
```

Evidence

The Evidence Annotation Type is used to annotate a BEL Statement with an evidence line. The evidence line for a BEL Statement is typically derived from a portion of the abstract or full text for the Citation for the BEL Statement. Evidence is defined intrinsically so it does not need to be defined in either BEL or XBEL type documents.

Definition
Not required.

Examples
BEL Script

```
# Create an Evidence Line for a block of BEL Statements
SET Evidence = "Here we show that interfereon-alpha (IFNalpha) is a potent producer of
SOCS expression in human T cells, as high expression of CIS, SOCS-1, SOCS-2, and SOCS-
3 was detectable after IFNalpha stimulation. After 4 h of stimulation CIS, SOCS-1, and
SOCS-3 had returned to baseline levels, whereas SOCS-2 expression had not declined."
```

XBEL

```
<ns1:evidence>Here we show that interfereon-alpha (IFNalpha) is a potent producer of
SOCS expression in human T cells, as high expression of CIS, SOCS-1, SOCS-2, and SOCS-
3 was detectable after IFNalpha stimulation. After 4 h of stimulation CIS, SOCS-1, and
SOCS-3 had returned to baseline levels, whereas SOCS-2 expression had not declined.
</ns1:evidence>
```

FluidAndSecretion

The FluidAndSecretion Annotation Type is used to annotate a BEL Statement with the fluids and secretions that the corresponding BEL Statements were observed within. The BEL Framework FluidAndSecretion Annotation Type uses the Fluids and Secretions [A12] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION FluidAndSecretion AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-fluid-and-
secretion.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="FluidAndSecretion"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-fluid-and-
secretion.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET FluidAndSecretion = "Sputum"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="FluidAndSecretion">Sputum</ns1:annotation>
</ns1:annotationGroup>
```

HemicAndImmuneSystem

The HemicAndImmuneSystem Annotation Type is used to annotate a BEL Statement with the hemic and immune system components that the corresponding BEL Statements were observed within. The BEL Framework HemicAndImmuneSystem Annotation Type uses the Hemic and Immune Systems [A15] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION HemicAndImmuneSystem AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-hemic-and-
immune-system.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="HemicAndImmuneSystem"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-hemic-and-
immune-system.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET HemicAndImmuneSystem = "Erythrocytes"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="HemicAndImmuneSystem">Erythrocytes</ns1:annotation>
</ns1:annotationGroup>
```

IntegumentarySystem

The IntegumentarySystem Annotation Type is used to annotate a BEL Statement with the integumentary system components that the corresponding BEL Statements were observed within. The BEL Framework IntegumentarySystem Annotation Type uses the Integumentary System [A17] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition

BEL Script

```
DEFINE ANNOTATION IntegumentarySystem AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-integumentary-
system.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="IntegumentarySystem"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-
integumentary-system.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples

BEL Script

```
SET IntegumentarySystem = "Hair Follicle"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="IntegumentarySystem">Hair Follicle</ns1:annotation>
</ns1:annotationGroup>
```

MusculoskeletalSystem

The MusculoskeletalSystem Annotation Type is used to annotate a BEL Statement with the musculoskeleta system components that the corresponding BEL Statements were observed within. The BEL Framework MusculoskeletalSystem Annotation Type uses the Musculoskeletal System [A02] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition

BEL Script

```
DEFINE ANNOTATION MusculoskeletalSystem AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-
musckuloskeleta-system.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="MusculoskeletalSystem"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-
musckuloskeleta-system.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET MusculoskeletalSystem = "Muscle, Smooth"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="MusculoskeletalSystem">Muscle, Smooth</ns1:annotation>
</ns1:annotationGroup>
```

NervousSystem

The NervousSystem Annotation Type is used to annotate a BEL Statement with the nervous system component that the corresponding BEL Statements were observed within. The BEL Framework NervousSystem Annotation Type uses the Nervous System [A08] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION NervousSystem AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-nervous-
system.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="NervousSystem"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-nervous-
system.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET NervousSystem = "Astrocytes"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="NervousSystem">Astrocytes</ns1:annotation>
</ns1:annotationGroup>
```

RespiratorySystem

The RespiratorySystem Annotation Type is used to annotate a BEL Statement with the respiratory system component that the corresponding BEL Statements were observed within. The BEL Framework RespiratorySystem Annotation Type uses the Respiratory System [A04] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION RespiratorySystem AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-respiratory-
system.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="RespiratorySystem"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-nervous-
system.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET RespiratorySystem = "Bronchioles"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="RespiratorySystem">Bronchioles</ns1:annotation>
</ns1:annotationGroup>
```

SenseOrgan

The SenseOrgan Annotation Type is used to annotate a BEL Statement with the sense organ that the corresponding BEL Statements were observed within. The BEL Framework SenseOrgan Annotation Type uses the Sense Organs [A09] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION SenseOrgan AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-sense-
organ.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="SenseOrgan"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-sense-
organ.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET SenseOrgan = "Meibomian Glands"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="SenseOrgan">Meibomian Glands</ns1:annotation>
</ns1:annotationGroup>
```

Species

The Species Annotation Type is used to annotate a BEL Statement with the species that the corresponding BEL Statements were observed in. The BEL Framework Species Annotation Type uses NCBI Taxonomy IDs in order to standardize the format and representation of species annotations.

Definition
BEL Script

```
DEFINE ANNOTATION Species AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/species-taxonomy-
id.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="Species"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/species-
taxonomy-id.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET Species = "9606"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="Species">9606</ns1:annotation>
</ns1:annotationGroup>
```

StomatognathicSystem

The StomatognathicSystem Annotation Type is used to annotate a BEL Statement with the stomatognathic system component that the corresponding BEL Statements were observed within. The BEL Framework StomatognathicSystem Annotation Type uses the Stomatognathic System [A14] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION StomatognathicSystem AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-sense-
organ.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="StomatognathicSystem"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-sense-
organ.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET StomatognathicSystem = "Masseter Muscle"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="StomatognathicSystem">Masseter Muscle</ns1:annotation>
</ns1:annotationGroup>
```

Tissue

The Tissue Annotation Type is used to annotate a BEL Statement with the tissue type that the corresponding BEL Statements were observed within. The BEL Framework Tissue Annotation Type uses the Tissues [A10] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION Tissue AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-sense-
organ.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="Tissue"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-sense-
organ.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET Tissue = "Myoblasts, Cardiac"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="Tissue">Myoblasts, Cardiac</ns1:annotation>
</ns1:annotationGroup>
```

UrogenitalSystem

The UrogenitalSystem Annotation Type is used to annotate a BEL Statement with the urogenital system component that the corresponding BEL Statements were observed within. The BEL Framework UrogenitalSystem Annotation Type uses the Urogenital System [A05] sub-branch of the Medical Subject Headings (MeSH) Anatomy [A] branch.

Definition
BEL Script

```
DEFINE ANNOTATION UrogenitalSystem AS URL \
    "http://resource.belframework.org/belframework/1.0/annotation/mesh-sense-
organ.belanno"
```

XBEL

```
<ns1:annotationDefinitionGroup>
    <ns1:externalAnnotationDefinition ns1:id="UrogenitalSystem"
ns1:url="http://resource.belframework.org/belframework/1.0/annotation/mesh-sense-
organ.belanno"/>
</ns1:annotationDefinitionGroup>
```

Examples
BEL Script

```
SET UrogenitalSystem = "Kidney"
```

XBEL

```
<ns1:annotationGroup>
    <ns1:annotation ns1:refID="UrogenitalSystem">Kidney</ns1:annotation>
</ns1:annotationGroup>
```

Namespaces

The BEL Framework V1.0 release includes the following Namespaces.

Gene, RNA, and Protein Abundances

The following Namespaces provide standard vocabularies for designating gene, microRNA, and protein abundances. Values in the gene vocabularies can also be used to specify abundances of the corresponding RNA and protein coded for by the gene.

Entrez Gene – Identifiers
The NCBI standard for identifying genes by unique identification number. These identifiers can be used to specify gene, protein and RNA abundances. The current version provides identifiers for the following species only:

Homo Sapiens, Mus Musculu, Rattus Novegicus

Suggested Namespace Identifier:

EGID

Definition
BEL Script

```
DEFINE NAMESPACE EGID AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/entrez-gene-ids-
hmr.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/entr
ez-gene-ids-hmr.belns" ns1:prefix="EGID"/>
</ns1:namespaceGroup>
```

Human Gene Nomenclature Committee – Symbols
Standard approved gene symbols and synonyms for Humans. These identifiers can be used to specify gene, protein and RNA abundances.

Suggested Namespace Identifier:

HGNC

Definition
BEL Script

```
DEFINE NAMESPACE HGNC AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/hgnc-approved-
symbols.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/hgnc
-approved-symbols.belns" ns1:prefix="HGNC"/>
</ns1:namespaceGroup>
```

Mouse Genome Informatics – Symbols
Standard approved gene symbols and synonyms for Mouse. These identifiers can be used to specify gene, protein and RNA abundances.

Suggested Namespace Identifier:

MGI

Definition
BEL Script

```
DEFINE NAMESPACE MGI AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/mgi-approved-
symbols.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/mgi-
approved-symbols.belns" ns1:prefix="MGI"/>
</ns1:namespaceGroup>
```

Rat Genome Database – Symbols
Standard approved gene symbols and synonyms for Rat. These identifiers can be used to specify gene, protein and RNA abundances.

Suggested Namespace Identifier:

RGD

Definition
BEL Script

```
DEFINE NAMESPACE RGD AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/rgd-approved-
symbols.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/rgd-
approved-symbols.belns" ns1:prefix="RGD"/>
</ns1:namespaceGroup>
```

SwissProt – Accession Numbers
SwissProt protein database referenced through SwissProt Accession Numbers. These identifiers can be used to specify gene, protein and RNA abundances.

Suggested Namespace Identifier:

SPAC

Definition
BEL Script

```
DEFINE NAMESPACE SPAC AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/swissprot-accession-
numbers.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/swis
sprot-accession-numbers.belns" ns1:prefix="SPAC"/>
</ns1:namespaceGroup>
```

SwissProt – Entry Names
SwissProt protein database referenced through SwissProt Entry Names. These identifiers can be used to specify gene, protein and RNA abundances.

Suggested Namespace Identifier:

SP

Definition
BEL Script

```
DEFINE NAMESPACE SP AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/swissprot-entry-
names.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/swis
sprot-entry-names.belns" ns1:prefix="SP"/>
</ns1:namespaceGroup>
```

Molecule Abundances

The following Namespaces provide standard vocabularies for designating molecule abundances.

Chemical Entries of Biological Interest – Identifiers
Chemical Entities of Biological Interest (ChEBI) database referenced through the standard ChEBI identifier.

Suggested Namespace Identifier:

CHEBIID

Definition
BEL Script

```
DEFINE NAMESPACE CHEBIID AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/chebi-ids.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/cheb
i-ids.belns" ns1:prefix="CHEBIID"/>
</ns1:namespaceGroup>
```

Chemical Entries of Biological Interest – Names
Chemical Entities of Biological Interest (ChEBI) database referenced through the standard name for each compound.

Suggested Namespace Identifier:

CHEBI

Definition
BEL Script

```
DEFINE NAMESPACE CHEBI AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/chebi-names.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/cheb
i-names.belns" ns1:prefix="CHEBI"/>
</ns1:namespaceGroup>
```

Biological Processes and Pathologies

The following Namespaces provide standard vocabularies for identifying biological processes such as diseases and pathologies.

Gene Ontology – Names
Gene Ontology database for biological processes referenced through the standard name.

Suggested Namespace Identifier:

GO

Definition
BEL Script

```
DEFINE NAMESPACE GO AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/go-biological-processes-
names.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/go-
biological-processes-names.belns" ns1:prefix="GO"/>
</ns1:namespaceGroup>
```

Gene Ontology – Accession Numbers
Gene Ontology database for biological processes referenced through the standard GO accession number.

Suggested Namespace Identifier:

GOAC

Definition
BEL Script

```
DEFINE NAMESPACE GOAC AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/go-biological-processes-
accession-numbers.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/go-
biological-processes-accession-numbers.belns" ns1:prefix="GOAC"/>
</ns1:namespaceGroup>
```

Medical Subject Headings (Disease)
U.S. National Library of Medicine provided vocabulary for disease. This Namespace provides the Main Heading for each disease in the Diseases tree.

Suggested Namespace Identifier:

MESHD

Definition
BEL Script

```
DEFINE NAMESPACE MESHD AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/mesh-diseases.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/mesh
-diseases.belns" ns1:prefix="MESHD"/>
</ns1:namespaceGroup>
```

Medical Subject Headings (Phenomena & Processes)
U.S. National Library of Medicine provided vocabulary for Phenomena and Processes. This Namespace provides the Main Heading for each biological process and phenomena in the .

Suggested Namespace Identifier:

MESHBP

Definition
BEL Script

```
DEFINE NAMESPACE MESHBP AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/mesh-biological-
processes.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/mesh
-biological-processes.belns" ns1:prefix="MESHBP"/>
</ns1:namespaceGroup>
```

Named Complex and Family Abundances

The following Namespaces provide standard vocabularies for encoding scientific findings in BEL, but for which there is no obvious standard vocabulary. These Namespaces are provided and managed by Selventa as part of the BEL Framework infrastructure.

Protein Families
Categorizes proteins into functional families identifiable by a protein family name. There is one of these Namespaces for each Human, Mouse and Rat species.

Suggested Namespace Identifier:

PFH (Human), PFM (Mouse), PFR (Rat)

Definition
BEL Script (Human)

```
DEFINE NAMESPACE PFH AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/selventa-named-human-
protein-families.belns"
```

BEL Script (Mouse)

```
DEFINE NAMESPACE PFM AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/selventa-named-mouse-
protein-families.belns"
```

BEL Script (Rat)

```
DEFINE NAMESPACE PFR AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/selventa-named-rat-
protein-families.belns"
```

XBEL (Human)

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/selv
enta-named-human-protein-families.belns" ns1:prefix="PFH"/>
</ns1:namespaceGroup>
```

XBEL (Mouse)

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/selv
enta-named-mouse-protein-families.belns" ns1:prefix="PFM"/>
</ns1:namespaceGroup>
```

XBEL (Rat)

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/selv
enta-named-rat-protein-families.belns" ns1:prefix="PFR"/>
</ns1:namespaceGroup>
```

Named Complexes
Provides commonly used names for some commonly occurring complexes. There is one of these Namespaces for each Human, Mouse and Rat species.

Suggested Namespace Identifier:

NCH (Human), NCM (Mouse), NCR (Rat)

Definition
BEL Script (Human)

```
DEFINE NAMESPACE NCH AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/selventa-named-human-
complexes.belns"
```

BEL Script (Mouse)

```
DEFINE NAMESPACE NCM AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/selventa-named-mouse-
complexes.belns"
```

BEL Script (Rat)

```
DEFINE NAMESPACE NCR AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/selventa-named-rat-
complexes.belns"
```

XBEL (Human)

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/selv
enta-named-human-complexes.belns" ns1:prefix="NCH"/>
</ns1:namespaceGroup>
```

XBEL (Mouse)

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/selv
enta-named-mouse-complexes.belns" ns1:prefix="NCM"/>
</ns1:namespaceGroup>
```

XBEL (Rat)

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/selv
enta-named-rat-complexes.belns" ns1:prefix="NCR"/>
</ns1:namespaceGroup>
```

Other Namespaces

The following Namespaces are not associated with a particular biological domain.

Medical Subject Headings (Cellular Locations)
U.S. National Library of Medicine provided vocabulary for cellular locations. This Namespace provides the Main Heading for each cellular location in the Anatomy tree.

Suggested Namespace Identifier:

MESHCL

Definition
BEL Script

```
DEFINE NAMESPACE MESHCL AS URL \
"http://resource.belframework.org/belframework/1.0/namespace/mesh-cellular-
locations.belns"
```

XBEL

```
<ns1:namespaceGroup>
    <ns1:namespace
ns1:resourceLocation="http://resource.belframework.org/belframework/1.0/namespace/mesh
-cellular-locations.belns" ns1:prefix="MESHCL"/>
</ns1:namespaceGroup>
```

Equivalences

The BEL Framework V1.0 release includes the following Equivalenced Namespaces.

Gene, RNA, and Protein Abundances

	Entrez Gene ID	HGNC	MGI	RGD	SwissProt Accession Numbers	SwissProt Entry Names
Entrez Gene ID		X	X	X	(partial)	(partial)
HGNC	X				X	X
MGI	X				X	X
RGD	X				X	X
SwissProt Accession Numbers	(partial)	X	X	X		X
SwissProt Entry Names	(partial)	X	X	X	X	

Molecule Abundances

	ChEBI Names	ChEBI Identifiers
ChEBI Names		X
ChEBI Identifiers	X	

Biological Processes and Pathologies

	GO Name	GO Accession Numbers	MeSH Diseases	MESH Processes
GO Name		X	(partial)	(partial)
GO Accession Numbers	X		(partial)	(partial)
MeSH Diseases	(partial)	(partial)		
MeSH Processes	(partial)	(partial)		

Additional Information

This section provides additional information that might be helpful to you.

Obtaining Technical Support

Technical support is available by phone or email during normal business hours (8am to 5pm EST).

Email Support

Send an email to support@belframework.org. Please make sure to include your name, a phone number where you can be reached, and details about the issue.

Phone Support

Please call Selventa's technical support line at (617) 851-5273 during normal support hours.

Learning More About Selventa's Software and Services

For all sales and other inquires, please contact:

Louis Latino
EVP Sales and Marketing
One Alewife Center,
Cambridge MA 02140

Phone: (617) 547-5421 x237
Email: llatino@selventa.com

