

## INOH Diagram File (.inoh) Format revision 0.7 (2005-08-02)

### 1. Specification Overview

(1) INOH data consists from three main elements (diagram, nodes and edges).

# diagram is a special type of an “event node”

(2) each main element has the following attributes

i) system attributes

```
<attributeList Name="System">
  <attribute Name="DisplayName" Value="Diagram1"/>
  <attribute Name="Comment" Value=""/>
</attributeList>
```

ii) editorial attributes

```
<attributeList Name="Editing">
  <attribute Name="Author" Value=""/>
  <attribute Name="AuthorMailAdd" Value=""/>
  <attribute Name="Version" Value=""/>
  <attribute Name="Date" Value="2006-01-06 11:42:39.682"/>
</attributeList>
```

#1 date format: YYYY-MM-DD HH:MM:SS.SSS eg.) 2006-02-09 17:12:33.148

#2 edge does not have PreMatID, Status values

## iii) biological attributes

Different node types have different attribute sets( See "3.Node types and their biological attributes").

```

<attributeList Name="Biological">
  <attribute Name="MoleculeRoleOntology" Value="IMR_XXXXXXX:Term name"/>--- (a)
  <attribute Name="MoleculeRoleOntology" Value="IMR_XXXXXXX:Term name"/>--- (b)
  <attribute Name="Organism" Value="Canonical"/>
  <attribute Name="SequenceFeature">
    <sub-attribute Name="AttributeSetNumber" Value="1"/>
    <sub-attribute Name="Type" Value="(controlled vocabulary)"/>
    <sub-attribute Name="Position" Value=""/>
    <sub-attribute Name="Site" Value="Ser"/>
    <sub-attribute Name="Status" Value=""/>
    <sub-attribute Name="Description" Value=""/>
  </attribute>
  <attribute Name="LocationOntology" Value="ILC:xxxx Term name"/>
  <attribute Name="Evidence">
    <sub-attribute Name="Type" Value="Generic"/>
    <sub-attribute Name="Target" Value=""/>
    <sub-attribute Name="Evidence Code" Value="IEX"/>
    <sub-attribute Name="Citation" Value="PubMed:xxxxxx"/>
    <sub-attribute Name="Comment" Value=""/>
  </attribute>
</attributeList>

```

# multi value attributes has multi lines of value description, like (a), (b)

(3) node elements and edge elements are appended in the same level.

```

<inoh>
  <node> </node>
  <node> </node>
  <node> </node>
  <edge> </edge>
  <edge> </edge>
  <edge> </edge>
</inoh>

```

(4) hierarchical information of graph objects is encoded by the following pointers.

Each node has its direct parent/child information. Note that the number of parentNode is only one or zero for every node.

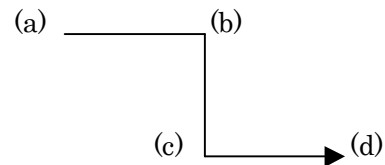
# At least one of the source or target node of a “childEdge” must be a childNode.

```
<hierarchy>
  <parentNodePtr  GID="GlobalID"  LID="LocalID"/>
  <childNodesPtr  GID="GlobalID"   LID="LocalID"/>
  <childEdgePtr   GID="GlobalID"   LID="LocalID"/>
</hierarchy>
```

(5) edge-bend information

“graphics” element has the following element for edge-bend information

```
<bend>
  <point XPoint="" YPoint=""/> . . . (a)
  <point XPoint="" YPoint=""/> . . . (b)
  <point XPoint="" YPoint=""/> . . . (c)
  <point XPoint="" YPoint=""/> . . . (d)
</bend>
```



(6) edge element has source/target elements. Their values are node IDs.

```
<edge GID="GlobalID"  LID="LocalID"  MatID="MatID"  PreMatID="PreMatID"
Type="type" >
  . . .
  <source GID="GlobalID"  LID="LocalID"/>
  <target GID="GlobalID"  LID="LocalID"/>
  . . .
</edge>
```

(7) root element “<inoh>” has file format version number.

```
<inoh FormatVersion="">
```

(8) <layout> provides default values for autolayouting options

i) compound node

```
<layout>
  <attribute Name="TYPE" Value="NODE"/>
  <attribute Name="AUTO_LAYOUT" Value="LOCAL_FIX"/>
  <attribute Name="LAYOUTER" Value="HIERARCHICAL_BASED"/>
  <attribute Name="ORIENTATION" Value="AUTO_ORIENTATION"/>
  <attribute Name="EDGE_ROUTING" Value="SIMPLE"/>
  <attribute Name="MIN_LAYER_DISTANCE" Value="40"/>
  <attribute Name="MIN_NODE_DISTANCE" Value="20"/>
  <attribute Name="MIN_EDGE_DISTANCE" Value="10"/>
</layout>
```

ii) edge

```
<layout>
  <attribute Name="TYPE" Value="EDGE"/>
  <attribute Name="AUTO_LAYOUT" Value="ON"/>
  <attribute Name="DIRECTION" Value="USE_DIRECTION"/>
  <attribute Name="ROUTING" Value="INHERIT"/>
  <attribute Name="TYPE_OF_EDGE" Value="USE_DEFAULT"/>
</layout>
```

## 2. Detailed description about biological attributes

### • **AttributeName: Evidence**

Definition: Evidence of annotation

Usage: Evidence has 0 or multiple units. A unit consists from the following 5 sub-attributes.

- Sub-attribute Name: Type
 

Definition: Indicate the attribute for which the evidence is. If the "Evidence" is for the entire Entity, then the value is Generic (which means it is a generic evidence).

Usage: Name of the attribute or "Generic"  
ex) SequenceFeature
- Sub-attribute Name: Target
 

Definition: (Use only if the "Type" value is "SequenceFeature") You may have multiple "SequenceFeature". This "Target" value specifies which SequenceFeature you are talking about. This value is handled by the INOH client software. Do not edit manually.

Usage: Integer (AttributeSetNumber of the attribute)
- Sub-attribute Name: EvidenceCode
 

Definition: Type of evidence.

Usage: Select one from below list:

IEX	Inferred from experiment
AS	Author statement
TAS	Traceable author statement
NAS	Non-traceable author statement
IC	Inferred by curator
IEDB	Imported entity from external DBs
IRDB	Imported reference from external DBs
- Sub-attribute Name: Citation
 

Definition: The reference on which the evidence is based on.

Usage: "database name" + ":" + "ID"
- Sub-attribute Name: Comment
 

Definition: Comment on the evidence

Usage: Free text

### • **AttributeName: Organism**

Definition: Organism of the entity

Usage: use NCBI Taxonomy or "Canonical"

- **AttributeName: ExternalReference**

Definition: Link to other database

Usage: "database name" + ":" + "ID"

ex) UniProt:P01234

- **AttributeName: LocationOntology**

Definition: Cellular location of the entity

Usage: Term of LocationOntology

- **AttributeName: MoleculeRole Ontology**

Definition: Type of the material (Protein or small molecules)

Usage: Term of MoleculeRoleOntology

- **AttributeName: GenomeSequence Ontology**

Definition: Type of the material (DNA or RNA)

Usage: Term of GenomeSequenceOntology

- **AttributeName: EventOntology**

Definition: Type of Event, which is life phenomenon or related physicochemical mechanism

Usage: Term of EventOntology

- **AttributeName: ProcessOntology**

Definition: Type of Process, which is the smallest unit of biological interaction

Usage: Term of ProcessOntology

- **AttributeName: EventRelation Ontology**

Definition: Type of interaction between two events

Usage: Term of EventRelationOntology

• **AttributeName: SequenceFeature**

Definition:

Usage: SequenceFeature has 0 or multiple units. A unit consists from the following 6 sub-attributes.

- Sub-attribute Name: AttributeSetNumber  
Definition: number tag for each unit.  
Usage: Integer (INOH client handle this. Do not edit manually)
- Sub-attribute Name: Type  
Definition: Description of sequence feature type. (domain, modification site, etc.)  
Usage: Select one from below list or free text:  
ADP-ribosylated, cholesterol modified, phosphorylated, DNA\_bind, protein\_bind, ubiquitinated, glycosylated, palmitoylated, cleavage site
- Sub-attribute Name: Position  
Definition: (range of) residue's position  
Usage: Integer ( start residue) + "-" + Integer( end residue)  
\*To describe a single residue ( start residue)+"-"+ ( start residue).
- Sub-attribute Name: Site  
Definition: Name of the residue (amino acid name or domain name)  
Usage: Free text  
ex. SH2
- Sub-attribute Name: Status  
Definition: PSI-MI's "position-status"  
Usage: Select one from below list:  
certain, uncertain, less than, greater than, blank(undefined)
- Sub-attribute Name: Description  
Definition: Supplemental information  
Usage: Free text

• **AttributeName: Stoichiometric Coefficient**

Definition: Stoichiometric Coefficient. (the number of homo multimeric complex subunits)

Usage: Integer

- **AttributeName: GeneProduct**

Definition: Gene product of the entity

Usage: Term of MoleculeRoleOntology

- **AttributeName: OriginalMaterial**

Definition: Only “Terminal” has this attribute. It specifies the material that is terminated.

Usage: Term of MoleculeRoleOntology

ex. A(protein) –[in]→ < degradation(conversion) > –[out]→B(terminal)

Then, terminal B’s “OriginalMaterial” value is A’s MoleculeRoleOntology ID.

## 3. Samples

```

<?xml version="1.0" encoding="UTF-8"?>
<inh FormatVersion="05/08/02">
  <node GID="" LID="id325988654" MatID="" PreMatID="" Type="Diagram">
    <attributeGroup #Attribute set
      <attributeList Name="System">
        <attribute Name="DisplayName" Value="Diagram1"/>
        <attribute Name="Comment" Value=""/>
      </attributeList>
      <attributeList Name="Editing">
        <attribute Name="Author" Value=""/>
        <attribute Name="AuthorMailAdd" Value=""/>
        <attribute Name="Version" Value=""/>
        <attribute Name="Date" Value="2006-01-06 11:42:39.682"/>
      </attributeList>
      <attributeList Name="Biological">
        <attribute Name="Evidence">
          <sub-attribute Name="Type" Value="Generic"/>
          <sub-attribute Name="Target" Value=""/>
          <sub-attribute Name="Evidence Code" Value="AS"/>
          <sub-attribute Name="Citation" Value="PubMed:xxxxx"/>
          <sub-attribute Name="Comment" Value=""/>
        </attribute>
      </attributeList>
    </attributeGroup>
    <graphics/>
    <layout #layout parameter
      <attribute Name="TYPE" Value="DIAGRAM"/>
      <attribute Name="EXEC_POLICY" Value="AutoLayout+Post"/>
      <attribute Name="AUTO_LAYOUT" Value="GLOBAL"/>
      <attribute Name="LAYOUTER" Value="HIERARCHICAL_BASED"/>
      <attribute Name="ORIENTATION" Value="AUTO_ORIENTATION"/>
      <attribute Name="EDGE_ROUTING" Value="SIMPLE"/>
      <attribute Name="MIN_LAYER_DISTANCE" Value="40"/>
      <attribute Name="MIN_NODE_DISTANCE" Value="20"/>
      <attribute Name="MIN_EDGE_DISTANCE" Value="10"/>
    </layout>
    <hierarchy>
      <childNodePtr GID="" LID="id484808271"/>
    </hierarchy>
  </node>
  <node GID="" LID="id484808271" MatID="" PreMatID="" Type="EventCompound">
    <attributeGroup #Attribute set
      <attributeList Name="System">
        <attribute Name="DisplayName" Value="Event1"/>
        <attribute Name="Comment" Value=""/>
      </attributeList>
    </attributeGroup>
  </node>

```

Diagram node

Event (Compound) Node

Continue to the next page

```

</attributeList>                                     #Attribute set
<attributeList Name="Editing">
  <attribute Name="Author" Value=""/>
  <attribute Name="AuthorMailAdd" Value=""/>
  <attribute Name="Version" Value=""/>
  <attribute Name="Date" Value="2006-01-06 11:42:39.682"/>
</attributeList>
<attributeList Name="Biological">
  <attribute Name="EventOntology" Value="IEV:xxxxx Term name"/>
  <attribute Name="Organism" Value="Canonical"/>
  <attribute Name="LocationOntology" Value="ILC:xxxx Term name"/>
  <attribute Name="Evidence">
    <sub-attribute Name="Type" Value="Generic"/>
    <sub-attribute Name="Target" Value=""/>
    <sub-attribute Name="Evidence Code" Value="AS"/>
    <sub-attribute Name="Citation" Value="PubMed:14687659"/>
    <sub-attribute Name="Comment" Value=""/>
  </attribute>
</attributeList>
</attributeGroup>
<graphics XPoint="270.5" YPoint="313.0" Width="187.0"
  Height="98.0" Font="DialogInput" FontSize="12"/>
<layout>                                             #layout parameter
  <attribute Name="TYPE" Value="NODE"/>
  <attribute Name="AUTO_LAYOUT" Value="LOCAL_FIX"/>
  <attribute Name="LAYOUTER" Value="HIERARCHICAL_BASED"/>
  <attribute Name="ORIENTATION" Value="AUTO_ORIENTATION"/>
  <attribute Name="EDGE_ROUTING" Value="SIMPLE"/>
  <attribute Name="MIN_LAYER_DISTANCE" Value="40"/>
  <attribute Name="MIN_NODE_DISTANCE" Value="20"/>
  <attribute Name="MIN_EDGE_DISTANCE" Value="10"/>
</layout>
<hierarchy>
  <childNodePtr GID="" LID="id11353895"/>
  <childEdgePtr GID="" LID="id1344064253"/>
  <childNodePtr GID="" LID="id1832150531"/>
  <parentNodePtr GID="" LID="id325988654"/>
</hierarchy>
</node>
<node GID="" LID="id11353895" MatID="" PreMatID="" Type="Protein" >
  <attributeGroup>                                   #Attribute Set
    <attributeList Name="System">
      <attribute Name="DisplayName" Value="Protein1"/>
      <attribute Name="Comment" Value=""/>
    </attributeList>
    <attributeList Name="Editing">
      <attribute Name="Author" Value=""/>

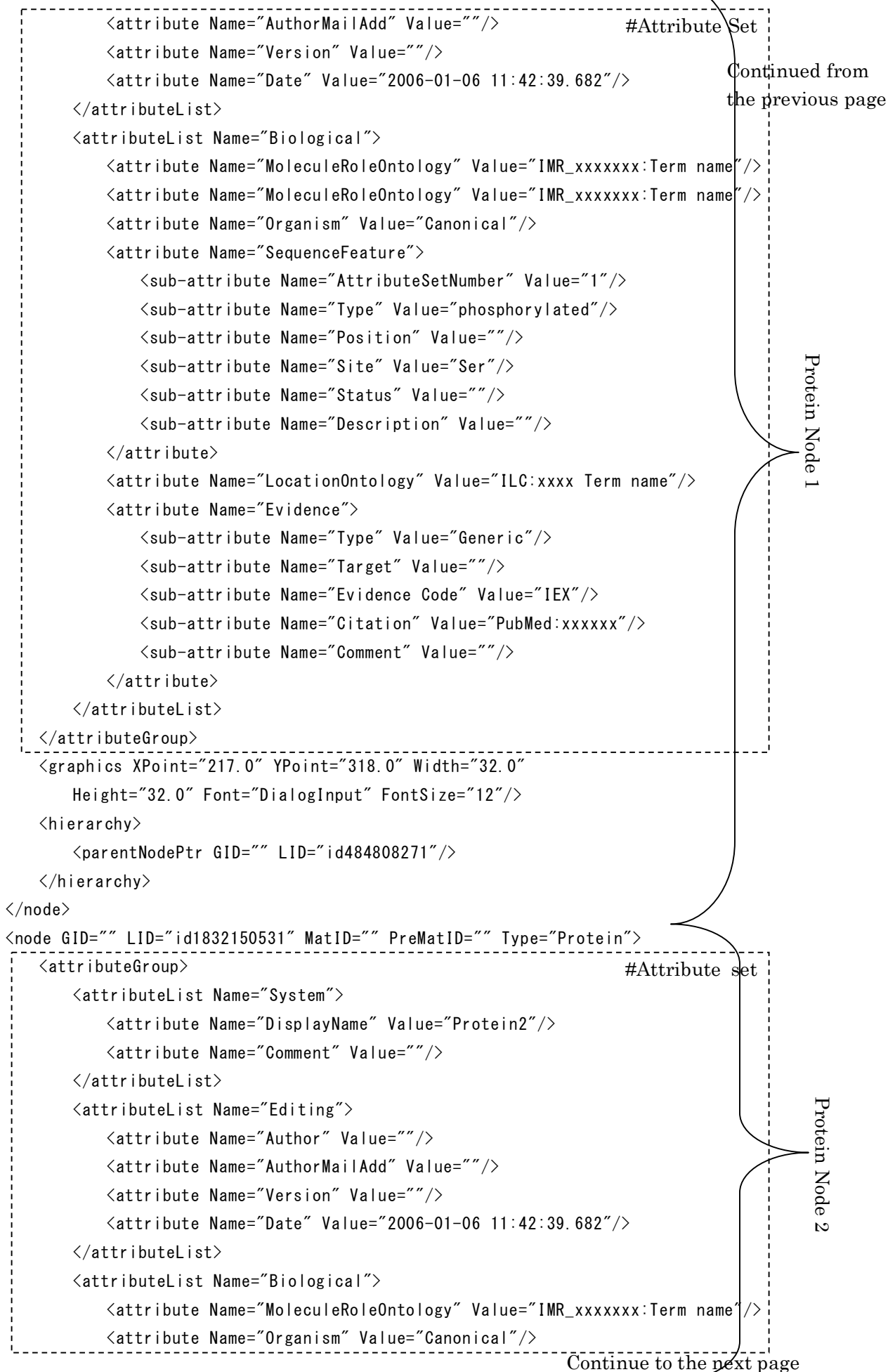
```

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the previous page

Event (Compound) Node

Protein Node 1

Continue to the next page



```

<attribute Name="SequenceFeature">                                     #Attribute set
  <sub-attribute Name="AttributeSetNumber" Value="1"/>               Continued from
  <sub-attribute Name="Type" Value="phosphorylated"/>               the previous page
  <sub-attribute Name="Position" Value=""/>
  <sub-attribute Name="Site" Value="Ser"/>
  <sub-attribute Name="Status" Value="greater than"/>
  <sub-attribute Name="Description" Value="COOH-terminal"/>
</attribute>
<attribute Name="LocationOntology" Value="ILC:xxxx Term name"/>
<attribute Name="Evidence">
  <sub-attribute Name="Type" Value="SequenceFeature"/>
  <sub-attribute Name="Target" Value="1"/>
  <sub-attribute Name="Evidence Code" Value="AS"/>
  <sub-attribute Name="Citation" Value="PubMed:xxxxx"/>
  <sub-attribute Name="Comment" Value=""/>
</attribute>
</attributeList>
</attributeGroup>
<graphics XPoint="314.0" YPoint="318.0" Width="32.0"
  Height="32.0" Font="DialogInput" FontSize="12"/>
<hierarchy>
  <parentNodePtr GID="" LID="id484808271"/>
</hierarchy>
</node>
<edge Type="Connected" LID="id1344064253" GID="" MatID="" PreMatID="">
  <attributeGroup>
    <attributeList Name="System">
      <attribute Name="DisplayName" Value="Connected"/>
      <attribute Name="Comment" Value=""/>
    </attributeList>
    <attributeList Name="Editing">
      <attribute Name="Author" Value=""/>
      <attribute Name="AuthorMailAdd" Value=""/>
      <attribute Name="Version" Value=""/>
      <attribute Name="Date" Value="2006-01-06 11:42:39.682"/>
    </attributeList>
    <attributeList Name="Biological"/>
  </attributeGroup>
  <graphics Font="DialogInput" FontSize="12">
    <bend>
      <point XPoint="257.0" YPoint="293.0"/>
      <point XPoint="265.0" YPoint="321.0"/>
    </bend>
  </graphics>
  <layout>                                                         #Layout parameter
    <attribute Name="TYPE" Value="EDGE"/>
    <attribute Name="AUTO_LAYOUT" Value="ON"/>                       Continue to the next page
  </layout>

```

Protein Node 2

Edge

```
                                #Layout parameter
<attribute Name="DIRECTION" Value="USE_DIRECTION"/>
<attribute Name="ROUTING" Value="INHERIT"/>
<attribute Name="TYPE_OF_EDGE" Value="USE_DEFAULT"/>
</layout>
<source GID="" LID="id11353895"/>
<target GID="" LID="id1832150531"/>
</edge>
</inoh>
```

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the previous page

Edge

## 4. Node types and their biological attributes

Different node types have different attribute sets.

\* M: multiple value, S: single value

Node type  Biological attribute	Compound nodes				Non-compound nodes								
	Diagram	Event Compound	MolecularComplex Compound	DNA Compound	Protein	ChemicalSubstance	MolecularComplex	DNA	RNA	Terminal	Event	Process	EventRelation
Evidence	M	M	M	M	M	M	M	M	M	M	M	M	M
Organism	-	S	S	S	S	S	S	S	S	-	S	-	-
ExternalReference	-	M	M	M	M	M	M	M	M	-	M	-	-
LocationOntology	-	S	S	S	S	S	S	S	S	S	S	-	-
MoleculeRole Ontology	-	-	M	-	M	M	M	-	-	-	-	-	-
GenomeSequence Ontology	-	-	-	S	-	-	-	S	S	-	-	-	-
EventOntology	-	S	-	-	-	-	-	-	-	-	S	-	-
ProcessOntology	-	-	-	-	-	-	-	-	-	-	-	S	-
EventRelation Ontology	-	-	-	-	-	-	-	-	-	-	-	-	S
SequenceFeature	-	-	-	-	M	-	M	M	M	-	-	-	-
Stoichiometric Coefficient	-	-	-	-	S	S	S	S	S	-	-	-	-
GeneProduct	-	-	-	M	-	-	-	M	-	-	-	-	-
OriginalMaterial	-	-	-	-	-	-	-	-	-	M	-	-	-