XCEDE 2.0 - A Manual

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Introduction

This is a manual for version 2.0 of XCEDE (XML-based Clinical and Experimental Data Exchange). The target audience for this manual is anyone who is interested in using or learning more about XCEDE. This manual will serve as both a tutorial and as a reference.

XCEDE is an extensible schema designed to store scientific data and metadata. XCEDE has its origins in various XML schemas developed for collaborative neuroinformatics projects, and was developed to enable the transfer and storage of several types of data including (but not limited to) clinical, demographic, behavioral, physiological and image data.

Chapter 1. The XCEDE Experiment Hierarchy

This is where the hierarchy text goes.

Chapter 2. Data Resources

This is where the data resource text goes.

Chapter 3. Catalogs

This is where the catalog text goes.

Chapter 4. Provenance

This is where the provenance text goes.

Chapter 5. Events

This is where the events text goes.

Chapter 6. Events

This is where the assessment text goes.

Chapter 7. Events

This is where the protocol text goes.

Appendix A. Schema

```
    <?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XMLSPY v2004 rel. 3 U (http://www.xmlspy.com) by dbk (UNIV CA IRVINE) -->
<xs:schema xmlns="http://www.xcede.org/xcede-2" xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:xlink
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```

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    <xs:element name="visitRef" type="ref_t" minOccurs="0"/>
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      </xs:annotation>
     </xs:element>
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       <xs:documentation>A resource that contains acquistion data (i.e. a URL to a document that conta
      </xs:annotation>
     </xs:element>
     <xs:element name="dataResourceRef" type="ref_t">
      <xs:annotation>
       <xs:documentation>A reference to a resource as described above.  The resource could be part of
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     </xs:element>
     <xs:element name="data" type="abstract_data_t">
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       <xs:documentation>A container that the actual acquisition data can go into (as opposed to being
      </xs:annotation>
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      <xs:annotation>
```

```
        <xs:documentation>This should be an abstract analysis_t that is extended to capture derived dat
       </xs:annotation>
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  </xs:sequence>
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  <xs:attribute name="rev" type="xs:string">
   <xs:annotation>
    <xs:documentation>Revision number, should correspond with an appropriate revision ID in the XCEDE/h
   </xs:annotation>
  </xs:attribute>
  <xs:attribute name="type" type="xs:string">
   <xs:annotation>
    <xs:documentation>Attribute for creating categories within a container set. For example, within stu
   </xs:annotation>
  </xs:attribute>
  <xs:attributeGroup ref="terminology_ag"/>
 </xs:complexType>
 <xs:complexType name="abstract_info_t">
  <xs:annotation>
   <xs:documentation>info elements are present in each of the hierarchy levels. these can be extended t
  </xs:annotation>
  <xs:sequence>
   <xs:element name="description" type="xs:string" minOccurs="0"/>
  </xs:sequence>
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  </xs:sequence>
  <xs:attributeGroup ref="ID_name_description"/>
  <xs:attributeGroup ref="terminology_ag"/>
  <xs:attribute name="level" type="levelDescriptor">
   <xs:annotation>
    <xs:documentation>Describes the level of the XCEDE hierarchy that this protocol instance should be
   </xs:annotation>
  </xs:attribute>
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  <xs:attribute name="minOccurences" type="xs:integer"/>
  <xs:attribute name="maxOccurences" type="xs:integer">
   <xs:annotation>
    <xs:documentation>Are these occurences within a step (i.e. during a single time point)?  How to ref
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  </xs:attribute>
  <xs:attribute name="minTimeFromStart" type="xs:string">
   <xs:annotation>
    <xs:documentation>Absolute time from start of overall protocol</xs:documentation>
   </xs:annotation>
  </xs:attribute>
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          <xs:documentation>Block for describing things like informant, clinical rater, assessment date
```

```
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       </xs:annotation>
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  <xs:element name="itemText" minOccurs="0">
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    <xs:documentation>'itemText' describes the text preceeding and following an assessment form item.
   </xs:annotation>
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  <xs:element name="itemName" type="xs:string">
   <xs:annotation>
    <xs:documentation>'itemName' is a short identifier for the assessment item. 'itemText' should be u
   </xs:annotation>
  </xs:element>
  <xs:element name="valueStatus" type="xs:string">
   <xs:annotation>
    <xs:documentation>Information on the status of a value (e.g. subject refused to answer)</xs:docume
   </xs:annotation>
  </xs:element>
  <xs:element name="itemValue" type="value_t">
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    <xs:documentation>Actual value of the assessment item as recorded on the form</xs:documentation>
   </xs:annotation>
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  <xs:element name="itemNormValue" type="value_t" minOccurs="0">
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    <xs:documentation>Normalized or scaled value of the assessment item</xs:documentation>
   </xs:annotation>
  </xs:element>
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   </xs:annotation>
  </xs:element>
  <xs:element name="invocation" type="xs:string">
   <xs:annotation>
    <xs:documentation>Application input required to generate this document. Should be explicit such th
   </xs:annotation>
  </xs:element>
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    <xs:documentation>Description of data source with version numbers and/or  timestamp of data</xs:do
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  </xs:annotation>
```

```
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 <xs:attribute name="termPath" type="xs:string"/>
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   links. The reason we are not using the native XML Schema ID attribute is that enforces
   document-wide uniqueness, whereas there may be instances of this bioterm schema that contain
   multiple namespace-qualified term or ontology class sets where IDs are unique within their
   namespace but not across the entire document. </xs:documentation>
 </xs:annotation>
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  <xs:pattern value="[A-Za-z0-9\-:_.]+"/>
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 </xs:annotation>
 <xs:sequence>
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    <xs:documentation>e.g. Dr., Mr., Mrs.</xs:documentation>
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  <xs:element name="middleName" type="xs:string" minOccurs="0"/>
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  <xs:element name="generator" type="generator_t" minOccurs="0"/>
  <xs:element name="annotation" type="textAnnotation_t" minOccurs="0"/>
 </xs:sequence>
 <xs:attribute name="ID" type="xs:string"/>
</xs:complexType>
<xs:complexType name="value_t">
 <xs:sequence>
  <xs:element name="actualValue" type="xs:string"/>
  <xs:element name="dataClassification" type="valueTypes_t" minOccurs="0"/>
  <xs:element name="unitRef" minOccurs="0">
   <xs:complexType>
    <xs:annotation>
     <xs:documentation>'unitDefID' is a reference to a unitDef block defining units</xs:documentation>
    </xs:annotation>
    <xs:attribute name="unitDefID" type="xs:string"/>
   </xs:complexType>
  </xs:element>
  <xs:element name="codeRef" minOccurs="0">
   <xs:complexType>
    <xs:annotation>
```

```
      <xs:documentation>'codeDefID' is a reference to a codeDef block defining coded values</xs:documen
     </xs:annotation>
     <xs:attribute name="codeDefID" type="xs:string"/>
    </xs:complexType>
   </xs:element>
  </xs:sequence>
 </xs:complexType>
 <xs:simpleType name="valueTypes_t">
  <xs:restriction base="xs:string">
   <xs:enumeration value="float"/>
   <xs:enumeration value="boolean"/>
   <xs:enumeration value="varchar"/>
   <xs:enumeration value="integer"/>
   <xs:enumeration value="URI"/>
  </xs:restriction>
 </xs:simpleType>
 <!--*********            Provenance types            *********-->
 <xs:complexType name="processStep_t">
  <xs:sequence>
   <xs:element name="package" type="versionedEntity_t" minOccurs="0"/>
   <xs:element name="program" type="versionedEntity_t"/>
   <xs:element name="programInvocation" type="mixedType_t"/>
   <xs:element name="timeStamp" type="mixedType_t"/>
   <xs:element name="cvs" type="mixedType_t" minOccurs="0"/>
   <xs:element name="user" type="mixedType_t" minOccurs="0"/>
   <xs:element name="machine" type="mixedType_t" minOccurs="0"/>
   <xs:element name="platform" type="versionedEntity_t" minOccurs="0"/>
   <xs:element name="compiler" type="versionedEntity_t" minOccurs="0"/>
   <xs:element name="library" type="versionedEntity_t" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
 </xs:complexType>
 <xs:complexType name="provenance_t">
  <xs:annotation>
   <xs:documentation>Note: sourceData should be included along with application parameters and configur
  </xs:annotation>
  <xs:sequence>
   <xs:element name="processStep" type="processStep_t" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="ID" type="xs:string"/>
 </xs:complexType>
 <!--*********            Resource types            *********-->
 <xs:complexType name="abstract_resource_t" abstract="true">
  <xs:annotation>
   <xs:documentation>A resource is something that we haven't agreed on yet.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
   <xs:element name="provenance" type="provenance_t" minOccurs="0"/>
   <xs:element name="metaFields" minOccurs="0">
    <xs:complexType>
     <xs:sequence minOccurs="0">
      <xs:element name="metaField" minOccurs="0" maxOccurs="unbounded">
       <xs:complexType>
        <xs:simpleContent>
         <xs:extension base="xs:string">
          <xs:attribute name="name" type="xs:string"/>
         </xs:extension>
        </xs:simpleContent>
       </xs:complexType>
      </xs:element>
     </xs:sequence>
    </xs:complexType>
   </xs:element>
   <xs:element name="uri" type="frag_uri_t" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attributeGroup ref="ID_name_description"/>
  <xs:attribute name="format" type="xs:string" use="optional">
   <xs:annotation>
```

```
    <xs:documentation>Format of file. E.g. DICOM, Analyze, 4dfp</xs:documentation>
   </xs:annotation>
  </xs:attribute>
  <xs:attribute name="content" type="xs:string" use="optional">
   <xs:annotation>
    <xs:documentation>Code indicating the contents of the image. E.g. GFC, T88</xs:documentation>
   </xs:annotation>
  </xs:attribute>
  <xs:attribute name="cachePath" use="optional">
   <xs:simpleType>
    <xs:restriction base="xs:string">
     <xs:maxLength value="255"/>
    </xs:restriction>
   </xs:simpleType>
  </xs:attribute>
 </xs:complexType>
 <xs:complexType name="informationResource_t">
  <xs:complexContent>
   <xs:extension base="abstract_resource_t"/>
  </xs:complexContent>
 </xs:complexType>
 <xs:complexType name="binary_data_resource_t">
  <xs:complexContent>
   <xs:extension base="abstract_resource_t">
    <xs:sequence>
     <xs:element name="elementType" minOccurs="0">
      <xs:annotation>
       <xs:documentation>This element describes the type of individual data elements in the data record
      </xs:annotation>
      <xs:simpleType>
       <xs:restriction base="xs:string">
        <xs:enumeration value="int8"/>
        <xs:enumeration value="uint8"/>
        <xs:enumeration value="int16"/>
        <xs:enumeration value="uint16"/>
        <xs:enumeration value="int32"/>
        <xs:enumeration value="uint32"/>
        <xs:enumeration value="int64"/>
        <xs:enumeration value="uint64"/>
        <xs:enumeration value="float32"/>
        <xs:enumeration value="float64"/>
        <xs:enumeration value="ascii"/>
       </xs:restriction>
      </xs:simpleType>
     </xs:element>
     <xs:element name="byteOrder" minOccurs="0">
      <xs:annotation>
       <xs:documentation>This element describes whether the individual data elements in the data record
      </xs:annotation>
      <xs:simpleType>
       <xs:restriction base="xs:string">
        <xs:enumeration value="lsbfirst"/>
        <xs:enumeration value="msbfirst"/>
       </xs:restriction>
      </xs:simpleType>
     </xs:element>
    </xs:sequence>
   </xs:extension>
  </xs:complexContent>
 </xs:complexType>
 <xs:complexType name="dimensioned_binary_data_resource_t">
  <xs:complexContent>
   <xs:extension base="binary_data_resource_t">
    <xs:sequence>
     <xs:element name="dimension" type="binary_data_dimension_t" maxOccurs="unbounded"/>
    </xs:sequence>
   </xs:extension>
```

```
 </xs:complexContent>
</xs:complexType>
<xs:complexType name="mapped_binary_data_resource_t">
 <xs:complexContent>
  <xs:extension base="binary_data_resource_t">
   <xs:sequence>
    <xs:element name="dimension" type="mapped_binary_data_dimension_t" maxOccurs="unbounded"/>
   </xs:sequence>
  </xs:extension>
 </xs:complexContent>
</xs:complexType>
<xs:complexType name="binary_data_dimension_t">
 <xs:annotation>
  <xs:documentation xml:lang="en">This element stores information about one of the N dimensions in the
 </xs:annotation>
 <xs:sequence>
  <xs:element name="size" type="xs:int" minOccurs="0">
   <xs:annotation>
    <xs:documentation xml:lang="en">The number of elements in the data along one traversal of this dim
   </xs:annotation>
  </xs:element>
 </xs:sequence>
 <xs:attribute name="label" type="xs:string">
  <xs:annotation>
   <xs:documentation xml:lang="en">This is a label for the dimension.  The first three spatial dimensi
       The data record allows the writer to specify some measure of data permutation/dimension merging
  </xs:annotation>
 </xs:attribute>
 <xs:attribute name="outputselect" type="xs:string" use="optional">
  <xs:annotation>
   <xs:documentation xml:lang="en">In the same way that the 'label' attribute allows you to specify di
  </xs:annotation>
 </xs:attribute>
</xs:complexType>
<xs:complexType name="mapped_binary_data_dimension_t">
 <xs:complexContent>
  <xs:extension base="binary_data_dimension_t">
   <xs:sequence>
    <xs:element name="origin" type="xs:float" minOccurs="0">
     <xs:annotation>
      <xs:documentation xml:lang="en">A value assigned to the first data element along this dimension.
     </xs:annotation>
    </xs:element>
    <xs:element name="spacing" type="xs:float" minOccurs="0">
     <xs:annotation>
      <xs:documentation xml:lang="en">This is the average distance between consecutive data elements i
     </xs:annotation>
    </xs:element>
    <xs:element name="gap" type="xs:float" minOccurs="0">
     <xs:annotation>
      <xs:documentation xml:lang="en">This is the length of the unsampled space between consecutive da
     </xs:annotation>
    </xs:element>
    <xs:element name="datapoints" type="xs:string" minOccurs="0">
     <xs:annotation>
      <xs:documentation xml:lang="en">The content of this element is either (1) a whitespace-separated
     </xs:annotation>
    </xs:element>
    <xs:element name="direction" type="listoffloats_t" minOccurs="0">
     <xs:annotation>
      <xs:documentation xml:lang="en">This element contains a vector (represented as a whitespace-sepa
     </xs:annotation>
    </xs:element>
    <xs:element name="units" type="xs:string" minOccurs="0">
     <xs:annotation>
      <xs:documentation xml:lang="en">This stores the units used for all numeric values in this dimens
     </xs:annotation>
```

```
    </xs:element>
   </xs:sequence>
  </xs:extension>
 </xs:complexContent>
</xs:complexType>
<xs:complexType name="frag_uri_t">
 <xs:annotation>
  <xs:documentation>The external data pointed to by this uri is a "fragment", where a "fragment" is de
 </xs:annotation>
 <xs:simpleContent>
  <xs:extension base="xs:anyURI">
   <xs:attribute name="offset" type="xs:unsignedLong">
    <xs:annotation>
     <xs:documentation>The data for this fragment will start at this byte position in the resource spe
    </xs:annotation>
   </xs:attribute>
   <xs:attribute name="size" type="xs:unsignedLong">
    <xs:annotation>
     <xs:documentation>This specifies the size(s) of this block in the resource specified by the 'uri'
    </xs:annotation>
   </xs:attribute>
  </xs:extension>
 </xs:simpleContent>
</xs:complexType>
<xs:simpleType name="listoffloats_t">
 <xs:list itemType="xs:float"/>
</xs:simpleType>
<xs:complexType name="catalog_t">
 <xs:sequence minOccurs="0">
  <xs:element name="metaDataRef" type="ref_t" minOccurs="0">
   <xs:annotation>
    <xs:documentation>Reference to the meta-date element that this catalog is related to.  Should poin
   </xs:annotation>
  </xs:element>
  <xs:element name="catalogList" minOccurs="0">
   <xs:complexType>
    <xs:choice minOccurs="0" maxOccurs="unbounded">
     <xs:element name="catalog" type="catalog_t"/>
     <xs:element name="catalogRef" type="ref_t"/>
    </xs:choice>
   </xs:complexType>
  </xs:element>
  <xs:element name="entryList" minOccurs="0">
   <xs:complexType>
    <xs:choice minOccurs="0" maxOccurs="unbounded">
     <xs:element name="entry" type="abstract_resource_t"/>
     <xs:element name="entryRef" type="ref_t"/>
    </xs:choice>
   </xs:complexType>
  </xs:element>
 </xs:sequence>
 <xs:attribute name="ID" type="xs:string" use="optional"/>
</xs:complexType>
<xs:complexType name="format_t">
 <xs:annotation>
  <xs:documentation>Container for describing imaging formats and file name extensions (currently under
 </xs:annotation>
 <xs:sequence>
  <xs:element name="description" type="xs:string" minOccurs="0"/>
  <xs:element name="documentationList" minOccurs="0">
   <xs:complexType>
    <xs:sequence>
     <xs:element name="documentation" type="informationResource_t" minOccurs="0" maxOccurs="unbounded"
    </xs:sequence>
   </xs:complexType>
  </xs:element>
  <xs:element name="extensionList" minOccurs="0">
```

```
    <xs:complexType>
     <xs:sequence>
      <xs:element name="extension" type="xs:string" minOccurs="0" maxOccurs="unbounded"/>
     </xs:sequence>
    </xs:complexType>
   </xs:element>
  </xs:sequence>
  <xs:attribute name="name"/>
 </xs:complexType>
 <xs:complexType name="catalog_t_expt">
  <xs:complexContent>
   <xs:extension base="abstract_resource_t"/>
  </xs:complexContent>
 </xs:complexType>
 <!--*********            Event types            *********-->
 <xs:complexType name="events_t">
  <xs:complexContent>
   <xs:extension base="abstract_data_t">
    <xs:sequence>
     <xs:element name="params" type="eventParams_t" minOccurs="0"/>
     <xs:element name="event" type="event_t" minOccurs="0" maxOccurs="unbounded"/>
     <xs:element name="description" type="xs:string" minOccurs="0"/>
     <xs:element name="annotation" type="textAnnotation_t" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
   </xs:extension>
  </xs:complexContent>
 </xs:complexType>
 <xs:complexType name="event_t">
  <xs:sequence>
   <xs:element name="onset" type="xs:float" minOccurs="0"/>
   <xs:element name="duration" type="xs:float" minOccurs="0"/>
   <xs:element name="value" type="eventValue_t" minOccurs="0" maxOccurs="unbounded"/>
   <xs:element name="annotation" type="textAnnotation_t" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="type" type="xs:string" use="optional"/>
  <xs:attribute name="units" type="xs:string" use="optional"/>
  <xs:attribute name="name" type="xs:string" use="optional"/>
 </xs:complexType>
 <xs:complexType name="eventValue_t">
  <xs:simpleContent>
   <xs:extension base="xs:string">
    <xs:attribute name="name" type="xs:string"/>
    <xs:attribute name="type">
     <xs:simpleType>
      <xs:restriction base="xs:string">
       <xs:enumeration value="number"/>
       <xs:enumeration value="string"/>
      </xs:restriction>
     </xs:simpleType>
    </xs:attribute>
    <xs:anyAttribute processContents="lax"/>
   </xs:extension>
  </xs:simpleContent>
 </xs:complexType>
 <xs:complexType name="eventParams_t">
  <xs:sequence>
   <xs:element name="firstmritime" type="xs:float" minOccurs="0"/>
   <xs:element name="value" type="eventValue_t" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
 </xs:complexType>
</xs:schema>
```