SIAP Extensions: Use cases and implementation rules

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1. Introduction

It was agreed at the Boston Interoperability meeting that there is a need to extensions in the SIA protocol (see Doug's Tody conclusions). This was in peculiar lessons learnt from the AVO demos and AVO prototype development and was expressed by several science archives operators such as ST ECF, CADC and ESAC XMM Science Archive.

2. Description of Use cases

a. detailed descriptions of an Observation

In the main section of SIAP defined by SIA 1.1 we should more or less find what is intended as "Characterization" in the IVOA Data Model Draft. The Draft explains that there are several level of characterization. Probably everything in "Location" and "Bounds" are in the right place in the main resource of SIA. In SIA 1.0 we already have Spatial, Temporal and Spectral Location. We only have Bounds for Spectral but not for Temporal and Spatial. It could be useful to add a start/stop time and explicitly a spatial bounding box. As said in the discussion the Spectral bounds could be replaced in the main section by a bandpassID , with details in the extension. (By the way, if we do that it would be usefull to add the spectral range of the bandpass in the input parameters) Resolution and Sampling should be present at the raw number level. Actually we already have the old VOX:Image_scale field (instr.scale in UCD1+) for SamplingPrecision. We lack the integrated resolution.

But Support and Sensibility should be reserved to the details in the so called SIA extensions we are proposing here. So should be the other detailed descriptions such as full WCS astrometric reduction or everything which is in Provenance.

b. Related Observations

When we are facing really different observations but with obvious generation links between them, the actual connection between these Observations cannot be modeled by a simple reference from one to the others. We would like to see the Observations themselves in the first section of SIA and all the Observation Process / Image Processing stuff necessary to understand the links from one Observation to the others in secondary sections.

Examples are:

- Whole field Observations and specific detector observations in CCD mosaics Observations or similar multidetector observations
- HST associations reprocessing together (coaddition et al) families of previous "member" associations
- XMM images in full band (0.2 - 12 keV) and their 5 sub-bands, as it was already stated at the AVO demo, using a modified IDHA tree. In this science case, the interest was in trying to elucidate if a YSO was of type I or II. (Some of us commented on this structure of "Observation - Exposure - Source -Energy Band" on the document at: http://www.ivoa.net/Documents/Notes/SIAPExt/PossibleSIAPExtension-20040514.pdf)

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3. Description of a general extension mechanism to SIAP

A SIAP Votable document contains a main Resource the name of which is “results”. In the following we do not rely on the exact content of this first section which may be consistent with version 1.0 of SIAP, or can also be upgraded to 1.1. Extensions will consist of one to several additional resources whose names, ids, types are free.

To create links between records in the main table and additional information contained in the additional resources, it is allowed to add one to several FIELDS to the main table with references to elements situated in the additional sections (free names and ids, utype =’a data model xpath for this field’ – the utype will have an xpath syntax, and can help a client software to extract the matching information). It is also allowed to refer to elements in the additional section from a standard SIAP field. It is possible to refer to the following elements:

group
table
resource
“external namespace” xml element

This implies that all these elements get an explicit ID, used as a value of the ref attribute of the extension(s) FIELD.

Example 1:

```
<RESOURCE name=”results>
.....
<FIELD name=”oneExtension” ID=”Ext1” ref=”extensionElementID”

.....
 </RESOURCE>
<RESOURCE name =”Extension1” .....
      .....
      < votOrNotVOTelement ..... ID=”extensionElementID”
```

The ref mechanism is not sufficient to create the links between records in the main table and additional information, because each record in the main table will generally need a specific extension different from those of the other records. That’s why we need an indexing mechanism. The values taken by the extension(s) field(s) for specific records are used as keys for this indexing mechanism. This implies that the field from the main table refering to a Pure VOTAble Extension element must be itself replicated in this extension element as a reference. In the external namespace xml element case we will use a xpath matching algorithm, using the utype of the refered field.

Exemple 2: “Pure VOtable case”

```
 <RESOURCE type=”results”>
   .....
    <FIELD ID=”ObservationName” datatype=”char” arraysize=”*” ref=”Provenance”
utype=”ivoa:observation/name” ucd=...  />
.....
<FIELD ucd=”DATA_LINK” ......>
<TABLEDATA>
      .....
       <TR>....<TD>Cl Trumpler 16</TD><TD><![CDATA[.....</TD>.....</TR>

</TABLEDATA></TABLE></RESOURCE>
```

```
<RESOURCE name=”Extensions”>
        <TABLE ID=”Provenance”>
             .............
             <FIELD ref=”ObservationName”/>
             <FIELD ID=”ProcessingMode”......./>
             <FIELD ID=”RelatedImages” ...../>
             .............
         <TABLEDATA>
        .....
<TR><TD>Cl Trumpler 16</TD><TD>Coaddition</TD><TD>Cl-Trumpler-16</TD></TR>

         </TABLEDATA></TABLE>
    </RESOURCE>
```

Example 3: “External namespace xml elements in a referred resource”

```
<RESOURCE type =”results”>
    .......
      <FIELD ID=”ObservationNumber” datatype=”char” arraysize=”*” ref=”Xml”
utype=”esacXmm:observation/@number” />
       <FIELD ucd=”DATA_LINK” ......>
<TABLEDATA>
      .....
       <TR>....<TD>001565543</TD><TD><![CDATA[.....</TD>.....</TR>

</TABLEDATA></TABLE></RESOURCE>

 <RESOURCE ID=”Xml” >

        <esacXmm:Observation number=”001565543”>
              <esacXmm:exposure number=” 001”>
                   .......
                   ........
                   <esacXmm:url  ...../>
                    <esacXmm:energyband  >
                          .......
                    </esacXmm:energyband>
                 </esacXmm:exposure>
                 <esacXmm:exposure number=002”>
                  .............
        </esacXmm:Observation>
         <esacXmm:Observation number=“00156.....“>
         ..................
         </esacXmm:Observation>
    </RESOURCE>
```

Example 4: “Support description as an STC AstroCoordArea”

```
<RESOURCE type=”results”>
   .............
    <FIELD ID=”ObservationName” datatype=”char” arraysize=”*” ref=”Provenance”
utype=”ivoa:observation/name” ucd=...   />
.....
```

<FIELD ID=”Support” .....utype=”ivoa:observation/characterization/support/@id” ref=”support”>
<TABLEDATA>

<TR>....<TD>Cl Trumpler 16</TD><TD>support1</TD></TR>

</TABLEDATA></TABLE></RESOURCE>
<RESOURCE name=”Extensions”
<RESOURCE ID=”support” >

<stc:AstroCoordArea id=”support1” >
<…..
…….
</stc:AstroCoordArea>

In addition it is possible to refer from any extension element to other elements in the document using the same mechanism.

It is allowed to point from Extensions to records located in the main section, except if this generates a circular link.