A recent RT Structure Set Correction Proposal, CP 2006, raised the question of whether every image slice in an ROI needs to be explicitly described in a volumetric ROI, or if it can be more coarsely sampled, as opposed to the omission of some slices implying that they are excluded from the ROI.

For SCOORD image-relative ROIs, even though the coordinates are defined relative to actual images, there was no intent to constrain the extent of a volumetric ROI to only those images, regardless of their spacing and thickness. I.e., the cross-plane sampling rate of the contours is not required to match that of the images. Failure to include an intervening image does not mean it is excluded from the ROI.

For SCOORD3D-defined ROIs, there may be no corresponding images, or they may be multiple differently sampled images, or they may be in different planes than the planar components of the SCOORD3D defined object.

The spatial extent of a single ROI is clarified and the need to encode disconnected fragments as separate ROIs is described.
Amend PS3.16 as follows (changes to existing text are bold and underlined for additions and struckthrough for removals):

**TID 1411 Volumetric ROI Measurements and Qualitative Evaluations**

This Template provides a general structure to report measurements for some metric, e.g., density, flow, or concentration, and/or qualitative evaluations, over a volumetric region of interest in a set of images or a Frame of Reference. The volumetric ROI may be specified by a set of SCOORDs on an image set representing a volume, by a volumetric Segmentation Image, by a volume defined in a Surface Segmentation, or by a set of SCOORD3Ds defining a volume relative to a 3D Frame of Reference.

<p>| Table TID 1411. Volumetric ROI Measurements and Qualitative Evaluations |
|---------------------|-----------------|-----------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>NL</th>
<th>Rel with Parent</th>
<th>VT</th>
<th>Concept Name</th>
<th>VM</th>
<th>Req Type</th>
<th>Condition</th>
<th>Value Set Constraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CONTAINER</td>
<td>EV (125007, DCM, &quot;Measurement Group&quot;)</td>
<td>1</td>
<td>M</td>
<td>XOR Rows 7, 10</td>
<td>GRAPHIC TYPE = not {MULTIPOINT}</td>
<td></td>
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<td>...</td>
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</tr>
<tr>
<td>5</td>
<td>CONTAINS SCOORD</td>
<td>EV (111030, DCM, &quot;Image Region&quot;)</td>
<td>1-n</td>
<td>MC</td>
<td>XOR Rows 7, 10</td>
<td>Reference shall be to a Segmentation Image or Surface Segmentation object, with a single value specified in Referenced Segment Number</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SELECTED FROM IMAGE</td>
<td>1</td>
<td>M</td>
<td>XOR Rows 5, 10</td>
<td>If one item, GRAPHIC TYPE = (ELLIPSOID or POINT)</td>
<td></td>
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<tr>
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<td>If more than one item, GRAPHIC TYPE = (POLYGON or ELLIPSE)</td>
</tr>
<tr>
<td>7</td>
<td>CONTAINS IMAGE</td>
<td>EV (121191, DCM, &quot;Referenced Segment&quot;)</td>
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<td>MC</td>
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<td>Reference shall be to a Segmentation Image or Surface Segmentation object, with a single value specified in Referenced Segment Number</td>
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<tr>
<td>10</td>
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<td>EV (121231, DCM, &quot;Volume Surface&quot;)</td>
<td>1-n</td>
<td>MC</td>
<td>XOR Rows 5, 7 and IFF (Row 7 or Row 10)</td>
<td></td>
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<tr>
<td>11</td>
<td>CONTAINS IMAGE</td>
<td>EV (121233, DCM, &quot;Source image for segmentation&quot;)</td>
<td>1-n</td>
<td>MC</td>
<td>XOR Row 12 and IFF (Row 7 or Row 10)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Content Item Descriptions

**Row 5**
Even though the coordinates are image-relative, not every image slice within the spatial extent of the ROI is required to be encoded. That is, the ROI may be more coarsely sampled than the image slices, and may be irregularly sampled, and the omission of a contour on a slice does not mean that it is omitted from the ROI. For example, a user may not draw an outline on every slice. However, failure to include every intermediate slice does give rise to this potential ambiguity, and is discouraged.

**Rows 5, 7, 10**
A single invocation of TID 1411 defines the entire spatial extent defined of a single ROI.

A single structure with multiple fragments disconnected in spatial extent needs to described as separate ROIs, in separate invocations of TID 1411, with different Tracking Identifiers and Tracking Unique Identifiers, but the same Finding.

**Rows 5, 10**
To describe an infinitely small volume, such as the center of a lesion, a Graphic Type of POINT may be used.
Referenced Segment Number (0062,000B) is an attribute of the IMAGE Content Item, and shall be present with a single value.

If the Referenced SOP Instance is a Segmentation Image, it shall have a defined Frame of Reference. If it has Segmentation Type (0062,0001) value BINARY, it identifies the volume of defined (measured) region of interest by voxel values in the referenced segment with value 1. If it has Segmentation Type value FRACTIONAL, the volume is defined by an implementation dependent method. The extent, sampling rate and orientation of the Segmentation are not required to match that of any corresponding image slices (if any), identified in Row 11 or referenced from the Segmentation.

If the referenced SOP Instance is a Surface Segmentation, the referenced segment shall constitute a finite volume. It identifies the volume of the defined (measured) region of interest by the interior of the finite volume.

Segment number shall be specified even if the Segmentation SOP Instance has only a single segment.

Either a single item describing a closed volumetric surface, or multiple items describing a set of parallel closed coplanar areas (contours) is specified. The sampling rate and orientation of the contours is not required to match that of any image slices (if any), nor are the in-plane or cross-plane sampling rates required to be regular.

Identifies the source images that were segmented to identify the ROI, when, for example a subset of images in a series was used.