SR Object Model (SR-OM)
- Towards an API for toolkits

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NEMA SR Workshop

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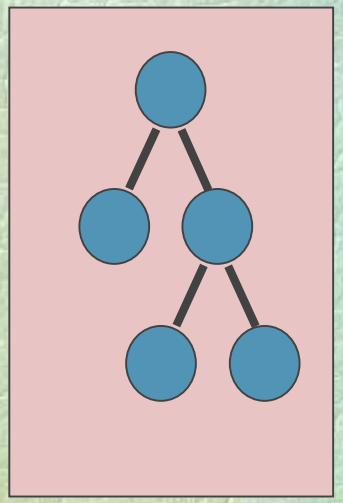
The need for an API

- SR is primarily encoded in DICOM
- DICOM parsing/encoding requires tools
- May need transcoding into XML, HL7 …
- Input methods, rendering rules essentially independent of encoding
- Standard API to separate encoding from applications

Transcoding Applications

```
...
(0x0040,0xa491) <COMPLETE>
(0x0040,0xa493) <VERIFIED>
(0x0040,0xa730) Content Sequence
(0x0040,0xa010) <HAS OBS CONTEXT>
(0x0040,0xa040) <PNAME >
(0x0040,0xa043) Concept Name Code Sequence
(0x0008,0x0100) <000555>
(0x0008,0x0102) <LNdemo>
(0x0008,0x0104) <Recording 0bserver>
(0x0040,0xa123) <Smith^John^^Dr^ >
...
```

DICOM



Internal

```
<contentsequence>
<contentitem>
<contentlabel>1.1</contentlabel>
<relationshiptype>HAS OBS CONTEXT</relationshiptype>
<conceptname>
<codesequence>
<codevalue>000555</codevalue>
<codingschemedesignator>LNdemo</codingschemedesignator>
<codemeaning>Recording Observer</codemeaning>
</codesequence>
</conceptname>
<valuetype>PNAME</valuetype>
<personname>Smith^John^^Dr^</personname>
</contentitem>
<contentitem>
```

XML

Rendering Applications

DICOM

```
…
(0x0040,0xa491) <COMPLETE>
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<codingschemedesignator>LNdemo</codin
gschemedesignator>
<codemeaning>Recording
Observer</codemeaning>
```
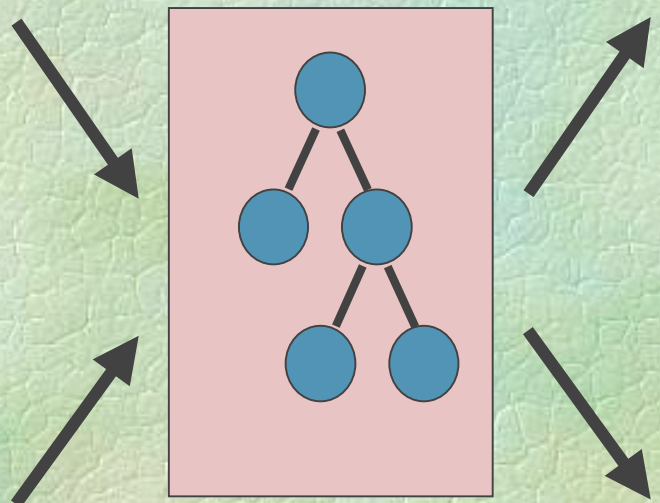

XML



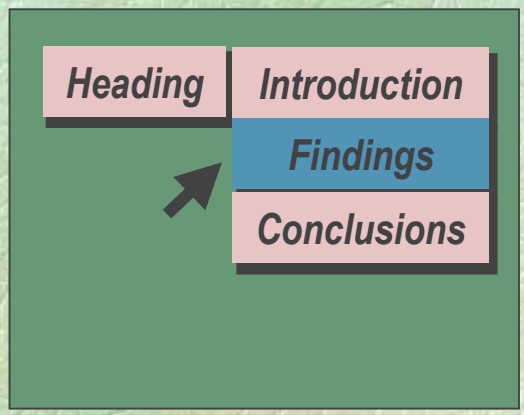
Report of Chest X-Ray (PA and LateralViews)

Patient Jane Homer
Study # 123456
Recorded by Dr. John Smith

The finding is a mass measuring 1.3 cm in diameter with an infiltrative margination.

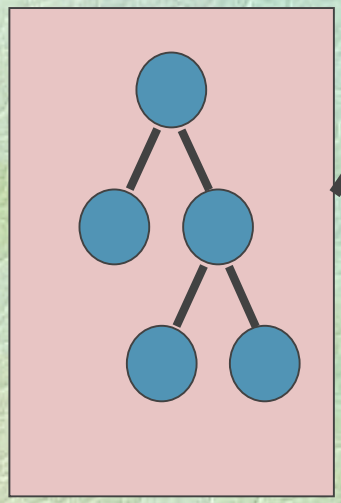
Chest X-Ray
has concept modifier Views=PA and Lateral
Recording Observer=Smith^John^^Dr^
Study Instance UID …=1.2.3.4.5.6.7.100
Patient-Data-Acquisition-Subject=Homer^Jane^^^
Finding=Mass
has properties diameter=1.3 cm
has properties margination=infiltrative (1.4.2)

Input Applications



GUI A

Encoder C



NLP B

Encoder D

Common API

…
(0x0040,0xa491) <COMPLETE>
(0x0040,0xa493) <VERIFIED>
(0x0040,0xa730) Content Sequence
(0x0040,0xa010) <HAS OBS CONTEXT>
(0x0040,0xa040) <PNAME >
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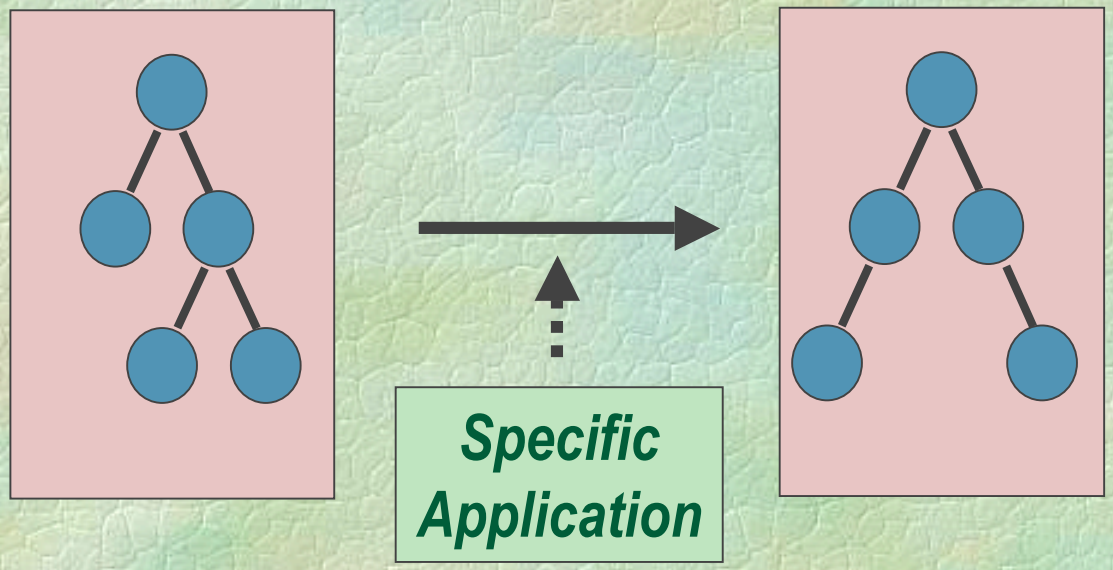
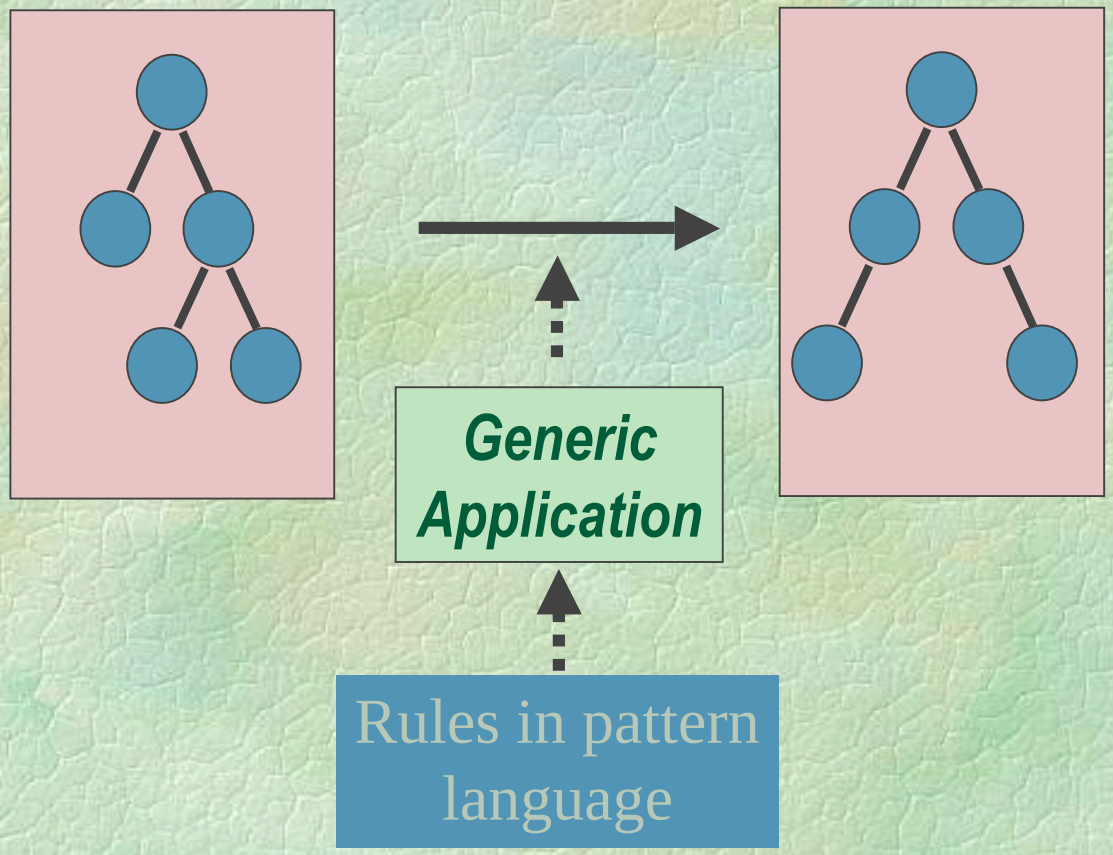
Tree rewriting



Tree rewriting



Precedent in XML World - DOM

- Document Object Model (W3C rec.)
  - Parse an XML document
  - Validate against DTD
  - Represent as tree
  - Multi-language bindings for accessor methods
  - Edit/generate tree elements
  - Write out as an XML document

SR - why not just use DOM ?

- Structure of the SR tree slightly different
- Node content different
- Constraints on value types different
  - XML - just PCDATA
  - SR - PNAME, NUM, IMAGE, SCOORD etc.

SR Object Model (SR-OM) API

- Follow DOM as closely as possible
- Generic specification in IDL
- Multiple language bindings
  - C++
  - Java
  - ECMAScript, Python, ...
- Accessor methods rather than generic collections (STL, Java 2 Collections)

SR-OM Classes and Interfaces

```
interface SRDocument {
        SRNode getRootNode();
};
interface SRNode {
        String getConceptName();
        SRValueType getValueType();
        SRValue getValue();
        …
        SRNode getParent();
        SRNode getFirstChild();
        SRNode getNextChild();
        …
};
```

SR-OM Decisions

- Is DOM concept sufficient ?
  - other XML API approaches
  - SAX - event driven tree traversal
- Accessors
  - Iterators: getNextChild()
  - Indexed: getNamedChild(ConceptName)
- Validation a separate interface ?

SR-OM Home

- DICOM Working Group home ?
  - WG 8 SR, WG 6 Base Standard, new WG ?
  - Joint effort with HL-7 (WG 20)
  - Vendor concensus (ad hoc group) ?
- Document home ?
  - DICOM Standard ?
  - DICOM Recommendation ?
  - Ad hoc concensus document