XML + HL7:
Does this spell help or trouble for registries?

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Outline

- XML is what?
- Why do we care?
- XML features
- CDC/HL7 Use
- Possible NAACCR use
- Tools for working with XML
- What’s next?
Acknowledgement

Many ideas presented here were
– Stolen from or
– Thought up while working on funds from:

CDC-NPCR
XML is what?

- A markup language using tags
- Originally created by WWW to disseminate structured data/docs over the web
- Now supported in MS Office 2003
- Makes information portable (cross-platform)
- Separates data and content
- Enforces rules (via schemas)
- Allows many output formats and styles for same data.
XML - What it’s not

- Not just for the Web
- Not a database
- Not a programming language
XML Features

- Self-documenting tags
- Browser-viewable
- Many views of the same data
<?xml version="1.0" encoding="UTF-8" ?>

- <books>
  - <book>
    <title>The XML Plot</title>
    <author>Brown, Browny</author>
    <publisher>Singleday</publisher>
    <price>$24.95</price>
    <contentType>Fiction</contentType>
    <format>Hardback</format>
    <isbn>0385504209</isbn>
  </book>
</books>
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  </book>
</books>
## The XML Plot
- Brown, Browny
- Singleday
- $24.95
- Fiction
- Hardback
- 0385504209

## State of Fear of XML
- Crichton, Mikey
- Self
- Free
- Fiction
- Hardback
- 9999999999
Outputs from XML (transforms)
Many views of the same data

- Via XSLT transforms
- Similar to using css style sheets files to change web styles
  - Example: csszengarden.com
XML: Why do we care?

- ‘CHEWUPS’
  - CDC’s choice for state transmits (NEDSS)
  - HL7 standard format
  - Easier to parse and program than flat files
  - Web-browser viewable
  - Updates easier than fixed-length formats
  - Popular with business/IT
  - Self-documenting and constraining
Advantage #1: CDC’s Use of XML

- NPCR uses XML to generate CS tables and documentation
- NEDSS/PHIN use
  - For lab reporting
  - Using HL7 version 3
  - Created STF format
NEDSS Use of XML

- Part of PHIN network
- Used to exchange state <> CDC data
- ebXML packages send XML + other data
  - National Cancer Research Network (NCRN)
  - Over 90 reportable conditions.
Simplified Transitional Format

The *Simplified Transitional Format* (STF) has been developed by the CDC in an effort to *simplify* the *transition* by states to the HL7 Version 3 Message for NCRN.
Advantage #2: HL7 provides standards for XML Formats

- HL7 Version 2.4, 2.5
- HL7 Version 3
V3 CDC infectious disease report trigger section [in XMLSpy]
Advantage #3: XML is Easy to Program

- Cross-platform
- Integrates with MS Office 2003
- Many other tools are available.
Tools

- Commercial vendor tools
  - XML Spy
  - Orion Symphonia/Rhapsody
  - Lots of others...

- Upcoming C/NET XML/NAACCR translator
Advantage #4: XML is Web browser-viewable

- Some illustrations from possible NAACCR messages
- Non-standard compared with NAACCR-standardized.
Non-NAACCR XML implementation

<?xml version="1.0" encoding="UTF-8"?>
<cases>
  <case>
    <Item10144>Ahab</Item10144>
    <Item202005>Captain</Item202005>
    <Item30304444>01012005</Item30304444>
    <Item4045432>C430</Item4045432>
  </case>
</cases>
NAACCR example using HL7/NAACCR standards

```xml
<case>
  <Name-Last>value="Ahab" uid="NAACCR2230" datatype="ST"></Name-Last>
  <Name-First>Captain</Name-First>
  <AddrCurrent-PostalCode value="37201" uid="NAACCR1830" datatype="ST"/>
  <Sex value="1" codeSystem="2.16.840.1.114222.4.11.206" uid="NAACCR0220" datatype="CV"/>
  <Date-of-Diagnosis>01012005</Date-of-Diagnosis>
  <Primary-Site>C430</Primary-Site>
</case>
<case>
</case>
```
Example NAACCR fields

```xml
<value="Ahab" uid="NAACCR2230" datatype="ST"
value="Captain" uid="NAACCR2240" datatype="ST"
value="C403" uid="NAACCR0400"
codeSystem="2.16.840.1.114222.4.11.206" datatype="CV"
```
Advantage # 5:
Format updates are easier

- Easy compared to fixed-length formats.
  - New items, length changes easy
- Coding tables changes are version-tracked
- Allows rich text
Advantage #6: XML is popular with programmers

- ebXML and XML used in business-to-business web services
- Programmers see it as a simple way to store and send data
- But maverick implementations hurt connectivity
- Example of rich-text formatting of path results
Non-XML Pipe-delimited version of path text

OBX|1|ST|SPSUR||| | | | | | | | D
OBX|2|TX|SPSUR||(NOTE)~~SURGICAL PATHOLOGY REPORT~~~SPECIMEN #: Sxx-xxxx~SPECIMEN(S)~1: Small bowel biopsy.~2: Gastric biopsy.~3: Distal esophagus.~4: Mid esophagus.~~PREOPERATIVE~Gastroesophageal reflux disease.&nbsp;Gastritis.~~POSTOPERATIVE~Distal antral gastritis.&nbsp;Distal erosive esophagitis.~~FINAL PATHOLOGIC DIAGNOSIS~~1.&nbsp;&nbsp;SMALL INTESTINE, BIOPSY (X3):~MUCOSA OF SMALL INTESTINE WITH NO PATHOLOGICAL CHANGE.~2.&nbsp;&nbsp;STOMACH, BIOPSY:~MILD CHRONIC GASTRITIS OF BODY MUCOSA OF STOMACH.~ORGANISMS RESEMBLING H. PYLORI ARE NOT PRESENT ON THE ROUTINE OR~SPECIFIC~IMMUNOPEROXIDASE STAINED SLIDES.~3.&nbsp;&nbsp;DISTAL ESOPHAGUS, BIOPSY (X3):~MILD CHRONIC REFLUX ESOPHAGITIS.~4.&nbsp;&nbsp;MID ESOPHAGUS, BIOPSY (X2):~STRATIFIED SQUAMOUS EPITHELIAL LINING OF MUCOSA OF ESOPHAGUS WITH~NO~PATHOLOGICAL CHANGE
XML report with formatted text

<OBX.1>1</OBX.1>
<OBX.2>ST</OBX.2>
<OBX.3>
  <CE.1>35660-0</CE.1>
  <CE.2>Final Diagnosis</CE.2>
  <CE.3>LN</CE.3>
</OBX.3>
<OBX.5>

1. Small intestine, biopsy (x3): mucosa of small intestine with no pathological change.
2. Stomach, biopsy: Mild chronic gastritis of body mucosa of stomach. Organisms resembling H. Pylori are not present on the routine or specific immunoperoxidase stained slides.
3. Distal esophagus, biopsy (x3): Mild chronic reflux esophagitis.
4. Mid esophagus, biopsy (x2): Stratified squamous epithelial lining of mucosa of esophagus with no pathological change.
</OBX.5>
Advantage #7:
Self-documenting data structure verified by schemas

- Schemas define and validate message structures
- Schemas are written in XML too
XML Schema snippet for path message

```xml
<?xml version="1.0" ?>
<!-- XML Composer generated schema, Orion Systems NZ Ltd -->
<x:schema xmlns:x="http://www.w3.org/2001/XMLSchema"
    xmlns:dt="urn:schemas-microsoft-com:datatypes">
  <Element name="ORUR01" model="closed" order="seq" content="eltOnly">
    <element type="MSH" minOccurs="1" maxOccurs="1" />
    <element type="PID" minOccurs="1" maxOccurs="1" />
    <element type="PD1" minOccurs="0" maxOccurs="1" />
    <element type="NK1" minOccurs="0" maxOccurs="*" />
    <element type="NTE" minOccurs="0" maxOccurs="*" />
    <element type="PV1" minOccurs="0" maxOccurs="1" />
    <element type="PV2" minOccurs="0" maxOccurs="1" />
    <element type="ORC" minOccurs="0" maxOccurs="1" />
    <element type="OBR" minOccurs="1" maxOccurs="1" />
    <element type="OBX" minOccurs="0" maxOccurs="*" />
  </Element>
</x:schema>
```
XML and cancer registries?

- Would fit with ebXML and PHIN standards
- Some states already starting to use XML
- Allows rich text formatting
- Easily updated when field definitions change
- Verifies format and content structure automatically using schemas
What’s next for California?

- Develop and test HL7/XML ‘rich text’ transmit
- Build XML translator toolbox
  - XML schemas for E-path, case transmit
  - Stand-alone conversion between XML, HL7 pipes, and NAACCR classic.
  - Table-driven for easy revision.
What’s Next Nationally?

- **IT Committee**
  - Canvas states who are starting to implement in XML
  - Discuss HL7 V2/V3 choices
  - Slowly develop framework that can help guide registry implementations
  - Make sure there is no XML ‘mandate’ – provide translation tools

- **Keep on talkin’…..**
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