HL7/ASTM Continuity of Care Document

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CDA is based on a principle of *Incremental Interoperability*

- *Incremental Interoperability* means that an implementer can begin with a simple CDA, and then add structured data elements over time.
- CDA R2 consists of a single CDA XML Schema, and the "architecture" arises from the ability to apply one or more "templates" which serve to constrain the richness and flexibility of CDA.
- Professional society recommendations, national clinical practice guidelines, standardized data sets can be expressed as CDA templates.
- There are many kinds of templates that might be created. Two are particularly relevant for documents:
  - Those that constrain the document sections based on the type of document (section-level templates);
  - Those that constrain the entries within document sections (entry-level templates)

ASTM CCR vs. HL7 CDA

- What if you could have both?!? (or, what if you could have your data elements, and send them in a common exchange framework too?)

ASTM CCR + HL7 CDA = CCD

- The primary use case for the ASTM CCR is to provide a snapshot in time containing a summary of the pertinent clinical, demographic, and administrative data for a specific patient.
- From the perspective of CDA, the ASTM CCR is a standardized data set that can be used to constrain CDA specifically for summary documents.
- The resulting specification is known as the Continuity of Care Document (CCD).

Continuity of Care Document (CCD)

- CCD maps the CCR elements into a CDA representation.

```
<Results>
  <Result>
    <CCRDataObjectID>
      2.16.840.1.113883.19.1
    </CCRDataObjectID>
    <DateTime>
      <Type>
        <Text>Assessment Time</Text
      </Type>
      <ExactDateTime>
        200004071430
      </ExactDateTime>
    </DateTime>
    <Type>
      <Text>Hematology</Text>
    </Type>
    <Description>
      <Text>CBC WO DIFFERENTIAL</Te
      <Code>
        <Value>43789009</Value>
        <CodingSystem>SNOMED CT</Co
      </Code>
    </Description>
    <Status><Text>Final Results</Text></Status>
```

```
<section>
  <templateId root="2.16.840.1.113883.10.20.1.14
  <code code="30954-2"
    codeSystem="2.16.840.1.113883.6.1"
    codeSystemName="LOINC"/>
  <title>Laboratory results</title>
  <text>
    CBC (04/07/2000): HGB 13.2; WBC 6.7; PLT 123
  </text>
  <entry>
    <organizer classCode="BATTERY" moodCode="EVN
      <templateId root="2.16.840.1.113883.10.20.
      <id root="2.16.840.1.113883.19" extension=
      <code code="43789009"
        codeSystem="2.16.840.1.113883.6.96"
        codeSystemName="SNOMED CT"
        displayName="CBC WO DIFFERENTIAL"/>
      <statusCode code="completed"/>
      <effectiveTime value="200004071430"/>
```

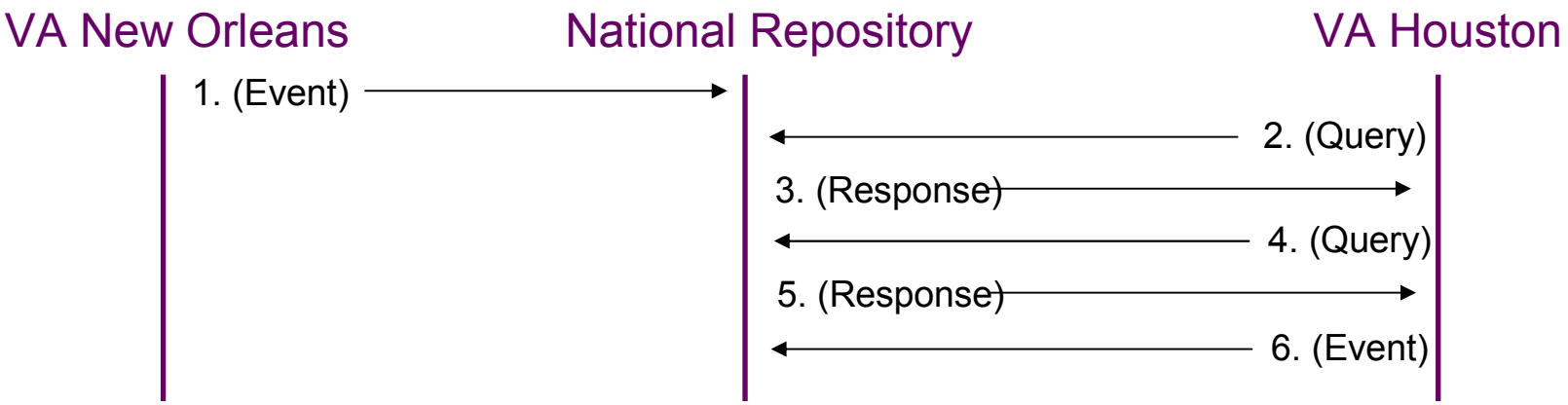
Continuity of Care Document (CCD)

- CCD sections include:
  - Payers
  - Advance Directives
  - Support
  - Functional Status
  - Problems
  - Family History
  - Social History
  - Alerts (e.g. Allergies, Adverse Events)
  - Medications
  - Medical Equipment
  - Immunizations
  - Vital Signs
  - Results
  - Procedures
  - Encounters
  - Plan of Care

National Health Data Repository

- This scenario has been built in collaboration with the HL7 Medical Records committee, and shows how a combination of HL7 messages (or IHE XDS) and CDA documents can support the requirements of a National Health Data Repository.

National Health Data Repository

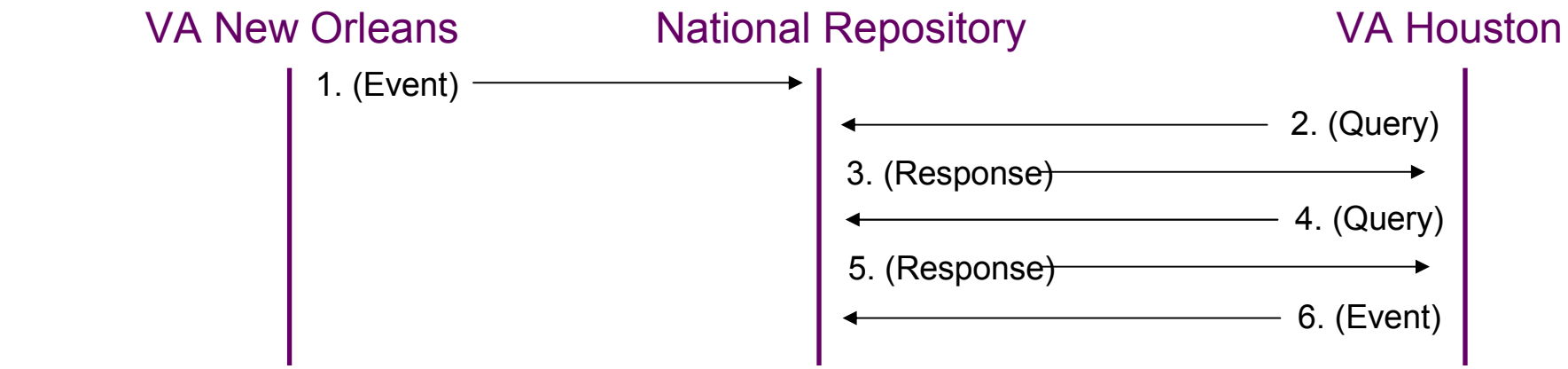


1. PatientOne receives his care at the VA New Orleans, which stores data in a local EHR, and contributes clinical documents to a national health data repository, which contains all clinical data that exists throughout the national VA health care system.

2. Due to Hurricane Katrina, PatientOne drives his family to Houston to stay with relatives, leaving their belongings behind. In Houston, PatientOne starts experiencing chest pain, and he is taken to the VA Houston ER. NurseOne asks the patient to provide his Veteran Information Card (VIC), finds no data in the local system, and submits a query for information about PatientOne to the National Repository.

3. The National Repository sends a response back, containing a listing of all clinical documents identified for PatientOne.

National Health Data Repository



4. NurseOne finds a recent CCD, several progress note documents, and recent reports of a treadmill and coronary angiogram, and submits a query to the National Repository for the documents of interest.
5. The National Repository responds back with the requested documents. Once the documents are available, they can be viewed in the local system.
6. Meanwhile, PhysicianOne has begun evaluating PatientOne. Sublingual NTG and O2 have been applied, and chest pain has resolved. An ECG is normal. PhysicianOne reviews the coronary angiogram report, which found no evidence of coronary artery disease. PhysicianOne reviews the CCD, which includes a history of GERD. PatientOne is diagnosed with GERD, reassured, and discharged. PhysicianOne then enters an ER visit note into the local system. When the visit note is completed and signed, a copy of it is uploaded to the National Repository.

CCD and Medication Reconciliation

- Henry Levin the 7th is a 75 year old male with type 2 DM, CAD, stage 2 CKD, and LV diastolic dysfunction. He is admitted to hospital on Jan 12, 2007, with fever, volume depletion, left lower extremity cellulitis, and increase in baseline serum creatinine. At the time of admission, his clinician obtains medication information from a pharmacy application and from the patient's personal health record (PHR), both in CCD format.

CCD from Pharmacy to Hospital

```
<section>
 <code code="10160-0"
  codeSystem="2.16.840.1.113883.6.1"/>
 <title>Medications</title>
 <text><list>
  <item>Metformin (Glucophage) 500mg
   tablet, 2 tablets BID PO.</item>
  <item>Clopidogrel (Plavix) 75mg tablet,
   1 tablet a day PO.</item>
  <item>Metoprolol (Lopressor) 50mg
   tablet, 1 tablet BID PO.</item>
  <item>Lisinopril (Zestril) 10mg tablet,
   1 tablet a day PO.</item>
 </list></text>
 <entry>
 <substanceAdministration moodCode="INT">
  <statusCode code="active"/>
  <effectiveTime xsi:type="PIVL_TS">
   <period value="12" unit="h"/>
  </effectiveTime>
  <routeCode code="PO" ... />
  <doseQuantity value="2"/>
  <consumable><manufacturedProduct>
   <manufacturedMaterial>
    <code code="311570" ...
     displayName="Metformin 500 MG oral
     tablet"/>
    <name>Glucophage</name>
   </manufacturedMaterial>
  </manufacturedProduct></consumable>
 </substanceAdministration>
 </entry>
 …
</section>
```

CCD from PHR to Hospital

```
<section>
 <code code="10160-0" .../>
 <title>Medications</title>
 <text><list>
  <item>Glucophage 1 tablet BID</item>
  <item>Plavix 1 tablet a day</item>
  <item>Metoprolol 1/2 tablet BID</item>
  <item>Lisinopril 1 tablet a day</item>
 </list></text>
 <entry>
 <substanceAdministration moodCode="EVN">
  <statusCode code="active"/>
  <effectiveTime xsi:type="PIVL_TS">
   <period value="12" unit="h"/>
  </effectiveTime>
  <routeCode code="PO" .../>
  <doseQuantity value="1"/>
  <consumable><manufacturedProduct>
   <manufacturedMaterial>
    <code code="372803" ...
     displayName="Metformin oral
      tablet"/>
    <name>Glucophage</name>
   </manufacturedMaterial>
  </manufacturedProduct></consumable>
 </substanceAdministration>
 </entry>
 ...
</section>
```

CCD and Medication Reconciliation

- During the hospitalization, medications are adjusted. Intravenous clindamycin is administered. Fever and cellulitis improve and serum creatinine returns to baseline. He is transferred to a skilled nursing facility (SNF) on Jan 15, 2007 to complete a course of intravenous antibiotics. A CCD accompanies – containing a section for medications on admission and a section for ongoing medication orders.

```
<section>
 <code code="10160-0" ... />
 <title>Medications</title>
 <!-- ********************************
 Admission Medications subsection
 ******************************** -->
 <component>
  <section>
   <code code="42346-7" ... />
   <title>Admission medications</title>
   <text><list>
    <item>Metformin (Glucophage) 500mg
     tablet, 1 tablet BID PO
     (SUSPENDED).</item>
    <item>Clopidogrel (Plavix) 75mg
     tablet, 1 tablet a day PO.</item>
    <item>Metoprolol (Lopressor) 50mg
     tablet, 1/2 tablet BID PO.</item>
    <item>Lisinopril (Zestril) 10mg
     tablet, 1 tablet a day PO
     (SUSPENDED).</item>
   </list></text>
   <entry>
   <substanceAdministration
    moodCode="EVN">
    <statusCode code="suspended"/>
    <effectiveTime xsi:type="IVL_TS">
     <high value="20070112"/>
    </effectiveTime>
    <effectiveTime xsi:type="PIVL_TS"
     operator="A">
     <period value="12" unit="h"/>
    </effectiveTime>
    <routeCode code="PO" .../>
    <doseQuantity value="1"/>
    <consumable><manufacturedProduct>
     <manufacturedMaterial>
      <code code="311570" ...
       displayName="Metformin 500 MG
       oral tablet"/>
      <name>Glucophage</name>
     </manufacturedMaterial>
    </manufacturedProduct></consumable>
   </substanceAdministration>
   </entry>
   ...
  </section>
 </component>
</section>
```

```
<!-- ********************************
Plan of Care section
*************************************-->
<component>
<section>
 <code code="18776-5" .../>
 <title>Plan</title>
 <text><list>
  <item>Clopidogrel (Plavix) 75mg
   tablet, 1 tablet a day PO.</item>
  <item>Metoprolol (Lopressor) 50mg
   tablet, 1/2 tablet twice a day
   PO.</item>
  <item>Lisinopril (Zestril) 5mg tablet,
   1 tablet a day PO.</item>
  <item>Clindamycin 500mg every 6 hours
   IV for 10 days.</item>
  <item>Regular insulin subQ AC/HS per
   protocol.</item>
 </list></text>
 <entry>
 <substanceAdministration moodCode="RQO">
  <statusCode code="active"/>
  <effectiveTime xsi:type="IVL_TS">
   <low value="20070115113000"/>
  </effectiveTime>
  <effectiveTime xsi:type="PIVL_TS"
   operator="A">
   <period value="24" unit="h"/>
  </effectiveTime>
  <routeCode code="PO" ... />
  <doseQuantity value="1"/>
  <consumable><manufacturedProduct>
   <manufacturedMaterial>
    <code code="309362" ...
     displayName="Clopidogrel 75 MG
     oral tablet"/>
    <name>Plavix</name>
   </manufacturedMaterial>
  </manufacturedProduct></consumable>
 </substanceAdministration>
 </entry>
 ...
</section>
```