CAP eCC migration to SDC

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DISCLOSURE

In the past 12 months, I have had a significant financial interest or other relationship with the manufacturer(s) of the following product(s) or provider(s) of the following service(s) that will be discussed in my presentation.

I am a member of the CAP PERT Committee and CAP pays for expenses for face to face meetings.
CAP eCC Historical Background

- 1990s Evolution to synoptic report in the 1990s
- 1998 Minimum data set to define a cancer diagnosis-first release
- 2003 SNOMED CT encoding
- 2007 SNOMED CT encoded MS Access database
- 2009 CAP XML eCC – CAP PERT Committee
  - Uses unique IDs to identify individual concepts paired with IDs for individual values such that a composite gives a unique identifier for question and answer
  - c-key to SNOMED CT mapping possible
• Proprietary XML format
• Question/Answer format
  – Required, Conditionally required and Optional
  – Parent / Child relationships
  – Fill-In answers
• Regulatory
  – Committee on Cancer (CoC)

• Cancer Care Ontario

• California

• ~12 Vendors, 6,000 pathologists
• Required vs Optional
• Conditionally required
• Single entry vs multiple select
• Question parent and child relationships
• Mutually exclusive
• Auto-calculation / Rules
• Repeating sections
• Validation rules for complete report
• Structured Data Capture
  ONC project
  – 2010 Health Information Technology Initiative
  – 2013 SDC Created

Products
- Integrating the Healthcare Enterprise (IHE) SDC profile
- HL7 FHIR SDC profile
Structured Data Capture Workflow

1. Sends request for form/template

2. Specified Form/Template

3. Converts, populates and displays form

4. Fills, stores/transmits structured data

5. Extract, Transform, and Load Data by form/template

SDC Scope

CDE Library

Form Library

Metadata Source

Actor Key
- Forms Filler
- Forms Manager
- External Repository
Identifiers can be Mapped to DEs
(this is external to the Form Template and optional)

Form Design Template (ID-T1)

Section (ID-S29)
- QAS:DE (ID-Q92)
- QAS:DE (ID-Q11)
- QAS (ID-Q5)

Section (ID-S23)
- QAS:DE (ID-Q39)
- QAS (ID-Q30)

Map
Q2 → DE123

DE123
- SNOMED = ...
- LOINC = ...
- Answer Items = a (SNOMED = ...)
b(SNOMED = ...)
c(SNOMED = ...)

Note: The map usually travels with the form in an SDC Package. The DEs live in a DE repository, and can be looked up on demand via a web service. DEs may be maintained independently of forms. Maps, if used, are maintained with the form, but do not need to travel with it.
Forms and Packages

• Form
  – One SDC FormDesign XML file

• Package
  – One or more SDC FormDesign templates (XML)
  – One Demographic FormDesign template (optional)
  – Maps to terminologies, data elements etc.
  – Transforms and/or other formatting / styling artifacts
  – Administrative data
• 2014 Balloted IHE SDC Profile through QRPH
  – Published – September
• 2015-18
  – IHE Connectathons
  – HIMSS Participation
  – Revised IHE SDC Profile Published – October 2015
  – IHE SDC Pilots – October 2015 through October 2016
  – 2nd Revised IHE SDC Profile Published for Comment – July 2016
• 2019 IHE Trial implementation revision 2.2
Why change to SDC

• SDC is technically more capable than the original eCC model
  – Non-proprietary format
  – Expanded metadata set
  – More compliant with modern healthcare informatics and general programming approaches
  – Standards development process (ONC, IHE, HL7)
  – Covers the entire data ecosystem, including standardized content design, data-entry, transmission, storage, aggregation and querying
  – Open source tools
• Goal categories:
  – Data Entry Form Content
  – Optimize Workflow
  – Reporting (Report order)
  – Secondary Use
  – Implementation
X.4.2.2.2 Capture and Submit Pre-Authorization - Process Flow

Security / authentication not shown

Figure X.4.2.2.2-1: Capture and Submit Pre-Authorization – Process Flow diagram
eCC to SDC Work Plan

- Pilot/Beta releases of SDC – Aug 2017, Sep 2017, and Aug 2018
- 2019 Q1 – Full SDC release (all 100 templates)
- No new SDC features utilized in 2019 release
  – Equivalent to prior eCC “enhanced” XML feature set
SDC Workflow

- HL7: CDA, V2, SOAP/REST (IHE), REST (FHIR)
- Cancer Registries
- Patient Providers
- Research
- Data Repository
- Data Entry Form
- SDC XML Output
- Vendor
- Synoptic Report
- Template Editor
- CAP Cancer Protocol

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Building Tools to Generate the SDC-XML Files

- Modifications were also needed to Template Editor (TE) to support SDC-XML file structure (and SSP)
- The new SDC-XML Generator required several iterations of testing and debugging
- Extensive, manual item-by-item review of SDC-XML file metadata was required as part of the SDC-XML Generator debugging process
List Item Types:
- **Hdr** - headers
- **QS** - single-select questions
- **AF** - answer fill-ins
- **A** - answers
- **Note/CN** - notes & combo notes
- **QF** - fill-in questions
- **QM** - multi-select questions
Primary Tumor (pT)

Note: There is no category of carcinoma in situ (pTis) relative to carcinomas of the adrenal gland.

- pTX: Primary tumor cannot be assessed
- pT0: No evidence of primary tumor
- pT1: Tumor ≤ 5 cm in greatest dimension, no extra-adrenal invasion
- pT2: Tumor > 5 cm, no extra-adrenal invasion
- pT3: Tumor of any size with local invasion, but not invading adjacent organs
- pT4: Tumor of any size with invasion of adjacent organs (kidney, diaphragm, pancreas, spleen, or liver) or large blood vessels (renal vein or vena cava)
Primary Tumor (PT)  \( \text{Cardinality: 1} \) 

\( \text{Minimum: 1} \) \( \text{Maximum: 1} \)

\( \text{Label: Primary Tumor (PT)} \)

\( \text{Prompt:} \) \( \text{Question:} \)

\( \text{Additional Instruction:} \) \( \text{Note: There is no category of carcinoma in situ (pTIS)} \)

\( \text{Adapted organs include kidney, duodenum, great vessel, pancreas, and liver.} \)

\( \text{PTO: No evidence of primary tumor} \)

\( \text{pT1: Tumor } \leq \text{5 cm, in greatest dimension, no extra-adrenal invasion} \)

\( \text{pT2: Tumor } \geq 5 \text{ cm, no extra-adrenal invasion} \)

\( \text{pT3: Tumor of any size with local invasion, no invasion of adjacent organs} \)

\( \text{pT4:} \) \( \text{Any size, any local invasion, invasion of adjacent organs} \)

\( \text{PTNX: Tumor not assessed} \)

\( \text{PTX:} \) \( \text{Tumor cannot be determined} \)
<Question>
  <QuestionText>Primary Tumor (pT) ID="2137.100004300" order="342" name="Q_pT_2137">
    <ListField order="343" name="lf_2137_1"/>
    <List order="344" name="lst_2137_2">
      <DisplayedItem title="Note: There is no category of carcinoma in situ (pTis) relative to carcinomas of the adrenal gland." ID="20894.100004300" order="345" name="DL_20894">
        <Property val="{no text}" order="346" propName="reportText" name="p_rptTxt_20894_1" />
      </DisplayedItem>
      <ListItem title="pTX: Primary tumor cannot be assessed" ID="2142.100004300" order="347" name="LI_pTX_2142">
        <Property val="pTX" order="348" propName="reportText" name="p_rptTxt_2142_1" />
      </ListItem>
      <ListItem title="pT0: No evidence of primary tumor" ID="20889.100004300" order="349" name="LI_pT0_20889">
        <Property val="pT0" order="350" propName="reportText" name="p_rptTxt_20889_1" />
      </ListItem>
      <ListItem title="pT1: Tumor \&lt;= 5 cm in greatest dimension, no extra-adrenal invasion" ID="2138.100004300" order="351" name="LI_pT1_2138" selected="true">
        <Property val="pT1" order="352" propName="reportText" name="p_rptTxt_2138_1" />
      </ListItem>
      <ListItem title="pT2: Tumor \&gt; 5 cm, no extra-adrenal invasion" ID="2139.100004300" order="353" name="LI_pT2_2139">
        <Property val="pT2" order="354" propName="reportText" name="p_rptTxt_2139_1" />
      </ListItem>
      <ListItem title="pT3: Tumor of any size with local invasion, but not invading adjacent organs" ID="2140.100004300" order="355" name="LI_pT3_2140">
        <Property val="pT3" order="356" propName="reportText" name="p_rptTxt_2140_1" />
      </ListItem>
      <ListItem title="pT4: Tumor of any size with invasion of adjacent organs (kidney, diaphragm, pancreas, spleen, or liver) or large blood vessels (renal vein or vena cava)" ID="2141.100004300" order="357" name="LI_pT4_2141">
        <Property val="pT4" order="358" propName="reportText" name="p_rptTxt_2141_1" />
      </ListItem>
    </List>
  </ListField>
</Question>
Report Output

Primary Tumor (pT): pT1
• The eCC unique IDs (previously “c-keys”) are not impacted by move to SDC

• Mapping to SNOMED in process
  – Dr. Scott Campbell – University of Nebraska
QA Issues Related to New SDC-XML Format

• The sheer volume of templates for the release: all 100 new and active templates needed to be rendered in SDC-XML format
• Needed to work in parallel with both enh-XML and SDC-XML files generated for these templates
• Full QA performed using our existing enh-XML QA tools and procedures on enh-XML template files
• QA for SDC-XML files centered on ascertaining that the correct metadata and attributes were present and that they matched those of previously released enh-XML files
• Any Vendors planning on using a generic SDC form filler?
• Needed for auto pTMN and enforcing internal consistency

• SDC Rule specifications still under development

• Currently subject to translation to vendors systems

• Auto-Staging (Stage Group)
Rules: Metadata approach

- **SelectionTest**
  - Type: RuleSelectionTestBoolType
  - This declarative rule specifies a set of ListItems that cannot be selected (@listItemNames) when a test ListItem...

- **SingleSelectionSet**
  - Type: RuleSingleSelectionSetsBoolType
  - NEW: This declarative rule restricts combinations of co-selected ListItems (answers). In other words, only zero or one...

- **AutoSelection**
  - Type: RuleAutoSelectType
  - Base Type: ExtensionBaseType
  - This declarative rule determines when target ListItems should be selected or unselected. The rule may optionally...

- **MinMaxSelectionSet**
  - Type: RuleSelectionSetsBoolType
  - NEW: This declarative rule restricts combinations of co-selected ListItems (answers). In the default case, where...
Secondary Uses

- Registries
- Public Health
- Quality
SDC Resources

- IHE SDC website
- Github IHE-SDC-WG - IHE SDC Schema files
SDC/eCC Resources

**eCC Resources**

- CAP 2019 eCC Release files
  - **IHE SDC Technical Reference Guide**
  - Provided XSLT and CSS files to allow examination of the eCC templates with current web browser – toggle items such as IDs

- If your site has an eCC license you can request access by email:
  - capecc@cap.org
eCC Resources

- eCC XML Comparator Tool
CAP/CDC SDC Collaborative Agreement Team (2018)

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It Takes a Great Team!

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Questions? Comments?