Proposed Simplification Process

Reston, VA | February 20, 2009

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HITSP Foundations Framework Committee
Accompanying this Presentation are two Spreadsheets:

- 090211HITSP-Foundations-Simplification-Y1-Biosurveillance.xls
  - Example using ONC/AHIC Year 1 Biosurveillance Use Case
  - Includes Tab-oriented references denoted by the dark red box in upper right corner of select slides

- 090211HITSP-Foundations-Simplification-UseCaseTemplate.xls
  - Blank template for your Use Case
Simplification Outline

• Introduction – Ideals and Objectives
• Simplification Strategy
  1. Correlate Health, Healthcare and its Information Currency
  2. Establish Common Conventions for Information Interchange
  3. Identify Commonalties, Repeat Patterns and supporting Services, Ready to Exploit
  4. Establish Libraries of Re-Usable Components, Ripe for Re-Use, and Auto-Generate Implementable Action Records
  5. Demonstrate Worksheet to capture Use Case details
  6. Employ HITSP Toolkit to Build It, Use It
• Conclusion
• Appendix
Simplification

Ideals

• Simple and sufficient
• Common – broadly applicable
• Concise – straight-forward
• Uniform – consistent, minimal variability
• Re-useable – recurrent, easily repurposed
• Standards-based
• End-to-end trust framework
  – To ensure continuous privacy and security protections
Simplification yields

Ready Adoption

- Make it universal, in common to all
- Make it technology, vendor and product neutral
- Make it easy to understand
- Make it easy to implement by small and large organizations alike
- Make it easy to bring to market
- Make it applicable to US and international

- Simplification Drives Adoption
HITSP Simplification

Objectives

• Identify and exploit commonalities broadly applicable
  – Across all ONC/AHIC Use Cases (circa 2006-09)
• Identify common
  – Patterns of real-world health and healthcare delivery, including process, actions (tasks), work flow, system functions
  – Information artifacts, including attributes & attribute aggregations
  – Patterns of information, including capture, retention and flow
  – Patterns of information protection, including privacy and security functions
• Promote path
  – From fragmented (disjoint, disparate)
  – To harmonized (common, uniform)
HITSP Simplification

Objectives, con’t

• Simplify development, contents and assimilation (awareness, comprehension and adoption) of HITSP Interoperability Specifications (ISs)
• Offer common (core) set of standards-based Services in the context of a services-based architecture
• Posit expanded scope of interoperability
  – From instant of interchange – Point-to-point with transient artifacts
  – To entire record lifecycle – End-to-end with persistent records
• Establish common record unit
  – Uniformly evidencing all Use Case Actions, and
  – Serving as the common currency of health information
HITSP Simplification

Objectives, con’t

• Maximize use and re-use of services, functionality, process and information artifacts, privacy and security protections
• Dramatically reduce HITSP resource needs by exploiting repeat patterns
• Offer HITSP toolkit allowing Stakeholders to
  – Compose their own Value/Use Cases
  – Re-purpose (localize) AHIC/NeHC and other Use Cases
  – Immediately assemble implementable standards-based services and functions, data/record containers (e.g., CDAr2), vocabulary and value sets
  – Sufficient to immediately implement their Scenarios
1a – Correlate Health, Healthcare, Information Currency

Information in Action

- **INFORMATION**: All health and healthcare information derives from, or is attributable to, a discrete Action

- **ACTIONS**: Actions are taken to support an individual’s health and to effect healthcare delivery
  - Corollary – Healthcare is the sum of all Actions taken to ensure its safe and effective delivery

- **CONTEXT**: The essential context of health and healthcare information is indivisible from its originating Action:
  - Who, What, When, Where
1a – Correlate Health, Healthcare, Information Currency

Action, Action Record

• An Action is taken, i.e.,
  – A Task or Procedure is performed; or
  – A Service is provided or rendered.

• A record is initiated, documenting Action facts, findings and observations.

• The resulting Action Record may be:
  – Retained; and/or
  – Interchanged (in whole or in part); and/or
  – Maintained and persisted.
1a – Correlate Health, Healthcare, Information Currency…

Action, Action Record, con’t

- Occurs Action
  - Is Documented Action Record
    - May be...
      - Retained Action Record
      - Interchanged Action Record
      - Maintained & Persisted Action Record
        - In Whole Full Record or In Part Record Extract
### 1a – Correlate Health, Healthcare, Information Currency…

## Actions, Action Records

<table>
<thead>
<tr>
<th>Actions…</th>
<th>Action Records…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are acts, tasks, procedures, or services</td>
<td>• Document (provide evidence of) each Action taken</td>
</tr>
<tr>
<td>Are taken in:</td>
<td>• May be entries in a persistent datastore (e.g., EHR or PHR)</td>
</tr>
<tr>
<td>• Support of individual health</td>
<td>• Are a common information currency for health/healthcare</td>
</tr>
<tr>
<td>• Provision of healthcare</td>
<td></td>
</tr>
<tr>
<td>• Public Health</td>
<td></td>
</tr>
<tr>
<td>Have chronology of occurrence</td>
<td>Have a corresponding chronology</td>
</tr>
<tr>
<td>Are a common unit of service in health/healthcare</td>
<td>Are a common and corresponding unit of record in health/healthcare</td>
</tr>
<tr>
<td>Have a context – who, what, when, where</td>
<td>Record/document Action context</td>
</tr>
</tbody>
</table>
1b – Apply Correlation to
ONC/AHIC/HITSP Use Cases

Use Case

Has one or more

Scenario(s)

Has one or more

Event(s)

Has one or more

Action(s)

Granularity
COARSE

FINE

Reference Tab
“Use Case”
Columns A-B

Use Case

Has one or more

Scenario(s)

Has one or more

Event(s)

Has one or more

Action(s)
1b – Apply Correlation to Use Cases

Actions, Set(s) of Actions

• Actions occur at leaf level of each Use Case.
• All Use Cases resolve to the set (and sequence) of Actions necessary to fulfill (satisfy, complete) each Scenario.
2 – Establish Common Conventions for Information Interchange

• System Actors (simplified to)
  – Source, sender
  – Receiver

• Interchange Patterns (simplified to)
  – Push: publish, subscribe
  – Pull: query/locate, retrieve
3a – Analyze & Identify Use Case Commonalities

Repeat Patterns and Services

• Assert, as statements of fact, **Use Case commonalities**, focused on:
  – Use Cases and Actions: process, work flow, tasks
  – Attributes: data content
  – Action Records: common currency, common container
  – Record Interchange: exchange, information flow
  – Privacy and Security: trust and protection
• From asserted commonalities, identify **repeat patterns as the basis for re-use**.
• From identified patterns, identify the set of applicable and re-usable services.
3a – Analyze and Identify Commonalties…

Example

- **Commonalty Assertion (RI-A2):** Action Record(s) may be interchanged based on:
  - Subscribe criteria
  - Pre-configured (hard-coded rules) or
  - Ad hoc query criteria

- **Repeat Pattern (RI-P1):**
  - Push/publish record(s), triggered by Subscribe criteria
  - Push/publish record(s), triggered by pre-configured rules
  - Respond w/record(s), triggered by Query, based on Query criteria

- **Supporting Services (S11):** Record Transactional Services
  - Push: Subscribe, Publish
  - Pull: Query/Locate, Retrieve
### 3b – Identify Core Services

**Transactional and Persistence**

#### Transactional Services
- Support Record Interchange
- Traditional HITSP Scope

- Push: Subscribe, Publish*
- Pull: Query/Locate, Retrieve Record(s)*
- Record Envelope*
- Record Addressing*
- Authorization*
- Source Signature*
- Author Signature*
- Source/Author Authentication*
- Record Content Integrity*
- Sender/Receiver Authentication*
- Payload Encryption*

* NHIN/FHA Identified Services

#### Persistence Services
- Support Record Persistence
- Correspond to Record Lifecycle Events

- Originate Record
- Index Record*
- Register/Retain Record*
- Link Record to Identity*
- Amend Record
- Translate Record
- Verify Record
- Attest Record
- Access/Use Record
- Transmit/Receive Record
- De-identify, Alias, Re-Identify Record
- Archive Record(s)
- Lose or Destroy Record(s)
- Deprecate Record(s)
3b – Identify Core Services

Applicability of Services

- Occurs Action
  - Is Documented Action Record
    - May be...
      - Retained Action Record
      - Interchanged Action Record
      - Maintained & Persisted Action Record

- Services
  - Persistence
  - Transactional
  - Persistence
3c – Identify Services to Support

Action Record Lifecycle

• Establish Services to support Action Record Lifecycle Events (as invoked by Use Case Actions)
  – e.g., originate record, amend record, transmit record

• Lifecycle Event Reference: HL7 EHR Lifecycle Model

Reference Tab “Key”, Rows 10-24, Columns B-D
4 – Establish Libraries

• Establish Libraries (catalogs) of re-useable components
  – Use Cases, Actions: process components
  – Attributes, Action Records: data components

• Establish
  – Public Libraries– open to all stakeholders, allowing all entries
  – Harmonized Libraries – authority managed, allowing only consensus or mandated entries
4a – Establish Libraries for Attributes

- Attributes are data elements, items or values
- Attributes may be atomic elements or aggregations (e.g., templates or archetypes)
- Attribute properties include: ID, name, description, data type, range, format, units of measure, coding scheme, value set, etc.
- Stakeholders are encouraged to select harmonized Attributes before creating their own variant

<table>
<thead>
<tr>
<th>Open Public Library</th>
<th>Harmonized Library</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entries instantiate current clinical and business practice</td>
<td>Entries are registered upon:</td>
</tr>
<tr>
<td></td>
<td>• Industry consensus agreement</td>
</tr>
<tr>
<td></td>
<td>• Authority mandate</td>
</tr>
<tr>
<td>Open to All Stakeholders to register, update, lookup</td>
<td>• Authorities may register, update</td>
</tr>
<tr>
<td></td>
<td>• All Stakeholders may lookup</td>
</tr>
</tbody>
</table>
4b – Establish Libraries for

**Actions, Action Records**

- Actions are acts, tasks, procedures or services performed/provided
- Each Action may have a corresponding Action Record
- Action Records are specified with Attributes selected from Attribute Library
- Stakeholders are encouraged to select harmonized Actions before creating their own variant

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<td>Open to All Stakeholders to register, update, lookup</td>
<td>- Authorities may register, update</td>
</tr>
<tr>
<td></td>
<td>- All Stakeholders may lookup</td>
</tr>
</tbody>
</table>

Reference Tab “Libraries”
4c – Establish Library for Use Cases

• Open to All Stakeholders
• Stakeholders may
  – Compose Value/Use Cases for their immediate purposes, instantiating their Current Clinical and Business Practices
  – Compose Value/Use Cases for submission to NeHC
  – Re-purpose (or localize) AHIC, NeHC and other Value/Use Cases
Potential Role of SDOs

- **Attribute Libraries**
  - Open Public
  - Harmonized

- **Action Libraries**
  - Open Public
  - Harmonized

- **Libraries may be initialized with previously agreed entries**

1. Identify commonalties in registered Attributes
2. Harmonize many to one (or small set)
3. Register upon consensus agreement

1. Identify commonalties in registered Actions
2. Harmonize many to one (or small set)
3. Register upon consensus agreement

4 – Sidelight

Reference Tab
“Libraries”
4d – Auto-Generate

Implementable Action Record

• Auto-Generate, from specification of Use Cases Actions and related Action Records, a standards-based “container” (e.g., CDAr2)
  – Record Header – Action context (meta-data) attributes – common to all Actions
  – Record Body – Action facts, findings and observations

• For example:
  – Action = Vital Signs
  – Record Header = who, what, when, where
  – Record Body = blood pressure, heart rate, respiratory rate, temperature…
5 – Demonstrate

Use Case Worksheet

• Enumerate Use Case Scenarios, Events, Actions
• Per Action:
  – Link to Action in Action Library
  – Establish relationship with Action Record: none, 1, 2 or more Action Records per Action
  – Identify Action data and Action Record content, link to Action Record Library
  – Identify Record lifecycle events (and/or Services) invoked, if any
    • Orchestrate Services resulting from Action, if applicable
  – Identify data input to, and data output resulting from, Action
  – Identify System functions likely invoked by Action
    • Reference HL7 EHR and PHR System Functional Models
  – Identify Actors, including interchange from/to, where applicable
  – Specify pre- and post-conditions and assumptions, if any
## Transition Strategy

### 1st, 2nd, 3rd Generation

<table>
<thead>
<tr>
<th>Action Record</th>
<th>1G 80s to Now</th>
<th>2G Next</th>
<th>3G Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>External to System architecture</td>
<td>Native to System architecture</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interchange Scheme</th>
<th>1G 80s to Now</th>
<th>2G Next</th>
<th>3G Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Often Customized Point to Point</td>
<td>Uniform (Back) End-to-End</td>
<td>Uniform (Front) End-to-End</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transient Artifacts (e.g., messages)</th>
<th>1G 80s to Now</th>
<th>2G Next</th>
<th>3G Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transient Action Records</td>
<td>Uniform (Back) End-to-End</td>
<td>Persistent Action Records</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Record originated at System</th>
<th>1G 80s to Now</th>
<th>2G Next</th>
<th>3G Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back-end interface, ready to transmit</td>
<td>Back-end interface, ready to transmit</td>
<td>Front-end – often at point of care or service</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Digitally Signed by</th>
<th>1G 80s to Now</th>
<th>2G Next</th>
<th>3G Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>Sending System</td>
<td>Originating Author and System</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Authenticate-able (traceable) to</th>
<th>1G 80s to Now</th>
<th>2G Next</th>
<th>3G Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>Sending System</td>
<td>Originating Author and System</td>
<td></td>
</tr>
</tbody>
</table>
Transition Strategy

External to Native

Record Flow

2G
Source/Sending EHRS/PHRS/App
Proprietary Record

External Transient Action Record

Receiving EHRS/PHRS/App
Proprietary Record

3G
Source/Sending EHRS/PHRS/App
Native Persistent Action Record

Receiving EHRS/PHRS/App
Native Persistent Action Record
## Transition Strategy

### Record Flow

<table>
<thead>
<tr>
<th>Source/Sender</th>
<th>Receiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front-end (User Interface)</td>
<td>Internal</td>
</tr>
<tr>
<td>Origination, Authorship</td>
<td>Retention</td>
</tr>
</tbody>
</table>

### Record Flow

#### 2G

<table>
<thead>
<tr>
<th>Proprietary</th>
<th>Proprietary</th>
<th>Transformed to Standard</th>
<th>Transformed from Standard</th>
<th>Proprietary</th>
<th>Proprietary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action Record</td>
<td>Action Record</td>
<td>Action Record</td>
<td>Action Record</td>
<td>Action Record</td>
<td>Action Record</td>
</tr>
</tbody>
</table>

#### 3G

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Action Record</td>
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<td>Action Record</td>
<td>Action Record</td>
<td>Action Record</td>
</tr>
</tbody>
</table>
6 – Build It, Use It

Developer’s Toolkit

• Use Case Worksheet (as previously described)
• Browser for Open Public and Harmonized Registries
  – Value/Use Case Registry
  – Action, Action Record and Attribute Registries
  – Services
• Value/Use Case Composer
  – Select* or create Use Cases, Scenarios and/or Events
  – Select* or create Actions within each Event
  – Select* or create Attributes for each Action
  – Select* or compose Action Records (incorporating Attributes)
  – Select* or generate implementable Action Record
  * Select from Library entries (preferred)
6 – Build It, Use It

Developer’s Toolkit, con’t

- Assemble applicable Action Records for each Use Case Scenario planned for implementation
- If Service Oriented, assemble appropriate Services
  - Select from Transactional, for record interchange
  - Select from Persistence, for records management and retention
- If not, assemble equivalent application software
- If 2G, select or build software adapter to
  - Pack Action Record (as source/sender) to transmit
  - Unpack Action Record (as receiver) upon receipt
Conclusions
This Proposal...

• Establishes a few simple conventions – broadly applied
  – Health, Healthcare and its information currency
  – Action, Action Record (common unit of service, common unit of record, common currency)
  – Sender/source and receiver Actors
  – Push and Pull Interchange Patterns

• Logically extends interoperability from instant of interchange (point to point with transient messages) to full record lifespan (end-to-end persistent health records)

• Applies uniform standards foundation to the origination, retention, interchange, access/use and protection of health and healthcare information

• Identifies and exploits commonalities and repeat patterns
Conclusions, con’t

This Proposal…

• Relies on a small set of Core Services – many already in place
• Employs libraries of re-usable process and data components
• Offers a developer’s toolkit – making it easy to build, use and re-use
  – One-stop self-service Value/Use Case specification
  – Auto-generated data containers – standards-based
• Promotes standards-based transition from current information practices (fragmented, disparate) to harmonized (whole, uniform)
• Shows how true standards harmonization maximizes commonalty and uniformity to A REDUCIBLY SMALL SET of core standards
• Offers a path to build out 10s and 100s of Use Cases THIS YEAR
• Maximizes economies of scale, minimizes HITSP resource needs
# Terms and Acronyms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>AHIC</td>
<td>American Health Information Community</td>
</tr>
<tr>
<td>CDAr2</td>
<td>HL7 Clinical Document Architecture, Release 2</td>
</tr>
<tr>
<td>DSTU</td>
<td>Draft Standard for Trial Use</td>
</tr>
<tr>
<td>EHR, EHRS</td>
<td>Electronic Health Record, EHR System</td>
</tr>
<tr>
<td>FHA</td>
<td>US Federal Health Architecture Group</td>
</tr>
<tr>
<td>HIT</td>
<td>Health Information Technology</td>
</tr>
<tr>
<td>HITSP</td>
<td>ANSI Health Information Technology Standards Panel</td>
</tr>
<tr>
<td>HL7</td>
<td>Health Level Seven, an ANSI Accredited SDO</td>
</tr>
<tr>
<td>NHIN</td>
<td>US Nationwide Health Information Network</td>
</tr>
<tr>
<td>NeHC</td>
<td>US National eHealth Collaborative (AHIC Successor)</td>
</tr>
<tr>
<td>ONC</td>
<td>US Office of the National Coordinator for HIT</td>
</tr>
<tr>
<td>PHR, PHRS</td>
<td>Personal Health Record, PHR System</td>
</tr>
<tr>
<td>SDO</td>
<td>Standards Developing Organization</td>
</tr>
</tbody>
</table>
Key References

• HL7 Clinical Document Architecture, Release 2 (2005)
• HL7 EHRS Functional Model (Mar 2007)
• HL7 PHRS Functional Model DSTU (Nov 2008)
• HL7 EHR Interoperability Model DSTU (Mar 2007)
• HL7 EHR Lifecycle Model DSTU (Jan 2008)
• NHIN/FHA Core Services (Dec 2008)
• ONC/AHIC Use Cases x 14 (2006-09)
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