US Office of National Coordinator
Standards and Interoperability (S&I) Framework

S&I Simplification Work Group

Overview Presentation

Gary L. Dickinson

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Quick History

2005-2009	AHIC, ANSI HITSP • 17 Use Cases, each siloed, but lessons were learned
2011	• Meaningful Use Stage 1 Begins • Standards and Interoperability (S&I) Framework Starts • S&I Simplification Gets Underway with Data Element Sets (DES) • Engaged with AHRQ, initiated Component Repository – US Health Information Knowledgebase (USHIK)
2012	• Common Element Data Dictionary (CEDD) supersedes DESs • Engaged with National Institute for Standards and Technology (NIST)
2013	• Federal Health Information Model (FHIM) supersedes CEDD • UCAT Prototype development starts: Prometheus and Sparx
2014	• Meaningful Use Stage 2 Begins • UCATs Maturing, NIST Tools in Development • ISO 19669 Approved as New Work Item by ISO TC215 – *Re-Usable Component Strategy for Use Case Development* • Emerging Interests beyond S&I…

Key Elements of Simplification

- To identify a set of Core Components broadly applicable to, and *re-usable* in subsequent specification of, Use Cases
  - Core Components are Requirements, Events, Actions, Actors, Roles and Data Objects and Elements, that we:
    - Find in common across Use Cases, Scenarios and Events;
    - Might re-use in a new Use Case Scenario.
- To establish/maintain a Core Component Registry
- To allow each Use Case Initiative to
  - Select (re-use) Core Components applicable to their needs
  - Create anew: identify new Core Component candidates
- To identify Implementable Data and Software Constructs fulfilling Core Component requirements

Key Objectives

- To lay the foundation for a consistent infrastructure and build-out
- To lead to uniformity in requirement specification, standards and implementation guidance, software development, testing and certification, implementation
- To ensure requirements traceability, at each progression step, and end-to-end (use case to implementation)
- [NIST] To apply cross-industry: beyond S&I Framework, beyond the domain of health and healthcare
  - A generic approach

S&I Simplification WG

Compiled and Distilled Components from S&I Initiatives

Current Analysis Status:
19 Use Cases with 41 Multi-Step Scenarios

S&I Simplification - Analysis Status - 1 July 2014 - Core Matrix Version 3.1 DRAFT
Incorporation of Use Case Initiatives in S&I Simplification Core Matrix

Initiative	Initial Analysis Phase - Core Matrix					FHIM	AHRQ	Consensus Core Matrix
	Analysis Type	Common Requirements	Common Actors, Systems, Roles	Scenarios, Event Steps	Common Actions	Common Data Objects, Elements	US Health Information Knowledgebase	
Transitions of Care (TOC)	Retro	COMPLETE	COMPLETE	COMPLETE	COMPLETE	FHIM Mapping in Progress	REGISTERED	v1
Lab Results Interface (LRI)								
Longitudinal Coordination of Care (LCC) 1								v2.1
LCC 2		In Progress						TBD
Lab Orders Interface (LOI)		COMPLETE	COMPLETE	COMPLETE	COMPLETE	FHIM Mapping in Progress	REGISTERED	v2.1
Provider Directory (PD) - Digital Certificate								
PD - Electronic Address								
esMD 1 - Electronic Submission of Medical Documentation, Provider Profiles Authentication								
esMD 2 - Structured Content of Electronic Medical Documentation Request (eMDR)								
esMD 3 - Author of Record Level 1	Concurrent						Awaiting Tooling	v3
esMD 3 - Author of Record Level 2	Retro							
esMD 3 - Author of Record Level 3	TBD	Future						
Query Health (QH)	Retro	COMPLETE	COMPLETE	COMPLETE	COMPLETE	FHIM Mapping in Progress	REGISTERED	v2.1
Data Segmentation for Privacy (DS4P)								
Public Health Reporting (PHRI)								
HeD 1 - Health eDecisions - Clinical Decision Support (CDS) Artifact Sharing							Awaiting Tooling	v3
HeD 2 - CDS Guidance Service								
Structured Data Capture								
EU/US eHealth Initiative	Concurrent							
DAF 1 - Data Access Framework - Local Access	Retro							
DAF 2 - Targeted Access								
Data Provenance	Concurrent	In Progress						TBD
RESTful Health Exchange (RHEx)	TBD	TBD						
Automated Blue Button								
Electronic Certificate		N/A				In Progress	REGISTERED	N/A

Considering…

- Which Components of a Use Case are:
  - Potentially computable?
    - As implementable software and/or data objects?
  - Uniquely identifiable? Catalogue-able?
    - In an established repository?
  - Candidates for re-use?
    - In another Use Case scenario?

Component Candidates

Components selected from S&I Initiative Use Cases ↓	Is it…			Potentially Computable for…											
	In Common?	Re-Usable?	Computable?	Identity	Accountability	Permission, Consent	Access, Data Use	Performance/ Fulfillment	Capture, Provenance	Content: Struct/Instruct	Coding, Classification	Completeness	Signature	Audit
Requirements	Y	Y	Y		•			•						
Actors, Roles	Y	Y	Y	•	•	•	•	•				•	•	•
Scenarios, Events, Actions	Y	Y	Y	•	•	•	•	•				•	•	•
				→ As standards-based software services										
Data Objects, Elements	Y	Y	Y		•	•	•		•	•	•	•	•	•
				→ As standards-based data objects, messages, documents…										

Analysis Focus

- Requirements
- Actors and Roles
  - Individuals, Organizations, Systems
- Scenarios
- Events and Actions
- Data Objects and Elements

Use Case Requirements Template

(LINK to S&I UCR Template)

- Starting Point for S&I Initiative Use Cases
- S&I Use Case Requirements Template is:
  - A Word document, completed by each Initiative
  - A consistent pattern, evolving over past 3+ years
  - Consensus approved at end of UCR Phase (I)
  - Starting Point for S&I Harmonization Phase (II)
  - Starting Point for S&I Simplification Retrospective Use Case Analysis
  - Fully represented in Use Case Authoring Tool (UCAT)

Common Requirements Analysis

(LINK to S&I Simplification – Requirements Analysis Worksheet)

- Use Case Requirements (from UCR Template)
  - Assumptions
  - Pre-Conditions
  - Post-Conditions
  - System Functional Requirements
- Raw Requirements
  - Duplicate discovery
  - Fulfillment: Pre, During or Post Use Case Scenario
  - Traceability: to Fulfilling Use Case Scenario/Event/Action
  - Re-Use: Requirements, Actions
  - Restatement of Requirement

Common Actions

S&I Simplification WG has identified a set of 36 Common Actions used and re-usable across Use Cases. Actions fall into these categories:

- Identity: Patient, Practitioner, Organization
- Consistent Time
- Data Access Permissions
- Access Control
- Audit
- Query
- Encryption, Decryption
- Signatures: Individual, System
- Exchange: Transmit, Receive
- Registration, Admission, Discharge, Transfer
- Clinical Summary
- Clinical Entries
- Record Lifecycle: Originate, Retain, Amend, Verify, Attest, Access/View, Extract, Translate, Transmit/Receive, De-Identify…

Common Actions

- Next Two Slides – Show a condensed version of the S&I Simplification Common Actions (L→R by column)
  A. Action Category
  B. Action ID
  C. Action Description
  D. Requirements Related to or Fulfilled by Action
  E. Data Requirements (partial)
  F. EHR-S Function ref: ISO/HL7 10781 EHR-S FM
  G. PHR-S Function ref: ISO/HL7 16527 PHR-S FM
  H. Is Action Auditable?
  I. Is Action typically Signed: by individual, system?

Common Actions from S&I Simplification Core Matrix v3.1

Action Category	Action ID	Action	Related Requirement(s)	Data Objects Note Re-Use across Multiple Actions	EHR System Functions (Ref: ISO/HL7 10781 EHRS Functional Model Release 2)	PHR System Functions (Ref: ISO/HL7 16527 PHRS Functional Model Release 1)	Action Auditable? (A.AUDIT)	Action Signed by… (A.SIGN)
Identity	A.ID.1	Identify, Authenticate Individual Patient	R3-R5, R15	DES101 Patient ID	TI.1.1 - Entity Authentication CPS.1.1 - Manage Patient Record CPS.1.2 - Manage Patient Demographics	PH.1.1, S.2.1, S.3.1, IN.1, IN.1.7, IN.3.1-4	Yes	N/A
	A.ID.2	Select Individual Patient					Yes	N/A
	A.ID.3	Identify, Authenticate Provider	R9-R11, R15	DES102 Individual Provider ID and/or DES103 Organizational Provider ID	TI.1.1 - Entity Authentication AS.1 - Manage Provider Information AS.1.1 - Manage Provider Registry or Directory AS.1.7 - Manage Practitioner/Patient Relationships RI.1.1.1-24.1 - Evidence of <Provider> in EHR Record Entry	S.1.2, S.1.3, IN.3.1-4	Yes	N/A
	A.ID.4	Select Provider					Yes	N/A
	A.ID.5	Identify System	R14	DES104 System ID	TI.1.1 - Entity Authentication CPS.2.8 - Support Medical Device Originated Data RI.1.1.1-24.1 - Evidence of <System> in EHR Record Entry TI.3 - Registry and Directory Services	IN.3.1-3, IN.3.5	Yes	N/A
	A.ID.6	Validate Identity Certificate	R8-R11	DES102 Individual Provider ID and/or DES103 Organizational Provider ID	<Not included in EHRS FM R2>	<Not included in PHRS FM R1>	Yes	N/A
Consistent Time	A.TIME	Reference Current Time	R1, R2, R12, R13	DES107 Consistent Time	RI.2 - Record Synchronization	PH.1.4, IN.1.1, IN.3.4	Yes	N/A
Data Access Permissions	A.PERMIT.1	Set Data Access Permissions, including Patient Consent	R2, R7, R15	DES105 Data Access Permissions	TI.1.2 - Entity Authorization CPS.1.7.3 - Manage Consents and Authorizations AS.2.6 - Manage Patient Privacy Consent Directives AS.3.2.1 - Manage Consents and Authorizations from a PHR RI.1.1.6-9 - Output/Disclose/Transmit/Receive Record Entry Content	S.3.3.1, S.7, IN.3.1, IN.3.8	Yes	N/A
	A.PERMIT.2	Determine/designate Scope of Data Access Permissions	R7, R7.1	DES105 Data Access Permissions			Yes	N/A
Access Control	A.ACCESS.1	Check User Data Access Permissions	R2, R2.1, R7, R15	DES102/DES103 Provider ID DES105 Data Access Permissions	TI.1.1 - Entity Authentication TI.1.2 - Entity Authorization TI.1.3 - Entity Access Control RI.1.1.5 - Access/View Record Entries	IN.3.1-4, IN.3.8	Yes	N/A
	A.ACCESS.2	Access/View Record, Document or Message	R1, R2, R3-7, R9-R15	Any/All		IN.3.1-3	Yes	N/A
Audit	A.AUDIT	Audit Action and/or Record Action	R1, R12-R17	DES108 Audit Parameters	RI.1.1.1-24.1 - Evidence of Record Entry Provenance and Accountability TI.2.1.1 - Record Entry Audit Triggers TI.2.1.2 - Security Audit Audit Triggers TI.2.1.3 - System Audit Triggers TI.2.1.4 - Clinical Audit Triggers	IN.1, IN.3-4		N/A
Query	A.QUERY	Query		Any/All	CPS.9.5 - Ad Hoc Query and Rendering POP.6.1 - Outcome Measures and Analysis POP.6.2 - Performance and Accountability Measures	PH.5.4, IN.2.1	Yes	N/A
Encrypt	A.ENCRYPT	Encrypt Record or Exchange Content		Any/All	RI.1.1.8 - Transmit Record Entry Content RI.1.1.9 - Receive Record Entry Content TI.1.6 - Secure Data Exchange TI.8 - Database Backup and Recovery	IN.3.5, IN.3.10		
De-Crypt	A.DECRYPT	Decrypt Record or Exchange Content		Any/All				
Signature	A.SIGN	Apply Signature	R8-R11, R13-R14	DES102 Individual Provider ID DES103 Organizational Provider ID DES104 System ID	RI.1.1.1 - Originate and Retain Record Entry RI.1.1.2 - Amend Record Entry Content RI.1.1.4 - Attest Record Entry Content TI.1.5 - Non-Repudiation	IN.3.4, IN.3.5, IN.3.7	Yes	N/A
Signature	A.DSig	Apply Digital Signature	R8-R11, R13-R14	DESxxx Individual Provider Digital ID DESxxx Organizational Provider Digital ID DESxxx System Digial ID	RI.1.1.1 - Originate and Retain Record Entry RI.1.1.2 - Amend Record Entry Content RI.1.1.4 - Attest Record Entry Content TI.1.5 - Non-Repudiation	IN.3.4, IN.3.5, IN.3.7	Yes	N/A
Signature	A.DSigV	Validate Digital Signature	R8-R11, R13-R14	DESxxx Individual Provider Digital ID DESxxx Organizational Provider Digital ID DESxxx System Digial ID	RI.1.1.1 - Originate and Retain Record Entry RI.1.1.2 - Amend Record Entry Content RI.1.1.4 - Attest Record Entry Content TI.1.5 - Non-Repudiation	IN.3.4, IN.3.5, IN.3.7	Yes	N/A

Common Actions from S&I Simplification Core Matrix v3.1

Action Category	Action ID	Action	Related Requirement(s)	Data Objects Note Re-Use across Multiple Actions	EHR System Functions (Ref: ISO/HL7 10781 EHRS Functional Model Release 2)	PHR System Functions (Ref: ISO/HL7 16527 PHRS Functional Model Release 1)	Action Auditable? (A.AUDIT)	Action Signed by… (A.SIGN)
Exchange	A.XFER.1	Transmit Record, Document or Message	R1.1-R14.1	Documents/Messages, containing DESs, as exchanged	RI.1.1.8 - Transmit Record Entry Content RI.1.1.9 - Receive Record Entry Content TI.1.6 - Secure Data Exchange TI.1.7 - Secure Data Routing TI.5 - Standards-Based Interoperability	IN.3.1-3, IN.3.5-6, IN.3.10	Yes	Sender/Source
	A.XFER.2	Receive Record, Document or Message					Yes	N/A
Acknowledgement	A.ACK	Acknowledgement		DES109 Acknowledgement information			Yes	N/A
Registration, Admission, Discharge	A.REG	Register Patient	R1, R3-R5, R8	DES101 Patient ID DES1 Personal Information DESxxx Other registration, admission and discharge information	CPS.1.1 - Manage Patient Record CPS.1.2 - Manage Patient Demographics CPS.1.5 - Manage Patient Encounter	PH.1.1	Yes	N/A
	A.IP.1	Admit Inpatient				N/A	Yes	N/A
	A.IP.2	Discharge Inpatient					Yes	N/A
	A.AP.1	Checkin Ambulatory Patient					Yes	N/A
	A.AP.2	Checkout Ambulatory Patient					Yes	N/A
Clinical Summary	A.REC.1-2	Compile/Retain - Clinical Summary	R1-R11, R14, R15	DES101 Patient ID DES102/DES103 Provider ID DES104 System ID DES105 Data Access Permissions DES1-DES37, as appropriate	[Refer to Specific Actions Re-Used - Col B.]	[Refer to Specific Actions Re-Used - Col B.]	Yes	Author/Source
	A.REC.3	Verify - Clinical Summary					Yes	Author/Source
	A.XFER.1	Transmit - Clinical Summary	R1.1-R14.1				Yes	Sender/Source
	A.XFER.2	Receive - Clinical Summary					Yes	N/A
	A.REC.2	Retain - Clinical Summary	R1-R14				Yes	N/A
	A.ACCESS.2	Access - View Clinical Summary	R2, R4-R15				Yes	N/A
Clinical	[See Clinical Summary Sequence]	Clinical Actions, for example: • Order(s) • History and Physical • Assessment • Reconcile medication list • Update problem list • Update care plan • Capture vital signs	R1, R3-R5, R8-R15	Any/All	Care Provision (CP) and Care Provision Support (CPS) Functions	Personal Health (PH) Functions	N/A	N/A
Record Lifecycle	A.REC.1	Originate	R1, R12, R13, R15-R17	Any/All	RI.1.1.1 - Originate and Retain Record Entry	IN.3.1-3, IN.4	Yes	Author/Source
	A.REC.2	Retain				IN.4	Yes	N/A
	A.REC.3	Verify			RI.1.1.4 - Attest Record Entry Content	IN.4	Yes	Author/Source
	A.REC.4	Attest				IN.3.1-3, IN.3.7, IN.4	Yes	Author/Source
	A.REC.5	Amend			RI.1.1.2 - Amend Record Entry Content	IN.4	Yes	Author/Source
	A.REC.6	De-Identify or Alias			RI.1.1.10 - De-identify Record Entries RI.1.1.11 - Pseudomynize Record Entries	PH.3.6.1, S.4.1.2, IN.1.4, IN.4	Yes	N/A
	A.REC.7	Re-Identify			RI.1.1.12 - Re-identify Record Entries	IN.1.4	Yes	N/A
	A.REC.8	Extract			RI.1.1.13 - Extract Record Entry Content	S.3.8, S.4.1.3, S.4.3, IN.1.4, IN.4	Yes	N/A
	A.REC.9	Translate			RI.1.1.3 - Translate Record Entry Content	IN.1.13	Yes	Author/Source Sender/Source
	A.REC.10	Output/Report			RI.1.1.6 - Output/Report Record Entry Content	PH.2.4, S.2.3-4, S.3.5, S.3.8, IN.4	Yes	Author/Source Sender/Source
	A.ACCESS.2	Access/View			[Refer to Specific Actions Re-Used - Col B.]	[Refer to Specific Actions Re-Used - Col B.]	Yes	N/A
	A.ENCRYPT	Encrypt					Yes	Sender/Source
	A.DECRYPT	Decrypt					Yes	Sender/Source
	A.XFER.1	Transmit, Disclose					Yes	Sender/Source
	A.XFER.2	Receive					Yes	N/A

Re-Use Examples

S&I Simplification Analysis

- Each S&I Use Case Scenario
  - Breaks down to Event Steps
- Each Event Step
  - Has an Actor (in Role)
  - Has Inputs and Outputs
  - Has Actions Taken (as examples)
- Each Action
  - Invokes EHR or other System Functions

Core Matrix

(LINK to Core Matrix Spreadsheet v3.1)

- Status – of S&I Simplification Initiative Analysis
- Key – Contents of All Tabs
- Assertions – Basis for Initial Requirements

* Common Requirements
* Common Actors
* Scenarios, Events – w/Action examples
* Common Actions
* Common Data Objects

* Re-usable Components

Scenario Events to Actions

- Next Slide – Shows condensed version of two S&I Transition of Care Scenarios (L→R by column)
  A. Event Step
  B. Actor
  C. Event Description
  D. Inputs
  E. Outputs
  F. Action Examples
  G and on. Action Repetition Tabulation

Light Blue Background - From S&I Use Case Initiative Scenarios
White Background - Added by Simplification Work Group for Illustration

(To show full Action Names, Unhide Rows 1, 2, 4.)

ACTION REPETITION EXAMPLE...

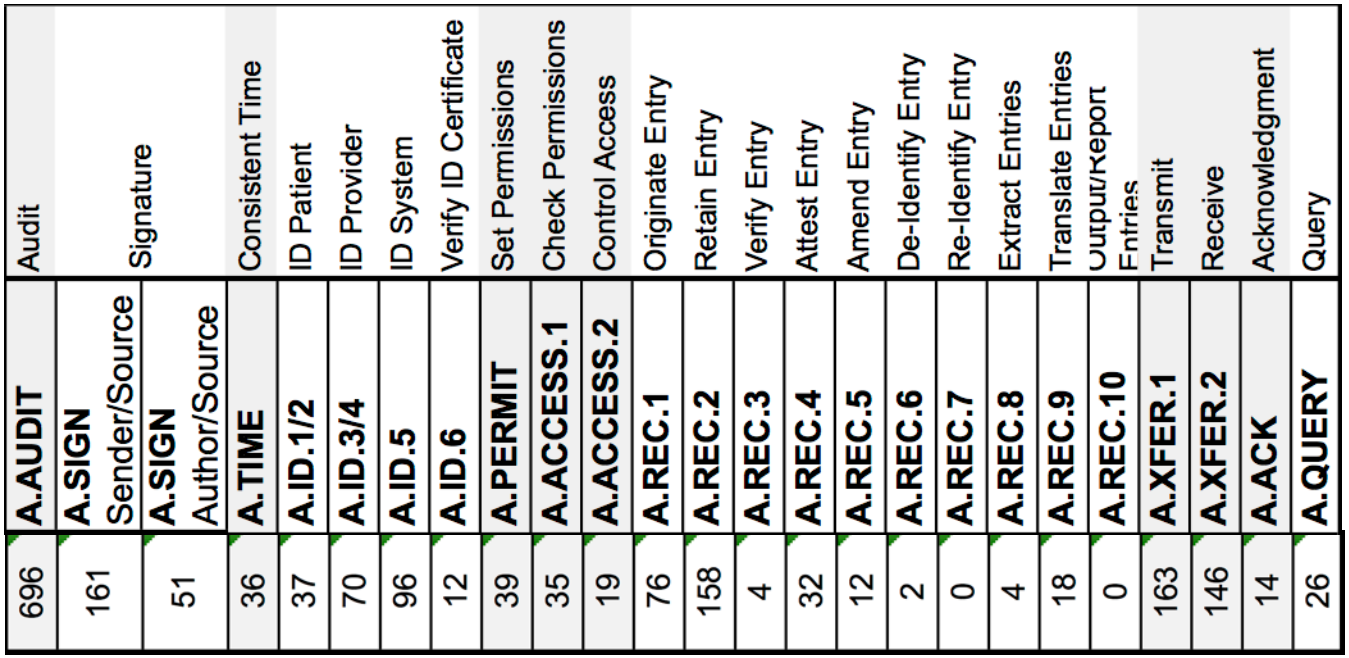
	Actor	Event/Description	Inputs	Outputs	Sample Action(s)	Audit	Signature		Consistent Time	ID Patient	ID Provider	ID System	Verify ID Certificate	Set Permissions	Check Permissions	Control Access	Originate Entry	Retain Entry	Verify Entry	Attest Entry	Amend Entry	De-identify Entry	Re-identify Entry	Extract Entries	Translate Entries	Transmit	Receive	Acknowledgment	Query
						A.AUDIT	A.SIGN	Sender/Source	A.SIGN	A.TIME	A.ID.1/2	A.ID.3/4	A.ID.5	A.ID.6	A.PERMIT	A.ACCESS.1	A.ACCESS.2	A.REC.1	A.REC.2	A.REC.3	A.REC.4	A.REC.5	A.REC.6	A.REC.7	A.REC.8	A.REC.9	A.XFER.1	A.XFER.2	A.ACK	A.QUERY
Transitions of Care (TOC) - Transitions of Care - Scenario 1A - Exchange of Discharge Summary to Support Transfer of Patient Information from One Provider to Another Provider																													
Pre	EHR System(s)	Reference/Set Consistent Time			Reference Consistent Time	X			X																				
1	Provider	Trigger Generation of Discharge Summary for Patient A	START	Discharge Instructions	Identify Patient, Provider, EHR System	X				X	X	X																	
					Originate/Attest/Retain - Discharge Summary	X		X									X	X		X									
					Set Data Access Permissions	X								X															
2	Hospital EHR System	Send Discharge summary to PCP's EHR System or other Provider EHR System	Discharge Instructions	Discharge Instructions	Transmit - Discharge Summary	X	X																		X			
3	PCP or other Provider EHR System	Receive Discharge Summary	Discharge Instructions	Discharge Instructions	Identify (EHR) System	X						X																
					Receive/Retain - Discharge Summary	X												X								X		
4	Provider	Trigger Generation of Discharge Summary for Patient A	Discharge Summary	Discharge Summary	Identify Patient, Provider, EHR System	X				X	X	X																
					Originate/Attest/Retain - Discharge Summary + Instructions	X		X									X	X		X									
					Set Data Access Permissions	X								X															
5	Hospital EHR System	Send Discharge summary to PCP's EHR System or other Provider Organization	Discharge Summary	Discharge Summary	Transmit - Discharge Summary + Instructions	X	X																		X			
6	PCP or other Provider EHR System	Receive Discharge Summary	Discharge Summary	Discharge Summary	Identify (EHR) System	X						X																
					Receive/Retain - Discharge Summary + Instructions	X												X								X		
7	Provider	View Discharge Summary/Instructions	Discharge Summary	END	Identify, Authenticate Provider	X					X																	
					Check User Data Access Permissions	X										X													
					Access/View - Discharge Summary + Instructions	X											X												
Transitions of Care (TOC) - Transitions of Care - Scenario 1B - Exchange of Clinical Summaries to Support Closed Loop Referral of Patient from One Provider to Another																													
Pre	EHR System(s)	Reference/Set Consistent Time			Reference Consistent Time	X			X																				
1	Provider	Trigger Generation of Consultation Request Clinical Summary for Patient A	START	Generated Consultation Request Clinical Summary	Identify Patient, Provider, EHR System	X				X	X	X																
					Originate/Attest/Retain - Clinical Summary	X		X									X	X		X									
					Verify - Clinical Summary	X		X											X										
					Set Data Access Permissions	X								X															
2	PCP EHR System	Send Consultation Request Clinical Summary to specialist's EHR System	Consultation Request Clinical Summary	Consultation Request Clinical Summary	Transmit - Clinical Summary	X	X																		X			
3	Specialist EHR System	Receive Consultation Request Clinical Summary from PCP's EHR System	Consultation Request Clinical Summary	Consultation Request Clinical Summary	Identify (EHR) System	X						X																
					Receive/Retain - Clinical Summary	X												X									X		
4	Provider	View Consultation Request Clinical Summary in specialist's EHR System	Consultation Request Clinical Summary	END	Identify Provider	X					X																	
					Check User Data Access Permissions	X									X														
					Access/View - Clinical Summary	X										X													
5	Provider	Trigger Generation of Consultation Summary for patient A	START	Generated Consultation Summary	Identify Patient, Provider EHR System	X				X	X	X																
					Originate/Attest/Retain - Consultation Summary	X		X									X	X		X									
6	Specialist EHR System	Send Consultation Summary to PCP's EHR System	Consultation Summary	Consultation Summary	Transmit - Consultation Summary	X	X																		X			
7	PCP EHR System	Receive Consultation Summary from specialist's EHR System	Consultation Summary	Consultation Summary	Identify (EHR) System	X																						
					Receive/Retain - Consultation Summary	X												X									X		
8	Provider	View Consultation Summary in PCP's EHR System	Consultation Summary	END	Identify, Authenticate Provider	X					X																	
					Check User Data Access Permissions	X									X														
					Access/View – Consultation Summary	X										X													

Analysis

- S&I Simplification Work Group has:
  - Analyzed 19 S&I Use Cases with 41 Scenarios
  - Specified Actions (examples) for each Scenario and Event Step
- Next Slide
  - Shows Repetition Counts for Action Examples

Potential Re-Use – Actions

Repetition Count →

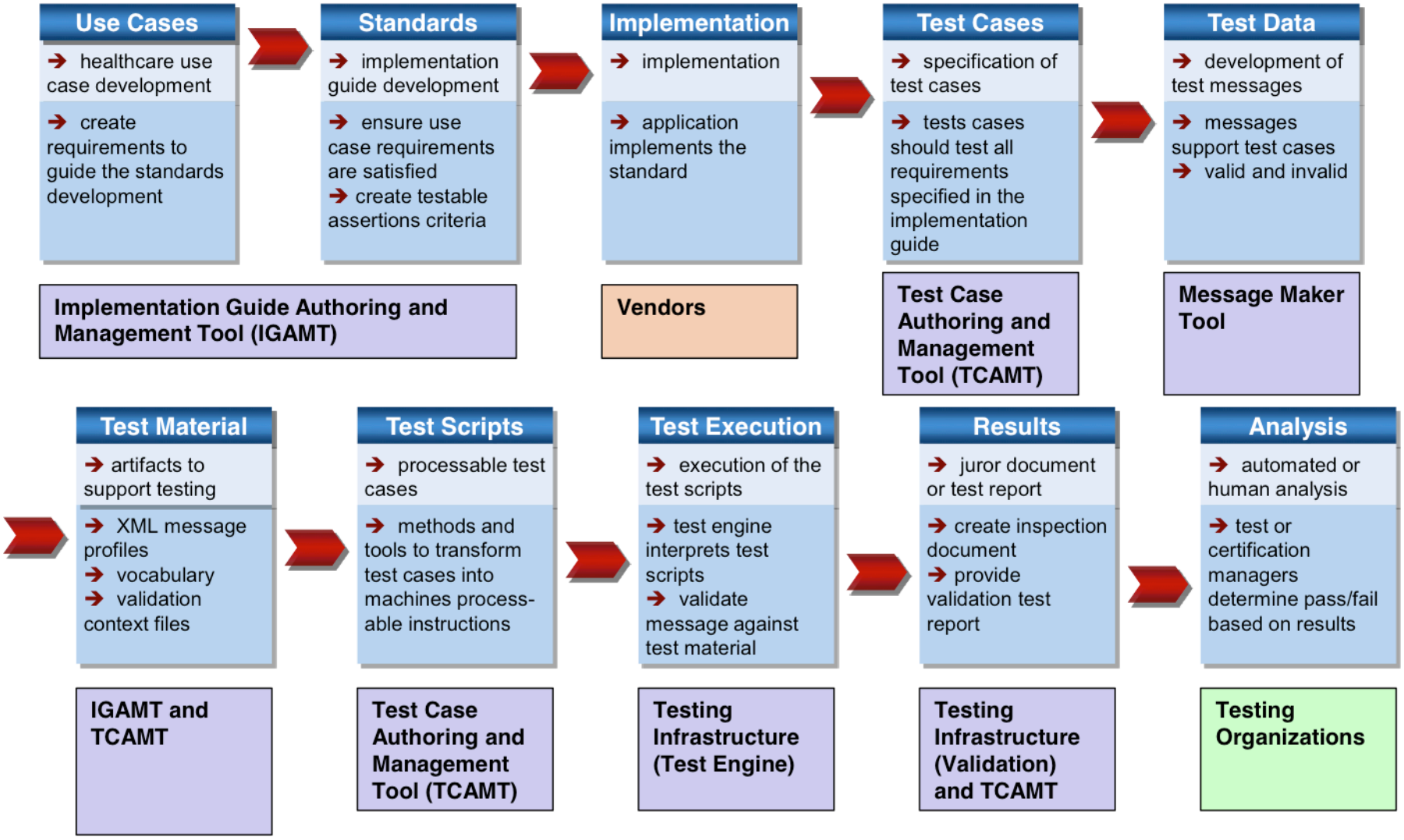


Repetition Count	Audit
696	**A.AUDIT**
161	**A.SIGN** Sender/Source
51	**A.SIGN** Author/Source
36	**A.TIME**
37	**A.ID.1/2**
70	**A.ID.3/4**
96	**A.ID.5**
12	**A.ID.6**
39	**A.PERMIT**
35	**A.ACCESS.1**
19	**A.ACCESS.2**
76	**A.REC.1**
158	**A.REC.2**
4	**A.REC.3**
32	**A.REC.4**
12	**A.REC.5**
2	**A.REC.6**
0	**A.REC.7**
4	**A.REC.8**
18	**A.REC.9**
0	**A.REC.10**
163	**A.XFER.1**
146	**A.XFER.2**
14	**A.ACK**
26	**A.QUERY**

Signature
Consistent Time
ID Patient
ID Provider
ID System
Verify ID Certificate
Set Permissions
Check Permissions
Control Access
Originate Entry
Retain Entry
Verify Entry
Attest Entry
Amend Entry
De-Identify Entry
Re-Identify Entry
Extract Entries
Translate Entries
Output/Report Entries
Transmit
Receive
Acknowledgment
Query

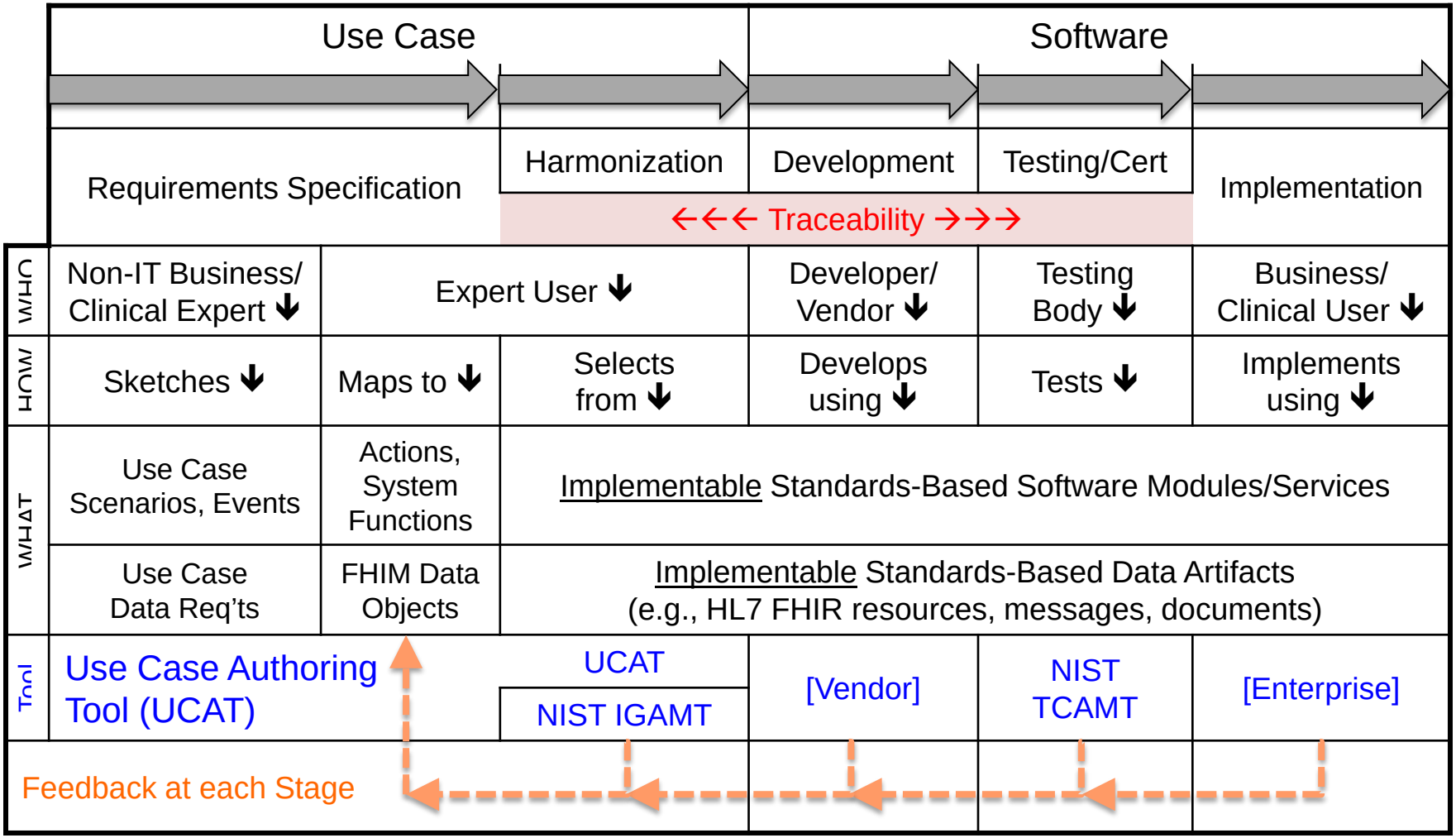
What will the tools address?

Source: Rob Snelick, NIST



Traceability – Anchored by Use Case Authoring Tool (UCAT)

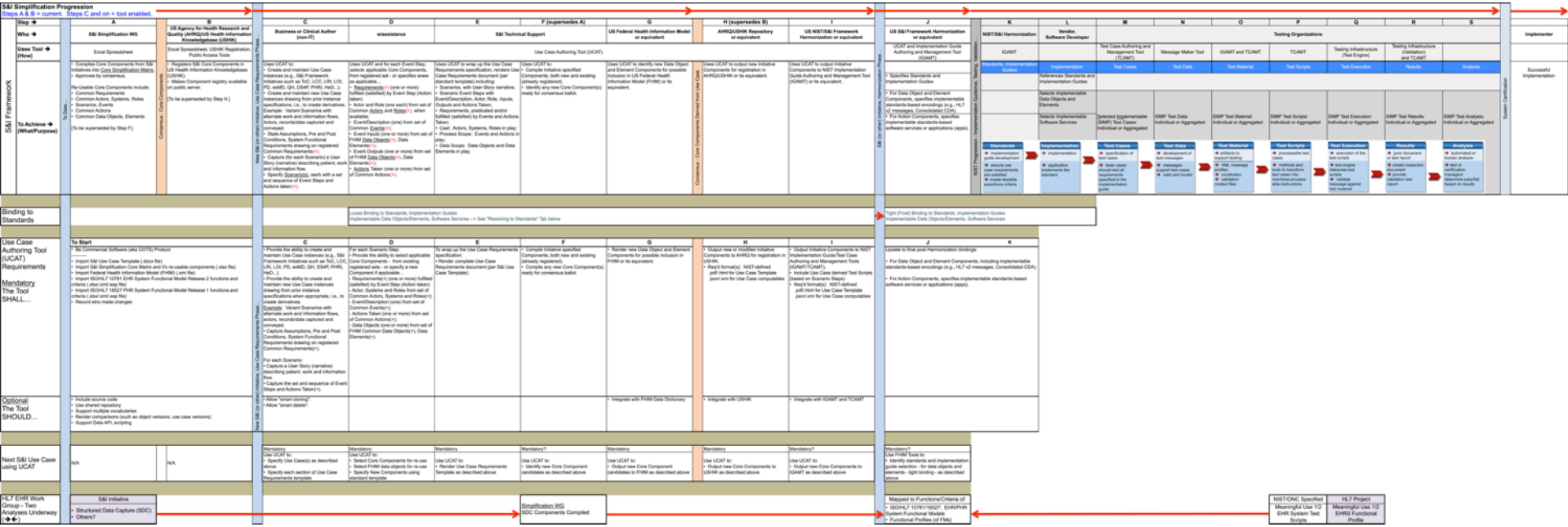
From Sketch to Implementation



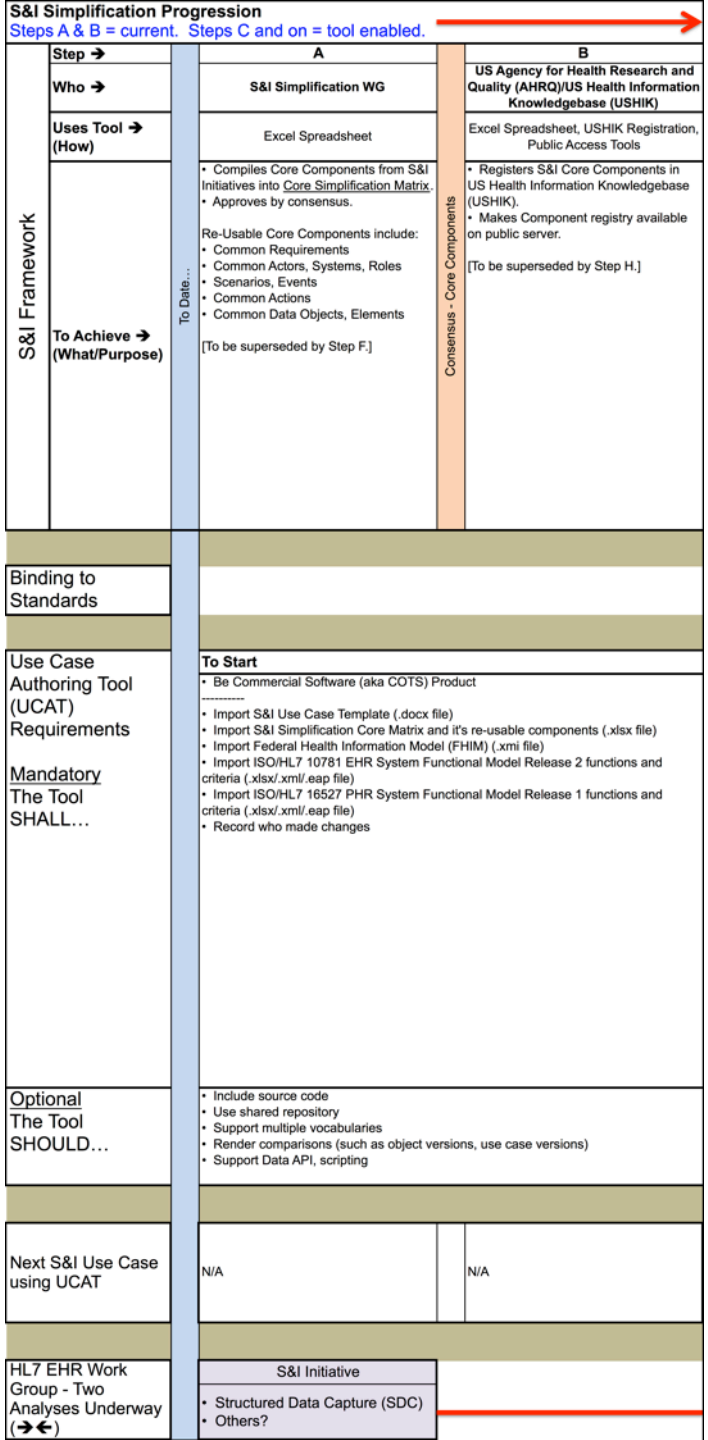
Progression

(LINK to Progression Spreadsheet)

- To Date (Steps A&B)
  - S&I Simplification + AHRQ
  - Core Matrix + USHIK Registry
- Going Forward (Steps C-S)
  - S&I Use Case Requirements Phase with Use Case Authoring Tool (UCAT)
  - S&I Use Case Harmonization Phase with NIST Tools
    - Standards Selection
    - Implementation Guide (Tools)
    - Testing (Tools)


S&I Simplification Progression
Steps A & B = current. Steps C and on = tool enabled.
S&I Framework
Step
Who
Uses Tool (How)
To Achieve (What/Purpose)
S&I Simplification WG
US Agency for Health Research and Quality (AHRQ)/US Health Information Knowledgebase (USHIK)
Business or Clinical Author (non-IT)
w/assistance
S&I Technical Support
US Federal Health Information Model or equivalent
AHRQ/USHIK Repository or equivalent
US NIST/S&I Framework Harmonization or equivalent
US S&I Framework Harmonization or equivalent
NIST/S&I Harmonization
Vendor, Software Developer
Testing Organizations
Implementer
Use Case Authoring Tool (UCAT)
Excel Spreadsheet
Excel Spreadsheet, USHIK Registration, Public Access Tools
UCAT and Implementation Guide Authoring and Management Tool (IGAMT)
IGAMT
Test Case Authoring and Management Tool (TCAMT)
Message Maker Tool
IGAMT and TCAMT
TCAMT
Testing Infrastructure (Test Engines)
Testing Infrastructure (Validation) and TCAMT
Standards, Implementation Guides
Implementation
Test Cases
Test Data
Test Material
Test Scripts
Test Execution
Results
Analysis
Successful Implementation
Binding to Standards
Loose Binding to Standards, Implementation Guides
Implementable Data Objects/Elements, Software Services --> See "Resolving to Standards" Tab below
Tight (Final) Binding to Standards, Implementation Guides
Implementable Data Objects/Elements, Software Services
Use Case Authoring Tool (UCAT) Requirements
To Start
Mandatory
The Tool SHALL...
Optional
The Tool SHOULD...
Next S&I Use Case using UCAT
HL7 EHR Work Group - Two Analyses Underway
S&I Initiative
Structured Data Capture (SDC)
Others?
Simplification WG
SDC Components Compiled
Mapped to Functions/Criteria of:
ISO/HL7 10781/16527: EHR/PHR System Functional Models
Functional Profiles (of FMs)
NIST/ONC Specified
Meaningful Use 1/2 EHR System Test Scripts
HL7 Project
Meaningful Use 1/2 EHRS Functional Profile

Steps A-B – Pre-Use Case Authoring Tool (UCAT)



Steps C-I – Use Case Authoring Tool (UCAT) Enabled

New S&I (or other) Initiative, Use Case Requirements Phase…

C	D	E	F (supersedes A)	G		H (supersedes B)	I
Business or Clinical Author (non-IT)	**w/assistance**	**S&I Technical Support**		**US Federal Health Information Model or equivalent**		**AHRQ/USHIK Repository or equivalent**	**US NIST/S&I Framework Harmonization or equivalent**
Use Case Authoring Tool (UCAT)							
Uses UCAT to: • Create and maintain Use Case instances (e.g., S&I Framework Initiatives such as ToC, LCC, LRI, LOI, PD, esMD, QH, DS4P, PHRI, HeD...). • Create and maintain new Use Case instances drawing from prior instance specifications, i.e., to create derivatives. Example: Variant Scenarios with alternate work and information flows, Actors, records/data captured and conveyed. • State Assumptions, Pre and Post Conditions, System Functional Requirements drawing on registered Common Requirements(+). • Capture (for each Scenario) a User Story (narrative) describing patient, work and information flow. • Specify Scenario(s), each with a set and sequence of Event Steps and Actions taken(+).	Uses UCAT and for each Event Step, *selects* applicable Core Components, from registered set - or *specifies* anew as applicable... • Requirements(+) (one or more) fulfilled (satisfied) by Event Step (Action taken) • Actor and Role (one each) from set of Common Actors and Roles(+), when available; • Event/Description (one) from set of Common Events(+); • Event Inputs (one or more) from set of FHIM Data Objects(+), Data Elements(+); • Event Outputs (one or more) from set of FHIM Data Objects(+), Data Elements(+); • Actions Taken (one or more) from set of Common Actions(+).	Uses UCAT to wrap up the Use Case Requirements specification, renders Use Case Requirements document (per standard template) including: • Scenarios, with User Story narrative; • Scenario Event Steps with Event/Description, Actor, Role, Inputs, Outputs and Actions Taken; • Requirements, predicated and/or fulfilled (satisfied) by Events and Actions Taken; • Cast: Actors, Systems, Roles in play; • Process Scope: Events and Actions in play; • Data Scope: Data Objects and Data Elements in play.	Uses UCAT to: • Compile Initiative specified Components, both new and existing (already registered). • Identify any new Core Component(s) ready for consensus ballot.	Uses UCAT to identify new Data Object and Element Components for possible inclusion in US Federal Health Information Model (FHIM) or its equivalent.	Consensus - Core Components Derived from Use Case	Uses UCAT to output new Initiative Components for registration in AHRQ/USHIK or its equivalent.	Uses UCAT to output Initiative Components to NIST Implementation Guide Authoring and Management Tool (IGAMT) or its equivalent.

Loose Binding to Standards, Implementation Guides
Implementable Data Objects/Elements, Software Services --> See "Resolving to Standards" Tab below

New S&I (or other) Initiative, Use Case Requirements Phase…

C	D	E	F	G		H	I
• Provide the ability to create and maintain Use Case instances (e.g., S&I Framework Initiatives such as ToC, LCC, LRI, LOI, PD, esMD, QH, DS4P, PHRI, HeD...). • Provide the ability to create and maintain new Use Case instances drawing from prior instance specifications when appropriate, i.e., to create derivatives. Example: Variant Scenarios with alternate work and information flows, actors, records/data captured and conveyed. • Capture Assumptions, Pre and Post Conditions, System Functional Requirements drawing on registered Common Requirements(+). For each Scenario: • Capture a User Story (narrative) describing patient, work and information flow. • Capture the set and sequence of Event Steps and Actions Taken(+).	For each Scenario Step: • Provide the ability to select applicable Core Components - from existing registered sets - or specify a new Component if applicable... - Requirements(+) (one or more) fulfilled (satisfied) by Event Step (Action taken) - Actor, Systems and Roles from set of Common Actors, Systems and Roles(+); - Event/Description (one) from set of Common Events(+); - Actions Taken (one or more) from set of Common Actions(+); - Data Objects (one or more) from set of FHIM Common Data Objects(+), Data Elements(+).	To wrap up the Use Case Requirements specification: • Render complete Use Case Requirements document (per S&I Use Case Template).	• Compile Initiative specified Components, both new and existing (already registered). • Compile any new Core Component(s) ready for consensus ballot.	• Render new Data Object and Element Components for possible inclusion in FHIM or its equivalent.		• Output new or modified Initiative Components to AHRQ for registration in USHIK. • Req'd format(s): NIST-defined .pdf/.html for Use Case Template .json/.xmi for Use Case computables	• Output Initiative Components to NIST Implementation Guide/Test Case Authoring and Management Tools (IGAMT/TCAMT). • Include Use Case derived Test Scripts (based on Scenario Steps) • Req'd format(s): NIST-defined .pdf/.html for Use Case Template .json/.xmi for Use Case computables
• Allow "smart cloning". • Allow "smart delete".				• Integrate with FHIM Data Dictionary		• Integrate with USHIK	• Integrate with IGAMT and TCAMT

Mandatory Use UCAT to: • Specify Use Case(s) as described above • Specify each section of Use Case Requirements template	Mandatory Use UCAT to: • Select Core Components for re-use • Select FHIM data objects for re-use • Specify New Components using standard template	Mandatory Use UCAT to: • Render Use Case Requirements Template as described above	Mandatory? Use UCAT to: • Identify new Core Component candidates as described above	Mandatory Use UCAT to: • Output new Core Component candidates to FHIM as described above		Mandatory Use UCAT to: • Output new Core Components to USHIK as described above	Mandatory? Use UCAT to: • Output new Core Components to IGAMT as described above

Simplification WG
SDC Components Compiled

Steps J-S – Harmonization, Guidance, Implementation, Testing

S&I (or other) Initiative, Harmonization Phase…

NIST Progression - Implementation Guidance, Testing, Validation…

J	K	L	M	N	O	P	Q	R	S
US S&I Framework Harmonization or equivalent	**NIST/S&I Harmonization**	**Vendor, Software Developer**	**Testing Organizations**						
UCAT and Implementation Guide Authoring and Management Tool (IGAMT)	IGAMT		Test Case Authoring and Management Tool (TCAMT)	Message Maker Tool	IGAMT and TCAMT	TCAMT	Testing Infrastructure (Test Engine)	Testing Infrastructure (Validation) and TCAMT	
	Standards, Implementation Guides	Implementation	Test Cases	Test Data	Test Material	Test Scripts	Test Execution	Results	Analysis
• Specifies Standards and Implementation Guides		References Standards and Implementation Guides							
• For Data Object and Element Components, specifies implementable standards-based encodings (e.g., HL7 v2 messages, Consolidated CDA).		Selects Implementable Data Objects and Elements							
• For Action Components, specifies implementable standards-based software services or applications (apps).		Selects Implementable Software Services	Selected Implementable (SIMP) Test Cases: Individual or Aggregated	SIMP Test Data: Individual or Aggregated	SIMP Test Material: Individual or Aggregated	SIMP Test Scripts: Individual or Aggregated	SIMP Test Execution: Individual or Aggregated	SIMP Test Results: Individual or Aggregated	SIMP Test Analysis: Individual or Aggregated
	Standards → implementation guide development → ensure use case requirements are satisfied → create testable assertions criteria	**Implementation** → implementation → application implements the standard	**Test Cases** → specification of test cases → tests cases should test all requirements specified in the implementation guide	**Test Data** → development of test messages → messages support test cases → valid and invalid	**Test Material** → artifacts to support testing → XML message profiles → vocabulary → validation context files	**Test Scripts** → processable test cases → methods and tools to transform test cases into machines process-able instructions	**Test Execution** → execution of the test scripts → test engine interprets test scripts → validate message against test material	**Results** → juror document or test report → create inspection document → provide validation test report	**Analysis** → automated or human analysis → test or certification managers determine pass/fail based on results

System Certification

Tight (Final) Binding to Standards, Implementation Guides
Implementable Data Objects/Elements, Software Services

J	K
Update to final post-Harmonization bindings: • For Data Object and Element Components, including implementable standards-based encodings (e.g., HL7 v2 messages, Consolidated CDA). • For Action Components, specifies implementable standards-based software services or applications (apps).	

Mandatory?
Use FHIM Tools to:
• Identify standards and implementation guide selection - for data objects and elements - tight binding - as described above

Mapped to Functions/Criteria of:
• ISO/HL7 10781/16527: EHR/PHR System Functional Models
• Functional Profiles (of FMs)

NIST/ONC Specified	HL7 Project
Meaningful Use 1/2 EHR System Test Scripts	Meaningful Use 1/2 EHRS Functional Profile

Progression Steps w/UCAT*

Steps	Tool	Used to…
S&I Use Case Requirements (UCR) Phase		
A-B	Excel	Analyze UC Components, Update Core Simplification Matrix
C-D	UCAT	Build Use Case, specify Requirements and Details
E		Render completed Use Case per S&I UCR Template (Word .docx)
F		Identify New Core Component Candidates from this Use Case
G		For FHIM update: identify new UC data objects, elements
H		Output to USHIK: full Use Case
I		Output to NIST Tool Suite (IGAMT/TCAMT): full Use Case
S&I Harmonization Phase		
J-K	UCAT/IGAMT	Develop/manage Implementation Guides for selected standards
NIST-designed Software Testing and Certification		
M-S	IG/TCAMT	Develop/manage software test cases; support testing and validation

* See S&I Simplification – Progression Spreadsheet (UCAT = Use Case Authoring Tool)

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William and Anneke Goosen, Michael Van Der Zel	Results4Care, Netherlands
Ed Larsen	Accenture / S&I Support Staff

UCAT Tool Developers

- Prometheus Use Case Editor
  - Art Griesser, Lead
  - a.griesser@prometheuscomputing.com
  - https://prometheuscomputing.com/beacon
- Sparx Enterprise Architect Extensions
  - J.D. Baker, Lead
  - jbaker@sparxsystems.com
  - http://www.sparxsystems.com

Contact

- Gary L. Dickinson
  - Director, Healthcare Standards, CentriHealth
  - Lead, S&I Framework, S&I Simplification Work Group
  - Co-Chair, HL7 EHR Work Group
  - +1-951-536-7010
  - gary.dickinson@ehr-standards.com

Links

- US Office of National Coordinator (ONC) Standards and Interoperability (S&I) Framework Wiki
  - http://wiki.siframework.org
- S&I Simplification Wiki
  - http://wiki.siframework.org/Cross+Initiative+-+S%26I+Simplification+WG
  - http://wiki.siframework.org/Use+Case+Simplification+Reference+Materials
- Federal Health Information Model (FHIM)
  - http://www.fhims.org
- AHRQ/USHIK S&I Pilot Site
  - http://ushik-stg.dcgroupinc.com/mdr/portals/si?system=si&enableAsynchronousLoading=true
- HL7 EHR Interoperability Wiki
  - http://wiki.hl7.org/index.php?title=EHR_Interoperability_WG