

HIT Standards Committee

NwHIN Power Team

Preliminary Recommendations for Standards Evaluation Criteria

Dixie Baker, Chair

July 19, 2012

NwHIN Power Team 2012

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- Tim Cromwell (VA)
- Floyd Eisenberg (National Quality Forum)
- Ollie Gray (DOD)
- David Groves (HealthBridge REC)
- David Kates (Navinet)
- David McCallie (Cerner)
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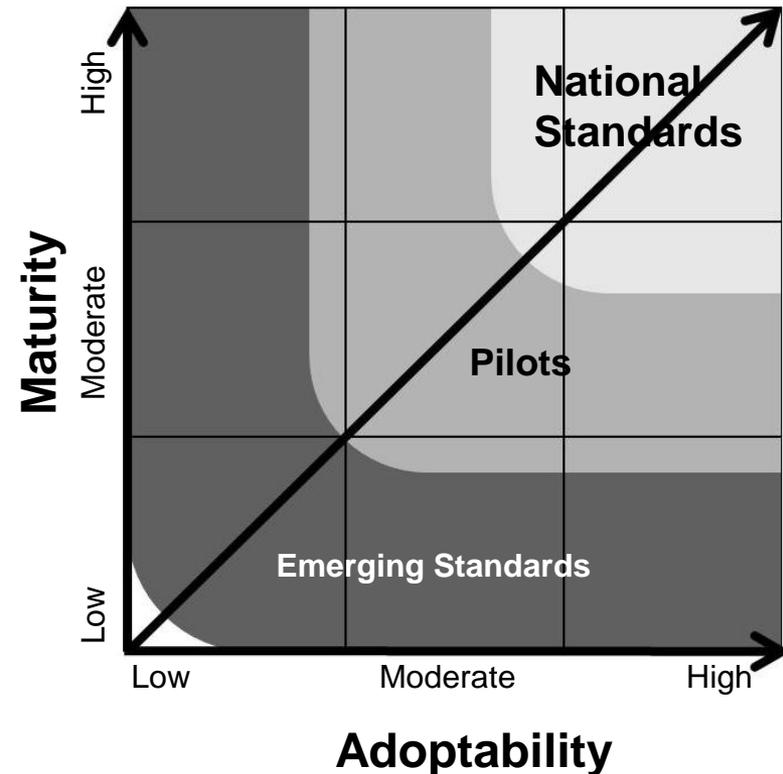
Context: Evaluation of Readiness of Technical Specifications to Become National Standards

Maturity Criteria:

- Maturity of Specification
- Maturity of Underlying Technology Components
- Market Adoption

Adoptability Criteria:

- Ease of Implementation and Deployment
- Ease of Operations
- Intellectual Property



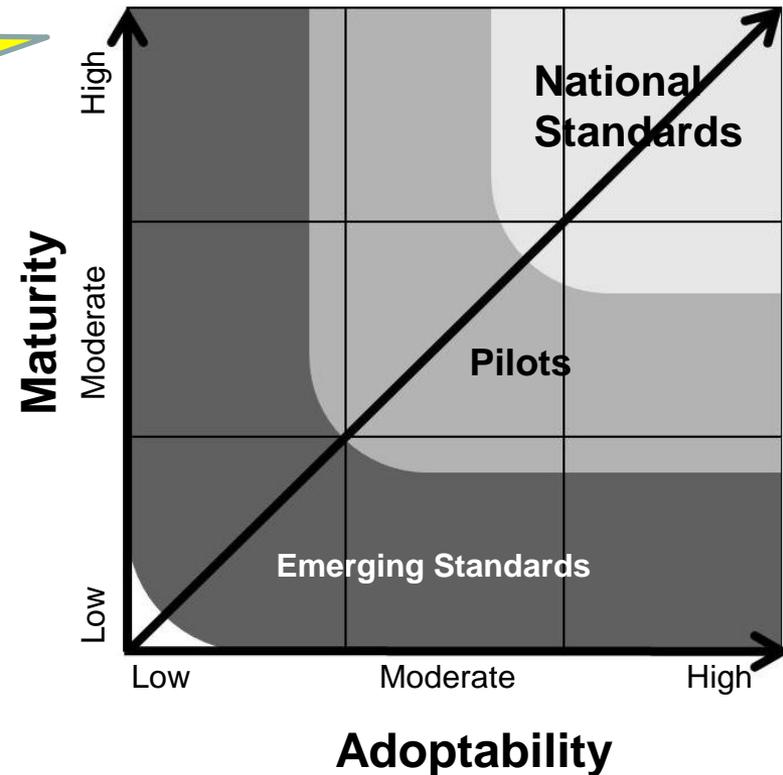
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Maturity Criteria: Attributes to be Evaluated

- Maturity of Specification
 - Breadth of Support
 - Stability
 - Interoperability among a number of independent implementations
 - Adoption of Specification
- Maturity of Underlying Technology
- Market Adoption

Metrics: Maturity of Specification (1 of 2)

Attributes	Metrics		
	Low	Moderate	High
Breadth of Support	<ul style="list-style-type: none"> • No contributing community or without activity • 1 organization supporting authorship • No support services other than public forums or mail lists • No implementation/ training services 	<ul style="list-style-type: none"> • Existing community with notable activity • 2-5 organizations supporting authorship • Single organization provides support service • Single organization provides implementation/ training services 	<ul style="list-style-type: none"> • Strong community with numerous contributors and advocates throughout industry • 5+ organizations supporting authorship • Multiple organizations provide support services • Multiple organizations provide implementation/ training services
Stability	<ul style="list-style-type: none"> • Unstable with numerous releases generating side effects • Standard has history of several known problems which can be prohibitive for adoption • Age of oldest known conforming implementation is less than 3 months 	<ul style="list-style-type: none"> • Stabilized release process but difficulties with development process to respond to industry required changes • No known history of major problems or crisis • Age of oldest known conforming implementation is 3 months – 3 years 	<ul style="list-style-type: none"> • Stabilized releases providing minor corrections to core standard. New core functionality changes in response to industry required changes • History of good management of crisis situations • Age of oldest known conforming implementation is 3 years or more

Metrics: Maturity of Specification (2 of 2)

Attributes	Metrics		
	Low	Moderate	High
Degree of Interoperability among independent non-coordinated implementations	<ul style="list-style-type: none"> • 0 - 1 non-coordinated implementations • Degree of interoperability is undetermined 	<ul style="list-style-type: none"> • 2 - 4 non-coordinated implementations • Some indications of interoperability between at least 2 implementations 	<ul style="list-style-type: none"> • 5+ non-coordinated implementations • Interoperability established for entire standard between at least 2 implementations
Adoption of Specification	<ul style="list-style-type: none"> • No references (informal blogs to formal papers) identified of the standard's specification in use • Existing specification with indications of decline <ul style="list-style-type: none"> - Existing community but no or little activity in last year - Fewer organizations supporting authorship - No new implementations - Critical programs analyzing replacement or upgrades options - Lacking support for new or emerging technology or products 	<ul style="list-style-type: none"> • Few references of use on non-critical programs (i.e., in pilot) 	<ul style="list-style-type: none"> • Numerous references of use in production for critical programs

Maturity Criteria: Attributes to be Evaluated

- Maturity of Specification
- Maturity of Underlying Technology – assessed for each technology component used by the specification:
 - Breadth of Support
 - Stability
 - Interoperability among a number of independent implementations
 - Adoption of Technology
 - Platform Support
 - Maturity of the technology within its life cycle
- Market Adoption

Metrics: Maturity of Underlying Technology (1 of 3)

Attributes	Metrics		
	Low	Mod	High
Breadth of Support	<ul style="list-style-type: none"> • No contributing community or without activity • 1-2 individuals leading development or not clearly defined • Less than 3 developers or not clearly identified • No support services other than public forums or mail lists • No implementation/ training services 	<ul style="list-style-type: none"> • Existing community with notable activity • 2-5 individuals leading development • 4-7 developers or more, but turnover high • Single organization provides support services • Single organization provides implementation/ training services 	<ul style="list-style-type: none"> • Strong community with numerous contributors and advocates throughout industry • 5+ individuals leading development • 7+ developers with low turnover • Multiple organizations provide support services • Multiple organizations provide implementation/ training services
Stability	<ul style="list-style-type: none"> • Unstable with numerous releases generating side effects • Standard has history of several known problems which can be prohibitive for adoption • Age of oldest known conforming implementation is less than 3 months 	<ul style="list-style-type: none"> • Stabilized release process but difficulties with development process to respond to industry required changes • No known history of major problems or crisis • Age of oldest known conforming implementation is 3 months – 3 years 	<ul style="list-style-type: none"> • Stabilized releases providing minor corrections to core standard. New core functionality changes in response to industry required changes • History of good management of crisis situations • Age of oldest known conforming implementation is 3 years or more

Metrics: Maturity of Underlying Technology (2 of 3)

Attributes	Metrics		
	Low	Mod	High
Degree of Interoperability among independent non-coordinated implementations	<ul style="list-style-type: none"> • 0 - 1 non-coordinated implementations • Degree of interoperability is undetermined 	<ul style="list-style-type: none"> • 2 - 4 non-coordinated implementations • Some indications of interoperability between at least 2 implementations 	<ul style="list-style-type: none"> • 5+ non-coordinated implementations • Interoperability established for entire standard between at least 2 implementations
Adoption of Technology	<ul style="list-style-type: none"> • No references of standard identified • Existing technology with indications of decline: <ul style="list-style-type: none"> - Existing community but no or little activity in last year - Reduced development staff with high turn over - No new implementations - Critical programs analyzing replacement or upgrades options - Lacking support for new or emerging technology or products - Technology readiness stalled or stopped before TRL-9 	<ul style="list-style-type: none"> • Few references of use on non-critical programs (i.e., in pilot) 	<ul style="list-style-type: none"> • Numerous references of use in production for critical programs
Platform Support	<ul style="list-style-type: none"> • Supports only one platform 	<ul style="list-style-type: none"> • Supports multiple platforms but requires additional effort or expertise 	<ul style="list-style-type: none"> • Support multiple platforms with no or minimal effort

Metrics: Maturity of Underlying Technology (3 of 3)

Attributes	Metrics		
	Low	Mod	High
Maturity of the technology within its life cycle	<ul style="list-style-type: none"> • Technology Readiness Level (TRL) 1-7 <u>TRL 1:</u> Basic principles observed and reported. Research begins. <u>TRL 2:</u> Technology concept and/or application formulated. Prototyping begins. <u>TRL 3:</u> Analytical and experimental critical function and/or characteristic proof of concept. Active R&D initiated, including analytical studies and lab studies to physically validate technology. <u>TRL 4:</u> Component and/or breadboard validation in a lab environment. Technological components are integrated in “low fidelity” setting. <u>TRL 5:</u> Component and/or breadboard validation in relevant environment. Technological components integrated with reasonably realistic supporting elements in an increased fidelity and simulated environment. <u>TRL 6:</u> System/subsystem model or prototype demonstration in relevant environment. Prototype is tested in relevant and “high-fidelity” simulated environment. <u>TRL 7:</u> System prototype demonstrated in operational environment. 	<ul style="list-style-type: none"> • TRL 8 <u>TRL 8:</u> Actual system completed and qualified through test and demonstration. Technology has been proven to work in its final form and under expected conditions. 	<ul style="list-style-type: none"> • TRL 9 <u>TRL 9:</u> Actual system proven through successful mission operations. Actual application of technology in its final form and under mission conditions.

Maturity Criteria: Attributes to be Evaluated

- Maturity of Specification
- Maturity of Underlying Technology
- **Market Adoption**
 - Installed Health Care User Base
 - Installed User Base Outside of Health Care
 - Future projections and anticipated support
 - Investments in User Training

Metrics: Market Adoption

Attributes	Metrics		
	Low	Mod	High
Installed health care user base	<ul style="list-style-type: none"> • Few users other than the developers of the standard or pilots within health care market, <u>or</u> • Well established standard, but anticipating decline in future use 	<ul style="list-style-type: none"> • Detectable references of use outside of developers of pilots within health care market 	<ul style="list-style-type: none"> • Numerous users and numerous references to large user bases
Installed user base outside of health care	<ul style="list-style-type: none"> • Few users other than the developers of the standard or pilots, <u>or</u> • Well established standard, but anticipating decline in future use 	<ul style="list-style-type: none"> • Detectable references of use outside of developers of pilots 	<ul style="list-style-type: none"> • Numerous users and numerous references to large user bases
Future projections and anticipated support	<ul style="list-style-type: none"> • No roadmap, future projections, or announcements 	<ul style="list-style-type: none"> • Future announcements of releases and community activities are provided to limited audience on an irregular basis 	<ul style="list-style-type: none"> • Roadmap and future announcements of releases are tightly coupled and are provided to a broad audience (members and public) on regular basis • Standard in broad use, projecting to continue
Investments in user training	<ul style="list-style-type: none"> • Few users investing in training on use of standard 	<ul style="list-style-type: none"> • Limited user investment in learning , primarily through indirect means such as discussion boards 	<ul style="list-style-type: none"> • Active user investments in training • Multiple training modes available, such as code-a-thons, webinars, classroom training

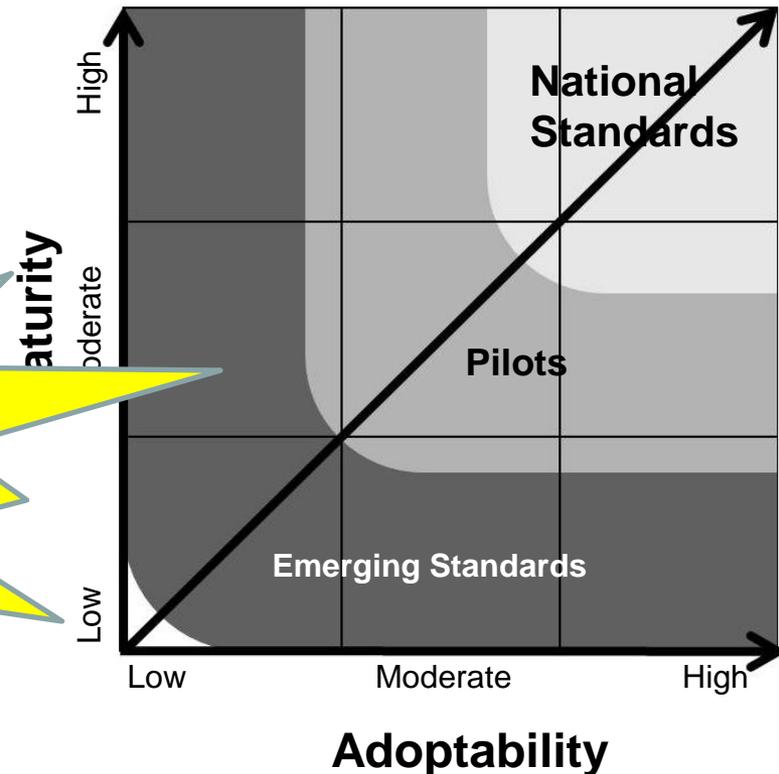
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Adoptability Criteria:

- Ease of Implementation and Deployment
- Ease of Operations
- Intellectual Property



Adoptability Criteria: Attributes to be Evaluated

- **Ease of Implementation and Deployment**
 - Availability of off-the-shelf infrastructure to support implementation
 - Deployment Complexity
 - Conformance criteria and tests
 - Availability of reference implementations
 - Complexity of Specification
 - Quality and Clarity of Specifications
 - Specification Modularity
 - Separation of Concerns
 - Ease of Use of Specification
 - Degree to which specification uses familiar terms to describe “real-world” concepts
 - Degree of optionality
- **Ease of Operations**
- **Intellectual Property**

Metrics: Ease of Implementation/Deployment (1 of 3)

Attributes	Metrics		
	Low	Mod	High
Availability of off-the-shelf infrastructure to support implementation	<ul style="list-style-type: none"> Few off-the-shelf infrastructure components are available or can be purchased to support implementation 	<ul style="list-style-type: none"> Some of supporting infrastructure components can be purchased off-the-self 	<ul style="list-style-type: none"> Most of supporting infrastructure components can be purchased off-the-self
Deployment Complexity	<ul style="list-style-type: none"> Many deployed implementations cite standard as a challenge to deployment Few cite standard as success factor 	<ul style="list-style-type: none"> No consensus view among deployed implementations on whether standard is a success factor or challenge to deployment 	<ul style="list-style-type: none"> Many deployed implementations cite standard as a success factor Few cite standard as challenge to deployment
Conformance Criteria and Tests	<ul style="list-style-type: none"> Incomplete conformance criteria Conformance tools and/or methodology not applied in any setting No automated tests available 	<ul style="list-style-type: none"> Complete conformance criteria Conformance tools and/or methodology applied in a lab or demo setting Automated tests exist for at least some part of standard. 	<ul style="list-style-type: none"> Complete conformance criteria Conformance tools and/or methodology applied to at least one operational implementation. Significant automated test support
Availability of Reference Implementations	<ul style="list-style-type: none"> No reference implementations 	<ul style="list-style-type: none"> Well-established reference implementations on a limited set of platforms 	<ul style="list-style-type: none"> Multiple reference implementations on multiple platforms

Metrics: Ease of Implementation/Deployment (2 of 3)

Attributes	Metrics		
	Low	Mod	High
Complexity of Specification	<ul style="list-style-type: none"> • Composition is monolithic and cannot be decomposed to smaller parts without some loss of context 	<ul style="list-style-type: none"> • Some modularity in composition but requiring additional references for context 	<ul style="list-style-type: none"> • Modular composition such that a large specification is easily decomposed into simpler, smaller parts
Quality and Clarity of Specifications	<ul style="list-style-type: none"> • Semantics not well defined and no evidence of interoperability • Inconsistent or ambiguous terminology within standard • Low terminology coherence with referenced or dependent standards 	<ul style="list-style-type: none"> • Defined semantics but evidence of some difficulty interoperating with other systems or networks • Consistent, unambiguous terminology within standard • Ad-hoc terminology alignment with any referenced or dependent standards 	<ul style="list-style-type: none"> • Precisely defined semantics and providing evidence of interoperability with other systems or networks • Consistent, unambiguous terminology within standard • Explicit terminology alignment with any referenced or dependent standards
Specification Modularity	<ul style="list-style-type: none"> • Modularity does not align well to the business problem 	<ul style="list-style-type: none"> • Modularity is unevenly aligned to business problem. 	<ul style="list-style-type: none"> • Modularity aligns well to the business problem. Parts are unambiguously identified
Separation of Concerns	<ul style="list-style-type: none"> • Competing standards. Referenced standards solve the same business problem as the standard under evaluation. 	<ul style="list-style-type: none"> • Partial overlap. Referenced standards solve part of the business problem as the standard under evaluation. 	<ul style="list-style-type: none"> • Clean separation. Referenced standards do not solve the same business problem as the standard under evaluation.

Metrics: Ease of Implementation/Deployment (3 of 3)

Attributes	Metrics		
	Low	Mod	High
Ease of use of specification	<ul style="list-style-type: none"> • Requires highly specialized expertise in multiple technologies to read and understand specification • Specification not appropriate as a starting point for maintenance 	<ul style="list-style-type: none"> • With moderate effort specification can be used as a starting point for maintenance 	<ul style="list-style-type: none"> • Easily read and understood by domain experts • Easily used as a starting point for maintenance activities • Navigation links provided or indexed
Degree to which specification uses familiar terms to describe “real-world” concepts	<ul style="list-style-type: none"> • Few concepts in standard are based on terminology currently used in industry • Concepts are not defined in business language 	<ul style="list-style-type: none"> • Some to majority of concepts in standard are based on terminology currently used in industry • Concepts are loosely defined in business language 	<ul style="list-style-type: none"> • Most concepts in standard are based on terminology well established in the industry • Concepts in specification expressively described in business language
Runtime Coupling	<ul style="list-style-type: none"> • Tightly coupled to one or more externally defined interfaces. Content or Common Coupling with one or more systems. 	<ul style="list-style-type: none"> • Mix of tight and loose coupling to externally defined interfaces. 	<ul style="list-style-type: none"> • Loosely coupled to externally defined interfaces. Message and Data coupling only.
Degree of Optionality	<ul style="list-style-type: none"> • Optionality exceeding requirement for implementation use cases, resulting in additional effort • No optionality exists to support implementation use cases, resulting in additional effort • Implementers cite optionality as a barrier to interoperability. 	<ul style="list-style-type: none"> • Optionality exceeds requirement for implementation use cases but does not result in addition effort • Some optionality exists to support implementation use cases, resulting in some additional effort 	<ul style="list-style-type: none"> • Optionality exists to fulfill and support the required implementation use cases • Implementers cite optionality as aiding interoperability.

Adoptability Criteria: Attributes to be Evaluated

- Ease of Implementation and Deployment
- **Ease of Operations**
 - Comparison of targeted scale of deployment to actual scale deployed
 - Number of operational issues identified in deployment
 - Degree of peer-coordination needed
 - Operation scalability (i.e., operational impact of adding a single node)
 - Fit to Purpose
- Intellectual Property

Metrics: Ease of Operations

Attributes	Metrics		
	Low	Mod	High
Comparison of targeted scale of deployment to actual scale deployed	<ul style="list-style-type: none"> No documented or advertised scale at which standard is intended to be deployed 	<ul style="list-style-type: none"> Scale is documented in standard but no evidence that the scale as been achieved in operations 	<ul style="list-style-type: none"> Scale is documented in standard and evidence that scale has been achieved or exceeded in operations
Number of operational issues identified in deployment	<ul style="list-style-type: none"> Several critical issues identified during deployment and are high risks to operations 	<ul style="list-style-type: none"> Several issues identified during deployment but all mitigated through operational activities 	<ul style="list-style-type: none"> Few issues identified during deployment
Degree of peer-coordination needed	<ul style="list-style-type: none"> Peer-coordination of technical experts required on daily basis 	<ul style="list-style-type: none"> Peer-coordination on frequent periodic basis 	<ul style="list-style-type: none"> Minimal peer-coordination required on as needed basis
Operational scalability (i.e. operational impact of adding a single node)	<ul style="list-style-type: none"> Addition of nodes creates exponential impacts to operational effort or complexity 	<ul style="list-style-type: none"> Addition of nodes creates linear impacts to operational effort or complexity 	<ul style="list-style-type: none"> Addition of nodes has little to no additional impacts to operational effort or complexity
Fit to Purpose	<ul style="list-style-type: none"> Some target use cases are met by the standard and specifications For met use cases, some main and/or alternative flows for high priority target use cases not met 	<ul style="list-style-type: none"> A majority of target use cases are met by the standard and specifications For met use cases, main and alternative flows for high priority target use cases met 	<ul style="list-style-type: none"> All or nearly all target use cases are met by use of the standard and specifications Main and alternative flows for high and medium priority target use cases met

Adoptability Criteria: Attributes to be Evaluated

- Ease of Implementation and Deployment
- Ease of Operations
- **Intellectual Property**
 - Openness
 - Accessibility and Fees
 - Licensing Policy
 - Copyrights
 - Patents

Metrics: Intellectual Property

Attributes	Metrics		
	Low	Mod	High
Openness	<ul style="list-style-type: none"> • Closed to few individuals or entities 	<ul style="list-style-type: none"> • Limited to only members or contributing organizations 	<ul style="list-style-type: none"> • Open to public
Accessibility and Fees	<ul style="list-style-type: none"> • Fees associated with accessing standard specifications • High costs for use and documentation are deemed prohibitive for high adoption 	<ul style="list-style-type: none"> • No fee for accessing standard specifications, but fees or restrictions on referenced specifications (e.g. vocabularies) • Nominal costs to use standard and documentation 	<ul style="list-style-type: none"> • No fees for accessing standard or referenced specifications • No costs to use standard and standard documentation
Licensing Policy	<ul style="list-style-type: none"> • Highly restricted use based on type of use 	<ul style="list-style-type: none"> • Restricted to only non-commercial • Negotiated agreement for use (i.e. SNOMED) 	<ul style="list-style-type: none"> • Unrestricted for any use (commercial, academic, governmental) • Perpetual use rights • Derivative work allowed • Unlimited number of users or instances
Copyrights	<ul style="list-style-type: none"> • Rights held by numerous individuals, making relicensing very difficult 	<ul style="list-style-type: none"> • Rights held by a few individuals or entities 	<ul style="list-style-type: none"> • Rights held by a legal entity whom the community trusts, and relicensing process is clear and streamlined
Patents	<ul style="list-style-type: none"> • Patent encumbered: Known or anticipated patented methods required for conformance to standard 	<ul style="list-style-type: none"> • RAND terms: Contributors to standard agree to reasonable and non-discriminatory (RAND) terms for their contributed material 	<ul style="list-style-type: none"> • No known or anticipated patents required to implement any portion of the specification, or • Patents to protect openness: Contributors to standard make patented methods available with zero royalty (RAND with zero royalty) available to all implementers (open license)

Next Steps

- July 26, 2012 at 2:00-4:00 PM ET
 - Presentation re RESTful Exchange specification development (ONC)
 - Discuss HITSC criteria feedback
 - Begin evaluation exercise: HL7 Context-Aware Knowledge Retrieval (“InfoButton”)
- August
 - Complete evaluation exercise
 - Incorporate evaluation exercise lessons into classification criteria
 - Report final results to HIT Standards Committee