



# Health IT Standards Committee

A Public Advisory Body on Health Information Technology to the National Coordinator for Health IT

September 28, 2011

Farzad Mostashari, MD, ScM  
National Coordinator for Health Information Technology  
Department of Health and Human Services  
200 Independence Avenue, SW  
Washington, DC 20201

Dear Dr. Mostashari:

The Office of the National Coordinator asked the HIT Standards Committee to convene a Nationwide Health Information Network (NwHIN) Power Team (NwHIN Team) as part of the “summer camp” activities. The ONC has defined the Nationwide Health Information Network (NwHIN) as “the set of standards, services and policies that enable secure health information exchange over the Internet.” The NwHIN Team was tasked to assist the ONC in defining this set of standards, services, and policies by:

1. Evaluating the specifications developed for the Exchange and Direct pilots with respect to their usability and scalability to support nationwide health information exchange
2. Recommending those specifications that could be integrated and deployed to support the secure transport and exchange of electronic health information at a national scale, and identifying where further work may be needed

Outputs from this work were intended to help inform ONC decisions regarding future investments in additional NwHIN pilots and specification development.

Over the past few months the NwHIN Team held a series of public meetings to first develop an assessment methodology, and then to assess the Exchange and Direct specifications as potential NwHIN standards, services, and policies. The Team defined and used the following criteria to assess each of the Exchange and Direct specifications:

1. Need for specified the capability
2. Maturity of the specification
3. Maturity of the underlying technology used in the specification
4. Deployment, operational, and administrative complexity
5. Industry adoption
6. Availability of alternatives

On September 28, 2011, the NwHIN Team presented its report to the HIT Standards Committee (HITSC). The Team's report on its work, including the methodology and detailed recommendations, is attached. The NwHIN Team's key high level conclusions are:

1. Architecture is important – whatever standards are chosen must be deployable within an architectural framework and must support the exchange of structured and well as unstructured data.
2. Neither the Exchange specifications nor the Direct specifications have been proven at large scale, in production environments, across a broad range of healthcare organizations.
3. The Exchange specifications are highly complex, and designed to support a complex architecture that may not be appropriate for all healthcare organizations, and that may not scale to nationwide deployment. The NwHIN Team identified a number of Exchange specifications that offer opportunities for simplification. To facilitate and encourage further deployment, we recommend the ONC take advantage of these opportunities.
4. The standards that Direct uses (SMTP and S/MIME) are well understood, widely deployed, and highly scalable. The Direct specifications do introduce some new approaches that have yet to be fully developed and proven beyond the Direct Project itself, but generally the Power Team supports and encourages broader deployment and use of these specifications.
5. Some areas were found to be underspecified, including exchange of large images, discovery and retrieval of data elements outside a document context, and more granular query (e.g., “most recent ECG”); these areas may be addressable by approaches set forth by the President's Council of Advisors on Science and Technology (PCAST) in December 2010 .
6. Industry is trending toward widespread use of the REST architectural style in designing networked systems; to provide consistency and security in RESTful implementations, a need exists for a specification for “secure RESTful transport for healthcare exchange.”

The robust discussion which followed produced valuable information and suggestions that the HITSC wishes to share with the ONC.

The framework and criteria developed by the NwHIN Team for characterizing and assessing the specifications were considered very useful. They provide a “Vocabulary” that was previously missing, which can be used to analyze specifications moving forward.

Some members expressed concern about some of the final recommendations, particularly around complexity ratings for Exchange specifications, and suggested that the complexity ratings reported in the analysis may primarily reflect the complexity of the health care systems of the Federal agencies whose implementers had provided testimony to the NwHIN Team. Some members shared their perceptions of their own organizations' deployments of the Exchange specifications and were aware of few implementation problems. They suggested that the experiences of implementers from

all of the non-Federal participants in the current Exchange should be solicited and incorporated. One member noted that a number of vendors may be implementing service-oriented architectures using a different technology stack from that represented in the Exchange specifications. Their experiences also should be incorporated in the analysis and final assessment.

The NwHIN Team noted that the complexity of the Exchange Patient Discovery specification is due primarily to policy limitations related to the complex problem of patient identification. These policy limitations then drive the technology architecture, and the resulting complexity and performance impacts. Some members further observed that the Direct specifications do not address the critical patient-matching policy issue at all. Everyone agreed that further policy work around patient matching is critically needed to enable robust exchange regardless of the specification.

Some members requested additional discussion of “push” versus “pull” approaches within the context of health care system needs and future meaningful use stages.

Members acknowledged that the Exchange and Direct specifications together comprise a portfolio of building blocks that have been implemented and are in use today. The Committee does not want to constrain or discourage entities that are already implementing robust service-oriented architectures, nor do we want to force entities to replace existing technologies in order to obtain Meaningful Use incentives. The Committee encourages further market implementation of both Exchange and Direct specifications, while continuing to pursue the opportunities for improvement identified by the NwHIN Team. Only through broad market deployment of these specifications can we objectively assess how these specifications can scale and adapt to various business models and provider workflows.

The Committee recognizes that the discussion raised issues that warrant further investigation. We recommend that ONC give priority to addressing the following needs identified in this discussion:

1. Policy issues that constrain architectural choices for matching patients
2. Further assessment of industry adoption, and deployment, operational, and administrative complexity of the Exchange specifications – specifically to include inputs from people who have implemented these specifications in organizations other than Federal agencies, and from organizations that have implemented a technology stack different from that represented in the Exchange specifications

We would appreciate hearing the outcome of work addressing these needs.

Sincerely yours,

/s/

Jonathan Perlin  
Chair, Health IT Standards Committee

*/s/*

John Halamka  
Vice Chair, Health IT Standards Committee

CC: Doug Fridsma

Attachment: Report and Recommendations of the NwHIN Power Team

**HIT Standards Committee  
NwHIN Power Team  
Final Recommendations  
Dixie Baker, Chair**

**September 28, 2011**

**NwHIN Power Team Context and Tasking**

The ONC has defined the Nationwide Health Information Network (NwHIN) as “the set of standards, services and policies that enable secure health information exchange over the Internet.” The NwHIN Power Team was tasked to assist the ONC in defining this set of standards, services, and policies by:

- Evaluating the specifications developed for the Exchange and Direct pilots with respect to their usability and scalability to support nationwide health information exchange
- Recommending those specifications that could be integrated and deployed to support the secure transport and exchange of electronic health information at a national scale, and identifying where further work may be needed

Outputs from this work are intended to help inform ONC decisions regarding future investments in additional NwHIN pilots and specification development .

**NwHIN Power Team Scope**

- The focus of this work is at the national level – we did not address the use of these specifications within enterprises or among partners within a regional health information exchange, or for community use.
- The Power Team evaluated each Exchange and Direct specification independently against a number of defined criteria.
- No “comparison” or “selection” between the specification sets for Exchange and Direct is implied – we recognize that each of these specification sets was designed for a different use case and to fulfill different needs, and that the scope of functions addressed by the Exchange specifications is considerably broader than the scope addressed by Direct.

## Methodology

1. Evaluate specifications generated by Exchange and Direct pilots on the following factors (defined in the Glossary at the end of this presentation):
  - Need for specified capability
  - Maturity of the specification
  - Maturity of the underlying technology used in the specification
  - Deployment and Operational Complexity
  - Industry adoption
  - Availability of alternatives

Scores recommended by the ONC, with inputs from the NwHIN Exchange Coordinating Committee and the National Institute of Standards and Technology (NIST), with review inputs from the NwHIN Power Team
2. Identify specifications that provide capabilities for which the business need is “Low”
3. Identify specifications that are in early or moderate stages of development, and that use technologies in the declining phase of their life-cycle
4. Identify specifications that introduce significant deployment, operational, and administrative complexity, and that have low industry adoption
5. Consider availability of alternatives
  - Sources used
    - NwHIN Power Team identification of standards and solutions that have been broadly adopted by healthcare, other than the Exchange and Direct specifications
    - Other industry standards
  - In considering suitability of alternatives, use the same criteria as those used for Exchange and Direct specifications
6. Subjectively assess whether any gaps remain that may be addressed with new specifications
7. Formulate recommendations for consideration by the HIT Standards Committee

## Scores – Exchange Specifications (1 of 2)

Specification	Need	Maturity of Spec	Maturity of Underlying Technology	Deployment, Operational, and Administrative Complexity	Industry Adoption	Alternatives
<i>NHIN Messaging Platform Specification</i>	High	High	Mature	Moderate (Mature tools available to deploy and manage the services)	Low	REST style; Direct Secure Transport
<i>NHIN Web Services Registry Specification</i>	Moderate/High	Moderate	Declining	High	Low	LDAP Provider Directories; DNS look-up for certificates (Direct)
<i>NHIN Authorization Framework Specification</i>	High	Moderate/High	Mature	High (Complexity is primarily a reflection of ensuring security)	Low	OAuth 2.0 OpenID for SOAP Authentication Framework; TLS over REST
<i>NHIN Patient Discovery Specification</i>	High (high need, spec has problems)	High	Mature	High	Low	PCAST model
<i>NHIN Query for Documents Specification</i>	Moderate	High	Mature	Moderate/High	Low	REST style

## Scores – Exchange Specifications (2 of 2)

Specification	Need	Maturity of Spec	Maturity of Underlying Technology	Deployment, Operational, and Administrative Complexity	Industry Adoption	Alternatives
<i>NHIN Retrieve Documents Specification</i>	Moderate	High	Mature	Moderate	Low	REST style
<i>NHIN Access Consent Policies Specification</i>	Low	Low	Emerging	High	Low	Metadata Power Team recommendation (HL7 CDA R2 with HL7, LOINC, and new vocab)
<i>NHIN Health Information Event Management (HIEM) Specification</i>	Low	Moderate	Mature	Not enough knowledge	Low	
<i>NHIN Document Submission Specification</i>	Moderate	High	Maturing	Low	Low	REST style
<i>NHIN Administrative Distribution Specification</i>	Moderate	Moderate	Maturing	Low	Low	REST style or other push solution



## Scores – Direct Specifications

Specification	Need	Maturity of Spec	Maturity of Underlying Technology	Deployment, Operational, and Administrative Complexity	Industry Adoption	Alternatives
<i>Applicability Statement for Secure Health Transport</i>	High	High	Mature	Moderate/High (mainly due to encryption, certificate mgmt)	Low	SOAP Transport, REST style
<i>XDR &amp; XDM for Direct Messaging</i>	High	High	Mature	Moderate	Low	Direct to email inbox

### Evaluation Criterion: Need

- **Need**

Subjective judgment (low, moderate, high) from ONC, focused on whether the specification is needed for meaningful-use, federal agencies, or to meet other national needs, plus review inputs from Power Team. Factors considered include:

- Lacks specific, compelling needs (low)
- Needed for meaningful use (moderate-high, considering other 3 factors)
- Federal agency need
- Other National HIT needs, etc.

### Specifications for Which Business Need is “Low”

- *NHIN Access Consent Policies Specification*
- *NHIN Health Information Event Management (HIEM) Specification*

## Evaluation Criteria: Maturity of Specification x Maturity of Underlying Technology

- **Maturity of Specification**

Subjective assessment (low, moderate, high) from survey conducted by NwHIN Exchange Coordinating Committee, plus ONC and NIST inputs, plus review inputs from Power Team. Factors considered include:

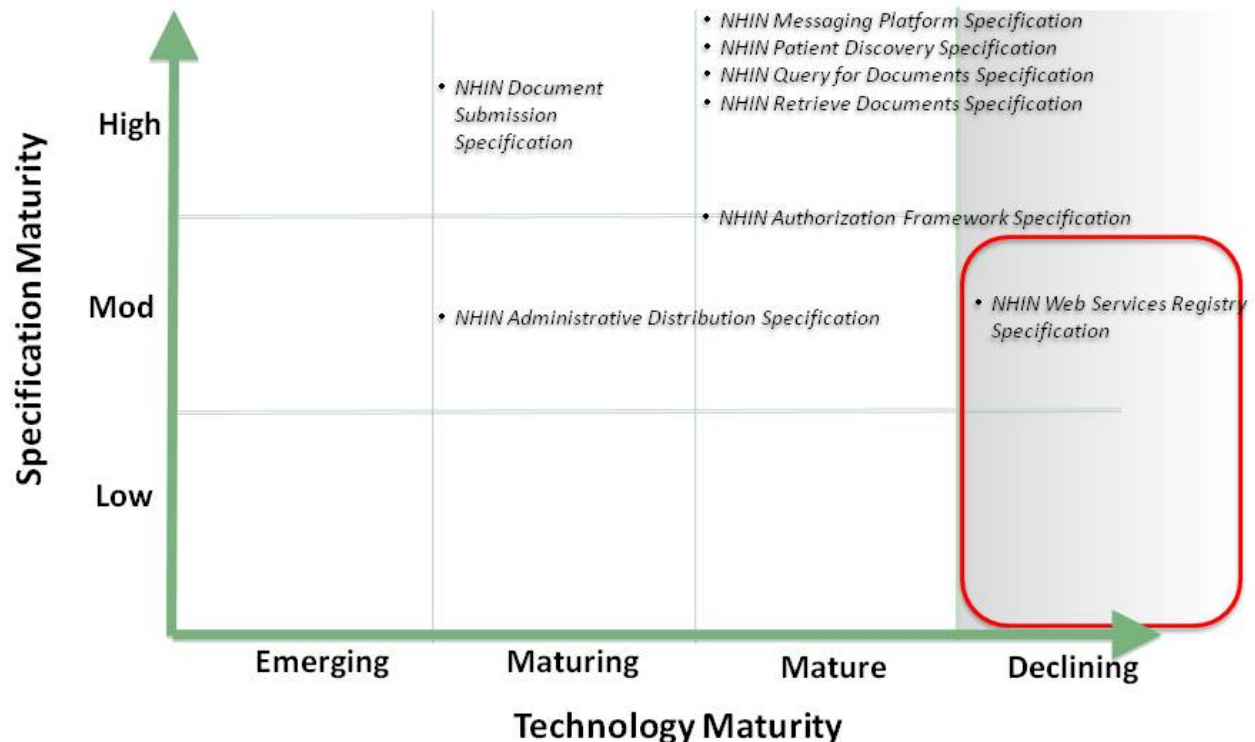
- Specification still in development (low)
- Clear and unambiguous (moderate)
- Testable (moderate-high)
- Maintainable (moderate-high)
- Fully tested and piloted (high)

- **Maturity of Underlying Technology**

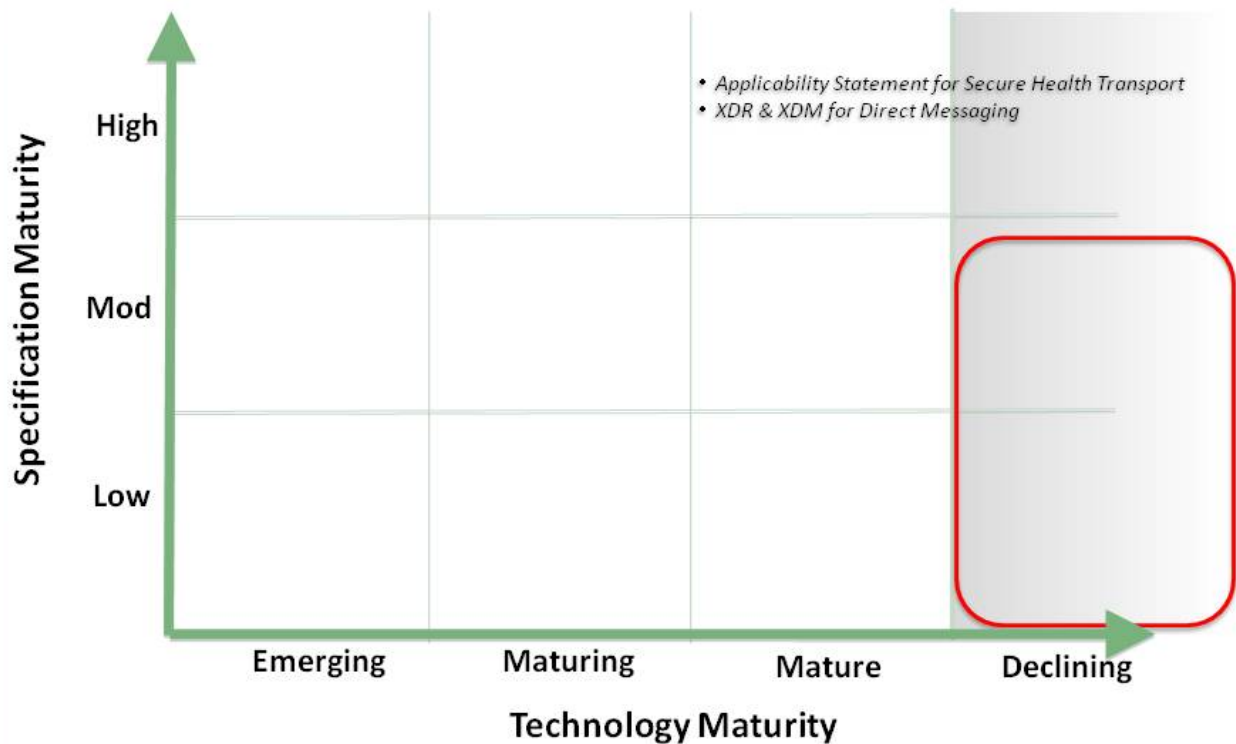
Subjective assessment (emerging, maturing, mature, declining) of the maturity of the technologies used in the specification, with respect to the complete technology life-cycle; plus review inputs from Power Team. Factors considered include:

- New unproven standard, building industry support (emerging)
- Gaining market adoption, but less than 30% industry adoption (maturing)
- Mainstream adoption (mature)
- Declining support (declining)

### Exchange: Maturity of Specification x Maturity of Underlying Technology



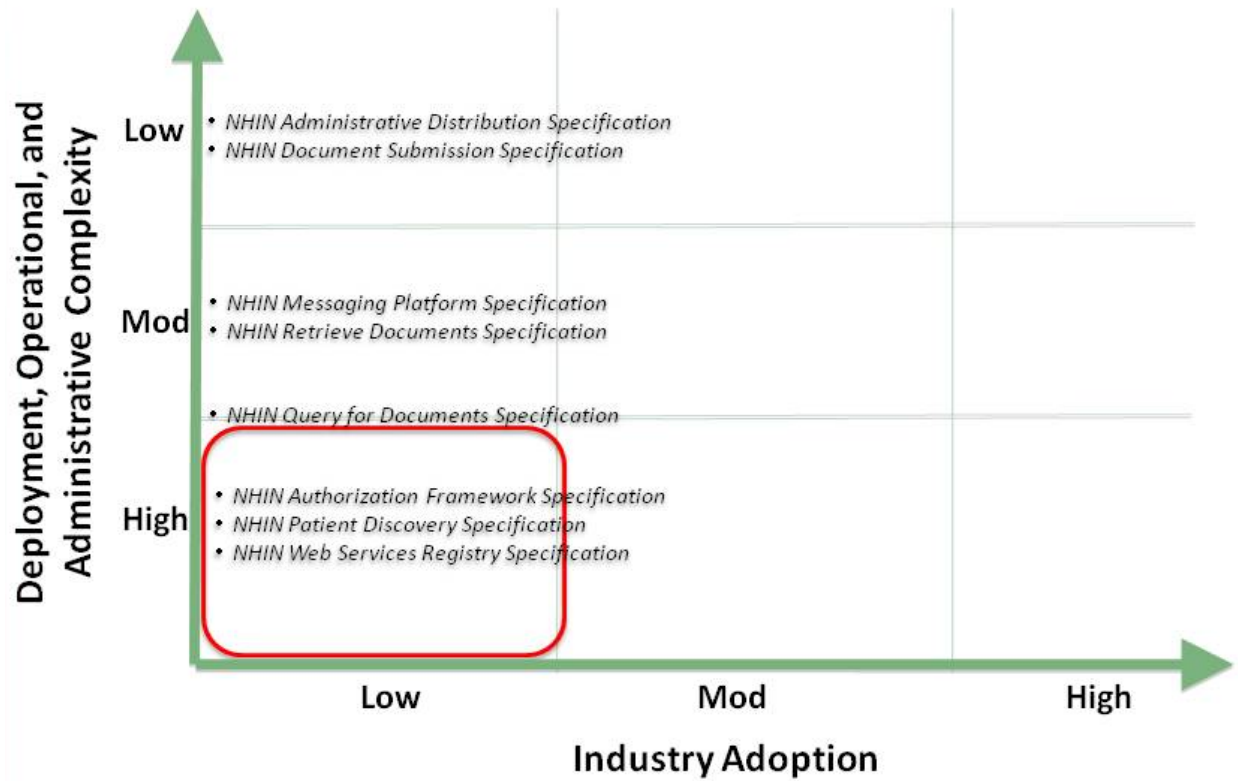
## Direct: Maturity of Specification x Maturity of Underlying Technology



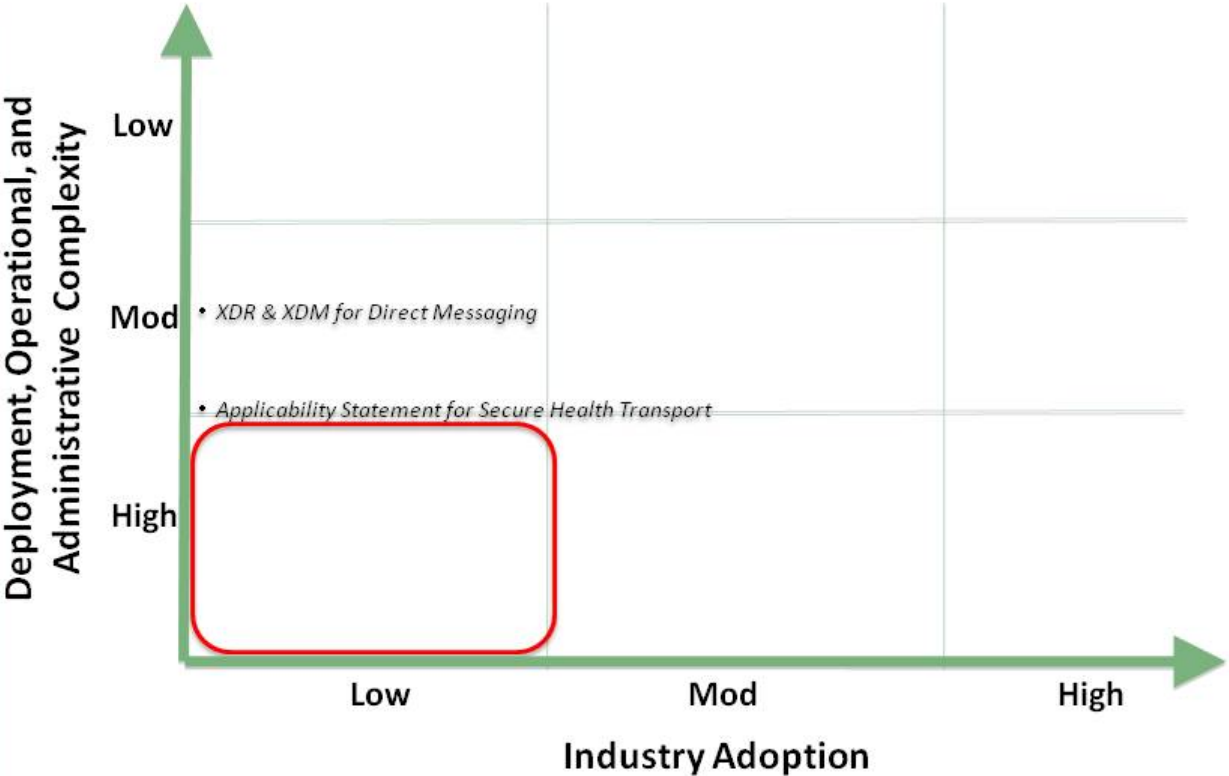
## Evaluation Criteria: Deployment, Operational, and Administrative Complexity x Industry Adoption

- Deployment, Operational, and Administrative Complexity  
Subjective assessment (low, moderate, high) that considers ease of implementation, maintenance throughout on-going operations, and administrative complexity across organizations.
  - Can be handled with ease by IT support (Low)
  - Need a modest administrative support for deployment and maintenance over time (Moderate)
  - Need a substantial on-going IT investment to support the service (High)
  - Introduces administrative complexity that spans organizations; requires high degree of federation; project complexity (High)
- Industry Adoption  
Assessed (low, moderate, high) relative to the market segment for which the specification was developed. Initial scores were derived from responses to objective questions on Exchange usage. Scores were reviewed by the Power Team, who concluded that since neither the Exchange specifications nor the Direct specifications had been broadly deployed beyond the ONC pilots, all should be judged “low.” Factors considered include:
  - Currently deployed as production offering by “x” number / percentage of vendors
  - Significant volume potential (e.g. within 12 months; full deployment, etc.)

## Exchange: Deployment, Operational, and Administrative Complexity x Industry Adoption



**Direct: Deployment, Operational, and Administrative Complexity x Industry Adoption**



## Conclusions and Recommendations

1. Architecture is important. The set of standards, services, and policies that comprise the Nationwide Health Information Network (NwHIN) must be deployable within an architectural framework capable of supporting the secure exchange of health information at a national scale.
  - Standards, services, and policies need to address transport, security, and clinical content, including standards for clinical documents and controlled vocabulary. Structured clinical documents and controlled vocabulary should be equally valuable regardless of the NwHIN secure transport used; and any NwHIN secure transport should support the full range of health information exchange, from unstructured (and perhaps incomplete) data to structured, coded data.
2. Neither the Exchange specifications nor the Direct specifications have been proven at large scale, in production environments, across a broad range of healthcare organizations. The scalability of the underlying architectures, and inherent impacts on workflow, need to be better understood. Once these specifications have been deployed at much larger scale, across a broader spectrum of healthcare users, they should be re-assessed against the criteria used in this exercise to determine suitability as a nationwide standard.
3. The Exchange specifications are highly complex, and designed to support a complex architecture that may not be appropriate for all healthcare organizations, and that may not scale to nationwide deployment today.
  - “Too many layers ... debugging is very hard due to the complexity of the layered approach ... all layered protocols have this problem, but this is the most complex we have encountered” (implementer testimony)
  - Version skew among “layered protocols” (externally specified) makes it hard to manage widespread deployments
  - *NHIN Query for Documents Specification* poses operational challenges
    - No agreed-upon way to query for specific item, such as “most recent ECG,” which forces download of large chunks of the patient's record from multiple sites
    - Does not handle images well (largely due to under-constrained specifications on how to handle extremely large files)
    - HITSP C32 (Continuity of Care Document) definitions are not precise enough to allow for seamless importing of external data elements
  - *NHIN Retrieve Documents Specification*'s method of accumulating query results may cause long delays, huge messages, and frequent time-outs
  - *NHIN Patient Discovery Specification* is at risk of being a “show stopper” for nationwide health information exchange – due to serious policy issues that drive an architecture that performs poorly, disrupts provider workflow, and poses a “serious challenge to scalability beyond a limited pilot”
4. The results from this study present opportunities for simplification, and to facilitate and encourage further deployment, we recommend the ONC take advantage of these opportunities.

- Two specifications address needs judged “low” in our analysis
    - *NHIN Access Consent Policies Specification*
    - *NHIN Health Information Event Management (HIEM) Specification*
  - *NHIN Web Services Registry Specification* – a moderately mature specification that uses technology in its declining phase of the life-cycle [Note: The Standards and Interoperability Framework team is already considering alternatives to this specification]
  - *NHIN Authorization Framework Specification* – highly complex, and alternatives exist (e.g., OAuth)
  - *NHIN Patient Discovery Specification* (highly complex, highly needed) and *NHIN Query for Documents Specification* (operational and workflow challenges)
    - Need more scalable architecture to support patient discovery
    - Because the *Query for Documents*, *Patient Discovery*, and *Retrieve Documents* specifications are usually implemented together, any alternatives should be considered within this context
5. Although the Direct specifications have been in pilot usage for only a short time (starting January this year) and have not been widely deployed beyond the pilot, the underlying transport standard (SMTP) is well-understood, widely deployed, and proven highly scalable, and the security standard (S/MIME) fulfills the EHR certification requirement for an “encrypted and integrity protected link” (45 CFR 170.210(a)(2)). The Direct specifications do introduce some new approaches that have yet to be fully developed and proven beyond the Direct Project itself, particularly around the validation and use of organization-level digital certificates and the use of DNS for certificate discovery. Given current ONC initiatives to address these risks, and recognizing the potential benefit of having a simple, easily implemented solution for exchanging EHR data within the framework of existing standards and certification criteria, we would support and encourage broader deployment and use of the Direct specifications.
6. Some areas are underspecified in the current specification set
- Exchange or remote viewing of large images
  - Discovery and retrieval of data elements (e.g., lab results) outside a “document” context
  - More granular query capability for patient records (e.g., “most recent ECG”)
- Addressing these needs may present opportunities to consider the PCAST model for data discovery using indexed metadata, combined with retrieval of the desired data element or object (e.g., image) – a model that may be more scalable for patient-discovery as well.
7. Industry is trending toward widespread use of the REST architectural style in designing networked systems – this presents an opportunity to develop new specification for RESTful exchange of healthcare information
- REST is not a “standard,” but a “style” that uses the HTTP standard communication protocol to provide a simpler alternative to SOAP for

accessing web services – not all “RESTful” implementations are implemented in the same way

- REST is not inherently secure, but can be secured using standards such as Transport Layer Security (TLS) and Open Authorization (OAuth)
- Developing specification(s) for “secure RESTful transport for healthcare exchange” would provide healthcare organizations assurance that RESTful implementations built in accordance with the specification(s) would be predictable and secured.



## Glossary

Term	Definition
<b>Direct Specifications</b>	Two (2) specification documents developed and implemented by participants in the Direct pilot; available from <a href="http://wiki.directproject.org/Documentation+Library">http://wiki.directproject.org/Documentation+Library</a>
Applicability Statement for Secure Health Transport	Describes how to use SMTP, S/MIME and X.509 certificates to securely transport health information over the internet. Standards used include (but not limited to): SMTP, MIME, S/MIME, X.509.
XDR and XDM for Direct Messaging	Describes the use of XDR and XDM zipped packages in email in the context of directed messaging for Direct Project <ul style="list-style-type: none"> <li>• XDR supports a direct push model from sender to receiver using Web Services transport</li> <li>• XDM supports a direct push model of a package of content where one of several optional transports is via SMTP</li> </ul>
<b>Evaluation Criteria</b>	Criteria that the NwHIN Power Team and its ONC support used to evaluate the Exchange and Direct specifications.
Deployment, Operational, and Administrative Complexity	Subjective assessment (low, moderate, high) that considers ease of implementation, maintenance throughout on-going operations, and administrative complexity across organizations. <ul style="list-style-type: none"> <li>• Can be handled with ease by IT support (Low)</li> <li>• Need a modest administrative support for deployment and maintenance over time (Moderate)</li> <li>• Need a substantial on-going IT investment to support the service (High)</li> </ul> Introduces administrative complexity that spans organizations; requires high degree of federation; project complexity (High)
Industry Adoption	Assessed (low, moderate, high) relative to the market segment for which the specification was developed. Initial scores were derived from responses to objective questions on Exchange usage. Scores were reviewed by the Power Team, who concluded that since neither the Exchange specifications nor the Direct specifications had been broadly deployed beyond the ONC pilots, all should be judged “low.” Factors considered include: <ul style="list-style-type: none"> <li>• Currently deployed as production offering by “x” number / percentage of vendors</li> </ul> Significant volume potential (e.g. within 12 months; full deployment, etc.)

Term	Definition
Maturity of Specification	<p>Subjective assessment (low, moderate, high) from survey conducted by NwHIN Exchange Coordinating Committee, plus ONC and NIST inputs, plus review inputs from Power Team. Factors considered include:</p> <ul style="list-style-type: none"> <li>• Specification still in development (low)</li> <li>• Clear and unambiguous (moderate)</li> <li>• Testable (moderate-high)</li> <li>• Maintainable (moderate-high)</li> </ul> <p>Fully tested and piloted (high)</p>
Maturity of Underlying Technology	<p>Subjective assessment (emerging, maturing, mature, declining) of the maturity of the technologies used in the specification, with respect to the complete technology life-cycle; plus review inputs from Power Team. Factors considered include:</p> <ul style="list-style-type: none"> <li>• New unproven standard, building industry support (emerging)</li> <li>• Gaining market adoption, but less than 30% industry adoption (maturing)</li> <li>• Mainstream adoption (mature)</li> <li>• Declining support (declining)</li> </ul>
Need	<p>Subjective judgment (low, moderate, high) from ONC, focused on whether the specification is needed for meaningful-use, federal agencies, or to meet other national needs, plus review inputs from Power Team. Factors considered include:</p> <ul style="list-style-type: none"> <li>• Lacks specific, compelling needs (low)</li> <li>• Needed for meaningful use (moderate-high, considering other 3 factors)</li> <li>• Federal agency need</li> <li>• Other National HIT needs, etc.</li> </ul>
<b>Exchange Specifications</b>	<p>Ten (10) specification documents implemented by participants in the Exchange pilot; available from <a href="http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__nhin_inventory/1486">http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__nhin_inventory/1486</a></p>
NHIN Access Consent Policies Specification	<p>Describes the content and format of access content policies covering the electronic exchange of health information between nodes and also describes how access consent policies may be exchanged among nodes. Standards used include (but not limited to): HITSP TP-20, HITSP TP-30, HITSP C80, XACML, XSPA Profile of XACML.</p>
NHIN Administrative Distribution Specification	<p>Describes specification to provide the ability to submit non-patient specific data including document based reports or discrete data from one node to another node using a “Push” mechanism. Standards used include (but not limited to): HITSP T63, OASIS EDXL.</p>

Term	Definition
NHIN Authorization Framework Specification	Describes the security and privacy foundations for every SOAP message in Exchange. It defines the exchange of metadata used to characterize the initiator of an Nationwide Health Information Network request so that it may be evaluated by responding node in local authorization decisions. Standards used include (but not limited to): XSPA Profile of SAML 2.0, WS-Security, X.509, TLS.
NHIN Document Submission Specification	Defines specification that allows an initiating Exchange node to send one or more documents for a given patient to a receiving node. Unlike Query/Retrieve and Pub/Sub, this specification does not require a prior request to retrieve a document or to subscribe to content and is categorized as a “push” transaction. Standards used include (but not limited to): IHE XDR TI, HITSP C80, MTOM SOAP Message Transmission Optimization Mechanism.
NHIN Health Information Event Messaging (HIEM) Specification	Describes specification which allows a node to request to subscribe or unsubscribe to various classes of content and events, and to notify node when content or events matching a subscription have been created or modified. Standards used include (but not limited to): OASIS WS-BaseNotification, WS-Topics.
NHIN Messaging Platform Specification	Describes the common web service protocols that must underlie every message transmitted via SOAP protocol. They represent common transport layer for all messages in Exchange. Standards used include (but not limited to): WS-I Basic Profile 2.0, SOAP 1.2, WS-*, XML Schema.
NHIN Document Submission Specification	Defines specification that allows an initiating Exchange node to send one or more documents for a given patient to a receiving node. Unlike Query/Retrieve and Pub/Sub, this specification does not require a prior request to retrieve a document or to subscribe to content and is categorized as a “push” transaction. Standards used include (but not limited to): IHE XDR TI, HITSP C80, MTOM SOAP Message Transmission Optimization Mechanism.
NHIN Health Information Event Messaging (HIEM) Specification	Describes specification which allows a node to request to subscribe or unsubscribe to various classes of content and events, and to notify node when content or events matching a subscription have been created or modified. Standards used include (but not limited to): OASIS WS-BaseNotification, WS-Topics.
NHIN Messaging Platform Specification	Describes the common web service protocols that must underlie every message transmitted via SOAP protocol. They represent common transport layer for all messages in Exchange. Standards used include (but not limited to): WS-I Basic Profile 2.0, SOAP 1.2, WS-*, XML Schema.

Term	Definition
NHIN Patient Discovery Specification	Defines the specification by which one Nationwide Health Information Network Node can query another to determine if it is a source of information for a specific patient. Standards used include (but not limited to): IHE XCPD.
NHIN Query for Documents Specification	Defines a query from one Exchange node to another, requesting a list of available patient specific documents meeting query parameters for later retrieval. Standards used include (but not limited to): IHE XCA TI, HITSP TP13, HITSP C80.
NHIN Retrieve Documents Specification	Defines specification which allows an initiating Exchange node to retrieve one or more documents for a specific patient from a responding node. The document Ids are typically (by not necessarily) obtained using Query specification. Standards used include (but not limited to): IHE XCA TI, HITSP TP13, HITSP C80.
NHIN Web Services Registry Specification	Describes the specification that allows nodes on the Nationwide Health Information Network to locate and utilize the appropriate services offered by other nodes in a controlled, secure manner. Standards used include (but not limited to): OASIS UDDI.
<b>IHE</b>	Integrating the Healthcare Enterprise, an initiative by healthcare professionals and industry to improve the way computer systems in healthcare share information
<b>Nationwide Health Information Network (NwHIN)</b>	The set of standards, services and policies that enable secure health information exchange over the Internet (ONC definition); for purposes of this evaluation, “NwHIN” refers to a collective set of specifications including NHIN Exchange, Direct, and other specifications to be defined in the future, including RESTful approaches
<b>PCAST</b>	President’s Council of Advisors on Science and Technology (PCAST) report to the President, “Realizing the Full Potential of Health Information Technology to Improve Healthcare for Americans: The Path Forward,” published December 2010
<b>REST</b>	REpresentational State Transfer – a style of system design that uses the Hypertext Transfer Protocol (HTTP) standard for communication, providing a simpler alternative to SOAP for accessing web services
<b>SMTP</b>	Simple Mail Transfer Protocol, the widely adopted Internet standard protocol for sending email messages between servers
<b>S/MIME</b>	Secure/Multipurpose Internet Mail Extensions, an Internet standard for securing email messages
<b>SMTP</b>	Simple Mail Transfer Protocol, the widely adopted Internet standard protocol for sending email messages between servers

Term	Definition
<b>SOAP</b>	Simple Object Access Protocol – an XML-based protocol for exchanging information in a decentralized, distributed environment

### **NwHIN Power Team**

- Dixie Baker (SAIC)
- Tim Cromwell (VA)
- John Feikema (Ability)
- Ollie Gray (DOD)
- Kevin Hutchinson (Prematics)
- David McCallie (Cerner)
- Nancy Orvis (DOD)
- Wes Rishel (Gartner)
- Cris Ross (SureScripts)
- Ken Tarkoff (Relay Health)
- ★ Supported by Avinash Shanbhag (ONC)