Nationwide Health Information Network (NHIN)

Trial Implementations

Service Interface Specifications

Consumer Preferences

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Document Approval

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1   Preface

1.1   Introduction

The NHIN Trial Implementations Service Interface Specifications constitute the core services of an operational Nationwide Health Information Network. They are intended to provide a standard set of service interfaces that enable Nationwide Health Information Exchange (NHIE) to NHIE exchange of interoperable health information. These services provide such functional capabilities as patient look-up, document query and retrieve, notification of consumer preferences, and access to logs for determining who has accessed what records and for what purpose for use. These functional services rest on a foundational set of messaging and security services. The current set of defined core services includes the following:

1. NHIN Trial Implementations Message Platform Service Interface Specification,
2. NHIN Trial Implementations Authorization Framework Service Interface Specification,
3. NHIN Trial Implementations Subject Discovery Service Interface Specification,
4. NHIN Trial Implementations Query for Documents Service Interface Specification,
5. NHIN Trial Implementations Document Retrieve Service Interface Specification,
6. NHIN Trial Implementations Audit Log Query Service Interface Specification,
7. NHIN Trial Implementations Consumer Preferences Service Interface Specification
8. NHIN Trial Implementations Health Information Event Messaging Service Interface Specification
9. NHIN Trial Implementations NHIE Service Registry Interface Specification
10. NHIN Trial Implementations Authorized Case Follow-Up Service Interface Specification

It is expected that these core services will be implemented together as a suite since the functional level services are dependent on the foundational services. Specifications #1 through #7 were the focus of the August 2008 testing event and September AHIC demonstrations. Specifications #1 through #9 were included in the November testing and demonstrations during the December 2008 NHIN Trial Implementations Forum.

1.2   Intended Audience

The primary audience for the NHIN Trial Implementations Service Interface Specifications is the individuals responsible for implementing software solutions that realize these interfaces for a NHIE. After reading this specification, one should have an understanding of the context in which the service interface is meant to be used, the behavior of the interface, the Web Services Description Language (WSDLs) used to define the service, any Extensible Markup Language (XML) schemas used to define the content and what "compliance" means from an implementation testing perspective.

1.3   Focus of this Specification

This document presents the NHIN Trial Implementations Consumer Preferences Service Interface Specification. The purpose of this specification is to provide the ability to exchange consumer-defined preferences regarding electronic exchange of their health information between NHIEs in support of query and retrieval services which are described in separate specifications.

1.3.1   Business Needs Supported by this Specification

A core service required of the NHIN Trial Implementations relates to the exchange of consumer preferences through the development of a consumer preferences profile and the exchange of profile information in association with the network exchange of patient information.

Several types of consumer preferences can be envisioned. This specification enables the ability of consumers to define with an NHIE and exchange through the NHIN two types of preferences:

1. a consumer's preference to be notified about the existence of data about them, and
2. a consumer's preferences for restrictions on access to data about them.

The model described in this specification could be expanded in the future to encompass other types of consumer preferences, including a consumer's preference to "opt-in" or "opt-out" of healthcare information exchange, and a consumer's ability to direct the authorized release of their health information to third parties through the conveyance of authorized release information "signed" by the patient

1.3.2   Key Attributes of the Specification

- This specification utilizes the Publish/Subscribe "Base" Specification for the definition of the Subscribe, Unsubscribe, and Notify messages.
- The specification supports the exchange of consumer preference profiles between NHIEs, That is, it is an inter-NHIE or gateway-to-gateway specification.
- This specification does not include the business rules which define how an NHIE applies the consumer preferences during network exchange activities. This may be separately addressed by NHIE-specific business rules and/or NHIN Cooperative Operating Procedures.
- The format for specifying preferences about restrictions on access to data is eXtended Access Control Markup Language (XACML), an OASIS standard.

1.3.3   Scenarios for Use

Appendix D examines five illustrative scenes of Consumer Preference Exchanges including Interaction diagrams.

1.4   Definitions

Subject: In the domain of the NHIN, the term "subject" refers to the person about whom health-care related information is being sought or provided. This type of subject can generically be thought of as a "**patient**", though the term patient is not preferred in this context because it implies that a person is actively receiving medical care, which may not be the case. The terms "**consumer**" or "**NHIN subject**" are used in this document to refer to this meaning. The identifiers that carry this meaning are fully qualified with the prefix "http://www.hhs.gov/healthit/nhin".

In the domain of access control, the term "subject" refers to the person about whom access restrictions apply – that is, the person requesting access to healthcare data. In this specification, the term "**user**" is used instead. Where "subject" is used with this meaning, it will be referred to as "**XACML subject**". The XACML specification uses the terms subject and subject role as identifiers: the context and meaning of these uses can always be determined because those identifiers are fully qualified using the prefix "urn:oasis:names:tc:xacml".

To avoid confusion over these two very different uses of the term "**subject**", the term is largely avoided in his document unless it is qualified.

Document: The term "**document**" has the same meaning as in the NHIE Query for Documents and NHIE Retrieve Documents specifications: it refers to a healthcare-related data about a consumer that is made available by an NHIE. It is important to note that a document is the unit of exchange in the NHIN, and restrictions on access to clinical data is at the level of documents. Differential access restrictions cannot be applied to content within a document.

Consumer Preferences: This term is preferred for referring to consumer empowerment tools that may cover a broad variety of use cases, including access consent, inter-NHIE exchange preferences, and third party authorizations. This term is used similarly to the term "**access consent**" as defined in the HITSP TP30 (Manage Consent Directives) transaction package. The term "**Consumer Preferences Directive**" means a single rule that a consumer applies to restrict or grant access to a document or type of document. (This corresponds to a "Rule" in XACML.) The term "**Consumer Preferences Profile**" refers to the complete collection of the consumer's preferences. (This corresponds to a "Policy" in XACML.)

The primary goal of this specification is to describe how a Consumer Preference Profile (which controls access to documents about the consumer) may be exchanged between NHIEs.

1.5 Related Documents

The following documents and standards were referenced during the development of this specification:

- WS-BaseNotification 1.3 OASIS standard (http://docs.oasis-open.org/wsn/wsn-ws_base_notification-1.3-spec-os.pdf).

- WS Addressing (http://www.w3.org/Submission/ws-addressing/)

- OASIS eXtended Access Control Markup Language (XACML) core v2.0 (http://docs.oasis-open.org/xacml/2.0/access_control-xacml-2.0-core-spec-os.pdf)

- OASIS Core and hierarchical role based access control (RBAC) profile of XACML v2.0 (http://docs.oasis-open.org/xacml/2.0/access_control-xacml-2.0-rbac-profile1-spec-os.pdf)

- IHE ITI White Paper: Publish/Subscribe Infrastructure (http://wiki.ihe.net/index.php?title=ITI_White_Paper:_Publish/Subscribe_Infrastructure)

- "Detailed Scenarios and Examples for Exchanging Consumer Preferences on the NHIN", memo to the Technical and Security Working Group, May 13, 2008. An updated version of the Example Scenario and Flow from this memo is included here as Appendix D.

- HITSP/TP-20, "Access Control Transaction Package".

- HITSP/TP-30, "Manage Consent Directives Transaction Package".

- NHIN Trial Implementations Publish/Subscribe "Base" Specification.

1.6 Relationship to HITSP Constructs

This specification covers only a portion of the complete Access Control infrastructure described by HITSP/TP-20, "Access Control Transaction Package." In the terms used in TP-20, the capability of the NHIE that may send and receive Consumer Preferences Profiles using the transactions defined in this document is the "Service Provider Access Control Service."

TP-20 implies the need for a complete vocabulary to describe Consumer Preferences Profiles using XACML; that vocabulary is provided in this specification. This specification also incorporates some of the vocabulary for Role-based Access Control from the XACML-RBAC specification. In terms used by XACML, this specification defines the precise format and content of Policies that would be used by a "Policy Decision Point" to make a "permit or deny" decision about a particular request. This specification does not imply that an NHIE must implement the architecture implied by XACML (using Policy Enforcement Point and Policy Decision Point) – it merely defines the transactions and content standards for exchanging Consumer Preferences Profiles. These Profiles may be used in whatever manner is appropriate for the receiving NHIE. This specification does not address the "Request Context" (as that term is defined in XACML). The processing of a request for access to clinical data and the granting or denying of that request is internal to an NHIE.

This specification does not adhere to the recommendations of HITSP/TP-30, "Manage Consent Directives Transaction Package." TP-30 envisions a network where Consent Directives are stored as CDA documents as defined by the IHE Basic Patient Privacy Consents (BPPC) profile, and exchanged using the XDS Document Sharing protocols.

This specification rejects the approach of TP-30 for the following reasons:
- BPPC is built on the Cross-Enterprise Document Sharing (XDS) profile of IHE, but a minority of the NHIEs participating in the NHIN Trial Implementation utilize an XDS-based architecture internally.
- TP-30 was created to address the consent management needs of the first 3 AHIC use cases, adopted in 2005. It specifically does not address the complete range of use cases for the NHIN Trial Implementation, significantly not including the Consumer Access to Clinical Information Use Case.

- BPPC attaches a single Privacy Consent Policy to a clinical document at the time that the document is stored in the HIE; the only mechanism for changing the Consent Policy associated with a document is to replace the entire document.
- BPPC refers to externally defined policies, but provides no guidance on the precise format of those policies, meaning that there is no mechanism to ensure that any two entities could mutually enforce each others' policies.

1.7 Relationship to other NHIN Cooperative Specifications

This specification relies on the NHIN Subject Discovery Interface specification as a precondition.

This specification uses the Subscribe, Unsubscribe, and Notify messages defined in the NHIN Publish/Subscribe "Base" Specification.

This specification utilizes the transmission and security standards identified in the NHIN Messaging Platform Interface Specification and NHIN Authorization Framework. Specifically, each transaction identified in this specification must contain assertions about the identity and role of the user or system initiating the request. The specific values that must be present on those assertions are defined in the Publish/Subscribe "Base" Specification.

This specification calls for the use of the NHIN Retrieve Documents specification to complete the transfer of Access Consent Directives and clinical documents about which notification is provided.

1.8 Enforcement of Access Consent Policies

This specification does not describe the obligations of an NHIE to enforce a patient's Consumer Preferences Profile that has been created in and retrieved from another NHIE. The enforcement of these Access Consent Policies are assumed to be a matter of NHIE policy. Two specific areas regarding this enforcement should be mentioned, however.

This specification would allow an NHIE to obtain multiple Consumer Preferences Profiles applying to the same consumer. An NHIE must have a mechanism to resolve conflicts among those policies during enforcement.

The Consumer Preferences Profiles themselves make no reference to the possibility of being overridden in emergency situations. The NHIN Authorization Framework allows requests to retrieve documents to carry a purpose for use of "Emergency". It is up to an NHIE to determine if a purpose for use of "emergency" is cause to suspend a consumer's Consumer Preferences Profile and provide access to a document when that access might not otherwise be allowed.

2 Interface Description

2.1 Definition

This specification defines how NHIEs can request and receive information about the following types of content:

1. A Consumer Preferences Profile, and
2. A consumer's preference about when to be notified when new healthcare-related data is available.

This specification uses the WS-Base Notification standard from OASIS to carry these requests, and the fulfillment of these requests. The use of WS-Base Notification is described in detail in the NHIN Publish/Subscribe "Base" Specification.

This specification treats a Consumer Preferences Profile as a document for the purposes of exchanging it between NHIEs. So the message format for the two different content types is very similar, with only a

specific document class code used to distinguish whether the subscription pertains to a Consumer Preferences Profile or a clinical document.

2.2 Triggers

The following triggers apply to Subscribe, Unsubscribe, and Notify messages for the two types of content described above:

1. Establish a subscription for a Consumer Preferences Profile: An NHIE may subscribe to updates to a Consumer Preferences Profile when it learns (via the NHIN Subject Discovery interface) that a consumer known in the NHIE ("local NHIE") is also known in a second ("foreign") NHIE.

2. Terminate a subscription for a Consumer Preferences Profile: An NHIE shall terminate its subscription for a consumer's Consumer Preferences Profile when it removes that consumer from its registry of consumers (patients). Note that the NHIN does not currently establish any rules or policies governing when a consumer should be removed from its patient registry.

3. Notify a subscriber of changes to a Consumer Preferences Profile: An NHIE that has accepted a subscription for a Consumer Preferences Profile should send a notification message to the subscribing NHIE whenever that Consumer Preferences Profile has been modified. It should also send a notification message when accepting a subscription for a Consumer Preferences Profile and such a Profile already exists, allowing the subscriber to retrieve the current version.

4. Establish a subscription to be notified about new documents: An NHIE may subscribe to be notified about new documents when it learns (via the NHIN Subject Discovery interface) that a consumer known in the NHIE ("local NHIE") is also known in a second ("foreign") NHIE, **and** the consumer has established such notification preferences in the local NHIE. An NHIE should not reflect a foreign NHIE's subscription to a third NHIE – the local NHIE must issue a subscribe request only when the consumer has established the notification preferences locally.

5. Terminate a subscription to be notified about new documents. An NHIE shall terminate its subscription to be notified about new documents when it removes that consumer from its registry of consumers (patients). Note that the NHIN does not currently establish any rules or policies governing when a consumer should be removed from its patient registry.

6. Notify a subscriber when a new document is available. An NHIE that has accepted a subscription for notification of new documents should send a notification message to the subscribing NHIE when a new document about that consumer is available in the NHIE. "Available" can be interpreted by the NHIE according to its policies regarding review of documents before they can be accessed by certain users (for example, the consumer).

2.3 Transaction Standard

The transactions used to implement the exchange of Consumer Preferences Profiles are the Subscribe, Unsubscribe, and Notify messages defined in the Publish/Subscribe "Base" Specification.

2.4 NHIE Core Services

The following NHIE Core Services are addressed by this specification:

- Data Services: Support for notification of the availability of new or updated data

- Consumer Services: Management of consumer-identified locations for the storage of their personal health records

- Consumer Services: Support of consumer information location requests and data routing to consumer-identified personal health records

▪ Consumer Services: Management of consumer-controlled providers of care and access permissions information

2.5   Technical Pre-conditions

The following technical pre-conditions exist for this interface specification:

- An NHIE has performed the NHIN Subject Discovery Interface and identified that it has a consumer in common with another NHIE.

2.6   Technical Post-conditions
The following technical post-conditions will results after the execution of this interface specification:

- NONE

3   Interface Definition

3.1   Message Syntax

The messages defined in this specification utilize elements defined in several different places, as described in the following table. Readers and implementers are urged to pay careful attention to the XML namespaces used in this document.

Namespace prefix used in this document	Full namespace identifier	Description
wsnt	http://docs.oasis-open.org/wsn/b-2	WS-Base Notification standard
wsa	http://www.w3.org/2005/08/addressing	WS-Addressing standard
nhin	http://www.hhs.gov/healthit/nhin	Defined by this specification in Appendix A
xacml	urn:oasis:names:tc:xacml:2.0:policy:schema:os	XACML standard
rim	urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0	ebXML Registry Information Model
ihe	urn:ihe:iti:xds-b:2007	IHE XDS.b schema
rs	urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0	Registry

The basic message syntax for the Subscribe, Unsubscribe, and Notify messages can be found in the NHIN Publish/Subscribe "Base" Specification. The next section describes the content of these messages that is specific to the exchange of the Consumer Preferences Profile.

3.2   Listing of base standard(s)

- WS-BaseNotification 1.3 OASIS standard (http://docs.oasis-open.org/wsn/wsn-ws_base_notification-1.3-spec-os.pdf).
- WS Addressing (http://www.w3.org/Submission/ws-addressing/)
- OASIS eXtended Access Control Markup Language (XACML) core v2.0 (http://docs.oasis-open.org/xacml/2.0/access_control-xacml-2.0-core-spec-os.pdf)
- OASIS Core and hierarchical role based access control (RBAC) profile of XACML v2.0 (http://docs.oasis-open.org/xacml/2.0/access_control-xacml-2.0-rbac-profile1-spec-os.pdf)
- IHE XDS.b (http://www.ihe.net/Technical_Framework/index.cfm#IT)

3.3   Content Semantics

This section describes unique content requirements for the content within the Subscribe or Notify messages. (The Unsubscribe message has no content.)

3.3.1   Subscribe to Update of Consumer Preferences Profile

The content of the Subscribe to Update of a Consumer Preferences Profile is the <rim:AdhocQuery> element as defined by XDS.b. The NHIN Subject ID of the consumer, as that consumer is known in the NHIE to which the subscription request is addressed, must be supplied using the $XDSDocumentEntryPatientId slot.

When used to request a subscription to updates of the consumer's Consumer Preferences Profile, the AdhocQuery element must contain a slot with the name "$XDSDocumentEntryClassCode", with the class code value "XNHIN-CONSENT". The intent is that this code is used as an extension code in the LOINC code set until a LOINC document code representing the Consumer Preferences Profile document can be created. A slot for the $XDSDocumentEntryClassCodeScheme is not required. Other slots defined by XDS.b must not be present.

3.3.2   Notify of Update to Consumer Preferences Profile

The Notify message used for Notification of Update to a Consumer Preferences Profile contains information required to allow the recipient to retrieve the Consumer Preferences Profile using the NHIN Retrieve Documents transaction. The content of the Notify message is an <ihe:RetrieveDocumentSetRequest> element, containing the three pieces of information required for the end-user to retrieve the updated Consumer Preferences Profile: (1) the Home Community ID of the NHIE making the document available, (2) the Repository Unique ID, and (3) the Document Unique ID. Although the IHE schema allows multiple DocumentRequest elements inside the <RetrieveDocumentSetRequest>, only one DocumentRequest element may be present in a Notify message when used for notification of an updated Consumer Preferences Profile.

The Home Community ID an NHIE sends in the notification of updated Consumer Preferences Profile must be a "well-known" Home Community ID that has been made available to other NHIEs, and will allow the notified NHIE to know where to address the subsequent Retrieve Documents request. Per the NHIN Query Documents and Retrieve Documents specifications, the Home Community ID is an OID.

An NHIE must only use the Notification of Update to Consumer Preferences Profile to inform other NHIEs about Consumer Preferences Profiles that are created locally. In other words, an NHIE must not reflect a foreign NHIEs Profile to a third NHIE on a Notify message.

Upon receipt of a Notify message for Update to a Consumer Preferences Profile, the receiving NHIE should issue a Retrieve Documents transaction using the parameters from the Notify.

The Notifying NHIE should respond with a document containing the NHIE Consumer Preferences Profile, as described in the next section. The Notifying NHIE may apply whatever role-based authorization and access consent it deems necessary before fulfilling the Retrieve Documents request.

There is no requirement that the Consumer Preferences Profile exist in the form of a document coded using XACML prior to being retrieved – the NHIE may generate the Consumer Preferences Profile document on demand. Further, it is not anticipated that an NHIE will return metadata about the Consumer Preferences Profile document on a Document Query Response. In other words, the Consumer Preferences Profile should not be visible on Document Queries.

3.3.3   Contents of the NHIE Consumer Preferences Profile Document

The Consumer Preferences Profile document is an XML document following the XACML standard. It's top level element is <xacml:Policy>, and the document must contain the entire content of the Consumer Preferences Profile for the consumer – there is no facility for exchanging only the updated portion of a Consumer Preferences Profile. This section represents a "profile" for the use of XACML for the exchange of Consumer Preferences Profile.

This specification allows Consumer Preferences Profile to apply Consumer Preferences Directives against the following attributes:

- The consumer (patient) ID.
- The role of the user requesting access.
- The Document Class code for the document being requested
- The Unique Document ID of the document being requested
- The start date/end date of the access consent directive
- Action. This version of the specification applies the directive to a single action, "Retrieve Documents". An NHIE may choose to apply these same access restrictions against the "Query Documents" operation.
- The unique user ID of the user requesting access. (Currently, NHIEs will not have the capability to implement a restriction against a specific user, since there is no model for exchanging user identities contemplated in the NHIN Cooperative specifications. However, this specification includes the capability because it is an anticipated future capability, and imposes almost no additional complexity on the specification.)
- The Purpose for Use of the operation, specified using the coded vocabulary defined in the NHIN Authorization Framework.

Only the consumer ID and Action are required, and they are attributes of the Policy. The other attributes are applied to a Rule.

The following table lists these attributes, the Attribute Type that represents the attribute in XACML, and the identifier for the data type of the attribute.

Attribute	Attribute Type identifier	Data Type Identifier
Consumer (patient) ID	http://www.hhs.gov/healthit/nhin#subject-id	http://www.hhs.gov/healthit/nhin#instance-identitifer
Action	urn:oasis:names:tc:xacml:2.0:action	http://www.w3.org/2001/XMLSchema#anyURI
User role	urn:oasis:names:tc:xacml:2.0:subject:role	http://www.w3.org/2001/XMLSchema#string
Document Class code	http://www.hhs.gov/healthit/nhin#document-class	http://www.w3.org/2001/XMLSchema#string
Unique Document ID	http://www.hhs.gov/healthit/nhin#document-id	http://www.w3.org/2001/XMLSchema#string
Rule start date	http://www.hhs.gov/healthit/nhin#rule-start-date	http://www.w3.org/2001/XMLSchema#date
Rule end date	http://www.hhs.gov/healthit/nhin#rule-end-date	http://www.w3.org/2001/XMLSchema#date
User ID	urn:oasis:names:tc:xacml:1.0:subject:subject-id	urn:oasis:names:tc:xacml:1.0:data-type:rfc822Name
Purpose for Use	http://www.hhs.gov/healthit/nhin#purpose-for-use	http://www.w3.org/2001/XMLSchema#string

A Consumer Preferences Profile may contain a <Resources> element with a list of Document Class Codes, or a list of Unique Document IDs, but not a mix of both. Similarly, a Consumer Preferences Profile may contain a <Subjects> element with a list of user roles, or a list of user IDs, but not a mix of both. Rule start and end date, and Purpose for Use, are specified (when present) using the <Environments> element.

The following table describes the location within the XACML Document of each of these attributes, and specific content requirements for each attribute. The Attribute Type identifier from the table above is found in the Attribute Designator element corresponding to the type of "match" – either <EnvironmentAttributeDesignator>, <SubjectAttributeDesignator>, or <ResourceAttributeDesignator>.

Attribute	Attribute location (XPath)	Content Requirements
Consumer (patient) ID	/Policy/Target/Environments/Environment/ EnvironmentMatch/AttributeValue/nhin:PatientId	Root and extension attribute. The consumer ID will be the ID by which the consumer is known in the NHIE that is the source of the Consumer Preferences Profile. When a Consumer Preferences Profile is retrieved by another NHIE,

		this patient ID should be translated by the retrieving NHIE to the ID by which the consumer is known in the retrieving NHIE.
Action	/Policy/Target/Actions/Action/ActionMatch/ AttributeValue	Fixed to http://www.hhs.gov/healthit/nhin#retrieveDocuments
User role	/Policy/Rule/Target/Subjects/Subject/ SubjectMatch/AttributeValue	Must be a Role Code defined in the NHIN Authorization Framework specification. These are SNOMED CT codes
Document Class code	/Policy/Rule/Target/Resources/Resource/ ResourceMatch/AttributeValue	Must be a Document Class code defined in the NHIN Core Services Content specification. These are LOINC codes.
Unique Document ID	/Policy/Rule/Target/Resources/Resource/ ResourceMatch/AttributeValue	As defined in IHE XDS.b profile.
Rule start date	/Policy/Rule/Target/Environments/Environment/ EnvironmentMatch/AttributeValue	In XML date format.
Rule end date	/Policy/Rule/Target/Environments/Environment/ EnvironmentMatch/AttributeValue	In XML date format.
User ID	/Policy/Rule/Target/Subjects/Subject/ SubjectMatch/AttributeValue	As an e-mail address.
Purpose for Use	/Policy/Rule/Target/Environments/Environment/ EnvironmentMatch/AttributeValue	Must be a Purpose for Use code defined in the NHIN Authorization Framework.

Consistent with this list of attributes, the following "match functions" are required to evaluate the rules. The last item on this list is newly defined by this specification. No other match functions should be included in Consumer Preferences Profiles exchanged among NHIEs.

- urn:oasis:names:tc:xacml:1.0:function:string-equal
- urn:oasis:names:tc:xacml:1.0:function:date-greather-than-or-equal
- urn:oasis:names:tc:xacml:1.0:function:date-less-than-or-equal
- urn:oasis:names:tc:xacml:1.0:function:rfc822Name-match
- http://www.hhs.gov/healthit/nhin/function#instance-identifier-equal . This function is defined to return true if both the "root" and "extension" attribute of the specified attribute value match the value provided in the request context, using a case-sensitive compare in the case of the "extension".

NHIEs should support the following rule-combining algorithms in evaluating Consumer Preferences Profile:

- Deny-overrides
- Permit-overrides
- First-applicable

A Policy may be defined in such a way that no Rule within the policy applies to any particular access request. An NHIE must have a "default rule" that either permits or denies access in these cases. This specification does not indicate a preference for a default policy of "permit" or "deny", but recommends that which policy is in effect be made clear to people whose healthcare-related data is stored in the NHIE.

A set of example XACML Policy documents is found in Appendix A.

3.3.4 Subscribe to Notification of new document availability

The content of the Subscribe to Notification of new document availability message is the <rim:AdhocQuery> element as defined by XDS.b. The NHIN Subject ID of the consumer, as that consumer is known in the NHIE to which the subscription request is addressed, must be supplied using the $XDSDocumentEntryPatientId slot.

The AdhocQuery element may also optionally contain one or more Document Class codes, using the $XDSDocumentEntryClassCode slot, listing the document classes for which notification is desired. If no

Document Class Code slot is present, then all documents for the consumer should trigger a notification. The class code is as defined by the NHIN Core Services Content specification. Since the NHIN Content specification requires the use of LOINC codes for document classes, the $XDSDocumentEntryClassCodeScheme is not required. The Class Code "XNHIN-CONSENT", defined in this specification to represent Consumer Preferences Profile documents, must not be included in a list with other document class codes.

Other slots defined by XDS.b are not supported by this specification.

3.3.5 Notification of new document availability

The Notification of new document availability contains an <ihe:RetrieveDocumentSetRequest> element, containing the three pieces of information required for the end-user to retrieve the new document: (1) the Home Community ID of the NHIE making the document available, (2) the Repository Unique ID, and (3) the Document Unique ID. This is the same element that will be required by the recipient of the Notification to retrieve the document. This element allows multiple instances of these three pieces of information (in the <DocumentRequest> element). NHIEs may utilize this capability to send multiple notifications of document availability under the same subscription in a single notify message.

The Home Community ID an NHIE sends in the notification of new document availability must be a "well-known" Home Community ID that has been made available to other NHIEs and will allow the notified NHIE to know where to address the subsequent Retrieve Documents request. Per the NHIN Query Documents and Retrieve Documents specification, the Home Community ID is an OID.

3.3.6 Notification of Authorization for Release of Information

The Notify message defined by the NHIN Health Information Event Messaging specification may be used to send a Consumer Preferences Profile to another NHIE in the absence of a subscription. This may be done in a situation when:

- One NHIE (the "authorized entity") has a relationship with an individual (consumer), and the individual has authorized persons within that NHIE to access their medical information, and

- A second NHIE (the "medical data holder") not established a subscription to receive the individual's Consumer Preferences Profile, because it is not aware that the individual is known in the first NHIE.

The "prototype" for this use of the Consumer Preferences Profile is the Social Security Administration (SSA) and the "Release of Information to an Authorized Entity" use case. In this scenario, the individual applies to Social Security Administration for disability insurance. The individual signs a form indicating the names and locations of their medical care providers, and authorizes SSA to receive their medical records from these providers. SSA (which is an NHIE) performs a Subject Discovery Query to learn about other NHIEs where the individual has medical records – this Subject Discovery Query may be directed to specific NHIEs based on information the disability applicant provided. Then, SSA issues a Notify containing a Consumer Preference Profile document that encodes the individual's authorization for SSA to access their medical records.

Since this Consumer Preference Profile from SSA may contradict consumer preferences the individual had earlier established with the "medical data holder" NHIE, the Notify message also contains a document that contains evidence of the individual's authorization. For SSA, that evidence will take the form of an image of the disability applicant's signed form authorizing the release of medical records.

The Notify message for the Authorization for Release of Information is represented using the RetrieveDocumentSetResponse element from the NHIN Retrieve Document specification. This element is contained in a new "AuthorizedRelease" element defined in the "http://www.hhs.gov/healthit/nhin" namespace.

The Notify message does not contain a SubscriptionReference, since there is no explicit subscription. It does contain a Topic element (as defined by WS-Base Notification), specifying:

- a Dialect (attribute) of "http:/docs.oasis-open.org/wsn/t-1/TopicExpression/Simple"
- a Topic Expression (text) of nhin:AuthorizedRelease (where "nhin" is a namespace prefix bound to the namespace "http://www.hhs.gov/healthit/nhin" in the Notify message).

A format definition of this Notify message follows, using the namespace identifiers from the table in Section 3.1.

```
<wsnt:Notify>
  <wsnt:NotificationMessage>
    <wsnt:Topic Dialect="http:/docs.oasis-open.org/wsn/t-1/TopicExpression/Simple">
        nhin:AuthorizedRelease
    </wsnt:Topic>
    <wsnt:Message>
      <nhin:AuthorizedRelease>
        <ihe:RetrieveDocumentSetResponse>
          <rs:RegistryResponse
                  status="urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Success">
          <ihe:DocumentResponse>
           <!-- as defined by Retrieve Document spec, a Document Response containing the
                  evidence for the authorized release.                     -->
          </ihe:DocumentResponse>
          <ihe:DocumentResponse>
           <!-- as defined by Retrieve Document spec, a Document Response containing the
                  XACML of the Consumer Preferences Profile                 -->
          </ihe:DocumentResponse>
        </ihe:RetrieveDocumentSetResponse>
      </nhin:AuthorizedRelease>
    </wsnt:Message>
  </wsnt:NotificationMessage>
</wsnt:Notify>
```

In this situation, the patient ID inside the XACML policy document must be the patient ID of the individual as known in the receiving NHIE.

3.4   Constraints and Extensions

The XACML standard upon which the Consumer Preferences Profile content is based is designed to be extended, through identified extension points. The extensions described in this specification are consistent with the intended use of those extension points.

Constraints on XACML identified in this document are:
- Only the attribute types, data types, and match functions identified in this document may be used to specify an NHIE Consumer Preferences Profile.
- Each NHIE Consumer Preferences Profile must have a Target element (an attribute of the Policy, not its rules) that identifies one and only one consumer to whom the policy applies, and specifies the action "Retrieve Documents".

Constraints on XDS.b identified in this document are:
- Only the XDSDocumentEntryPatientId and XDSDocumenEntryClassCode slots may be present in the AdhocQuery element of the Subscription request.

3.5   Sample Messages

These sample messages correspond to the example scenario in Appendix D, which is taken from the "Detailed Scenarios and Examples for Exchanging Consumer Preferences on the NHIN", memo to the Technical and Security Working Group, May 13, 2008. SOAP headers are not shown.

3.5.1 Sample Subscribe and SubscribeResponse to Update of Consumer Preferences Profile

```
<wsnt:Subscribe xmlns:wsnt="http://docs.oasis-open.org/wsn/b-2"
    xmlns:wsa="http://www.w3.org/2005/08/addressing"
    xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0">

    <wsnt:ConsumerReference>
        <!-- this is the endpoint to notify -->
        <wsa:Address>https://csnhintiapps03.cgifederal.com:6151/Subscribe
        </wsa:Address>
    </wsnt:ConsumerReference>

    <rim:AdhocQuery id="urn:uuid:14d4debf-8f97-4251-9a74-a90016b0af0d">
        <rim:Slot name="$XDSDocumentEntryPatientId">
            <rim:ValueList>
                <!-- this is the patient ID as known by NCHICA -->
                <rim:Value>222498764^^^&amp;2.16.840.1.113883.3.18.103&amp;ISO</rim:Value>
            </rim:ValueList>
        </rim:Slot>
        <!--  this ClassCode indicates the Access Consent Policy Document -->
        <rim:Slot name="$XDSDocumentEntryClassCode">
            <rim:ValueList>
                <rim:Value>XNHIN-CONSENT</rim:Value>
            </rim:ValueList>
        </rim:Slot>
    </rim:AdhocQuery>
</wsnt:Subscribe>
```

3.5.2 Sample Notify of Update to Consumer Preferences Profile

```
<wsnt:Notify xmlns:wsnt="http://docs.oasis-open.org/wsn/b-2"
    xmlns:ihe="urn:ihe:iti:xds-b:2007">

    <wsnt:NotificationMessage>
        <wsnt:Message>
            <ihe:RetrieveDocumentSetRequest>
                <ihe:DocumentRequest>
                    <ihe:HomeCommunityId> 2.16.840.1.113883.3.18.103</ihe:HomeCommunityId>
                    <ihe:RepositoryUniqueId> 2.16.840.1.113883.3.18.103.12
                     </ihe:RepositoryUniqueId>
                    <ihe:DocumentUniqueId>20cf14fb-b65c-4c8c-a54d-b0cca8341234
                    </ihe:DocumentUniqueId>
                </ihe:DocumentRequest>
            </ihe:RetrieveDocumentSetRequest>
        </wsnt:Message>
    </wsnt:NotificationMessage>

</Notify>
```

3.5.3 Sample Subscribe and SubscribeResponse to Notification of new document availability

```
<wsnt:Subscribe xmlns:wsnt="http://docs.oasis-open.org/wsn/b-2"
    xmlns:wsa="http://www.w3.org/2005/08/addressing"
    xmlns:nhin="http://www.hhs.gov/healthit/nhin"
    xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0">

    <wsnt:ConsumerReference>
        <!-- this is the endpoint to notify -->
        <wsa:Address>http://www.nchica.org/NHIN_NotificationService
        </wsa:Address>
        <wsa:ReferenceParameters>
            <nhin:UserAddress>dizzy@capmed.com</nhin:UserAddress>
        </wsa:ReferenceParameters>
    </wsnt:ConsumerReference>

    <rim:AdhocQuery id="urn:uuid:14d4debf-8f97-4251-9a74-a90016b0af0d">
        <rim:Slot name="$XDSDocumentEntryPatientId">
            <rim:ValueList>
                <!-- this is the patient ID as known by CareSpark -->
```

```
                <rim:Value>15794^^^&amp;2.16.840.1.113883.3.106.12.5&amp;ISO</rim:Value>
            </rim:ValueList>
        </rim:Slot>
        <!--  omit this ClassCode element to indicate all documents -->
        <rim:Slot name="$XDSDocumentEntryClassCode">
            <rim:ValueList>
                <!-- class code for Summarization of Episode Note (CCD) and Lab documents-->
                <rim:Value>('34133-9', '11502-2')</rim:Value>
            </rim:ValueList>
        </rim:Slot>
    </rim:AdhocQuery>
</wsnt:Subscribe>
```

3.5.4   Notification of new document availability

```
<wsnt:Notify xmlns:wsnt="http://docs.oasis-open.org/wsn/b-2"
    xmlns:ihe="urn:ihe:iti:xds-b:2007">

    <wsnt:NotificationMessage>
        <wsnt:Message>
            <ihe:RetrieveDocumentSetRequest>
                <ihe:DocumentRequest>
                    <ihe:HomeCommunityId>2.16.840.1.113883.3.106.12</ihe:HomeCommunityId>
                    <ihe:RepositoryUniqueId>2.16.840.1.113883.3.106.7.55
                     </ihe:RepositoryUniqueId>
                    <ihe:DocumentUniqueId>20cf14fb-b65c-4c8c-a54d-b0cca834c18c
                    </ihe:DocumentUniqueId>
                </ihe:DocumentRequest>
            </ihe:RetrieveDocumentSetRequest>
        </wsnt:Message>
    </wsnt:NotificationMessage>
</wsnt:Notify>
```

4   Error Handling

This section describes error responses that may be returned in response to the Subscribe, and Unsubscribe messages identified in this specification. Unless otherwise noted, other faults defined by WS-Base Notification should not be used.

4.1   Subscribe to Update of Consumer Preferences Profile

If the responding NHIE does not support Notification of Consumer Preferences Profiles, then it should return the NotifyMessageNotSupportedFault defined by WS-Base Notification.

If the consumer referred to in the Subscription request is not known to the responding NHIE, then it should return the ResourceUnknownFault defined by WS-Base Notification. This scenario should not occur, since establishing the consumer's ID via the NHIN Subject Discovery Interface is a precondition to requesting a subscription.

If the responding NHIE does not currently have a Consumer Preferences Profile for the consumer, it should accept the Subscription request. This will ensure that if the consumer establishes a Consumer Preferences Profile in the future, it will be communicated to other NHIEs where the consumer is known.

4.2   Unsubscribe to Update of Consumer Preferences Profile

Faults should be sent as described by WS-Base Notification.

4.3   Notify of Update of Consumer Preferences Profile

No response is expected to a Notify message.

4.4   Subscribe to Notification of new document availability

If the responding NHIE does not support Notification of new documents, then it should return the NotifyMessageNotSupportedFault defined by WS-Base Notification.

If the consumer referred to in the Subscription request is not known to the responding NHIE, then it should return the ResourceUnknownFault defined by WS-Base Notification. This scenario should not occur, since establishing the consumer's ID via the NHIN Subject Discovery Interface is a precondition to requesting a subscription.

4.5   Unsubscribe to Notification of new document availability

Faults should be sent as described by WS-Base Notification.

4.6   Notification of new document availability

No response is expected to a Notify message.

5   Auditing

An NHIE should create an "Export" audit event when sending a Notify message to another NHIE.

An NHIE should create an "Import" audit event when receiving a Notify message to another NHIE.

NHIEs are encouraged to create audit events when requesting, terminating, or accepting subscriptions.

6   Potential Future Considerations

1. Extend the Consumer Preferences Profile to refer to other Actions besides "Retrieve Documents".
2. Allow the exchange of Preferences Profiles that are not tied to a consumer.
3. Support other slots (parameters) in the notification of new documents subscription request.
4. Extend the attributes against which a Consent Policy can be applied to include Confidentiality Code, and develop a vocabulary for Confidentiality Code that corresponds to types of data consumers might wish to remain confidential.

7 Appendix A – Example XACML Consumer Preferences Profiles

The following examples demonstrate various aspects of representing an Consumer Preferences Profile in XACML. There are descriptive comments within each sample.

7.1 Sample XACML #1

```
<Policy xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
    xmlns:nhin="http://www.hhs.gov/healthit/nhin"
    PolicyId="12345678-1234-1234-1234-123456789abc"
    RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining-algorithm:first-applicable">
    <Description>Sample XACML policy showing access by user role</Description>

<!-- The Target element at the Policy level identifies the subject to whom the Policy applies -->
    <Target>
        <Actions>
            <Action>
                <ActionMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                    <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#anyURI">
                        http://www.hhs.gov/healthit/nhin#retrieveDocument
                    </AttributeValue>
                    <ActionAttributeDesignator AttributeId="urn:oasis:names:tc:xacml:2.0:action"
                        DataType="http://www.w3.org/2001/XMLSchema#anyURI"/>
                </ActionMatch>
            </Action>
        </Actions>

        <Environments>
            <Environment>
 <EnvironmentMatch MatchId="http://www.hhs.gov/healthit/nhin/function#instance-identifier-equal">
            <AttributeValue DataType="http://www.hhs.gov/healthit/nhin#instance-identitifer">
              <nhin:PatientId root="2.16.840.1.113883.3.18.103" extension="00375"/>
            </AttributeValue>
                    <EnvironmentAttributeDesignator
             AttributeId="http://www.hhs.gov/healthit/nhin#subject-id"
             DataType="http://www.hhs.gov/healthit/nhin#instance-identitifer"/>
         </EnvironmentMatch>
            </Environment>
        </Environments>
    </Target>

    <Rule RuleId="122" Effect="Deny">
        <Description>Deny nurses access to mental health documents</Description>
        <Target>
            <Subjects>
                <Subject>
                    <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                        <AttributeValue
    DataType="http://www.w3.org/2001/XMLSchema#string">106292003</AttributeValue>
                        <SubjectAttributeDesignator
    AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
    DataType="http://www.w3.org/2001/XMLSchema#string"/>
                    </SubjectMatch>
                </Subject>
            </Subjects>
            <Resources>
                <Resource>
                    <ResourceMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                    <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">34903-5
                    </AttributeValue>
                    <ResourceAttributeDesignator
        AttributeId="http://www.hhs.gov/healthit/nhin#document-class"
        DataType="http://www.w3.org/2001/XMLSchema#string"/>
                    </ResourceMatch>
                </Resource>
            </Resources>
        </Target>
    </Rule>
```

```xml
    <Rule RuleId="123" Effect="Permit">
        <Description>Permit access to all documents to all physicians and nurses</Description>
        <Target>
            <Subjects>
                <Subject>
                    <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                        <!-- coded value for physicians -->
                        <AttributeValue
    DataType="http://www.w3.org/2001/XMLSchema#string">112247003</AttributeValue>
                        <SubjectAttributeDesignator
    AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
    DataType="http://www.w3.org/2001/XMLSchema#string"/>
                    </SubjectMatch>
                    <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                        <!-- coded value for nurses -->
                        <AttributeValue
    DataType="http://www.w3.org/2001/XMLSchema#string">106292003</AttributeValue>
                        <SubjectAttributeDesignator
    AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
    DataType="http://www.w3.org/2001/XMLSchema#string"/>
                    </SubjectMatch>
                </Subject>
            </Subjects>
            <!-- since there is no Resource element, this applies to all resources -->
        </Target>
    </Rule>

    <Rule RuleId="124" Effect="Permit">
        <Description>Permit access to any Psychiatrist for mental health related
documents</Description>
        <Target>
            <Subjects>
                <Subject>
                    <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                        <AttributeValue
    DataType="http://www.w3.org/2001/XMLSchema#string">80584001</AttributeValue>
                        <SubjectAttributeDesignator
     AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
    DataType="http://www.w3.org/2001/XMLSchema#string"/>
                    </SubjectMatch>
                </Subject>
            </Subjects>
            <Resources>
                <Resource>
                    <ResourceMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                     <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">34903-5
                    </AttributeValue>
                        <ResourceAttributeDesignator
         AttributeId="http://www.hhs.gov/healthit/nhin#document-class"
        DataType="http://www.w3.org/2001/XMLSchema#string"/>
                    </ResourceMatch>
                </Resource>
            </Resources>
        </Target>
    </Rule>

    <Rule RuleId="125" Effect="Deny">
        <Description>deny all access to documents.  Since this rule is last, it will be selected
if no other rule applies.</Description>
        <Target/>
    </Rule>
</Policy>
```

7.2   Sample XACML #2

```xml
<Policy xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
    xmlns:nhin="http://www.hhs.gov/healthit/nhin"
    PolicyId="12345678-1234-1234-1234-123456781234"
    RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining-algorithm:first-applicable">
```

```
        <Description>Sample XACML policy showing access to a user role for a limited time
period</Description>

<!-- The Target element at the Policy level identifies the subject to whom the Policy applies -->
    <Target>
      <Actions>
        <Action>
          <ActionMatch
           MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
            <AttributeValue
            DataType="http://www.w3.org/2001/XMLSchema#anyURI">
              http://www.hhs.gov/healthit/nhin#retrieveDocuments
            </AttributeValue>
            <ActionAttributeDesignator
             AttributeId="urn:oasis:names:tc:xacml:2.0:action"
             DataType="http://www.w3.org/2001/XMLSchema#anyURI"/>
          </ActionMatch>
        </Action>
      </Actions>
      <Environments>
        <Environment>
<EnvironmentMatch MatchId="http://www.hhs.gov/healthit/nhin/function#instance-identifier-equal">
       <AttributeValue DataType="http://www.hhs.gov/healthit/nhin#instance-identitifer">
                    <nhin:PatientId root="2.16.840.1.113883.3.18.103" extension="00375"/>
               </AttributeValue>
               <EnvironmentAttributeDesignator
            AttributeId="http://www.hhs.gov/healthit/nhin#subject-id"
              DataType="http://www.hhs.gov/healthit/nhin#instance-identitifer"/>
            </EnvironmentMatch>
        </Environment>
      </Environments>
    </Target>

    <Rule RuleId="133" Effect="Permit">
        <Description>Permit access to all documents to all physicians and nurses</Description>
        <Target>
           <Subjects>
               <Subject>
          <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                       <!-- coded value for physicians -->
                       <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">112247003</AttributeValue>
                       <SubjectAttributeDesignator
AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
DataType="http://www.w3.org/2001/XMLSchema#string"/>
                  </SubjectMatch>
                  <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                       <!-- coded value for nurses -->
                       <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">106292003</AttributeValue>
                       <SubjectAttributeDesignator
     AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
     DataType="http://www.w3.org/2001/XMLSchema#string"/>
                  </SubjectMatch>
               </Subject>
           </Subjects>
           <!-- since there is no Resource element, this applies to all resources -->
        </Target>
    </Rule>

    <Rule RuleId="134" Effect="Permit">
        <Description>Allow access for Dentists and Dental Hygienists for a defined time
period.</Description>
        <Target>
           <Subjects>
               <Subject>
                   <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                       <!-- coded value for dentists -->
                       <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">106289002</AttributeValue>
```

```
                <SubjectAttributeDesignator
AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
DataType="http://www.w3.org/2001/XMLSchema#string"/>
                </SubjectMatch>
                <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                    <!-- coded value for dental hygienists -->
                    <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">26042002</AttributeValue>
                    <SubjectAttributeDesignator
AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
DataType="http://www.w3.org/2001/XMLSchema#string"/>
                </SubjectMatch>
            </Subject>
        </Subjects>
        <!-- since there is no Resource element, this applies to all resources -->
        <Environments>
            <Environment>
                <EnvironmentMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:date-
greather-than-or-equal">
            <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#date">2008-07-01
            </AttributeValue>
                <EnvironmentAttributeDesignator
    AttributeId="http://www.hhs.gov/healthit/nhin#rule-start-date"
    DataType="http://www.w3.org/2001/XMLSchema#date"/>
                </EnvironmentMatch>
    <EnvironmentMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:date-less-than-or-equal">
        <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#date">2008-12-31
        </AttributeValue>
                <EnvironmentAttributeDesignator
        AttributeId="http://www.hhs.gov/healthit/nhin#rule-end-date"
        DataType="http://www.w3.org/2001/XMLSchema#date"/>
                </EnvironmentMatch>
            </Environment>
        </Environments>
    </Target>
    </Rule>

    <Rule RuleId="135" Effect="Deny">
        <Description>deny all access to documents.  Since this rule is last, it will be selected
if no other rule applies.</Description>
        <Target/>
    </Rule>
</Policy>
```

7.3   Sample XACML #3

```
<Policy xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
    xmlns:nhin="http://www.hhs.gov/healthit/nhin"
    PolicyId="12345678-1234-1234-1234-123456787777"
    RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining-algorithm:first-applicable">
    <Description>Sample XACML policy showing access to a specific document for a specific
user</Description>

<!-- The Target element at the Policy level identifies the subject to whom the Policy applies -->
    <Target>
      <Actions>
        <Action>
          <ActionMatch
           MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
           <AttributeValue
            DataType="http://www.w3.org/2001/XMLSchema#anyURI">
              http://www.hhs.gov/healthit/nhin#retrieveDocuments
           </AttributeValue>
           <ActionAttributeDesignator
            AttributeId="urn:oasis:names:tc:xacml:2.0:action"
            DataType="http://www.w3.org/2001/XMLSchema#anyURI"/>
          </ActionMatch>
        </Action>
      </Actions>
      <Environments>
```

```
            <Environment>
 <EnvironmentMatch MatchId="http://www.hhs.gov/healthit/nhin/function#instance-identifier-equal">
        <AttributeValue DataType="http://www.hhs.gov/healthit/nhin#instance-identitifer">
                    <nhin:PatientId root="2.16.840.1.113883.3.18.103" extension="00375"/>
                    </AttributeValue>
                    <EnvironmentAttributeDesignator
              AttributeId="http://www.hhs.gov/healthit/nhin#subject-id"
              DataType="http://www.hhs.gov/healthit/nhin#instance-identitifer"/>
                    </EnvironmentMatch>
            </Environment>
        </Environments>
    </Target>

    <Rule RuleId="143" Effect="Permit">
        <Description>Permit access to all documents to all physicians and nurses</Description>
        <Target>
            <Subjects>
                <Subject>
             <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                        <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">112247003</AttributeValue>
                        <SubjectAttributeDesignator
     AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
     DataType="http://www.w3.org/2001/XMLSchema#string"/>
                        </SubjectMatch>
             <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                        <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">106292003</AttributeValue>
                        <SubjectAttributeDesignator
     AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
     DataType="http://www.w3.org/2001/XMLSchema#string"/>
                        </SubjectMatch>
                </Subject>
            </Subjects>
            <!-- since there is no Resource element, this applies to all resources -->
        </Target>
    </Rule>

    <Rule RuleId="144" Effect="Permit">
        <Description>Permit access to a specific document for a specific user </Description>
        <Target>
            <Subjects>
                <Subject>
                <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:rfc822Name-match">
           <AttributeValue DataType="urn:oasis:names:tc:xacml:1.0:data-type:rfc822Name">
             sonny.rollins@uro.com</AttributeValue>
                        <SubjectAttributeDesignator
                         AttributeId="urn:oasis:names:tc:xacml:1.0:subject:subject-id"
                         DataType="urn:oasis:names:tc:xacml:1.0:data-type:rfc822Name"/>
                    </SubjectMatch>
                </Subject>
            </Subjects>
            <Resources>
                <Resource>
                <ResourceMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">
                 57053a03-ef5a-4900-9c81-4cdd3e8b118c</AttributeValue>
                        <ResourceAttributeDesignator
                 AttributeId="http://www.hhs.gov/healthit/nhin#document-id"
                  DataType="http://www.w3.org/2001/XMLSchema#string"/>
                    </ResourceMatch>
                </Resource>
            </Resources>
        </Target>
    </Rule>

    <Rule RuleId="145" Effect="Deny">
        <Description>deny all access to documents.  Since this rule is last, it will be selected
if no other rule applies.</Description>
        <Target/>
```

```
        </Rule>
</Policy>
```

7.4   Sample XACML #4

```
<Policy xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
    xmlns:nhin="http://www.hhs.gov/healthit/nhin"
    PolicyId="12345678-1234-1234-1234-123456785555"
    RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining-algorithm:deny-overrides">
    <Description>Sample XACML policy allowing all users to access PHR documents.  This Policy has
    a rule-combining algorithm of "deny overrides".  This Policy does not have a "default" rule
    that covers all document and all users, so it is possible that no rule will apply for a
    particular access request for documents for this patient.  In that case, the NHIE must have a
    default rule that will determine if access is granted or denied.
    </Description>

<!-- The Target element at the Policy level identifies the subject to whom the Policy applies -->
    <Target>
      <Actions>
        <Action>
          <ActionMatch
            MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
            <AttributeValue
             DataType="http://www.w3.org/2001/XMLSchema#anyURI">
               http://www.hhs.gov/healthit/nhin#retrieveDocuments
            </AttributeValue>
            <ActionAttributeDesignator
             AttributeId="urn:oasis:names:tc:xacml:2.0:action"
             DataType="http://www.w3.org/2001/XMLSchema#anyURI"/>
          </ActionMatch>
        </Action>
      </Actions>
        <Environments>
           <Environment>
 <EnvironmentMatch MatchId="http://www.hhs.gov/healthit/nhin/function#instance-identifier-equal">
 <AttributeValue DataType="http://www.hhs.gov/healthit/nhin#instance-identitifer">
                       <nhin:PatientId root="2.16.840.1.113883.3.18.103" extension="00375"/>
                  </AttributeValue>
                  <EnvironmentAttributeDesignator
               AttributeId="http://www.hhs.gov/healthit/nhin#subject-id"
               DataType="http://www.hhs.gov/healthit/nhin#instance-identitifer"/>
              </EnvironmentMatch>
           </Environment>
        </Environments>
    </Target>

    <Rule RuleId="151" Effect="Permit">
        <Description>Allow all users to access my PHR documents.</Description>
        <Target>
            <!-- Since there are no subjects, this applies to all users.  -->
            <Resources>
                <Resource>
                    <ResourceMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                        <!-- coded value for PHR document class -->
                        <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">
                    44943-9</AttributeValue>
                        <ResourceAttributeDesignator
                          AttributeId="http://www.hhs.gov/healthit/nhin#document-class"
                            DataType="http://www.w3.org/2001/XMLSchema#string"/>
                    </ResourceMatch>
                </Resource>
            </Resources>
        </Target>
    </Rule>

    <Rule RuleId="152" Effect="Permit">
        <Description>Permit access to all documents to all physicians and nurses</Description>
        <Target>
            <Subjects>
                <Subject>
```

```
                            <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                                <!-- coded value for physicians -->
                                <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">112247003</AttributeValue>
                                <SubjectAttributeDesignator
                AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
                DataType="http://www.w3.org/2001/XMLSchema#string"/>
                            </SubjectMatch>
                            <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                                <!-- coded value for nurses -->
                                <AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">106292003</AttributeValue>
                                <SubjectAttributeDesignator
AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
DataType="http://www.w3.org/2001/XMLSchema#string"/>
                            </SubjectMatch>
                    </Subject>
                </Subjects>
                <!-- since there is no Resource element, this applies to all resources -->
            </Target>
        </Rule>

        <Rule RuleId="153" Effect="Deny">
            <Description>deny all users access to a specific document.  Because this policy has a
            combining rule of "deny overrides", even doctors and nurses cannot access this document,
            nor can anyone access even if the document class is 44943-9.
            </Description>
            <Target>
                <Resources>
                    <Resource>
                        <ResourceMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                            <AttributeValue
        DataType="http://www.w3.org/2001/XMLSchema#string">
            57053a03-ef5a-4900-9c81-4cdd3e8b118c</AttributeValue>
                            <ResourceAttributeDesignator
                AttributeId="http://www.hhs.gov/healthit/nhin#document-id"
                DataType="http://www.w3.org/2001/XMLSchema#string"/>
                        </ResourceMatch>
                    </Resource>
                </Resources>
            </Target>
        </Rule>
</Policy>
```

7.5   Sample XACML #5 – Social Security Administration policy for Authorized Release

```
<Policy xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
    xmlns:nhin="http://www.hhs.gov/healthit/nhin"
    PolicyId="12345678-1234-1234-1234-123456789abc"
    RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining-algorithm:first-applicable">
    <Description>XACML policy granting access to SSA user to all documents for a
patient</Description>

<!-- The Target element at the Policy level identifies the subject to whom the Policy applies -->
    <Target>
        <Actions>
            <Action>
                <ActionMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                    <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#anyURI">
                        http://www.hhs.gov/healthit/nhin#retrieveDocument
                    </AttributeValue>
                    <ActionAttributeDesignator AttributeId="urn:oasis:names:tc:xacml:2.0:action"
                        DataType="http://www.w3.org/2001/XMLSchema#anyURI"/>
                </ActionMatch>
            </Action>
        </Actions>

        <Environments>
            <Environment>
                <EnvironmentMatch
```

```
MatchId="http://www.hhs.gov/healthit/nhin/function#instance-identifier-equal">
                    <AttributeValue
   DataType="http://www.hhs.gov/healthit/nhin#instance-identitifer">
                        <nhin:PatientId root="2.16.840.1.113883.3.18.103" extension="00375"/>
                    </AttributeValue>
                    <EnvironmentAttributeDesignator
                        AttributeId="http://www.hhs.gov/healthit/nhin#subject-id"
                        DataType="http://www.hhs.gov/healthit/nhin#instance-identitifer"/>
                </EnvironmentMatch>
            </Environment>
        </Environments>
    </Target>


    <Rule RuleId="a02ca8cd-86fa-4afc-a27c-616c183b2055" Effect="Permit">
        <Description>Permit access to all documents to the specified user</Description>
        <Target>
            <Subjects>
                <Subject>
                    <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:x500Name-match">
                        <AttributeValue
        DataType="urn:oasis:names:tc:xacml:1.0:data-type:x500Name"
        >CN=SSA User,OU=Social Security Administration,L=Baltimore,ST=MD,C=USA</AttributeValue>
                        <SubjectAttributeDesignator
                AttributeId="urn:oasis:names:tc:xacml:1.0:subject:subject-id"
                DataType="urn:oasis:names:tc:xacml:1.0:data-type:x500Name"/>
                    </SubjectMatch>
                </Subject>
            </Subjects>

            <!-- No Resources element means all clinical documents -->

            <Environments>
                <!-- SSA-827 authorization is valid for 12 months. -->
                <Environment>
                    <EnvironmentMatch
        MatchId="urn:oasis:names:tc:xacml:1.0:function:date-greather-than-or-equal">
                        <AttributeValue DataType=http://www.w3.org/2001/XMLSchema#date
                >2008-10-08</AttributeValue>
                        <EnvironmentAttributeDesignator
        AttributeId="http://www.hhs.gov/healthit/nhin#rule-start-date"
        DataType="http://www.w3.org/2001/XMLSchema#date"/>
                    </EnvironmentMatch>
                    <EnvironmentMatch
        MatchId="urn:oasis:names:tc:xacml:1.0:function:date-less-than-or-equal">
                        <AttributeValue DataType=http://www.w3.org/2001/XMLSchema#date
          >2009-10-07</AttributeValue>
                        <EnvironmentAttributeDesignator
        AttributeId="http://www.hhs.gov/healthit/nhin#rule-end-date"
        DataType="http://www.w3.org/2001/XMLSchema#date"/>
                    </EnvironmentMatch>

        <!-- SSA authorization is valid only for purpose of Disability Coverage determination-->
                    <EnvironmentMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                        <AttributeValue
            DataType="http://www.w3.org/2001/XMLSchema#string">COVERAGE</AttributeValue>
                        <EnvironmentAttributeDesignator
            AttributeId="http://www.hhs.gov/healthit/nhin#purpose-for-use"
            DataType="http://www.w3.org/2001/XMLSchema#string"/>
                    </EnvironmentMatch>
                </Environment>
            </Environments>
        </Target>
    </Rule>

</Policy>
```

8   Appendix B – Example Scenario

8.1   Story Background

- Mr. Gillespie is a North Carolina resident, and registered to the NC HIE.
- Mr. Gillespie uses a PHR to access the NC HIE.
- His preferences restrict access to only his primary care physicians and a few specialists that he sees regularly. (Note: none of the sample XACML policies in Appendix A match this scenario.) His preferences also indicate that he wishes to be notified through his PHR when new data about him is available.
- Mr. Gillespie visits a cardiologist in Johnson City, TN, Dr. Rollins. Mr. Gillespie isn't aware that his Dr. Rollins has access to the NHIN through his local NHIE, and has not updated his preferences prior to his visit.

8.2   Scene 1

- Dr. Rollins uses his EMR to query the NHIN for data about Mr. Gillespie. Because Mr. Gillespie has not included Dr. Rollins in his access consent permissions, his request to retrieve the documents is denied.
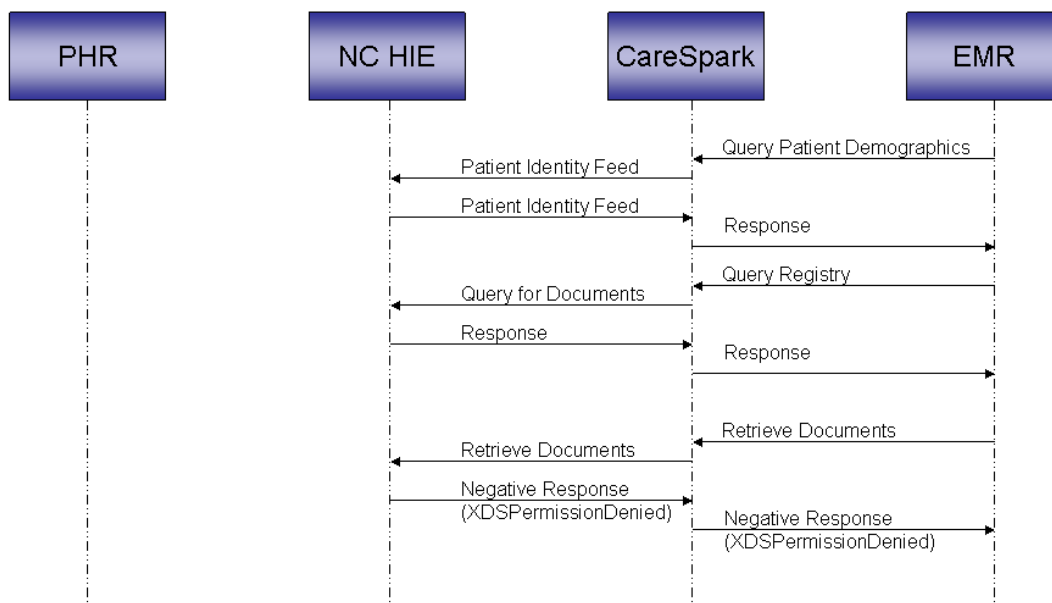

The gory details of the mutual Patient Identity Feed are not shown, but are as described in the Patient Discovery Interface specification. The NHIN specifications do not dictate whether NHIEs must enforce Consumer Preferences directives on the "Query for Documents" operation or on the "Retrieve Documents" operation (both have their advantages and drawbacks). In the scenario, the NC HIE is enforcing the patient's Consumer Preferences directives on the "Retrieve Documents" operation.

8.3 Scene 2

Triggered by the successful mutual Patient Identity Feed:
- CareSpark subscribes to Mr. Gillespie's Access Consent Policy.
- A Notification is sent immediately allowing CareSpark to retrieve the Mr. Gillespie's current Access Consent Policy.
- NC HIE subscribes to any new data for Mr. Gillespie, extending Mr. Gillespie's preferences for notification to CareSpark.
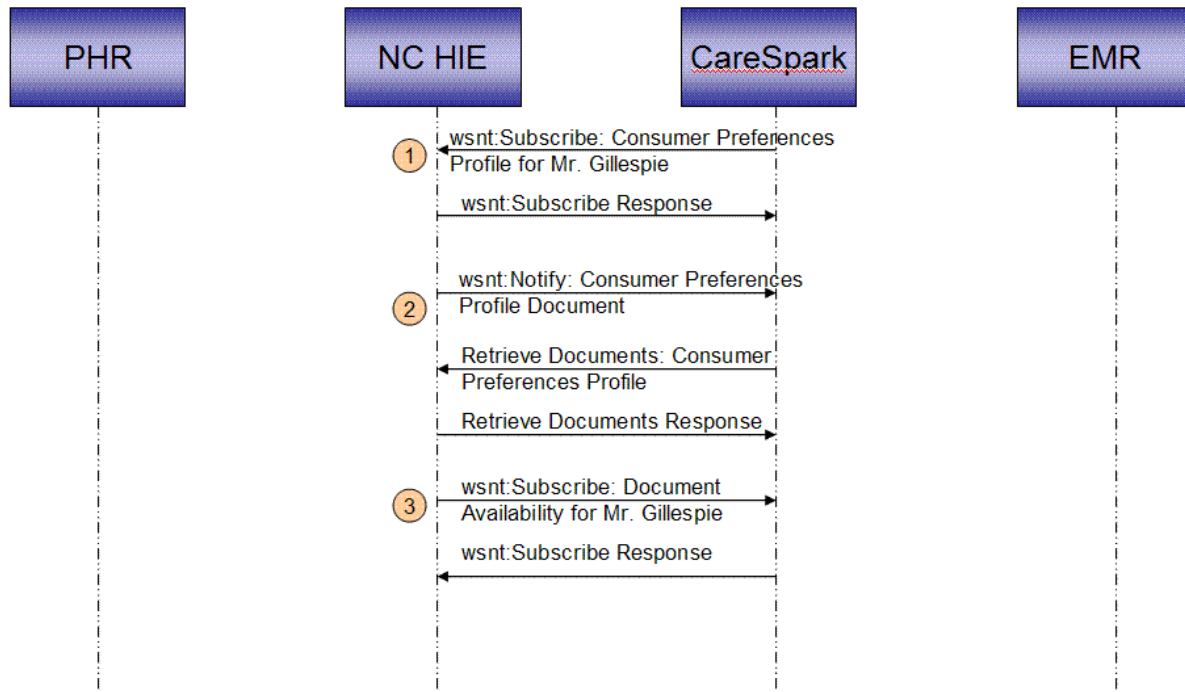
This scenario shows the notification of an Update to the Consumer Preferences Profile being sent to CareSpark (the requester) immediately upon receipt of the Subscription Request. This allows CareSpark to retrieve the initial policy.

The numbered arrows correspond to:
1. Subscribe to Update of Consumer Preferences Profile (Section 3.3.1)
2. Notification of Update of Consumer Preferences Profile (Section 3.3.2)
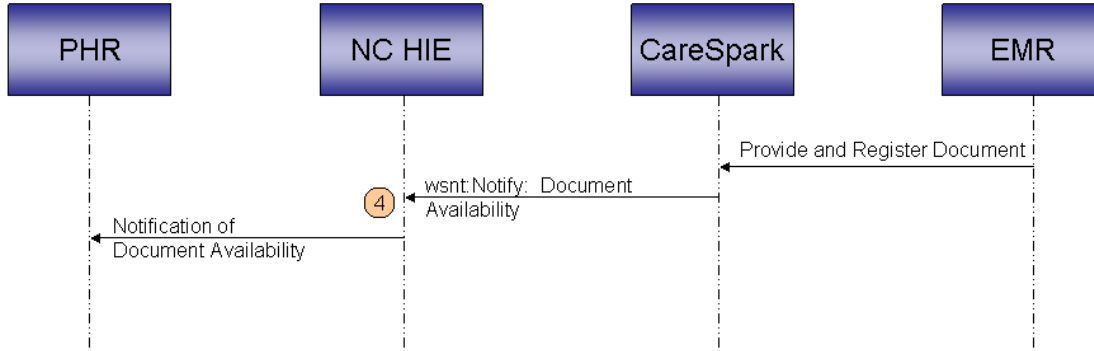3. Subscribe to Notification of New Document Availability (Section 3.3.4).

This example does not show a Subscribe to Update of Consumer Preferences Profile flowing in the opposite direction from NC HIE to CareSpark, though such a subscription would be allowed under this specification.

8.4 Scene 3

- During the visit, Mr. Gillespie consents to have his data from Dr. Rollins's office made available on the CareSpark network.
- When the visit is complete, Dr. Rollins creates a Visit Summary and publishes it to CareSpark. The Notification of Document Availability is sent to NC HIE because of the earlier subscription request. Dr. Rollins also has ordered some lab tests.

- The NC HIE forwards the Notification of Document Availability to Mr. Gillespie's PHR. Since this is an intra-NHIE flow, the format of this notification need not use the messages defined in this specification.


The numbered arrow corresponds to:
4. Notification of New Document Availability transaction (Section 3.3.5)

8.5 Scene 4

- Upon returning home, Mr. Gillespie sees the notification and retrieves the visit summary to his PHR. The notification contains the CareSpark homeCommunity ID and unique Document ID and Repository ID, so no Query for Documents operation is required.
- Mr. Gillespie also updates his Consumer Preferences Profile to allow Dr. Rollins to access his data in the future. A notification flows to CareSpark because of the earlier subscription.
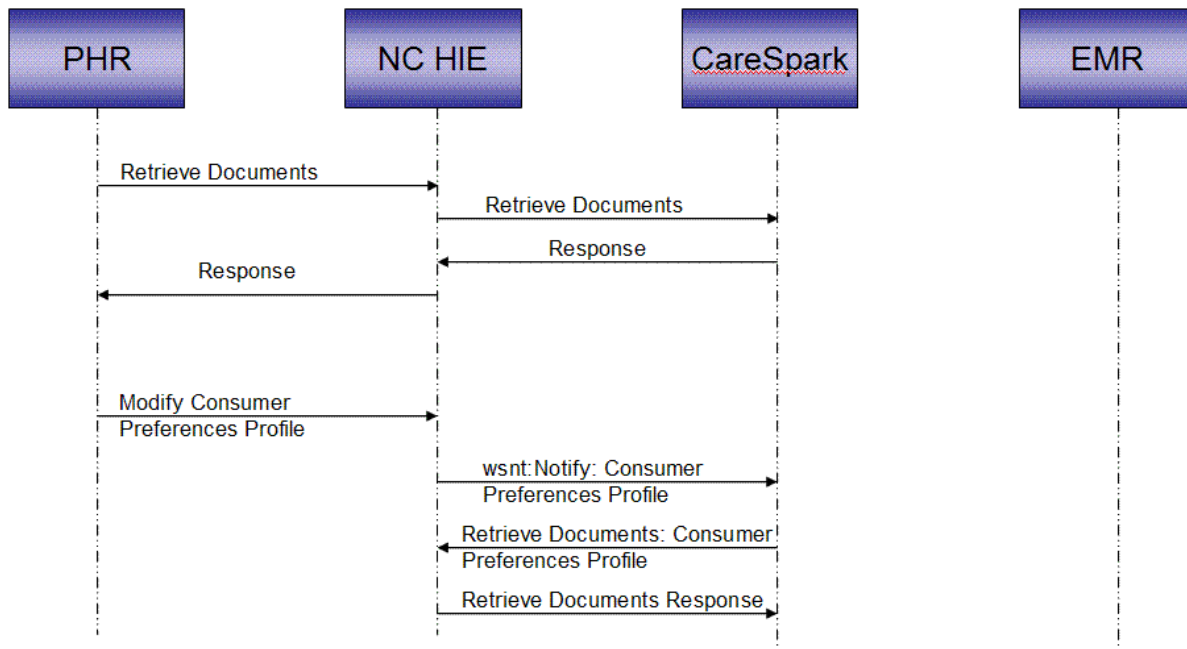
8.6 Scene 5

- The lab results arrive in Dr. Rollins's office. Dr. Rollins's policy is that patients may not access their results until he has reviewed them. Mr. Gillespie is notified about the availability of the results, but his attempt to access them fails because of the access consent directive imposed by Dr. Rollins.
- Later, after Dr. Rollins has released the results, Mr. Gillespie successfully retrieves them.
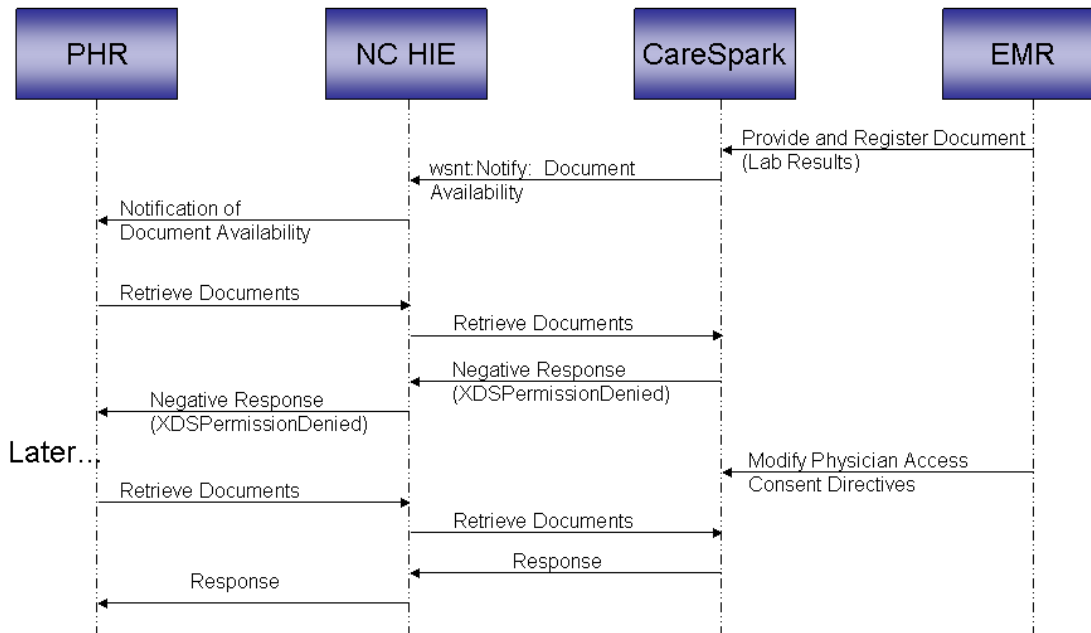
We can envision a number of solutions that would prevent the negative response when Mr. Gillespie attempts to access his lab results – the most straightforward is that CareSpark defers sending the Notification that the results are available until consent permissions are in place to allow Mr. Gillespie to access them. This demonstrates the interconnected nature of the Notification and the Consumer Preferences; that interconnectedness is assumed to be internal to an NHIE.