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Enabling Standards-Based eHealth Interoperability

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Saudi eHealth Provider Identification Interoperability Use Case

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Document Revision History

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1.0	February 22, 2015	First Release	eHealth Strategy Management Office – eHealth Standards Department

PREFACE

KEY CONCEPTS

Key concepts used in this document are introduced below. Consult *IS0302 SeHE Project Glossary* for other terms used within this document.

Interoperability Use Case: In software engineering, a Use Case is a technique for capturing the requirements of a new or updated system. Each Use Case provides one or more business scenarios that convey how the system should interact with end-users or other systems to achieve a specific business goal. Interoperability Use Cases use language that end-users and domain experts can understand, rather than technical jargon. Use Cases are often co-authored or co-developed by business analysts and end-users.

Business Scenario: The business scenario is defined as a sequence of activities by one or more users (e.g. patients, clinicians, etc.) that describe a real-world story. A business scenario executes one or more business processes in a sequence of end-user interactions called a process flow. Business scenarios are the starting point of the analysis leading to the discovery of actors and services necessary to meet the requirements of the assigned Use Case.

Actors: In this specification actors describe the interoperable software components which support interoperable exchanges of information between systems.

Services: Services describe collections of capabilities of a system that enable communication and exchange through standards-based messages and information content. A capability within a service describes the smallest unit of useful work that facilitates information exchange between systems.

Process Flow: A process flow represents a possible sequence of business processes being executed to perform the work of the Use Case. Process flows are identified by analysis of business scenarios through the identification of common reusable sequences of business processes.

Main Flow: The main flow of a Use Case usually describes the simplest path through the smallest set of business processes necessary to complete the work of the Use Case. It describes the minimal skeleton of the Use Case which appears in common across the various business scenarios which explore the scope of the Use Case. The main flow is the sequence of business processes that is both common to and required to be executed in all normal business scenarios.

Alternative Flow: Alternative flows describe additional paths that can be taken to provide additional capabilities to the main flow of work. Alternative flows are described as auxiliary paths that can be added-on to the main flow in one or more locations.

Exception Flow: Exception flows describe alterations to the main flow under exceptional or out of the ordinary circumstances. The existence of exception flows allows for alternative exit paths from the main flow that allow a work flow to complete under extreme situations, even though it deviates from the main flow.

Business Process: A business process is a reusable unit of interaction between an end-user and one or more information systems. Business processes perform work through the execution of services provided in the information system environment.

APPROACH

The approach used to develop this Use Case specification starts with the identification of a stakeholder group of end-users, beneficiaries and implementers of systems which may be affected by implementation of Interoperability Specifications supporting the Use Cases in the work stream described by this document. These stakeholders identify real-world scenarios in which users and other individuals (e.g., patients) interact with systems to perform or receive a service. The process used is as follows:

- Scenarios are identified by first identifying the simplest (but not necessarily the most common) case in which the Use Case can be completed. More complex scenarios are added which illustrate the range of complexity of the Use Case until essential requirements have been identified.
- Through analysis of these scenarios, a main flow, and often one or more alternative and exception flows are identified. These process flows identified need not match one-to-one with the real-world scenarios originally used to explore the Use Case; however, they are derived from them.
- The process flows are decomposed into business processes, where a business process is described as an end-user initiated interaction with one or more systems in order to complete some essential task in the Use Case.
- The systems and business processes are analyzed to identify the common system components (Actors) responsible for supporting the end-user in the work being done.
- The actors and business processes are further analyzed to identify the necessary services which support the requirements identified in the Use Case.
- The collection of actors and services forms the solution space for the Use Case, representing the system components and the interoperability that is necessary to meet the requirements of the Use Case.
- From business scenarios implemented by systems and operated by users to actors and services, the derivation of the service model can be shown through a clear progress of analysis.

Lastly, stakeholders contribute candidate data elements to the use case that support the information exchanges identified in the business scenarios.

CONVENTIONS

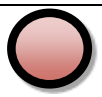
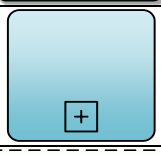
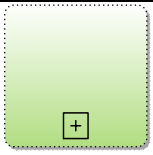
This document has adopted the following conventions for representing the Use Case concepts and information workflow.

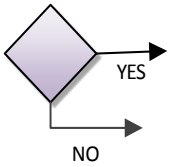
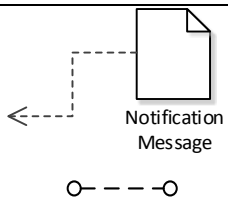
Process Flow Diagrams

The descriptions of interoperability Use Cases that follow include process flow diagrams that illustrate a series of visual representation of related tasks that a person, business, and/or system executes to achieve a desired outcome of the Use Case. The process flow diagrams are created using the Business Process Modeling Notation (BPMN) format. The notations of the diagram represent different shape such as an event (a circle shape denotes start/end of process), an activity (a rectangle describes actions performed by the actor), a gateway (diamond shape determines forking and merging of paths depending on the conditions expressed), and a connector to show in which order the activities are performed and the intermingling of actions between actors and other systems. Complete explanations of the business process diagram elements used within this document are in the table below.

There are main process flows, followed by optional alternative or exception flows.

TABLE2.1-1 SEHE BUSINESS PROCESS MODELING NOTATION CONVENTIONS

SHAPE	DESCRIPTION
	Start event acts as a trigger to launch the business process.
	End event acts as a trigger to terminate the business process.
	Activity that represented with a rounded-corner rectangle and describes **systematic** action performed by the actor
	Sub-process used to denote additional levels of business process by referring to an action that can be broken down to a finer level of details or to another business process name.
	External activity that represented with a rounded-corner rectangle and describes **systematic** action performed by the actor
	External sub-process used to denote additional levels of business process by referring to an action that can be broken down to a finer level of details or to another business process name.

SHAPE	DESCRIPTION
	Activity that represented with a light colored rectangle and describes **physical** action performed by the actor
	Gateway that determines forking and merging of paths depending on the conditions expressed
	Sequence flow that shows in which order the activities are performed and the intermingling of actions between different actors or other systems.
	Message flow that shows the flow of messages between two actors or systems that are prepared to send and receive messages.
	Message event used to send a message and to invoke other activity within the business processes then the token will immediately moves to the invoked flow of the process

Requirements Language

Throughout this document the following conventions[1] are used to specify requirement levels:

SHALL: the definition is an absolute requirement of the specification.

SHALL NOT: the definition is an absolute prohibition of the specification.

SHOULD: there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.

SHOULD NOT: there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.

MAY or **OPTIONAL**: means that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item.

PROJECT PURPOSE

The National eHealth strategy has established a number of key business objectives for the Saudi eHealth program including the definition and implementation of healthcare applications to support critical business scenarios.

Within this overarching strategy, an eHealth Standards-based Interoperability Specification and Policy project has been identified, with scope defined to:

- Deliver the Interoperability Specifications (i.e. standards, profiles, terminologies, etc.)
- Deliver test plans, test tools, and testing and certification policies to support the associated conformance testing for new and existing information systems (Hospital Information Systems [HIS], Primary Healthcare [PHC] Systems, Electronic Medical Record [EMR] Systems, Laboratory Information Systems [LIS], Radiology Information Systems [RIS]/ Picture and Archiving Communication Systems [PACS], etc.). These test plans, test tools, and testing and certification policies will ensure that these systems connect to the a Saudi Health Information Exchange (HIE) platform and its internal Systems which includes patient identification management, provider directory, document and image repository, and access control, etc.
- Establish the policies for health information exchange in Saudi Arabia. These policies ensure trust relationships between the various healthcare organizations sharing information as well as the health professionals and patients in the Kingdom.

[1] Definitions based upon RFC 2119

The project's goal is to enable interoperability and to mainly specify the external interfaces of the local edge systems (i.e. point of care HIS or PHC applications), without constraining:

- The local systems' internal design
- The intra-organization interoperability policies or management processes used to implement such polices.

FIGURE 2.1- 1 SCOPE OF EHEALTH STANDARD BASED INTEROPERABILITY SPECIFICATIONS AND POLICY PROJECT depicts the general scope and focus of the project highlighted in red.

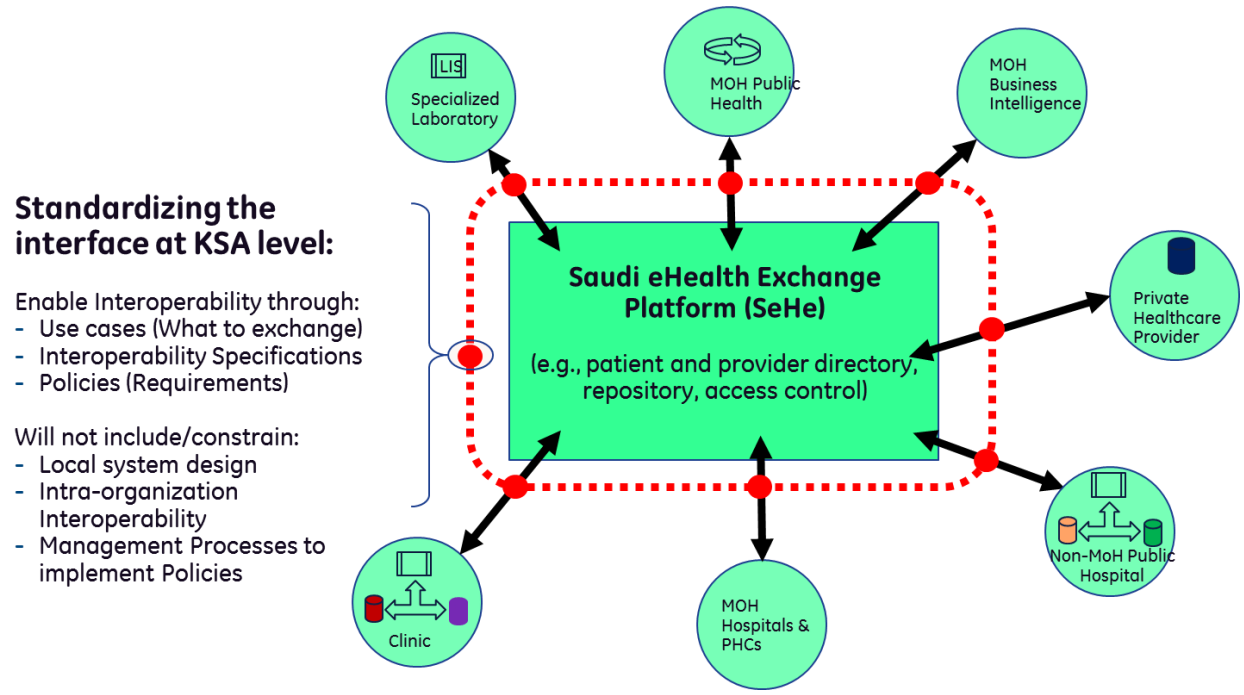


FIGURE 2.1- 1 SCOPE OF EHEALTH STANDARD BASED INTEROPERABILITY SPECIFICATIONS AND POLICY PROJECT

REFERENCES

National eHealth Strategy

See the Saudi Ministry of Health Portal (Arabic: http://www.moh.gov.sa/Ministry/nehs/Pages/default.aspx English: http://www.moh.gov.sa/en/Ministry/nehs/Pages/default.aspx) for more information.

Saudi eHealth Interoperability Specification Document

A Saudi eHealth Interoperability Specification documents the selection of profiles and standards that support specific Saudi eHealth Interoperability Use Cases. Such Interoperability Specifications apply to new and existing information systems (HIS, PHC, Laboratory, etc.) and ensure their connection to the national Saudi Health Information Exchange platform (HIE).

Saudi Health Information Exchange Policy Document

IS0303 *Saudi Health Information Exchange Policies* is used to set the policies applicable to users and systems connected to the HIE Platform.

Examples of such policies are:

- Authentication Policy
- Consent and Access Control Policy
- Identity Management Policy
- Breach Notification Policy
- Others

The Use Cases specified in this document operate within the context of these Health Information Exchange policies.

MIDDLE- OUT METHODOLOGY

Like most eHealth programs around the world, the challenge to identify and document a large number of business Use Cases and variants is avoided by using a "middle-out" methodology. The core requirements start with the Interoperability Use Cases, especially when those are "classical Use Cases" that have been analyzed by the profiles and standards development organizations in their prior work.

FIGURE 2.1- 2 METHODOLOGY STEPS FOR THE EHEALTH STANDARDS-BASED INTEROPERABILITY SPECIFICATIONS AND POLICY *PROJECT*

illustrates the main steps of this methodology, where the knowledge of the array of Business Scenarios come from the stakeholders and a validation performed through their experiences (i.e., issues and gaps corrected based on their feedback).

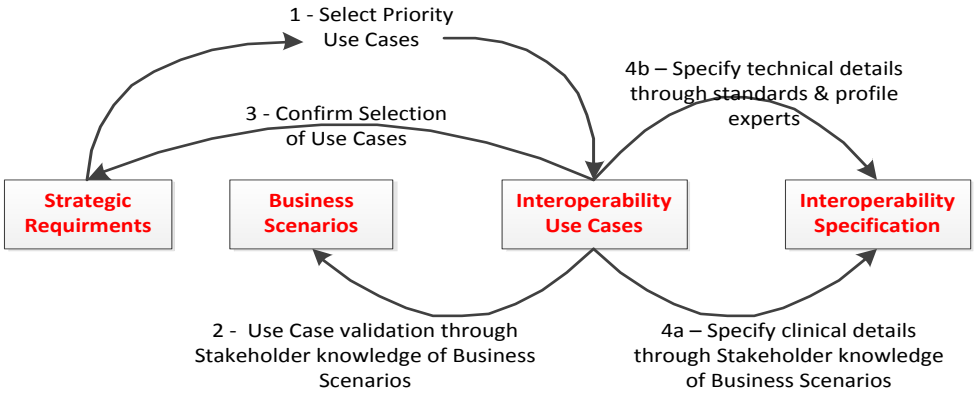


FIGURE 2.1- 2 METHODOLOGY STEPS FOR THE EHEALTH STANDARDS-BASED INTEROPERABILITY SPECIFICATIONS AND POLICY PROJECT

The Interoperability Use Cases provide a description of the workflows that need to be addressed and the main exception situations. They are not expected to cover all design details in term of error codes, data element specification and terminology code sets to be used.

This level of detail is appropriately addressed in the Interoperability Specification (See step 4a in the diagram methodology steps). It contains the detailed design specification against which implementations will be tested and certified. An Interoperability Use Case is a scoping document and is a stepping stone to the development of a Saudi eHealth Core Interoperability Specification and supporting Saudi eHealth Core Interoperability Specifications. Together these Interoperability Specifications cover five complementary aspects:

The specification of the information transport running above the Internet TCP/IP layer.

The specification of one or more data exchange services suitable for the workflow needed by the Use Case that runs over the above transport.

The specification of one or more information content data structure enabling the structured representation of the health information data elements and their specific attributes to be conveyed.

The specification of one set of coded values, each to be placed into a specific attribute of a selected data elements to be conveyed by the above data structure.

The specification of the technical measures to ensure security and privacy of the information conveyed and accessed.

These Interoperability Specifications and the standards and profiles they reference are designed to form a complete specification covering all aspects necessary to achieve the standards-based exchange of information across the HIE Platform (except for interoperability policy matters that are addressed separately). The Saudi eHealth Interoperability Specifications are the authoritative documents for software implementers and system deployment teams.

As a consequence, rigorous but concise test plans (i.e., a set of test scripts) may be developed and when executed result in a reasonable assurance of interoperability between successfully tested systems. Such testing for interoperability may be performed against test tools as well as between systems under test; a combination widely accepted as the most efficient testing process. These test plans and test tools provide closure against the Core Interoperability Specifications and Supporting Interoperability Specifications, thus bringing the necessary level of quality in interoperable IT systems development and deployment. This is depicted in FIGURE 2.1- 3 VERIFICATION OF CONFORMANCE TO A CORE SAUDI EHEALTH INTEROPERABILITY SPECIFICATION

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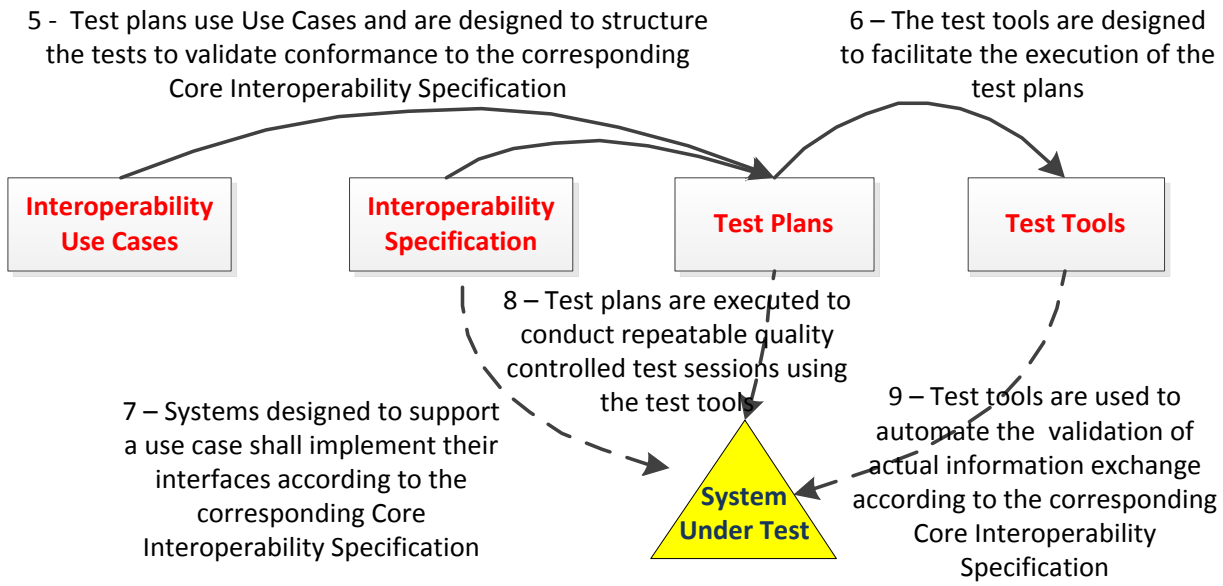

FIGURE 2.1- 3 VERIFICATION OF CONFORMANCE TO A CORE SAUDI EHEALTH INTEROPERABILITY SPECIFICATION

HEALTHCARE PROVIDER DIRECTORY QUERY - INTEROPERABILITY USE CASE

1 Description

This Use Case describes the ability to access information about health professionals and the organizations where they practice. This information is centrally managed by a national healthcare provider directory; the directory which supports searches for providers and organizations and conveys authoritative attributes related to them. This information describes organizations that provide patient care, such as public and private hospitals, primary care centers, laboratories, pharmacies, etc. It is used by these organizations and by the MOH business applications. This document aligns with the Saudi e-Government Interoperability Standards (YEFI) to expedite national adoption.

Among the use cases supported by such a system, this Interoperability Use Case focuses only on the services that need to be standardized at the national level to support the ability to query for provider and organization information by the various "edge applications" connected to the SeHE System. The "national healthcare provider directory" needs to be populated, maintained, and updated using interfaces outside the scope of this Use Case and need to be addressed at the implementation of such interfaces.

The information managed by the provider directory falls in two categories of entities that provide healthcare services (generally called "providers") that are qualified by attributes such as provider type, specialties, credentials, demographics and service locations. These two categories are:

Individual Provider – A person who provides healthcare services, such as a physician, nurse, or pharmacist, etc.

Organizational Provider – An organization that provides or supports healthcare services, such as a hospital, a primary care facility, a laboratory center, etc.

2 Use Case Benefits

- Provides timely access to a provider and organizational information across all stakeholders, such as hospitals, primary care centers, laboratories, pharmacies, etc.
- Produces accurate and consistent provider and organizational information captured in patient's records generated by the stakeholders (i.e. discharge summaries, laboratory results reports, imaging reports, etc.).
- Reduces errors for provider and organizational identification.

- Allows searching for and identifying relevant providers for direct communication.

3 Actors

The Actors defined in this Use Case are described in Table 1.2-1 ***Actors***.

TABLE 1.2-1 ACTORS

ACTOR NAME	DESCRIPTION	EXAMPLE REAL-WORLD IT SYSTEMS
Provider Information Directory	Performs the function of processing queries to search for provider individuals and/or organizations based on search criteria received from the Provider Information Consumer actor. It returns matches to the Provider Information Consumer actor.	Saudi eHealth Exchange (SeHE) – Healthcare Provider Directory
Provider Information Consumer	Queries the Provider Information Directory Actor indicating search criteria for provider individual and/or organizational information. It receives the query response and makes the returned information available to local applications and users.	Point of Care Systems such as: • Hospital Information Systems (HIS) • Primary Healthcare (PHC) Electronic Medical Record Systems • Laboratory Information Systems • Radiology Information Systems • Other Point of care systems • MOH Business Systems • Patient Portal Applications

4 Main Flow of Events

Edge systems, including point of care systems, are offered a service to "search for" provider based information on individuals and organizations. The process flow below depicts this capability in the context of an overall referral use case.

Error! Reference source not found. and the text below provides a typical high level example of the main information workflow.

The patient visits his/her primary physician in a local PHC as part of the patient's care and it is determined that he/she needs to be referred to a specific healthcare service. The referral PHC (e.g. source provider) needs to find information on the location and availability to book the requested service in providing organization(s). The PHC EMR (acting as a Provider Information Consumer) queries the Provider Information Directory to obtain the organization information. The SeHE Healthcare Provider Directory (acting as a Provider Information Directory) matches the search criteria and returns the attributes (phone name, phone numbers, addresses, business contacts, credentials, etc.) for each one of the known matches to the PHC EMR.

The PHC EMR uses the information to call the organization and books the patient for the referral. A referral summary document is created and stored on the SeHE repository (this is outside the scope of this Use Case).

Note: The electronic management of the referral process is expected to be addressed in the future as part of the Saudi eHealth strategy. **Error! Reference source not found.** illustrates a typical workflow for an electronic referral.

Note: The support for the use of Arabic and Western spellings of names is required. Translation from Arabic to Western spellings is not always precise, for example Mohammad, Muhammad, Mohamed are typical spellings of the same name in Arabic. Therefore, support for "fuzzy" matching on names is required to solve this issue.

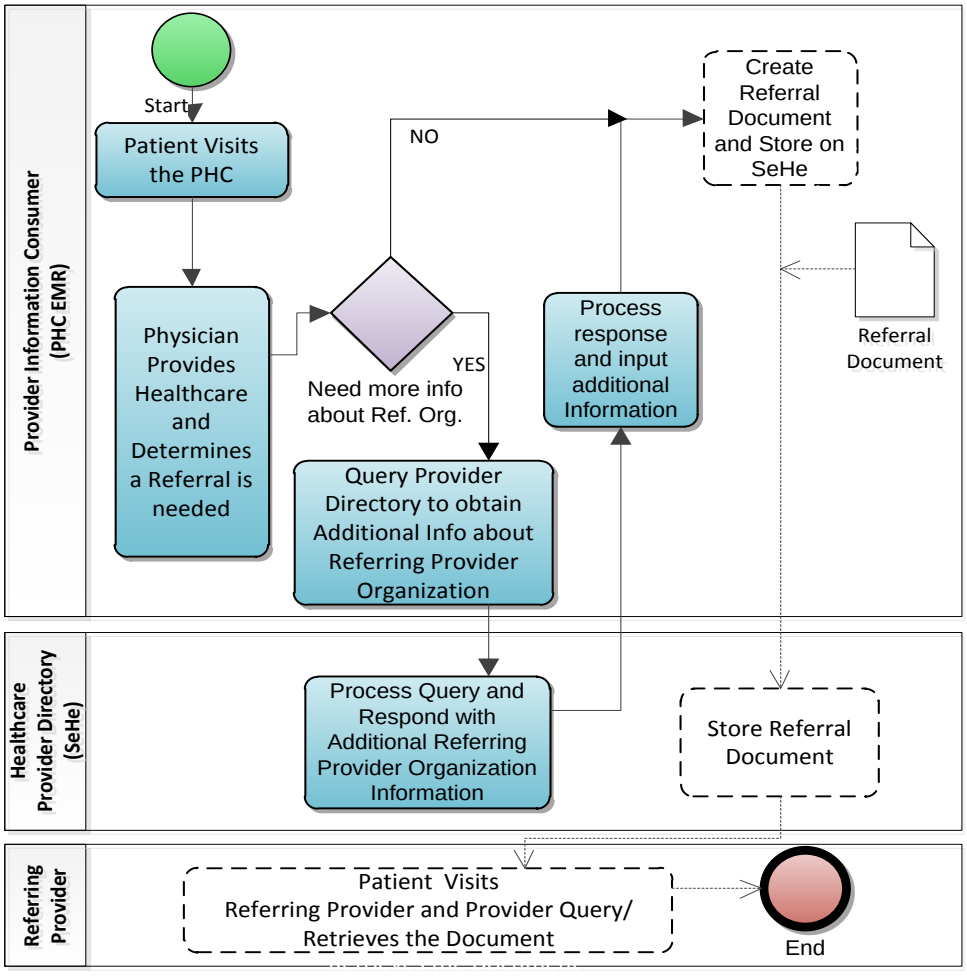

FIGURE 2.1-1 HEALTHCARE PROVIDER DIRECTORY QUERY MAIN FLOW

5 Alternative Flow of Events

N/A

6 Exceptions Work Flow

N/A

7 Specific Workflow Scenarios

The following sections provide short descriptions of scenarios that complement the use case flow of events by using the defined transactions in specific ways. Some of these scenarios highlight variants to the use case main flow of events while others describe interactions with local workflow situations that are beyond the scope of the use case but consistent with it. These workflow scenarios are not intended to be an exhaustive list.

7.1 Scenario 1: Look-up Provider Contact and Specialty Information to support Patient Referral

A patient is seen in a Primary Health Center. The physician determines that the patient should be seen by a specialist. The Physician uses the Provider Directory to look-up the individual providers and organizations with the appropriate specialty that is in a location convenient to the patient. The provider initiates a patient referral to the selected specialist.

7.2 Scenario 2: Request of information from an identified provider

A patient is visiting Saudi Arabia from another country for an extended period and needs to locate a healthcare provider for management of his chronic condition. The patient uses a SeHE authorized portal to query the directory for the appropriate specialty, location, and supporting his native language.

8 Service Model

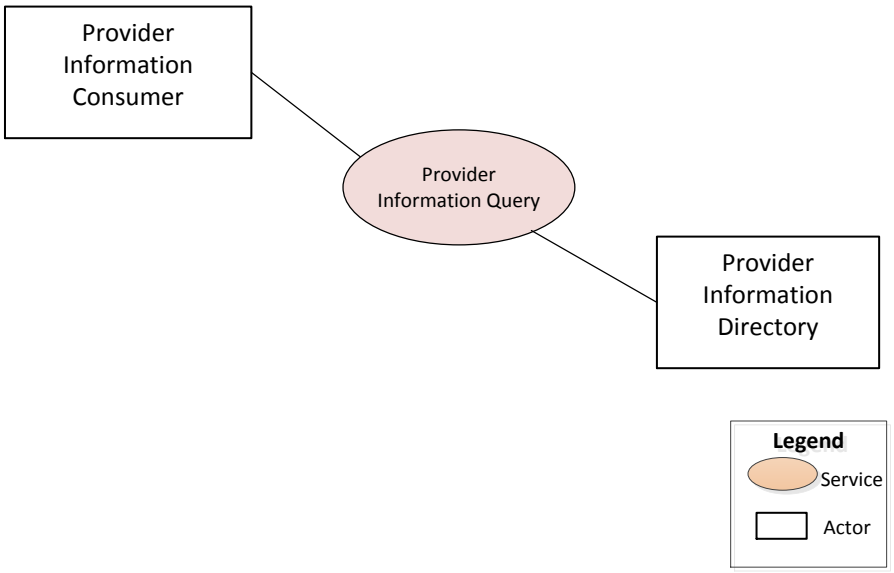

FIGURE 1.2-2 PROVIDER INFORMATION QUERY SERVICE MODEL

9 Service Description

The Services defined in this Use Case are described in Table 2.2-2 Services

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TABLE 2.2-2 SERVICES

SERVICE NAME	DESCRIPTION
Provider Information Query	A service initiated by the Provider Information Consumer that includes search criteria for matching one or more provider individual and/or organizational entities. There may be many types of queries performed using provider's national id, and other information such as location, type of practice, provider role, etc. There are many variants of queries. The Provider Information Directory responds with information for all provider individuals and/or organizations matching the search provided by the Provider Information Consumer.

10 Pre-Conditions

Table 2.2-3 Pre-Conditions

identifies pre-conditions for this Use Case.

TABLE 2.2-3 PRE-CONDITIONS

ACTOR NAME	SERVICES	DESCRIPTION
All Actors	Provider Information Query	It is expected that all services initiated or provided by this actor operate in accordance to the Saudi eHealth Interoperability Polices and Interoperability Specifications.
Provider Information Directory	Provider Information Query	KSA-wide organizations, such as MOH facilities, private facilities, and non-MOH public facilities (i.e. National Guard) maintain accurate information with correct attributes for each the providers individuals/organizations for which they are responsible.
		Provider's individual/organization information is synchronized to the Healthcare Provider Information Directory which provides current data. How this is accomplished (such as creation of new providers/organizations, delete providers/organizations, providers moving to other organizations, synchronization frequency, etc.) is out of scope and will be specified outside of the Saudi eHealth Interoperability Specification.
		Maintains a set of provider individual and/or organizational information suitable for matching plus additional information to be returned upon request.
Provider Information Consumer	Provider Information Query	The reporting of missing or incorrect information in the Healthcare Provider Directory and the correction processes are outside the scope of this Use Case.

11 Post-Conditions

Table 2.2-4 Post Conditions

identifies post-conditions for this Use Case.

TABLE 2.2-4 POST CONDITIONS

ACTOR NAME	SERVICES	DESCRIPTION
Provider Information Consumer	Provider Information Query	The individual provider and/or organizational information are used to facilitate the management of the patient's healthcare records and the communication between them.

12 Data Requirements

This section defines the general scope of the type of data needed for this Use Case. However, it does not define the entire detailed data set as this will be discussed in the Saudi eHealth Interoperability Specification design documents.

12.1 Healthcare Provider Directory Query data

The information content managed by the Healthcare Provider Directory includes basic provider and organization information such as provider national ID, provider type, specialties, credential, provider demographics, service locations, etc. This information is made available via SeHE System.

Table 2.2-5 Individual Provider Data Content

and Table 2.2-6 Organizational Provider Information Content

provides a minimum set of information content. More provider and organization data may be included. Many attribute concepts are coded to facilitate query matching.

TABLE 2.2-5 INDIVIDUAL PROVIDER DATA CONTENT

KEY DATA CONCEPTS	DESCRIPTION	TEXT/ CODED
Provider "Identifier"	National identifier that uniquely identifies an individual.	Text
	Professional ID.	Text
Provider Type	The type of individual provider.	Text and Coded
Provider Type Description	Description of individual provider's type.	Text
Status	The status of this individual. (Accredited, Expired, Pending, Registered, Registered / Classified, Suspended, Temporary, Temporary Suspended)	Text
Provider Primary Name	Names that a provider has, or is, known by. May include (4) name components: [First Name, Second Name, Third Name, and Family Name]	Text
Provider Last Name	Family name of the provider.	Text
Provider First Name	Given name(s) of the provider.	Text
Provider Specialty	Individual's specialization, a specific medical service, a specialization in treating a specific disease. Some specialties are: Psychiatry, Radiology , Endocrinology	Text and coded
Provider Language Supported	Language(s) that the provider uses.	Coded
Provider Gender	The gender of the provider.	Coded
Provider Medical Records Delivery e-mail Address	Electronic mailing address of an individual where medical or administrative records can be sent to. Supports multiple e-mail addresses (e.g. individual belongs to multiple practices).	Text
Provider e-mail address	Electronic mailing address to receive general purpose communication not related to medical records.	Text
Electronic Service URI	Reference to an entry in a systems directory or to a service definition page where this individual provider has electronic access points defined.	Text

KEY DATA CONCEPTS	DESCRIPTION	TEXT/ CODED
Provider Practice Address	Practice or Service address.	Postal Address
Provider Mailing Address	Primary address for mailing purposes for the individual provider.	Postal Address
Provider Credential	Detailed Health related credentials earned by provider.	Text
Relationship	Business associations with an organization. There can be multiple types of relationship but generically categorizes all relationship as – 'member-of'.	Coded
Category	Business Category indicating Seniority level. For example, Registrar, Consultant, etc.	Text and coded
Religion	Religion of the provider.	Text and coded
Nationality	Nationality of the provider.	Text and coded

TABLE 2.2-6 ORGANIZATIONAL PROVIDER INFORMATION CONTENT

KEY DATA CONCEPTS	DESCRIPTION	TEXT/ CODED
Org Type	The type of organization represented. Some values are: Hospital, PHC, Laboratory Clinics, Imaging Centers, Pharmacies Practice, etc.	Coded
Org Type Description	The type of organization represented. Some values are: Hospital, PHC, Laboratory Clinics, Imaging Centers, Pharmacies Practice, etc.	Text
Org Status	The status of the organization. Active – This organization is currently in existence. Inactive – This organization is no longer in existence	Coded
Organization Name	Multiple names used for an organization.	Text
Org Contact	Multiple individuals who can be contacted in reference to this organization, including a phone number and e-mail address. An individual role can be included in the name, instead of an individual.	Text and Coded
Electronic Service URI	Reference to an entry in a systems directory or to a services definition page where this organization has its electronic access points defined.	Text
Medical Records Delivery E-mail Address	Electronic mailing address of an organization where medical or administrative records can be sent to.	Text

Org Address	Physical address information for an organization. Each type of address can be a primary or secondary address. Addresses that are no longer valid are marked as Inactive. Billing Address. One primary address-the preferred billing address for the organization. Multiple secondary billing addresses. Multiple inactive addresses which were once used as billing addresses but are no longer valid. Mailing Address. One primary address-the preferred mailing address for the organization. Multiple secondary mailing addresses. Multiple inactive addresses which were once used as mailing addresses but are no longer valid. Practice Address. Multiple primary addresses-All locations where healthcare services are provided. There are no secondary practice addresses. Multiple inactive.	Postal Address
Provider Language Supported	Language(s) that an Organization support.	Coded
Org Credentials	This includes certifications or licenses earned by an organization.	Text
Org Specialty	Organization's specialization, a specific medical service, a specialization in treating a specific disease. Some specialties are: Psychiatry, Radiology, Endocrinology	Coded
Org Identifiers	National identifier that uniquely identifies an organization.	Text
Provider Relationship	Business associations either between an organization and an individual provider or between an organization and another organization. There can be multiple types of relationship but generically categorizes all relationship as – 'member-of'.	Text
Date/Time of last update	Attribute that the LDAP directory server maintains to capture the time when an entry was modified.	Date

13 Assumptions and Dependencies

N/A

14 Special Requirements

N/A

15 Notes and Issues

N/A