An introduction – Consumer Health Platform, PHR, Ecosystem, and EHR interoperability

HIG Workgroup Meeting - October 2010

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Objective

- We would like to introduce key concepts and technology first, and then go into some workflow scenarios to introduce consumer oriented view of EHR interoperability
- Including :
  - Introduce basic concepts of PHR
  - What are the strategy and key business drivers for PHR? – Blueprint 2015 anticipates Consumer Health Solution (and PHR as one form of CHS) to be one of the cornerstones of future EHRS
  - What are the capabilities PHR offers?
  - An overview of the most prominent PHR solutions – TELUS health space, Google Health
  - What are the presumptions about EHR / PHR interoperability? - any reference to our experience with PHR implementation
  - Indicate key challenges for integration with EHR infostructure.

Definitions

- **Consumer Health Application:** an electronic solution that provides functionality for the consumer including the collection, retrieval, management, use and sharing of personal information and other health-related data. This could include applications commonly known as personal health records and patient portals. If connected to a consumer health platform, the consumer health application provides access to the services provided by the platform and the personal information stored in the platform.

- **Consumer Health Platform:** an electronic system which provides a secure, interoperable, enterprise environment and personal information database. The platform enables a range of consumer health applications, most often from different vendors to run and interoperate. These two elements together allow a consumer, as data custodian, to store and manage their personal information and other health-related data. The consumer health platform also facilitates the sharing of data by the consumer with clinicians, family members and other authorized individuals, as well as with other applications and health information systems (e.g. EHRs, EMR Systems and Hospital Information Systems).

Definitions(cont'd)

- The following definitions are from *The National Alliance for Health Information Technology: Defining Key Health Information Technology Terms, April 28, 2008*

- **Personal Health Record:** An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being managed, shared, and controlled by the individual.

- **Electronic Medical Record:** An electronic record of health-related information on an individual that can be created, gathered, managed, and consulted by authorized clinicians and staff within one health care organization.

An overview of the most prominent PHR solutions

- TELUS health space
  - 1st CHP certified from Canada Health Infoway (CHI certification ensures safe, secure, , proven to be compliant with government PI/PHI policies)
  - Canadian installation of Microsoft Health Vault (also using Canadian local vocabularies)
  - Xml-based SDK for ecosystem partners(CCD, CCR, thing type schemas)
  - Interoperated with Canadian Ecosystem partners
  - Create, store, manage, and share PHR records in one central place
- Google Health
  - US-based CHP but not limited to US citizens, not localized for Canadian environment(no localized vocab, unit of measure)
  - US-based ecosystem partners
  - CCR XML-based Data API
  - store, manage and share all of your health and wellness information in one central place

TELUS health space, PHR

- A Consumer Health Platform in Canada
- Licensed & localized Microsoft HealthVault for Canadian specific implementation
- Hosted in TELUS Data Centre located in GTA
- HealthVault SDK is available in various languages : XML over HTTPS, ASP.NET, Java, etc.
- 1st Infoway certified CHP in Canada
- Current ecosystem partners include EMR, online PHR web applications, and expending into HIS, Lab, and other types of PHR/EHR systems.

TELUS health space Platform Overview

HealthSpace Platform

TELUS health space

HealthVault Database

- HV Account
- HV record
- HV record
- HV record
- Medicine
- Weight
- Appointments
- Biometric Measurements
- Health Items (Lab, Allergy, etc.)
- Custom Thing Types
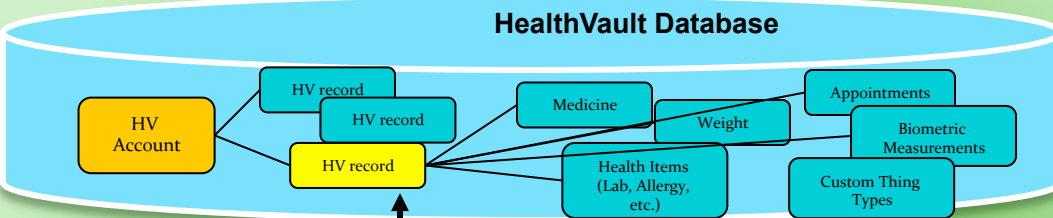
- Consent
- Audit
- Security
- Vocabs/Terminology

HealthVault Platform Server

Web UI

HealthVault Shell Server

Provincial EHR Infostructure

HIAL

App Partners(offline access)

On-Boarding Partner Systems

HV API (.NET, Java, based on xml over https)

+

HV Streaming API(DICOM)

over Internet

HV SDK

EMR

HIS

CDM .....
(H&S, CDA, Asthma, etc.)
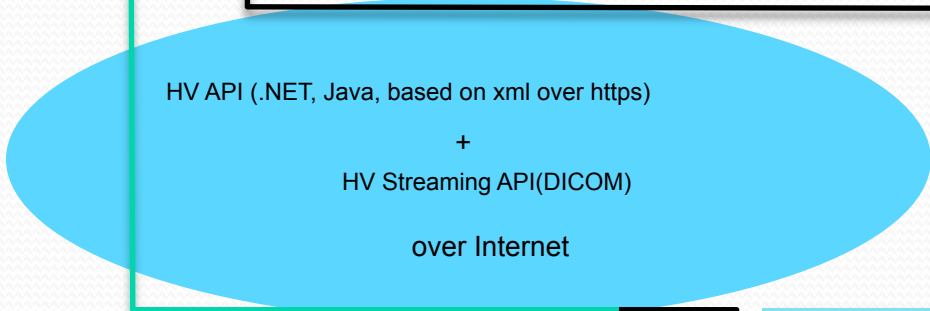
Online PHR Application Partners

TELUS PHR

Web UI

Mobile UI

3rd party PHR

Recommendation Engine

Web UI

Biometric Devices

Microsoft HV Connection Center

TELUS health space, PHR

- As an application running on TELUS health space, the TELUS personal health record enables individuals to collect, store and update their personal health information and displays the data collected in a user friendly manner, such as:

  - Family history
  - Allergies
  - Medications
  - Key measurements
  - Care teams
  - Health & wellness goals

Accounts and Records

- A person using TELUS health space has an Account, identified by a set of credentials

- A Record contains information about an individual

- Accounts and records share a many-to-many relationship

- Information contained in a Record can be shared with third parties

Accounts and Records
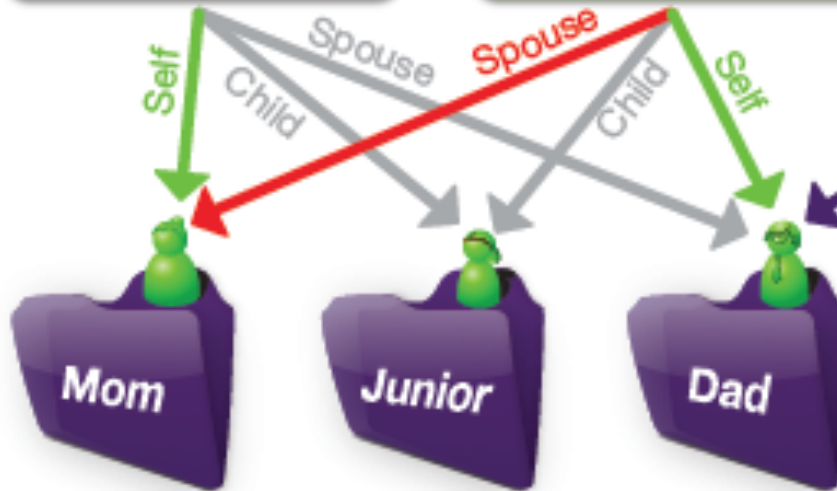
User Authentication
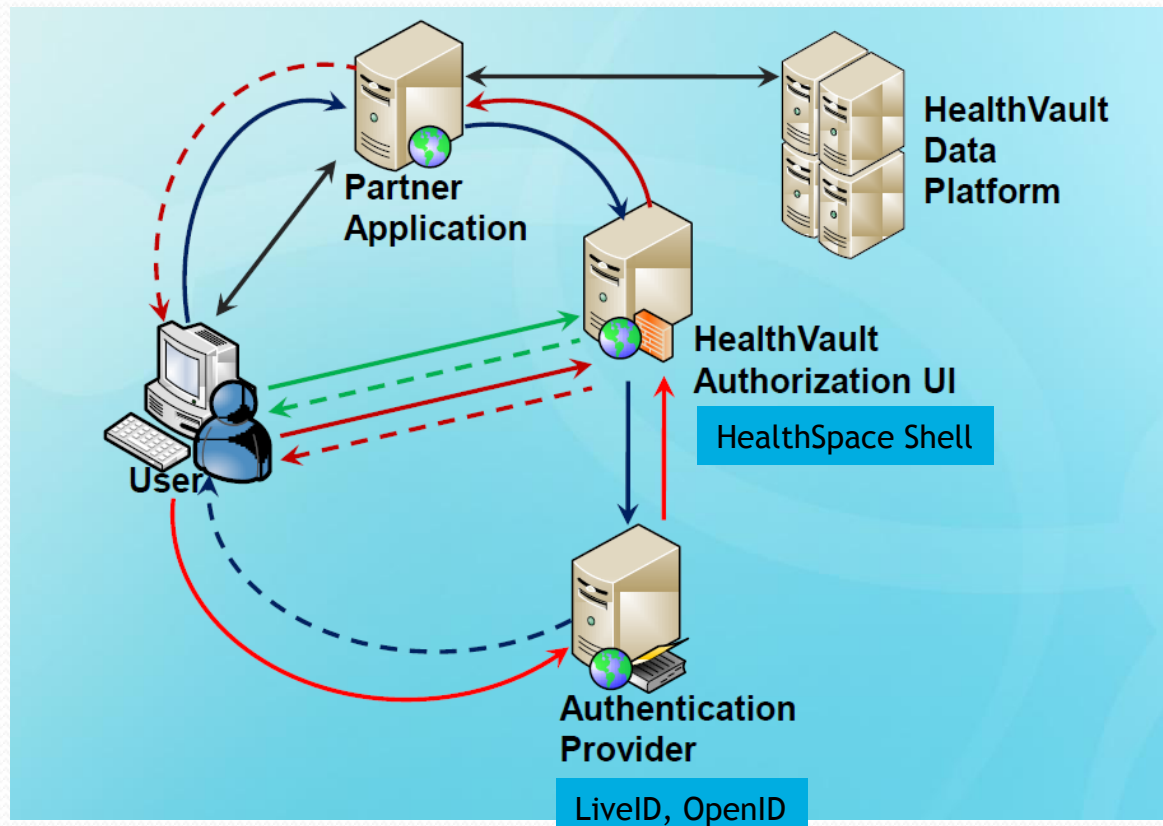
Three level accesses

- View only
- View and Edit
- Custodian

User Sharing/Access Authorization Mechanism

Granting Accounts Access to Records

- Special role called Custodian
  - Custodians can grant access to other accounts
  - At least one custodian for every record
  - Private items are visible to custodians only
- Granular access controls for non-custodians
  - Create, read, update, delete by data type
  - Access expiration
  - Can authorize applications if they have access to the necessary data types

User Sharing/Access Authorization Mechanism

Authorizing Applications for Access to Records

- Applications (including Child App) must be authorized for access to records (by TELUS)
- Applications must be registered with health space
- List of required and optional data access rules
- Public key / private key cryptography used to authenticate applications
- On first use of an application, user must approve authorization
- Authorize specific access levels by item type
- User must re-authorize if access levels change
- Users can revoke access at any time

Person to Person Sharing

Consumer controls data types for sharing and online apps should respect the rules.

Data Types

HealthVault Data Model

- Interoperable
  - Designed to work well with industry standards
- Inclusive
  - Use structure data when available but allow unstructured data
- Just in Time
  - The data model is growing based on real-world requirements
- Independent data elements
  - Minimizes relationships
  - Allows connections but does not enforce referential integrity

Example Data Types
Aerobic Exercise Session
Allergy
Blood Pressure Measurement
CCD / CCR
Condition
Encounter
Family History
Health Assessment
Medication
Procedure
Weight Measurement

HealthRecordItem Type Schema Browser lists the current data types that are available in the health space platform. Please check the URL link:
http://developer.healthvault.com/types/types.aspx

Vocabulary & Codeable Values

- Challenges
  - Industry standard codes
  - Application interoperability
  - Allow unstructured textual data

- Solution: Codeable value
  - Store multiple codes
  - Store display text
  - Query based on codes
  - Preferred vocabulary

allergen-type	HbA1C-assay-method
anesthesia-methods	health-assessment-category
blood-types	health-assessment-name
communication-medium	Icd9cm
calorie-guideline-names	icd9cm-reactions
conception-methods	immunizations
concern-status	insulin-type
delivery-complications	iso3166
ethnicity-types	LOINC
gender-types	vaccines-cvx

Icd9cm (13000+ codes)

International Classification of Diseases

ItemKey	Description
0010	cholera d/t vib cholerae
0011	cholera d/t vib el tor
0019	cholera nos
0020	typhoid fever
0021	paratyphoid fever a
0022	paratyphoid fever b
0023	paratyphoid fever c
0029	paratyphoid fever nos
0030	salmonella enteritis
....	....
....	....

PHR export as HL7 CDA CCR

```
 <?xml version="1.0" encoding="UTF-8" ?>
- <ContinuityOfCareRecord xmlns="urn:astm-org:CCR">
 <CCRDocumentObjectID>ID-f7c8bd32-85c3-46a8-abf0-aa98c17ed693</CCRDocumentObjectID>
+ <Language>
+ <DateTime>
+ <Patient>
+ <From>
- <Purpose>
- <Description>
 <Text>Personal Health Record Export</Text>
 </Description>
 </Purpose>
- <Body>
+ <Payers>
+ <Support>
- <Problems>
- <Problem>
 <CCRDataObjectID>ID-f5037478-806a-4e59-ac43-129350b24820</CCRDataObjectID>
+ <DateTime>
+ <Type>
- <Description>
 <Text>Depressive Disorder</Text>
+ <Code>
+ <Code>
- <Code>
 <Value>192372006</Value>
 <CodingSystem>SNOMEDCT</CodingSystem>
 <Version>2005</Version>
 </Code>
```

NOTE: THIS IS SAMPLE PUBLIC DATA
Google: filetype:ccr
http://www.recordsforliving.com/PersonalHealthRecords/
SamplePHRs/Jose Gonzalez/Jose Gonzalez.CCR

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PHR export as HL7 CDA CCR

```
- <Actor>
  <ActorObjectID>ID-45t9e578-4u2b-4aa1-576-dcf725e575754</ActorObjectID>
- <Person>
- <Name>
- <CurrentName>
  <Given>Jose</Given>
  <Family>Gonzalez</Family>
  </CurrentName>
+ <DisplayName>
  </Name>
- <DateOfBirth>
  <ExactDateTime>1961-03-19</ExactDateTime>
  </DateOfBirth>
+ <Gender>
  </Person>
- <IDs>
- <Type>
  <Text>Social Security Number</Text>
  </Type>
  <ID>123-45-6789</ID>
+ <Source>
  </IDs>
+ <Address>
+ <Telephone>
+ <EMail>
  <Value>Sam.Gonzales@aol.com</Value>
  </EMail>
  </Actor>
```

NOTE: THIS IS SAMPLE PUBLIC DATA
See link on previous page.

Consumer Health Solution Types

- Consumer-owned PHR vs. Tethered Portal
- Can the consumer enter their own data?
- Can the consumer delete or hide data?
- Can it integrate with the EHR to get data?
- Can it integrate with EMRs to get/put data?
- Can the consumer decide who can have, and who cannot have, access? EHR, EMR, family, advocate
- Who retains the data when the account is decommissioned? Who are the custodians?
- Can the data be exported?

CHP Ecosystem

Mundane Privacy & Security aspects (re portals)

- Large consumer population, id mgmt capacity
- Consumer enrollment
- Consumer authentication
  - Windows Live ID and Open ID
- Connection security
- Browser/consumer privacy & security
- Web application/server/database security
- Network security
- Segregation of services, network
- Regular penetration testing
- Privacy protective e-mail notification re portal
- etc

Interesting Privacy & Security aspects (consumer)

- Privacy impact on third party data subjects; requests, complaints, ombuds
- Consumer's ability to understand the privacy impacts of
  - sharing data with other users
  - sharing custodianship
  - sharing data with applications (external vs. internal data)
- User agreements
- Privacy Account Statement, PIA
- Data retention after account closed
- Deletion of imported data

Interesting Privacy & Security aspects (general)

- Potential for unmediated/direct consumer access to EHR data

- EHR & Application on-boarding process, agreements, dispute resolution

- Consumer access to CHP will increase EHR visibility

- Consumer experience with CHP will set expectations re EHR capabilities
  - access control, consent directives & wishes, use & disclosure reports, EHR copy/export, research opt out/in

- Commissioner hopes and expectations of CHP capabilities (consent, access requests, etc)

Interesting Privacy & Security aspects (technical)

- EHR/CHP consumer account connection/enrollment
- EHR/EMR direct access for corrections
- Ongoing visibility of erroneous/corrected data
- Security of data sharing invitations
- Secure e-mail

Business Drivers for PHR

- Chronic Disease Management, Scheduling, Wellness

- Consumers, Caregivers, Providers, Health Care Programs, Pharmacies, Vendors
  - sharing information
  - self-management
  - tool for caregivers
  - new delivery channel for existing care/education programs/mandates
  - align with CHI BP2015 vision for EHR interoperability
  - service offering/service differentiator

Key Challenges with EHR integration

- Identity Management :
  - CHP Account ID and EHR User Registry Integration
- Client Registry Integration
- Data Ownership and Custodian rights
- Sharing of PHR records data within EHR infostructure
- Interoperability b/w Nation-wide CHP(like TELUS HealthSpace) vs. Jurisdictional CHP:
  - Managing multiple PHR accounts will not be realistic for individual consumer. So, how will synching of 2 records occur. What custodian relationship will transpire. (i.e, CHP to CHP sync vs. CHP->EHR->CHP)
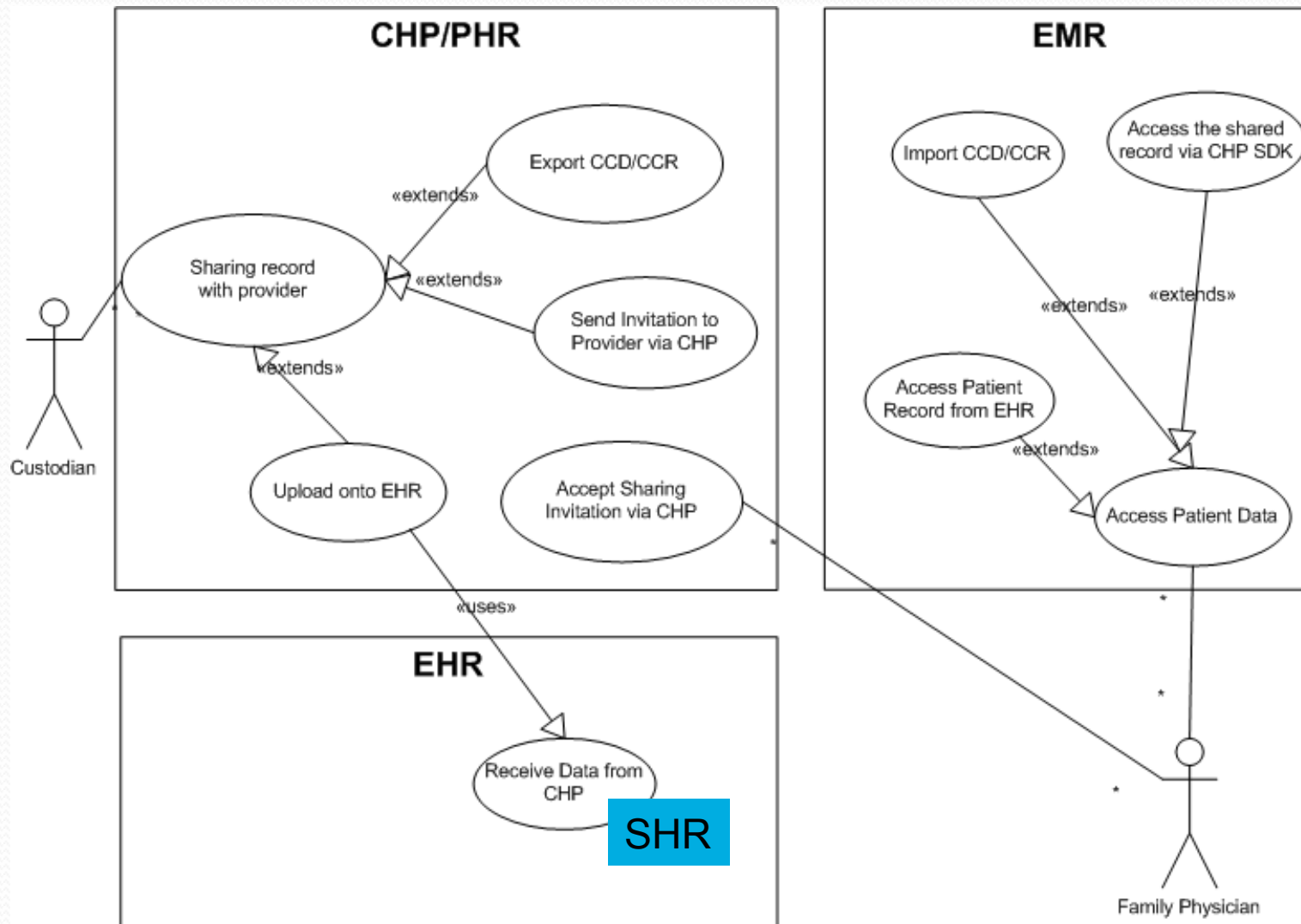
PHR Usecases

- UC1: Managing family health records
- UC2: Sharing PHR data with health care providers
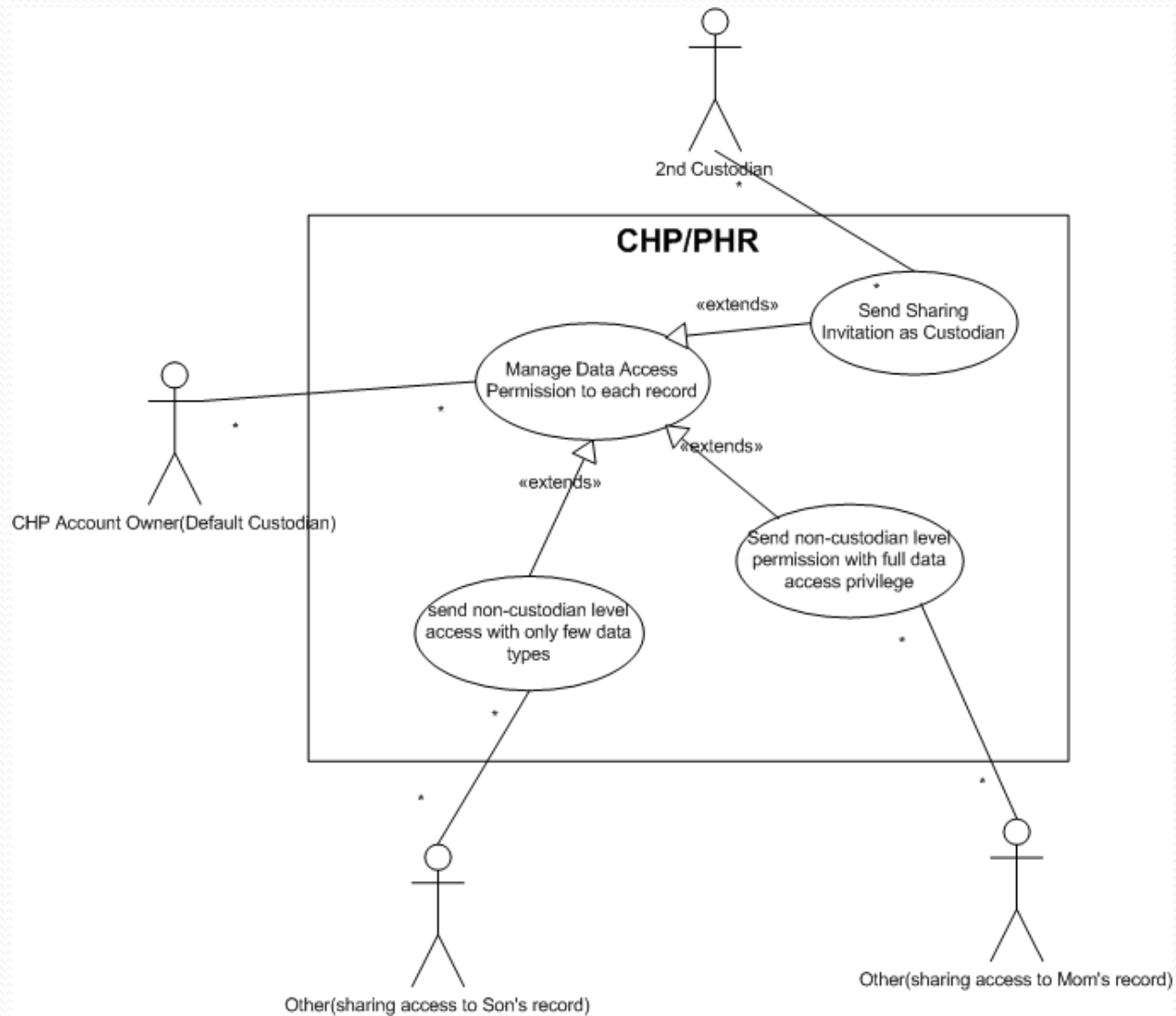- UC3: managing custodianship/privilege

PHR UC1 – managing family health records
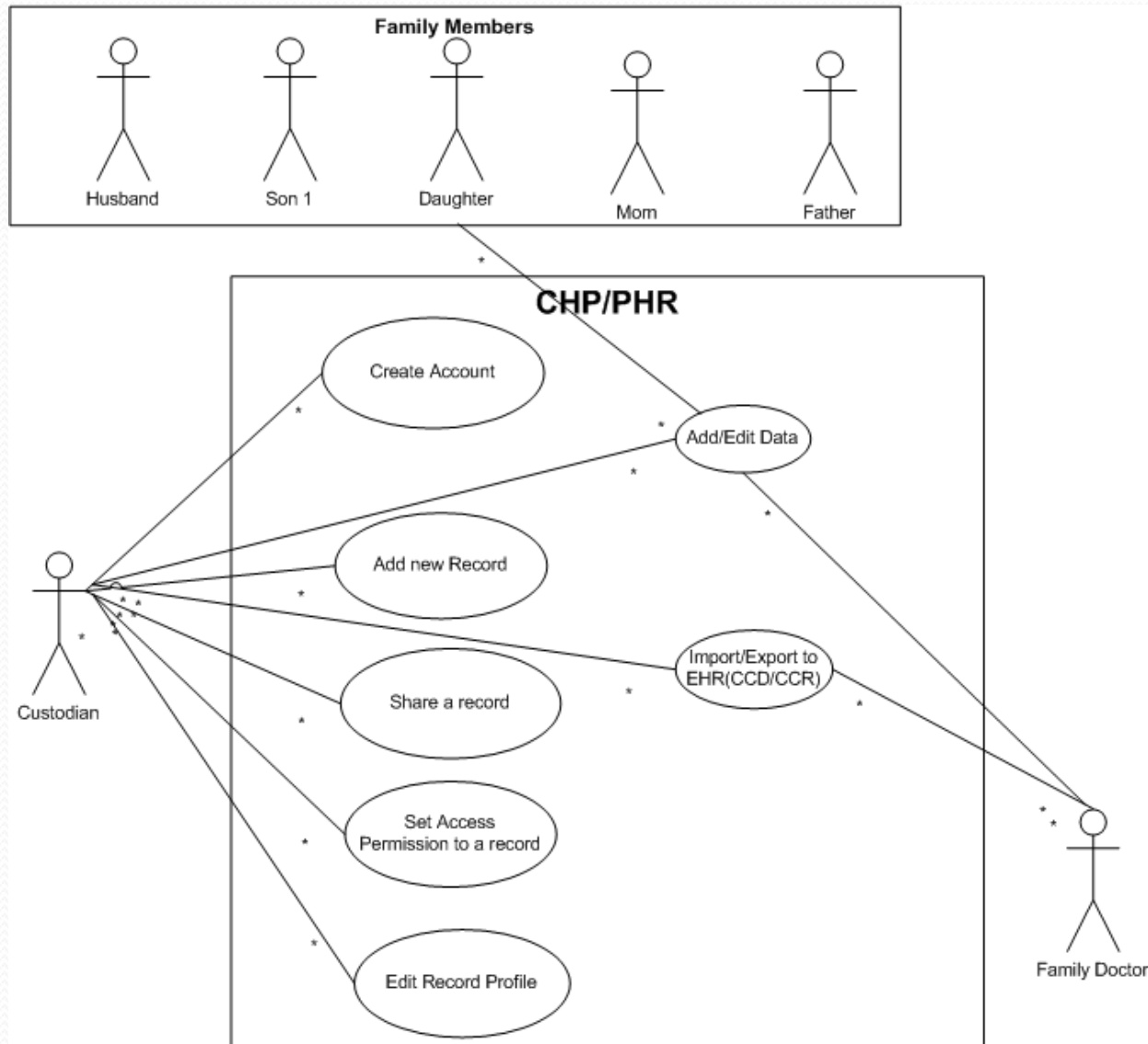
PHR UC2 – sharing PHR data with health care providers

PHR UC3 – managing custodianship/privilege

EHR Usecases

- What are the presumptions about EHR / PHR interoperability? - any reference to our experience with PHR implementation
  - Nation-wide CHP and its onboarded ecosystem partners are interconnected with CHP-provided SDK
  - Pan-Canadian EHR is based on HL7 v3 and TLI for messaging
  - CHP-specific IDM solutions vs jurisdictional User Registiries : they can be same or different.
  - Provider owns patient data for EHR while patient owns data for PHR. When data is initiated from PHR, EHR access point should respect patient's decision on access request. Once data access is approved by patient, EHR can persist the data based on EHR specific access control.

PHR UC4 – Syncing PHR data with EHR Repositories