Development of the Health System Use Project (HSU)

by

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I would especially like to thank Alex Mair, as well as other members of Canada Health Infoway's Atlantic offices for providing the opportunity to participate in the HSU project, and for their constant guidance and support. For the development and coordination of this internship, I would like to thank Dalhousie University, and the MHI graduate coordinator Dr. Paterson for her continuous support, encouragement and assistance in coordinating an ideal internship position with a rich learning opportunity. A special thanks goes out to Dr. Brett Taylor from Dalhousie University, for his useful suggestions and insights into the secondary uses of data. Finally, I would like to thank and acknowledge Dr. Abidi and Dr. Paterson for their tremendous effort in opening the minds of their students through academic learning in health informatics.

David Rampaul

EXECUTIVE SUMMARY

In order to fully understand health care, one must first recognize and acknowledge the many uses for health system data. To this end it is necessary to develop methods and solutions that can capture information for its many varied uses efficiently and effectively. Besides direct patient care there are also secondary uses of health data some of which could help determine health programs, health policies, focus research, allocate funding and provide understanding on the return of investment in different areas. Canada Health Infoway has recognized this value and has initiated early phases of the Health System Use (HSU) project.

The HSU project provided an opening for a valuable internship experience that was completed at CHI's Atlantic offices in Bedford, Halifax between the dates of May 6 to July 31, 2009. The author's major responsibility was to support the core CIHI and CHI project teams on the development of the health system use materials to support the Health System Use Phase 0 proposal to the Board of Deputy Ministers. The following internship report describes the work and contribution that the author made on the HSU project, including his experience and findings in the use of template reporting and the traceability matrix.

What was evident whilst working on the project was the importance of recognizing standards for efficient and useful data capture. Standards also included pan-Canadian standards. Also important was the requirement to identify existing gaps in Infoway's use cases. Both of these components suggested that template reporting could be a useful tool to standardize point of data capture. One such example of template reporting is synoptic reporting. One of the challenges that the author encountered, was how best to adapt a template for standardized reporting and ease of data entry, when questions and answers on patient care tend to be documented in narrative text. Some of the recommendations and solutions that the author made included identifying primary health care indicators from available systematized nomenclatures, and incorporating these indicators as questions on checklists. Another solution consisted of designing the questions to obtain

accurate answers whilst at the same time maintaining flexibility in interpretation for secondary data use. This report describes in detail the author's experience throughout the internship, his findings, the challenges and his solutions to those challenges; and the inter-relationships with health informatics learning.

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1. Introduction

Management of an effective and efficient health care system requires timely and accurate information from many sources. It is important to understand how to effectively use the data to broaden the range of health system uses, not only for patient care delivery but to help stakeholder jurisdictions set health policies, develop standards and create interoperable solutions. The Health System Use (HSU) project seeks to accomplish this goal by articulating the current state of the health care industry and what is occurring in specific health care settings. The opportunity to leverage health data from different processes and procedures moving through the health care environment necessitates a need to repurpose this data from many different perspectives [1].

The HSU project encompasses a number of different components. When considering the many secondary uses for health system data, understanding the information requirements and the standards used to capture the data are critical. This is essential to ensure that a full range of outcomes and uses are possible. The principles used to support HSU data span a number of different categories moving from direct patient care to clinical program management, to health system management, surveillance and research [2]. From a medical standpoint, the HSU project will touch areas covering health outcomes, safety and quality, system efficiencies, utilization and access, and finally, longitudinality and continuum of care. There is great opportunity for health informatics to provide effective solutions. In this context, health informatics can support health system uses such as clinical decision support, system management activities such as analysis, research and reporting, as well as safety and quality improvement. Additionally, facilitating health informatics solutions will lead to better and more robust health system architectures, and technologies that can in turn be leveraged to improve health services and address the value taken away from administration and business perspectives.

The outcome of the project is intended to ensure that in the future, the health of Canadians and the performance of the health system is improved and influenced by the data and the knowledge gathered from health system use and its technologies. It is an ongoing and iterative process towards achievement of this goal. The author's role was to

develop health system use materials in support of the core CIHI and CHI project teams to present the HSU Phase 0 proposal to the Board of Deputy Ministers. Other responsibilities included research and information gathering. For the HSU project, the author was given the opportunity to learn and use two tools, synoptic reporting (SR) and the traceability matrix. A number of primary use cases involving Infoway's Life of the Lamberts (LoL) framework and their Electronic Health Record Solution (EHRS) Blueprint, were analyzed by the author for traceability and mapped back to the standards found in the Maintenance Release Specifications 2009 (MR 2009). These documents, along with Infoway's Vision for 2015 outline the road map for accelerating the implementation of an interoperable Electronic Health Record (EHR) solution across Canada. A traceability matrix was designed by the author and enhanced as a tool for assisting Infoway to align their standards use cases into a consolidated framework, keeping in mind HSU purposes.

In spite of further phases of HSU being halted pending federal funding, the author was provided the opportunity to work on other aspects of secondary data use with the project team and explore concepts in great detail. Dr. Brett Taylor from Dalhousie University was engaged for this purpose. He was interviewed on his ideas for template reporting and for his insights into the provider perspective. In terms of moving HSU forward, discussions in meetings led the author to recommend incorporating template mechanisms for data capture, coupled with real-time, immediate feedback for physicians, as well as a set of use cases to model this new approach. Of particular interest was the process carried out with CIHI in the development of a set of standards for capturing Primary Health Care (PHC) indicators, and the further extension of these indicators into the use case exercise, and the templating methodology. Health informatics based solutions were utilized every step of the way during the placement.

2.   Description of the Organization

"Canada Health Infoway, created in 2001, is an independent, federally-funded, not-for-profit organization that collaborates with the provinces and territories, health care

providers and technology solution providers to accelerate the use of electronic health records (EHRs) in Canada. Its vision is a high-quality, sustainable and effective Canadian health care system supported by an infostructure that provides residents of Canada and their health care providers, with timely, appropriate and secure access to the right information when and where they enter into the health care system. Its mandate is the development of a network of interoperable electronic health record solutions across Canada – linking clinics, hospital, pharmacies and other points of care. Infoway's members are Canada's 14 federal, provincial and territorial Deputy Ministers of Health". [3]

The mission of the organization is guided by a plan that incorporates two important documents – the Electronic Health Record Solution Blueprint and Vision 2015. Together, these documents provide a road map for the development and implementation of a pan-Canadian, interoperable electronic health record [4]. Currently, the opportunity to leverage these efforts for the secondary uses of data has presented itself in the form of the Health System Use Project. Under their federal mandate to move the electronic health record forward, Infoway's plan to focus on health system use is an approach guaranteed to provide the jurisdictions with better support for purposes other than direct patient care. This in turn should provide impetus for possible future uses of information and the implementation of Health Information Technology (HIT) systems. As such, information surrounding health system use will be used by Infoway to inform policy, make better decisions regarding patient outcomes and reduce budget costs around health care spending [5]. Statistical trends in the health care system can be provided to Deputy Ministers to assist them in making decisions for the industry. This will in turn help the members of Infoway to determine what types of data are required, how funding is allocated, and what types of care programs should be developed in order to address health care triggers and different routes of treatment.

The work at Infoway's Atlantic offices is shared and divided amongst a small group of dedicated individuals, each focusing on aspects of the Blueprint. Working sectors dedicated to EHR Privacy and Security, Standards, Change Management, Architecture and Solution, Products and Services (SPS) collectively contribute to Infoway's project

management and overall plan [6]. On behalf of the jurisdictions and under the supervision and auspices of Alex Mair, Regional Director of Architecture, the HSU project was initiated and will continue to move forward under Infoway's core business architecture sector. This division is responsible for aligning Infoway's EHR Blueprint to a Service Oriented Architecture (SOA) that will support the e-health Blueprint 2015 and new and existing HSU services. The architecture outlines the road map that Infoway plans to follow. It includes considerations such as software solutions, standards, and implementation plans. Ultimately, Infoway's goal to transform the way health care is delivered across Canada is dependent upon developments like the Health System Use project, together with stakeholder support in government and neighboring health care organizations such as CIHI.

3. Description of Work Performed at the Organization

3.1 Description and Role Overview

For the internship, the author under the supervision of Alex Mair, was to assist in moving the HSU project forward. Responsibilities included developing health system use materials in support of the core CIHI and CHI project teams to present the HSU Phase 0 proposal to the Board of Deputy Ministers. Other responsibilities included research and information gathering from several sources, such as the Infoway Blueprint and various Standards documents which cover governance processes related to HL7. Research and information consolidation was also performed for the HSU project. The author was also charged with monitoring interim deliverables of the project and providing comments on the deliverables and drafts. The author participated in workshops and meetings and was tasked with documenting meeting notes and following up on action items (refer to Appendixes 1 and 2 – Work Schedule and Meetings Attended). In the performance of his responsibilities, the author was given the opportunity to learn and use two tools extensively; synoptic reporting (SR) or template reporting and the traceability matrix.

3.2   Synoptic Reporting (SR)

Synoptic reporting (SR) is a tool for assisting providers to capture information easily at the user interface level. Being involved in the HSU project, the author was exposed to this tool (SR templates) as one of the many options that Infoway had considered as having great potential for capturing information. Much of the internship focused on how best to use this tool and capitalize on its use, always recognizing the overarching purpose for efficient and effective data capture. The ability to utilize templates at the point of care in order to capture codified information, as well as nomenclature for secondary uses of data, was the primary focus and chief objective for the following exercise being undertaken.

In order to clearly and quickly recognize the most important findings, SR uses established checklists and provides the ability to record directly [7]. This concept builds on using structured, coded data entry templates and focuses on a form of report standardization [8]. There is a lot of promise in SR templating as a solution to the problem of gathering and collating information for the purposes of secondary data use. As such, this activity was followed mostly from the perspective of a primary health care provider and/or family physician, with the intent to save time through quick, fast and concise data entry. As part of the HSU project, the author sought to use variations of SR and templating as a tool to increase the usefulness of data and to assess how complete that data actually was. Responsibilities included formulating recommendations on who should primarily be entering this type of template data, as well as exploring the possible challenges encountered with the recommended approach (refer to Appendix 5 – SR Presentation).

Other responsibilities for the HSU project included constructing new use cases that would incorporate the new type of SR templating, and depicting these use cases in a way that could further guide the design and architecture for Infoway's EMR's and EHR Blueprint. Discussions and meetings with Dr. Brett Taylor from Dalhousie University were carried out by the author and members of Infoway, in order to gain a better understanding of the physician perspective and to gather further insight on this type of approach.

3.3   Traceability Matrix

Another responsibility of the author was to complete a number of jobs using Infoway's past uses cases, commonly referred to as the Life of the Lamberts (LoL). These use cases depict a fictional family known as the Lamberts, and essentially act as a storyboard guide outlining all of the family's health encounters, demographic data, business views, interaction diagrams, and Electronic Health Record Infostructures (EHRi) and EHR services [9]. The purpose for identifying the various techniques that were applied for these fictional health service encounters is to provide the provinces and jurisdictions with a detailed reference framework for leveraging the EHR Blueprint and building on the Electronic Health Record Solution (EHRS) reference architecture. The LoL framework demonstrates how to model and leverage existing use cases for application in real health care scenarios and settings, and EMR / EHR application.

The author was charged to review various Statements of Work (SOW) for the e-Health Blueprint Business Requirements, and collaborate with the project team to research what was currently in practice in the field for the standards use cases. An assessment was made by the author on what Infoway should incorporate into the business requirements, as well as an evaluation of the additional work effort required to link the relevant use cases into the Life of the Lamberts (LoL) framework. Necessary to this assessment was a review and understanding of the Maintenance Release Specifications 2009 (MR 2009) – an internal Infoway document outlining various specifications, revisions, implementation guides (by suite of products and standards), terminology, messaging standards and interactions (messages and terminology binding to payload) [10].

The author provided a summary evaluation on the relevance of the MR 2009 to the LoL framework. With Angus King, the Atlantic Standards Lead and Clinical Subject Matter Expert (SME), the author was provided guidance on how to begin mapping all of the Electronic Health Record Interoperability Profiles (EHR IPs) to the messaging standards in the form of a traceability matrix. The matrix would outline all of the functional requirements found in the LoL framework, take into consideration the Infoway Blueprint, and display these requirements against the relevant pan-Canadian messaging standards

found in the MR 2009 (ideally tied to MR 2009 volume numbers and names, and associated with major components and content topics). With this tool, Infoway could assess existing gaps, identify major categories / domains of pan-Canadian standards (pCSs) for implementation, as well as future use cases (refer to Appendix 3 – Traceability Matrix). This would lead to a more consolidated framework and single-point of reference.

4.   Discussion on how Work Relates to Health Informatics

4.1   Synoptic Reporting (SR) – The Relationship with Health Informatics

Solutions in health informatics often build on the use of messaging standards, classifications, coding systems, and common terminologies and nomenclatures, in order to have interoperability among health systems whether in clinical, hospital, or other health care settings. SR and template reporting approach these issues by providing a standardized nomenclature and a very uniform report structure [11]. The use of standards will lead to better information gathering for efficient health mechanisms and patient outcomes.

The use and importance of standards were highlighted in the Health Information Flow and Standards teachings. For the author, the learning from this class was key in understanding why formal methodologies such as the HL7 Framework are required to ensure semantic interoperability and system integration. For instance, the main purpose for standards development is to facilitate a common platform or shared ground, so that "knowledge sharing between individuals" is mutual and collective [12]. In order to examine standards, there are a number of key features that are addressed by various organizations such as Infoway through their Standards Collaborative Working Groups (SCWGs), Standards Collaborative Strategic Committees (SCSC), Standards Collaborative Coordinating Committees (SCCC) and the Standards Collaboration Process (SCP), covering pan-Canadian Standards and HL7 development frameworks [13].

The approach taken by the author to use Synoptic Reporting (SR) to improve the data capture for health system use purposes at the EMR / physician level, builds on the concept of templates and coded data entry, to ultimately make Version 3 (V3) standards more stable. The activity of using SR templating has predominantly been focused around cancer care, and advancing excellence among the College of American Pathologists (CAP). Using item checklists and acceptable synoptic style reporting approaches is indicative of the work found behind health informatics since various data elements and predictive parameters must be validated in order to improve interoperability, and report generation [14]. Infoway's goal to leverage and pull information from the EMR / EHR, while at the same time feeding it back into this new templating concept will be paramount to how data is captured for secondary purposes of health system use like immunizations, health screening, vaccinations, public surveillance, and research.

The approach of using templates is similar to an academic activity undertaken by the author where students were asked to create a Clinical Document Architecture (CDA) and become familiar with the approach of completing an HL7 template and leveraging that information by viewing the XML source code. The use of SR and templates incorporated many aspects of this learning; however the author sought to take this one step further to understand and investigate how HSU might be impacted, and the type of indicators required to accomplish this.

4.2 Traceability Matrix – The Relationship with Health Informatics

Efficient and accurate data collection and the use of Information Communication Technologies (ICTs) to share and gather health information electronically are important elements to health informatics. The ability to correctly identify existing gaps in standards, duplication of effort, redundant information and overlapping areas, is a large factor in determining how health informatics-based solutions are considered, deployed and executed. The traceability matrix designed by the author was created to address this ability, and to provide Infoway with a tool that could be used to further guide future direction.

Within Infoway's Blueprint for an interoperable Electronic Health Record (EHR) framework, a number of components are found within the Jurisdictional Infostructure. Registries and Data Services (containing the Client, Provider, Location, and Terminology Registries), Public Health Surveillance (PHS) Ancillary Data and Services (containing Outbreak Management, and PHS reporting), EHR Data and Services (containing Shared Health Record, Drug Information, Diagnostic Imaging, and Laboratory), Data Warehouse (Health Information), Longitudinal Record Services and the Health Information Access Layer (HIAL) (containing Common Services, the Communication Bus, and Privacy and Security concerns) all correspond and contain various pan-Canadian standards used to support the EHR infostructure [15]. Moreover, additional e-health solutions require and demand pan-Canadian standards that are stable and up-to-date in order to support clinical point-of-service integration for an interoperable EHR [16]. Therefore, the matrix designed helps to provide a critical analysis, and traceability from functional requirements in the use cases (Infoway Blueprint, LoL Framework) through to the standards (MR 2009). Ultimately, tools like this will assist Infoway in bringing together some of the standards use cases to create a consolidated framework, which can then provide background and reference for the provinces and jurisdictions when rolling out health informatics based solutions.

5.   Discussion of Problems Analyzed and Corresponding Solutions

5.1   Challenges with Synoptic Reporting

The author's decision to use SR to capture aspects of the patient encounter presented some difficult challenges. When trying to capture information at point of service or at the user interface level, there must be a consideration for elements such as how the data will be stored and collected, who will enter or input the data into the system, how the data will be standardized, and how much time and effort will be used by the attending physician. Adhering to the objective that the data should have the potential to be used from a secondary standpoint (i.e. a focus on HSU) the author had to phrase questions in a specific way which ultimately affected the design of the template.

According to the literature, a major difficulty with template reporting is the fact that the majority of reporting is largely narrative text, meaning that in most cases the text is basically unstructured, uncodified free text or dictation [17]. As a result, there are unlimited vocabularies and unlimited responses, which could pose a problem for standardizing data across different health care settings. This is especially true and problematic for specific persons, such as complicated populations and complicated individuals [18]. Another major challenge was deciding who would ultimately enter the data. Bearing in mind the goal of saving time for the physician and the rest of the health care team whose focus is immediate patient care, it became less likely that asking the physician to enter additional information for the purpose of secondary uses would be a reasonable solution. As well, from a patient perspective, it is extremely difficult to look at anything beyond what is immediately relevant and critical at the point of care. It is a challenge to revisit a patient's history after the fact to glean further information or to try to capture other information regarding HSU at the point of service, since realistically, questions target immediate concerns while other items are deferred or ignored.

A physician's perspective is to address immediate patient needs, and tend to as many patients as quickly and as safely as possible. Garnering health information or statistics for secondary use is not a priority if at all. For example, with respect to a doctor checklist, a patient with a twisted ankle would only have as checked off on the list, an injury. No unrelated data on whether or not the patient had a fever, was ever immunized or vaccinated would be recorded. Inputting extra information would appear to waste time. Unfortunately for HSU, not having access to this ancillary information could result in a larger health issue when one desires to repurpose this information for secondary uses such as public surveillance and/or population health.

With respect to standardizing the template data, additional challenges occurred in making the correct determination of which questions to ask, and if not asked at the time, how to obtain it at a later time. Specifically, the type of surveillance executed in later phases may be difficult to comprehend if the information or data is not initially captured. Therefore, difficulties were encountered in predicting parameters; the concern here being

to lead health care solutions to become more selective versus synoptic, which is exactly what health care hopes to avoid. If the parameters must address complicated and specific individual cases, then flexibility would have to be incorporated into the author's solution. These were some of the challenges encountered by the author when considering a solution to capture patient information for HSU purposes.

5.2   Solutions in Template Reporting

With respect to the challenges outlined above, the author sought the advice and help of Dr. Brett Taylor from Dalhousie University for his insight into the provider perspective. The conclusion was a decision by the author to incorporate as many aspects of secondary data use into the physician's workflow, and within the actual template and information capture process. When considering the many difficulties in standardization and the many available systematized nomenclatures and coding systems such as ICD, SNOMED CT, and LOINC, identification of the indicators required to accomplishing the goal of template reporting for secondary uses was clear.

Meetings and discussions carried out with the HSU project team and members from the Canadian Institute for Health Information (CIHI) helped to clarify some of the overlap in identifying the relevant health information areas and Primary Health Care indicators (PHC) required for HSU. To facilitate this process, the author worked with members of CIHI to create a checklist outlining the relevant CIHI PHC indicators and EMR content standards; thereby giving both members of Infoway and CIHI a clearer picture and direction of where they planned on heading in later phases of the HSU project [19]. This checklist would additionally aid vendors in having a quick view of the indicators required for HSU, the standards needed to achieve interoperability, and in selecting the best software solution (refer to Appendix 4 – PHC Checklist).

The approach taken by the author to phrase questions in the best way, to incorporate flexibility into the template and to decide who would be the appropriate person to fill in the data, all leveraged health informatics based solutions. For instance, having a reliable index would entail knowing the perspective of the user – how granular and valid would

the index need to be, what was the relevant health care setting, what was the user's basic needs, and how to ask questions in a meaningful way. Asking a patient whether or not they have an injury or an infection is a fairly straightforward exercise. Physicians can answer this question with a yes or a no easily and quickly. However, asking a physician about the type of infection the patient has or the type of cold is somewhat more problematic since physician interpretation is required. One could theoretically end up with many different answers, making standardization of templates from setting to setting extremely difficult. Therefore, in order to remedy this problem, as well as maintain flexibility for complicated individuals and populations, the author suggested using easy, single observation questions in the form of yes or no answers. The approach used was indicative of the author's goal to lower rate of change and increase inter-rater reliability among the template approach. In this way, knowing the specific group and the specific group's uses would be a more accurate depiction. Recommendations by the author such as collecting participation rates, data completion rates, and utilization rates were significant contributions to HSU. These metrics are useful since one of the goals would be to determine if the data is being used, and if that utilization is resulting in change. The data could also help users determine and consider further indicators for analysis.

With respect to the issue of complicated populations and specific individuals, the author sought to incorporate the idea of knowledge sharing, while having Clinical Practice Guidelines (CPGs) built into the template reporting concept [20]. For the author, this idea stemmed from academic learning and experience gained in another health informatics course known as Knowledge Management, where students are encouraged to consider technology and health informatics based solutions as a revolutionary way of thinking. In keeping with this notion, the author sought to incorporate a link to CPGs within the template, and to take it one step further by not only having built-in recommendations for the physician, but a model of real-time feedback for the physician as well. The model would recognize the problem physicians face – not having enough time, ability, memory and/or space to constantly absorb all those specific data pieces and to store data elements in their head. The new idea for immediate feedback within a template report, in conjunction with built-in CPGs and recommendations, would provide

the physician with greater assurance and more informed power on physician decisions and courses of action for patient treatment. Additional alerts, the use of touch screens and drop down menus, intertwined and infused with pop-up balloons providing real-time feedback built into a template would be beneficial to physicians. For health system use this idea could be extended to health screening, immunizations, and collecting data on PHC indicators. The model just described could be as simple as having a mechanism that utilizes data collected through the template approach, popping up a balloon and giving the physician feedback such as, "you have seen twenty cases like this in the last week, and of them half required blood tests, and the other half chest x-rays". With this functionality in the system, metrics and statistics on the physician's actions can be summarized and be available to inform and guide his or her actions on patient care. Statistics could be gathered in all forms across different physicians, and across different locations. From an HSU standpoint, this approach could be leveraged to assess risk in certain patient populations by analyzing recommendation and courses of action by attending physicians.

The last recommendation made by the author was to have the patient commit to their own care in the health care process (self-care) by completing a template of their information. This could be serviced by kiosks in waiting rooms where patients, facing long wait times, could present customized patient data sheets immediately to the physician. From the author's perspective, having the patient record their own information is reasonable since they have the ultimate stake in their well-being and could speak to their symptoms best. Patients would most likely be amenable to share the responsibility to expedite the health care process, and in regard to their own patient histories, very little interpretation would be required.

5.3   Building Solutions for Template Reporting Through Use Cases

In addition to researching solutions for HSU, the author also worked with members of Infoway to review, refine and revise their current standards use cases. Using the experience gained through class training and project assignments, the author developed a number of use cases for Infoway's HSU alignment that would incorporate aspects of the

innovative template approach, as well as capture the intended future direction for HSU. With the Life of the Lamberts (LoL) framework as the basis, together with the newly designed traceability matrix, the author identified and focused on a number of existing gaps found within the matrix, and worked to incorporate these new aspects into the new HSU model and template approach.

Use cases were created for scenarios in emergency room assessment, diabetes care management (real-time feedback and diabetes template reporting with a diabetes registry), orthopaedic surgery settings (reducing the waitlist and using a centralized patient referral system with closed-loop reporting), and depression assessment (HSU and capturing PHC indicators). This exercise demonstrated to the author the effectiveness and relevance of use cases. Solutions proposed by the author helped reveal how interactions were modeled, how test data helped to establish baselines for Lambert demographics, and how careful consideration worked well to ensure that the use cases were accurate in depicting clinically relevant techniques and clinical perspectives. The use case solutions proposed by the author served to confirm the validity and internal consistency of the use cases in the Lamberts framework. Furthermore, the use cases for the LoL continue to be relevant and useful.

6. Conclusions

For health care and its stakeholders, the new direction and drive towards leveraging health system data for the purposes of secondary use create opportunity for an effective health care system. Findings could help determine what funding goes back into health care from a financial and business perspective, and they could also support and guide the future direction of care program implementation for the community, and how health care is ultimately delivered to patients. The potential to learn and uncover new and relevant trends that could benefit the public demonstrates why other uses of health data can serve to support the direction of health policies and programs.

Canada Health Infoway's (CHI) primary role in this endeavour, as well as their high-level plan to build and extend on the Blueprint vision spanning EHR architecture, standards

and implementation phases, bodes well for health care stakeholders and Deputy Ministers. The business context, as well as the technical and strategic plan with which CHI hopes to move forward suggests a number of new opportunities for Health System Use (HSU). Targeted vision areas include decreased wait times in line with the 2015 Vision, new Health Information Technology (HIT) investments such as EMRs, toolkits, and Clinical Service Integration (CSI), pan-Canadian initiatives in drugs, labs and diagnostic imaging (DI), as well as improvements in Primary Health Care (PHC) and Data Warehousing (DW) solutions for the provinces and jurisdictions.

For the author, the chance to be involved and be a part of Infoway's HSU project was an invaluable experience. The opportunity to work with bright, committed and knowledgeable staff only enhanced and solidified the classroom training in health informatics. The author's appreciation and understanding of the process of data capture to meet flexibility criteria were increased through meeting discussions, brainstorming sessions, research, use case and traceability matrix development, and template reporting (SR) design. The internship at CHI provided an opportunity to see health informatics in action versus the theory of the classroom. The author also gained the big picture perspective of Infoway's mandate.

7. Recommendations for HSU Moving Forward

The basis for the author's recommendations is the work performed for the internship and as well, discussions with Infoway members, supporting academic staff, supporting project teams and organizations. For the HSU project, it is recommended that CHI and CIHI work closely together to form an agreement to develop and align standard coding sets for PHC indicators in order to achieve interoperability for HSU, reduce overlap and duplication of effort. There is an opportunity for an enhanced, consolidated framework for aligning Infoway's current and future standards use cases, with emphasis and consideration for capturing data in the HSU direction and identifying existing gaps in standards. Additional time and effort should be allocated for updating standards use cases and incorporating new aspects of the template report approach and new models of real-time, immediate feedback for the physician. Capturing data for health system use at the EMR / physician level should incorporate some aspects of Synoptic Reporting (SR), but should move beyond SR to an enhanced model of template reporting. The argument for this is the fact that SR is a tool geared to cancer care and has constraints for HSU purposes [21].

Sourcing the best vendor with an optimal software solution for capturing HSU data should be undertaken. This will ensure that the EMR / EHR infostructure is servicing health care staff at the point of service, and that various applications at the user interface level are efficient at capturing secondary data. An assessment should be made on the opportunity to use open source tools, data warehousing approaches and Business Intelligence (BI) tools. This will guarantee financial stability for health care spending and reduced vendor license fees, as well as delivering information for analysis and reporting quick, fast and effectively.

On the architecture, vehicles such as the EMR and the HIAL / EHR infostructure will have to incorporate new features and data components required for health system use. This could involve modification and/or including new and additional components to the jurisdictional infostructure in order to achieve interoperability for de-identification,

anonymization and other concerns such as metadata management, data warehousing for HSU, and obvious privacy and security concerns.

With respect to work being completed amongst the Federal, provincial and territorial (F/P/T) jurisdictions, CHI should work closely with these groups to facilitate better information sharing for HSU through toolkits, and knowledge exchange networks. The opportunity to learn from one another and leverage efforts among the provinces was something that every jurisdiction across Canada expressed in survey results.

Finally, consideration must be given to tools and standards for privacy and security, as well as de-identification and anonymization of patient identifiable information. An assessment or measurement for risk exposure as well as the overall risk management for de-identified patient information for HSU is a beneficial framework with which to guide future direction. This can ensure that all HSU privacy and security concerns are mitigated, and that there is ethical consent for use of the patient data among privacy agents, research data centres, and ethical boards.

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9. Appendices

Please see the additional attached documents.

9.1 Appendix 1 – Work Schedule

A table outlining all of the author's internship work – particular tasks, involved parties, assigned responsibilities, target dates and deliverables.

9.2 Appendix 2 – Meetings Attended

A table outlining all of the meetings attended by the author over the course of the internship. Focus of the meeting, attendees and dates are provided.

9.3 Appendix 3 – Traceability Matrix

The final traceability matrix designed by the author highlighting the LoL framework and standards use cases. All EHR IPs are mapped to the appropriate pan-Canadian Standards in the form of a List, Get or Put (L/G/P). Sheet 1 contains a condensed view, while Sheet 2 provides a detailed view down to the EHR IP level, and health service encounter.

9.4 Appendix 4 – PHC CIHI Checklist

The draft checklist designed by the author for capturing Primary Health Care (PHC) indicators, used by CIHI to formulate their own draft matrix and RFQ assessment.

9.5 Appendix 5 – SR Presentation

A deck highlighting the author's findings for synoptic reporting presented to the members of Infoway on June 3, 2009.