

A network diagram consisting of numerous red circular nodes of varying sizes connected by thin red lines, forming a complex web. It is positioned in the top left corner of the page.

WHITE PAPER

Health Information Integration: Assessing the Need for Integration

INTRODUCTION	3
ASSESSING THE NEED FOR INTEGRATION.....	3
BUSINESS CASE ASSESSMENT	3
ORGANIZATIONAL READINESS ASSESSMENT	4
BUSINESS PROCESS ASSESSMENT	4
TECHNOLOGY ASSESSMENT	4
FINDING THE EVIDENCE.....	5
ANALYZING THE EVIDENCE.....	6
KEY HIIF SUCCESS FACTORS	7
INTEROPERABILITY	7
DATA ANALYTICS	8
ORGANIZATIONAL CHANGE MANAGEMENT.....	8
BARRIERS TO HIIF SUCCESS	8
RECOMMENDATIONS BASED ON THE EVIDENCE	9
BUSINESS CASE	9
ORGANIZATIONAL READINESS	9
BUSINESS PROCESSES	9
TECHNOLOGY	10
NEXT STEPS.....	10
APPENDIX.....	11
LITERATURE REVIEW REFERENCE LIST	11
WHITE PAPER REFERENCE LIST	11

Introduction

This paper is the second in a series on health information integration. The first paper—“An Introduction to Health Information Integration”—discussed a health care organization’s need for a method to manage the many variables involved in developing interoperable health care systems and highlighted CGI’s Health Information Integration Framework (HIIF) as such a method.

This second paper compares the results of an academic literature review with the assessment concepts and processes encompassed in HIIFs. The literature review was conducted to examine health information integration from a patient care and safety perspective and to evaluate the need for an HIIF within the current health care environment.

The review demonstrates the value of HIIF components when applied to real problems facing health care organizations today and why an IT framework should be considered within the context of health care delivery.

A proper assessment of an organization’s readiness and capabilities is required to create a sound planning foundation for health information integration.

Assessing the need for integration

A proper assessment of an organization’s readiness and capabilities is required to establish a sound planning foundation for health information integration.

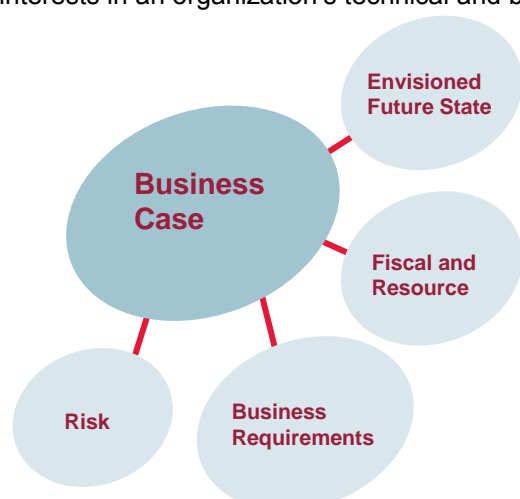
CGI’s HIIF is based on a standard cycle of organizational planning and effort. It brings both technical and business planning and execution together, creating the necessary alignment for successful health information integration initiatives.

CGI’s HIIF provides health care organizations with a way to evaluate, prepare, implement and support a new information sharing reality by applying a flexible yet structured approach to information integration. It’s based on five key phases: assessment, gap analysis, solution development, implementation and steady state.

This paper focuses on the first phase—assessment. Assessment ensures that constraints are identified and respected and that strengths and reusable assets are leveraged. It centers around four main categories: business case, organizational readiness, business processes and technology.

BUSINESS CASE ASSESSMENT

A business case assessment is performed to ensure that a cost-benefit analysis, risk identification, preliminary business requirements, and known fiscal and resource constraints are part of the planning. Without a strong and focused business case, complicated integration efforts will fall prey to the many competing interests in an organization’s technical and business operations.



ORGANIZATIONAL READINESS ASSESSMENT

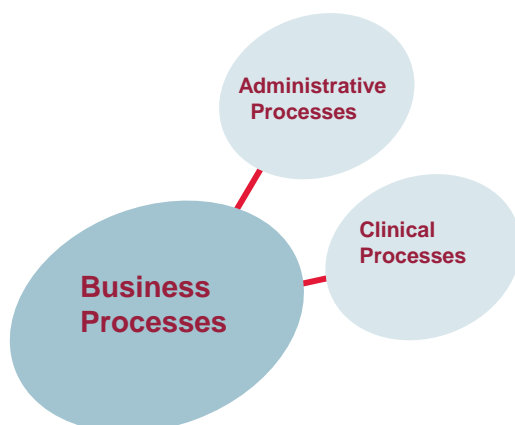
An organizational readiness assessment is performed to determine whether an organization's current structure and culture support the required changes/enhancements for health information integration. This includes assessing the organization's governance structure and determining whether it covers key elements, such as data ownership, data stewardship and data governance. An organization's overall readiness for change is imperative for information integration initiatives to generate their intended results.



An organization's overall readiness for change is imperative for information integration initiatives to generate their intended results.

BUSINESS PROCESS ASSESSMENT

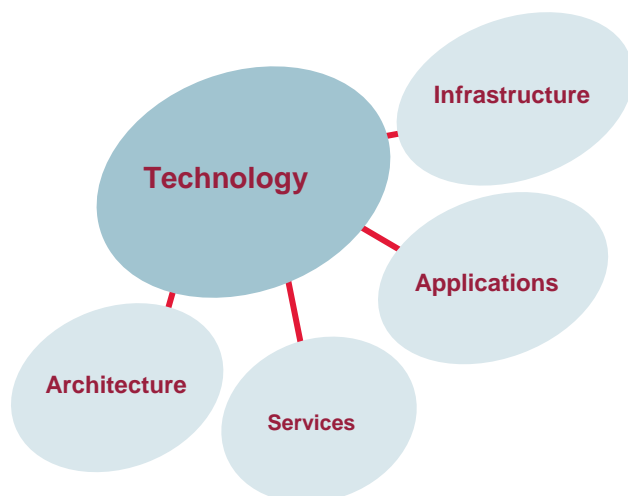
An assessment of the current function, purpose, reliability, specificity, maturity and predicted longevity of business and clinical processes is performed to determine the nature and extent of required changes/enhancements. This assessment determines what business and clinical processes must remain intact despite technological changes/enhancements and, on the other hand, what processes will need to change to support the goals and objectives related to information integration.



TECHNOLOGY ASSESSMENT

An assessment of technology services, platforms and applications is performed to determine the following: (i) the nature and extent of changes/enhancements

required; (ii) any reusable assets available; and (iii) service, program and enterprise architecture strengths and challenges.



These four types of assessments serve as building blocks that form the foundation for successful health information integration.

These four types of assessments serve as building blocks that form the foundation for successful health information integration. Without them, an HIIF lacks a proper baseline for success.

Finding the evidence

The above mentioned literature review was undertaken to evaluate available academic evidence supporting the use of an HIIF in information integration initiatives. It examined what is currently being done in the industry by asking a specific question about the potential benefits of health information integration:

Do fewer patient safety incidents or fewer readmissions occur when patients are admitted to a hospital that uses an integrated information solution compared to a hospital that uses an electronic health record alone?

Search criteria were researched and developed for the literature review and then used to search a number of databases. A search matrix was used to search PubMed, EBSCO, British Nursing Index, ABI Inform/Complete, British Nursing Index with Full Text, Allied & Complementary Medicine™, Gale Group Health Periodicals Database, and MEDLINE®. A public domain search was also conducted using Google Scholar.

Articles relevant to the topic were selected for inclusion in the literature review and were critically appraised. In the end, a total of 17 articles that met the author's inclusion criteria were selected for review.

A method was devised for rating the articles based on the strength of the evidence they presented. Peer reviewed articles were scored out of eight points while non-peer reviewed articles were scored out of seven points. Peer reviewed and non-peer reviewed articles scoring greater than four points were used to develop recommendations.

Of the 17 initial articles, recommendations were based on five articles scoring greater than four. These articles are listed in the literature review reference list at the end of this paper. More details about the search strategy and ranking method used can be obtained by contacting the author.

Analyzing the evidence

In response to the research question posed in the “Finding the evidence” section above, industry assumptions about improved patient care and safety resulting from health information integration are not fully supported by the evidence. There is minimal evidence showing that simply improving access to health information across a variety of settings *instantly* improves patient safety; more is needed. Perhaps we are looking to IT to be the panacea when it can only be the tool.

Literature review findings reveal the following potential benefits related to patient care and safety when health information is integrated across organizations and IT systems (see table below). Because the quality of available evidence is weak, these results should be viewed as preliminary with more research required to strengthen and further delineate results.

There is minimal evidence showing that simply improving access to health information across a variety of settings instantly improves patient care and safety; more is needed.

Potential benefits of health information integration with respect to patient care and safety

1. Medication errors are reduced when computerized provider order entries (CPOEs) with decision support are implemented^{2,3}
2. Reduction of health care delivery costs associated with adverse events, documentation of clinical care, documentation of test results, storage of paper information, and information processing³
3. More accurate and complete medical documentation³
4. Improved communication among providers³
5. Improvements in patient outcomes, including improvements in diabetes control, decreases in the number of upper gastrointestinal studies ordered, and increases in the number of Pap smears performed³
6. Improved error reporting¹
7. A community wide approach works best to coordinate integration implementation efforts among payers, providers and vendors⁴

In terms of improving patient care and safety, health information integration aims to accomplish the following:

1. Collect and analyze patient care and safety information so that we can learn what we need to improve.
2. Implement corrective actions.
3. Share collected data among organizations so that we can learn from each other¹

However, the literature reveals an important piece is missing; we are not sharing how we correct problems as much as we are sharing what went wrong and comparing ourselves to each other. This reactive approach to using integrated health information is not helping us to prove the value of integration.

Integrating information is much more than simply transferring data among software systems and applications. It requires careful analysis of the data and the use of that data to help solve problems and improve the quality of health

care provided to patients. It also requires careful analysis of workflows and frontline users' needs for patient information.

Many assume that integrated health information systems and software solutions would improve patient care and safety by giving clinicians access to patient data across all health care settings. Yet, the literature review failed to find specific examples of such improvements; very little empirical information was available.

As noted by Canada Health Infoway,² most of the safety improvements documented relate specifically to the introduction of computerized provider order entry (CPOE) with clinical decision support.

In addition, several sources^{2,6} noted that implementation of information integration technology may actually produce unintended consequences, including new types of errors related to workflow changes introduced with the new technology.

However, it is clear that clinicians and administrators alike require useful information that can improve their ability to serve patients. Consider hospital readmissions. Readmissions are costly and can indicate a failure to appropriately manage a patient's condition on the first admission.

The lack of information integration can result in the following:

- Interdisciplinary communication during hospital admission may be lacking important patient psychosocial information that later affects the success of the patient's transition back to a home environment.
- Discharge instructions and medication changes experienced during the patient's hospital stay may not be communicated with community health care agencies, resulting in a worsening of the patient's condition when outdated treatments and procedures are then carried out post-discharge.
- Acuity triage scores used for determining the need for services post-discharge may be calculated differently by different community agencies, resulting in patients with similar urgent needs being reassessed at less than optimal time frames.

Therefore, the key is to finding how to make health information integration work.

Key HIF success factors

INTEROPERABILITY

When it comes to HIF technology, the evidence reveals that interoperable systems are essential to advance patient care and safety. Key to this is the electronic health record (EHR*) and its ability to "facilitate continuously informed care across healthcare settings."²

In turn, the effectiveness of EHRs depends on technical and research standards. Technical standards are the building blocks of interoperability; without them, the necessary nomenclature, structure and messaging required for health information integration cannot be implemented.

What is interesting from the evidence analyzed, however, is that the importance of research standards is often downplayed. Research into what should be measured, how it should be measured, and how it should be used is necessary to translate raw patient data into meaningful information.

When it comes to HIF technology, the evidence reveals that interoperable systems are essential to advance patient care and safety.

DATA ANALYTICS

The need for data analytics is also noted in the literature review and should be considered as part of any technology and business process assessment. When health information is integrated and shared via sophisticated software applications and solutions, the volume and variety of information can be dizzying to the average system user.

Advanced analytics may be required in these situations. As noted by McFadden, "...as more comprehensive data are collected about errors, more sophisticated statistical modeling techniques can be employed to analyze more complex relationships and interactions that occur among variables that may be related to medical errors. This is important because research indicates that most errors stem from the interaction of several variables rather than from one underlying cause."⁵

ORGANIZATIONAL CHANGE MANAGEMENT

The literature review highlighted examples of key HIIF organizational change management components,^{2,3,4} including organizational readiness, planning, social engineering, design and development, training, managing expectations, and user acceptance.

As previously discussed, assessing organizational readiness determines an organization's capacity for change. Careful attention to workflow and software configuration is also essential if health information integration is to provide value for frontline systems users. In addition, governance is critical to ensure clear, consistent leadership in integration projects and initiatives.

The larger view of implementing integrated information systems within or among health care organizations needs to take into account all of these aspects of organizational change management.

The larger view of implementing integrated information systems within or among health care organizations needs to take into account all of these aspects of organizational change management.

Barriers to HIIF success

The literature review revealed a number of barriers to the use of integrated health information. These include funding for IT investment, lack of associated data and information standards, as well as security and privacy concerns.

An improper match between information technology configuration (software, hardware, associated equipment) and the clinical processes carried out by clinicians is another barrier. Almost everyone who works in health care can share a failed technology story that includes how a great piece of technology was misused, abandoned or, in worst case scenarios, contributed to a decrease in the quality of patient care.

And, central to those stories is the lack of a workflow assessment with the clinicians, support staff and administrators responsible for completing the work. The effective application of technology in a health information integration initiative requires confirmation of the value proposition at the frontline level. This is a key literature review finding. The benefits related to health information integration can only be achieved by engaging frontline individuals in comprehensive discussions about how technology may impact their work.^{2,3}

Recommendations based on the evidence

Health system problems requiring integrated information solutions are not limited to patient care and safety. They include any problems related to sharing information within and across health organizations and jurisdictions.

Much can be learned from the work completed to date. In general, the literature review revealed the need to conduct more research related to patient care and safety outcomes and to share that research.

Three of the top ranked articles^{2,3,5} note that further investment in research, standards development, and IT systems development may improve our ability to benefit from information integration.

Investment is also needed to make IT systems usable. The literature elaborates on the problems organizations are experiencing.

Based on these findings, the author offers the following recommendations for improved health information integration within each of the four HIIF assessment categories.

Health system problems requiring integrated information solutions are not limited to patient care and safety. They include any problems related to sharing information within and across health organizations and jurisdictions.

BUSINESS CASE

1. **Create and use a business case.** If there were solid business cases on the integration of health information, especially related to patient care and safety, there would be more program evaluation reports and information on the successful execution of integration. The fact that there are very few literature sources regarding the topic of this paper may imply the following:
 - Business cases are not routinely employed for integration initiatives aiming to improve patient care and safety.
 - Business cases used for patient care and safety integration initiatives do not contain an evaluation component.
 - The results of patient care and safety integration initiatives supported by business cases are not being shared.
2. **Document more program evaluations.** Sharing integration results is important for the purpose of repeating integration successes and preventing common mistakes. It is essential that we start proving our business and clinical hypotheses related to health information integration and patient care and safety improvements. Otherwise, our investment in health IT to date will have been for naught. And, our future investments will fall under increasing scrutiny and suspicion³.

ORGANIZATIONAL READINESS

Employ a comprehensive organizational change management strategy with health information integration initiatives.^{2,3}

BUSINESS PROCESSES

1. Carefully consider the value of health information integration to the frontline system user and include a comprehensive workflow assessment in integration projects and initiatives.^{2,3}
2. Build advanced analytics capabilities when designing solutions and systems for health information integration.⁵

3. In addition to sharing data and analyses related to patient outcomes, share information about corrective actions and their impact on patient outcomes¹.

TECHNOLOGY

It is important to note what is not working. Introducing IT solutions in a health care environment can produce new errors or risks. It is important to consider that health care and IT may not always mix.^{2,6} Or, the mix is so sensitive that it must be studied carefully to avoid unwanted and unanticipated consequences. For these reasons, it is recommended to monitor health integration implementations using quality metrics.

Next steps

Assess, research and evaluate. Why? As noted in a GAO report, “Despite the \$20 billion in healthcare-related IT expenditures in the United States in 2001, less than 10% of U.S. hospitals had adopted electronic medical records.”³

Using this example, health electronic medical records (EMR*) represent only the first level of health information integration, i.e., within a health facility. If we cannot show improvements at a facility level, how can we garner support for integrated information initiatives such as cross-organizational shared health records or nationwide health records?

CGI's HIIF advocates assessment as a first step in improving health information integration; however, the literature review reveals the need for additional research and evaluation. What it boils down to is giving careful consideration to all that has been done to date and equal consideration for what needs to be done in the future. Looking at the HIIF concept and academic information sources helps to better prepare organizations as they look to integrate more and more patient health data.

The next white papers in this series will consider what needs to be done once an organization is aware of its needs, strengths and challenges. Guidance will be offered on the concepts and processes necessary to identify gaps and create solutions based on the results of a thorough health information integration assessment.

** In the U.S., an EMR is considered to be a hospital-based information system. In Canada, an EMR is an information system used for clinical and business support of physician community and ambulatory practices. Canada Health Infoway describes an EHR as a “secure and private lifetime electronic record of a person’s health history and health care services received across more than one point of service.”*

The HIIF advocates assessment as a first step in improving health information integration; however, the literature review reveals the need for additional research and evaluation.

To discuss in more detail the topics addressed in this white paper, please contact us at info@cgi.com.

our commitment, our average client satisfaction score for the past 10 years has measured consistently higher than 9 out of 10. For more information about CGI, visit cgi.com or contact us at info@cgi.com.

Appendix

LITERATURE REVIEW REFERENCE LIST

- 1 Anderson, James G., Ramanujam, Rangaraj, Hensel, Devon J., Sirio, Carl A. "Reporting trends in a regional medication error data-sharing system." Health Care Management Science. Mar2010; Vol. 13 Issue 1, p74-83.
- 2 Canada Health Infoway Electronic Health Records and Patient Safety - Future Directions for Canada.
- 3 GAO Report; Oct 2003. "Information Technology: Benefits Realized for Selected Health Care Functions: GAO-04-224."
- 4 Halamka, J., Aranow, M., Ascenzo, C., Bates, D.W., Berry, K., Debor, G., Fefferman, J., Glaser, J., Heinold, J., Stanley, J., Stone, D.L., Sullivan, T.E., Tripathi, M., Wilkinson, B.E. "Prescribing collaboration in Massachusetts: Early experiences from regional prescribing projects." J Am Med Inform Assoc. May-Jun 2006; Vol. 13, Issue 3, pp. 239-44. Epub 2006, Feb 24. PubMed PMID: 16501174; PubMed Central PMCID: PMC1513650.
- 5 McFadden, Kathleen L., Stock, Gregory N., Gowen, Charles R. "Exploring Strategies for Reducing Hospital Errors." Journal of Healthcare Management, Mar/Apr2006; Vol. 51, Issue 2, pp. 123-135.

WHITE PAPER REFERENCE LIST

- 6 Vozikis, Athanassios. "Information management of medical errors in Greece: The MERIS proposal." International Journal of Information Management; Feb2009, Vol. 29, Issue 1, pp. 15-26.
- 7 Canada Health Infoway Frequently Asked Questions for Clinicians, <https://www.infoway-inforoute.ca/index.php/resources/toolkits/knowning-is-better-for-clinicians/supporting-documents>.