V3.0

HEALTH INFORMATICS PROFESSIONAL **CORE COMPETENCIES**

NOVEMBER 2012

Contents

1. Preface

COACH: CANADA'S HEALTH INFORMATICS ASSOCIATION IS COMMITTED TO "TAKING HEALTH INFORMATICS MAINSTREAM" AS A CRITICAL ENABLER FOR HEALTH SYSTEM MODERNIZATION AND TRANSFORMATION.

Health informatics (HI) is a dynamic and evolving field with a rapidly developing knowledge base and a growing need for an adequate supply of qualified HI Professionals. The *Health Informatics Professional Core Competencies* sets out a common core or shared set of skills, knowledge, attitudes, and capabilities necessary for each of us to effectively perform as a Health Informatics Professional, regardless of the route by which each of us originally entered the field of HI, or our current of area of practice within the diverse field of HI.

Core Competencies was originally released in November 2007, providing a key foundational element for COACH's Health Informatics Professionalism (HIP®) Program. Version 3.0, released in November 2012, is the first major revision of the competencies themselves since 2007, and reflects COACH's commitment to ensuring that health informatics practices continue to advance in enabling continuous health system improvement.

In order to formally review *Core Competencies* in preparation for V3.0, COACH convened a group of experts who were as representative as possible of the field of HI (i.e. different practice settings, career stage, geographic location, specialization etc.). The process this expert group used to refresh *Core Competencies* for V3.0 included:

- **Brainstorming** emerging trends, both in HI and in the healthcare system and workforce more broadly
- **"Rating"** each of the existing core competencies for relevance in 2012 (and for the next five years)
- **Convening** a one day in person workshop to assess major trends in HI practice, review the competencies and discuss the modifications and updates required
- **Reviewing** the refreshed competencies over a series of teleconferences and by email (it took several iterations and discussions before the final document was prepared).

The process demonstrated the original *Core Competencies* stood the test of time very well because they were forward looking. New updates and enhancements to the *Core Competencies* for 2012 include:

- **Increasing** emphasis in the areas of patient safety, consumer health, architecture and integration, change management and quality improvement (either by adding competencies or updating existing ones);
- **Streamlining** the content of some competencies so they were all at a similar level of detail and by combining several competencies where there was some overlapping content;
- **Adjusting** verbs of some competencies to address the level of knowledge/experience now required;

The end result of all these changes is a slight increase in the number of competencies (from 46 to 50), but the overall structure and essence of *Core Competencies* have not changed fundamentally.

COACH has focused on the application of the competencies since their initial release, significantly advancing a number of supporting projects under the HIP® program including:

- **Professional certification:** The CPHIMS-CA (Certified Professional in Healthcare Information and Management Systems plus the Canadian Supplement credential) allows HI professionals to demonstrate their professional competency to employers, clients, and peers, as well as the general public. The credential builds on the internationally-recognized CPHIMS credential, and extends it to include the HI competencies required in the Canadian health system context through a Canadian (CA) supplement. In order to obtain the CA portion of the credential, candidates must write a Canadian exam that is based on the subset of *Core Competencies*, which are not already covered by the CPHIMS alone.

- **HIP@work:** The first phase of this project took the core competencies and validated their real world application against over 500 jobs from HI employers. Jobs with a high degree of alignment were placed on COACH's HIP® Career Matrix. Taking this one step further, role profiles were developed for each job title on the Career Matrix and collated into a document published as HIP® Role Profiles. As with *Core Competencies*, establishing a Career Matrix and the *Role Profiles* has been a major step in defining our profession. A subsequent phase of the project has begun to continue to work with employers to develop tools to support organizational and individual career planning using *Core Competencies*, in conjunction with the Career Matrix and *Role Profiles*.

- ***Health Informatics and Health Information Management Human Resources Report:*** Along with a group of industry partners, COACH commissioned a *Health Informatics and Health Information Management Report*. Th[e] report provided objective evidence on the current supply a[nd] forecast demand of HI and health information management professionals in Canada. COACH continues to increase awareness about the need for ongoing development of our human resources, and to emphasize the importance of an adequate supply of skilled professionals in advancing and modernizing our healthcare system.

On behalf of COACH, we would like to acknowledge the excellent contributions from many individuals, organizations and other groups in developing and updating this document (See Appendix B: Contributors). We invite you to continue to contribute your creative ideas, suggestions and energy in building upon the foundation established by *Core Competencies* as we advance the profile and the practice of HI in Canada. Core competencies, in a field as dynamic as HI, will evolve over time as knowledge and practice evolve. COACH is committed to keeping *Core Competencies* current and relevant to our membership.

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and

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2. *Core Competencies* Development Process

Development of the *HIP® Core Competencies* was a multi-year project that involved many stakeholders. The following chronology details how the document has been developed and updated to date.

2005-2006
Research and Consultation

Through COACH's Health Informatics Professionalism (HIP®) Steering Committee, a series of consultation papers in the area of professionalism and credentialing were developed to evolve and shape thinking. COACH had excellent input from its membership through committee work, focus groups and individual contacts. The feedback received reinforced that an overarching definition for health informatics (HI) in Canada, backed up by a set of core competencies and organized into a strong conceptual framework, was a cornerstone for COACH's future health informatics professionalism initiatives.

2008
Updating and Validating

After the publication of *Core Competencies* in November 2007, COACH actively solicited feedback on how the competencies were being applied and used. Responses were received from a variety of sources, summarized and reviewed at a one-day workshop in October 2008. The workshop participants validated that the competencies and the definition of HI were still valid and only required minor adjustments. At this session the content outline for the "CA" (Canadian Supplement to the CPHIMS) exam was also built from *Core Competencies*.

Development and Release
of *Core Competencies Version 1.0*
2007

The development of a set of core competencies for a multi-disciplinary professional group like HI was a complex process that required a proven approach that has been used successfully with other health professional groups. The main phases in developing the original *Core Competencies* were:

PHASE 1: Consultants conducted a search for definitions of HI that were currently in use, both in Canada and internationally. Academic, operational and standard definitions of HI were retrieved from

textbooks, journal articles and the Internet. The search yielded over 50 definitions from relevant sources, reinforcing the need for a consistent definition of HI in Canada. The data were analyzed thematically; that is, elements from the various definitions were grouped in terms of (a) primary goal, (b) purpose (narrow and broad focus), (c) roles of HI Professionals, (d) broad domains and (e) applications. Using this procedure, content from the relevant definitions was synthesized into an initial working definition.

PHASE 2: An initial list of core competencies was derived after reviewing existing provincial, territorial, national and international competency frameworks pertaining to HI. First, extant competency frameworks were evaluated for commonality among categories, resulting in seven competency categories. Subsequently, competency statements from the source documents were sorted into appropriate categories. Redundancy among competencies similar in content was minimized during this process.

PHASE 3: The initial working definition and list of core competencies were revised in a two-day workshop facilitated by consultants. Participants at the workshop consisted leaders in the field, representative of the HI profession from across Canada. Upon completion of the workshop, an updated draft of the competencies was reviewed by additional content experts. Based on the feedback provided by these individuals, the COACH HIP® Steering Committee and the COACH Board, further improvements and refinements were made to the document and it was published in November 2007 as Version 1.0.

2010
Competencies in Action

2010 saw the *Core Competencies* continue to be applied through HIP® products and services. A CPHIMS-CA Review Guide was developed and more sittings of the CPHIMS-CA exams were held.

2012
Release
of *Core Competencies Version 3.0*

COACH convened a Competencies Refresh Task Force who were as representative as possible of the field of HI. The TF first brainstormed emerging trends and analyzed the existing *Core Competencies* for continued relevance. A one-day in-person workshop was convened to assess input and the modifications and updates required. The refreshed competencies were reviewed over a series of teleconferences and by email. The look of the document was refreshed as well, and *Core Competencies V3.0* was released in November 2012.

Application and Release
of *Core Competencies Version 2.0*
2009

Core Competencies continued to be applied through COACH projects, by employers and individual HI Professionals. *Core Competencies V2.0* was enhanced by streamlining the introductory sections, adding one new competency and by making several minor wording changes. The HIP® Career Matrix and *HIP® Role Profiles* were introduced, illustrating the breadth, depth and diversity of the realm of HI by categorizing and aligning typical HI jobs based on their commonalities, relative levels of mastery and area of specialization. The first sittings of the CA exam were held in 2009, and the *HI & HIM Human Resources Report* was produced.

Globalization of *Core Competencies*
2011

Core Competencies went global as COACH collaborated with SBIS (the Brazilian Health Informatics Society), who adapted it as the basis for its proTICS (professionalism) program. The groundwork for a new HIP® Career Tool was laid by developing and prioritizing requirements. Work on this continues; and the online tool should be available in 2013.

Core Competencies is a living document, so COACH will conduct a major review of it every five years, with informal reviews conducted more frequently. Although the HI profession is dynamic, it is also new. It is therefore important that *Core Competencies* strike a balance between consistency and currency. Looking ahead, with innovations such as the career planning tool, we expect that *Core Competencies 3.0* will be leveraged in new ways to help prepare for the challenges and opportunities ahead, enabling better profiling of HI as a profession, and to attract new talent to the growing and increasingly important HI field.

3. COACH Definition of Health Informatics

HEALTH INFORMATICS (HI) IS THE INTERSECTION OF CLINICAL, IM/IT AND MANAGEMENT PRACTICES TO ACHIEVE BETTER HEALTH.

HI involves the application of information technology to facilitate the creation and use of health-related data, information and knowledge. HI enables and supports all aspects of safe, efficient and effective health services for Canadians (e.g., planning, research, development, organization, provision, evolution of services, etc.).

Examples of HI applications include the design, development, implementation, maintenance and evaluation of:

- communication protocols for the secure transmission of healthcare data
- electronic patient record systems (regionally, provincially, territorially or nationally)
- evidence-based clinical decision support systems
- classification systems using standardized terminology and coding
- case management systems (e.g., for community, home and long-term care)

- access and referral systems for healthcare services
- patient monitoring systems (e.g., computer controlled bedside monitors and patient home monitoring devices)
- digital imaging and image processing systems
- telehealth technologies to facilitate and support remote diagnosis and treatment
- internet and mobile technology and applications for engaging patients in their own care
- public health surveillance and protection systems
- methodologies and applications for data analysis, management and mining
- clinical information data warehouses and reporting systems
- business, financial, support and logistics systems.

4. Guide to This Document

THE DEFINITIONS AND ASSUMPTIONS USED TO DEVELOP THE CORE COMPETENCIES ARE ESSENTIAL TO THE UNDERSTANDING OF HOW THEY MAY BE APPLIED TO CANADIAN HI PRACTICE IN A VARIETY OF EMPLOYMENT SETTINGS.

Competencies:

- Competencies are the knowledge, skills, attitudes, and judgments required to perform safely and effectively in a broad range of environments and practice settings.

- The competency profile for HI Professionals collectively represents a unique blend of knowledge, skills and abilities obtained from a variety of disciplines including information, health and management sciences.

- HI core competencies are progressive and continuously evolving.

- Each competency statement is organized into a higher order category, but may also be applicable in several categories; the categories are not mutually exclusive.

- The examples provided within the competency statements are not intended to be all inclusive; rather they are used to illustrate concepts.

- It is intended that all competencies are applicable to the field of HI. Certain words like "health" and "information" are not stated in every competency to avoid repetition.

- The competencies in this document represent the minimum requirements necessary for a HI Professional to practice safely either solo and/or as a member of a HI team that includes multiple specialties. As HI Professionals move along the continuum from beginning to expert levels, they would be expected to develop more advanced or specialized competencies (e.g., by drawing on their HI knowledge as well as their source discipline knowledge).

- While specific competencies associated with distinct HI roles (e.g., researchers, clinical informaticians) will be determined by their context of practice, the Core Competencies are intended to apply across a broad variety of settings.
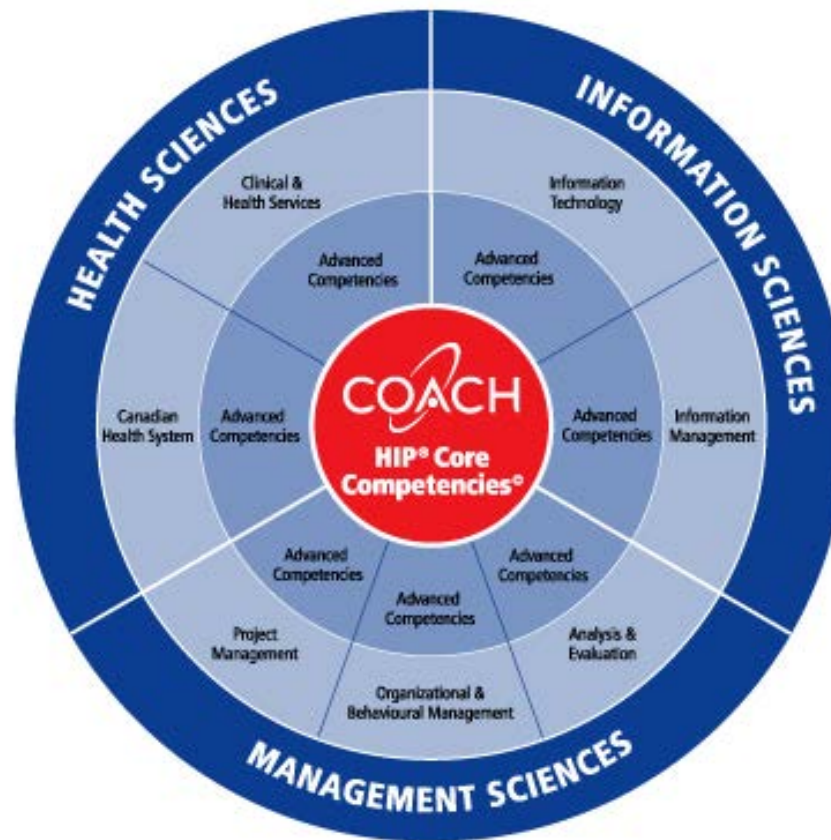
Health Informatics Professionals:

- work in collaboration with a variety of healthcare providers and other professionals to ensure the best possible delivery of healthcare for Canadians.

- apply ethical principles to the collection, maintenance, use and dissemination of data and information (See Appendix A: COACH Ethical Principles).

- promote and incorporate standardization and consistency with respect to how information is captured, reported and exchanged.

- provide and use information to enable sound decision making.

- possess a blend of education and experience having:

  - graduated from a recognized program in one of the source disciplines and garnered the other requisite core competencies through work experience and self-study in the HI field,

    and/or

  - graduated from a multi-disciplinary HI program and acquired practical experience and knowledge in one or more area of HI practice through work experience

5. HIP® Competency Framework

THE HIP® COMPETENCY FRAMEWORK DEMONSTRATES HOW THE THREE SOURCE DISCIPLINES INTERSECT TO FORM THE "CORE" BODY OF HEALTH INFORMATICS (HI) KNOWLEDGE.

While COACH remains focused on the common, or core, competencies, the framework also clearly acknowledges that professionals may either start with, or subsequently develop, advanced competencies in particular specialty areas. All HI Professionals require the identified core competencies, but may also acquire or bring advanced competency in specific disciplines as they specialize their practice over time.
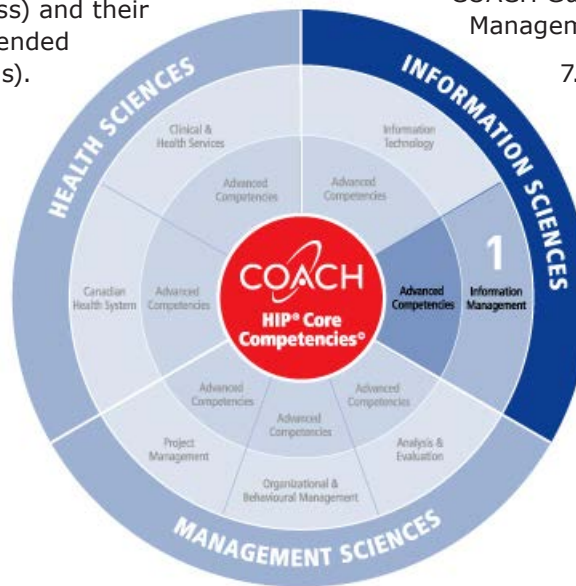
6. Competencies

Category A: INFORMATION SCIENCES

A1. INFORMATION MANAGEMENT

The Health Informatics (HI) Professional:

1. **Advances** the management of information as a key strategic resource.

2. **Demonstrates** an understanding of the key attributes of data and information (e.g., quality, integrity, accuracy timeliness, appropriateness) and their limitations within the context of intended use (e.g., clinical and analytical uses).

3. **Determines** appropriate data sources and gaps in data sources in relation to identified business needs across the healthcare system.

4. **Demonstrates** an understanding of the data interrelationships and dependencies among the various health information systems (e.g., decision support systems, electronic health records, order entry, registries, etc.).

5. **Demonstrates** an understanding of the implications of ethical, legislative, and regulatory requirements related to the management of health information.

6. **Applies** accepted policies, principles and guidelines for the management of health information (e.g., COACH Guidelines and Canadian Health Information Management Association practices).

7. **Demonstrates** an understanding of relevant health information standards and their appropriate use (e.g., classifications, vocabularies, nomenclature, etc.).

8. **Integrates** data quality principles and methodologies into the identification, use and management of information sources (people and systems).
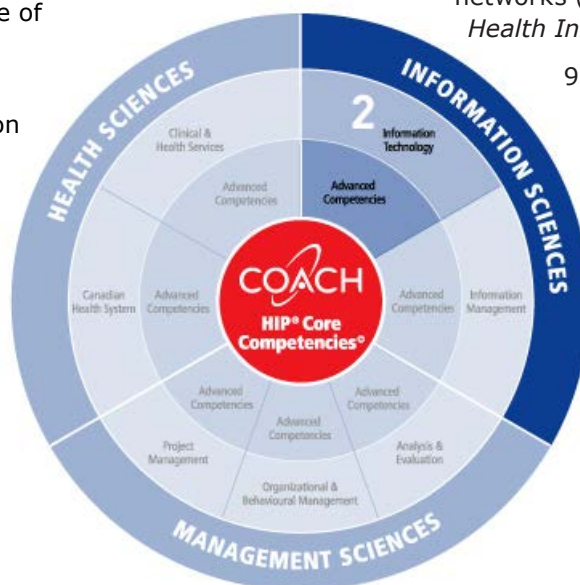
A2. INFORMATION TECHNOLOGY

The Health Informatics Professional:

1. **Demonstrates** an understanding of key information technology concepts and components (e.g., networks, storage devices, operating systems, information retrieval, data warehousing, applications, firewalls, etc.).

2. **Engages** relevant stakeholders at the appropriate stages of the system life cycle.

3. **Addresses** information, business, and technical requirements to meet the full range of stakeholders' information needs.

4. **Contributes** to the selection and utilization of appropriate information technologies to meet business requirements.

5. **Applies** appropriate health informatics standards and enterprise models to enable system interoperability (e.g., terminology, data structure, system to system communication, privacy, security, safety).

6. **Applies** knowledge of health data, information and workflow models to information technology solutions.

7. **Applies** information technology best practices (e.g., quality management systems, testing, service level agreements, business continuity and incident management) throughout the system life cycle.

8. **Applies** best practices and solutions required to manage the security of data, systems, devices and networks (e.g. COACH *Guidelines for the Protection of Health Information*).

9. **Demonstrates** an understanding of architectural relationships between key health information technology components (e.g., the Infoway EHRS blueprint) and best practices in enterprise architecture frameworks/perspectives.

Category B: HEALTH SCIENCES

B3. CLINICAL & HEALTH SERVICES

The Health Informatics Professional:

1. **Applies** knowledge of basic clinical and biomedical concepts, clinical care processes, technologies and workflow for purposes of analysis, design, development and implementation of health information systems and applications.

2. **Understands** basic clinical terminology and commonly used abbreviations and acronyms.

3. **Recognizes** commonly used formats, structures and methods for recording and communicating clinical data and how these are incorporated into system and application use.

4. **Fosters** the adoption and use of health information systems in clinical settings.

5. **Facilitates** appropriate consumer use of health information and communication technologies.

6. **Assesses** and mitigates clinical safety risks associated with health information and systems throughout the system life cycle.

7. **Facilitates** clinicians' use of electronic decision support tools in accessing evidence to support practice.
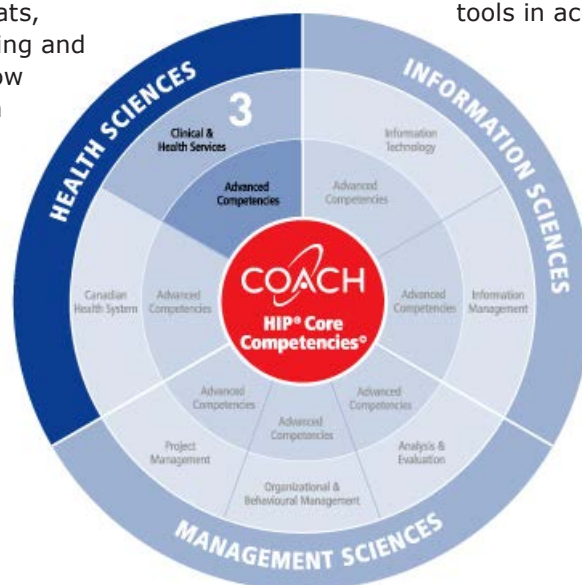
B4. CANADIAN HEALTH SYSTEM

The Health Informatics Professional:

1. **Demonstrates** knowledge of health and health systems in Canada and appropriately applies this information to work products and services, including:

   i. key characteristics (e.g., governance, funding, structures, agencies, related organizations, emerging trends, etc.),

   ii. determinants of health (e.g., environment, genetics, socioeconomic), and

   iii. key factors affecting healthcare (e.g., demographics, supply and distribution of health professionals, new technologies, incentives).

2. **Demonstrates** knowledge of the way HI benefits are realized and measured in the Canadian healthcare system

3. **Demonstrates** an understanding of different types of Canadian healthcare delivery models across the continuum of care and their interrelationships (e.g., hospitals, clinics, ambulatory centres and community health agencies, regional health authorities).

4. **Demonstrates** knowledge of how people, resources and information flow through the health system.

5. **Applies** knowledge of the roles and relationships of health professionals along with the organizational and regulatory structure in which they work.

6. **Addresses** the challenges related to the adoption and realization of clinical value of information systems in the health sector.

7. **Understands** the need to balance the privacy of personal health information with improved care delivery and health system management.

8. **Promotes** the safe and appropriate use of health information technologies to ensure patient safety.
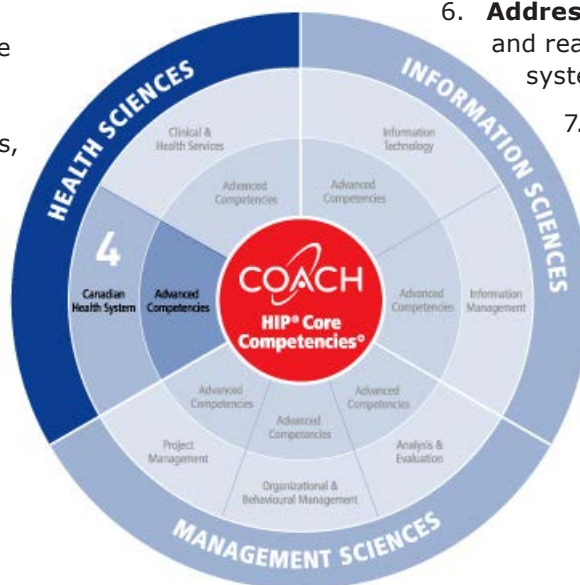
Category C: MANAGEMENT SCIENCES

C5. ORGANIZATIONAL AND BEHAVIOURAL MANAGEMENT

The Health Informatics Professional:

1. **Applies** the basic theories, concepts and practices of management including:

   i. organizational behaviour and culture

   ii. human resources

   iii. financial and budget management

   iv. governance, accountability, risk analysis and management

   vi. procurement and vendor relationships, and

   vii. customer relationships.

2. **Contributes** to organizational plans and strategies to ensure that information and systems enable business goals and strategy.

3. **Promotes** an information culture by facilitating appropriate uses of information and knowledge.

4. **Facilitates** self, individual, team and organizational learning and development through the use of appropriate technologies, communication channels and organizational skills.

5. **Uses** audience-appropriate communication and language to present information and convey concepts to relevant stakeholders.

6. **Applies** best practices in quality improvement and process engineering to facilitate business and clinical transformation.

7. **Contributes** to ongoing evaluation of the functionality of systems so that they can evolve to support best practice in clinical care.

8. **Applies** best practices of change management in the implementation of new processes or systems.

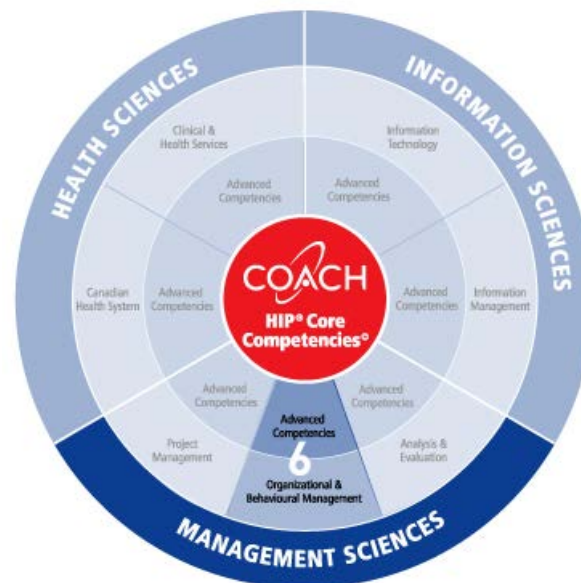9. **Integrates** COACH's ethical principles into daily practice.
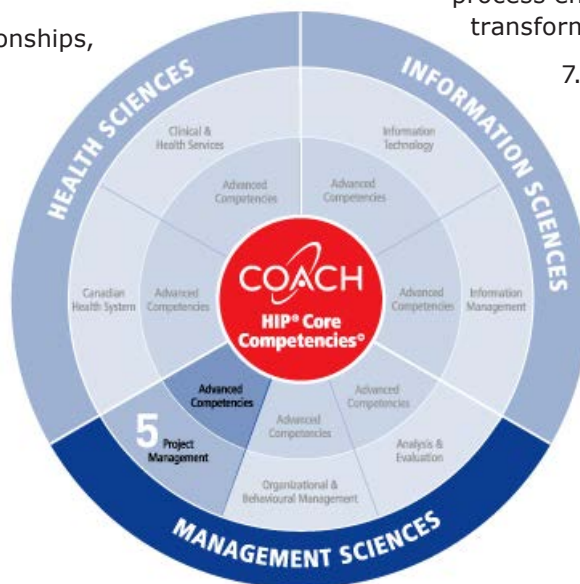
C6. PROJECT MANAGEMENT

The Health Informatics Professional:

1. **Applies** project management principles and best practices (e.g., project charter, scope, life cycle, budgets, resourcing, timelines, milestones, monitoring, status reports).

2. **Works** collaboratively and contributes to project planning, implementation, monitoring and evaluation.

3. **Anticipates** issues and opportunities and mitigates risks associated with projects.

C7. ANALYSIS AND EVALUATION

The Health Informatics Professional:

1. **Identifies** and frames information queries in collaboration with stakeholders in order to meet their needs for analysis and interpretation of data.

2. **Identifies** relevant sources of data and information in order to:

   i. assess the quality of information, and

   ii. draw appropriate conclusions.

3. **Demonstrates** an understanding of appropriate analytical and evaluation techniques and concepts (e.g., qualitative and quantitative methods, basic statistical and epidemiological techniques, indicators and evaluation measures).

4. **Contributes** to quality analysis by organizing and transforming data into reliable and meaningful information for diverse audiences.

5. **Presents** data and information in a way that is effective for users.

6. **Demonstrates** knowledge of indicators and metrics for healthcare delivery and systems management.
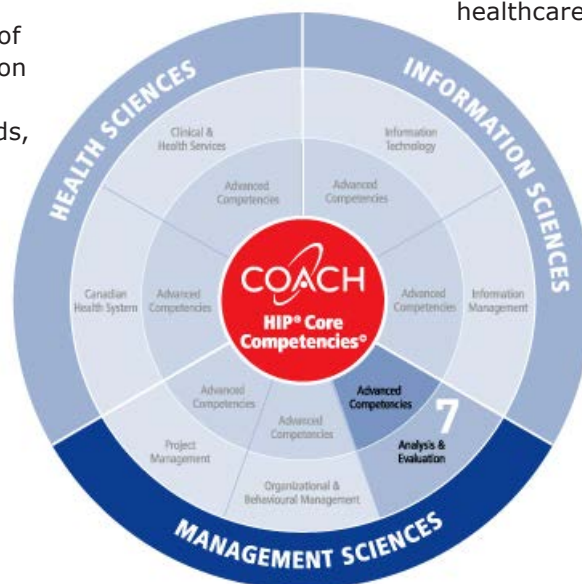
Appendix A: COACH Ethical Principles

The Canadian health system is increasingly dependent on a range of complex information technologies to enhance both its ability to provide the highest quality of care and service, and its ability to do so in an efficient manner. As a result, the health of Canadians depends, to an increasing degree, upon the excellence and integrity of the information and supporting technologies that facilitate the work of the health system.

The complexity and sensitivity of health information implies a crucial role for Health Informatics Professionals. The reliance of individuals and health organizations upon the work of Health Informatics Professionals requires that those professionals conduct themselves according to the highest standards of both professional competence and ethics.

Recognizing the trust placed in them, Canadian Health Informatics Professionals are committed to the following guiding principles. These principles are our promise to the Canadian public, and are intended to guide us in our dealings with those who depend upon, or contribute to, the delivery of healthcare and health information.

The following principles are illustrative, rather than exhaustive, of all the ethical obligations of a Health Informatics Professional. They are the foundation upon which the field of health informatics stands, and they embody the values that make us proud of our profession.

- I will make the health, safety and privacy of all who interact with the health system my highest priority.

- I will treat all persons equally and with respect and dignity. I will not discriminate based on gender, race, culture, religion, political belief, sexual orientation or socio-economic status. I will promote the same behaviour among others.

- I will safeguard information entrusted to me, and will work diligently to protect confidential information and to ensure the integrity and security of health information and information systems.

- I will work collegially with my fellow Health Informatics Professionals, and with members of other professions.

- I will perform my duties diligently and will offer services that I can provide competently and reliably.

- I will anticipate, to the best of my abilities, future developments in health information and technology, and will address ethical questions that may arise in a fair and thoughtful manner.

- I will strive continually to maintain and improve my professional competence and knowledge-base, and to foster the kinds of professional standards that merit the public's trust

- I will act professionally and not engage in behaviours that might bring the health informatics profession into disrepute.

- I will avoid conflicts of interest and address them openly, honestly and fairly when they cannot be avoided.

- I will strive to balance my professional obligations in an open, honest and diligent manner, honouring the trust placed in me as a Health Informatics Professional.

Appendix B: Contributors

The following individuals have contributed their time and effort to the work leading up to the production of Health Informatics Professional Core Competencies v3.0.

2012 Competency Refresh Task Force

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- Participants in the 2007 & 2008 Competency Development Workshop
- 2007 Code of Ethics Task Force
- Alex Hennig of ClearDesign

Appendix C: Bibliography

The following documents were reviewed when developing the original set of *HIP® Core Competencies* in 2007. Several of the documents have been revised since then, and were reviewed as part of the 2012 refresh project.

American Medical Informatics Association. (2012). AMIA 10x10 Course Description – Competencies. Retrieved October 30, 2012 from http://www.amia.org/education/10x10-courses/10x10-osu/course-description.

Bakken, S., Shets Cook, S., Curtis, L., Soupios, M., & Curran, C. (2003). Informatics Competencies Pre- and Post-Implementation of a Palm-based Student Clinical Log and Informatics for Evidence-based Practice Curriculum. AMIA Annual Symposium Proceedings, 2003, 41–45.

Banks, M. A., Cogdill, K. W., Selden, C. R., Cahn, M. A. (2005). Complementary competencies: public health and health sciences librarianship. Journal of the Medical Library Association, 93, 338-347.

Benner, P. (1984). From Novice to Expert: Excellence and Power in Clinical Nursing Practice. Menlo Park, CA: Addison- Wesley, pg. 13-34.

Certified Professional in Healthcare Information and Management Systems. (2011). Candidate Handbook and Application. Conducted by the CPHIMS Technical Committee of the Healthcare Information and Management Systems Society (HIMSS). Retrieved October 30, 2012 from http://www.himss.org/content/files/CPHIMS_Candidate_Handbook.pdf.

Covvey, H. D., Zitner, D., & Bernstein, R. M. (2001). Pointing the Way: Competencies and Curricula in Health Informatics. (Book) H/IT Advisors. Retrieved January 31, 2007 from www.nihi.ca/hi.

Dreyfus, S. (2004). The Five- Stage Model of Adult Skill Acquisition. Bulletin of Science, Technology & Society, 24(3), 177-181.

Garde, S., Harrison, D., & Hovenga, E. (2005). Skill needs for nurses in their role as Health Informatics Professionals: A survey in the context of global health informatics education. International Journal of Medical Informatics, 74, 899-907.

Garde, S., Harrison, D., Huque, M., & Hovenga, E. (2006). Building health informatics skills for health professionals: results from the Australian Health Informatics Skill Needs Survey. Australian Health Review, 30, 34-46.

International Medical Informatics Association. (2000). Recommendations of the International Medical Informatics Association (IMIA) on Education in Health and Medical Informatics. Methods of Information in Medicine, 39, 267-277.

Johnson, S. B. (2003). A framework for the biomedical informatics curriculum. AMIA Annual Symposium Proceedings, 2003, 311–335.

Leach, J. (2006). Association for Informatics Professionals in Health and Social Care (ASSIST) –Newsletter: Benchmarking Informatics. Retrieved January 31 2007 from http://www.bcs.org/upload/pdf/assnlsep06_20060906141922.pdf.

McNeil, B. J, Elfrink, V. L., Pierce, S. T., Beyea, S. C., Bickford, C. J., & Averill, C. (2005). Nursing informatics knowledge and competencies: A national survey of nursing education programs in the United States. International Journal of Medical Informatics, 74, 1021-1030.

Murphy, J., Stramer, K., Clamp, S., Grubb, P., Gosland, J., & Davis, S. (2004). Health informatics education for clinicians and managers – What's the holding up process? International Journal of Medical Informatics, 73(2), 205-213.

National Health Service. (2001). Pathways to Professionalism in Health Informatics : A Discussion Document. Retrieved January 31, 2007 from http://www.ukchip.man.ac.uk.

O'Carroll PW, Public Health Informatics Competency Working Group. (2002). Informatics Competencies for Public Health Professionals. Seattle, WA: Northwest Center for Public Health Practice. Retrieved October 30, 2012 from http://www. nwcphp.org/docs/phi/comps/phi_print.pdf.

Pigott, K., de Lusignan, S., Rapley, A., Robinson, J. & Pritchard-Copley, A. (2007). An informatics benchmarking statement. Methods of Information in Medicine, 46(4), 394-398.

Skills for Health. (2004). Competences and National Occupational Standards. Retrieved October 30, 2012 from www.skillsforhealth. org.uk.

Spyrou, S. S., Bamidis, P., Chouvarda, G. Gogou, S. M., Tryfon, S.M., & Maglaveras, N. (2002). Healthcare information standards: comparison of the approaches. Health Informatics Journal, 8, 14-19.

United Kingdom Council for Health Informatics Professions. (2006). Mapped Registration Requirements Version 1.2 for external consultation. UKCHIP Standards Committee. Retrieved February 5, 2007 from http://www.ukchip.org.uk.

University of Washington, Center for Public Health Informatics. (2006). Draft PHI Competencies, V6. Retrieved January 31, 2007 from http://phicomp.cphi.washington.edu/PHI_Competencies%20v6%20102606.pdf.

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