

Professional practice:
**Enterprise Architecture
 in the Information
 Services Division,
 Ministry of Health
 Holdings, Singapore**



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Health informatics: a journey, not a destination

Looking back at my career as a health informatics professional has made me appreciate how much our industry has evolved over the years. Health Information Managers (HIMs) have needed to be adaptable to changing demands, practices and technologies. More importantly there have been unique opportunities for our industry, and the people in it, to drive and influence change.

The types of roles I have had as a HIM have changed enormously over the years and the entire informatics profession is undergoing, dare I say it, massive change. Factors such as information and digital technology, the Internet and the enormous potential of wireless technologies continue to move us along the path of being a connected society. The demand for instant access to all sorts of data and information, from anywhere, continues to grow and has become an expectation in many industries, including ours.

As a graduate from the Queensland Institute of Technology (as it was known back in 1987), I emerged with a Bachelor of Business, Medical Record Administration. At that time there was a major shortage of people in our field and graduate numbers were very small so we enjoyed choices of different types of roles early in our careers. One of my very early roles was as the Data Manager in the Gynaecological Oncology Unit at the Royal Brisbane Hospital. This is where my passion for health and information started and I discovered 'health information' as an asset that could truly have an impact on people's lives

and I could work in an industry that was able to 'make a difference'.

Most HIMs spend at least part of their careers in the medical record department of a hospital or healthcare facility and I am no different. This time provided valuable lessons in managing vast volumes of patient records, clinical information and diverse stakeholders. Over the years I have held various positions with healthcare providers, software vendors, information technology companies, as well as state and commonwealth health departments and consulting groups. I have had the opportunity to work overseas and spent a number of years, from 1999, as an Information Technology Consultant for a niche consulting group in the United Kingdom. I quickly discovered that the challenges faced by health information managers, particularly in Electronic Health Record (EHR) and e-health programs are global.

I referred to health informatics as a journey, and for me, this has been the case. Some of the most exciting opportunities in my career have come from the challenges that advances in technology bring to information management, including (a) providing access to patient information anywhere, anytime, at the point of care; (b) building foundations that support interoperability and integration across disparate, unconnected information systems; (c) enabling the sharing of patient information across multiple care settings; and (d) bringing business and technology together to drive and enable change. I will focus on just a couple of key roles that touch on these four areas.

As Assistant Director for National Infostructure Development (NID), Department of Health and Ageing (DoHA) I helped develop national strategies for key foundational components that enabled health information exchange at whole-of-enterprise and national levels. The work program included the development of strategies and recommendations to support standard clinical terminologies, information models, information exchange standards and specifications, national patient and provider identifiers and identification services. My time at NID taught me valuable lessons in the conceptualisation of an 'enterprise', be it an organisation, a group of organisations, a state or a country, and then thinking about the problems that needed to be solved at a whole-of-enterprise level. I also started to gain an appreciation of an enterprise architecture based approach to defining, planning, delivering and managing enterprise information assets, both physical and logical.

My next move after NID was to Queensland Health as the Director of Strategy and Architecture for the Clinical Informatics Program. Here I had the opportunity to drive and be involved in the development of clinical informatics architecture to help inform priorities and plan the way forward. The clinical informatics architecture was based on an enterprise architecture (EA) development approach. This involved developing an inventory of the current business, information, application and technology environment, working through options analysis for priorities within the clinical informatics program and then articulating a longer-term vision and goal state architecture.¹

All of this has led me to where I am today, Principal Enterprise Architect for the Ministry of Health Holdings (MOHH) in Singapore. I relocated to Singapore and joined MOHH in November 2008 and this is where I can truly say that yes, it continues to be a journey and it is also one fantastic ride.

MOHH is the holding company of Singapore's public health care assets. MOHH undertake strategic initiatives for the Ministry of Health and public healthcare institutions and is currently

targeting the first phase of delivery of a national EHR by the end of 2010. As the Principal Architect I have two core responsibilities, one being the establishment of an EA practice for MOHH and the second being the development and governance of a national EHR architecture and implementation plan. At the time of writing, Singapore is in the process of procuring an EHR solution and the requirements are being driven by the goal state EHR architecture. This has been a very 'hands-on' role and has included lots of planning, architecting, and numerous healthy, productively tense debates that continue to drive the way forward.

Enterprise Architecture is a great challenge. It is a role that HIMs can well adapt to for a number of different reasons. HIMs often have the opportunity to drive strategic information management, and in the health industry in particular, information matters. Many in the profession have a unique opportunity to develop a set of blended skills that include management across information, clinical, business, and technology disciplines.

As the technological advances continue to move us from the management of silos of information and systems, the need to enable integration and interoperability of across organizations continues to increase. My experience has taught me that through the development of an EA and implementation of an EA based approach to program planning, delivery and management, integration and interoperability become possible across enterprises in a transparent way.

EA is a discipline in its own right and there are many different methodologies and tools that can support the creation of architectures and the component artifacts. Our approach to EA has been a very practical and pragmatic one. EA is being created to inform program development, planning, delivery and investment. EA is not being created for the sake of it, it is a tool that enables the implementation of the business's strategic vision. The EHR continues to be a core focus for me and my team. Our approach is architecture based; however the key to our success is that we are a clinically driven program, not an architecturally or technically driven program. We have had over 100 local clinicians involved in the development of clinical use cases and scenarios that continue to inform clinical priorities and

¹ The goal state architecture is the architecture blueprint that describes the future vision for the national EHR in a way that informs program and implementation planning to enable the realization of that vision.

requirements. Our EHR architecture has also been positioned to ensure that the needs of our clinical community and their priorities drive our direction and approach.

To ensure that enterprise requirements continue to be met and that we continue to inform the way forward everything that we develop in the EA practice is driven by core business, information, application and technical principles being:

- Business principles
 - deliver 'real' tangible benefits to the healthcare ecosystems
 - support the sharing of patient information across health care service providers
 - ensure 'fitness for purpose' and alignment to the requirements of the business
 - support evolutionary change over time.
- Information principles
 - support information sharing through services aligned to business requirements
 - support a national approach to data and information standards
 - support a quality based approach to information management
 - support consistency of data application, usage and interpretation.
- Application principles
 - driven by the 'service' needs and business requirements of the organisation
 - support loose coupling and flexibility over time
 - cater for evolutionary and revolutionary requirements over time.
- Technical principles
 - support a 'services' based approach
 - provide an agile framework capable adapting and extending to meet the changing needs of the business
 - scalable to meet national information exchange requirements
 - supportable and maintainable longer term
 - acknowledge future operational costs
 - ability to support a security infrastructure that aligns to business needs.

As we continue to develop our EA practice, over time my hope is that we will be able to support, inform and govern effective investment and decision making by providing the following:

- decision makers and managers with a transparent view of the whole of enterprise

vision for the EHR and health informatics more broadly

- opportunities for collaborative planning and implementation of information technology and solution across the enterprise
- transparency of resources and assets to support project planning
- support for procurement processes and increasing time to market for new technology project as components and services become architectural standards
- simplification of integration problems over time by providing transparency of the application landscape and compliance processes
- clear sets of priorities for solution and infrastructure development
- over time build a repository of architectural products, models and tools that will help all of our stakeholder and partners plan, manage and delivery successful projects.

My role here in Singapore will continue to evolve as the information technology landscape changes and the demands for quality, accessible and timely health information grows. I am definitely going to enjoy this ride!

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