



eHealth in sub-Saharan Africa

Canadian Involvement Helps Launch a new Health Informatics Research Centre

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For the first time, in September 2010, the International Medical Informatics Association's (IMIA) Medinfo Conference was held on the continent of Africa. In Cape Town, at the IDRC/Rockefeller booth in the conference's exhibition area, an interoperability showcase was set up. The showcase demonstrated African open-source clinical and community care EMR systems, and even a mobile phone based (mHealth) application, interoperating with each other by exchanging pan-Canadian standard HL7 messages with a HIAL. *You read that correctly: pan-Canadian standard HL7 messages... with a HIAL!* You might suspect there is a bit of a story behind this. You would be right...

This story begins in November 2009 at the ISO/TC215 (Health Informatics Technical Committee) meetings in Durham, North Carolina. At that meeting, a conference call was set up (at oh-dark-thirty in the morning, as I recall) to connect interested ISO delegates with a meeting of healthcare CIOs from sub-Saharan Africa. These African CIOs were meeting in Kigali, Rwanda to discuss healthcare Enterprise Architecture and how it could help their eHealth efforts in the region. A number of Canadians participated in the conference call including myself, Ron Parker and Julie Richards (from Canada Health Infoway), and Don Newsham – our Canadian head-of-delegation.

Based on what we learned during the call, Ron, Julie, Don and I thought Infoway's blueprints and engineering might be helpful to the African CIOs. We believed, at the very least, it could help inform their efforts going forward and that they could benefit from lessons we have learned (good and bad). We approached

Dennis Giokas, Infoway's CTO, who was supportive of the idea. In the weeks following the Durham meeting we inquired and lobbied (and cajoled) and, in the end, secured permission to make available Infoway's engineering – in its entirety – to the folks in Africa.

Following the Durham meeting, I also approached Ted Scott and Cheryl Jensen of Mohawk College. Ted and Cheryl are the executives responsible for the Mohawk Applied Research Centre in Health Informatics (MARC-HI). MARC-HI is the home of Canada's reference implementation of the Infoway EHRs blueprint and has developed a working version of the HIAL and other technology pieces. Ted and Cheryl were enthusiastically supportive. Mohawk agreed to make a donation of their software and to provide technical support to the initiative, as needed.

Offer Well Received

Canada's offer of blueprints, engineering and software was very well received. Over the course of the next few months, and at subsequent meetings in Bellagio, Italy, Vancouver (at the e-Health Conference) and New York, plans were developed that culminated in the launching of a project funded by the International Development Research Centre (IDRC, a Canadian donor agency). The REACH Project (Research in Enterprise Architecture for Coordinated Healthcare) was approved in late July. The scope of the project was twofold:

1. To assist in launching an eHealth enterprise architecture research lab at the University of KwaZulu-Natal

(UKZN) in Durban, South Africa; and

2. To demonstrate, at the Medinfo conference in Cape Town in mid-September, a clinically impactful use case that leveraged healthcare enterprise architecture to achieve interoperability between disparate systems.



MARC-HI and Jembi Teams

A key collaborator on the project was Dr. Chris Seebregts, a faculty member at UKZN and director of a South African NGO (Non-Government Organization), Jembi Systems. For two weeks in late July and early August, four developers from Jembi Systems traveled to Hamilton, Ontario and worked with the team at MARC-HI. They learned how the pan-Canadian standards-based HIAL worked and came up to speed on the technologies used by MARC-HI's prototype software. Following these two weeks of immersive training, the Jembi team returned to South Africa with a powerful new computer, the entire library of Infoway blueprints, standards and engineering, and a working version of the pan-Canadian HIAL.

The new HIAL server was set up in

an eHealth software lab at UKZN. Over the course of the next six weeks, our international project team worked diligently, sometimes feverishly, to prepare for the Medinfo demo. The

the Saturday before the conference (they had just arrived from Brazil the day before). Final software modifications were completed at the IDRC/Rockefeller booth at around midnight on Sunday.

send an SMS message to the ChildCount+ application, which in turn posts the message to the HIAL. The ChildCount+ application then queries the HIAL to obtain Mosa's shared health record. Finding that she is HIV positive, ChildCount+ creates an SMS message and sends it to the CHW. The CHW receives the SMS reply message indicating that Mosa is a high risk pregnancy and should attend an antenatal care (ANC) appointment at the nearby clinic. Mosa's HIV status is not revealed to the CHW.

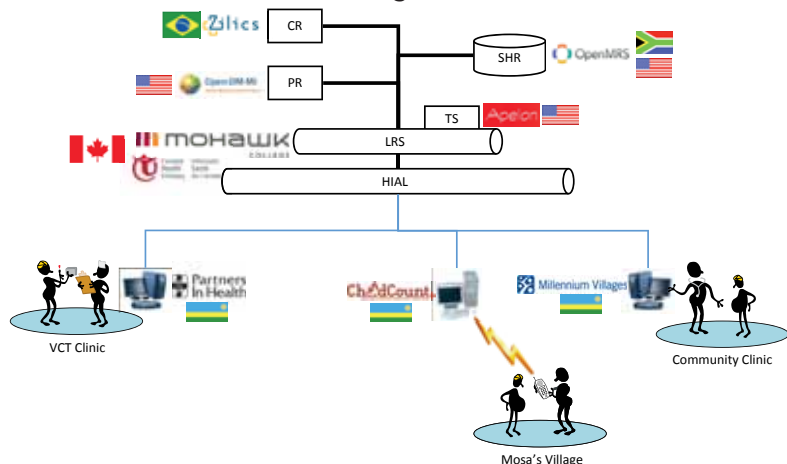
Mosa attends her ANC appointment at the MVP clinic in the nearby town. Her shared health record is retrieved from the HIAL, indicating that she is HIV positive and pregnant. In the face of this information, Mosa is placed on a PMTCT (prevention of mother to child transmission) protocol. The PMTCT protocol prevents Mosa's baby from contracting HIV and helps insure Mosa has a safe pregnancy and delivery.

Demos were run during every conference break (morning and afternoon tea and twice at lunchtime). They were very well received and their impact was decidedly positive. Many had doubted that the open source products used in Africa could be configured to communicate using HL7v3 messages. Others had suggested that an enterprise architecture would be "too heavy" for an African setting. Few had thought that the team would be able to stand up a working demo in such a short time. Everyone was surprised and delighted that it had all come together (and the team was relieved, given that it had been midnight Sunday before the final program edits were made!).

Following the Medinfo demo, Dr. Seebregts and I met with UKZN's head of school and representatives from IDRC and the Rockefeller Foundation. We worked with them to help leverage the significant progress made by the REACH Project and launch the new permanent lab to be located at UKZN: the Health Enterprise Architecture Lab (HEAL). At present, multi-year funding agreements for HEAL are being finalized.

There is no denying that Canada's contribution in helping launch this new lab has been important. We should look upon our role in that success with some humility, however. In just about eight weeks, a small team of African and Brazilian programmers started with the MARC-HI software and configured a working EHRS based on HL7v3 messaging and which included field-based mobile phone applications operating in real time. It is expected that the new South African lab will be making a presentation at the upcoming eHealth Conference in Toronto in 2011. Frankly, I look forward to seeing, in the span of one short year, what we will be able to learn from them!

Figure 1



healthcare Enterprise Architecture design is illustrated in Figure 1.

Our REACH Project demonstration involved open source EMR software (openMRS: <http://openmrs.org/>) from the Millennium Villages Project (USA, Rwanda: <http://www.millenniumvillages.org/>) and from Partners in Health (USA, Rwanda: <http://www.pih.org/>) and a mobile phone application called Childcount+ (USA, Rwanda: <http://www.childcount.org/>). Teams from Jembi Systems developed interfaces between these client applications and the HIAL. A self-contained, asynchronous interface based on a USB stick was also developed. In this way, client systems could interoperate even if they were not connected to a full-time internet link.

A client registry from Zilics (Brazil: <http://www.zilics.com.br/>) was set up to provide an EMPI (enterprise master patient index). For Terminology Services, Apelon's (USA: <http://www.apelon.com/>) server product and ICD-10 library were configured and connected (and Apelon became the new lab's first private sector donor!). An open source registry, OpenDMMI (USA: <https://open-dm-mi.dev.java.net/>) was set up to be the Provider Registry. Lastly, Jembi configured a version of openMRS to act as the Shared Health Record repository.

In late August, I travelled to South Africa and worked with the Jembi teams at UKZN and in Cape Town to complete final preparations for the Medinfo demo. As is true for many projects like this, there was configuration work and bug fixes to do right up to the final moments. The Zilics team's registry services were connected to the live system, for the first time, on

At 10:45am on Monday, the first day of the Medinfo conference, Liz Peloso (a Canadian, and Jembi team member) conducted the first REACH project demonstration.

REACH Demos

The REACH Project demonstrations at Medinfo followed the story of a young African woman named Mosa.

Mosa is a 19-year-old female living in a rural village. Her village has no electricity and there is no land-line based telephone, although there is mobile phone coverage in the area. There is a town 5km away where there is a regional clinic which provides basic care. This clinic is operated by the Millennium Villages Project (MVP, an aid agency). Another town 15km away has an HIV Voluntary Counselling and Testing (VCT) centre supported by the aid agency Partners in Health (PIH).

Mosa is sexually active; she becomes concerned that she may have been exposed to HIV. Worried about her own health, Mosa makes her way the VCT clinic for testing. She is diagnosed with asymptomatic HIV and is enrolled in a care management program and scheduled for regular tests every six months. Her diagnosis is logged in the VCT clinic's EMR and posted to the HIAL, where it becomes part of Mosa's shared health record.

Fearing the social stigma around HIV, Mosa does not divulge to her neighbours that she is HIV positive. Some months later, Mosa becomes pregnant.

Mosa is visited by the Community Health Worker (CHW) who is doing regular follow-up visits in the village. The CHW notes that Mosa is pregnant and logs this "diagnosis" by using her mobile phone to