Towards Service-oriented architecture for a local health integration network in Canada

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Agenda

• Healthcare in Canada
• Local health integration networks (LHIN)
• Need for SOA
• Case study of a LHIN
• Major issues
Healthcare in Canada

• Publicly funded system
• Universal and comprehensive coverage for medically necessary hospital and physician services
• Health service financing
  – Public (municipal, provincial, and federal) about 70%
  – Private (health insurance, out of pocket payments) about 30%
Healthcare in Canada

Healthcare cost in Canada (Ottawa: CIHI, 2007)
LHINs

- 14 Not-for-profit corporations
- Created by the Ontario government in March 2006
- Shift from a centralized model to a regional model
- Mandated for planning, identifying, and funding health services and priority programs for their regions
Case study: Erie St. Clair LHIN

- Smallest of the 14 LHINs
- Annual budget of $900 million
- Serving population of 649,000
- Region: Chatham-Kent, Sarnia/Lambton and Windsor/Essex (South-western Ontario)
Case study: Erie St. Clair LHIN

• Oversees 88 institutions in the region
  – Hospitals
  – long-term care centres and assisted living services
  – mental health and addiction agencies
  – community support services
  – community care access centres
  – and community health centres.
Case study: Erie St. Clair LHIN

- Launched Integrated Health Service Plan 2 (IHSP 2) for 2010-2013
- IHSP 2’s five strategic objectives
  - improved outcomes in
    - alternate level of care
    - emergency department care
    - diabetes management
    - mental health addiction
    - rehabilitation care and interventions
Framework for service outcomes

• Improved access
• Improved quality
• Cost effectiveness
• Co-ordination
Success measure

LHIN Triple Aims based on the IHI approach

<table>
<thead>
<tr>
<th>Dimension/Aim</th>
<th>Measured with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>Health adjusted life expectancy; Composite health risk appraisal score; Hospital and emergency department utilization for ambulatory care sensitive conditions; Disease burden</td>
</tr>
<tr>
<td>Individual</td>
<td>Surveys to assess a patient’s overall experience in emergency department care, integrated diabetes care, and alternate level of care</td>
</tr>
<tr>
<td>Cost</td>
<td>Cost per member of the population per month; Hospital and emergency department utilization cost</td>
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</tbody>
</table>
SOA for the LHIN

SOA is defined as

“A paradigm for organizing and utilizing distributed capabilities that may of under control of different ownership domains. It provides a uniform means to offer, discover, interact with and use capabilities to produce desired effects consistent with measureable preconditions and expectations” (OASIS, 2006).
## SOA for LHIN

<table>
<thead>
<tr>
<th>Member agencies</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitals</td>
<td>Primary care, emergency, outpatient</td>
</tr>
<tr>
<td>Long-term care centres</td>
<td>24-hour nursing care and supervision</td>
</tr>
<tr>
<td>Assisted living services</td>
<td>Assistance with activities of daily living</td>
</tr>
<tr>
<td>Community support services</td>
<td>Independence while living at home</td>
</tr>
<tr>
<td>Community care access centres</td>
<td>Service co-ordinator and planner</td>
</tr>
<tr>
<td>Mental health agencies</td>
<td>Dealing with mental illness</td>
</tr>
<tr>
<td>Addiction agencies</td>
<td>Dealing with drug, alcohol &amp; other abuse</td>
</tr>
<tr>
<td>Community health centres</td>
<td>Primary health &amp; health promotion</td>
</tr>
</tbody>
</table>
SOA for the LHIN

Proposed architecture for the LHIN (Bhandari and Snowdon, 2011)
Relationship between the LHIN, member agencies and the public in the SOA
System development approach: SPL

Product Line Engineering

Domain Engineering

- Software Family Analysis
- Common and Variable Features Identification
- Ontology Instantiation

Application Engineering

- Interactive Requirement Elicitation
- Service Description Generation
- Service Discovery, Composition, Implementation

System Testing, Delivery
Service ontology - example
Service ontology - example
Tools for service ontology generation

• Interactive RE
  – Eclipse IDE 3.6 for coding and debugging
  – Java 6.0 on x86 platform for programming

• Ontology
  – Protégé ontology editor 4.2
  – Pellet 2.2.2 for ontology reasoning
OWL-S for service discovery
Challenges in SOA adoption

• Difficult to get the management buy-in
• Not sure what to do with the legacy systems
• Difficulty of deciding on the accessibility and granularity of services and security
• Uncertainty regarding the successful transition to the SOA
References

• Erie St. Clair LHIN (http://www.eriestclairlhin.on.ca/)
• IHSP 2 (http://www.esclhinihsp2.ca/)
• IHI- The Institute for Healthcare Improvement (www.ihi.org)
• LHIN (http://www.lhins.on.ca/)