



Exploring the Use of Open Source Software for Health Information Exchange

**A White Paper by
HIMSS Healthcare Information Exchange
Open Source Task Force**

July 2009

Table of Contents

Introduction	3
Methodology	3
Step 1 – Initial Online Survey	3
Responses to Initial Online Survey	4
Conclusions from Online Survey	5
Step 2 – Telephone Follow-up Interview	6
Results of Telephone Follow-up	7
Choosing Open Source Components	7
Budgeting	7
Adding Open Source Components.....	7
Conclusions from Telephone Follow-up	9
Summary	9
Acknowledgments	10

Introduction

In June, 2008, the HIMSS Health Information Exchange (HIE) Open Source Task Force released a white paper entitled “Evaluating Open Source Software for Health Information Exchange.”¹ As a follow-up task, this HIMSS task force focused efforts on assessing *how* open source software is used or planned to be used by HIE organizations.

The timeliness of the task force efforts was emphasized by Senator Jay Rockefeller on April 23, 2009, in his introduction of the Health Information Technology Public Utility Act² which, among other things, supports the open source model to accelerate adoption of health information technology across the United States.

Methodology

The Open Source Task Force elected to proceed with a focused two-step survey process for this project. The first step entailed deployment of an online survey of five questions for rapid turnaround. The second step was a telephone follow-up interview designed to elicit more details from those organizations that were (1) actively exchanging clinical information, (2) using open source software, and (3) amenable to follow-up conversations.

The task force was able to take advantage of the progress of another HIMSS group, the HIMSS RHIO/HIE Technology Best Practices Task Force, which conducted an in-depth survey in 2008. This survey covered a number of topics, and the responses helped the Open Source Task Force identify a sub-set of organizations to contact regarding use of open source software.

The initial online survey was distributed through an invitation email in late fall, 2008. There were three separate email pushes inviting identified HIE organizations to participate, as well as HIMSS volunteers who participate in an HIE organization. Approximately 40 organizations were contacted in this outreach effort. The online survey results were summarized and used in identifying organizations to target for the telephone interview. The telephone interviews were conducted during the early part of 2009.

Step 1 – Initial Online Survey

Five questions were identified for the initial online survey. In addition to inquiries about the use of open source software, the online survey explored some of the potential motivators for using open source software. In particular, the survey included a question about dependencies on public funding.

¹ http://www.himss.org/content/files/HIE_FY08_Open_Source.pdf

² <http://rockefeller.senate.gov/press/record.cfm?id=311951>

The survey as it appeared in the online survey tool follows.

Online Survey Questions

1. Are you currently enabling the exchange of health information (is your exchange operational)? Yes / No
2. In enabling the exchange of health information, what (if any) open source software components are you using or planning to use?
 - a. None
 - b. Components that are not specific to healthcare (such as Linux, Java, etc)
 - c. Components specifically developed for health care (such as OpenVISTA, ClearHealth, MIRTH, etc)
3. If you are using open source software, how do you provision technical support for the open source software (check all that apply)
 - a. purchase support from the open source software vendor
 - b. purchase support from an external services organization
 - c. leverage internal software engineering resources to support the open source tool(s)
4. Is your exchange funded in part through public funds or grants (e.g. Medicare, Medicaid, DHHS, ONC, ARC)? Yes / No
 - a. If the answer to #4 is "Yes", please provide an approximate current percentage of such funding:
 1. 0-20%
 2. 21-40%
 3. 41-60%
 4. 61-80%
 5. Over 80%
 - b. If the answer to #4 is "Yes", was the choice of using open source products a condition of your funding?
5. If an open source component was available to replace a component in your HIE project, would you evaluate or utilize it? (an EMR, RLS, integration engine, etc)
6. May we follow up with you by telephone?
 - a. Please supply telephone number, email address, and name of the most appropriate person to contact in your organization.

Responses to Initial Online Survey

Fourteen organizations submitted responses to the online survey. The responses are outlined below.

1. The majority (12 organizations out of 14) of the respondents reported active exchange of healthcare information.
2. The majority (11/14) of the respondents reported use of open source software.
 - a. Four organizations reported using two types of open source components (healthcare specific and general). The cited healthcare specific components were JCAPs and MIRTH as well as a healthcare specific standard, the ASTM Continuity of Care Record (CCR) <http://www.astm.org>.
 - b. Two respondents reported development of healthcare specific open source software that was placed in the public domain but carried dependencies on

proprietary components. This represents a broader definition of open source than expected.

- c. Nine respondents (including the three described in section ‘a’ above) reported use of open source components that were not specific to healthcare. Apache, CentOS, Eclipse, GlassFish, Java, Linux, MySQL, OpenESP, NetBeans, PostgreSQL, and Tomcat were specifically named.
 - d. One respondent reported use of open source software general components but then named Microsoft and SQL server as general open source technology components. This response may indicate misunderstanding what ‘open source’ means. A definition of ‘open source’ was not provided in the online survey tool.
3. Some respondents (5/11) reported exclusively using internal resources for support of their open source software, while one reported exclusively using purchased support from an external vendor. Four reported use of both methods for support. One respondent failed to specify how support was provisioned.
 4. The majority of the respondents (10/14) reported use of public funding for their HIE activity. One organization failed to respond to the question. No organization reported that the use of open source software was a condition of the funding. The following table illustrates the very large dependency on public funding for these projects. The one organization that failed to indicate the level of funding is listed as “uncertain.”

Level of funding	0-20%	21-40%	41-60%	61-80%	81-100%	Uncertain
Number of organizations	0	1	1	2	5	1

5. The majority of respondents (12/14) said that they would be interested in evaluating and potentially utilizing additional open source components as replacements or for added functionality.

Conclusions from Online Survey

It is not known how representative the pool of respondents to the online survey are to the potential pool of organizations engaged in HIE activity and planning with an interest in open source. The number of online respondents was small as compared to the number of survey invitations sent (approximately 40.) However, it is noted that a number of the more highly profiled HIE organizations in the United States, including organizations that participated in the very first round of NHIN pilot activities, did respond to the survey.

The task force characterized the respondents, based on the survey findings, as being:

- Committed to using open source software as part of their HIE technology
- Interested in exploring additional open source components
- Dependent on public funding

- Unconstrained by stipulations of public funding in choosing to employ open source software
- Reliant largely on internal support for the open source portions of their projects

Step 2 – Telephone Follow-up Interview

The task force designed a script to use for the telephone follow-up interview that mirrored the online survey questions. Although all comments that the survey participants wished to share were of interest, the volunteers used the script to maximize telephone discussion time realizing participants' time would most likely be limited. The task force strived to follow-up with the telephone interview promptly after completion of the online survey. The rather loose script crafted for the task force volunteers to use when speaking with participants appears below.

Telephone Interview Script

Comment/Question 1

The telephone follow up will (initially) focus only on organizations that answer “yes” to question # 1 on the online survey

Question 2

- For organizations that answer “none” on question 2 on the online survey, ask the following:
 - Are you familiar with the concept of open source software? If answer is yes, then ask:
 - What does the concept of open source software mean to you?
 - What problems do you see with using open source software?
 - What advantage do you see with using open source software?
- For organizations that list components for 2b, verify the list and then ask
 - What led you to choose (this) (these) component(s)?
- For organizations that list components for 2c, verify the list and then ask
 - What led you to choose (this) (these) component(s)?

Question 3

- For organizations that check 3a on the online survey, ask
 - What have you budgeted (annually) for this support?
- For organizations that check 3b, ask
 - What have you budgeted (annually) for this support?
- For organizations that check 3c, ask
 - What have you budgeted (annually) for your internal resources?

Question 4

Question 4 from the online survey needs no further detail explanation to discussion purposes.

Question 5

- For organizations that answer yes to question 5 on the online survey, ask the following:
 - What components would be attractive to you?
 - How would you proceed to evaluate (this) (these) components?

Results of Telephone Follow-up

Although the targeted participants listed telephone numbers for an organizational contact person, actually establishing communication proved to be difficult. The combined availability of task force volunteers and the HIE contact personnel was sufficiently daunting that it was quickly decided to abandon the effort to call organizations that were *not* using open source components. The task force focused phone interviews with representatives of nine organizations, and not all of these organizations were able and/or willing to answer all of the additional questions.

Areas of particular sensitivity appeared to involve issues of budgets and replacement of proprietary components. While the former issue was not a surprise, the political sensitivity of the second (replacement of proprietary components) was surprising. Upon further investigation, it was explained that the sensitivity was a consequence of a hard sell to stakeholder groups of a technology that had not lived up to expectations.

Choosing Open Source Components

Respondents were quite consistent in one area – open source components. The cited attractive features of open source software, regardless of whether components were general or specific to healthcare, were much the same as the ones listed in the HIMSS Open Source Software Fact Sheet.³ Particular mention was made of the following:

- Absence of licensing costs
- Availability of source code
- Ability to download and evaluate before implementation
- Extensibility

Budgeting

Organizations that were willing to share any budgeting information couched their responses in very general terms. They were given the choice of naming ballpark dollar amounts as well as FTE estimates. Needless to say, the information obtained is “notional” and is assuredly dependent on the scope of the organization’s HIE activity. Since we did not ask for volume or scope details, the budget estimates are not precise but are included to suggest guidance for further study.

The range of FTEs assigned to maintain the open source projects was between 1 and 7. Establishing the projects ranged from “below \$100,000” to “\$4,000,000.” We were consistently cautioned that *all* FTE and dollar costs were spread across projects and could not easily be attributed to either open source exclusively or to proprietary software exclusively. It was determined that the majority of costs for any organization were spent “in house” and that the minority of costs were spent on outside vendors who supported or implemented open source software.

Adding Open Source Components

As already mentioned, this area of questioning elicited an unexpected amount of anxiety, but it also led to a degree of ‘straight talking’ that had not occurred earlier in the work

³ <http://www.himss.org/content/files/HIMSSOpenSource.pdf>

efforts. In general, organizations were searching for healthcare specific components rather than for more general ones.

- Several organizations had an open source Enterprise Master Patient Index (EMPI) at the top of their wish list. In some cases, the EMPI concept was conflated with a Record Locator Service (RLS), although clearly one could exist without the other.
- Several organizations were looking for electronic medical record (EMR) functionality as well as other value-added applications.
- One organization was eager to replace a major proprietary healthcare vertical solution because it had proved to be difficult and expensive to implement, configure, and maintain.
- Another organization wished to take advantage of the Federal Health Connect software although the respondent was not certain what functionality was present in that software.

Interestingly, no organization expressed an interest in a personal health record (PHR) application, despite careful reviews of the potential for PHRs to contribute to overall healthcare quality.⁴

Although the task force volunteers did not specifically ask questions about use of healthcare information standards, it was somewhat surprising that no respondent *volunteered* any comment about the use of or importance of such standards, aside from the CCR and a casual mention of Health Level 7 (HL7) (with no version specification). Vocabulary and information model standards never entered the conversations either. Thus it is possible that the responding organizations have not approached semantic interoperability but have achieved syntactic interoperability.⁵

Respondents assured the volunteers that internal team members had already been assigned the task of evaluating open source components for future integration or substitution. In no case were such tasks assigned to persons outside of the organization's information technology department.

A major concern expressed by several respondents was inadequate support from vendors. This concern was expressed about proprietary software as well as about open source software. Having a viable, responsive support organization was deemed to be a critical factor in evaluating any software component. Clearly any organization that seeks to garner revenue from open source software implementations must take this concern to heart.

One site noted that "enterprise readiness" was a criterion when investigating new open source components. Careful questioning of other respondents led to the conclusion that none of the organizations surveyed was using open source (or public domain) software developed by any other of the respondents. The absence of "productization" (including

⁴ "Personal Health Records and Personal Health Record Systems," NCVHS report, February 2006; and Final Report of the Personal Health Working Group, Markle Foundation, July 2003

⁵ Uniform Data Standards for Patient Medical Record Information." NCVHS report, July 6, 2000

the evolution of a support organization for deployment to other projects) of custom built open source (or public domain) software may slow the adoption of open source software for HIE projects.

Conclusions from Telephone Follow-up

For participating respondents, open source software is a rational choice for constructing the technology for HIE. The total cost of ownership (TCO) for a given project varies considerably, and this survey was not sufficiently detailed to uncover all of the factors that contribute to the variability. Enthusiasm for open source software has, if any thing, increased based on the respondent's response as their projects have matured.

Surprisingly, questions about the adequacy of support for components used in HIE were distributed equally across open source and proprietary software, although such concerns were much more clearly articulated for the healthcare specific components than for the general components.

Summary

A few salient points stood out from the survey results as outlined below:

1. Open source technology is being widely used in HIE projects; general components are still more commonly deployed than are specific healthcare information components.
2. The decision to use open source software is not driven by directions from funding sources.
3. Open source software components are evaluated by project teams with the same scrutiny as proprietary software components; functionality and scalability are key criteria.
4. Organizations are motivated to use other open source software components, particularly ones that are specific to healthcare information technology.

The HIMSS Open Source Task Force believes that more focused review of the availability of open source components specifically designed for healthcare HIE and deployment of healthcare information technology is needed. The use of open source in healthcare is an evolving area which promises significant return on benefits and value for those committed to the technology solution.



Acknowledgments

Special acknowledgment and appreciation is extended to Tom Jones, Chair of the HIMSS HIE Open Source Task Force, for his time, leadership and content contribution in the development of this white paper.

Members of the HIMSS 2008 – 2009 HIE Open Source Task Force, who spearheaded the development of this white paper, include:

<p><u>Eric Freed</u> IT Manager New Rochelle Radiology epfreed@metafreed.net</p>	<p><u>Wanda Gamble</u> Business Development Director SRA International, Global Health Sector Wanda_Gamble@sra.com</p>
<p><u>Jason Goldwater, MA, MPA, PMP</u> Principal, Director, State Health Information Technology Accounts SRA International, Global Health Sector, Health Care Programs and Services Jason_Goldwater@sra.com</p>	<p><u>Kate Johnson, MHA, MS</u> Team Lead, Management Systems, Information Technology H. Lee Moffitt Cancer Center Kate.Johnson@moffitt.org</p>
<p><u>Tom Jones, MD (Chair)</u> Medical Director Tolven tom.jones@tolvenhealth.com</p>	<p><u>Dave Minch</u> HIPAA/HIE Project Manager John Muir Health Dave.Minch@johnmuirhealth.com</p>
<p><u>Will Ross</u> Project Manager Mendocino Informatics wross@minformatics.com</p>	<p><u>Pam Matthews, CPHIMSS, FHIMSS</u> Senior Director, Healthcare Information Systems HIMSS – Staff Support pmatthews@himss.org</p>
<p><u>Holly Gaebel</u> Coordinator, Healthcare Information Systems HIMSS – Staff Support hgaebel@himss.org</p>	

The inclusion of an organization name, product or service in this publication should not be construed as a HIMSS endorsement of such organization, product or service, nor is the failure to include an organization name, product or service to be construed as disapproval. The views expressed in this white paper are those of the authors and do not necessarily reflect the views of HIMSS.