Health IT Sharing Program
Health Informatics Strategy Office
VHA Office of Information

Veterans Health Administration & Open Source Software (OSS)

Working Paper - 2004 Update

Market Update, Open Source Business Models Analysis and Implications for VHA and VistA

June 2004

Prepared by:
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Roger Maduro, 'Open' Strategist and OSS SME

Reviewed and Edited by:
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FOREWORD

*"Subject: Open Source Software in the Department of Defense (DoD)." This memorandum "reiterates current policy **and provides additional guidance on the acquisition, use and development of OSS within DoD. DoD Components acquiring, using or developing OSS must ensure that the OSS complies with the same DoD policies that govern Commercial off the Shelf (COTS) and Government off the Shelf (GOTS) software."***

John P. Stenbit, CIO, Department of Defense, Policy Memorandum, May 2003

*"..the U.S. Department of Labor's Workforce Connections™ **is a set of Web-based tools that empower non-technical individuals to create, acquire, share and control content in real-time. Workforce Connections™ is the first tool** (Open Source Software) **of its kind to be licensed by the U.S. government** **free of charge** (under a General Public License) **to public and private sector organizations. Learn how your organization can use these tools to easily build and maintain: Traditional Web sites, Online courses or presentations, Community of practice Web sites, Online coaches, Knowledge repositories."***

U.S. Department of Labor Web Site for Workforce Connections, March 2004

This Internal Working Paper is an update on the growth and expansion of free and Open Source Software (OSS) throughout public and private sectors during the last two years since the publication of the first VHA OSS White Paper 'Open Source Software (OSS) Analysis: *Profile of Increasing Use and the Opportunity in Information Technology and the Health Care Enterprise'* (June 2002). This OSS Internal Paper 2004 is not designed to cover the same basic information as covered in the first VHA OSS White Paper in 2002. Rather, this document delivers additional data, analysis, observations and findings related to the market status of free and Open Source Software (OSS), profiles of private and public sector OSS case studies, and implications for VHA.

The purpose of OSS Internal Working Paper 2004 is to present findings related to open source software development and their associated business models that apply to large scale software development in healthcare and specifically how they relate to VHA. This report provides market background and many key factors that need to be considered by VA/VHA in decision-making regarding an OSS policy and enhances knowledge of open source software adoption options. Finally, it delivers analysis and several key observations and findings to support the evolution of VistA/CPRS into the open source arena inside and outside of VHA in a way that supports VHA's mission to serve the American veterans obtaining care inside the VA and in the private sector.

"Open Source Software is a huge piece of our country's disaster preparedness infrastructure within the Department of Homeland Security and National Weather Services."

Barry West, Chief Information Officer, EP&R/FEMA, March 2004

Methodology: Extensive market research was conducted by reviewing and analyzing literature both on and offline during a six month period. In addition, the OSS SMEs conducted interviews with participants in the healthcare OSS movement, research organizations, state/local governments, private healthcare organizations, technology companies, national associations and foundations, and government agencies. Research team members subscribed to major health care OSS listservs to monitor developments, engaged in dialogues with OSS developers in the health care environments and participated in OSS healthcare conferences and events. Finally, the team used its extensive experience in health information technology and OSS technology to update the 2002 Internal Working Paper developed by this team for VHA, which also served as a foundation for this OSS Internal Report 2004.

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Executive Summary

"By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care." President George W. Bush, State of the Union Address, January 2004

President Bush has outlined a plan to ensure that most Americans will have electronic health records within the next 10 years. The President believes that better health information technology is essential to his vision of a health care system that puts the needs and the values of the patient first and gives patients information they need to make clinical and economic decisions – in consultation with dedicated health care professionals. This will address longstanding problems of preventable errors, uneven quality, and rising costs in the Nation's health care system.
The President's Health Information Technology Plan, April 2004

"Within 90 days, the Secretary of Veterans Affairs and the Secretary of Defense shall jointly report on the approaches the Departments could take to work more actively with the private sector to make their health information systems available as an affordable option for providers in rural and medically underserved communities."
President Executive Order - Incentives for the Use of Health Information Technology, April 2004

Internal Working Paper on Open Source Software (OSS) - Key Findings: *Adoption of health information technology (IT) has been slower in healthcare institutions because of its high cost and limited availability of capital resources for public and private sector care providers. Open Source Software (OSS) offers solutions that are affordable, reliable, and viable. Further, its acceptance in the healthcare community is growing rapidly.*

- Open Source Software (OSS) market is growing across all domains of information technology in both the public and private sectors.
- Federal Government agencies are actively deploying OSS solutions and leading OSS development initiatives.
- OSS was identified as one of nine key health care information technology trends for 2004 by Healthcare Informatics magazine.
- Healthcare institutions need an affordable comprehensive clinical information system to meet the Presidential agenda, homeland security requirements, and patient demands for safe, high quality health care.
- OpenVistA is an OSS version of VistA that has already been released by the Pacific Telehealth & Technology Hui, a DoD/VA joint venture, to address the need for a cost-effective health information technology (IT) in the pacific region.

Given all these factors, the time may be right for VHA to begin seriously considering options on how to effectively participate with the Open Source community and healthcare industry at-large with regards to VistA and the VA Computerized Patient Record System (CPRS).

The VHA Office of Information (OI) should consider taking some preliminary steps to release one or more software modules as Open Source Software (OSS) in order to assess the process and implications prior to releasing the entire VistA package into the Open Source community.

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Open Source Software

'Open Source Software" (OSS) means software which is available in the source code form and generally on a free, no cost license basis. OSS software is licensed in one of forty or more approved OSS licensing arrangements that guide the use, modification, or redistribution of the software. OSS is similar to Public Domain Software, with three key differences: 1) Public Domain Software released under the Freedom Of Information Act (FOIA) is free, without restrictions; 2) Public Domain Software is not copyrighted; and 3) Public Domain Software may not always come with source code. Benefits offered by OSS includes: saving money, generating better quality software, delivering and enabling flexibility, accelerating innovation and problem solving, reducing cycle time, and avoiding vendor lock-in.

The growth of OSS is occurring in nearly all software categories including: Internet, operating systems, middleware, databases, applications, desktop, and other areas. OSS is also pervasive in the entire product and services life cycle through all major sectors of the American and international economies. Leading international information technology (IT) companies are making major investments in OSS products and services as a core element of their business and customer strategies. These companies and public sector entities are making significant investments in the development of OSS through the contributions of source code and operations of service/support networks. Some examples include:

- *Rapid growth and acceptance of Linux operating system.* According to research firm IDC, sales of Linux servers jumped 63 percent in the fourth quarter of 2003 when compared to figures from a year earlier. Gartner predicts that Linux will run 21% of desktops by 2008, taking its market share directly from Microsoft as reported by Time magazine in May 2004.
- *Apache Web Server – an OSS solution which has been the #1 Web server in the world* - In the last 2 ½ years, Apache market share increased 5% and is up to 67% as of February 2004
- *Hewlett Packard sponsors two to three new open source application development projects per week, according to a HP executive. On June 1, 2004, HP announced that will increase its backing of "open source" software by being the first large technology company to certify and support programs made by MySQL AB and JBoss Inc.*
- *IBM is moving to open source on all desktops and provides $1B plus in OSS development support. It has a strong focus on service and support of OSS for customers.*
- *OpenOffice.org* is both an Open Source product and a project. The product is a multi-platform office productivity suite that is often used in healthcare settings. It includes the key desktop applications, such as a word processor, spreadsheet, presentation manager, and drawing program, with a user interface and feature set similar to other office suites. OpenOffice runs stably and natively on Linux and MS Windows and is widely used around the world.
- *Novell acquired SuSE Linux and the desktop Linux maker Ximian*, which sparked IBM's $50 million investment in Novell to help it develop Linux-related products and projects.

Adoption of OSS is growing in both public and private sectors among very diverse group of communities. This is evidenced by the growth of SourceForge.net, which is the world's largest Open Source software development Web site that has over 78,000 hosted OSS projects and in excess of 800,000 registered users. One of the driving forces in the increasing diversity and size of the OSS community is the wide spread of programmers across the private and public sectors. This includes an international network of programmers who work outside of proprietary software companies. These programmers are focused on implementing solutions specific for their business problems rather than producing a software product that can be sold. They commonly look for solutions that offer security, flexibility, source code availability and a lower cost of ownership. The

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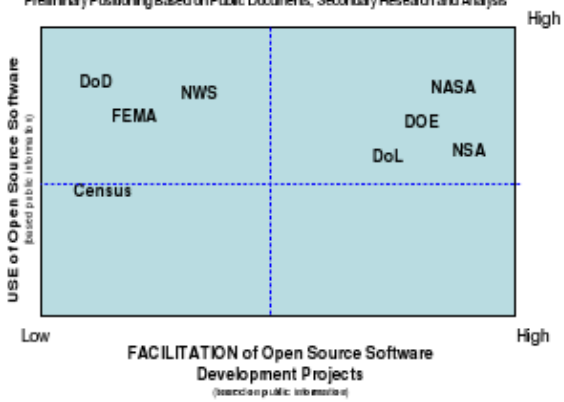
international networks of Internet connected volunteer and corporate programmers are successfully developing, evolving and supporting OSS programs that deliver advantages over proprietary solutions at the enterprise level.

Open Source Software in the Federal Government

U.S. Government agencies are actively deploying OSS and leading Open Source Software development initiatives. Many Federal and State Agencies are not only using OSS extensively, but are also leading and facilitating the growth of complex OSS packages in collaboration with the private sector and releasing them back to the community.

- ***Department of Energy (DOE)*** is leading the development of eleven OSS worldwide initiatives such as the **Globus** project, which includes development of fundamental technologies needed to build computational grids.
- ***Department of Labor (DOL)*** was one of the first federal agencies to release a major new software application program, Workforce Connections™, as OSS under a General Public License.
- ***The National Aerospace Administration (NASA)*** is focused on developing OSS that supports its operations as well as releasing many of their software programs to the community. NASA has developed its own OSS license agreement geared to meet their needs as well as the needs of the community.
- ***Department of Defense (DOD)*** has formalized their efforts by establishing a policy on OSS and has documented widespread OSS use throughout DoD.
- ***The Defense Advanced Research Projects Agency (DARPA)*** has supported, leveraged and collaborated with the Open Source community on a number of projects including the Composable High Assurance Trusted Systems (CHATS) program designed to protect computer systems from constant attack.

Figure 2. U.S. Government Agencies Open Source: Use and Facilitation
Preliminary Positioning Based on Public Documents, Secondary Research and Analysis



- ***The National Security Agency*** led the development of a security-enhanced version of Linux, SELinux, in partnership with public and private sectors, which is now a core element of Linux.
- ***The National Weather Service*** runs its entire system for weather surveillance on open platform and as a result has improved performance and saved lives.
- ***Department of Health and Human Services*** – In May 2004, representatives of the Center for Medicare and Medicaid Services announced that it has awarded a $100,000 grant to the American Academy of Family Physicians to develop low-cost, standardized and open-source electronic medical records. The grant will help the AAFP to develop, implement and evaluate a pilot project that provides EMR systems for several medical practices (CMS press release, 5/28). Also in the press release it was mentioned CMS is investing in making the Veterans

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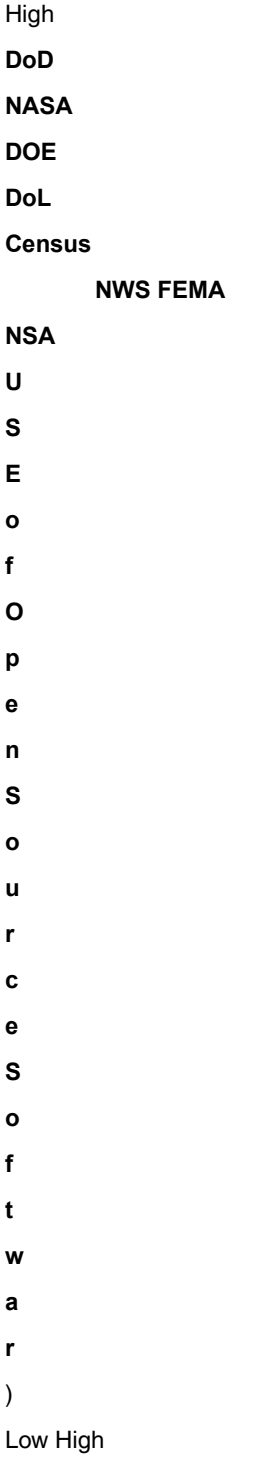

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- ***Department of Homeland Security - Within the Federal Emergency Management Agency (FEMA)*** OSS is an essential component of the country's disaster preparedness infrastructure. It was selected and used because of secure architectural framework, improved product performance and scalability, reusable code, and shortened development time.
- ***Additional government and OSS resources*** related to policy and strategy are available at The Center of Open Source & Government hosted by George Washington University.

Advanced, flexible, scaleable, secure and sustainable information systems are essential for government agencies to deal with the complexity of globalization of economies, unanticipated threats, legislative directives, citizen demands and fiscal constraints. OSS across all IT categories offers practical, affordable and enterprise ready solutions that can support governmental efficiency and effectiveness.

Open Source Software in the Health Care Community

Over the last five years, there has been a continued explosion in the amount and quality of Open Source Software (OSS) being developed and deployed around the world in virtually every industry, including health care. In the last two years, the accelerated growth in OSS has occurred due to (1) growing awareness and acceptance of OSS as a viable solution, (2) increasing ability of OSS to operate at the enterprise level, and (3) increased software functionality that has resulted from high profile alliances and coalitions. The success of Linux and Apache's evolution into a viable, cost effective, and secure enterprise-wide systems are a testimony to the growing acceptance and use of OSS solutions.

Open Source Software in health care is declared as a top information technology (IT) trend. Healthcare Informatics, a leading industry magazine, declared OSS as one of the "9 Tech Trends" for 2004 in the article Inroads in the Right Places - Open Source. It said *"once not ready for prime time, open source now appears poised to begin influencing IT selection by companies in the future"*. The growth of OSS in healthcare is attributed to major support by corporations such as IBM, HP, Novell, Amazon and others. Some specific OSS health care examples include:

- *McKesson Corporation*, the world's largest seller of health care management products and services, announced that it had switched to Linux for its "most important customer-facing application."
- *Open Infrastructure for Outcomes* is a shared and free OSS infrastructure that supports the creation of web-forms as plug-and-play modules for medical information systems with integrated statistical reports generation.
- *BLOX* is quantitative medical imaging and visualization program is an OSS project sponsored by Kennedy Krieger Institute and the Johns Hopkins University that is focused on developing a quantitative medical imaging and visualization program for use on brain MR, DTI and MRS data.
- *OpenVistA* is an OSS version of VistA developed by the Pacific Telehealth & Technology Hui in conjunction with WorldVistA and other organizations.

There also has been significant growth in international networks of programmers organized around health care initiatives to build and evolve Open Source Software focused on health care information technology needs, e.g., growing networks of developers focused on evolving OpenVistA, and Open Infrastructure for Outcomes (OIO) initiatives (for additional examples see Section 3.0).

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In 2002, the eStrategy initiative for VHA identified Open Source Software in healthcare as an emerging information technology trend. Although growth in the use of OSS in healthcare has lagged compared with other sectors, 2004 will be seen as the landmark year where OSS will hit the radar screens of healthcare organizations. For additional OSS projects in healthcare see Section 3.0 and Appendix C.

Open Source Software (OSS) and VistA

Today, VistA is released through FOIA requests as public domain software. VistA has become so popular that there are hundreds of successful deployments of VistA in various configurations across the US and in other countries. Further, interest in VistA and the VA Computerized Patient Record System (CPRS) appears to be increasing rapidly. Internal and external factors are creating a rationale to think about alternative approaches for releasing VistA to the private and public sectors that could prove more beneficial to the VA and the veterans it serves.

Until recently, there has not been a central coordinating entity to manage the release of VistA into the public and private sectors. Consequently, there are currently several divergent VistA software products, or forks of the VistA FOIA product released by the VA, that have now emerged. The emergence of these divergent development paths has many potential negative consequences for the health and safety of patients being treated by providers using some variation of the VistA software. These include: continued lack of interoperability, lack of standards, hindered disaster preparedness and bio-terrorism response, decreased patient safety, and possible impacts on the quality of care delivered to patients. The present FOIA release process provides for little follow-up of any kind with the entities that have requested VistA and are implementing it. Under the current scenario, there is no effective mechanism for VHA to release bug fixes or programming enhancements, and there is no mechanism to receive code improvements or enhancements to VistA from these external entities.

Releasing VistA as Open Source Software (OSS) with the leadership and participation of VHA through a buffer organization would address the above issues and offer many other potential benefits to VHA. Benefits to VHA might include:

- Reduced legal risks through more timely bug releases within a Collaborative Software Development framework;
- Access to code from experienced programmers that could fill code gaps and improve existing code and save time and money for VHA;
- Ability to access the knowledge, experience and software development capabilities from the expanding universe of retired programmers and developers from VA now working in the private sector;
- Ability to augment internal programmers with an Internet based network of programmers from external organizations; and
- Training of a new generation of programmers and VistA developers, support staff, and system administrators.

VHA leadership in releasing VistA as an OSS product and officially supporting the buffering organization could help to unite the divergent forks that have started to emerge in the external community that have started to build up around VistA. The Open Source Software development efforts of other Federal agencies and international OSS alliances/coalitions offer a potential model and a business case for VHA to consider taking a more proactive leadership role in the external

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In 2002, the eStrategy initiative for VHA identified Open Source Software in healthcare

as an emerging information technology trend. Although growth in the use of OSS in healthcare has lagged compared with other sectors, 2004 will be seen as the landmark year where OSS will hit the radar screens of healthcare organizations. For additional OSS projects in healthcare see Section 3.0 and Appendix C.

Open Source Software (OSS) and VistA Today, VistA is released through FOIA requests as public domain software. VistA has become so popular that there are hundreds of successful deployments of VistA in various configurations across the US and in other countries. Further, interest in VistA and the VA Computerized Patient Record System (CPRS) appears to be increasing rapidly. Internal and external factors are creating a rationale to think about alternative approaches for releasing VistA to the private and public sectors that could prove more beneficial to the VA and the veterans it serves.

Until recently, there has not been a central coordinating entity to manage the release of VistA into the public and private sectors. Consequently, there are currently several divergent VistA software products, or forks of the VistA FOIA product released by the VA, that have now emerged. The emergence of these divergent development paths has many potential negative consequences for the health and safety of patients being treated by providers using some variation of the VistA software. These include: continued lack of interoperability, lack of standards, hindered disaster preparedness and bio-terrorism response, decreased patient safety, and possible impacts on the quality of care delivered to patients. The present FOIA release process provides for little follow-up of any kind with the entities that have requested VistA and are implementing it. Under the current scenario, there is no effective mechanism for VHA to release bug fixes or programming enhancements, and there is no mechanism to receive code improvements or enhancements to VistA from these external entities.

Releasing VistA as Open Source Software (OSS) with the leadership and participation of VHA through a buffer organization would address the above issues and offer many other potential benefits to VHA. Benefits to VHA might include:

Training of a new generation of programmers and VistA developers, support staff, and system administrators.

VHA leadership in releasing VistA as an OSS product and officially supporting the buffering organization could help to unite the divergent forks that have started to emerge in the external community that have started to build up around VistA. The Open Source Software development efforts of other Federal agencies and international OSS alliances/coalitions offer a potential model and a business case for VHA to consider taking a more proactive leadership role in the external

Reduced legal risks through more timely bug releases within a Collaborative Software Development framework;

Access to code from experienced programmers that could fill code gaps and improve existing code and save time and money for VHA;

Ability to access the knowledge, experience and software development capabilities from the expanding universe of retired programmers and developers from VA now working in the private sector;

Ability to augment internal programmers with an Internet based network of programmers from external organizations; and