OSEHRA

Open Source Electronic Health Record Alliance

Open Source Technical Support and Working Group Services for VA VistA

Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis

Contract Number: VA118-16-C-0841

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1. Introduction

1.1. Executive Summary

For the 2017 third quarter (Q3) deliverable cycle, a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was performed for the following open source software (OSS) candidates, with the resulting intake recommendations:

- Pharmacy On-Demand Labels – Recommend proceeding with VA intake and OSEHRA Certification.
- Date of Death Entry – Hold until VHA can perform a business case analysis to determine that the benefit provided by this enhancement offsets the effort to integrate the data with the Social Security Administration (SSA) and Veterans Benefits Administration (VBA).
- Victory Programmer Environment (VPE) – Recommend proceeding with VA intake and OSEHRA Certification.

The candidates included in this document were the highest scoring candidates (and best fit for Q3) reviewed during the 2017 Q3 OSS and Product Selection Criteria analysis.

Next steps include developing the Prioritization Description Document for these OSS candidates, which will incorporate additional candidate detail. The SWOT analysis for these candidates may be updated in subsequent quarters as additional information becomes available.

1.2. Overview

The purpose of this document is to provide a SWOT analysis to assess the strengths, weaknesses, opportunities, and threats to VA of OSS and products to be considered for VA VistA intake. The analysis includes an assessment of the candidates, with the highest functional strengths/opportunities and lowest weaknesses/threats in alignment to VistA 4 required functional Feature Sets.

Several factors are critical to the success of the OSS intake process. The emphasis must be on providing business value by filling functional and technical gaps, identifying applicable OSS, and working with VA to “lay the pathway” for integration of OSS into VistA to fill identified gaps.

2. Approach

To facilitate the SWOT analysis, evaluation criteria were established to objectively assess the strengths/weaknesses and opportunities/threats associated with each OSS candidate. Candidates are assessed as having either a high or low score within each analysis element, then key decisional elements for each candidate are identified. The

SWOT analysis table and summary findings for each candidate product are presented in this document.

OSS candidates are reviewed using the Strengths/Weaknesses Dimension Definitions presented in Table 1.

SWOT Dimension	High Score Strength (1-5 Scale, 5 is High)	Low Score Weakness (1-5 Scale, 1 is Low)
Functional Fit with Requirement	Function fills substantive functionality gap and is of value to users.	Function is not needed or is a duplicate of existing functionality.
Technical Fit - Data	Code is a strong fit with data structures in VistA. Implementation would be low-risk in regards to corrupting existing data.	Code is not a fit with data structures in VistA and would require re-architecting to implement.
Technical Fit - API	Code fits well with VistA API structures. Code would integrate with other VistA modules and would be easily callable.	Code is not a fit with API structures in VistA and would require re-architecting to implement.
Code Quality	Code is safe, compliant, and functional. Code is OSEHRA Level certified, fully tested, and highly reliable in providing function / feature. Test documentation is available for certification.	Code has bugs, limited or no documentation, or potentially unreliable. No test documentation is available.
VistA 4 Product Roadmap - Architectural Fit	Code will fit well into existing Roadmap plans and will continue to fit with anticipated evolution of VistA and the Roadmap.	Code will be quickly obsolete or will not work due to planned changes in the Roadmap.
Time-to-Value	Rapid, low-risk implementation. Use of code provides faster time-to-value than internal development and implementation by VA. Intake through the Existing Product Intake Program (EPIP) or bug fix maintenance release process would be faster than implementing a project requiring funding. Intake of bug fixes (patches), minor enhancements (patches), and tools is generally faster than application components, applications, applications with new data stores, and platforms.	Use of code will not improve time-to-value and may actually decrease time-to-value in VA overall due to implementation complexity / risk or other issues. Code requiring additional hardware / software or code that implements a new database will take more time to implement. Code that uses PII requires additional levels of security review, delaying implementation.

Table 1. Strengths/Weaknesses Dimension Definitions

OSS candidates are reviewed using the Opportunities/Threats Dimension Definitions presented in Table 2.

SWOT Dimension	High Score Opportunity (1-5 Scale, 5 is High)	Low Score Threat (1-5 Scale, 1 is Low)
Intellectual Property Rights / Copyright, Licensing Obligations	Use of code is free and clear with no IP / legal issue.	Use of code puts VA or open source community at risk of legal action.
Open Source Community Involvement	Use of code viewed as enhancing the value and engagement of the community.	Adoption of code could result in reduction of community involvement. Use of code not viewed as positive for the community.
Veteran Experience	Use of code will greatly enhance Veteran experience.	Use of code may damage Veteran experience.
Quality Risk	Code is high-quality; adoption provides the opportunity to add value from the open source community.	Code is of low or unproven quality, or is not an improvement over existing VA software quality, leaving VA vulnerable.
Political Risk	No political or competing concerns associated with adoption of open source code. If the code is already in limited use by VA, there is no known opposition to expansion of its use.	Political or competing concerns exist related to open source code. Other existing code already in use at VA. Could cause organizational issues for VA if open code is adopted.

Table 2. Opportunities/Threats Dimension Definitions

3. Analysis of Pharmacy On-Demand Labels

3.1. OSS Candidate Overview

The Pharmacy On-Demand Labels candidate is an enhancement to the inpatient pharmacy module that allows pharmacy labels to be created for patient self-medication, which can then be administered through Bar Code Medication Administration (BCMA).

Pharmacy On-Demand Labels was developed by Document Storage Systems (DSS), Inc. to support the vxVistA EHR. Pharmacy On-Demand Labels was released to the open source community as part of the full vxVistA release to OSEHRA. It has not been deployed within VA.

The primary benefit associated with intake of Pharmacy On-Demand Labels is the ability to generate labels for patient self-medication that are functionally similar to VA-provided medication. VHA Directive 1108.06, Inpatient Pharmacy Services, requires outpatient medication that is authorized for inpatient use to be relabeled prior to reissue.[1]

The recommendation for Pharmacy On-Demand Labels is to proceed with VA intake and OSEHRA Certification.

[1] Department of Veterans Affairs / Veterans Health Administration. (2017). VHA Directive 1108.06: Inpatient Pharmacy Services. Washington, DC: Author. Retrieved September 8, 2017 from https://www.va.gov/vhapublications/ViewPublication.asp?pub_ID=5333

3.2. Strengths/Weaknesses

The Strengths and Weaknesses analysis elements for Pharmacy On-Demand Labels are presented in Table 3, along with a score, evaluation comments, and decisional element indicator for each dimension.

SWOT Dimension	Score	Evaluation Comments
Functional Fit with Requirement	4*	The Pharmacy On-Demand Labels candidate is an enhancement to the inpatient pharmacy module that allows pharmacy labels to be created for patient self-medication, which can then be administered through Bar Code Medication Administration (BCMA). It supports requirements in VHA Directive 1108.06, Inpatient Pharmacy Services, bullet 8.e which states, "When an outpatient medication is authorized for inpatient use, the Pharmacy Service must relabel the medication in accordance with the provider's instructions. This must be done using standard labeling as required for inpatient dispensing, prior to reissue."[2] This enhancement adds value, but does not fill a significant gap.
Technical Fit - Data	4	No data issues are anticipated; this code has been developed specifically to enhance VistA functionality. This enhancement may result in a new data field, but additional analysis is required to determine.
Technical Fit - API	4**	No architectural issues are anticipated; this code has been developed specifically to enhance VistA functionality. Implementation of code involves Pharmacy KIDS build for inpatient medications (PSJ). There is no impact to CPRS.
Code Quality	3	Code is in use at all vxVistA installations without issue. It has been in use in production environments outside VA, but has not been piloted or deployed in VA. This candidate has not been reviewed or certified by OSEHRA. Documentation and test cases may need to be developed to support the OSEHRA certification process.
VistA 4 Product Roadmap - Architectural Fit	3	This functionality is not specifically referenced in the Roadmap, but is also not in conflict with it.
Time-to-Value	4*	Pharmacy On-Demand Labels does not impact CPRS, and may qualify for intake through EPIP.

*Legend: *Decisional element, ** Additional analysis needed*

Table 3. Strengths / Weaknesses Associated with Pharmacy On-Demand Labels

[2] Department of Veterans Affairs / Veterans Health Administration. (2017). VHA Directive 1108.06: Inpatient Pharmacy Services. Washington, DC: Author. Retrieved September 8, 2017 from https://www.va.gov/vhapublications/ViewPublication.asp?pub_ID=5333

3.3. Opportunities/Threats

The Opportunities and Threats analysis elements for Pharmacy On-Demand Labels are presented in Table 4, along with a score, evaluation comments, and decisional element indicator for each dimension.

SWOT Dimension	Score	Evaluation Comments
Intellectual Property Rights / Copyright, Licensing Obligations	5*	No licensing or copyright issues; licensed under the Apache 2.0 License. Code was developed by DSS, Inc. for use with vxVistA, and is included in the full vxVistA distribution released to OSEHRA.
Open Source Community Involvement	4	Code is current and available to the open source community for use and comment.
Veteran Experience	4*	Code has the potential to improve delivery of healthcare and patient convenience by allowing patient's normal medications (e.g. blood pressure pills) to be administered through BCMA in an inpatient pharmacy setting.
Quality Risk	4*	Because this code was developed specifically for VistA and has been in use for several years outside the VA, there is low quality risk associated with intake. This code has been in use in production outside VA, but has not been piloted or deployed in VA.
Political Risk	3	This code involves a moderate level of business process / cultural change. Pharmacists would have a new process allowing them to gather patient medications and print labels for patient self-medication. Once labels are printed, the BCMA process would be the same as for other medications. VA medical facilities are required to implement processes to comply with the requirements in VHA Directive 1108.06, Inpatient Pharmacy Services, including outpatient medication that is authorized for inpatient use. Use of this enhancement may impact existing procedures and processes.

*Legend: *Decisional element*

Table 4. Opportunities / Threats Associated with Pharmacy On-Demand Labels

3.4. SWOT Analysis Summary

An overall summary of the Pharmacy On-Demand Labels SWOT analysis decisional elements are presented in Table 5.

	Helpful to achieving time to value	**Harmful** to achieving time to value
VA Perspective (VistA Fit, Business Value)	Strengths • Code developed specifically for VistA, which indicates a strong technical fit • Code has the potential for rapid intake, potentially through EPIP	Weaknesses • None
External Impacts (Risks, Upside)	Opportunities • Improves the Veteran inpatient experience • Low quality risk; enhancement has been in use for several years outside the VA • No licensing or copyright issues	Threats • None

Table 5. SWOT Analysis Summary of Pharmacy On-Demand Labels

4. Analysis of Date of Death Entry

4.1. OSS Candidate Overview

The Date of Death Entry enhancement allows date of death information to be entered without being a result of inpatient disposition. This information could be sent back to the Veterans Affairs Central Office (VACO) or populated by VACO for improved record keeping and benefits tracking.

Date of Death Entry was developed by Document Storage Systems (DSS), Inc. to support the vxVistA EHR. Date of Death Entry was released to the open source community as part of the full vxVistA release to OSEHRA. It has not been deployed within VA.

The primary benefit associated with intake of Date of Death Entry is improved administrative efficiency.

The recommendation for Date of Death Entry is to hold until VHA can perform a business case analysis and determine that the benefit provided by this enhancement offsets the effort that may be required to integrate the data with the Social Security Administration (SSA) and Veterans Benefits Administration (VBA).

4.2. Strengths/Weaknesses

The Strengths and Weaknesses analysis elements for Date of Death Entry are presented in Table 6, along with a score, evaluation comments, and decisional element indicator for each dimension.

SWOT Dimension	Score	Evaluation Comments
Functional Fit with Requirement	3*	The Date of Death Entry enhancement allows date of death information to be entered without being a result of inpatient disposition. This information could be sent back to VACO or populated by VACO for improved record keeping and benefits tracking. This functionality currently does not exist in CPRS / VistA. This enhancement adds value, but does not fill a significant gap.
Technical Fit - Data	3*	No VistA data issues are anticipated. This code was developed for use with vxVistA, and therefore integrates well with VistA data exchange. However, integrating the data with the Social Security Administration (SSA) and Veterans Benefits Administration (VBA) could require data integration that may require funding to accomplish.
Technical Fit - API	4**	No architectural issues are anticipated. This code was developed for use with vxVistA, and therefore integrates well with VistA architecture. It may involve a change to CPRS code and a database patch to add a new field for the date, but additional analysis is required to determine.
Code Quality	3	Code is in use at all vxVistA installations without issue. It has been in use in production environments outside VA, but has not been piloted or deployed in VA. This candidate has not been reviewed or certified by OSEHRA. Documentation and test cases may need to be developed to support the OSEHRA certification process.
VistA 4 Product Roadmap - Architectural Fit	3	This functionality is not specifically referenced in the Roadmap, but is also not in conflict with it.
Time-to-Value	3*	This candidate may involve a change to CPRS code. Prior conversations with VA stakeholders have raised concern that any changes involving CPRS may involve a longer lead-time as future CPRS GUI changes are already largely determined.

*Legend: *Decisional element, ** Additional analysis needed*

Table 6. Strengths / Weaknesses Associated with Date of Death Entry

4.3. Opportunities/Threats

The Opportunities and Threats analysis elements for Date of Death Entry are presented in Table 7, along with a score, evaluation comments, and decisional element indicator for each dimension.

SWOT Dimension	Score	Evaluation Comments
Intellectual Property Rights / Copyright, Licensing Obligations	5*	No licensing or copyright issues; licensed under the Apache 2.0 License. Code was developed by DSS, Inc. for use with vxVistA, and is included in the full vxVistA distribution released to OSEHRA.
Open Source Community Involvement	4	Code is current and available to the open source community for use and comment.
Veteran Experience	1*	Code is not Veteran facing, and there is no impact on the Veteran experience from intake of this code.
Quality Risk	4*	Because this code was developed specifically for VistA and has been in use for several years outside the VA, there is low quality risk associated with intake. This code has been in use in production outside VA, but has not been piloted or deployed in VA.
Political Risk	4	The limited scope / impact associated with this code provides for a low process and change risk. The code simply adds the date of death field, which would be used in limited circumstances.

*Legend: *Decisional element*

Table 7. Opportunities / Threats Associated with Date of Death Entry

4.4. SWOT Analysis Summary

An overall summary of the Date of Death Entry SWOT analysis decisional elements are presented in Table 8.

	Helpful to achieving time to value	**Harmful** to achieving time to value
VA Perspective (VistA Fit, Business Value)	Strengths • Code developed specifically for VistA, which indicates a strong technical fit • Functionality could provide better integration with VACO record keeping	Weaknesses • Data integration with SSA and VBA may present a challenge for intake • May involve a change to CPRS, which may present some challenges for intake
External Impacts (Risks, Upside)	Opportunities • Low quality risk; enhancement has been in use for several years outside the VA • No licensing or copyright issues	Threats • No impact on Veteran experience

Table 8. SWOT Analysis Summary of Date of Death Entry

5. Analysis of Victory Programmer Environment (VPE)

5.1. OSS Candidate Overview

Victory Programmer Environment (VPE) consists of a number of integrated programmer utilities that increase productivity and decrease the number of key strokes required to complete normal programming tasks in the VistA environment. It includes a VistA-friendly programmer shell with improved routine and global management tools, and an Electronic Data Dictionary that complements and extends the FileMan data dictionary options.

VPE was developed by David Buldoc, a programmer with VA until he retired in 1999. VPE was released to the MUMPS programming community in 1997. It has recently been revived and enhanced by the open source community. Version 14.1 was released August 16, 2017 and is available through both GitHub and the OSEHRA Technical Journal. It is currently in use within VA Regions 1 and 2.

The primary benefit associated with intake of VPE is improved programmer efficiency. It aligns with an identified implementation gap related to inefficient development tools, and has the potential for rapid intake through the Technical Reference Model (TRM).

The recommendation for VPE is to proceed with VA intake and OSEHRA Certification. The candidate is currently in use locally, and is recommended for intake nationally.

5.2. Strengths/Weaknesses

The Strengths and Weaknesses analysis for VPE are presented in Table 9, along with a score, evaluation comments, and decisional element indicator for each dimension.

SWOT Dimension	Score	Evaluation Comments
Functional Fit with Requirement	4*	VPE consists of a number of integrated programmer utilities that increase productivity and decrease the number of key strokes required to complete normal programming tasks in the VistA environment. It aligns with an identified implementation gap related to inefficient development tools.
Technical Fit - Data	4	No data issues are anticipated; this code has been developed specifically to enhance VistA functionality.
Technical Fit - API	5*	No architectural issues are anticipated; this code has been developed specifically to enhance VistA functionality. At the core of VPE is the VShell, which is a series of MUMPS routines and global nodes that are used to simulate advanced programmer mode. The VShell (^%ZVEMS*) is the common way to access the other VPE modules: VRoutine Reader (^%ZVEMR*), VRoutine Editor, VElectronic Data Dictionary (^%ZVEMD*), and VGlobal Lister/Editor (^%ZVEMG*).[3] The VPE routines are designed to function in the presence or absence of VA FileMan and VA Kernel software. VPE is installed by loading the routine archive and then running ^XV. On both GT.M and Cache, the routine archive is loaded by using D ^%RI.[4]
Code Quality	3*	Code was submitted to the OSEHRA Technical Journal, and is currently in the certification queue. Certification is expected to begin October 2017, with a target of OSEHRA Level 3™ certification. The User Guide was released in 1997, and is not current with the latest release. As of version 14.2, VPE includes a Unit Testing suite that covers approximately 50% of the code.
VistA 4 Product Roadmap - Architectural Fit	3	This functionality is not specifically referenced in the Roadmap, but is also not in conflict with it. VPE streamlines the VistA development process, so therefore could be seen as supporting the development of Roadmap requirements.
Time-to-Value	5*	VPE is a tool with the potential for rapid intake through the TRM. It is currently used in Regions 1 and 2. Addition to the TRM would allow for expanded VPE use at the national level.

*Legend: *Decisional element*

Table 9. Strengths / Weaknesses Associated with VPE

[3] Kreis, G. (1997). *VPE User Guide*. Pioneer Data Systems, Inc. Retrieved September 11, 2017 from http://www.pioneerdatasys.com/hardhats/VPEUSER.pdf

[4] Victory Programmer Environment. Retrieved September 11, 2017 from http://www.hardhats.org/tools/vpe/vpe_db.html

5.3. Opportunities/Threats

The Opportunities and Threats analysis elements for VPE are presented in Table 10, along with a score, evaluation comments, and decisional element indicator for each dimension.

SWOT Dimension	Score	Evaluation Comments
Intellectual Property Rights / Copyright, Licensing Obligations	5*	No licensing or copyright issues; licensed under the Apache 2.0 License.
Open Source Community Involvement	5*	Code is current and available to the open source community for use and comment. VPE was published to the OSEHRA technical journal, but is not yet reviewed or certified. Code and documentation are posted to GitHub and to VistA's hardhats.org. The software is well regarded among the VistA open source community.
Veteran Experience	1*	Code is not Veteran facing, and the Veteran experience would not be noticeably impacted by intake of this code.
Quality Risk	4	Code is a programmer tool that would not be deployed in a production environment, which minimizes risk. The candidate is used in Regions 1 and 2 currently.
Political Risk	4*	The limited scope / impact associated with this code provides for a low process and change risk. The appropriate intake path may be TRM, and would likely not require a funded project to implement.

*Legend: *Decisional element*

Table 10. Opportunities / Threats Associated with VPE

5.4. SWOT Analysis Summary

An overall summary of the VPE SWOT analysis decisional elements are presented in Table 11.

	Helpful to achieving time to value	**Harmful** to achieving time to value
VA Perspective (VistA Fit, Business Value)	Strengths • Improves programmer efficiency • Code developed specifically for VistA, which indicates a strong technical fit • Tool with the potential for rapid intake	Weaknesses • User Guide is not current to latest release of VPE
External Impacts (Risks, Upside)	Opportunities • Strong support from the open source community • Low risk due to limited scope and impact • No licensing or copyright issues	Threats • No impact on Veteran experience

Table 11. SWOT Analysis Summary of VPE

6. Next Steps

The OSS candidates reviewed in this SWOT analysis will be included in the 2017 Q3 Prioritization Description Document, along with additional detail. Additionally, these candidates will be reviewed during the 2017 Q3 In-Progress Review (IPR).

This SWOT analysis may be updated in subsequent quarters as additional information becomes available.