



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**



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1. Introduction

1.1. Executive Summary

For the 2017 first quarter (Q1) 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:

- NDC Code Capture – Recommend proceeding with VA intake and OSEHRA Certification.
- Patient Picture Modules – Recommend proceeding with VA intake and OSEHRA Certification.
- Auto Resize Margins to Fit Terminal Size – Recommend proceeding with VA intake and OSEHRA Certification.

The candidates included in this document were the highest scoring candidates reviewed during the 2017 Q1 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 implementing 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 NDC Code Capture

3.1. OSS Candidate Overview

NDC Code Capture allows pharmacists to log and store specific drug product information on inpatient dispense (pre-exchange doses, enter units dispensed, extra units dispensed, and return to stock) and outpatient prescription release. It also allows for capture and storage of the same data on medication administration within Bar Code Medication Administration (BCMA). BCMA is an automated system that uses an integrated bar code scanner to validate and record the administration of patient medications.^{1,2}

NDC Code Capture was developed by Document Storage Systems (DSS), Inc. to support the vxVistA EHR. Initial functionality was deployed approximately two years ago at New York State Office of Mental Health (OMH) sites, with additional patches implemented approximately one year ago. NDC Code Capture has not been deployed within VA, though it was released to the open source community in the 2016 vxVistA release to OSEHRA.

The primary benefit associated with intake of NDC Code Capture is improved patient safety by reducing errors at the point of administration and enhancing the ability to contact patients in the event of a drug recall. Additionally, NDC Code Capture allows pharmacy to better manage inventory stock levels.

The recommendation for NDC Code Capture is to proceed with VA intake and OSEHRA Certification.

¹ McCall, M. (2013, November 1). *Bar Code Medication Administration*. Retrieved March 22, 2017 from <http://wiki.osehra.org/pages/viewpage.action?pageId=5866210>

² Department of Veterans Affairs / Office of Information and Technology (OI&T). (2016). *Bar Code Medication Administration (BCMA): GUI User Manual*. Retrieved March 22, 2017 from [https://github.com/OSEHRA/VistA-Document-Library/blob/master/Clinical/Pharm%253A%20Bar%20Code%20Medication%20Administration%20\(BCMA\)/3.0/BCMA%20V.3.0%20GUI%20User%20Manual%20Chapters%201%20through%206/psb_3_um_chapters_1_thru_6_r1216.pdf](https://github.com/OSEHRA/VistA-Document-Library/blob/master/Clinical/Pharm%253A%20Bar%20Code%20Medication%20Administration%20(BCMA)/3.0/BCMA%20V.3.0%20GUI%20User%20Manual%20Chapters%201%20through%206/psb_3_um_chapters_1_thru_6_r1216.pdf)

3.2. Strengths/Weaknesses

The Strengths and Weaknesses analysis elements for NDC Code Capture 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	3	NDC Code Capture allows pharmacists to log and store specific drug product information on inpatient dispense and outpatient prescription release, and to capture and store this data on medication administration within BCMA. This functionality currently does not exist in CPRS / VistA. 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. Per DSS, there are no known issues with existing data structures. Implementation of this code requires pharmacy to set up synonyms with linked NDC to be effective. The code makes use of existing fields which have not previously been utilized.
Technical Fit - API	5*	No architectural issues are anticipated; this code has been developed specifically to enhance VistA functionality. Per DSS, there is strong integration with other VistA modules and no known issues with existing VistA architecture. Implementation of code involves Pharmacy Kernel Installation and Distribution System (KIDS) builds for inpatient medications (PSJ), outpatient pharmacy (PSO), and controlled substance (CS). There are no new modules and no impact to CPRS. It does implement a new menu for pre-exchange doses. (Within Inpatient Pharmacy, "pre-exchange doses" refers to the number of doses added to a medication cart anticipated to be distributed before the next cart exchange.)
Code Quality	3	Per DSS, the code is safe, compliant, and fully functional. It has been in use at New York State OMH sites for the past two years. This code 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. It generally aligns with enhancements to pharmacy included in Feature Sets 3 and 4.
Time-to-Value	4*	NDC Code Capture is a minor enhancement with the potential for rapid intake. Per DSS, implementation would be low risk and rapid.

Legend: *Decisional element

Table 3. Strengths / Weaknesses Associated with NDC Code Capture

3.3. Opportunities/Threats

The Opportunities and Threats analysis elements for NDC Code Capture 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 License 2.0. Code is included in the 2016 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*	This code improves patient safety by reducing errors on scan when a nurse tries to administer a product, and it improves the ability to contact patients when specific drug recalls occur since the exact product dispensed is recorded. It also helps the pharmacy better manage inventory stock levels and prevent diversion of prescription medications to unintended recipients.
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. Per DSS, the code is safe, compliant, and fully functional.
Political Risk	4	There is likely low business and cultural risk associated with intake of this code. Per DSS, this code involves a minimal level of business process / cultural change.

Legend: *Decisional element

Table 4. Opportunities / Threats Associated with NDC Code Capture

3.4. SWOT Analysis Summary

An overall summary of the NDC Code Capture 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)	<u>Strengths</u> <ul style="list-style-type: none"> • Code developed specifically for VistA, which indicates a strong technical fit • Code is a minor enhancement with the potential for rapid intake 	<u>Weaknesses</u> <ul style="list-style-type: none"> • None
External Impacts (Risks, Upside)	<u>Opportunities</u> <ul style="list-style-type: none"> • Improves patient safety • Low quality risk; enhancement has been in use for several years outside the VA 	<u>Threats</u> <ul style="list-style-type: none"> • None

Table 5. SWOT Analysis Summary of NDC Code Capture

4. Analysis of Patient Picture Modules

4.1. OSS Candidate Overview

The Patient Picture Modules candidate consists of two integrated modules evaluated together. The vxPatient Picture Module allows users to quickly capture, securely store, and link a photo to the patient record. The Patient Picture Display in CPRS/BCMA displays a patient photo for safer "right patient" confirmation before charting in CPRS or administration of medications in BCMA, meets the Joint Commission requirement for positive patient identifier, and displays at patient selection and during the session.

The Patient Picture Modules were developed by DSS, Inc. to support the vxVistA EHR. They have been in use by DSS clients for the past two years and were made available to the open source community through the 2016 vxVistA release to OSEHRA. The Patient Picture Modules candidate has not been deployed at VA.

The primary benefits associated with intake of the Patient Picture Modules are improved clinician efficiency and improved patient safety.

The recommendation for the Patient Picture Modules is to proceed with VA intake and OSEHRA Certification.

4.2. Strengths/Weaknesses

The Strengths and Weaknesses analysis elements for the Patient Picture Modules 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 Patient Picture Modules allow users to capture, store, and link a photo to the patient record and display the patient photo for safer "right patient" confirmation before charting in CPRS or administration of medications in BCMA. This functionality currently does not exist in CPRS / VistA. 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 CPRS / VistA functionality. Per DSS, there are no known issues with existing data structures. VA would make a determination regarding where to store the pictures. Pictures are not necessarily stored locally within VistA; only a path to the picture's location is stored locally.
Technical Fit - API	5*	No architectural issues are anticipated; this code has been developed specifically to enhance CPRS / VistA functionality. Per DSS, there is strong integration with other VistA modules and no known issues with existing VistA architecture. Implementation of code involves a new module, CPRS modification, BCMA change, KIDS build, and storage of images. Although the two modules are designed to work together, they could be taken in separately depending on VA's needs and related existing capabilities.
Code Quality	3	Per DSS, the code is safe, compliant, and fully functional. It has been in use outside the VA for approximately two years. This code 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 included in the Roadmap. It generally aligns with eHMP requirements in Feature Set 3. As the timeline for eHMP has extended, this code may be seen as enhancing CPRS functionality in the interim until eHMP is deployed and fully functional.
Time-to-Value	3*	This candidate requires a new module, BCMA change, and CPRS modification. While this change is considered a minor enhancement, 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

Table 6. Strengths / Weaknesses Associated with the Patient Picture Modules

4.3. Opportunities/Threats

The Opportunities and Threats analysis elements for the Patient Picture Modules 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 License 2.0. Code is included in the full 2016 vxVistA distribution released to OSEHRA.
Open Source Community Involvement	4	Code is current and available to the open source community for use and comment. DSS developed this functionality for CPRS and BCMA; the open source community and VA could leverage the code to modify additional applications.
Veteran Experience	4*	This code improves patient safety and adds functionality that is not currently available. These modules reduce the risk of charting on an incorrect patient and improve safety of medication administration by helping to ensure correct patient identity. The code also helps patients meet the requirement for two forms of identification.
Quality Risk	4*	As 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. Per DSS, the code is safe, compliant, and fully functional.
Political Risk	3	Prior to its implementation into vxVistA, this functionality was one of the most requested enhancements received by DSS. It meets the Joint Commission requirement for positive patient identifier. Per DSS, this code involves a minimal level of business process / cultural change. Implementation of code would require a workflow determination of where to take the patient photographs.

Legend: *Decisional element

Table 7. Opportunities / Threats Associated with the Patient Picture Modules

4.4. SWOT Analysis Summary

An overall summary of the Patient Picture Modules 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)	<u>Strengths</u> <ul style="list-style-type: none"> Code developed specifically for VistA, which indicates a strong technical fit 	<u>Weaknesses</u> <ul style="list-style-type: none"> Involves a change to CPRS, which may present some challenges for intake
External Impacts (Risks, Upside)	<u>Opportunities</u> <ul style="list-style-type: none"> Improves patient safety; enhances Veteran experience by helping to meet the requirement for two forms of patient identification Low quality risk; enhancement has been in use for several years outside the VA 	<u>Threats</u> <ul style="list-style-type: none"> None

Table 8. SWOT Analysis Summary of the Patient Picture Modules

5. Analysis of Auto Resize Margins to Fit Terminal Size

5.1. OSS Candidate Overview

Many modern applications that use terminals (e.g. Midnight Commander, Vim, Emacs) are able to resize themselves to make full use of the screen's available real-estate. This functionality has generally not been available in VistA, except by creating special terminal types. The Auto Resize Margins to Fit Terminal Size build introduces changes that allow for full use of the terminal screen's available real-estate.

The Auto Resize Margins to Fit Terminal Size build was developed by DSS, Inc. to support the vxVistA EHR. It was submitted to the OSEHRA Technical Journal for review and use by the open source community on February 6, 2017. This candidate has not been deployed within VA.

The primary benefits associated with intake of the Auto Resize Margins to Fit Terminal Size enhancement are improved efficiency, improved patient safety, and the implementation of a minor bug fix.

The recommendation for Auto Resize Margins to Fit Terminal Size is to proceed with VA intake and OSEHRA Certification.

5.2. Strengths/Weaknesses

The Strengths and Weaknesses analysis elements for Auto Resize Margins to Fit Terminal Size 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	3	The Auto Resize Margins to Fit Terminal Size build introduces changes that allow for full use of the terminal screen's available real-estate. "Any applications taking advantage of any Fileman utility will see a difference: Inquire into File Entries will show more information; Screenman forms can be taller; and the Fileman Browser will take up the whole screen." ³ This functionality currently does not exist in VistA. This enhancement adds value, but does not fill a significant gap. Although not primarily a bug fix, this enhancement also fixes a minor bug in the Listman template related to maximum height.
Technical Fit - Data	4	No data issues are anticipated; this code has been developed specifically to enhance CPRS / VistA functionality.
Technical Fit - API	4*	No architectural issues are anticipated; this code has been developed specifically to enhance CPRS / VistA functionality. The release notes submitted to OSEHRA indicate that this code changes the device driver, and therefore additional testing is needed to ensure everything using the device driver still functions properly. The recommended tests are: <ul style="list-style-type: none"> - CPRS Connections (Null device, Resource devices) - Background prints from CPRS (Chart Copy/Work Copy) - Queued prints from any roll and scroll option - Regular prints from any roll and scroll option⁴ The normal KIDS load and install options are used to install this build (VFD*15.0*123). The changes in this build make adjustments in %ZIS3, %ZIS4, and VALM0 and VALM1. ⁵ This enhancement also fixes a minor bug in the Listman template.
Code Quality	3	This code has not been reviewed or certified by OSEHRA. The OSEHRA Technical Journal submission includes release notes and a white paper.

³ Habel, S. (2017). VFD*15.0*123 - Auto resize margins to fit terminal size. Retrieved March 16, 2017 from <http://hdl.handle.net/10909/11279>

⁴ DSS, Inc. (2017). VFD*15.0 123 Release Notes. Retrieved March 16, 2017 from <http://code.osehra.org/journal/journal/view/downloadrevisionId=896#>

⁵ Habel, S. (2017). VFD*15.0*123 - Auto resize margins to fit terminal size. Retrieved March 16, 2017 from <http://hdl.handle.net/10909/11279>

SWOT Dimension	Score	Evaluation Comments
VistA 4 Product Roadmap - Architectural Fit	3	This functionality is not included in the Roadmap, but also does not detract from it. “The most important benefit is for users of Listman applications, which don't display enough information for the user to act on. This is especially prominent in Pharmacy.” ⁶ Enhancements to pharmacy are included in Feature Sets 3 and 4 of the Roadmap.
Time-to-Value	4*	The Auto Resize Margins to Fit Terminal Size code is a minor enhancement and bug fix with the potential for rapid intake.

Legend: *Decisional element

Table 9. Strengths / Weaknesses Associated with Auto Resize Margins to Fit Terminal Size

⁶ Habiél, S. (2017). *VFD*15.0*123 - Auto resize margins to fit terminal size*. Retrieved March 16, 2017 from <http://hdl.handle.net/10909/11279>

5.3. Opportunities/Threats

The Opportunities and Threats analysis elements for Auto Resize Margins to Fit Terminal Size 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 License 2.0.
Open Source Community Involvement	4	This code was developed for the open source vxVistA EHR. It was submitted to the OSEHRA Technical Journal for review and use by the open source community on February 6, 2017.
Veteran Experience	4*	This code has the potential to improve patient safety by making it easier for pharmacists to view additional patient information. Currently, pharmacists viewing a patient's profile in Inpatient Pharmacy can only view four medications at a time, and when processing an individual medication, they don't see the provider comments and CPRS order checks except by scrolling down. This enhancement allows the display to resize itself so more information can be displayed on the screen.
Quality Risk	3	This candidate has not been piloted at VA. It was initially released in August 2016 and submitted to the OSEHRA Technical Journal in March 2017, so it does not have a long history. If any issues occur as a result of installation, the original copies of %ZIS3 and VALM0 can be restored. Two risks / disadvantages associated with intake of this code have been identified: (1) Some menu options may rely on a hardcoded value of 80 x 24; and (2) Users need to know that they can resize the terminal. To mitigate the disadvantages, the code will have no effect if terminal size is 80 x 24.
Political Risk	4*	The limited scope / impact associated with this code provides for a low process and change risk.

Legend: *Decisional element

Table 10. Opportunities / Threats Associated with Auto Resize Margins to Fit Terminal Size

5.4. SWOT Analysis Summary

An overall summary of the Auto Resize Margins to Fit Terminal Size 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)	<u>Strengths</u> <ul style="list-style-type: none"> Code developed specifically for Vista, which indicates a strong technical fit Minor enhancement and bug fix with the potential for rapid intake 	<u>Weaknesses</u> <ul style="list-style-type: none"> None
External Impacts (Risks, Upside)	<u>Opportunities</u> <ul style="list-style-type: none"> Potential to improve patient safety; improves user interface Low implementation risk 	<u>Threats</u> <ul style="list-style-type: none"> None

Table 11. SWOT Analysis Summary of Auto Resize Margins to Fit Terminal Size

6. Next Steps

The OSS candidates reviewed in this SWOT analysis will be included in the 2017 Q1 Prioritization Description Document, along with additional detail. Additionally, these candidates will be reviewed during the 2017 Q1 In Progress Review (IPR).

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