OSEHRA

Open Source Electronic Health Record Alliance

Open Source Technical Support and Working Group Services for VA VistA

Prioritization Description Document
For VA Open Source Intake Candidates

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07/28/16	1.0	Initial submittal
11/04/16	1.1	Updated references to Drupal in the RAPTOR candidate analysis, updated analysis text.

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1. Introduction

1.1. Executive Summary

The purpose of this Prioritization Description Document (PDD) is to compile and document the analysis findings for the open source software (OSS) intake candidates identified during the quarter. The candidates reviewed in the second quarter (Q2) document are listed below:

- **Enhanced XML Utilities for VistA** - an upgraded XML package that includes templating tools, XPath searching of documents, XML authoring facilities, and bug fixes.
- **HIEOS** - a document sharing information exchange platform.
- **RAPTOR** - an automated, electronic tool allowing radiologists to optimize advanced medical imaging protocols.
- **Perceptive Reach** - an “upstream suicide prevention” project which uses existing VA clinical data to identify Veterans at risk of suicide.

To date, a total of 7 OSS candidates have been recommended for intake this year. In addition to the 4 candidates listed above, three OSS candidates were recommended during the first quarter: Appointment Postcard Notification Letter v4.0, OpenInfobutton, and XU Digital Signature. The candidates were rated using a high / medium / low scale in the categories of Veteran Experience, Speed to Implement, and Level of Risk. The candidates receiving the highest scores in the Veteran Experience category are Appointment Postcard Notification Letter v4.0, Perceptive Reach, and RAPTOR. The candidates receiving the highest scores in the Speed to Implement category are Appointment Postcard Notification Letter v4.0, Enhanced XML Utilities for VistA, and XU Digital Signature. The candidates receiving the highest scores in the Level of Risk category are RAPTOR, Enhanced XML Utilities for VistA, and XU Digital Signature.

The results of the Gap Analysis, Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis, OSS and Product Selection Criteria, and PDD for each identified open source intake candidate will be combined into the quarterly CBA package. The OSS candidates included in the CBA package will be presented at the Q2 In-Progress Review (IPR).

1.2. Overview

The PDD incorporates findings from the OSS and Product Selection Criteria analysis and the SWOT analysis. The PDD then expands the assessment with additional analysis across multiple areas. A high level business case is outlined for each intake candidate. Ultimately, this document serves to position the candidates for the VA intake assessment process.

The PDD includes multiple analysis elements for the intake candidates, including the following:

1. Provides a mapping and functional description of open source software features proposed for VA VistA intake as they correlate to defined VA VistA 4 Feature Sets (FS).
2. Elaborates how the alternatives for the same VistA feature set compare to one another.
3. Identifies and sizes the scope of additional development needed to meet VA requirements.
4. Provides supporting technical detail regarding supported and/or required/missing components (such as client and server operating systems, database managers, application program interfaces, etc.).
5. Provides recommendations regarding any required/missing components necessary for full operation of VA VistA that may be addressed through either open source or other channels.
6. Identifies the level of maturity and supportability requirements associated with the intake of the respective open source code.
7. Identifies any licensing implications affecting intake.
8. Identifies risks (technical, operational, programmatic) for each open source alternative.
9. Identifies proposed mitigation strategies for risks associated with VA VistA intake that may affect deployment at VAMCs nation-wide.

2. Approach

Several deliverables converge to create the PDD. The approach to developing this PDD included four main steps:

1. Incorporate the Q2 Gap Analysis findings into the PDD as appropriate
2. Incorporate the Q2 Product Selection Criteria into the PDD as appropriate
3. Review, analyze, update, and incorporate the SWOT content for each candidate
4. Organize the analysis into a business case summary and sequence;
    - Overview
    - Rationale / Summary of Business Case
    - Fit to Requirements / Benefits
    - Costs
    - Risks

The PDD then reviews and provides prioritization guidance for all of the OSS items recommended to date.

3. Analysis of Enhanced XML Utilities for VistA

3.1. Overview and Rationale

An overview of the Enhanced XML Utilities for VistA open source candidate is presented in Table 1, below, along with a summary of the business case for this candidate and an assessment of available alternatives.

PDD Element	Enhanced XML Utilities for VistA
Overview	
Overview of Open Source Intake Candidate	This OSS candidate is an upgraded XML package that includes templating tools, XPath searching of documents, XML authoring facilities, and bug fixes. It is needed for XML parsing capabilities to allow any VistA application to perform XML processing in a more efficient manner.
Recommendation	
Recommendation	The overall recommendation for this candidate is to proceed with intake, either as a Kernel patch or as a package separate from VA's Kernel. Additional analysis is needed to determine the best intake approach.
Rationale	
Rationale / Summary of Business Case	Utilities for VistA provides an enterprise-wide XML development tool that streamlines the current development process, which requires developers to create unique XML tools for each VistA package. This will increase the efficiency and productivity of VistA developers and speed implementations. Additionally, XML Utilities helps simplify certain coding operations, as well as fix some existing VistA bugs. XML (Extensible Markup Language) is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable.
Assessment of Alternatives	The primary alternative to this candidate is to continue with the current software, which requires VistA developers to create their own tools rather than using the APIs available through the Utility. Additionally, the current process requires the use of proprietary extensions from Intersystem Cache or using the original VA XML code to navigate the XML document node-by-node to parse XML rather than utilizing the XML Path Language (XPath) made available through the Utility.

Table 1. Overview and Rationale

3.2. Fit to Requirements / Benefits

Enhanced XML Utilities for VistA is evaluated based on the fit to requirements and benefits offered by the candidate in Table 2, below. A mapping to the VistA 4 Roadmap Feature Sets is provided, as well as an analysis of overall fit to the Roadmap.

PDD Element	Enhanced XML Utilities for VistA
Fit to Requirements / Benefits	
Fit with Roadmap	This code is not specific to the VistA 4 Product Roadmap; it provides an underlying utility function for all of VistA.
Mapping to Feature Sets	This code is not specific to a Feature Set; it provides an underlying utility function for all of VistA.
Functional Fit with Requirements	This code fills a modest technical gap by providing XML parsing capabilities to allow VistA applications to perform XML processing in a more efficient manner.
Technical / Architectural Fit with VistA	This code fits well with VistA data structures and APIs, and is a VistA package. No re-architecting is required. It is easily callable. Technical benefits associated with intake of this code include: 1. It fixes several bugs in VistA regarding parsing XML entities and loading files from the File system on GT.M. The ^%ZISH API used in the package is not officially supported; it only works on Cache. 2. It adds several APIs to help with the creation/authoring of XML documents from VistA, including using a template to fill in XML. Currently, each VistA package creating XML creates its own tools. 3. It adds support for an extensive subset of XPath. XPath is a query language for selecting nodes from an XML document. Additionally, XPath may be used to compute values (e.g., strings, numbers, or Boolean values) from the content of an XML document. Currently, VistA packages that need to parse XML either use proprietary extensions from Intersystem Caché (see PSSFDBRT), or use the original VA XML code to navigate the XML document node by node (see PSSHRQ2O). XPath simplifies these operations.
Business Benefits to VA	Business benefits associated with intake of this code include: 1. Fixes existing bugs in VistA. 2. Adds several APIs to help with the creation/authoring of XML documents from VistA, which streamlines the development process. 3. Adds support for an extensive subset of XPath, which helps simplify certain coding operations.

Table 2. Analysis of Fit to Requirements / Benefits

3.3. Costs

An overview of the costs associated with intake of the Enhanced XML Utilities for VistA is presented in Table 3, below. Specific elements addressed include a description of the size and scope of additional development that would be required prior to implementation.

PDD Element	Enhanced XML Utilities for VistA
Costs	
Size and Scope of Any Additional Development	No additional development is required to implement this code.
Supported and / or Required / Missing Components	There are no required or missing components.
Recommendations for Required or Missing Components	Not applicable as there are no required or missing components.
Level of Maturity and Support Requirements	This product has been certified to OSEHRA Level 3™ and is included as part of the OSEHRA VistA Core™ code set. OSEHRA VistA Core provides a common underlying foundation for VistA-based solution development in the open source community. The code is intentionally limited in size, and tightly controlled to ensure compatibility with the variety of current and future VistA distributions (https://www.osehra.org/content/osehra-vista).

Table 3. Analysis of Costs

3.4. Risks

The level of risk associated with intake of the Enhanced XML Utilities for VistA open source candidate is evaluated in Table 4, below. Technical, operational, and programmatic risks are evaluated.

PDD Element	Enhanced XML Utilities for VistA
Risks	
Technical Risks	The technical risk associated with implementation of this code is low. Other than a minor bug fix for interoperability in the open source environment (GT.M M-System), the enhancements are all new and do not change the existing VistA software.
Operational Risks	No operational risk associated with implementation of this code have been identified.
Programmatic Risks	The programmatic risk associated with implementation of this code is low. Implementation can either be achieved through the Kernel group on the VIMM program or as a package separate from VA's Kernel. Additional analysis is needed to determine the best intake approach. The best route for intake with minimal risk could help resolve roadblocks to OSS implementation by providing a successful example for VistA intake.
Licensing Implications and Code Quality	There are no licensing or copyright issues; the code is licensed under the Apache 2.0 License. Also, it has been certified to OSEHRA Level 3™, indicating that it is highly reliable.
Mitigation Strategies	The low technical risk related to implementing the minor bug fix will be mitigated through testing by the VA prior to implementation. The programmatic risk related to intake path will be mitigated by working across the various intake options to determine the most appropriate intake path.

Table 4. Analysis of Risks

4. Analysis of HIEOS

4.1. Overview and Rationale

An overview of the HIEOS open source candidate is presented in Table 5, below, along with a summary of the business case for this candidate and an assessment of available alternatives.

PDD Element	HIEOS
Overview	
Overview of Open Source Intake Candidate	HIEOS (Health Information Exchange Open Source) is an open-architecture platform that enables secure health information exchange between disparate health communities. HIEOS provides core components that enable the exchange, location and/or storage of health information in a federated, hybrid, or centralized model. The primary benefit associated with intake of the HIEOS application is that it enables secure information exchange, which supports the VA's goal of interoperability and communities of care. HIEOS implements standards related to data aggregation that support areas such as clinical research and population health monitoring. Additionally, HIEOS implements standards related to the linking of patient information from different sources that may use different patient identifiers. HIEOS is intended to work with the systems currently in place rather than requiring the replacement of existing systems.
Recommendation	
Recommendation	The overall recommendation for this product is to proceed with further analysis to determine the specific technical integration fit and details, then proceed to potential intake if fit is appropriate.
Rationale	
Rationale / Summary of Business Case	HIEOS is a document sharing information exchange platform that promotes interoperability by implementing standards related to sharing clinical care documents. Clinical document sharing supports improved population health analysis and provides efficient and effective care in the communities of care setting, which are important VA health care goals.
Assessment of Alternatives	Alternatives to HIEOS are to continue with the status quo or seek out commercial or custom solutions. Since HEIOS is an open source product, there is no cost for acquisition. However, other solutions need to be analyzed from an ease of implementation standpoint compared to the effort to implement HEIOS.

Table 5. Overview and Rationale

4.2. Fit to Requirements / Benefits

HIEOS is evaluated based on the fit to requirements as well as benefits offered by the candidate in Table 6, below. A mapping to the VistA 4 Roadmap Feature Sets is provided, as well as an analysis of overall fit to the Roadmap.

PDD Element	HIEOS
Fit to Requirements / Benefits	
Fit with Roadmap	Data interoperability is a key goal of the VistA Evolution program. Population health and communities of care are currently key gap areas so there is a functional fit, but timing and technical fit need to be assessed.
Mapping to Feature Sets	Aspects of interoperability are included in Feature Sets 1, 2, and 3 of the VistA 4 Product Roadmap. Feature Set 3 includes the Interoperable EHR element which states: “Interoperability is a core requirement in the VistA modernization effort. Feature Set 3 is focused on the delivery of interoperability enabling capabilities that also meet FY 2014 NDAA directives. Feature Set 3 will complete the VistA Evolution baseline for an Interoperable EHR.”
Functional Fit with Requirements	Cross-enterprise query function supports potential population health analysis and communities of care.
Technical / Architectural Fit with VistA	HIEOS is intended for data exchange, so it has the potential to operate as an adjunct to the Kernel. HIEOS is written in Java and runs within the open source GlassFish application server environment; the software can run on any server platform that supports Java. HIEOS implements Cross Enterprise Document Sharing (XDS.b), Cross Enterprise Document Sharing for Imaging (XDS-I.b), Cross Community Access (XCA) and Cross Enterprise User Assertion (XUA) integration profiles. HIEOS also provides support for Multi-Patient Queries (MPQ) and HL7 V2 and V3 Patient Identity Feeds. The XDS and XCA profiles appear to be in use at VA (http://mihin.org/wp-content/uploads/2013/07/MiHIN-UCIG-Exchange-Continuity-of-Care-Documents-with-VA-v4-02-04-15.pdf), and an open source product would support these profiles. Additional analysis is required to determine if gaps currently exist in the integration profiles implemented by HIEOS.
Business Benefits to VA	This product is a document sharing information exchange platform that promotes interoperability by implementing standards related to sharing clinical care documents. Cross-Enterprise Document Sharing (XDS) is focused on providing a standards-based specification for managing the sharing of documents between any healthcare enterprise. The scope of the healthcare enterprise can include a private physician office, a clinic, an acute care in-patient facility, and personal health record systems. Interoperability continues to be a major focus for Congress, as evidenced by discussion during the Senate

PDD Element	HIEOS
	Appropriations Subcommittee Hearing to Review the VA Electronic Health Record Network conducted July 13, 2016 (http://www.appropriations.senate.gov/hearings/hearing-to-review-the-va-electronic-health-record-network-vista). Members of the subcommittee stressed the need for interoperability, including the sharing of images, and also stressed the desirability of open source applications. HIEOS provides for the sharing of documents (XDS.b), including the sharing of images (XDS-I.b), in an open-architecture platform.

Table 6. Analysis of Fit to Requirements / Benefits

4.3. Costs

An overview of the costs associated with intake of HIEOS is presented in Table 7, below. Specific elements addressed include a description of the size and scope of additional development that would be required prior to implementation.

PDD Element	HIEOS
Costs	
Size and Scope of Any Additional Development	There is no known additional development required for use of this product. Additional analysis needs to be conducted to ensure use of this product does not interfere with any document sharing capabilities VA is already implementing.
Supported and / or Required / Missing Components	There are no known required or missing components needed for use of this product.
Recommendations for Required or Missing Components	Not applicable as there are no known required or missing components.
Level of Maturity and Support Requirements	HIEOS is Integrating the Healthcare Enterprise (IHE) and Healthcare Information Technology Standards Panel (HITSP) compliant and certified. It was selected by the Office of the National Coordinator (ONC) as the default XDS.b registry (record locator services) and repository (record storage services) implementation in the National Health Information Network (NHIN) CONNECT Gateway. This product is not currently certified through OSEHRA.

Table 7. Analysis of Costs

4.4. Risks

The level of risk associated with intake of the HIEOS open source candidate is evaluated in Table 8, below. Technical, operational, and programmatic risks are evaluated.

PDD Element	HIEOS
Risks	
Technical Risks	There is potentially a moderate level of integration risk, but more analysis is required in this area. There is potentially a low level of rollout risk since this involves standards that may be already implemented, but more analysis is also required in this area.
Operational Risks	No operational risk associated with implementation of this code have been identified.
Programmatic Risks	This is infrastructure data exchange software that would provide additional exchange capability. There is a low cultural change risk.
Licensing Implications and Code Quality	There are no licensing or copyright issues; the code is licensed under a Vangent HIEOS License (adapted from the Apache 2.0 License). [Note: Vangent was purchased by General Dynamics, but the HIEOS code available for download on sourceforge.net contains the referenced Vangent license.]
Mitigation Strategies	To address the noted technical risks, additional analysis is recommended.

Table 8. Analysis of Risks

5. Analysis of RAPTOR

5.1. Overview and Rationale

An overview of the RAPTOR open source candidate is presented in Table 9, below, along with a summary of the business case for this candidate and an assessment of available alternatives.

PDD Element	RAPTOR
Overview	
Overview of Open Source Intake Candidate	The RAPTOR (RAdiology Protocol TOol and Recorder) application is an automated, electronic tool for capturing data that is needed by radiologists to optimize advanced medical imaging protocols including CT, MRI, and nuclear medicine. RAPTOR automates an existing paper-based, error-prone, manual process that can take weeks to complete. RAPTOR improves upon the existing system by capturing medical device data automatically from VistA. RAPTOR automatically extracts and prioritizes orders and relevant information from VistA. Information required for radiology protocol decisions, such as patient allergies, renal function, clinician contact information, key clinical notes, specific lab values, and radiology reports is extracted. This data is automatically populated into a dashboard that can be easily accessed by authorized users. By providing this information in one place, radiologists can be more thorough in selecting patient treatment protocols. This information is instantly communicated to the patient care team with the dashboard. Additionally, workflows can be automated to prevent care steps from being overlooked. RAPTOR also provides a comprehensive, time-stamped, permanent record of all activities related to protocol assignment and workflow that can be used for population health analysis. RAPTOR was developed through the VA Center for Innovation using mature open source tools and open standards.
Recommendation	
Recommendation	The overall recommendation for the RAPTOR application is to proceed with further analysis and potential intake through a funded project.
Rationale	
Rationale / Summary of Business Case	RAPTOR improves the quality of health care provided to Veterans by providing a foundation for treatment protocol selection, helping to ensure that protocol treatment steps are completed, and by supporting population health analysis. RAPTOR increases the efficiency and effectiveness of the

PDD Element	RAPTOR
	patient care team by automating workflows, documenting a record of care activities, and providing protocol decision support. RAPTOR tracks the clinical decisions associated with medical images to ensure that Veterans receive the highest quality radiological care.
Assessment of Alternatives	The primary alternative to this candidate is to continue with the existing paper-based process, which is labor intensive and error-prone. Alternatives are to acquire a commercial radiology product or custom develop a product with similar functionality.

Table 9. Overview and Rationale

5.2. Fit to Requirements / Benefits

RAPTOR is evaluated based on the fit to requirements as well as benefits offered by the candidate in Table 10, below. A mapping to the VistA 4 Roadmap Feature Sets is provided, as well as an analysis of overall fit to the Roadmap.

PDD Element	RAPTOR
Fit to Requirements / Benefits	
Fit with Roadmap	VistA Imaging in Support of Radiology is a Feature Set 4 requirement in the VistA 4 Product Roadmap.
Mapping to Feature Sets	VistA Imaging in Support of Radiology is a Feature Set 4 requirement in the VistA 4 Product Roadmap. The Roadmap states: “VistA 4 will update the radiology package to transition radiology operations from a paper-based to a paper-light practice. These enhancements will address the current clinical workflow demand with emphasis on increased efficiency, improved documentation, and enhanced patient safety.” Since RAPTOR is already developed and available as open source, adoption of RAPTOR would speed time to value for this functionality and the associated benefits.
Functional Fit with Requirements	VistA Imaging in Support of Radiology is a Feature Set 4 requirement in the VistA 4 Product Roadmap. The application provides an overall improvement to health care delivery, which is significant.
Technical / Architectural Fit with VistA	The code is a strong technical fit. RAPTOR is already implemented at four VA sites (Seattle, Oregon, California, and Arizona). RAPTOR was built using mature open source tools (Drupal 7, Apache, MySQL, PHP, d3) and open standards. RAPTOR reuses existing components/services such as EWD.js and VistA Imaging eXchange (VIX).

PDD Element	RAPTOR
Business Benefits to VA	Business benefits associated with RAPTOR include: • Improved operational efficiency and cost savings related to improved compliance • Better care by reducing waits and delays, eliminating ambiguous responsibility, and facilitating communication between scheduler, resident, radiologist, and technologist. • Improved patient safety by improving adherence to Federal Regulations / Standards of Care • Improved cost savings by decreasing the actual costs of providing services related to the delivery of healthcare, avoiding an estimated $23 million per year resulting from adverse reactions to contrast agents administered prior to a medical imaging procedure, and reducing radiology personnel manual labor, estimated at $9.5 million per year. • Improved personnel satisfaction by improving efficiency, effectiveness and support in patient care and providing for clear responsibility and accountability. Source: S.A.N. Business Consultants RAPTOR presentation, 2014 OSEHRA Open Source Summit (https://www.osehra.org/sites/default/files/RAPTOR%20-%20Casertano.pdf).

Table 10. Analysis of Fit to Requirements / Benefits

5.3. Costs

An overview of the costs associated with intake of RAPTOR is presented in Table 11, below. Specific elements addressed include a description of the size and scope of additional development that would be required prior to implementation.

PDD Element	RAPTOR
Costs	
Size and Scope of Any Additional Development	As noted in the RAPTOR Veteran-Focused Integration Process (VIP) Intake Candidate Selection Checklist, some of the documentation refers to future functionality which will need to be added. The Functional Requirements Document (FRD) dated August 14, 2015 does include the assumption that interfaces to other applications (both GOTS and COTS) and common services could be developed in future phases and scoped separately. It appears that RAPTOR could potentially be usable as-is, with the possibility of enhancements in the future.
Supported and / or Required / Missing Components	RAPTOR requires that MySQL 5.6, PHP 5.4, and Drupal 7.x have been installed prior to the installation of RAPTOR. MySQL 5.6 and Drupal 7.x are both in TRM as approved for use, with constraints noted. PHP version 5.4 is no longer supported by the vendor; versions 5.6.x and 7.0.x are approved for use in TRM, with constraints noted. Additionally, this product requires a server to host the web application. The RAPTOR VIP Intake Candidate Selection Checklist indicates that there will be an increase in computing and network usage plus the addition of the server storage requirement, but it shouldn't be significant enough to impact existing functionality negatively.
Recommendations for Required or Missing Components	Prior to installation, RAPTOR should be tested using a current version of PHP. As RAPTOR is currently implemented at four VA sites, it is possible this testing has already been completed, in which case the RAPTOR General Install Guide should be updated.
Level of Maturity and Support Requirements	RAPTOR has not been reviewed or certified by OSEHRA. The RAPTOR EPIP Intake Candidate Selection Checklist indicates that this product must complete the Architecture & Engineering Review Board (AERB) and Systems Engineering and Design Review (SEDR) processes. RAPTOR performs its functionality reliably and was selected as one of the Top 5 Medical Imaging IT Projects by the Society of Imaging Informatics in Medicine (SIIM) in 2012.

Table 11. Analysis of Costs

5.4. Risks

The level of risk associated with intake of the RAPTOR open source candidate is evaluated in Table 12, below. Technical, operational, and programmatic risks are evaluated.

PDD Element	RAPTOR
Risks	
Technical Risks	RAPTOR is likely to have minimal integration risk since it is an Innovations product, but more analysis is needed to confirm.
Operational Risks	No operational risks associated with implementation of this code have been identified.
Programmatic Risks	New business processes will be required for clinicians to adopt this code. It was developed through the Innovations program, so there is low political risk from that perspective. RAPTOR has already been analyzed for intake and there is a National Service Request (NSR) in the queue for implementation. The VA Technical Review Board (TRB) recommended against selection of RAPTOR as a project to be undertaken by VIP due to its extensive implementation requirements.
Licensing Implications and Code Quality	There are no licensing or copyright issues; the product is licensed under the Apache 2.0 License.
Mitigation Strategies	RAPTOR is not a candidate for intake through VIP; an alternate source must be identified for project creation and funding to achieve intake of this product.

Table 12. Analysis of Risks

6. Analysis of Perceptive Reach

6.1. Overview and Rationale

An overview of the Perceptive Reach open source candidate is presented in Table 13, below, along with a summary of the business case for this candidate and an assessment of available alternatives.

PDD Element	Perceptive Reach
Overview	
Overview of Open Source Intake Candidate	The Perceptive Reach application is an “upstream suicide prevention” project from the VA Center for Innovation. The application identifies Veterans at risk of suicide using existing VA clinical data. Perceptive Reach provides a clinical decision support dashboard with a categorized list of "at risk" Veterans. The application securely notifies outreach and intervention resources.
Recommendation	
Recommendation	The overall recommendation for the Perceptive Reach application is to proceed with further analysis and potential intake.
Rationale	
Rationale / Summary of Business Case	The primary benefit associated with intake of the Perceptive Reach application is the potential for prevention of suicide among at-risk Veterans, which is a life and death issue, and a key long-term goal for VA. Perceptive Reach combines technology, outreach, and intervention services to improve Veteran care, prevent suicides, and reduce the number of Veterans reaching a crisis stage. The application includes the development of a database, risk model, secure messaging, and dashboard web application. Using existing VA data, the application produces a stratified list of potentially at risk Veterans. The application then securely notifies outreach and intervention resources, who coordinate appropriate support for these Veterans.
Assessment of Alternatives	Another product that is available to VA, STORM (Stratification Tool for Opioid Risk Mitigation), focuses on opioid risk, which is often a precursor to suicide. However, STORM is not solely focused on suicide risk, and does not consider suicide risk factors other than opioid use.

Table 13. Overview and Rationale

6.2. Fit to Requirements / Benefits

Perceptive Reach is evaluated based on the fit to requirements as well as benefits offered by the candidate in Table 14, below. A mapping to the VistA 4 Roadmap Feature Sets is provided, as well as an analysis of overall fit to the Roadmap.

PDD Element	Perceptive Reach
Fit to Requirements / Benefits	
Fit with Roadmap	Does not relate to the Roadmap, but also does not conflict with it.
Mapping to Feature Sets	Does not relate to the Feature Sets, but also does not conflict with them.
Functional Fit with Requirements	Perceptive Reach would bolster the 3 major components of VHA's Strategic Plan for Suicide Prevention: surveillance, risk and protective factors, and prevention interventions. This product supports population health for those with psychological issues and potential suicide risks. Suicide prevention is a key VHA long-term goal.
Technical / Architectural Fit with VistA	This product creates a "reach database" that imports data from a variety of sources. One source is the Corporate Data Warehouse (CDW), which contains data from VistA. Analysis was conducted by VA for inclusion of this product in the Technical Reference Model (TRM). According to TRM, this is a highly interoperable technology that can interface with several VA-approved technologies and standards (http://www.va.gov/TRM/ToolPage.asp?tid=9226).
Business Benefits to VA	Perceptive Reach can bridge the gap in predictive analytics capability missing from the Joint Legacy Viewer (JLV) by providing an integrated data analytic and predictive modeling database system using currently available data. The use of algorithms to predict suicide risk was discussed during the Senate Appropriations Subcommittee Hearing to Review the VA Electronic Health Record Network conducted July 13, 2016 (http://www.appropriations.senate.gov/hearings/hearing-to-review-the-va-electronic-health-record-network-vista). Presiding Senator Mark Kirk indicated that discussions with Cerner have led him to believe the JLV is incapable of providing analytics of this type. David Waltman (VistA Evolution Program Executive and Senior Advisor to the Under Secretary for Health, VHA) agreed with this statement, and indicated that eHMP would provide the capability for these analytics.

Table 14. Analysis of Fit to Requirements / Benefits

6.3. Costs

An overview of the costs associated with intake of Perceptive Reach is presented in Table 15, below. Specific elements addressed include a description of the size and scope of additional development that would be required prior to implementation.

PDD Element	Perceptive Reach
Costs	
Size and Scope of Any Additional Development	Perceptive Reach has been deployed at the pilot level only. The product relies on a "reach database" which pulls information from a variety of external data sources. Capabilities are currently in place to pull data from the VA Suicide Data Repository (SDR), Corporate Data Warehouse (CDW), and HealthIndicators.gov. The ability to pull data directly from VistA and the Enterprise Data Warehouse (EDW) are listed as future capabilities, as is the ability to pull data from non-VA sources such as LexisNexis and PACER. CDW warehouses mostly VistA data, so the future capability to pull data directly from VistA refers only to data not currently available in CDW. According to release notes published in May 2016 (https://github.com/VHAINNOVATIONS/PerceptiveReach/blob/master/Documentation/PR_Release_Notes.docx), all critical code defects have been resolved. However, there are remaining documented non-critical defects which will be addressed at a later date. Perceptive Reach is available for use as is, and does not require the noted future capabilities to realize value.
Supported and / or Required / Missing Components	Clinical Care Team Members will access Direct Messages regarding at-risk Veterans via a VA-owned system called Virtual Lifetime Electronic Record (VLER) Direct, which is a required supporting component to the Perceptive Reach application.
Recommendations for Required or Missing Components	The process for requesting access to VLER Direct, the application's required supporting component, is detailed in the Perceptive Reach User Manual (https://github.com/VHAINNOVATIONS/PerceptiveReach/blob/master/Documentation/PR_User_Manual.docx). A coordinated effort should be utilized to ensure access does not become an issue.
Level of Maturity and Support Requirements	As noted in the TRM, this product is less than one (1) year old and may be considered immature. The software appears to perform its functions in a quality way. This technology has the potential to collect, store or transmit Personally Identifiable Information (PII), Protected Health Information (PHI) or other sensitive VA data, and therefore needs to comply with VA PII and related regulations.

Table 15. Analysis of Costs

6.4. Risks

The level of risk associated with intake of the Perceptive Reach open source candidate is evaluated in Table 16, below. Technical, operational, and programmatic risks are evaluated.

PDD Element	Perceptive Reach
Risks	
Technical Risks	As noted in the TRM; this product is less than one (1) year old and may be considered immature. An additional constraint noted in the TRM is that Perceptive Reach is only compatible with the Windows operating system and is not portable.
Operational Risks	Also noted in the TRM; this technology has the potential to collect, store or transmit PII, PHI, or compromise other sensitive VA data. Proper steps must be taken to ensure any sensitive data at rest or in transit is protected per VA Handbook 6500 and that sensitive data is not transferred outside the VA production network.
Programmatic Risks	Since this is a needed adjunct function likely to be primarily used by mental health professionals, it is likely that this would be welcomed and there would be a low level of cultural risk. Success of the system is dependent on users completing the required steps to access the system, logging into the VLER web application to receive messages, and utilizing the dashboard to review analytics and update the outreach status. Use of this application, while an enhancement to the current process, would be a change in process which would need to be managed.
Licensing Implications and Code Quality	There are no licensing or copyright issues; the product is licensed under the Apache 2.0 License. Perceptive Reach won a 2016 Federal Health IT (FHIT) award in the Data Solutions category.
Mitigation Strategies	To address the noted technical risks, it is recommended that additional testing be performed to confirm proper technical operation and compatibility with the versions of Windows in use at VA. To address the operational risks, it is recommended that a security review is done to ensure proper privacy protections prior to implementation. To address the programmatic risks, it is recommended that training materials be developed and provided to all users prior to implementation.

Table 16. Analysis of Risks

7. OSS Candidate Review and Summary

A summary ranking of all OSS candidates recommended for intake to date are presented below in Table 17. The candidates were rated on a high (3) / medium (2) / low (1) scale in three categories, with a high (3) score being the highest positive score possible.

- In the Veteran Experience category, a high score (3) indicates there is a direct positive impact to the Veteran, a medium score (2) indicates there is an indirect positive impact to the Veteran, and a low score (1) indicates there is no tangible impact to the Veteran. The candidates receiving the highest scores in the Veteran Experience category are Appointment Postcard Notification Letter v4.0, Perceptive Reach, and RAPTOR.
- In the Speed to Implement category, a high score (3) indicates there are no constraints to implementation, a medium score (2) indicates the code is ready for implementation but the effort is too large and/or complex to implement through EPIP, and a low score (1) indicates additional development is required or the code is not ready to implement. The candidates receiving the highest scores in the Speed to Implement category are Appointment Postcard Notification Letter v4.0, Enhanced XML Utilities for VistA, and XU Digital Signature.
- In the Level of Risk category, a high score (3) indicates there are no identified risks, a medium score (2) indicates a reasonable level of risk has been identified, and a low score (1) indicates significant risks have been identified or risks have been identified for which there is no acceptable mitigation strategy available. The candidates receiving the highest scores in the Level of Risk category are RAPTOR, Enhanced XML Utilities for VistA, and XU Digital Signature.

OSS Candidate	Impact to Veteran	Speed to Implement	Level of Risk
Appointment Postcard Notification Letter v4.0	3	3	2
Perceptive Reach	3	2	2
RAPTOR	3	2	3
Enhanced XML Utilities for VistA	1	3	3
XU Digital Signature	1	3	3
OpenInfobutton	2	2	2
HIEOS	1	1	2

Table 17. Summary of OSS Candidate Ranking

8. Next Steps

The results of the SWOT Analysis, Gap Analysis, Open Source Software and Product Selection Criteria, and Prioritization Description Document for each identified open source intake candidate will be combined into the quarterly CBA package. The OSS candidates included in the CBA package will be presented at the next In-Progress-Review. The next quarterly cycle will be initiated to search for and assess open source candidates, align the candidates with an updated Gap Analysis, and continue to mature the analysis approach and content.

Appendix A. Additional Documentation for OSS Candidates

Description	Link
Enhanced XML Utilities for VistA	
OSEHRA Product Summary	https://www.osehra.org/post/enhanced-xml-tool
OSEHRA Technical Journal Entry	http://code.osehra.org/journal/journal/view/429
HIEOS	
General Dynamics Product Summary	http://www.gdit.com/Capabilities/Health/Government-Health-IT/HIE/HIEOS/
IHE Integration Statement	http://tenet.dl.sourceforge.net/project/hieos/Vangent_HIEOS_IHE_Integration_Statement.pdf
Sourceforge Code Repository	https://sourceforge.net/projects/hieos
RAPTOR	
GitHub Code Repository	https://github.com/VHAINNOVATIONS/RAPTOR
Project Documentation on GitHub	https://github.com/VHAINNOVATIONS/RAPTOR/tree/automate/SharedDocs
2013 OSEHRA Summit Presentation	https://www.osehra.org/content/raptor-radiology-protocol-tool-and-recorder-andrew-casertano
2014 OSEHRA Summit Presentation	https://www.osehra.org/sites/default/files/RAPTOR%20-%20Casertano.pdf
Clinical Informatics Seminar	http://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=856
Perceptive Reach	
GitHub Code Repository	https://github.com/VHAINNOVATIONS/PerceptiveReach
Project Documentation on GitHub	https://github.com/VHAINNOVATIONS/PerceptiveReach/tree/master/Documentation
TRM Entry Description	http://www.va.gov/TRM/ToolPage.asp?tid=9226
PwC Project Description	http://www.pwc.com/us/en/public-sector/solutions/open-source-agility.html
Medium Article by VACI	https://medium.com/@VAInnovation/perceptive-reach-putting-data-analytics-for-upstream-suicide-prevention-754e8b3aeff8#.l6zqu7kg8

Table 18. Additional Documentation for OSS Candidates

Appendix B: Cross Reference of PDD Analysis Elements to the Statement of Work

PDD Element	SOW Cross Reference - Section 5.2.1, Page 37
Overview	
Overview of Open Source Intake Candidate	Additional analysis.
Rationale	
Rationale / Summary of Business Case	Additional analysis.
Assessment of Alternatives	PDD Item 2: Elaborate how the alternatives for the same VistA feature set compare to one another.
Fit to Requirements / Benefits	
Mapping to Feature Sets	PDD item 1: Provide a mapping and functional description of open source software features proposed for VA VistA intake as they correlate to defined VA VistA 4 Feature Sets.
Functional Fit with Requirements	Additional analysis.
Technical / Architectural Fit with VistA	Additional analysis.
Fit with Roadmap	Additional analysis.
Business Benefits to VA	Additional analysis.
Costs	
Size and Scope of Any Additional Development	PDD Item 3: Identify and size the scope of additional development required to meet VA requirements.
Supported and / or Required / Missing Components	PDD Item 4: Provide supporting technical detail regarding supported and/or required/missing components (such as client and server operating systems, database managers, application program interfaces, etc.).
Recommendations for Required or Missing Components	PDD Item 5: Provide recommendations regarding any required/missing components necessary for full operation of VA VistA that may be addressed through either open source or other channels.
Level of Maturity and Support Requirements	PDD Item 6: Identify the level of maturity and supportability requirements associated with the intake of the respective open source code.
Risks	
Technical Risks	PDD Item 8: Identify risks (technical, operational, programmatic) for each open source alternative.
Operational Risks	PDD Item 8: Identify risks (technical, operational, programmatic) for each open source alternative.
Programmatic Risks	PDD Item 8: Identify risks (technical, operational, programmatic) for each open source alternative.

PDD Element	SOW Cross Reference - Section 5.2.1, Page 37
Licensing Implications and Code Quality	PDD Item 7: Identify any licensing implications affecting intake.
Mitigation Strategies	PDD Item 9: Identify proposed mitigation strategies for risks associated with VA VistA intake that may affect national deployment at VAMCs nation-wide.

Table 19. Cross Reference to Statement of Work