



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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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 fourth quarter (Q4) document are listed below:

- Mental Health eScreening (MHE) – web-based intake form for completing mental health assessments – recommended for intake.
- Chemotherapy Ordering Management System (COMS) – web-based application providing oncology teams with ordering, preparation, and documentation of chemotherapy treatment – recommended for intake.
- Apelon Distributed Terminology System (DTS) - open source terminology management platform; intake recommendation on hold.

Including the two recommended candidates listed above, a total of fifteen OSS candidates have been recommended for intake to date. All candidates were rated using a high / medium / low scale in the categories of Veteran Experience, Speed to Implement, and overall priority.

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. To facilitate the intake process, suggested Epic statements are included for each candidate. VA uses Epics to define user needs and initiate the project planning phase of the Veteran Focused Integration Process (VIP).

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 Veterans Health Information Systems & Technology Architecture (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 estimates 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 Q4 Gap Analysis findings into the PDD as appropriate
2. Incorporate the Q4 Product Selection Criteria content into the PDD as appropriate
3. Incorporate the SWOT content for each candidate
4. Organize the analysis into a business case summary and sequence:
 - o Overview
 - o Rationale / Summary of Business Case
 - o Fit to Requirements / Benefits
 - o Costs
 - o Risks
 - o Epic Statements

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

3. Analysis of Mental Health eScreening (MHE)

3.1. Overview and Rationale

An overview of the MHE open source candidate is presented in Table 1.

PDD Element	Analysis
Overview	
Overview of Open Source Intake Candidate	<p>The MHE application accelerates the process of enrolling Veterans into mental health care by introducing a web-based intake form for completing mental health assessments. MHE allows clinicians to perform patient-directed screening, real-time scoring and chart note generation, and individualized patient feedback. It provides a real-time push of clinical information to VistA and CPRS, and real-time alerts to clinicians for evaluation and triage. Screens can be structured to include measures of post-traumatic stress disorder (PTSD), depression, traumatic brain injury (TBI), military sexual trauma, substance use, pain, and suicide risk. The VA Center of Excellence for Stress and Mental Health (CESAMH) initiated the project through the VA Center for Innovation (VACI) and it was developed by the Information Innovators Inc. Team (Triple-i).</p>
Recommendation	
Recommendation	<p>The recommendation for MHE is to proceed with OSEHRA Certification for VA intake.</p>
Rationale	
Rationale / Summary of Business Case	<p>The primary benefit associated with intake of the MHE application is accelerated access to mental health care. Additionally, MHE may accelerate care for PTSD, suicide prevention, and prescription drug abuse if the e-screen is structured to include these measures, all of which are high priority focus areas for both VHA and Congress.</p>
Assessment of Alternatives	<p>The primary alternative to MHE is to continue with the existing process which requires Veterans to complete standardized paper screenings. The responses are manually scored and entered into CPRS and VistA for appropriate clinical action and documentation. MHE automates the scoring and data entry process.</p>

Table 1. Overview and Rationale

3.2. Fit to Requirements / Benefits

MHE is evaluated based on the fit to requirements and benefits offered by the candidate in Table 2.

PDD Element	Analysis
Fit to Requirements / Benefits	
Fit with Roadmap	This functionality is not specifically referenced in the Roadmap, but is also not in conflict with it.
Mapping to Feature Sets	This functionality generally aligns with the Specialty Clinical Areas requirement to support mental health workflows within Feature Set 4.
Functional Fit with Requirements	This application accelerates access to care by automating the lengthy paper screening process for new and existing VA mental health patients and accelerating clinician and scheduler access to this information via mobile and web-based apps. Improving access to care is a primary objective within VA. By accelerating access to mental health care, and by significantly reducing the time for follow up care for urgent services, this application ties into an identified functionality gap related to suicide prevention.
Technical / Architectural Fit with VistA	MHE has a strong technical and architectural fit with VistA and CPRS. Code was developed through the VA Innovations program for use with VistA and CPRS. The application allows Veterans to use tablets to report mental health symptoms in a VA clinic. MHE has 2-way communication with VistA/CPRS. It pulls Veteran identification and demographics information, both reads and writes active clinical reminders, health factors, and consults, and inserts assessment results as clinical progress notes in CPRS. All communication between MHE and VistA takes place behind VA firewalls via VA VistALink, a Remote Procedure Calls (RPC) framework that is part of the OneVA architecture. MHE reuses existing RPCs.
Business Benefits to VA	MHE accelerates and improves delivery of mental health care. A 2012-2013 study conducted by VA comparing paper vs. e-screening concluded that "e-screening was more satisfying, reduced overall screening burden, improved screening rates, and improved patient care." The most significant difference appeared to be in the time it took for Veterans to receive needed clinical follow-up care. ¹ The pilot program resulted in an "overwhelmingly positive impact on clinical care and efficiencies," with results such as faster documentation of

¹ Pittman, J. O. E., Floto, E., Afari, N. (2015, January). The VA e-Screening Program: Technology to Improve Veteran Healthcare. Presented at the Society for Social Work and Research 19th Annual Conference, New Orleans, Louisiana. Abstract retrieved December 2, 2016 from <https://sswr.confex.com/sswr/2015/webprogram/Paper24204.html>

PDD Element	Analysis
	<p>completed clinical reminders in CPRS (averaging 19 days less time than paper screening), reduced redundancy yielding an estimated savings of 6.5 provider hours and 4.4 Veteran hours for every 100 Veterans seen, and increased operational efficiencies yielding an estimated savings of \$100 for every 100 clinical reminders completed. Same day access to clinical care and triage for urgent services was provided for 84% of Veterans who completed e-screening compared to 49% who were screened by paper.² eScreening was named as a Gold Status Best Practice for Care Coordination.³</p>

Table 2. Analysis of Fit to Requirements / Benefits

² Afari, N., Pittman, J., Floto, E. VA Center of Excellence for Stress and Mental Health. (2015). *The VA eScreening Program: Technology to Improve Veteran Healthcare*. Retrieved December 5, 2016 from https://github.com/VHAINNOVATIONS/Mental-Health-eScreening/blob/master/eScreening%20overview-02-08-2015_w_screenshots.pdf

³ Elnahal, S., & Littlefield, P. (2016, March 02). VA Diffusion – spreading and implementing best practices to improve care for our nation's Veterans. Retrieved January 10, 2017, from <http://www.blogs.va.gov/VAntage/26205/va-diffusion-spreading-and-implementing-best-practices-to-improve-care-for-our-nations-veterans/>

3.3. Costs

An overview of the costs associated with intake of MHE is presented in Table 3.

PDD Element	Analysis
Costs	
Size and Scope of Any Additional Development	There is no known additional development required at this time. A future enhancement may be desired to integrate with My HealthVet to allow screening to occur remotely, but the current version of the application is functional as-is with accessibility at VA clinics.
Supported and / or Required / Missing Components	The application is intended for use with tablets, which would most likely need to be purchased for each installation. A “Care and Feeding” document prepared following the pilot phase estimated start-up costs of \$75K per facility, with the majority of that cost due to the purchase of tablets. ⁴
Recommendations for Required or Missing Components	Estimated start-up costs should be weighed against the reported benefits of e-screening to determine if the investment provides a reasonable return.
Level of Maturity and Support Requirements	The application has been piloted, and is currently in use, at the San Diego and Long Beach VAMCs. Results of the pilot have been described as “overwhelmingly positive.” There are reportedly no further implementations planned due to lack of resources. ⁵ The “Care and Feeding” document estimates annual human resource costs at \$81K per facility. ⁶ This code has not been reviewed or certified by OSEHRA.

Table 3. Analysis of Costs

⁴ Floto, Elizabeth. VA Center of Excellence for Stress and Mental Health. (2016). *Care and Feeding of the Mental Health eScreening (MHE) System*. Retrieved January 6, 2017 from <https://github.com/VHAINNOVATIONS/Mental-Health-eScreening/blob/master/the%20care%20and%20feeding%20of%20eScreening020116.docx>

⁵ Afari, N., Pittman, J., Floto, E. VA Center of Excellence for Stress and Mental Health. (2015). *The VA eScreening Program: Technology to Improve Veteran Healthcare*. Retrieved December 5, 2016 from https://github.com/VHAINNOVATIONS/Mental-Health-eScreening/blob/master/eScreening%20overview-02-08-2015_w_screenshots.pdf

⁶ Floto, Elizabeth. VA Center of Excellence for Stress and Mental Health. (2016). *Care and Feeding of the Mental Health eScreening (MHE) System*. Retrieved January 6, 2017 from <https://github.com/VHAINNOVATIONS/Mental-Health-eScreening/blob/master/the%20care%20and%20feeding%20of%20eScreening020116.docx>

3.4. Risks

The level of risk associated with intake of the MHE open source candidate is evaluated in Table 4.

PDD Element	Analysis
Risks	
Technical Risks	No technical risks associated with implementation of this code have been identified.
Operational Risks	No operational risks associated with implementation of this code have been identified.
Programmatic Risks	Some minor programmatic risks exist related to intake of this code. First, VA staff will need to be trained in creation of the assessments and use of the dashboard. Second, while the application includes electronic security measures, physical security procedures will need to be developed for each facility to ensure tablets are not removed from the clinic. During the pilot phase, some facilities opted for visual surveillance, while others required Veterans to check out the tablets in exchange for an ID card.
Licensing Implications and Code Quality	There are no licensing or copyright issues; MHE is licensed under the Apache 2.0 license. The OSEHRA certification package has been prepared and is ready for analysis upon request. The application was accepted by VA in its San Diego production environment on 06/12/2015. MHE is currently in use by the Operation Enduring Free / Operation Iraqi Freedom / Operation New Dawn (OEF/OIF/OND, or OOO) program locations, Mental Health Access Clinic (MHAC), and Primary Care clinics associated with the San Diego CESAMH.
Mitigation Strategies	Training guides, slide decks, videos, and lesson plans have been developed as part of the pilot phase ⁷ , and should be leveraged to ensure a comprehensive training program is developed. Coordination needs to occur prior to implementation to ensure all procedures have been developed and communicated.

Table 4. Analysis of Risks

⁷ 20388 – Mental Health eScreening: Deliverables. (2015, December 11). Retrieved January 6, 2017 from <https://vacloud.us/groups/20388/wiki/c3371/Deliverables.html>

3.5. Epic Statements

To support funding and agile development requirements, Epic statements for this candidate are provided in Table 5. Formatting and categories are consistent with VA's Epic statement format.

Epic Category	Description
Candidate	Mental Health eScreening (MHE)
For <target customers>	clinicians
Who <need or opportunity>	need to quickly screen Veterans for mental health issues
the <solution>	Mental Health eScreening (MHE)
Is <something – the “how”>	an application
That <provides this value>	allows real-time scoring of screens for staff notification of high-risk veterans for same-day care.
Unlike <the primary alternative, current solution or non-existing solution >	paper-based systems that cannot provide real time notification
Our solution <does something better – the “why”>	provides real time information to clinicians to identify and treat high risk Veterans quickly.
Scope	
Success Criteria <how success will be measured, quantified if possible>	More rapid access to mental health care for high risk Veterans
In Scope <features that are in scope>	Interview and screening software
Out of Scope <items not needed for this epic>	N/A
Non-Functional Requirements <shall statements for usability, reliability, etc. if applicable>	N/A

Table 5. Epic Statements

4. Analysis of Chemotherapy Ordering Management System (COMS)

4.1. Overview and Rationale

An overview of the COMS open source candidate is presented in Table 6.

PDD Element	Analysis
Overview	
Overview of Open Source Intake Candidate	COMS is a web-based application providing oncology teams with ordering, preparation, and documentation of chemotherapy treatment. The application supports the unique needs of oncology healthcare teams by providing standardized capabilities to meet direct order entry, clinical documentation, and assessment of the administration of chemotherapy. COMS allows for the creation, customization, and use of chemotherapy regimens, which define the specific combination of chemotherapy drugs to be used for treatment along with their dosage, frequency, and duration. Additionally, COMS provides interoperability with VHA's EHR, interfacing and interacting with existing applicable systems, modules, capabilities, and processes within CPRS and VistA. The COMS application was developed through the VA Center for Innovation by CACI International, Inc.
Recommendation	
Recommendation	The recommendation is to proceed with VA intake to use COMS as a starting point for any additional development that might be needed, most likely through a funded project. Prior analysis by VA determined that COMS does not qualify for intake through the Existing Product Intake Process (EPIP).
Rationale	
Rationale / Summary of Business Case	The primary benefits associated with intake of COMS are improved clinician efficiency and improved patient safety. VHA supports one of the largest cancer populations in the country, and oncology patients are the fastest growing group of VHA patients. VHA's current oncology processes are a mix of paper-based and computer-based practices with minimal standardization and limited direct order entry of chemotherapy. The VHA Office of Health Information (OHI) Patient Safety Workgroup rated this issue as having a high level of patient safety risk. ⁸ COMS was developed to address these concerns.

⁸ Department of Veterans Affairs. (2015). *Chemotherapy Order Management System (COMS): Technical Manual Version 2.2*. Retrieved December 1, 2016 from https://github.com/VHAINNOVATIONS/COMS/blob/master/COMS%20manuals%20/COMS_Technical_Manual_2.2.pdf

PDD Element	Analysis
Assessment of Alternatives	An alternate proprietary application, the VistA Chemotherapy Manager (VCM), is available through Document Storage Systems (DSS), Inc. and is currently in use at some VA facilities. VCM is a licensed version of the software IntelliDose®, which was customized by DSS to integrate with VistA ⁹ . VCM offers many benefits, including automated dose calculations and modifications, treatment plans, and drug interaction alerts. VCM includes “a comprehensive database of standardized chemotherapy regimens” and facilitates scheduling of regimens. ^{10,11}

Table 6. Overview and Rationale

⁹ Savage, Sam. *DSS Licenses IntelliDose to Standardize VA Oncology Practices*. (2008, August 18). Retrieved January 10, 2017 from http://www.redorbit.com/news/health/1524807/dss_licenses_intellidose_to_standardize_va_oncology_practices/

¹⁰DSS, Inc. (2016). *Products: VistA Chemotherapy Manager*. Retrieved January 10, 2017 from <https://www.dssinc.com/products/integrated-clinical-products/vista-chemotherapy-manager/>

¹¹OHSU Clinical Informatics Wiki. *Veterans Health Information Systems and Technology Architecture (VistA): Vista Chemotherapy Manager (VCM)*. Retrieved January 10, 2017 from [http://clinfowiki.org/wiki/index.php/Veterans_Health_Information_Systems_and_Technology_Architecture_\(VistA\)#Vista_Chemotherapy_Manager_.28VCM.29](http://clinfowiki.org/wiki/index.php/Veterans_Health_Information_Systems_and_Technology_Architecture_(VistA)#Vista_Chemotherapy_Manager_.28VCM.29)

4.2. Fit to Requirements / Benefits

COMS is evaluated based on the fit to requirements as well as benefits offered by the candidate in Table 7.

PDD Element	Analysis
Fit to Requirements / Benefits	
Fit with Roadmap	Oncology enhancements are not included in the Roadmap. Oncology has been identified by stakeholders as a VistA 4 functionality vision gap.
Mapping to Feature Sets	This functionality is not included in the Roadmap.
Functional Fit with Requirements	<p>Stakeholders have identified a vision gap related to oncology and the need for functionality supporting chemotherapy regimens. Stakeholder discussions identified a number of detailed requirements:</p> <ol style="list-style-type: none"> 1. Need functionality allowing for the building and saving of chemotherapy regimens for ordering, processing, dispensing, and administration purposes. <ul style="list-style-type: none"> • COMS appears to satisfy this requirement. It allows for the creation, customization, and use of chemotherapy regimens. 2. Need functionality allowing chemotherapy regimens to be uploaded and downloaded from a shared library that is accessible by authorized users at all VA sites. <ul style="list-style-type: none"> • COMS appears to satisfy this requirement. According to the user manual, the Chemotherapy Template Order Source (CTOS) Module within COMS permits the oncology provider to download a chemotherapy regimen template from a central library and modify it for local use.¹² 3. Need oncology-related functionality providing clinical decision support (CDS) in the form of calculations, access to supporting primary and tertiary literature, order checks, patient preferences, etc. <ul style="list-style-type: none"> • COMS appears to partially satisfy this requirement. It allows users to auto-calculate treatment dosage, and includes the ability to generate alerts related to cumulative dose tracking and specific “intelligent data parameter checks.”¹³ There does not appear to be CDS functionality related to supporting literature.

¹² Department of Veterans Affairs. (2015, September). *Chemotherapy Order Management System (COMS): User Manual v. 2.5*. Retrieved January 10, 2017 from https://github.com/VHAINNOVATIONS/COMS/blob/master/COMS%20manuals%20/COMS_User_Manual_2.5.pdf

¹³ Department of Veterans Affairs. (2015, September). *Chemotherapy Order Management System (COMS): User Manual v. 2.5*. Retrieved January 10, 2017 from https://github.com/VHAINNOVATIONS/COMS/blob/master/COMS%20manuals%20/COMS_User_Manual_2.5.pdf

PDD Element	Analysis
	<p>4. Need oncology functionality / user interface to be efficiently accessible via existing VA software and not require separate sign-on.</p> <ul style="list-style-type: none"> The COMS application may not satisfy this requirement. COMS is a stand-alone application in which COMS administrators can designate users, assign roles, and set permissions to author templates. <p>5. Need oncology-related functionality that communicates bi-directionally with existing software used by providers, pharmacy, nursing, lab, surgery, and radiation such as CPRS, VistA, and Bar Code Medication Administration (BCMA).</p> <ul style="list-style-type: none"> COMS appears to partially satisfy this requirement. It is interoperable with VistA and CPRS, but does not interface directly with BCMA.
Technical / Architectural Fit with VistA	<p>COMS has a strong technical and architectural fit with VistA and CPRS. Code was developed through the VA Innovations program for use with VistA and CPRS, and has read/write interoperability with VistA. The web-based application utilizes an interface via Hypertext Preprocessor (PHP), Java Script, Node.js, Simple Object Access Protocol (SOAP), and Representational state transfer (REST) web services, which are all commonly used within VA. COMS is a standalone application which provides a new Graphical User Interface (GUI) front end interface to VistA data.</p>
Business Benefits to VA	<p>Due to limitations with the current system, the VHA OHI Patient Safety Workgroup rated oncology as having a high level of patient safety risk.¹⁴ COMS enhances the clinical environment and safety for oncology patients. Additionally, COMS supports compliance with Joint Commission standards. Expected advantages resulting from the implementation of COMS include increased efficiency, error reduction, effective knowledge transfer and sharing, useful clinical workflows, and reduced rework.</p>

Table 7. Analysis of Fit to Requirements / Benefits

¹⁴ Department of Veterans Affairs. (2015). *Chemotherapy Order Management System (COMS): Technical Manual Version 2.2*. Retrieved December 1, 2016 from https://github.com/VHAINNOVATIONS/COMS/blob/master/COMS%20manuals%20COMS_Technical_Manual_2.2.pdf

4.3. Costs

An overview of the costs associated with intake of COMS is presented in Table 8.

PDD Element	Analysis
Costs	
Size and Scope of Any Additional Development	COMS has not completed deployment in a production environment. It completed prototype phases and pilot deployment at two VA locations (Durham, NC VAMC and Puget Sound Health Care System). Testing identified necessary functionality fixes. Additional enhancements were identified which must be completed in a future release of the software.
Supported and / or Required / Missing Components	According to the Technical Review Board (TRB) assessment conducted in September 2015, COMS requires two servers at each facility. Sites may be able to utilize existing servers or may need to buy new ones to support this application. Additional network usage is required due to necessary communication between COMS and Vista. ¹⁵
Recommendations for Required or Missing Components	Additional development and testing effort is required before this candidate would be ready for production deployment. At one point, VA planned to include COMS as part of a software suite of oncology services within eHMP. ¹⁶ [REDACTED]
Level of Maturity and Support Requirements	The software is not ready for release as-is, and will require additional development and testing effort prior to deployment. According to the TRB review, new sustainability and maintenance/support funding may be required to support COMS once it is released, and it may require additional resources from Customer Product Support. ¹⁷ This code has been submitted to the OSEHRA technical journal, but has not been reviewed or certified by OSEHRA.

Table 8. Analysis of Costs

¹⁵ Winterton, S. and Thomas, R. Department of Veterans Affairs. *TRB Recommendation – Chemotherapy Order Management System Innovation Intake Product*. (2015, September). Unpublished document.

¹⁶ U.S. Department of Veterans Affairs. Veteran’s Health Administration. (2016). *VHA Innovation Program eBook: Quarterly Portfolio*. Retrieved January 10, 2017 from https://connectedcare.va.gov/sites/default/files/eBook_Innovation_Portfolio_FY16Q1_FINAL.pdf

¹⁷ Winterton, S. and Thomas, R. Department of Veterans Affairs. *TRB Recommendation – Chemotherapy Order Management System Innovation Intake Product*. (2015, September). Unpublished document.

4.4. Risks

The level of risk associated with intake of the COMS open source candidate is evaluated in Table 9.

PDD Element	Analysis
Risks	
Technical Risks	Moderate technical risk is associated with implementation of this code. The application has not been deployed to a production environment, and there are known functionality fixes needed that were identified during User Acceptance Testing. An additional technical risk exists due to deficiencies identified in the System Design Document (SDD). According to the TRB assessment conducted in September 2015, the COMS SDD does not include sufficient information regarding data technical fit. While it does include the RPCs utilized, the documentation does not include sufficient information regarding the data elements in the SQL Database used by the web application or the data elements accessed and/or updated from VistA. ¹⁸
Operational Risks	No operational risks associated with implementation of this code have been identified.
Programmatic Risks	Moderate programmatic risk is associated with implementation of this code. The application would require training, and would likely have a significant impact on the effected users. OSEHRA certification testing would need to be conducted. Based on lessons-learned from recent certification efforts, issues have been encountered related to FileMan versioning and security. COMS relies on FileMan to convert SQL-based data into MUMPS. While no Personally Identifiable Information (PII) and Protected Health information (PHI) is stored on the COMS servers, COMS displays PII/PHI. These factors may impact the OSEHRA certification timeline and result in required updates.
Licensing Implications and Code Quality	COMS is licensed as public domain vs. the preferred Apache 2.0 license. The application completed prototype phases and pilot deployment at two VA locations (Durham, NC VAMC and Puget Sound Health Care System). Testing identified necessary functionality fixes. Additional enhancements were identified which must be completed in a future release of the software.
Mitigation Strategies	Designating this effort as a funded project, and applying the requirements of the Veteran-focused Integration Process (VIP), will mitigate most of the implementation risks.

Table 9. Analysis of Risks

¹⁸ Winterton, S. and Thomas, R. Department of Veterans Affairs. *TRB Recommendation – Chemotherapy Order Management System Innovation Intake Product*. (2015, September). Unpublished document.

4.5. Epic Statements

To support funding and agile development requirements, Epic statements for this candidate are provided in Table 10. Formatting and categories are consistent with VA's Epic statement format.

Epic Category	Description
Candidate	Chemotherapy Ordering Management System (COMS)
For <target customers>	oncology care teams
Who <need or opportunity>	wish to efficiently and safely provide standardized, best practice chemotherapy treatment protocols to Veterans
the <solution>	Chemotherapy Ordering Management System (COMS)
Is <something – the “how”>	a web-based application
That <provides this value>	provides oncology teams with ordering, preparation, automatic checking, and documentation of chemotherapy treatments.
Unlike <the primary alternative, current solution or non-existing solution >	the current non-standard chemotherapy ordering practices in the VA which mix paper-based and computer-based practices
Our solution <does something better – the “why”>	improves clinical outcomes by decreasing the rate of medication errors, reducing costs, and fostering compliance and standardization of chemotherapy regimens VHA-wide while allowing for local facility policies for clinical preferences and processes.
Scope	
Success Criteria <how success will be measured, quantified if possible>	Ability to document chemotherapy regimens and improve patient safety.
In Scope <features that are in scope>	Development and implementation of an automated ordering and management process.
Out of Scope <items not needed for this epic>	N/A
Non-Functional Requirements <shall statements for usability, reliability, etc. if applicable>	Accessibility at all oncology unit clinical workstations.

Table 10. Epic Statements

5. Analysis of Apelon Distributed Terminology System (DTS)

5.1. Overview and Rationale

An overview of the DTS open source candidate is presented in Table 11.

PDD Element	Analysis
Overview	
Overview of Open Source Intake Candidate	<p>Apelon DTS is an open source terminology management platform. It allows organizations to manage and cross-reference standard terminologies, such as ICD-10, SNOMED CT, and LOINC, as well as local terminologies. The system provides the ability to view, query, and browse terminology versions across the terminology lifecycle. DTS supports data standardization and interoperability in EHR systems, Healthcare Information Exchanges (HIEs), and Clinical Decision Support (CDS) systems. Apelon, Inc. is a clinical informatics company focused on accelerating eHealth through data standardization and interoperability. DTS was developed by Apelon, and has been available as an open source product since 2007.</p>
Recommendation	
Recommendation	<p>The recommendation is to hold until the intake status of DTS as part of the Collaborative Terminology Tooling and Data Management (CTTDM) project is determined, then proceed with OSEHRA Certification and consideration for intake, if appropriate.</p>
Rationale	
Rationale / Summary of Business Case	<p>The primary benefit associated with intake of DTS is improved semantic interoperability, which is a VistA 4 Product Roadmap requirement that supports FY14 National Defense Authorization Act (NDAA) interoperability requirements.</p>
Assessment of Alternatives	<p>There are several alternative terminology server technologies. Ontoserver is a terminology server designed primarily to support SNOMED CT, as well as LOINC and custom taxonomies. It is available under license from the CSIRO's Australian eHealth Research Centre, but is not free for use outside Australia. Unlike Ontoserver, DTS is open source and available for use under the Apache 2.0 license. An additional alternative, the 3M Healthcare Data Dictionary (HDD) and Health Language, is a proprietary product that maintains multiple standard terminologies, including LOINC, ICD-9, ICD-10, SNOMED CT, RxNorm, and others. It offers structure and support for meaningful use, and is system agnostic. There is an open-source version of the product, HDD Access, which offers fewer features and less frequent update cycles. The development of</p>

PDD Element	Analysis
	<p>HDD Access was a joint initiative by the DoD, VA, and 3M. Unlike HDD Access, the full-featured version of DTS is available as an open-source product. According to the Requirements Specification Document (RSD) for CTTDM, the project scope included an analysis of these alternatives, as well as DTS.¹⁹</p> <p>The project SDD contains a statement indicating the CTTDM system is stand-alone, but shares an environment with DTS.²⁰</p>

Table 11. Overview and Rationale

¹⁹ Department of Veterans Affairs. *Collaborative Terminology Tooling and Data Management (CTT&DM) SERVER: Requirements Specification Document*. (2015, March). Unpublished document. Retrieved January 11, 2017 from [http://tspr.vista.med.va.gov/warboard/ProjectDocs/Collaborative_Terminology_Tooling_Data_Management/CTTDM_RSD_Server_Final_v1_04_29_15%20Final\(2\).pdf](http://tspr.vista.med.va.gov/warboard/ProjectDocs/Collaborative_Terminology_Tooling_Data_Management/CTTDM_RSD_Server_Final_v1_04_29_15%20Final(2).pdf)

²⁰ Department of Veterans Affairs. *Collaborative Terminology Tooling & Data Management Server: System Design Document*. (2015, March). Unpublished document. Retrieved January 11, 2017 from http://tspr.vista.med.va.gov/warboard/ProjectDocs/Collaborative_Terminology_Tooling_Data_Management/CTTDM_SDD_Server_Final_v1_06_02_2015%20Final.pdf

5.2. Fit to Requirements / Benefits

DTS is evaluated based on the fit to requirements as well as benefits offered by the candidate in Table 12.

PDD Element	Analysis
Fit to Requirements / Benefits	
Fit with Roadmap	DTS supports improved semantic interoperability, which is a VistA 4 Product Roadmap requirement.
Mapping to Feature Sets	This functionality supports the Interoperable EHR requirement for national standard terminology within Feature Set 3.
Functional Fit with Requirements	DTS supports FY14 NDAA interoperability requirements, which required a modernized VistA by December 31, 2016.
Technical / Architectural Fit with VistA	No significant technical or architectural constraints are anticipated. VA's Technical Reference Model (TRM) indicates that DTS is mature, stable, and well documented.
Business Benefits to VA	The primary benefit associated with intake of DTS is improved semantic interoperability, which is a VistA 4 Product Roadmap requirement that supports FY14 NDAA interoperability requirements.

Table 12. Analysis of Fit to Requirements / Benefits

5.3. Costs

An overview of the costs associated with intake of DTS is presented in Table 13.

PDD Element	Analysis
Costs	
Size and Scope of Any Additional Development	DTS is stable and mature, and ready for intake as-is. Additional development may be required to integrate it into a larger effort.
Supported and / or Required / Missing Components	No supported and/or required missing components have been identified.
Recommendations for Required or Missing Components	There are no constraints due to required or missing components.
Level of Maturity and Support Requirements	As noted in the TRM analysis, this product is considered mature technology. The code has not been reviewed or certified by OSEHRA.

Table 13. Analysis of Costs

5.4. Risks

The level of risk associated with intake of the DTS open source candidate is evaluated in Table 14.

PDD Element	Analysis
Risks	
Technical Risks	No technical risks associated with implementation of this code have been identified.
Operational Risks	No operational risks associated with implementation of this code have been identified.
Programmatic Risks	Further analysis regarding the use of DTS was likely completed as part of the CTTDM project; additional analysis is needed to identify the results of that analysis and determine the extent of use within VHA.
Licensing Implications and Code Quality	There are no licensing or copyright issues; DTS is licensed under the Apache 2.0 license. The code is viewed as high quality. TRM analysis indicates DTS is mature and stable, with no known security vulnerabilities.
Mitigation Strategies	Not applicable given the low level of risk.

Table 14. Analysis of Risks

5.5. Epic Statements

To support funding and agile development requirements, Epic statements for this candidate are provided in Table 15. Formatting and categories are consistent with VA's Epic statement format.

Epic Category	Description
Candidate	Apelon Distributed Terminology System (DTS)
For <target customers>	clinicians
Who <need or opportunity>	need to manage, cross reference and utilize medical terminologies
the <solution>	Distributed Terminology System (DTS)
Is <something – the “how”>	an open source terminology management platform
That <provides this value>	provides the ability to view, query, and browse across terminology versions across the terminology lifecycle.
Unlike <the primary alternative, current solution or non-existing solution >	the alternative, DTS, is an open-source product which is free for use in the United States
Our solution <does something better – the “why”>	supports FY14 NDAA interoperability requirements, is widely used, and supports Feature Set 3 requirements.
Scope	
Success Criteria <how success will be measured, quantified if possible>	provides appropriate semantic interoperability and terminology version management
In Scope <features that are in scope>	Terminology management and cross-reference across the terminology life cycle.
Out of Scope <items not needed for this epic>	N/A
Non-Functional Requirements <shall statements for usability, reliability, etc. if applicable>	N/A

Table 15. Epic Statements

6. OSS Candidate Review and Summary

A summary ranking of all OSS candidates recommended for intake to date are displayed in Table 16. The overall priority of the candidates is presented, with prioritization based on discussion with VA. Additionally, the candidates were rated on a high / medium / low scale in the Veteran Experience and Speed to Implement categories, with a high (3) score being the highest positive score possible.

The full candidate list was reviewed with VA, most recently on January 9, 2017, and prioritized based on factors such as overall need, technical and programmatic fit, potential to fill existing gaps, and interest from the target customer group. The candidates receiving the highest prioritization scores are:

- Complex Orders “Then” Conjunction
- Maternity Tracker
- RAPTOR

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 best scores in the Veteran Experience category are:

- MHE
- Maternity Tracker
- VANS
- Appointment Postcard Notification Letter v4.0

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 prioritized candidates receiving the best scores in the Speed to Implement category are:

- Complex Orders “Then” Conjunction
- XU Digital Signature

OSS Candidate	Priority	Impact to Veteran	Speed to Implement	Current Status
Q4 (current quarter)				
MHE	Pre-CBA	3	2	New intake recommendation
COMS	Pre-CBA	2	1	New intake recommendation
Apelon DTS	Pre-CBA	1	2	New intake recommendation, on hold
Q3 (CBA submitted October 31, 2016)				
Complex Orders "Then" Conjunction	1	2	3	OSEHRA certification in process; VA will push through maintenance team as a bug fix
Maternity Tracker	2	3	1	OSEHRA certification in process; will require funded project for intake
Enhanced Problem List	5	1	2	Awaiting VA business review
VANS	7	3	1	Awaiting VA business review
On-the-Fly Alerts	8	1	2	Awaiting VA business review
Patient Search Tool	Unprioritized	2	2	Awaiting VA business review
bbClear	Unprioritized	2	2	Awaiting VA business review
Q2 (CBA submitted August 2, 2016)				
RAPTOR	4	2	1	In VA intake queue; OSEHRA certification in process
Enhanced XML Utilities for VistA	Unprioritized	1	3	Awaiting IT response
HIEOS	Unprioritized	1	1	Awaiting VA business review
Perceptive Reach	Unprioritized	2	1	Portions of code have been extracted, remainder not ready for intake; candidate will not move forward at this time
Q1 (CBA submitted May 11, 2016)				
XU Digital Signature	3	1	3	Awaiting additional information
Appointment Postcard Notification Letter v4.0	6	3	2	VA proceeding with intake; awaiting funding
OpenInfobutton	Unprioritized	2	2	Active in eHMP; awaiting decision regarding version

Table 16. Summary of OSS Candidate Ranking

7. Next Steps

The results of the Gap Analysis, Open Source Software and Product Selection Criteria, SWOT Analysis, and Prioritization Description Document will be combined into the quarterly CBA package. The OSS candidates included in the CBA package will be discussed at the next In Progress Review. The next quarterly cycle will then 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

Additional information regarding the candidates is available through online resources. Links to these resources are provided in Table 17.

Description	Link
MHE	
GitHub Code Repository	https://github.com/VHAINNOVATIONS/Mental-Health-eScreening
Application Overview with Screen Shots	https://github.com/VHAINNOVATIONS/Mental-Health-eScreening/blob/master/eScreening%20overview-02-08-2015_w_screenshots.pdf
“Care and Feeding” of eScreening	https://github.com/VHAINNOVATIONS/Mental-Health-eScreening/blob/master/the%20care%20and%20feeding%20of%20eScreening020116.docx
VA Cloud Repository	https://vacloud.us/groups/20388/
TRM Product Description	http://www.va.gov/TRM/ToolPage.asp?tid=9272
Executive Summary	https://github.com/VHAINNOVATIONS/Mental-Health-eScreening/blob/master/Documentation/MHE_20388_Executive%20Summary_May2014.docx
Research Results Presented at SSWR Conference	https://sswr.confex.com/sswr/2015/webprogram/Paper24204.html
YouTube Demo Videos	https://www.youtube.com/channel/UCElo_OuGf3DUpHHeUqnt5RQ
CESAMH eScreening Video	https://www.youtube.com/channel/UCElo_OuGf3DUpHHeUqnt5RQ
COMS	
GitHub Code Repository	https://github.com/VHAINNOVATIONS/COMS
VA Cloud Repository	http://vacloud.us/groups/20355/
OSEHRA Technical Journal	http://code.osehra.org/journal/journal/view/?revisionId=483
Research Results Presented at AVAHO Conference	http://www.mdedge.com/fedprac/avaho/article/86963/oncology/chemotherapy-ordering-management-system
DTS	
Product Website	http://www.apelondts.org/
Apelon Website	http://www.apelon.com/solutions/terminology-tooling/dts
TRM Product Description	http://www.va.gov/TRM/ToolPage.asp?tid=6249

Table 17. 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	
Fit with Roadmap	Additional analysis.
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.
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 18. Cross Reference to Statement of Work