

## T4 TECHNICAL EVALUATION FORM – FIRM FIXED PRICE & TIME-AND-MATERIALS

T4 Number T4-0250	Task Title VistA Adaptive Maintenance	
Name of Offeror Offeror C		Date of Proposal August 17, 2017
<b><u>1. Technical Evaluation Criteria:</u></b> TECHNICAL: The evaluation of the technical proposal considered the following:  (1) Understanding of the Problem – The Technical Volume of the Task Execution Plan (TEP) was evaluated to determine the extent to which it demonstrates a clear understanding of all features involved in solving the problems and meeting and/or exceeding the requirements presented in the task and the extent to which uncertainties are identified and resolutions proposed.  (2) Feasibility of Approach –The Technical Volume was evaluated to determine the extent to which the proposed approach is workable and the end results achievable. The Technical Volume was evaluated to determine the level of confidence provided the Government with respect to the Offeror’s methods and approach in successfully meeting and/or exceeding the requirements in a timely manner.  <b><u>2. Proposal Summary:</u></b>  The Offeror provided a technical and management approach to create a Veteran Integrated Care Service (VICS) that surfaces and migrates clinical functionality and business logic from the VA’s Veterans Information System Technology Architecture (VistA) Electronic Health Record (EHR) into a data model-driven, Node Package Manager (NPM)-installable, Node.js-based national service with no legacy Massachusetts General Hospital Utility Multi-Programming System (MUMPS) code dependencies. The Offeror’s overall solution architecture was provided, showing the existing architecture, and their planned “to-be” architecture, and their interdependencies (Exhibit 3).  In addition to the overall architecture, the Offeror provided supporting descriptions of the specific components the Offeror will deliver including a Remote Procedure Calls (RPC) Router, RPC Emulator, Virtual Patient Record (VPR) Emulator, a Representational state transfer (REST) interface, a service interface, and the VICS service, delivered in the VA-specified Node.js-based, NPM-installable, JavaScript form with no MUMPS dependencies. The Offeror’s proposal included details on how they would develop each of the architectural components, why they are necessary, how they work, and features of each.  The proposal describes how the Offeror will utilize “RPC sniffing” to assess RPC traffic between the Computerized Patient Record System (CPRS) and VistA and the impact to the data store of the RPC execution sequences from which to develop Node.js-based Data models. Finally, the Offeror’s proposal outlines the staffing levels by labor category and PWS functional area for the entirety of the project as allocated between the prime and its subcontractors.  The Offeror has proposed to team with two subcontractors.		<b>Technical Rating:</b>  Outstanding

After review of the entire proposal, it was determined that the Offeror's approach contained the Significant Strengths detailed below. The remainder of the VistA Adaptive Maintenance requirements was adequately addressed.

### **3. Summary of Significant Strengths and Strengths:**

**Significant Strength #1: (TEP pp4-6 and 8 – 11, Sections 2.1-2.4 and 3.0, Request for Task Execution Plan (RTEP) B.1.1.a, B.1.1.b, B.1.1.c and B.1.2.c, PWS 5.2.1 & 5.2.2):** In its proposed approach for developing a service layer to emulate CPRS the Offeror provides a highly detailed explanation of its approach for creation of a "Native Model" that defines each VistA in standard JSON/Node.js, and which includes all classes, triggers and indexing for both the Patient Data Entry (PDE) functions and for the Outpatient Pharmacy Computerized Physician Order Entry (CPOE) applications functionality under the CPRS including prompt and scroll control. Defining and establishing a Common data model is one of the most complex tasks necessary for automatic translation between any VICS object and the native objects it defines, and this complexity is one of the main reasons the legacy VistA system cannot be ripped and replaced. The Offeror's approach to establish the VICS data model in the same data model format as the Common Native Model will ensure backward compatibility between FileMan resident data (i.e., in legacy, MUMPS-based format) and equivalent VICS data (i.e., in JSON/JavaScript format), supporting selective write-back to VistA of VICS data. The Offeror provides significant elaboration of the guidelines by which it will refine relevant classes of the Common Native Model and the importance of each of these elements in the standardization of VistA data, many of which are not covered by industry standards and likely makes up more than half of VistA data, and thus its complexity. The Offeror's approach demonstrates an understanding of the unique data synchronization problems to be addressed within each of the PDE functions of Vitals, Allergy, and Patient Problems (PWS 5.2.1) as well as those within the functions of CPOE applications. This significantly increases the Government's assurance that the Offeror's solution will facilitate automatic translation of VistA FileMan data to a standard VICS data model while also identifying what data is Veteran-specific and not standard to industry (e.g., VA-specific eligibility and service records, stop codes, health factors, service-related disabilities, billing, and disease registries) and which are VA-specific. The ability to differentiate these non-standard data from those applicable for standardization will enable VA to make decisions regarding its data storage policies as it migrates to a commercial EHR system. Additionally, the Offeror's approach to categorizing these unique, VA-specific data will enable VA to identify what data elements are not covered by commercial EHRs and/or commercial standards like Fast Healthcare Interoperability Resources, and thus helps to identify what can and cannot be migrated to a commercial system. It also highlights the data elements VA must maintain, for which it will require a revised data storage policy and process, so that it can keep critical Veteran's data available and accessible consistent with the lifetime records retention schedules applicable to the Veterans under VA's care without jeopardy. The Offeror's approach to creating a Common Native Model, coupled with its demonstrated expertise with the classes, triggers and indexing required to establish the data standardization (as well as the cases in which standardization is not possible) will significantly reduce the risk of schedule delay, inaccurate costing, underestimation of the effort needed for establishing the required VICS components, and decreases the potential requirement of data loss; all of which strongly increases the confidence in the Offeror's ability to deliver the requirements of the PWS.

**Significant Strength #2: (TEP pp6-7, RTEP B.1.1.c and B.1.2.c, PWS 5.2.1 and 5.2.2):** The Offeror provides a highly detailed approach to MUMPS RPC emulation in Javascript/Node.js. Offeror C's proposed approach begins with identifying all relevant RPCs by employing "RPC Sniffing" to capture sequences of RPC traffic between CPRS and VistA, and then employ "Snapshotting" to establish changes in the data store (FileMan) and process stack of VistA caused by these sequences. The Offeror's approach includes the development of Common Utility Services as elaborated in detail in Exhibit 6 spanning Change Events through Parameter Access and then porting and routing those elements through a VICS Interface available over REST using RPC Emulation. Identifying all relevant RPCs to the PDE and Pharmacy CPOE clinical functions and then making them a common utility via a national/common utility service is a huge undertaking, and has not been accomplished before. Tracing RPC functions has cyclical consequences, as the call of one RPC may have corresponding calls and implications to other applications. The Offeror's automation approach to identify the RPCs and then trace their consequences to the FileMan data store will facilitate the isolation of the output produced by these calls and facilitate the refinement of a Common Data Model from which to establish web-based, national services. Additionally, the Offeror provides significant detail of its approach to establish the national services and proposed implementing an RPC Router to seamlessly and securely redirect some CPRS RPCs to national services and pass the remainder on to the appropriate VistA. Model-backed, NPM-installable, Node.js-based national services will support relevant RPCs over their interfaces and synchronize with functionality still running in VistA. Routing RPCs will (1) introduce precise auditing of all VistA RPC traffic for the first time, while re-implementation will (2) remove vulnerabilities from all emulated RPCs and (3) enable elevated access control. End-to-end (4) encryption of RPC traffic will guard against traffic interception. This significantly increases the Government's assurance that the Offeror's solution will not only address the desired migration off of VistA MUMPS through emulation, but will resolve many of VistA's known security vulnerabilities, which has been a persistent, well-documented, but unresolved issue for years due to the complexity and dependencies of the RPCs in place today.

**Significant Strength #3: (TEP pp15-16, RTEP B.1.3, PWS 5.5.5):** The VistA Adaptive Maintenance project calls for an automated Test VistA and a series of domain-specific and cross-domain regression test suites. The Offeror proposes to create a regression test suite ("VistA Domain Test Suite") comprised primarily of "RPC Test Suites" that reproduce the ways CPRS and the Joint Legacy Viewer (JLV) use individual RPCs and sequences of RPCs. Offeror C proposed approach consists of creating the VistA Domain Test Suite before creating a VICS for a domain to formally capture that domain's behavior so as to mitigate the risk and reproduction of largely untested, pre-existing functionality. The Offeror notes an exception in which it will employ a combination of "terminal session," Application Programming Interface (API), and Health Level 7 v2 tests interleaved with RPC tests to reproduce a pharmacist's behavior to test how a pharmacist interacts with VistA, which, as the PWS points out, is neither through CPRS nor its RPCs. The Offeror's approach resolves the gaps that are left by the RPC test suites whose test results are displayed in the CPRS and JLV applications' graphical user interface (GUI) layer. It benefits VA by providing a means to test and demonstrate successful replication of pharmacists' multi-client user desktops and the transfer of pharmacist clinical and administrative data between RPCs – tests whose results can only be verified in the back-end of the system and which cannot be validated via display in

the CPRS/JLV GUIs. Offeror C also proposes to test not only the functionality to be reproduced in a VICS, but running over a VICS to test the effectiveness of that VICS as a reproduction (e.g., as emulating the MUMPS functionality in the new, web-based service). The Offeror's testing approach and application of dual use testing will provide the ability to demonstrate safe and effective deployment of a VICS that should mirror a production install early on and consistent with project goals to demonstrate "no legacy MUMPS code dependencies." By utilizing the same test suite that will first test the effectiveness of that VICS (e.g., VistA functionality in its current state or "As Is"), and then secondly, test it as a reproduction (e.g., emulation as a result of the Offeror's new development or "To Be"), the Dual Use testing approach will validate common behavior between the "As Is" and "To Be" and verify the output of the developed code consistent with the most significant requirement of the "To Be" delivered solution which is to have "no legacy MUMPS code dependencies." As separate tests for VistA function and its emulation could not ensure common behavior, the Offeror's proposed approach to "Dual Use" testing is a significant discriminator as it demonstrates a Test-Driven Development process and use of automation, which are recognized in industry as best practices for repeating tests of a very short development cycle. By executing these tests early on and incrementally through the development process, the Offeror's approach decreases Government risk early on in the project, rather than at the point of Initial Operating Capability (IOC) and production migration. Additionally, the Offeror's dual use testing approach reduces the risk of schedule delays or of delivering inappropriate components to production, which appreciably increases the likelihood of successful completion of all the PWS requirements and delivery of a solution with "no legacy MUMPS code dependencies" which will simplify VA's migration to a single, centralized commercial service and EHR.

**Significant Strength #4: (TEP pp3-4 & pp16-17, RTEP B.1.4 & B.1.5, PWS 5.6 & 5.7):** The success of National Deployment relies on a solution architecture that has addressed all the components and applications involved when a VICS replaces the functionality of a VistA domain. The Offeror depicts a Solution Architecture in Exhibit 3 comprised of components including the RPC Router, RPC Emulator, VPR Emulator, a REST interface, a service interface, and the VICS Service, which the Offeror indicates explicitly that it will develop in the project in Node.js-based, NPM-installable JavaScript and developed without MUMPS. The Offeror's solution architecture is one that has never before been conceived of for, or put into use by VA, and is one which thoroughly addresses all requirements for model development, RPC emulation, and VistA Synchronization following common patterns and maximizing the use of shared utilities to create national services. All prior attempts at VA for replicating RPC functionality have been through the use of RPC wrappers, which continue to create reliance on MUMPS code in contrast to the project's objectives. Offeror C's proposed VICS architecture completely contrasts all former VA attempts to address the complexity of the RPC problem and is one that specifies the common structure and environment for every VICS which facilitates a consistent approach to national deployment of these new and state-of-the-art services. The Offeror's approach to the IOC demonstration with pre-established success criteria significantly increases the assurance to VA that CPRS continues to operate unchanged after migration to VICS. The up-front development of the Offeror's complete solution architecture as part of its proposal, coupled with the successful results of IOC demonstration after development and delivery, greatly increases the Government's assurance that all required solution components have been identified and scoped within the Offeror's TEP, thus mitigating the potential for cost, schedule, or performance impacts. The Offeror's proposed use of an IOC

demonstration to verify successful execution of all the stated acceptance criteria will provide the Government assurance of the performance of the centralized, national services and backwards compatibility to show successful “dual use” and verification that there are no legacy MUMPS code dependencies. By providing a detailed and well-conceived system architecture, coupled with the identification of success criteria to demonstrate achievement of VA project goals regarding successful operation of the emulated VICS at IOC, the Offeror reduces the risk of delivering inappropriate components to production, which appreciably increases the likelihood of successful and timely completion of all PWS requirements and ease of VA’s migration to a single, centralized commercial service and EHR.

**4. Summary of Significant Weaknesses and Weaknesses:**

None identified.

**5. Summary of Deficiencies:**

None identified.

**6. Special Terms and Conditions / Deviation / Critical Assumptions stated in TEP:**

None identified.

**7. Evaluation Criteria:**

**a. Understanding of the Problem**

Overall, Offeror C demonstrates a thorough understanding of the requirements.

**b. Feasibility of Approach**

Overall, Offeror C demonstrates an approach that is considered highly feasible and is considered low risk.

**8. Rating:** Outstanding

Offeror C’s TEP meets or exceeds all of the Government’s requirements, demonstrates a thorough understanding of the problems, and is highly feasible (low risk).

**Evaluator Signature**

**Date**

**Rafael M. Richards, MD MS, Physician Informaticist, Veterans Health Administration**

*Contract Evaluation Form Rev 2.0 CAI 22 May 2009*