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Integration and Migration of U.S Armed Forces Health Longitudinal Technical Application and Air Force Medical Applications Virtualization System

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Abstract

This paper described and discussed the systems integration and design proposal for an actual project that was implemented by the United States Air Force. The material is neither classified nor proprietary and is available openly. Server virtualization, mobile device proliferation, and software-defined networks are now demanding new technologies, products, and architectural approaches, especially in the data center. This paper demonstrated the process of migrating US Armed Forces current client based software over to a virtualized solution. It incorporated those best practices that we have utilized in order to obtain maximized cooperation and success. The U.S. Air Force has decided that it wants to move its current client based electronic health record to a virtual server based program. Its reasons for change are many. The desired results will be reduced delay in program operation, fewer dropped sessions and greater accessibility to the system with alternative input devices and diagnostic equipment.

INTRODUCTION

The current iteration of the U.S. Air Forces electronic health record, known as Armed Forces Health Longitudinal Technical Application (AHLTA), is a client based system that relies on connections to a local cache server as well as internet connection to two primary data farms. Some locations have a standalone cache server

installation while most require networking into a host that can be as much as 600 miles away. When a facility has many end user devices vying for overhead in order to get information to one or more of these servers, we have experienced significant delays in data transmission as well as many instances of program stoppage and actual loss of entered data. Our goal is to provide ten small to large facilities with our virtualized solution and demonstrate that for a far less cost we can provide the facilities, clients and users with a more functional, reliable and cost effective way to utilize their current program rather than have to develop a new program which would take years where our solution takes as little as three weeks to install, integrate and migrate a small amount of data.

Requirements Specifications

Requirements for this project were obtained by direct interaction with the management and technical staffs in the US Air Force and their communities. We did an electronic survey of users and received an 85% return on our query. These responses were then tabulated and we had a meeting with the upper echelon to discuss the results and see how these results fit in with their ideas. Through several more meetings we distilled the specifications into three areas; must have, Should have if cost allows, Nice to have if will not affect production or cost. The survey was sent the following:

- All military, civilian and contract direct care providers.
- All military, civilian and contract nurses, clinical aides and nursing assistants.
- All military, civilian and contract ancillary services leads (Pharmacy, Lab, Radiology etc.)

Once the results were received and tabulated we discussed them with the following:

- Air Force Surgeon General's office- SG6
- Head Air Force Medical Services
- Head Air Force Medical Information Services
- CIO of the Air Force
- Deputy CIO of the Air Force

In order to achieve the requirements collected from the survey we were able to determine the hardware and software needed for the project (Teddy Batarro, 2011).

Measurable Functional Requirements

The client has required that we be able to provide statistical analysis of the performance of the AFMAVS solution. In order to do this we asked of them what metrics they wanted measured and they provided us with the following requirements. They wanted application response time on the following areas provided for both the client based system and AFMAVS:

- Encounter opening
- Check in
- Technician data entry
- Lab, X-ray and pharmacy order entry

- Shut down time.

The data for these metrics was obtained through an in place E2E software and reports provided at weekly intervals during the scheduled AFMAVS developer/client meetings.

Non-functional Measureable Requirements

The client also stipulated that as part of the installation process we would provide in briefs for the MTF's executive staff and chair side training to the providers that felt they needed it. We are required to provide training data to the command's Education and Training department for inclusion in the user's record.

For this project the following are assumed. The client wants 12 test sites installed in range of sizes of facilities. The client also requires that this project will have completed the installation and maintained metric gathering as required.

In support of this project the following must be considered. If the client continues to use the current system which has a high rate of fail over, lost connections, lost data and requires significantly more resources to operate. A delay repairing or replacing the system will only increase the cost and increase the possibility of major data loss.

In support of not proceeding with this project these things must be considered. There is the ever present potential, slight as it may be, of data loss, network compromise and failure of the solution to provide a cure or repair for the current state of the program. We feel that we have mitigated the possibility of these issues by thorough pre deployment testing in an environment utilizing live real time access to the current program. (DIACAP Concept of Operations, 2011)

Enterprise System Integration Analysis

Functionality- The solution must provide the same or better functionality than the current system. This is fairly easy to evaluate, have end users test the system. If they have less than optimal performance, adjustments can be made to increase the solutions ability.

Connectivity- The solution must provide exactly the same or better connectivity than the current system. Utilizing an in-place E2E system, reports that has the ability to drill down to the end user device, we can produce ARM reports that will give us quantifiable data concerning the time it takes each system to complete a specific function.

Continuity of Operation Plan- All clinics, the medical information systems department, major command network operations and the vendor must provide a Continuity of Operations Plan in the event there is a loss of function, for whatever reason.

We have determined that there are the following options for moving forward with this project:

1. We provide the solution and it performs as requested and promised. In this instance we have fulfilled our contract.

2. We provide the solution and greater than 85% compliance with the contract is met according to the client's imposed standards, again we have fulfilled our contract. We should in this instance however be prepared to provide further service in order to bring the system to full compliance to the degree possible if due to external factors (ie faulty infrastructure, defective equipment that cannot or will not be replaced by the client etc).
3. We are unable to attain the minimum acceptable standard of 85%. In this instance we are contractually required to continue to work on the solution until it attains a minimum of 85% compliance or is to the satisfaction of the client providing we can guarantee compliance in a minimum amount of time.

System Integration Implementation Plan

Our implementation plan takes into consideration the importance of timing the individual steps to ensure all of these elements come together at the right time to complete each site implementation successfully. Approximately 6-8 weeks prior to site implementation the contract site lead assembled available information and discussed the delivery plan during a Site Planning Meeting. The initial site call consist of introductions and basic information to prepare for the visit. The main piece of information provided to the MTF staff is a site survey that collects information and provides any preparatory tasks or requirements that will need local support. Upon arrival the team lead did an on-site assessment to include hardware delivered, computer room and rack space preparedness, as well as project awareness of staff and local communications support. When the site was satisfied that the implementation is stable and that appropriate knowledge transfer has occurred, the site lead worked with the local government lead to accomplish the AF 1261, Communications and Information Systems Acceptance Certificate. Post-delivery brings lessons learned and trip report documentation from the team lead to the PM and process analyst. Some of these functions will have minor overlap, but it is important to follow this cycle to ensure the flow of delivery is monitored and controlled to fit the individual nuances of the sites. (Smartronix, 2012)

Conclusion

This project has presented many challenges the least of which was actually implementing the project. We have travelled to 3 different sites implementing the project and we have learned that there cannot be too much interaction with the client while developing their solution. We also have found that the more you plan the better prepared you will be for those issues that do come up at the worst possible time. There is no substitute for documentation. It should be done as the steps are completed and whenever a change or fix initiated. Even fixes that do not work need to be documented so that time to fix is reduced. The biggest single thing that we have learned during this project is time management.

References

1. *Project Life Cycle*. (2010). Retrieved January 11, 2013, from CA.GOV Office of System Integration Best Practices: http://www.bestpractices.osi.ca.gov/sysacq/projectoffice.shtml
(2011). *DIACAP Concept of Operations.* Shalimar: Smartronix.

2. Smartronix. (2012). *AFMAVS Master SIP*.

3. Teddy Batarro. (2011). *AFMAVS C&A Boundry Devices Matrix.* Shalimar: Smartronix.