

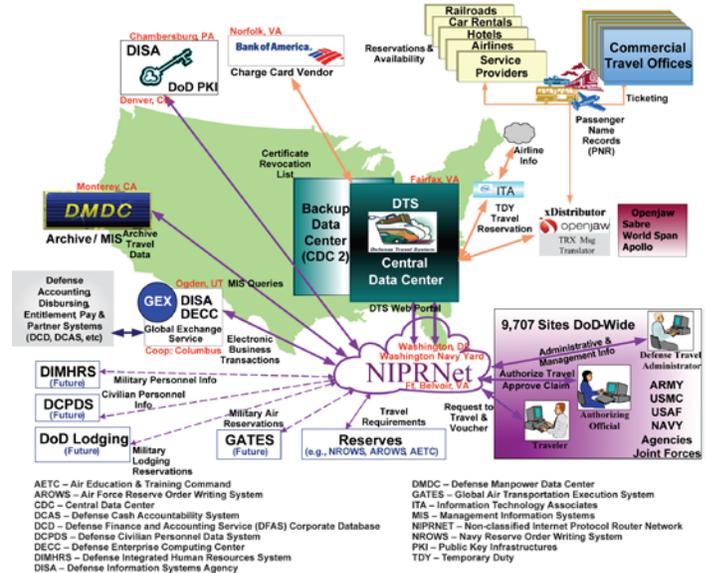
Defense Travel System (DTS)

Executive Summary

- For complex software systems such as the Defense Travel System (DTS), robust developmental testing and operational testing are critical to maintaining quality. Web-based systems with extensive live interfaces pose unique challenges for operational testing since the only full operational environment is the actual user system. Robust developmental testing and integrated developmental/operational testing must be used to mitigate this risk.
- The Army Test and Evaluation Command (ATEC) observed and analyzed developmental testing results for the combined Special Circumstances Travel (SCT)/Technical Refresh release that occurred in August 2009. The release converted proprietary software code to open-source Java programming language, incorporated the SCT functionality, and corrected prior deficiencies.
- ATEC verified that 100 percent of the test cases involving 29 SCT categories passed during the Program Management Office (PMO)-led procedural and regression testing. ATEC did not assess operational effectiveness and operational suitability since OT&E could not be conducted for this release.
- A Hewlett Packard test team acted as an independent observer to assess the contractor load testing and the overall performance of the release. The Hewlett Packard test team concluded that the load tests were consistent with the Hewlett Packard test methodology and that the contractor had mitigated all identified risks with the caveat that the test did not exercise external booking functions (airlines, hotels, etc.). The Hewlett Packard test team also concluded that modifications proposed and tested by the contractor exceeded performance expectations in terms of supported users.
- Based on these findings, the Defense Business Systems Acquisition Executive decided to place the release into production on August 8, 2009.
- While the new release performed significantly better than the 2008 Technical Refresh release, initial system performance was marginal at best. Many users had difficulty accessing the system or experienced very slow response times. Other users encountered functionality problems. After the contractor implemented several software patches, system performance gradually improved.

System

- DTS is a Major Automated Information System designed to automate and streamline the DoD travel process, support DoD travel requirements, and reduce the associated cost for the DoD. With DTS, travelers perform many of the administrative tasks themselves.



- DTS integrates commercial travel reservation systems and DoD accounting and disbursing systems using secure networks and procedures.
- There are two major functional blocks. Block 1 focuses on Temporary Duty (TDY) travel. Block 2, which is under development, focuses on military Permanent Duty Travel (PDT).
- The program manager is developing DTS in releases of increasing functionality. Each major TDY release was named after a U.S. president. The Monroe release (the final TDY presidential release) was deployed in 2006. DTS is continuing to use a spiral development strategy during FY09 and FY10 to develop the PDT functionality and the remaining TDY functionality that was not included in the presidential releases.

Mission

DoD travelers use DTS as a single interface to process their end-to-end travel requirements via an Internet connection or a Non-classified Internet Protocol Router Network connection using a Common Access Card with Public Key Infrastructure certificates. Travelers use a rule-based web portal to prepare travel authorizations and vouchers, to get the documentation approved, and to get reimbursed once their travel is completed.

Prime Contractor

- Northrop Grumman, Fairfax, Virginia

Activity

- ATEC conducted observations and analyses of the developmental testing of a combined SCT/Technical Refresh release from February through August 2009. The release converted proprietary software code to open-source Java programming language, incorporated the SCT functionality, and corrected prior deficiencies.
- After serious performance problems were identified in the 2008 Technical Refresh release, the PMO contracted the Hewlett Packard test to assist the PMO and the contractor in establishing better load testing practices and to verify the fixes. From July 14 - 23, 2009, the Hewlett Packard test team independently observed and assessed contractor load testing and the overall performance of the new SCT/Technical Refresh release. The Hewlett Packard test team concluded that the load tests were consistent with the Hewlett Packard test team methodology and that the contractor had mitigated all identified risks with the caveat that the test did not exercise external booking functions (airlines, hotels, etc.). The Hewlett Packard test team also concluded that modifications proposed and tested by the contractor exceeded performance expectations in terms of supported users.
- Based on these findings, the Defense Business Systems Acquisition Executive decided to place the release into production on August 8, 2009.

Assessment

- For complex software systems such as DTS, robust developmental testing and operational testing are critical to maintaining quality. Web-based systems with extensive live interfaces pose unique challenges for operational testing since the only full operational environment is the actual user system. Robust developmental testing and integrated developmental/operational testing must be used to mitigate this risk. DOT&E has engaged the PMO and ATEC to conduct a thorough review of the integrated test processes to improve system quality.
- For Major Automated Information Systems, operational testers usually conduct an OT&E on a production system at selected operational sites prior to a full deployment decision. Since DTS is a web-based system, this traditional approach is not practical. Any new DTS release placed on the enterprise web server for operational testing is in fact already fully deployed.
- To mitigate the risk of the combined SCT/Technical Refresh release, ATEC observed the developmental testing conducted by the PMO and the contractor, and analyzed the developmental testing results. The testing was conducted

in a test environment with much smaller capacity than the production environment using a prorated work load. ATEC verified that 100 percent of the test cases involving 29 SCT categories passed during the PMO-led procedural and regression testing. ATEC did not assess operational effectiveness and operational suitability since OT&E could not be conducted for this release. The independent Hewlett Packard test team also concluded that modifications proposed and tested by the contractor exceeded performance expectations in terms of supported users. These conclusions appeared to be reasonable based on the test results. Both ATEC and DOT&E concurred with the assessment.

- Once fielded, the new release performed significantly better than the 2008 Technical Refresh release, but system performance was marginal at best. Many users had difficulty accessing the system or experienced very slow response times. Other users encountered functionality problems. After the contractor implemented several software patches, system performance gradually improved. However, it is not known how many functionality problems were introduced as a result of the installed patches. DOT&E has engaged the PMO in an effort to determine the root causes of these performance and functionality problems in order to identify ways to improve system quality for future releases.

Recommendations

- Status of Previous Recommendations. While ATEC attempted to validate the Technical Refresh fixes as a part of the SCT release prior to fielding, a follow-on operational assessment of DTS has yet to be conducted.
- FY09 Recommendations.
 1. The PMO should implement a test environment that more accurately replicates actual user loading in order to better support the developmental testing and integrated developmental testing/operational testing for future releases.
 2. The PMO should either strengthen its developmental testing staff or continue the practice of hiring an independent verification and validation team to authenticate contractor developmental results.
 3. ATEC and the PMO should develop and execute more robust integrated developmental/operational testing for future releases.
 4. ATEC should conduct a follow-on operational assessment of DTS at selected operational sites as soon as practicable to determine operational effectiveness, suitability, and survivability of the system.