



# Memorandum

**To:** ISO Operations Committee  
**From:** Dan Yee, Acting Chief Information Officer & Vice President Information Services  
**CC:** ISO Board of Governors, ISO Officers  
**Date:** October 12, 2005  
**Re:** *Technology Status Report (Report covers period 09/03/05 through 10/12/05)*

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*This is a status report only. No Board action is required at this time.*

## EXECUTIVE SUMMARY

This memorandum provides an overview of and status report on certain key technology and capital projects. The projects are grouped by the following focus areas:

- Ensure Reliability of the Grid
- Technologies and Activities Supporting Market Redesign and **Technology Upgrade** Program (MRTU)
- Improve Operational Efficiencies
- Enhance Business Effectiveness
- Strengthen and be Responsive to External Relationships

Management has grouped the projects by focus area so that the Board and stakeholders can appreciate and understand how these projects relate to both the ISO's corporate goals as well as issues raised by stakeholders.

In addition to the progress of recent activities outlined below, Information Services highlights the following:

- **Sustain High Reliability and Availability of Key Information Systems – Q3 2005**  
**Availability Results:** 99.98%  
**Status:** EMS Ranger 100%; EMS ICCP 100%; PI 99.996%; RTMA/SCED 99.90%; BITS 100%; BBS (Settlements) 100%; ADS 99.995%; OASIS 100%; SA 99.99%; SI 99.97%; SLIC 99.993%; Vitria 100%; OOS/OOM/MOO 100%; CAISO Intranet Page 100%.  
\*Energy Management System (EMS); Plant Information (PI); Real-time Market Applications (RTMA); Security Constrained Economic Dispatch (SCED); Bill's Interchange Transaction Management System (BITS); Balance of Business Systems (BBS); Automated Dispatch System (ADS); Open Access Same-Time Information System (OASIS); Scheduling Applications (SA); Scheduling Infrastructure (SI); Scheduling and Logging for ISO in California Information System (SLIC); Out of Sequence/Out of Market/Must Offer Obligation (OOS/OOM/MOO)

## Ensure Reliability of the Grid

- **Energy Management System (EMS) 2004 Upgrade Project:** The Energy Management System (EMS) is a group of systems/subsystems and hardware that monitors, evaluates, and controls the power system lines, loads, and generators in the ISO Control Area. The EMS is the fundamental system that the ISO utilizes to operate the grid safely and reliably in real-time. In an effort to ensure that the EMS will meet future requirements and functionality, Management undertook a review of the existing EMS and identified the need for implementing the ISO's existing vendor's technology upgrade - ABB's EMS Network Manager 2004 release. Key functionalities associated with the upgrade include:
  - Performance improvements: There is a 10 second update for real-time EMS screens in the EMS User Interface. The Network Manager 2004 update would provide a minimum 2 second update.
  - SAS 70: The current EMS does not accommodate for the level of auditing and access controls currently being mandated. Security requirements would be addressed within the new release inclusive of auditing, authorization controls, and access controls.
  - Security requirements: This upgrade would provide single user sign on, audit records of user's actions, and administration of security update patches.
  - Alarm enhancements: In response to August 14, 2003 Eastern Blackout, NERC and WECC requirements include the usability of alarm systems, navigation, and usability of EMS systems. The business requirement is to have a system that would allow operators the ability to view what is pertinent and not overload them with lower priority views. This update would address the enhancements necessary to accommodate mandates.
  - Workstation expansion: The update would allow for an easy expansion of additional workstations. Moreover, the update would remove the necessity for an intermediate display server resulting in a simpler architecture.
  - New web interface: All on-line diagrams of the EMS system would be available for Operations Engineers via a new web interface. This would expand the Grid Operations views of our system to a much wider engineering user community.

**Status: Project on target (deadline extended).** Funding approval for the EMS 2004 Upgrade project was received at the September 15, 2004 ISO Board of Governors meeting. There have been several schedule impacts due to personnel changes, challenges with the vendor's resources, and working through variances regarding our onsite testing in our EMS Quality Assurance Systems. The project team is focused on several major issues that are compromising our ability to begin full functional testing. The largest issues concern our data acquisition system and display functionality. ABB is working on each issue with the effort to begin testing by October 10. Due to this, we are recalculating our implementation date to November 10, which may place us too close to the overall changes associated with our Control Area footprint change on December 1. Discussions with Operations and others may make a December 6 or 7 date more likely. Current planning is contingent on successful testing during the rest of October. Original target date: May 15, 2005. Revised target date: November 10, 2005.

- **Transmission Register Redesign:** The ISO's current Transmission Register (TR) application provides information on transmission equipment, specifically, the ratings of equipment. It is frequently used by Grid Operations and Planning to determine the most limiting element(s) on a transmission line. The initial TR application met these business requirements but has quickly become deficient in being able to meet the evolving business requirements of external PTO

administration and more robust reporting. Due to performance and usability issues, many users are no longer accessing this application. The administration of transmission equipment is problematic for PTO administrators due to limited functionality. Some PTO administrators have resorted to updating their organization's equipment details in a process that, at times, bypasses the front end of the TR application. This process, along with other "workarounds" to prevent security violations, costs the ISO in both Operations Engineering and Information Systems employee resources. The deficiencies that negatively affect the business today will become even more exasperated with the deployment of the Market Redesign & Technology Upgrade program in which the TR becomes even more critical to day-to-day operations. In 2004, the ISO performed a business analysis, gathering information from the primary PTOs such as SDGE, SCE, and PG&E. The result of that effort was presented to the participating PTOs and they were very pleased.

The primary benefits to be achieved include:

- A satisfied user community. Performance issues will no longer prevent PTOs from accessing the system.
- A system that provides accurate transmission equipment information to those who need it at the time they need it. Users will no longer have to rely on potentially outdated printed reports to determine ratings. Providing the most up to date and accurate transmission data will reduce the potential for grid reliability events.
- An open system that conforms to ISO application standards. This will lower maintenance costs and make it easier to expand its functionality, as business needs change. The TR can easily and openly share information with other ISO applications with minimal integration efforts.
- A more flexible system that allows the TR administrators to support business changes without requiring new development.
- A secure system.

**Status: Project on target.** The ISO Project Steering Committee approved funding for this project during their April 21, 2005 meeting. Business requirements completed. The team is currently working on the application design and development. Target date: June 30, 2006.

### **Technologies and Activities Supporting Market Redesign and *Technology Upgrade Program (MRTU)***

- **Vitria 4.3 Upgrade:** Vitria is the vendor that provides the ISO's Enterprise Application Integration (EAI) software solution that connects the Energy Management System (EMS) with the Market Operations systems, as well as other market related systems. Completing the upgrade will not only provide increased system reliability and availability, it will also support the new system integration requirements necessary for the MRTU program. The production upgrade of the existing software will be performed; fully complying with Vitria's maintenance agreement and obsolesces of their 3.X platform.

**Status: Project schedule revised to complete in Q1 2006.** Due to multiple projects delayed until after the summer, as well as the ISO realignment, this project has been prioritized and sequenced after the Ultra-High Database/Oracle 10g Upgrade Project based on the dependency with operational needs and the MRTU testing schedule. Target date: January 2006.

- **Market Redesign & Technology Upgrade (MRTU) Test Environment Project:** The management and support of the current ISO testing environments is decentralized with each of the different support and development groups maintaining their own processes, system configurations, and sets of documentation. While this approach has worked in a maintenance mode, it adds additional overhead, makes consistency difficult, and audit assessments more expensive. At the same time, specific tools and practices that improve, automate, and simplify the required processes cannot be leveraged easily across the environments. As the ISO continues to develop and implement the MRTU program, it has become apparent that the existing processes and procedures for managing the introduction of system changes into the environment will not scale adequately to support the major changes that are required for the MRTU program to succeed. The MRTU Test Environment Project will provide a standardized set of strategies, guidelines, and tactical artifacts that improve the processes and procedures for managing the ISO testing environments. Ultimately, the project will move the management and support of the MRTU test environments to a centrally managed and supported Enterprise Testing environment.

**Status: Project on target.** The Enterprise (End-to-End) Testing Project received ISO Board of Governors approval on September 8, 2005; project ramp up efforts are occurring. There are a number of interdependencies between MRTU testing environments and Enterprise testing environments to support changes to existing systems that will remain post-MRTU implementation. The project managers have been working together to ensure that schedule and improvement efforts remain in alignment. These two efforts will provide the ISO with a comprehensive solution that will support current testing operations as well as MRTU testing efforts.

As the MRTU systems development and vendor testing completes, many of the testing environments are being installed or scheduled to move onsite for system acceptance, integration, and end-to-end testing over the next year. A technical writer has joined the team to formalize the installation, deployment, and testing processes specific to the MRTU systems. These processes will continue to be aligned with existing processes for change and configuration management as well as those new processes being developed for the Enterprise Testing Project. The testing support tools continue to be built out supporting MRTU testing preparation as well as the test lab client stations.

Activities continue towards setup and documentation of MRTU testing environments for System Acceptance Testing (SAT), build out of shared Legacy test environments, and finalizing network configuration for testing infrastructure. IS Infrastructure Services teams (Engineering, Security, and Application Support) have completed conceptual and specific detailed designs for testing hardware, administration tools, network infrastructure, and server raised floor environments required to support current and MRTU testing infrastructure delivery. Original target date: December 15, 2005.

- **Legacy System Project:** Fundamental market changes proposed under MRTU (e.g.: integrated forward market, nodal prices, etc.) impact a number of the current systems operating at the ISO. There are many MRTU impacted information systems that are not included within the scope of the four major MRTU projects or within the IS support projects. Impacts of the MRTU program, the market rule changes and the organizational architectural

changes to existing ISO systems that are not addressed by the major MRTU project or IS support projects, will be managed within the scope of the Legacy System Project.

**Status: Project on target.** Legacy team developers and testers have completed the implementation of web services being deployed under Stage 1 Integration. Application Integration Testing is scheduled for next week (October 10, 2005). The Legacy team continues to work on further definition of the functional impacts to Legacy systems that are required by new MRTU market rules and systems. The team is meeting with all application IT support managers and application business unit owners to review the functional impacts to Legacy applications caused by MRTU. Upon completion, software modifications will be made in support of the new MRTU design. MRTU program milestone(s) and project schedule(s) will ultimately dictate completion.

- **Computer Infrastructure (System) Provisioning:** The current process for the installation, configuration, and maintenance of computer systems, databases, and applications is mostly a manual and decentralized effort as well as a labor and time intensive process due to the lack of automated provisioning tools. Until recently, the few tools available in the market were point solutions for a few computer infrastructure components and for specific technologies. However, mature enterprise-wide provisioning tools are now available in the market, which address previous shortcomings. The primary objective of this project is to deploy an automated provision tool to accomplish the following: a) reduce labor and time required for the deployment and upkeep of computer systems; b) ensure consistent computer infrastructure deployments across all technologies; c) track computer systems' configuration from a central location as well as automate detection of non-compliant configurations; d) centralize the auditing of computer systems through the automated recording of all configuration changes applied on any managed system; and e) increase the leveraging of ISO's computer assets for multiple projects through rapid redeployment of those assets. Initially, this tool will manage all new systems being introduced by the MRTU program as well as other existing critical systems impacted by MRTU.

**Status: Project on hold.** The ISO Project Steering Committee authorized the initiation of the planning phase for this project. Due to critical summer readiness projects and the organizational restructuring, this project was placed on hold. Provisioning capabilities have been included within the outsourcing contract currently under negotiation. Target date: December 31, 2005.

### **Improve Operational Efficiencies**

- **Enterprise Lightweight Directory "Access" Protocol (LDAP) Infrastructure Upgrade:** The ISO's current LDAP infrastructure was initially created to support the existing public-key infrastructure required to secure access for many of our external-facing market systems. Today, there is a need for several new systems to also utilize LDAP, including the Vitria upgrade; the Portal; and the new Identify, Policy, and Access Management (IPAM) Project. Analysis has shown that the current LDAP infrastructure cannot support the additional availability and load requirements of these new systems. The purpose of this project is to create a single new enterprise infrastructure for application and system security that will accommodate all current and foreseeable future business requirements. This eliminates the need for current and future systems to provide separate servers to host individual LDAPs,

centralizing access control and decreasing the maintenance required to manage multiple infrastructures.

**Status: Project pending.** The ISO Project Steering Committee approved funding for this project during their August 5, 2004 meeting. All hardware and software have been installed and configured in production, ready for use. New web applications are utilizing the new infrastructure as they come online. Legacy web applications can make use of the new LDAP infrastructure after they are all decommissioned from the existing ISO Internet network infrastructure and migrated to the Internet segment of the Next Generation Network (reference Internet Application Tree Network Project). The project team is currently testing migrations of existing web applications. Original target date: January 2005. Revised target date: November 30, 2005.

- **Database Server Replacement Project:** The database server infrastructure that currently supports several ISO mission critical applications (ADS, SLIC, BITS, SRS, and GRMMA) must be upgraded to support upcoming applications such as SIBR, Vitria, Portal, and others. The Information Services department has, over the last two years, redefined its systems availability architecture and server consolidation strategy. This architecture seeks to group like-applications with identical availability requirements onto a common set of infrastructure that can be leveraged for all projects in a cost-effective and reliable manner. The current database server infrastructure is not compliant with ISO's system availability architecture. To bring the database server infrastructure into compliance requires an additional database server in Alhambra. In addition, Information Services has defined a testing infrastructure architecture comprised of staging, testing, development, and sandbox environments to allow deployment teams to capture and address application and integration issues before they impact production. In order to reduce the risk of impacting production databases, it is imperative to test new updates in a staging environment where functional and performance testing can be performed before being deployed into a live production environment. The primary objective of this project is to replace the three older production database servers with four new production servers and two new staging servers to accomplish the following: a) replace five year old servers with new servers to reduce infrastructure costs for both current and future projects; b) add one additional server in Alhambra to support failover support to increase the availability of mission critical applications; c) expand the database server infrastructure to support new applications such as SIBR, Vitria, Portal, and others as identified; and d) add two new servers to support a staging environment for testing.

**Status: Project on hold.** The ISO Project Steering Committee approved funding for the Ultra-High Availability Database (UHDB) project on September 2, 2004. A change request to extend the project through June 2005 to utilize Oracle's latest database solutions, which will provide a savings of \$263,400.00 or approximately 30% of the approved budget, was approved in December 2004. The savings were used to upgrade the ultra-high availability database servers to support future databases such as SIBR, Vitria, Portal, and MasterFile – providing additional room for future growth. The ultra-high available production environment has been setup and configured. However, due to the risk associated with replacing the existing SLIC, ADS, BITS, and SRS database servers prior to summer operations, a decision was made to postpone the upgrade project until after the summer. The project has approximately two months of activity remaining, as defined within the original project plan. An updated plan will be developed. Original target date: December 31, 2004. Revised target date: Fall 2005.

## Enhance Business Effectiveness

- **Internet Application Tree (IAT) Network Project:** The Internet Application Tree (IAT) Network supports all ISO Internet web and application services such as Open Access Same-Time Information System (OASIS), Automated Dispatch System (ADS), Secondary Registration System (SRS), Scheduling and Logging for ISO in California (SLIC), and others. The IAT network is currently separated from the Next Generation Network (NGN) through security and network infrastructure. This separation results in increased operational complexity, increased hardware and software costs, and does not support future MRTU Portal requirements. The IAT decommission project presents an opportunity to: a) increase system reliability by reducing operational complexity; b) reduce hardware and software costs through better utilization of computer assets; and c) enables integration of existing Internet applications into the ISO Portal solution.

**Status: Project behind schedule.** The ISO Project Steering Committee approved funding for this project on June 15, 2004. A collaborative design effort between Network Services and Information Security was completed on July 15, 2004. Procurement of the security equipment was completed on August 31, 2004. Infrastructure installation, configuration, and testing were completed on October 29, 2004. Application migrations began on February 1, 2005 and will continue through the duration of the project. Eighty percent of IAT application migrations have completed. Resource constraints experienced during the organizational realignment slowed progress. However, the team is back on track with migration planning and execution for the remainder of the project. Original target date: May 31, 2005. Revised target date: December 15, 2005.

- **Oracle Employee Timecard Exception Report:** As a result of the settlement of the wage/hour case, Shift Workers at the California ISO are now classified as Non-Exempt employees, eligible for overtime earnings. Since November 2004, ISO Shift Workers have entered hours into an interim online system. All processing thereafter is manual, adding 60-70 person hours to every payroll. The manual process is prone to error and is acknowledged to be a corporate risk of high order. The existing Exception Report cannot feasibly be modified to meet the complex Shift Worker timekeeping requirements, except at prohibitive development and support costs, while adding even more risk to this critical corporate process. At the same time, Exempt and Non-Shift Non-Exempt employees use old and inadequate software that has long outlived its ability to adapt to our evolving business and needs to be replaced. We have an ideal opportunity to do that. This project is to replace all employee timekeeping and exception reporting with the Employee Self-Service (ESS) framework already familiar to ISO employees. There will be no new software or hardware costs; our approach is rather to extend the functionality and utility of the software and hardware we already use to support our corporate accounting and HR processes. If we do not undertake this project, Payroll and IS Payroll Support will continue to process payrolls with high risk for errors and working long hours against inflexible deadlines. If one or more steps of the manual processes are overlooked or are conducted inaccurately, the legal exposure and financial liability to the organization could be substantial.

**Status: Project on target.** The ISO Project Steering Committee approved funding for this project during their April 21, 2005 meeting. Factory Acceptance Testing (FAT) was completed in August 2005. The team recently completed a Ceridian (payroll vendor) payroll interface that translates raw time entry into payable hours based on rigorously defined Shift Worker

timekeeping rules; this in preparation for Site Acceptance Testing (SAT) scheduled for October. A detailed communications plan is in progress. Target date: December 26, 2005.

- **Enterprise (End-to-End) Testing Project:** In the demanding energy market, ISO must respond rapidly to change. Over the years, these changes have led to increasingly more complex software systems used to manage the grid. Validating changes to these software systems to ensure continued grid reliability has also become much more complex. The existing test environments, processes, and procedures do not scale adequately to support the large number of changes and interdependencies of software systems and scripts that have evolved. In addition, the management, support, and coordination of the current ISO testing processes and test environments are decentralized with a number of different groups maintaining their own processes, system configurations, and sets of documentation. In the past, system changes had minimal or no impact on other systems, allowing for less sophisticated testing tactics. However, with today's integrated systems, even small changes can have adverse impact on other systems' functionality and performance. Today's systems require a much more rigorous testing approach to ensure continued reliability.

In recognition of the current situation, ISO embarked on a three-phase approach to improvements. The initial phase, referred to as the Stabilization Phase, was completed in late August 2005. During this phase, ISO defined a testing coordinator, identified enterprise-wide roles and responsibilities within the current organization, and streamlined the testing processes. While this effort provided immediate results, long-term opportunities were identified and scoped out in two additional phases. Phase 2, the Finalization Phase, will provide adequate development and test environment infrastructure. In addition, Phase 2 will create a comprehensive test repository, define test data sets, standardize the test execution processes, and transition roles and responsibilities to a centralized testing team. Phase 3, the Optimization Phase, will create a "production-like" staging environment and ensure future sustainability at a reasonable staffing level.

**Status: Project on target.** Funding approval for the Enterprise (End-to-End) Testing project was received at the September 8, 2005 ISO Board of Governors meeting. Project roles and responsibilities have been communicated to the ISO resources that will be engaged in the project and the Business Unit liaisons have been assigned. The hardware procurement orders have been placed and the plan to receive the hardware has been reviewed with the Data Center Manager. Contract resources to augment the IS support groups are being deployed as well as additional Accenture support personnel. Target date: April 8, 2006.

### **Strengthen and be Responsive to External Relationships**

- **Website Redesign Project:** The ISO Internet Website is the organization's principle tool for communicating and disseminating information externally to market participants, stakeholders, regulatory and governmental entities, the media, and consumers. Website users have voiced substantial concerns about the volume of stale data on our website and the difficulty they encounter retrieving current and relevant information, including difficulties navigating the site and determining where to look for information. In 2004, several incremental improvements were made to the current site, and more specific information was gathered regarding the concerns identified above. In 2005, the ISO will concentrate on a redesign and deployment of a new website that addresses the most important stakeholder needs and the ISO's business requirements.

**Status: Project on target.** The scope of requirements that will be implemented in the first iteration of the project is complete. New branding is complete and has been approved by executive staff. Drafts of the new governance management plans, as well as requirements for agreed upon enhancements, have been created. Development is almost complete. Testing will begin in October. Target date: October 31, 2005.