



December 2, 2002

The Honorable Magalie Roman Salas
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

**Re: California Independent System Operator Corporation
Docket No. ER02-1656-000**

**Investigation of Wholesale Rates of Public Utility Sellers and Ancillary
Services in the Western Systems Coordinating Council
Docket No. EL01-68-017**

Dear Secretary Salas:

Pursuant to the "Notice of Technical Conference" issued by the Federal Energy Regulatory Commission on November 8, 2002 in the captioned proceeding, the California Independent System Operator ("ISO") hereby submits its presentation for the December 9, 2002 technical conference.

The ISO notes that, due to computer problems, the ISO initially was able to file only the presentation portion of this filing electronically with the Commission. The ISO is now submitting a complete filing including the presentation, the instant transmittal letter and certificate of service. The ISO requests that the Commission accept this filing effective December 2, 2002.

Thank you for your assistance in this matter.

Respectfully submitted,

Anthony J. Ivancovich
Counsel for The California Independent
System Operator Corporation



CAISO MD02 Implementation

FERC Technical Conference

December 9, 2002

MD02 PMO
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Why the Request for a Technical Conference?

- Shared commitment to implement markets that provide for safe, reliable and transparent operation of the transmission system to support the needs of consumers in California and the West
- Realization that we must work together to ensure a thoughtful and comprehensive implementation of these markets
- Timing of MD02 provided an opportunity to change internal operations and market systems
- Want to show why CAISO's comprehensive, integrated approach to implementing markets is necessary even though it extends timeframes ordered by FERC
- Describe why a fragmented approach, the CAISO's historical practice, is sub-optimal

The CAISO wants to make sure that FERC understands the context in which it is working and that the objectives of MD02 Implementation are aligned with what the Commission has put forth in the FERC's Market Design. In order to meet the objectives of both organizations, we need to look at the objectives in a comprehensive manner.



The CAISO has initiated a comprehensive implementation approach

- Instituted a disciplined, industry standard approach to the process
- Actively involved with four Stakeholder Working Groups created as an outcome of the August 2002 FERC Technical Conference
- Conducted three Joint Application Design sessions for Phase 1B with six planned for Phases 2 and 3
- CAISO's 'Fence and re-invest' strategy to re-architect system infrastructure

The CAISO has undertaken a comprehensive approach to the design that needs to be carried into implementation. This approach is a fundamental change in the way that the CAISO looks at system development, a manner which employs sound business practices consistent with those found in a mature organization.



Goals of Today's Presentation

- Communicate the comprehensive nature of what the CAISO is trying to do and the detrimental nature of fragmenting decisions and directives
- Work towards a comprehensive implementation approach for both FERC and CAISO
- Be conscious of timelines of stakeholders, FERC, CAISO, system development and western RTOs/ISOs
- Communicate the implications of FERC's decisions and timeframes for keeping the MD02 Implementation moving forward

FERC admonished the CAISO to present a comprehensive market redesign plan rather than to continue a piecemeal approach. The CAISO delivered a comprehensive design. In order to realize the intended outcome of this directive, we need to make sure that both the Commission and CAISO can craft an implementation plan that gets us to a workable market that meets the needs of California and the West.



Benefits of a Comprehensive Market Implementation

- Successful resolution to those market design problems under CAISO's control
- Cost-effective implementation of an infrastructure that is flexible and adjustable
- Faster implementation of a stable set of market rules
- Consistency with FERC's market design

We understand what issues are critical to California and the wholesale market and have incorporated those in our design. It is better, and less expensive in the long run, if we plan and design to these issues now, rather than find out something doesn't work and to have to change it later. The underlying system changes are designed to allow adaptation to standard design elements as they evolve and to improve the wholesale electricity market in California.



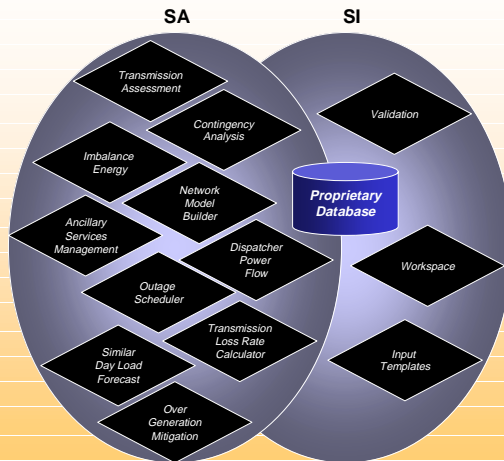
Today's Presentation

- Provide a description of the current state of CAISO's systems
- Demonstrate how CAISO's proposed approach is aligned with FERC's market design
- Discuss how CAISO's proposed approach parallels industry standards
- Describe the key factors driving CAISO's proposed timelines
- Review the key FERC decision points in the timeline

We will show you what we are dealing with today and why it needs to change. How both market design elements and underlying infrastructure are consistent with the Commission's vision. What the CAISO is doing to assure its implementation strategy is consistent with prudent commercial practices and why we need to proceed at the pace that we are proposing.



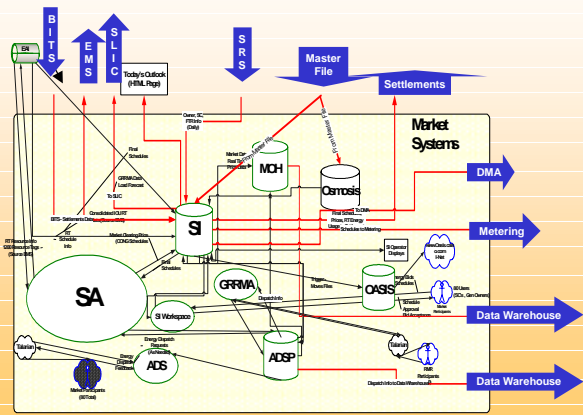
The current CAISO market systems



- Monolithic tightly coupled applications composed of multiple components with complex interactions
- Proprietary Database for data transfer prevents use of industry standard protocols and methodologies
- Market rule changes typically require extensive program modifications
- No ability to implement plug-and-play as interfaces and data are not exposed

Most of CAISO’s current market functions reside in a black box we call our Scheduling Application (SA). This black box is welded to the Scheduling Infrastructure (SI) making it difficult to change, or add to, the existing functionality. The design of these systems is monolithic (that is the complex interdependent elements of the systems make changes to one element impact others, there is a high degree of shared data elements and interfaces and data interactions are not open.) Monolithic design, although not inherently poor, is intended for systems that will not undergo significant change. In general, the systems development industry has evolved away from monolithic design toward open and component type design principles to drive flexibility and economies in system development and operations.

A complex aggregation of unique interfaces that have evolved over time



The result of this complexity ...

- requires that over 32 scripts be run every hour with approximately 12-15 manual “work-arounds” conducted on a daily basis
- necessitated, since 1999, approximately 337 software patches to the SI and SA systems
- cost the CAISO more than 80% of the original system cost to complete 72 change orders over the last four years

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Although SI and SA are the foundation CAISO market systems, they are but part of a complex web of systems and interfaces required to run the CAISO markets.

The current design derives much of its unseemly complexity from accommodations and additions over the years to core market functionality. For example, in addition to core market functionality, GRMMA is used to track RMR dispatches, and OSMOSIS is for out of sequence and out of market energy. The market systems also include a complex set for interfaces to non market systems required to operate the CAISO such as EMS, settlements, metering and data warehouse to name but a few. The broad scope and high complexity of this set of systems makes changes to them risky and very difficult.

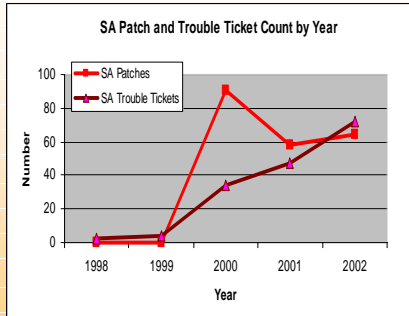
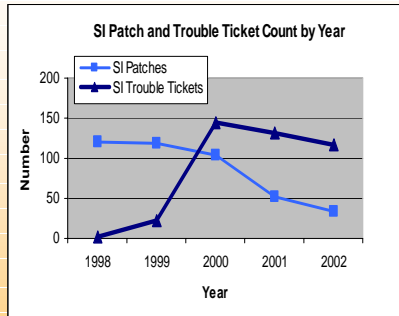
- The three main CAISO markets that use the SA for their operational functions are the: a) Day-ahead (DA), b) hour-ahead (HA) and c) RT markets. The SA system coordinates and consolidates all DA and HA energy schedules and optimizes AS bids and schedules into final schedules constrained by the CAISO grid reliability requirements. It also conducts the RT imbalance energy market by dispatching supplemental energy and AS resources in response to system imbalance energy (IE) requirements.

- Within these systems, over 32 scripts are run every hour with approximately 12-15 manual work-arounds (only within the market systems alone and doesn't include manual efforts in other departments such as settlements) conducted on a daily basis. This process is taxing and cumbersome and is making ongoing operations inefficient with an increased long term cost burden.

- Since 1999, approximately 337 software patches have been applied to the SI and SA systems. Software patches are used to fix problems and improve functionality as needed after the system has been delivered. In 2001 alone, there were over 141 trouble tickets associated with these two systems. Trouble tickets are created when system problems occur and the means for immediate resolution is not readily known. These trouble tickets resulted in system downtime averaging up to one hour per ticket.



The complexity is affecting system reliability

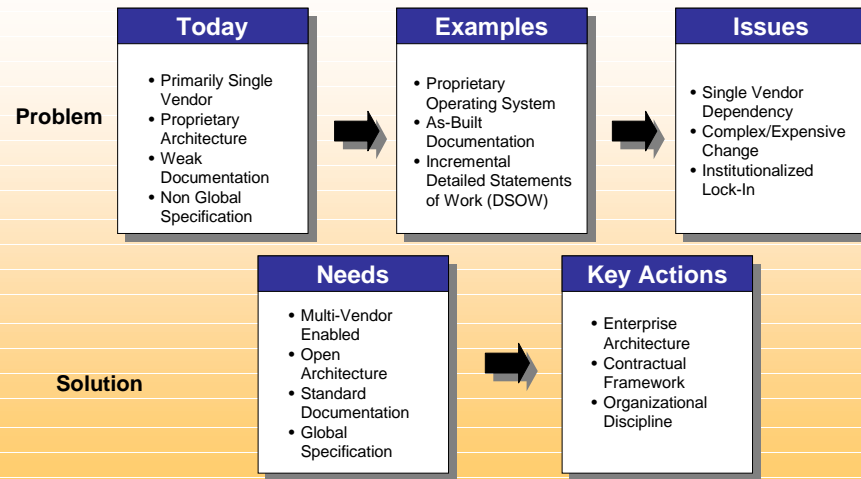


CAISO's market systems since start-up have undergone significant incremental change (patches). Many of these patches include multiple updates to functionality. Concurrently over this time period, the CAISO systems have experienced a substantive numbers of trouble tickets. Each of these trouble incidences have impacted business operations (severity 1's and 2's). The most recent experience with trouble tickets in the SA system shows an alarming trend.

Although the cause and effect relationship of patches to trouble tickets is not one to one (i.e. some patches were to change functionality as a result of market rule changes) the primary trend of trouble tickets is increasing and most certainly the result of the added complexity resulting from the incremental changes to the SI and SA systems.

Continued incremental changes to these systems will undoubtedly continue these undesirable trends.

The current technical and commercial environment is not sustainable



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The current technical and commercial environment of the CAISO systems is not sustainable in the future. CAISO’s primary system architecture is proprietary to a single vendor and inadequately documented. Specifications for changes to the systems since start up have primarily been incremental. This has resulted in the CASIO being dependent upon a single vendor. Changes to the current systems are complex and expensive. For all intents and purposes, the CAISO is “locked-in” into a technical environment and commercial framework which is not sustainable.

CAISO’s approach to MD02 is to implement MD02 functionality upon a technical environment which is multi-vendor enabled, open and well documented. The foundation for this implementation is an open and flexible enterprise architecture implemented under a vendor contractual framework and process discipline consistent with good systems implementation practices.



FERC's Market Design NOPR articulates a clear and prudent direction for ISO/RTO systems

- **Open** - Avoid "Black Box" software
- **Economical** - Reduce implementation cost ("reinventing the wheel")
- **Transparent** – The ability to understand what the software does
- **Testable** – The ability to understand and compare performance
- **Modular** – The ability to change software modules without changing other software. ...Modularity requires standard interfaces
- **Validated** - Instill confidence in the software through robust testing and validation
- **Competitive** - The Commission's goal is to assure that the best software is available for use in the nation's wholesale markets. This can best be attained by promoting competition among vendors, in a way that assures that no vendor comes to "own" a market niche or impose barriers to entry by new software companies with innovative analytical approaches

FERC under the SMD NOPR has outlined a clear set of system objectives for ISO/RTO implementation. These objectives are consistent with best practices in the systems development industry. For the most part CAISO's current systems do not meet these objectives. This situation is one of the key drivers to migrate CAISO functioning market systems to new operating platforms.



CAISO has aligned its MD02 implementation objectives with FERC's Market Design

FERC Market Design Characteristics

CAISO MD02 Objectives

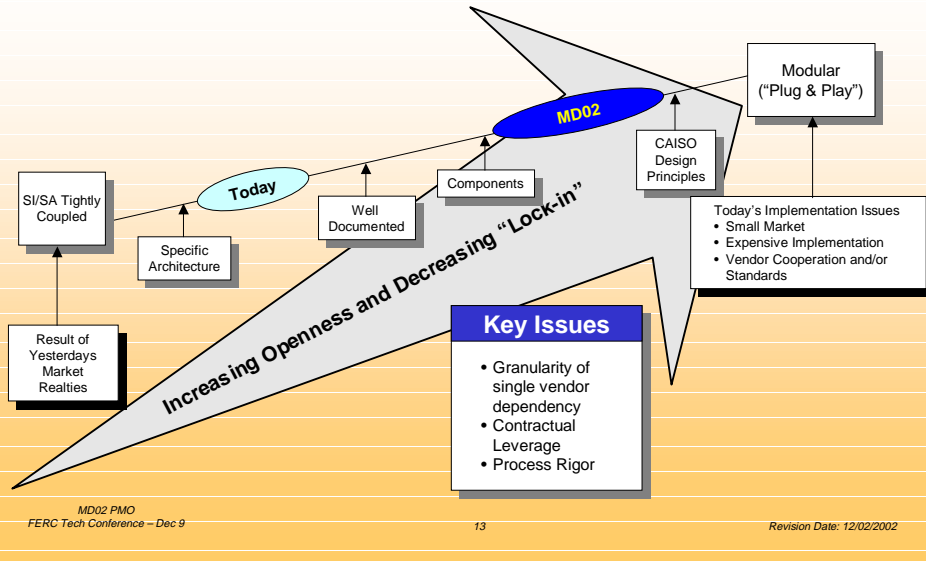
- Implement systems and processes pursuant to FERC Order (Scope, Time and Cost)
- Implement a repeatable, prudent and defensible process (Participative, Transparent and Repeatable)
- Minimize "Lock-in"
- Create "Open" Systems (Modular, Architected, Standardized and Documented)

| | Open | Economical | Transparent | Modular | Validated | Competitive |
|--|------|------------|-------------|---------|-----------|-------------|
| | | ☑ | | | ☑ | ☑ |
| | | ☑ | ☑ | | ☑ | |
| | ☑ | | | ☑ | | ☑ |
| | ☑ | | ☑ | ☑ | | |

The CAISO's objectives for the implementation of MD02 align closely with the objectives of SMD.



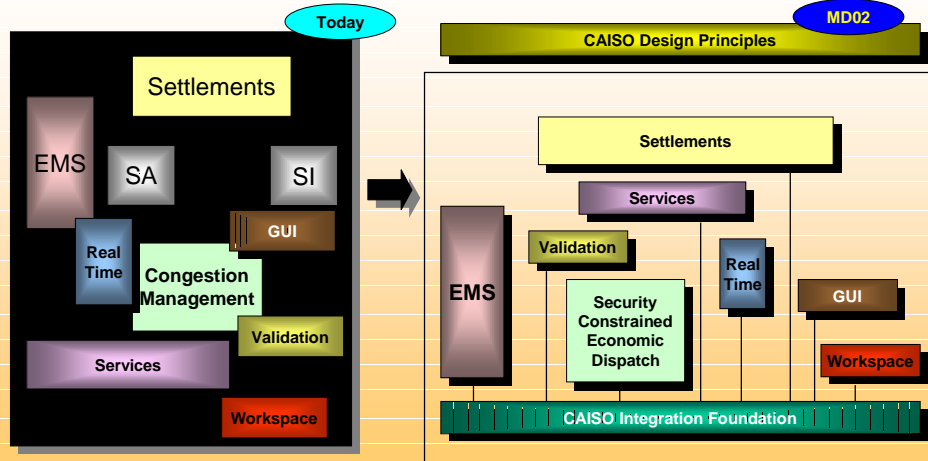
MD02 Implementation will significantly improve CAISO market systems



MD02 implementation as planned by the CAISO is aimed at significantly improving the foundation for CAISO’s systems. MD02 will move the architecture of CAISO systems from the current tightly coupled specific architecture of the SI and SA systems to a well documented component based architecture consistent with the direction of FERC and good systems development practice.

Our plan and objective is the same as the Commission’s, get to a point where we have an open and adaptable system within the context of a limited number of vendors. That is, be realistic about how open you need to be given that there are only a handful of suppliers and don’t design beyond the scope of the market.

MD02 Implementation realizes a standards based architecture



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The primary enabler for driving the complexity out of the current CAISO systems is the use of a standard integration approach. Under such an approach, a common and “open” integration architecture will be utilized that integrates the various component elements of the CAISO systems.

The end point of this approach is an elimination of the complex and closed “black-box” characteristic of the current systems. After MD02 is implemented, integration of the specific components required to operate the CAISO markets will be accomplished through an open and common interface framework that supports flexibility and maintainability.



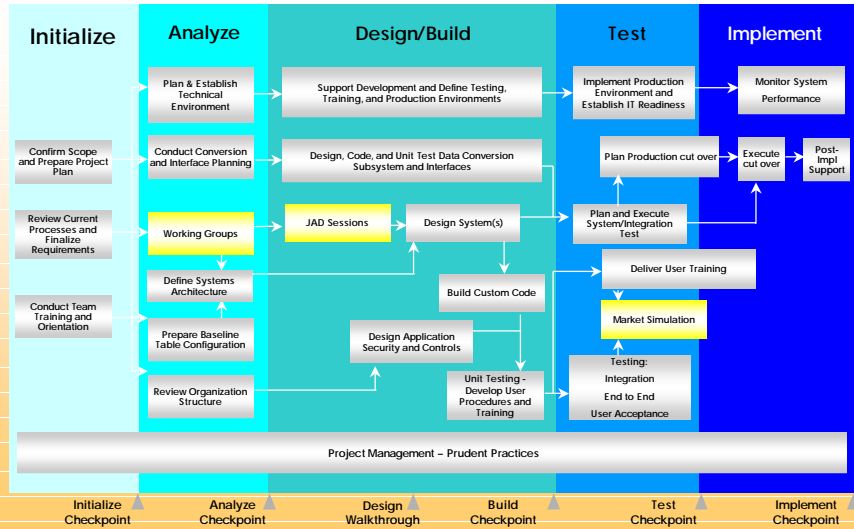
MD02 Implementation Embraces Best Practices

- Commercially Accepted Methodology (Conform to IEEE Standard)
- Program Management Office
- System Development Life Cycle (SDLC)
 - Provides a common understanding of approach to systems development
 - Establishes a standard terminology
 - Maps project deliverables to roles and responsibilities
 - Repeatable process to gather and document business requirements
 - Standardized approach to system documentation (through process models and templates)
 - Identify points for measuring project performance and efficiency
 - Links directly to project methodology
- Information Services Industry Accepted (and common) Practices and Technologies
 - Use of standard technologies
 - ✓ Extensible Markup Language (XML)
 - ✓ Standard commercial data base
 - ✓ Common Information Model (CIM)
 - Adoption of an open system and standards approach
- CAISO Enterprise Architecture – Design Principles
 - Scalability, Openness, Reusability, Availability, Securability, Manageability....

These represent the significant efforts that the CAISO has undertaken up to this point in the implementation phase of changing market functionality.



MD02 Implementation Applies a Robust Project Methodology



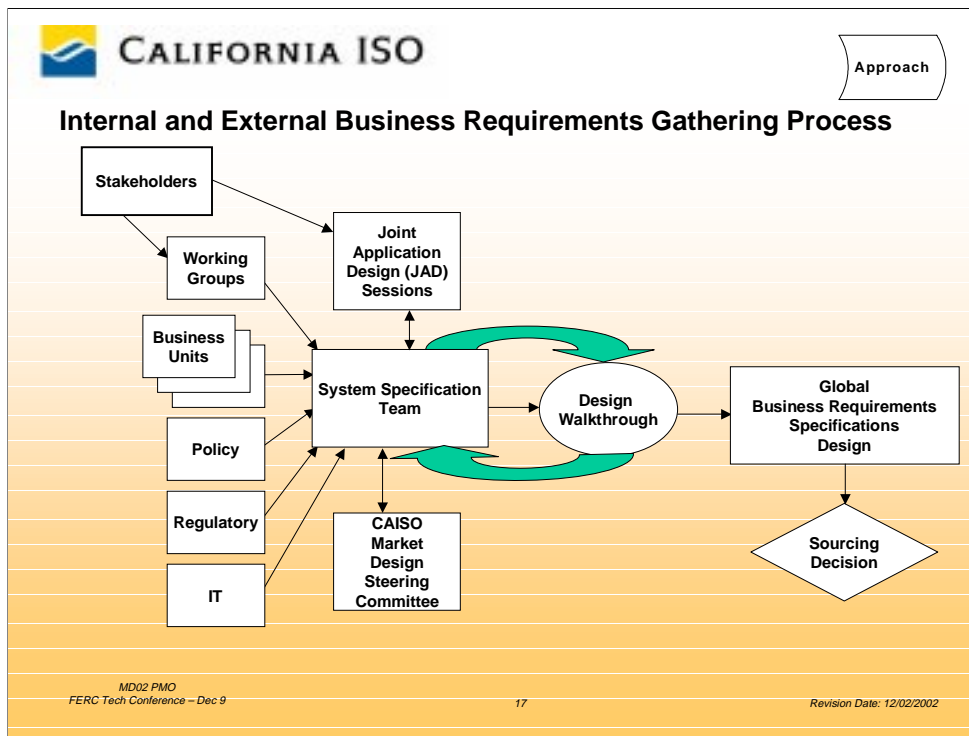
Software Requirements

A methodology such as this is required to ensure quality

Vendor control points

Proper and prudent testing – unit, system, integration, end to end, user acceptance

Adequate time for market simulation



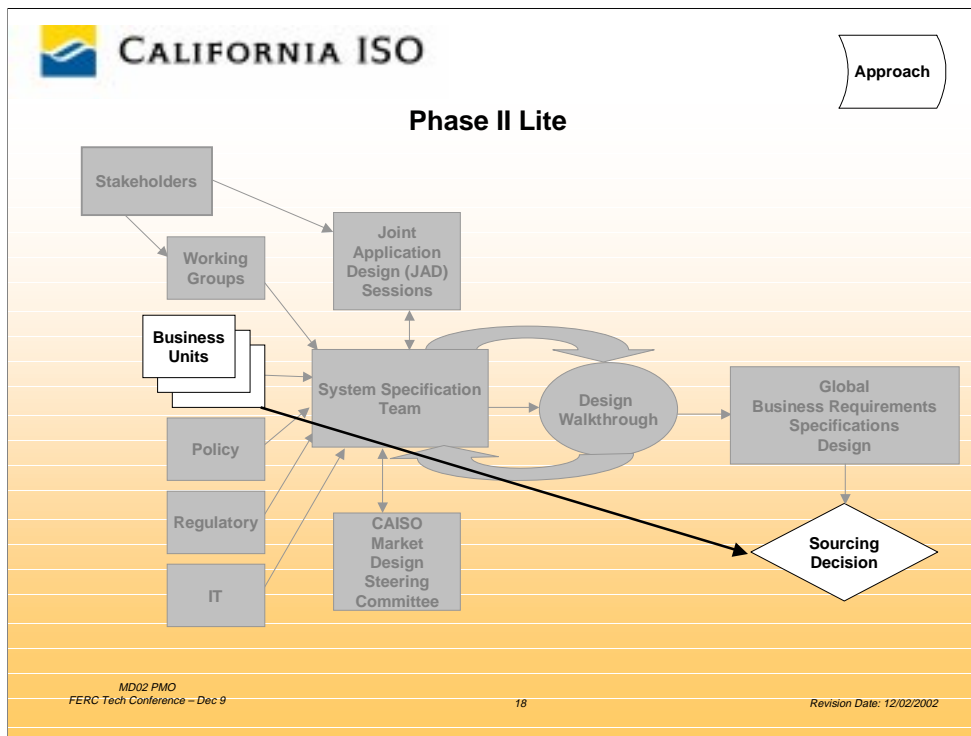
Describes the extensive stakeholder involvement through Working Groups (the what) and Joint Application Development (the how) process.

This business requirements gathering process needs to be done no matter how you source the solution.

Software Requirements

By fully engaging stakeholders and applying industry practices the final product will be more reliable and focused on the business needs.

While the Security Constrained Economic Dispatch for real-time imbalance energy did not receive significant stakeholder input in the conceptual design, significant rigor was added in developing the functional specifications. This included several joint application development (JAD) sessions with stakeholders, an iterative process within CAISO business units, a design walkthrough and the development of additional Tariff language to support the final design requirements prior to delivery to the vendor for coding (the actual software development). The result is that there is a well documented, broadly accepted market functionality that will be implemented by the CAISO pending successful development and testing phases.

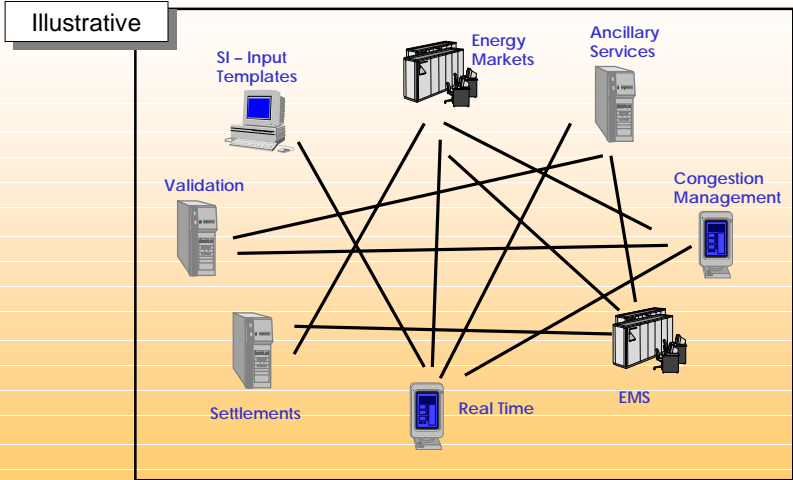


The Phase 2 “Lite” concept as originally proposed in the August FERC technical conference, was not considered in context of best practices for system development. As brought forward, it advanced directly from a business unit concept to a predestined sourcing decision. When the CAISO actually took a look at functional requirements and a reasoned approach, the implementation timeline increased substantially. When the requirements for both the market system and settlements changes were determined at a high level and adequate functional, integration and market testing were contemplated, it became apparent that to be implemented in a commercially prudent manner, it would require eight months or longer. This timeline is somewhat compressed as it did not contemplate significant stakeholder process in the design phase.

In addition to the extended implementation timeframe for adding Phase 2 “Lite” functionality on existing CAISO systems, the effort would have the undesirable impact of diverting scarce CAISO resources away from implementing the comprehensive MD02 Implementation changes. While MD02 Implementation activity would not cease, projected project timelines would invariably increase if critical resources were diverted to the Phase 2 “Lite” effort.



Improve Current Application Integration



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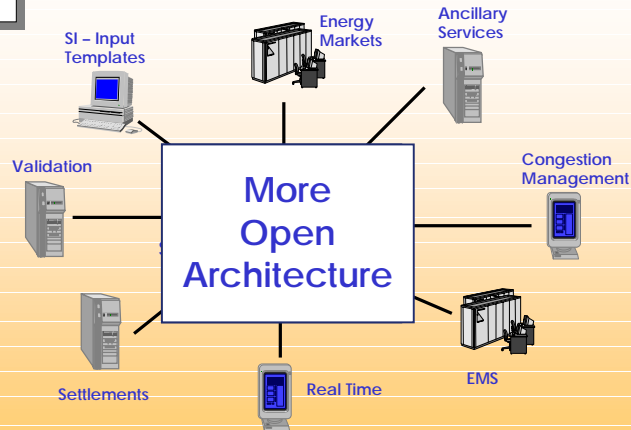
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Due to the way that the current systems evolved, we are required to establish a multitude of point to point connections from one application to another to tie critical functionality together.



Work Toward Providing an “Open” Architecture

Illustrative



- CAISO Enterprise Architecture – Design Principles
 - Scalability, Openness, Reusability, Availability, Securability, Manageability



MD02 Implementation Schedule is Driven by Key Factors

- MD02 system implementation is primarily “brown field”
- Adequate time for Testing and Market Simulation is critical for both CAISO systems and market participants
- Addition of new market functions requires integration of new interfaces and migration of retained interfaces
- Many elements have predecessor requirements that create scheduling dependencies (i.e., Congestion Revenue Rights are dependant on implementation of the Full Network Model portion of Locational Marginal Pricing)
- Aggressive acceleration of implementation will precipitate implementation trade offs
- Many new market functions will be implemented on new platforms

The MD02 Implementation provides for a totally new market structure for California. Within this context, planned timeframes are aggressive.

- MD02 system implementation is primarily “brown field” requiring CAISO staff to both support MD02 development and testing while sustaining current operations
- The degree of market change will necessitate appropriate time for market simulation to support market participant needs
- Development of new market functions requires significant modification to already complex system components. Development time lines are highly dependent on limited vendor and CAISO staff expertise reducing the opportunity for parallel development across multiple system functions
- Many elements have predecessor requirements which create scheduling dependencies (i.e. Outage Notification)
- Imprudently accelerating implementation will precipitate implementation trade offs which may compromise quality and jeopardize efforts to minimize on going cost of operations
- Many new market functions will be implemented on new platforms which provide for improved operations. However implementing these new platforms requires robust testing and appropriate transition management activities



MD02 Implementation Will Result in Significant Changes

| | | Phase 1A AMP Implementation | |
|---|---------------|--------------------------------|----|
| | | RT | FM |
| C u r r e n t C A I S O S y s t e m s | SI | | |
| | GUI | Modified | |
| | Validation | Modified | |
| | Workspace | Modified | |
| | SA | | |
| | Energy Market | Modified | |
| | Cong | | |
| | ASM | | |
| | AMP | New | |
| | Ref Price | New | |
| Outage Sched | | | |
| SDLF | | | |
| Settlements | | | |
| Master File | | | |
| Settlement | | | |
| Compliance | | | |
| DW | | | |
| Metering | | | |
| SLIC | | | |
| EMS | | | |
| ETCC | | | |
| FTR | | | |

| | | | |
|--------------------|----------|------------|--------------|
| Risk Rating | Moderate | Complex | Very Complex |
| Result | Modified | Eliminated | New |

Work on Phase 1A began on July 17, 2002 and was successfully implemented on October 30, 2002.

New components include:

- Automatic Mitigation Procedure (AMP)
- Reference Price as calculated by an independent entity (Potomac Economics)

Using the legend, both projects are 1) new and 2) complex projects to implement.

The other components include:

Balancing Energy Ex-Post Price (BEEP) is an existing market system that was modified during Phase 1A

The Scheduling Infrastructure components were modified and moderately complex.



MD02 Implementation Will Result in Significant Changes

| | | Phase 1A AMP Implementation | | Phase 1B Integrated RT Mkt | |
|---------------------------------|---------------------------|--------------------------------|----|-------------------------------|----|
| | | RT | FM | RT | FM |
| C u r r e n t | SI | | | | |
| | GUI | Modified | | Modified | |
| | Validation Workspace | Modified Modified | | Modified Modified | |
| C A I S O | SA | | | | |
| | Energy Market Cong | Modified | | Modified | |
| | ASM AMP Ref Price | New New | | | |
| | Outage Sched SDLF | | | New | |
| S y s t e m | Settlements | | | | |
| | Master File Settlement | | | Modified Modified | |
| | Compliance | | | New | |
| | DW | | | | |
| | Metering | | | | |

| | | | |
|--------------------|----------|------------|--------------|
| Risk Rating | Moderate | Complex | Very Complex |
| Result | Modified | Eliminated | New |

The CAISO is currently in the planning phase of of Phase 1B.

The BEEP (Imbalance Energy) modification is actually a migration to Security Constrained Economic Dispatch (SCED) on a new platform.

The outage scheduling functionality will allow the Scheduling Coordinator to update unit de-rates in real-time.



MD02 Implementation Will Result in Significant Changes

| | | Phase 1A AMP Implementation | | Phase 1B Integrated RT Mkt | | Phase 2 IFM | |
|---|--------------------|--------------------------------|----------|-------------------------------|----|----------------|----------|
| | | RT | FM | RT | FM | RT | FM |
| C u r r e n t C A I S O S y s t e m s | SI | | | | | | |
| | GUI | Modified | | Modified | | | Modified |
| | Validation | Modified | | Modified | | | Modified |
| | Workspace | Modified | | Modified | | | Modified |
| | SA | | | | | | |
| | Energy Market | Modified | | Modified | | | New |
| | Cong | | | | | | Modified |
| | ASM | | | | | | Modified |
| | AMP | New | | | | | New |
| | Ref Price | New | | | | | |
| | RUC | | | | | | New |
| | Outage Sched | | | New | | | |
| | SDLF | | | | | | New |
| | Settlements | | | | | | |
| | Master File | | | Modified | | | Modified |
| Settlement | | | Modified | | | Modified | |
| Compliance | | | New | | | | |
| DW | | | | | | New | |
| Metering | | | | | | | |
| SLIC | | | Modified | | | | |
| EMS | | | | | | | |
| ETCC | | | | | | | |
| FTR | | | | | | | |

| | | |
|--------------------|----------|-------------|
| Risk Rating | Complex | VeryComplex |
| Result | Modified | New |

Phase 2 Forward Market (FM) modifications associated with energy, CONG (congestion) and ASM (ancillary service procurement) are the core changes that add a forward energy market to the CAISO and optimize its integration with congestion and ancillary services. The new AMP (Automatic Mitigation Procedure) functionality is adding mitigation to forward market bids. Significant changes are required in settlements and the master-file to accommodate the added market functionality. The MTS (market transaction system) moves historical transaction data off of the production system to a data warehouse.



MD02 Implementation Will Result in Significant Changes

| | | Phase 1A AMP Implementation | | Phase 1B Integrated RT Mkt | | Phase 2 IFM | | Phase 3 LMP & FNM | |
|---------------------------------|--------------------|--------------------------------|----|-------------------------------|----|----------------|----------|----------------------|----------|
| | | RT | FM | RT | FM | RT | FM | RT | FM |
| C u r r e n t | SI | | | | | | | | |
| | GUI | Modified | | Modified | | | Modified | New | New |
| | Validation | Modified | | Modified | | | Modified | Modified | Modified |
| | Workspace | Modified | | Modified | | | Modified | New | New |
| | SA | | | | | | | | |
| | Energy Market | Modified | | Modified | | | New | | |
| | Cong | | | | | | Modified | | |
| | ASM | | | | | | Modified | | |
| | AMP | New | | | | | New | | |
| | Ref Price | New | | | | | | | |
| C A I S O | RUC | | | | | New | | | |
| | FNM/LMP | | | | | | | New | New |
| | Outage Sched | | | | | | | | |
| | SDLF | | | New | | | New | | |
| | Settlements | | | | | | | | |
| | Master File | | | Modified | | | Modified | Modified | New |
| | Settlement | | | Modified | | | Modified | Modified | Modified |
| | Compliance | | | New | | | | | |
| | DW | | | | | New | New | | |
| | Metering | | | | | | | | |
| S y s t e m s | SLIC | | | Modified | | | | | |
| | EMS | | | | | | | | |
| | ETCC | | | | | | | New | |
| | FTR | | | | | | | New | |
| | | | | | | | | | |

| | | | |
|--------------------|----------|------------|--------------|
| Risk Rating | Moderate | Complex | Very Complex |
| Result | Modified | Eliminated | New |

Phase 3 adds Locational Marginal Pricing derived from a Full Network Model to the preceding changes in Phase 1 and Phase 2, and requires changes to the existing transmission contract calculation (ETCC) in the form of transmission allocation contract optimization system (TCOS). The basis for settlements changes again and at this point it is desirable to actually redesign the Masterfile architecture.



MD02 Implementation Will Result in Significant Changes

| | | Phase 1A AMP Implementation | | Phase 1B Integrated RT Mkt | | Phase 2 IFM | | Phase 3 LMP & FNM | | |
|---|---------------|--------------------------------|----|-------------------------------|-----|----------------|-----|----------------------|--------------------|-----------------|
| | | RT | FM | RT | FM | RT | FM | RT | FM | |
| C u r r e n t C A I S O S y s t e m s | SI | | | | | | | | | MI |
| | GUI | Modified | | Modified | | Modified | | New | New | GUI |
| | Validation | Modified | | Modified | | Modified | | Modified | Modified | Validation |
| | Workspace | Modified | | Modified | | Modified | | New | New | Workspace |
| | SA | | | | | | | | | MA |
| | Energy Market | Modified | | Modified | | New | | | | SCED |
| | Cong | | | | | Modified | | | | Cong |
| | ASM | | | | | Modified | | | | AS |
| | AMP | New | | | | New | | | | AMP |
| | Ref Price | New | | | | | | | | Ref Price |
| RUC | | | | | New | | | | LMP | |
| FNM/LMP | | | | | | | New | New | FNM | |
| Outage Sched | | | | New | | | | | Outage Sched | |
| SDLF | | | | | | New | | | SDLF | |
| Settlements | | | | | | | | | Settlements | |
| Master File | | | | Modified | | Modified | | Modified | New | Master File |
| Settlement | | | | Modified | | Modified | | Modified | Modified | Settlement |
| Compliance | | | | New | | | | | | UDP |
| DW | | | | | | New | New | | | MTS |
| Metering | | | | | | | | | | Metering |
| SLIC | | | | Modified | | | | | | SLIC |
| EMS | | | | | | | | | | EMS |
| ETCC | | | | | | | | New | New | TCOS |
| FTR | | | | | | | | New | New | CRR |

| | | | |
|--------------------|----------|------------|--------------|
| Risk Rating | Moderate | Complex | Very Complex |
| Result | Modified | Eliminated | New |

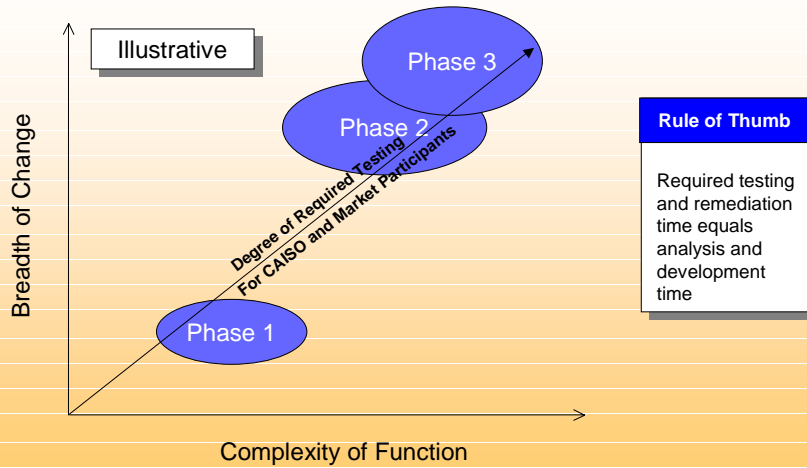
The new comprehensive market design is shown in the far right column as the ultimate outcome of MD02 Implementation.

- The market participant interface components (SI) will be completely revamped with improvements that benefit the market participants through an improved user interface (GUI) and CAISO system architecture through redesign table structures.
- Market applications (SA) will, by the end of the of the project, be completely revamped. SCED, FNM, LMP will have replaced or added to current market functionality and related market components will be pointed to new platforms and applied to new functionality (e.g.. AMP will be applied to forward markets)
- Settlement functionality will be significantly altered and the master file will be stand independent of the settlements system.
- The addition of the market transaction system (MTS) will provide a data warehouse for historical transaction data independent of the market production systems.
- While the metering and EMS functions will remain unchanged, interfaces with market, settlement and compliance systems will be updated to meet new standard integration protocols.
- The existing FTR functionality will be replaced with a CRR system to accommodate FNM and LMP functionality.
- TCOS is the method by which the CAISO assures that existing transmission contract rights (see slide 33) will be honored under the Full Network Model.

Overall, the MD02 Implementation is a highly complex project that affects every major system at the CAISO. The new market design must be viewed from a long term and comprehensive “end to end” perspective to ensure all the requirements of the new market are achieved.



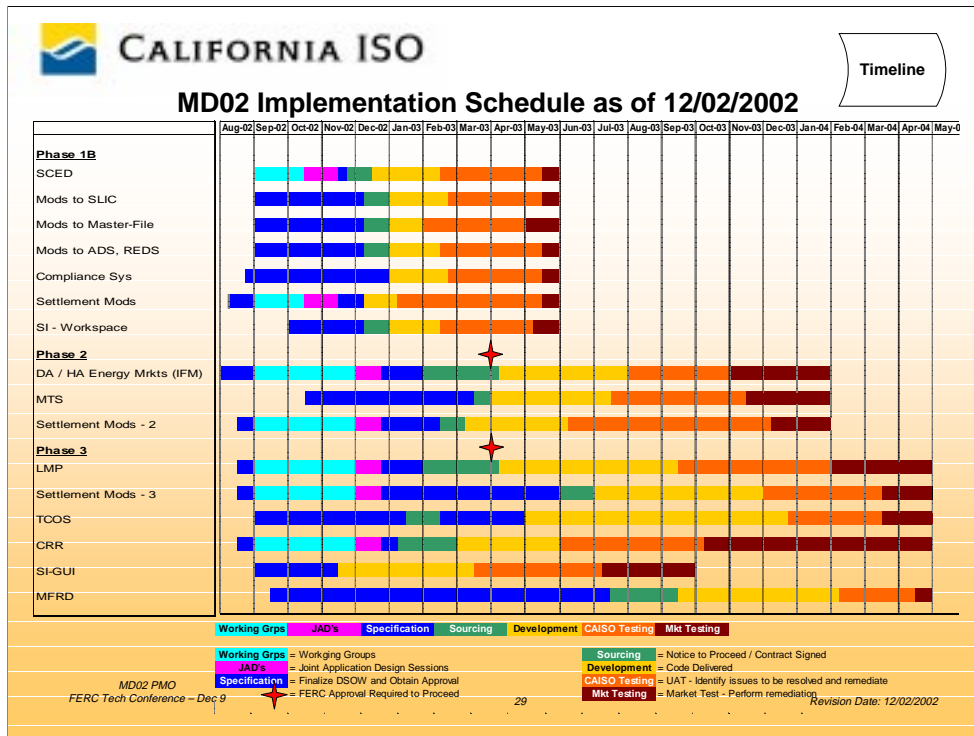
Complexity and breadth requires adequate testing including market simulation



The scope of change and critical interdependencies between operating systems and market functionality require a robust testing regime.

There must be adequate time for comprehensive testing and Market Simulation for both the CAISO and market participants.

Testing is critical to the success of the new market.



The current implementation timelines deviate from dates originally contemplated by CAISO and implementation dates ordered by FERC. These timeframes reflect employing commercially prudent practices in system development that were not contemplated in previous MD02 filings with the Commission. Furthermore, they are subject to change based on variables such as vendor responses to RFPs and the change management process employed in system development.

FERC Decision Point Criteria:

Phase 2 – The CAISO requires conceptual design authorization from FERC to implement an optimized forward market that includes energy, ancillary services and congestion with accompanying settlement schema for allocation of charges substantially as initially filed. Additionally the CAISO expects to make a 205 filing on residual unit commitment and other issues that emerge as a result of additional stakeholder input from working groups and JAD sessions.

Phase 3 – As with Phase 3, the CAISO requires both conceptual design authorization on its proposed implementation of LMP and the design of CRRs, along with any subsequent design changes that emerge as a result of ongoing stakeholder working group issue resolution and design changes that come from JAD sessions.

Currently the CASIO anticipates making these 205 filings in January 2003. FERC would then have before it all of the material necessary to make a comprehensive decision on the required elements for the implementation of both Phase 2 and Phase 3. If a decision on both the conceptual design and subsequent 205 filings were to be rendered on or before March 31, 2003, the CAISO could maintain this projected implementation timeline. A FERC order in March that deviates significantly from the proposed design, or a ruling after that date is likely to extend the projected timeline.



Summary

- CAISO approach is comprehensive and is consistent with FERC NOPR
- Fragmented decisions further complicate system development and significantly slows timeline for delivery
- Timeframe for MD02 Implementation is dependent on content and timing of FERC decisions

- Want to thank the FERC for putting on the Technical Conference and allowing the CAISO to present its current market systems, what the CAISO is moving towards and its timeline for completion.
- The CAISO understands the importance of working together with the FERC and Market Participants throughout the MD02 Implementation process.



Appendix



MD02 Implementation Projects

| | Description |
|---------------------------|--|
| Phase 1B | |
| SCED | Security Constrained Economic Dispatch |
| Mods to SLIC | Modifications to System Logging |
| Mods to Master-File | Master File Modifications |
| Mods to ADS, REDS | Modifications to Dispatching Systems |
| Compliance Sys | Compliance System Modifications |
| Settlement Mods | Settlements Modifications |
| SI - Workspace | Workspace enhancement for "Openness" |
| Phase 2 | |
| DA / HA Energy Mkts (IFM) | Day Ahead/Hour Ahead - Integrated Forward Market |
| MTS | Market Transaction System |
| Settlement Mods - 2 | Settlements Modifications |
| Phase 3 | |
| LMP | Locational Marginal Pricing |
| Settlement Mods - 3 | Settlements Modifications |
| TCOS | ETCC's |
| CRR | Congestion Revenue Rights |
| SI-GUI | SI Interface Modifications |
| MFRD | Master File Redesign |

Brief description of Project Names in the MD02 Implementation Schedule.



CAISO Existing Transmission Rights

Obligations Under Current Design Cause "Phantom Congestion"

- Rights Holders Assert that Physical Rights are Available in Real-time
- Currently Track 30 Separate Rights Holders on 19 (Bi-Directional) Branch Groups with over 25,000 MW of Obligations

Significant Impacts to Transmission Availability While Honoring ETCs on LMP

- Additional Rights need to be Modeled on Network
- Twice to Ten Times the Flow-Gates (Branch Groups) to Be Modeled Depending on Required Granularity
- System Effectively De-Rated by ETC Rights Prior to Calculating CRR and ATC Availability



Western Interconnection Activity

- **Seams Steering Group-Western Interconnection:**

- January 8, 2003 Filing:

- Codified Memorandum of Understanding

- Identification of seams issues and plans for resolution

- Working Groups:

- Market Monitoring

- Common Systems Interfaces

- Transmission Planning

- Congestion Management

- Pricing Reciprocity

- **WestConnect Implementation Date: 2007/2008**

- **RTOWest Implementation Date: 2006**



Implement Enterprise Architecture Design Principles

| Tenet/Design Principle | SMD |
|--|--|
| Modular - - Functionally partitioned into discrete, scalable, reusable modules consisting of isolated, self-contained functional elements | 352 - Modularity 358 - Standard Data Transfer |
| Configurable - the ability to reconfigure the component or service | 352 - Transparent 352 - Robust |
| Customizable - must be capable of being customized to business requirements | 352 - Transparent 352 - Robust |
| Open - allows programs to leverage commercially funded or developed technologies and thereby take increased advantage of competition | 352 - Transparent 353 - Open Process 358 - Best Modules from Vendor 354 - Common Data Model |
| Abstract - allow a service to leverage other services in a simplified manner while reducing cohesion | 352 - Transparent 354 - Common Data Model |
| Loosely Coupled - reduces the dependencies between other services, including, but are not related to transactions, security, conversational state, and location | 352 - Modularity 357 - Vendor Competition |
| Technologically neutral - does not favor a specific platform or invocation mechanism | 352 - Scalability 356 - Keep pace with market 357 - Vendor Competition |
| Encapsulated - gathering together of related pieces of data and the operations performed on that data | 355 - Standardization 358 - Standard Data Transfer |
| Secure - the ability to provide security to an application and its data | 352 - Security |
| Unique - can be discovered and utilized by other applications | 354 - Common Data Model |
| Instrumented - enables the state and performance related metrics of services to be monitored and allows services to managed | 355 - Standardization 354 - Common Data Model |

MD02 PMO
FERC Tech Conference – Dec 9

Modularity encapsulates all of the principles of *Component Based Development (CBD)* and *Service Oriented Environments (SOEs)*, two key features of the CAISO Application Architecture. CBD principles may be implemented in various technologies, but at the heart of CBD is the notion that if business services are designed as components, they are inherently reusable (as opposed to being designed for obsolescence).

Configurability describes the ability to reconfigure the component or service. Configurable components may be run in numerous physical topologies and be invoked in a number of manners. For example, a service will typically surface parameters related to how it connects to a database.

Applications must also be capable of being *customized* to business requirements. In the past, packaged applications often made a virtue of requiring that the business align its functions with the package. Today, this is recognized as inappropriate and usually impossible, because of the timescale of business change. Although numerous companies might use similar services, there will always be the need to implement business logic according to individual specifications.

An *open system* is a collection of interacting software, hardware, and human components that:

- Is designed to satisfy stated needs
- Has component interface specifications that are: Fully-defined, Available to the public and Maintained through group consensus
- Is implemented such that its components conform to the interface specifications

Abstraction is “the expression of a quality apart from a particular object or specific embodiment.” Abstraction is related to encapsulation: it is a mechanism for reducing complexity and increasing efficiency. Abstraction also tends to have the effect of reducing cohesion between services. Abstraction will often define a simplified interface that wraps a much more complex set of interfaces. For example, a complex set of relational tables in a Relational Database Management System (RDBMS) might be surfaced using a view; or the functionality of a messaging product might be surfaced using an abstracted interface. Abstractions allow a service to leverage other services in a simplified manner while reducing cohesion.

A *loosely coupled* system is one that reduces the dependencies between services. These dependencies include, but are not related to, transactions, security, conversational state, and location. The less context information that is shared between them, the more loosely coupled are the services.

Services that are *technologically neutral* do not favor a specific platform or invocation mechanism.

Security is about controlling access to a variety of resources, such as application components, data, and hardware.

Encapsulation is the gathering of related pieces of data together with the operations performed on that data. The essential characteristic of a service is this grouping of data and methods (operations) into a “black box” that only surfaces the service’s business functionality. Thus, the interface to the service provides access to its business logic without the necessity for understanding the internals of the implementation. For example, it is irrelevant whether a data store is implemented in a database or in memory.

Unique services provide functionality that is not available from other services. Services should rely on other services as applicable for providing needed functionality. Common examples are services that in turn use the services of an RDBMS, Light Weight Directory Access Protocol (LDAP), or Domain Name Server (DNS). Services should also be designed with an understanding that they can and will be reused in any number of unforeseen manners.

Services must be *instrumented* to be globally manageable in order to provide reliable and maintainable solutions. As critical business functionality is accomplished by utilizing services, it is imperative that the services be proactively managed, just as hardware and network infrastructure are typically managed. As services are reused across system boundaries, this management functionality must also span system support groups.

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in the above-captioned docket.

Dated at Folsom, California, on this 2nd day of December, 2002.

Anthony J. Ivancovich