CALIFORNIA ISO

California Independent
System Operator

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

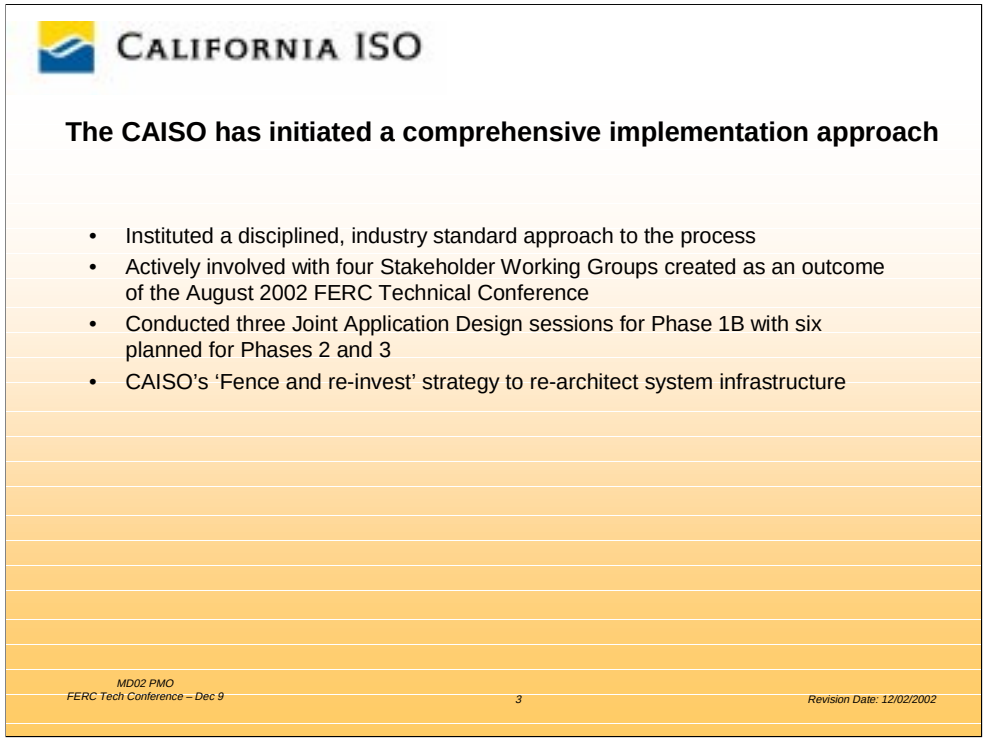
CALIFORNIA ISO

CAISO MD02 Implementation

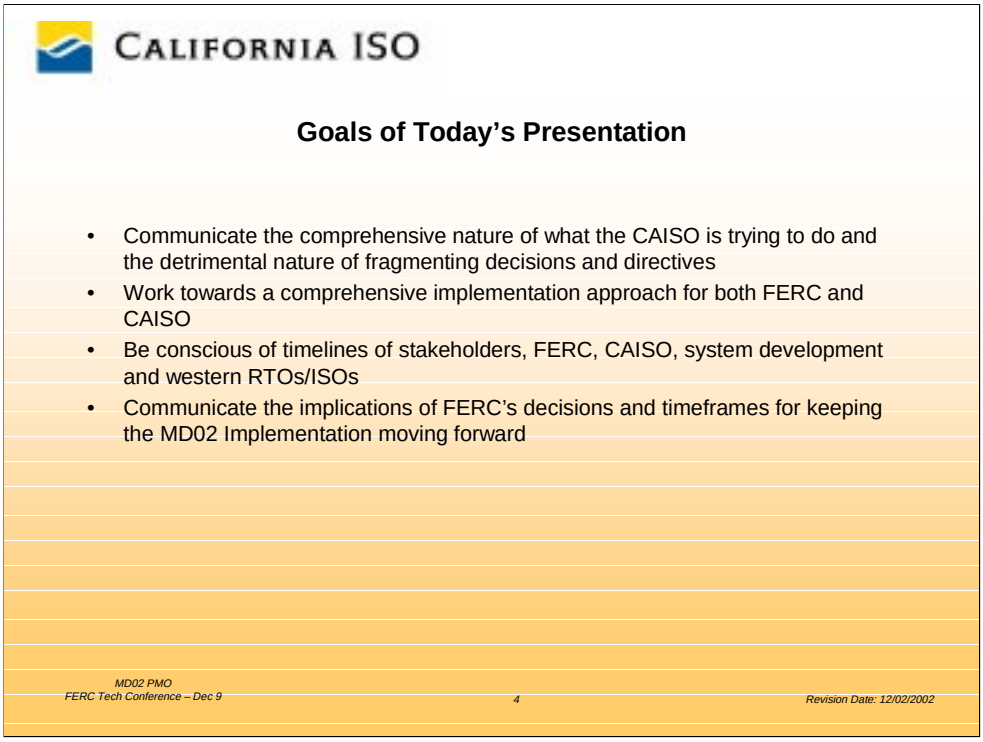
FERC Technical Conference

December 9, 2002

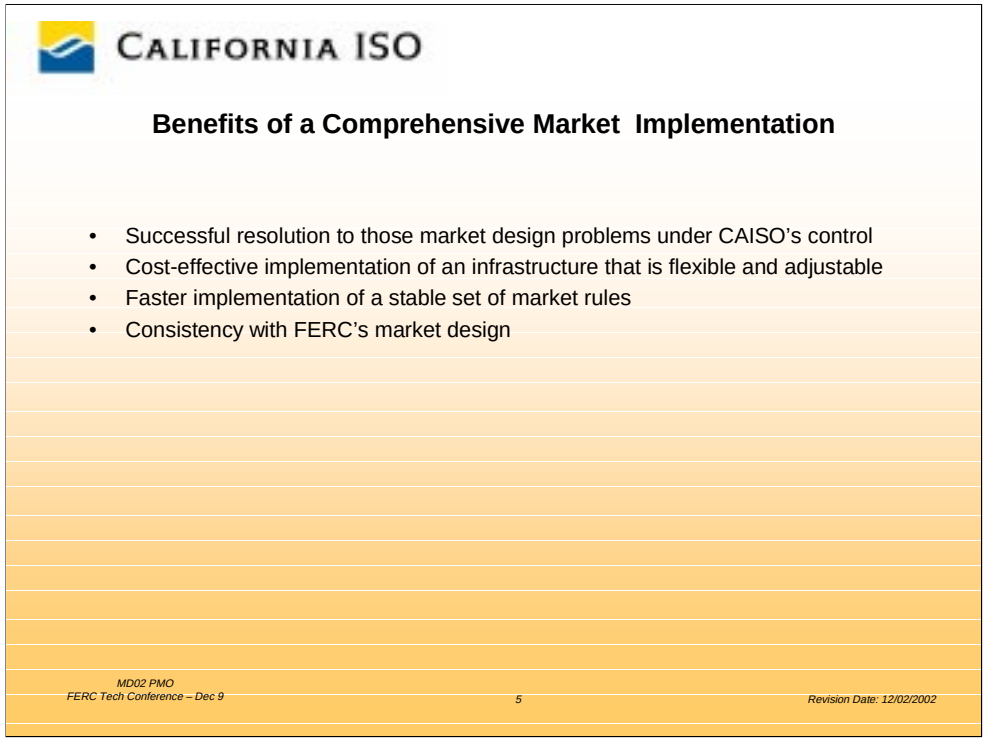
The CAISO wants to make sure that FERC understands the context in which it is working and that the objectives of MD02 Implementation are aligned with what the Commission has put forth in the FERC's Market Design. In order to meet the objectives of both organizations, we need to look at the objectives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



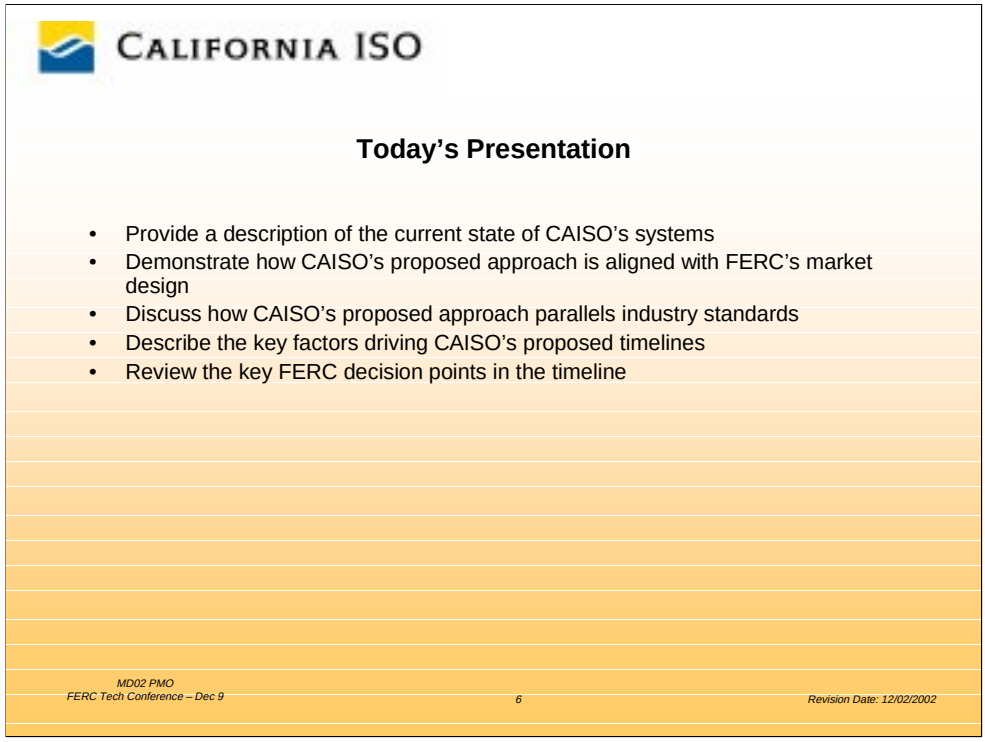
The CAISO has undertaken a comprehensive approach to the design that needs to be carried into implementation. This approach is a fundamental change in the way that the CAISO looks at system development, a manner which employs sound business practices consistent with those found in a mature organization.



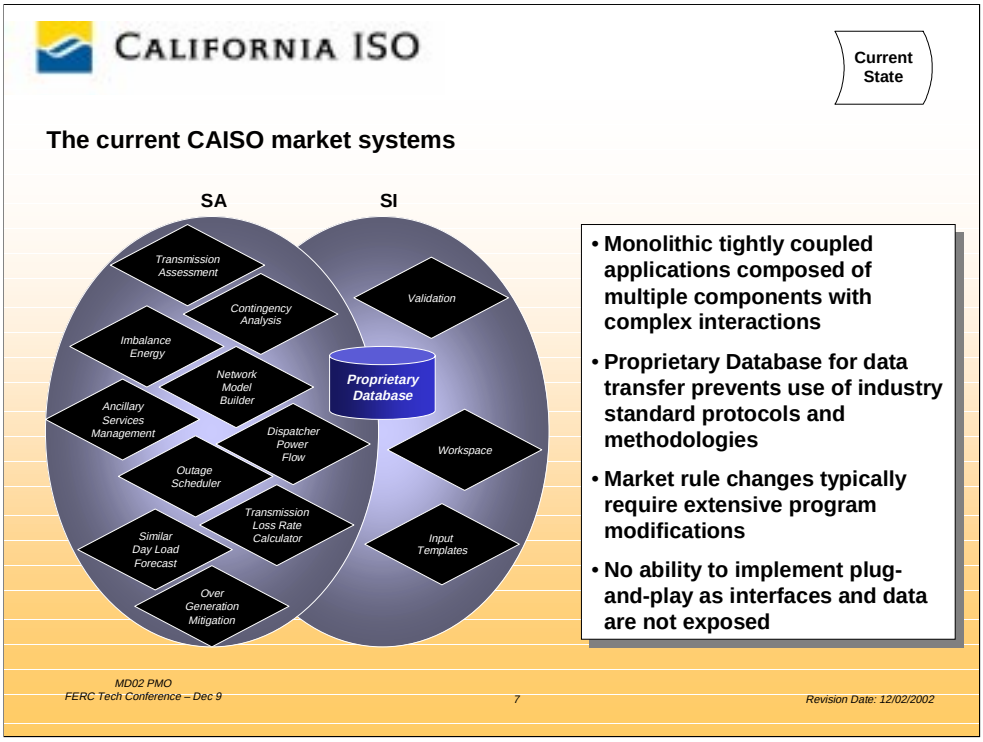
FERC admonished the CAISO to present a comprehensive market redesign plan rather than to continue a piecemeal approach. The CAISO delivered a comprehensive design. In order to realize the intended outcome of this directive, we need to make sure that both the Commission and CAISO can craft an implementation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



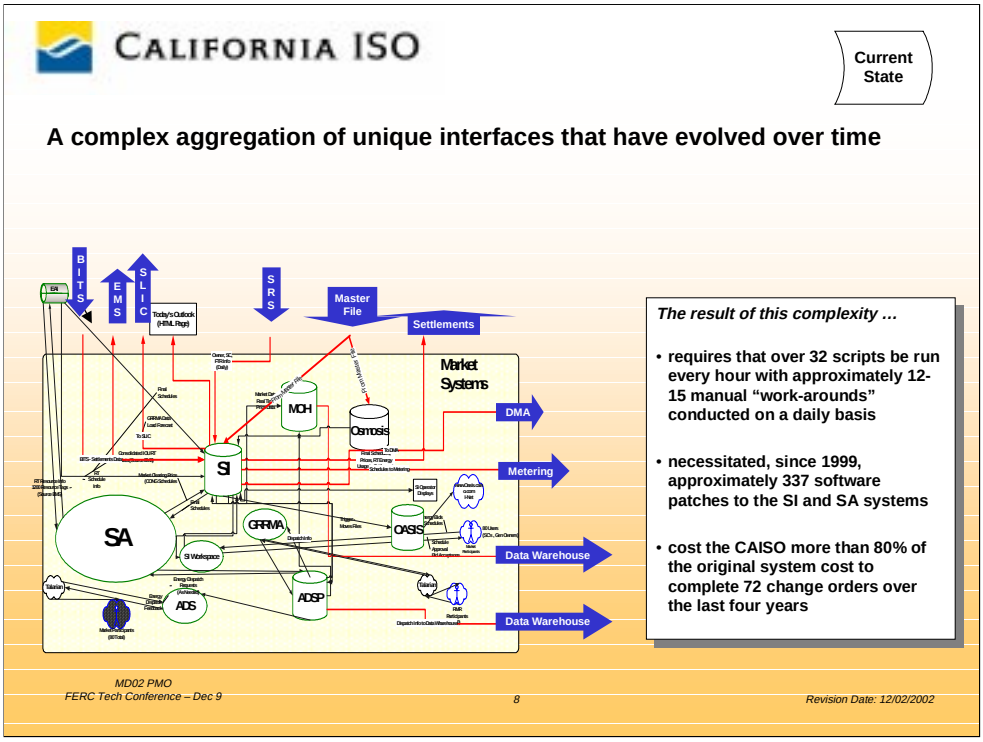
We understand what issues are critical to California and the wholesale market and have incorporated those in our design. It is better, and less expensive in the long run, if we plan and design to these issues now, rather than find out something doesn't work and to have to change it later. The underlying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



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.



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.



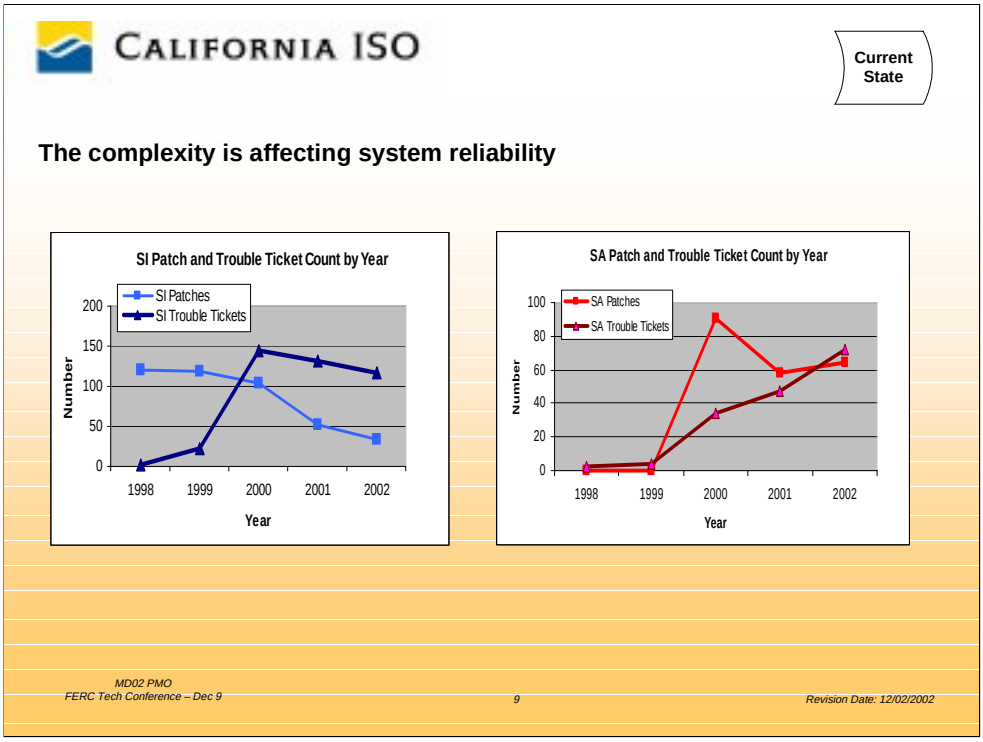
Although SI and SA are the foundation CAISO market systems, they are but part of a complex web of systems and interfaces required to run the CAISO markets.

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.

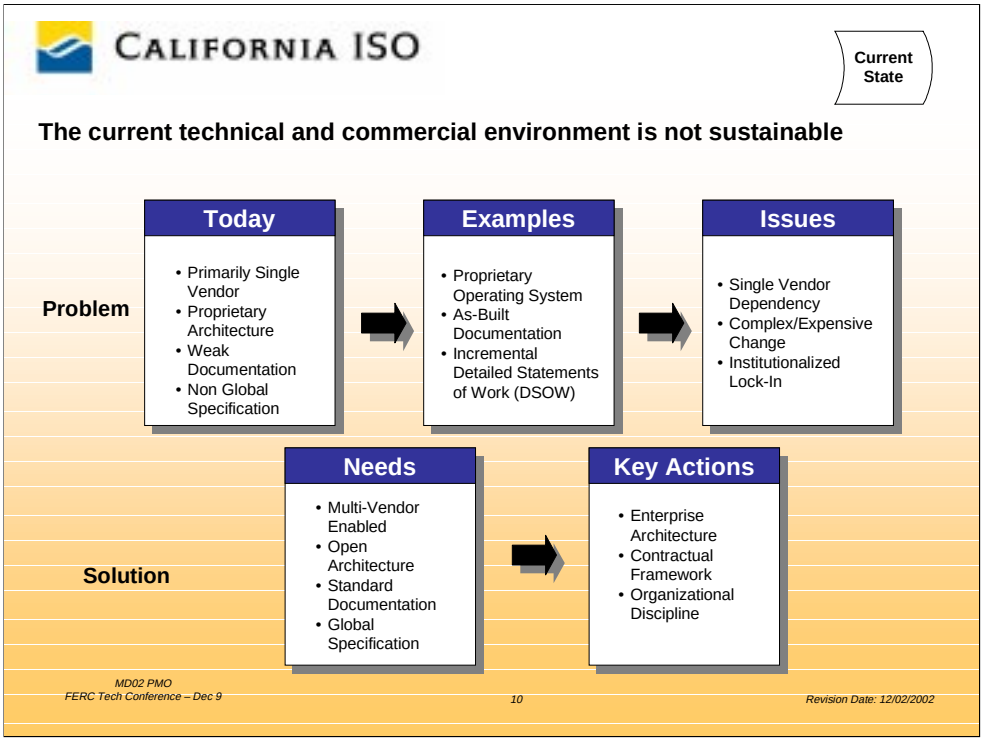
•Since 1999, approximately 337 software patches have been applied to the SI and SA systems. Software patches are used to fix problems and improve functionality as needed after the system has been delivered. In 2001 alone, there were over 141 trouble tickets associated with these two systems. Trouble 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.



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.

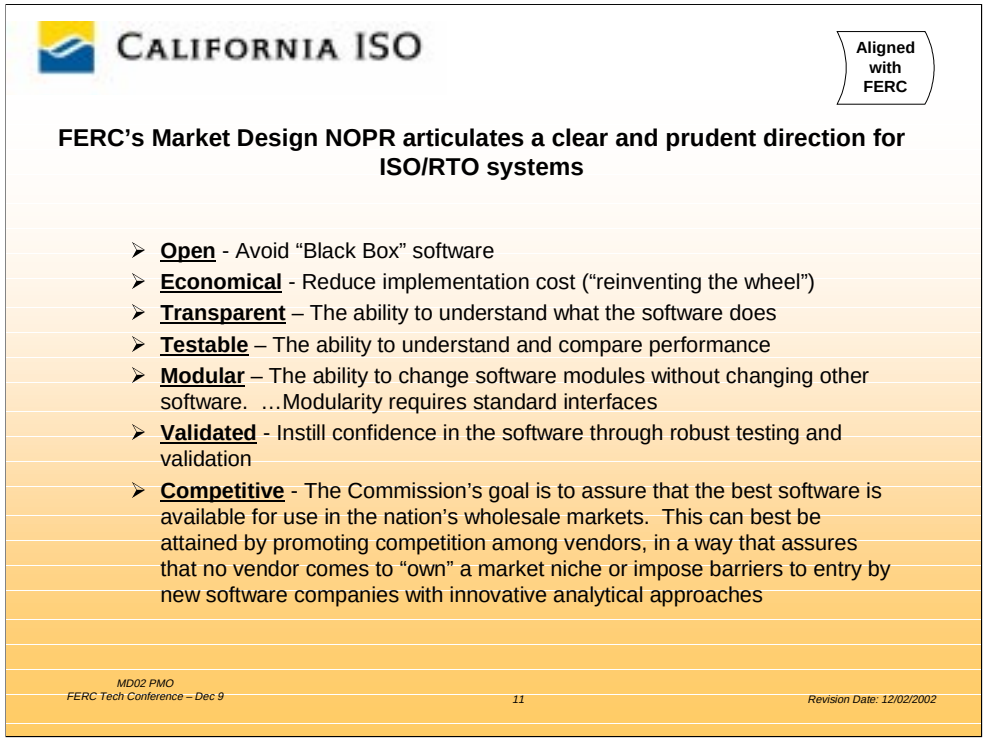
Although the cause and effect relationship of patches to trouble tickets is not one to one (i.e. some patches were to change functionality as a result of market rule changes) the primary trend of trouble tickets is increasing and most certainly the result of the added complexity resulting from the incremental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

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

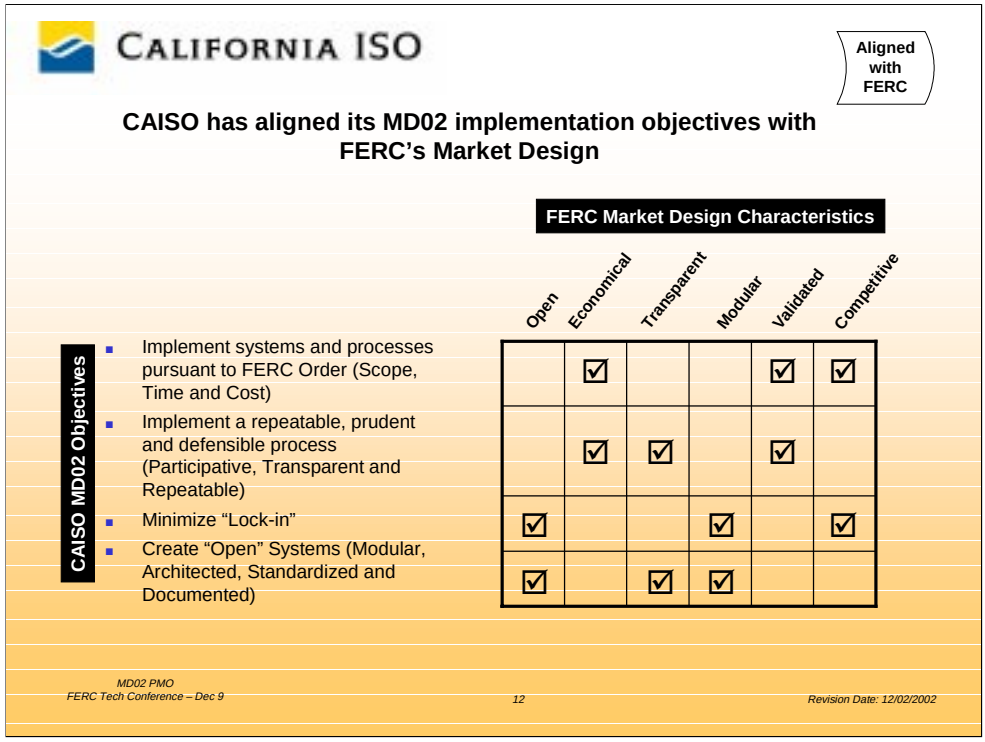


The current technical and commercial environment of the CAISO systems is not sustainable in the future. CAISO's primary system architecture is proprietary to a single vendor and inadequately documented. Specifications for changes to the systems since start up have primarily been incremental. This has 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.

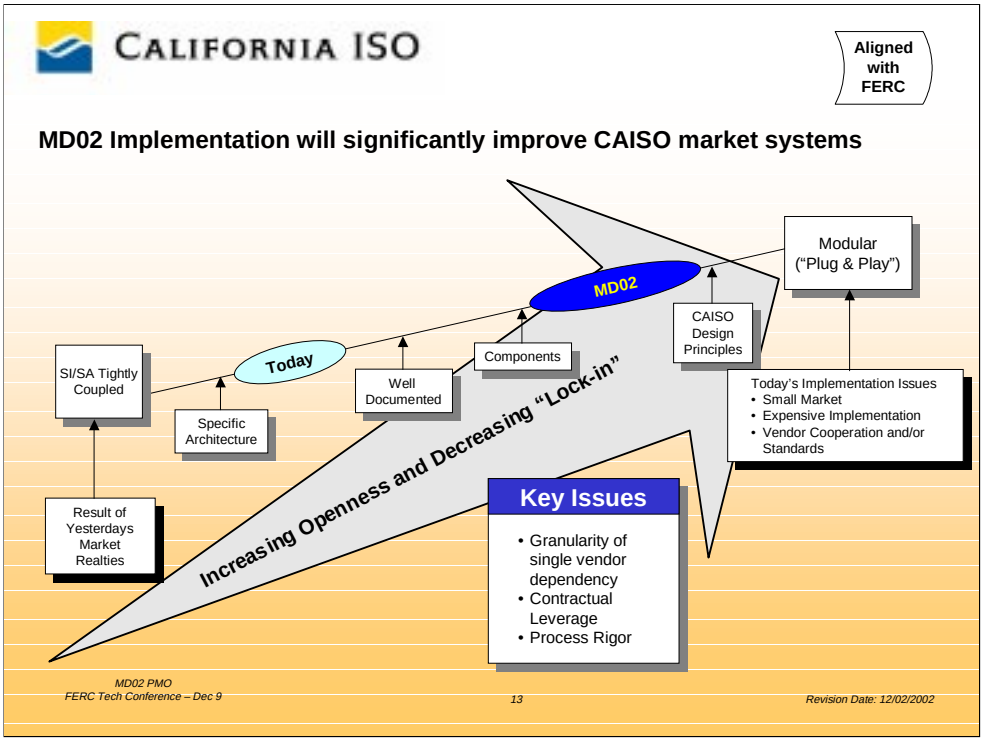
CAISO's approach to MD02 is to implement MD02 functionality upon a technical environment which is multi-vendor enabled, open and well documented. The foundation for this implementation is an open and flexible enterprise architecture implemented under a vendor contractual framework and process discipline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



FERC 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.

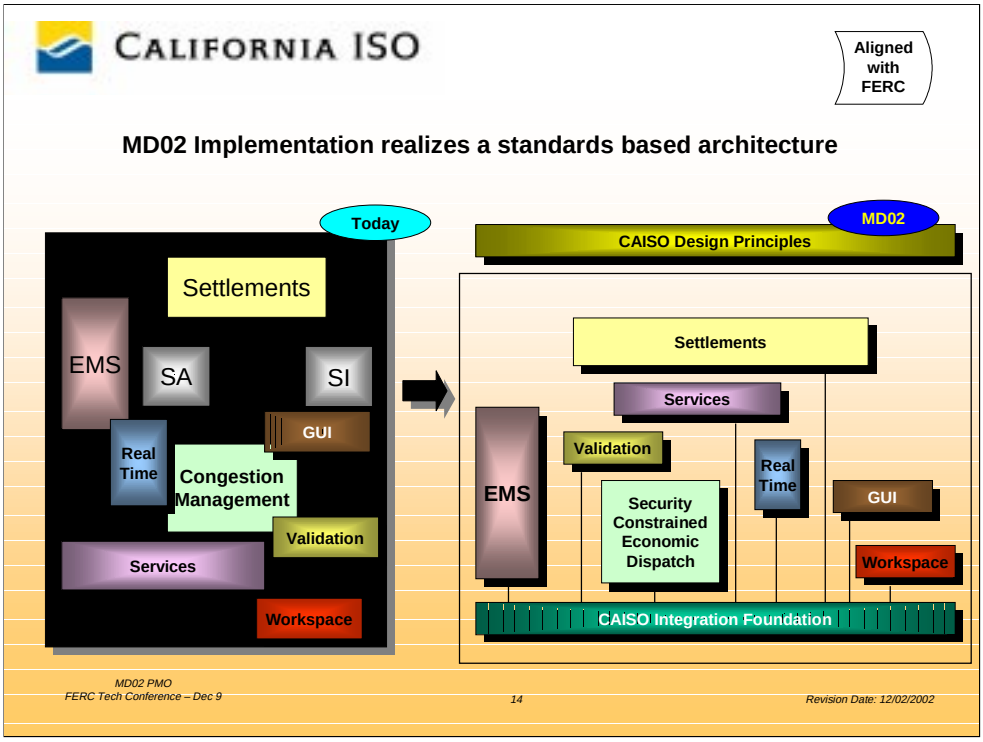


The CAISO's objectives for the implementation of MD02 align closely with the objectives of SMD.



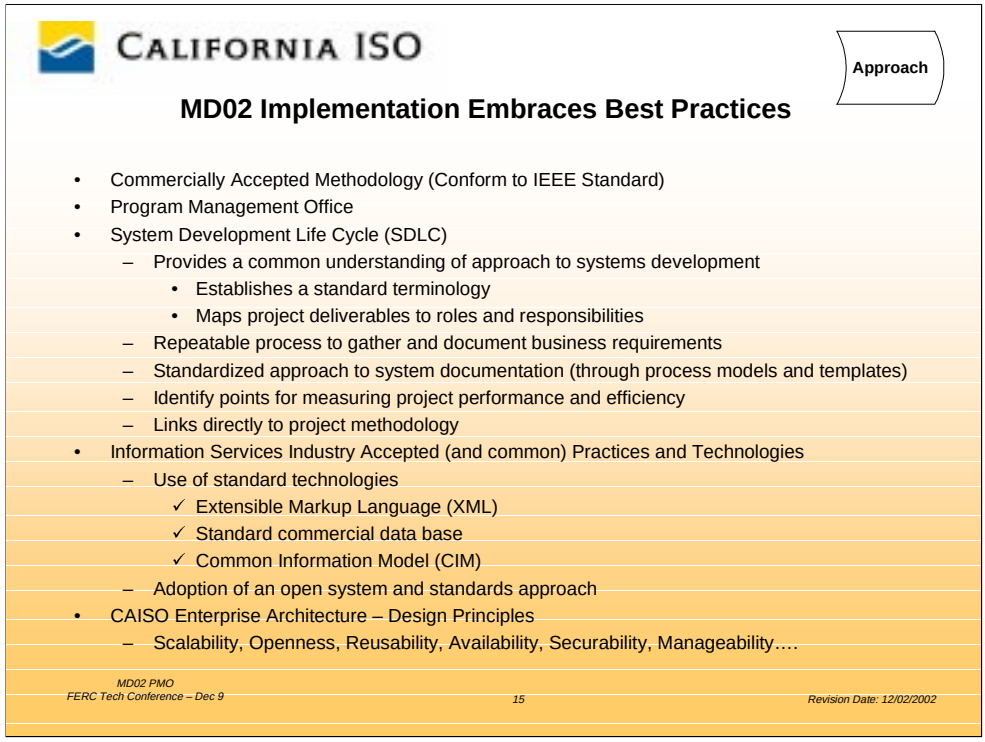
MD02 implementation as planned by the CAISO is aimed at significantly improving the foundation for CAISO's systems. MD02 will move the architecture of CAISO systems from the current tightly coupled specific architecture of the SI and SA systems to a well documented component based architecture consistent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

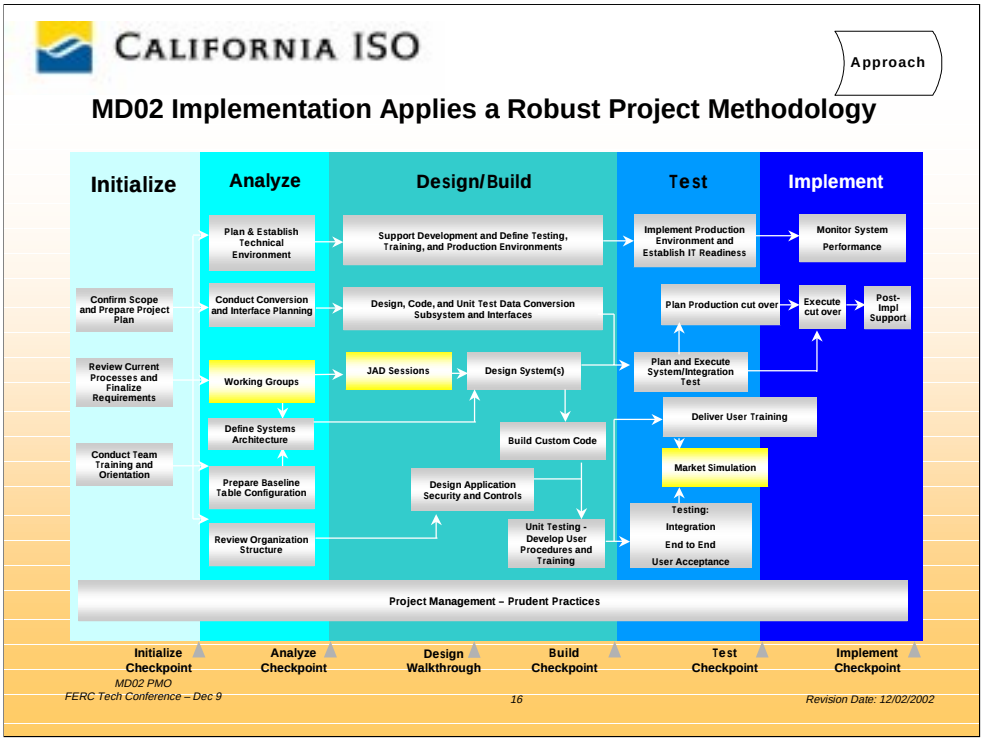


The primary enabler for driving the complexity out of the current CAISO systems is the use of a standard integration approach. Under such an approach, a common and "open" integration architecture will be utilized that integrates the various component elements of the CAISO systems.

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.

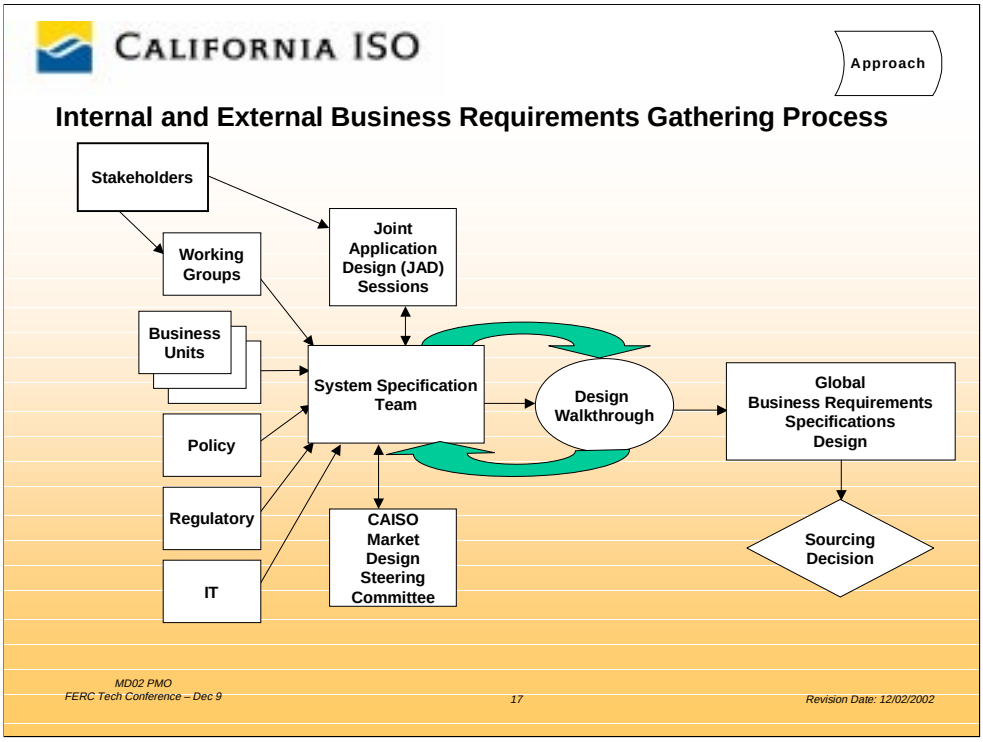


These represent the significant efforts that the CAISO has undertaken up to this point in the implementation phase of changing market functionality.



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



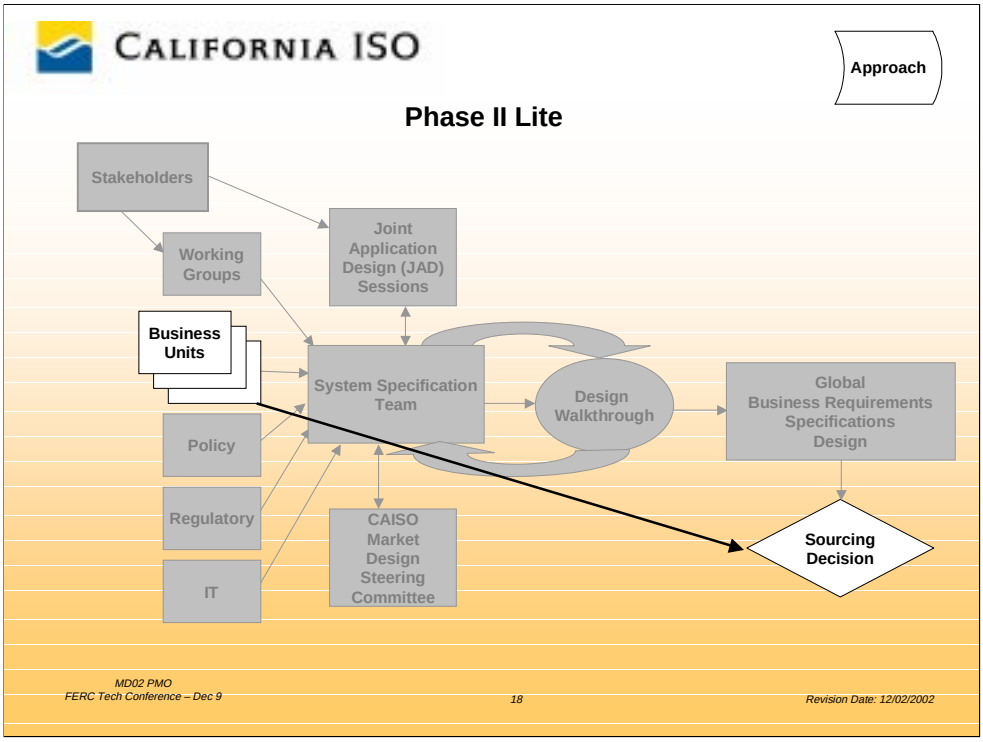
Describes the extensive stakeholder involvement through Working Groups (the what) and Joint Application Development (the how) process.

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

Software Requirements

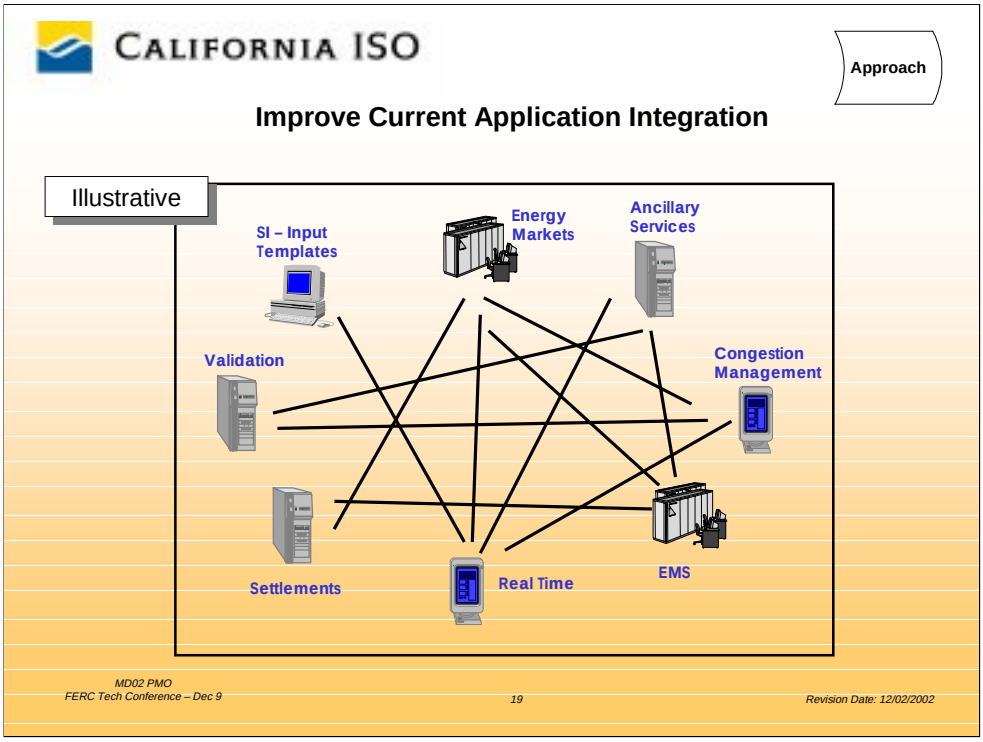
By fully engaging stakeholders and applying industry practices the final product will be more reliable and focused on the business needs.

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.

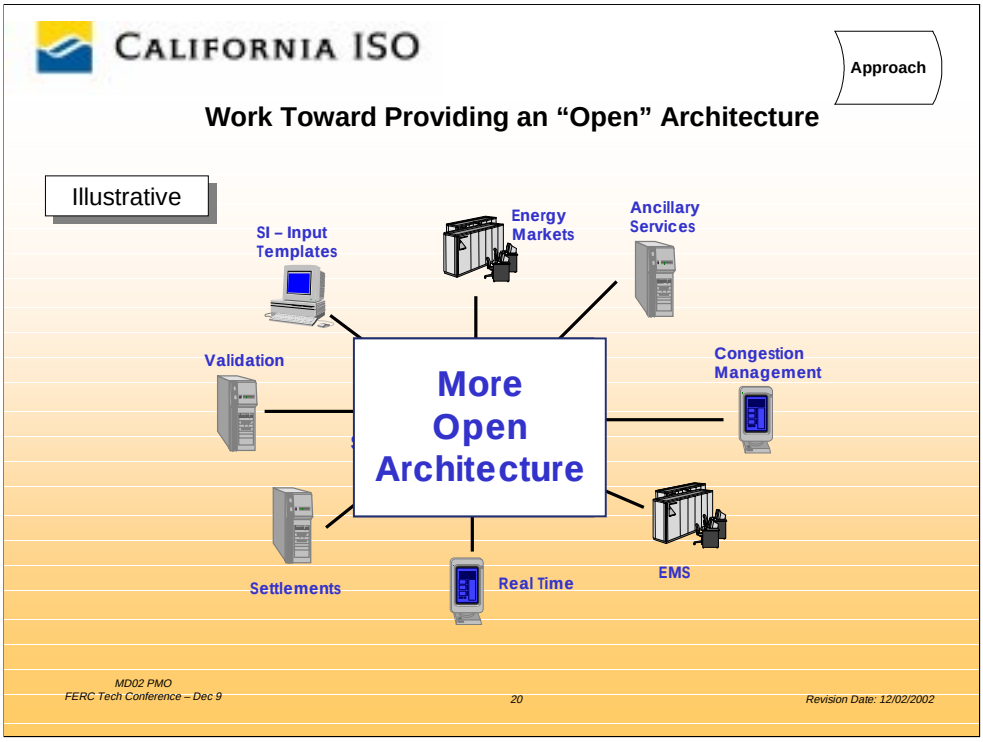


The Phase 2 "Lite" concept as originally proposed in the August FERC technical conference, was not considered in context of best practices for system development. As brought forward, it advanced directly from a business unit concept to a predestined sourcing decision. When the CAISO actually took a look 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.

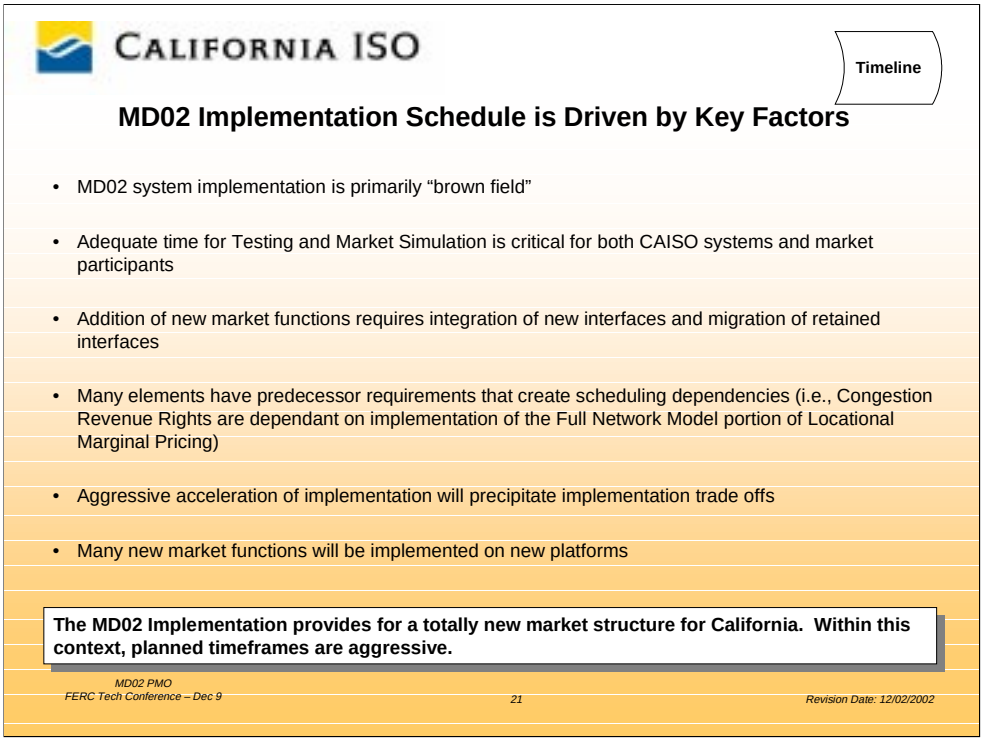


Due to the way that the current systems evolved, we are required to establish a multitude of point to point connections from one application to another to tie critical functionality together.



•CAISO Enterprise Architecture – Design Principles

–Scalability, Openness, Reusability, Availability, Securability, Manageability



•MD02 system implementation is primarily "brown field" requiring CAISO staff to both support MD02 development and testing while sustaining current operations

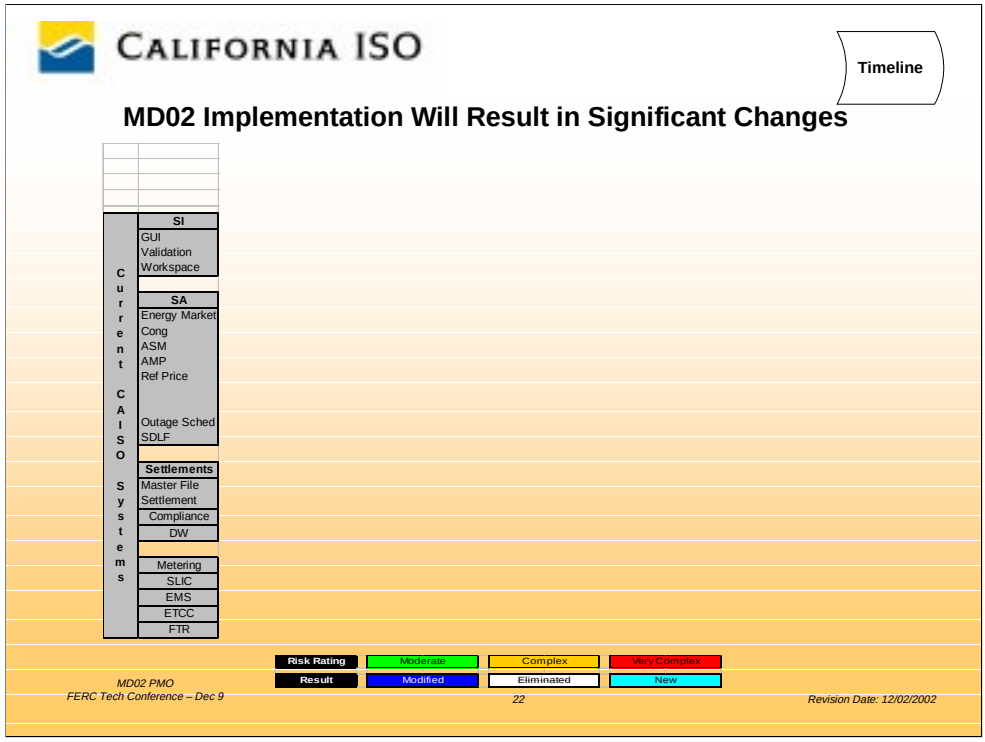
•The degree of market change will necessitate appropriate time for market simulation to support market participant needs

•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



Above are the current components of the CAISO's current systems:

•Scheduling Infrastructure (SI)

•Scheduling Application (SA)

•Settlements

•Compliance

•Data Warehouse (DW)

•Metering

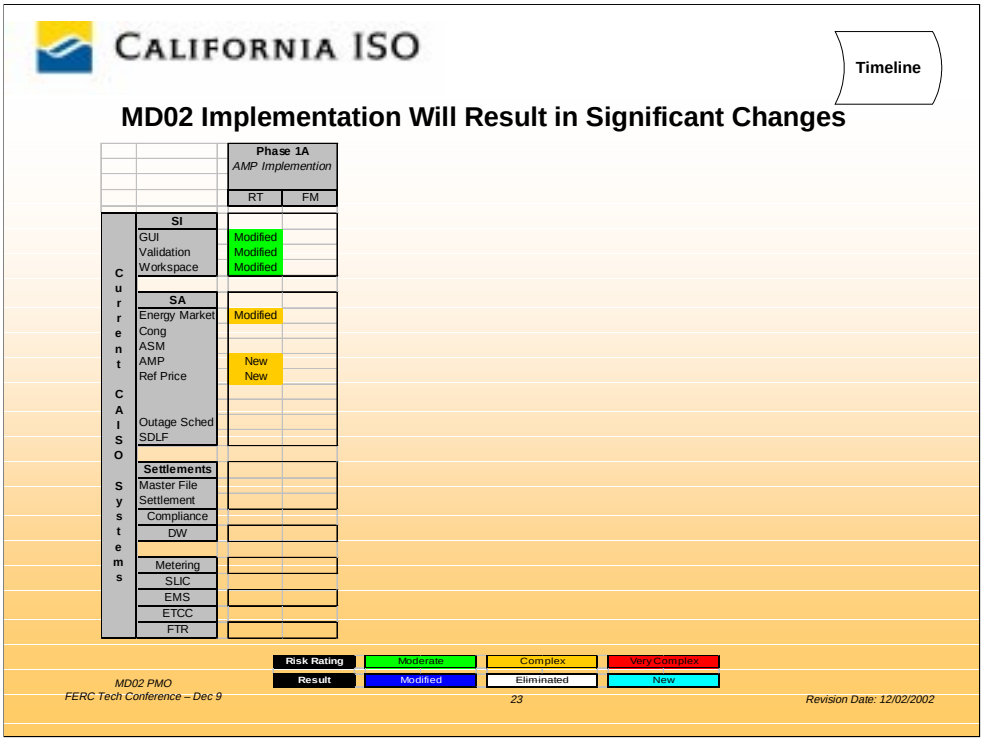
•Scheduling and Logging for ISO California (SLIC)

•Energy Management System (EMS)

•Existing Transmission Contract Calculator (ETCC)

•Firm Transmission Right (FTR)

The Legend denotes both a Risk Rating and the expected Result.



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

New components include:

•Automatic Mitigation Procedure (AMP)

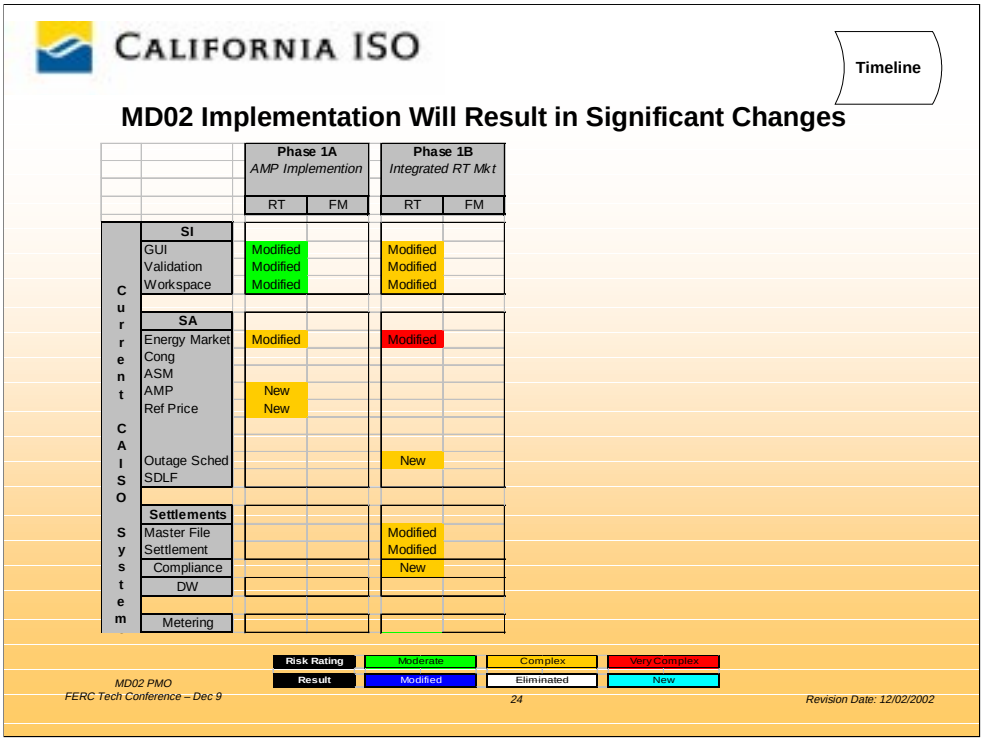
•Reference Price as calculated by an independent entity (Potomac Economics)

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

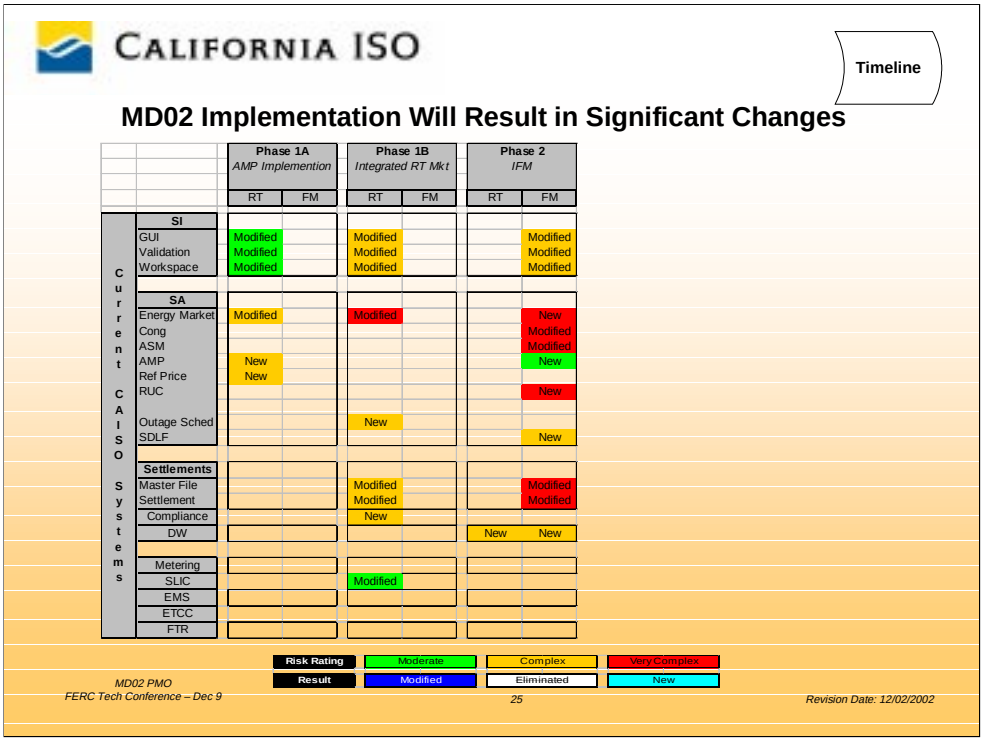
The Scheduling Infrastructure components were modified and moderately complex.



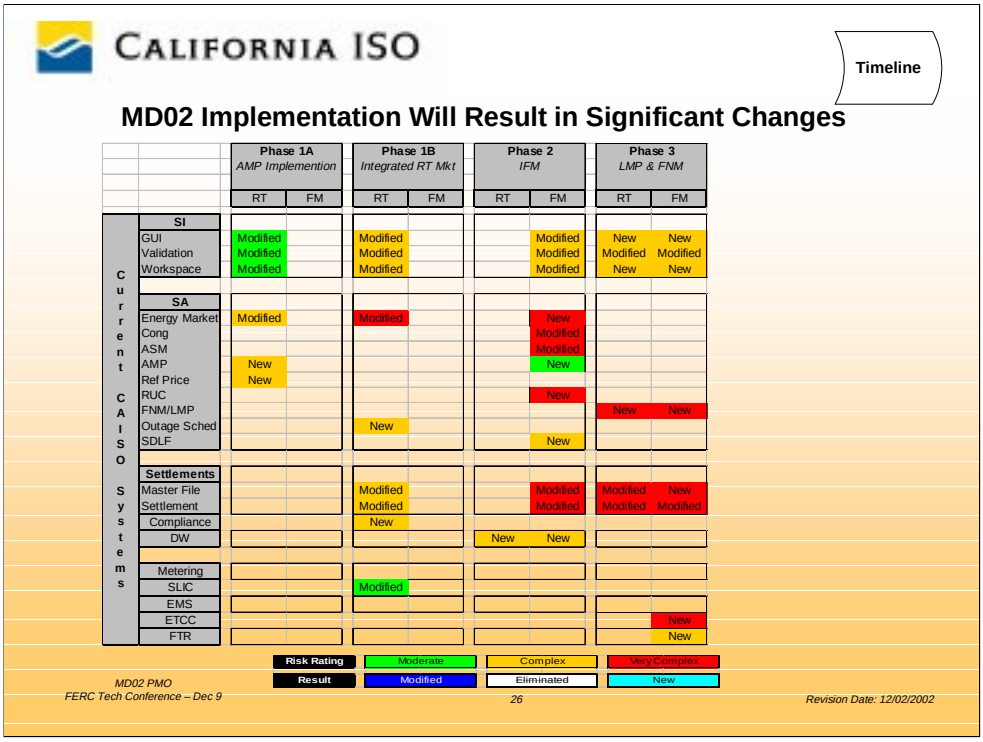
The CAISO is currently in the planning phase of of Phase 1B.

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

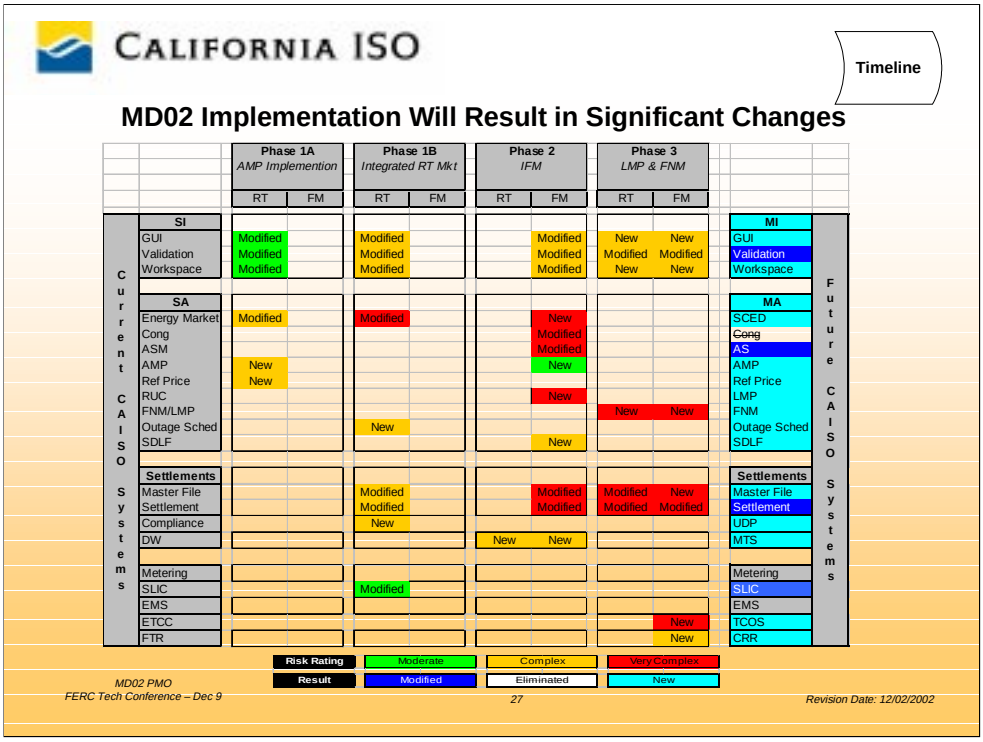
The outage scheduling functionality will allow the Scheduling Coordinator to update unit de-rates in real-time.



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.



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.



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.

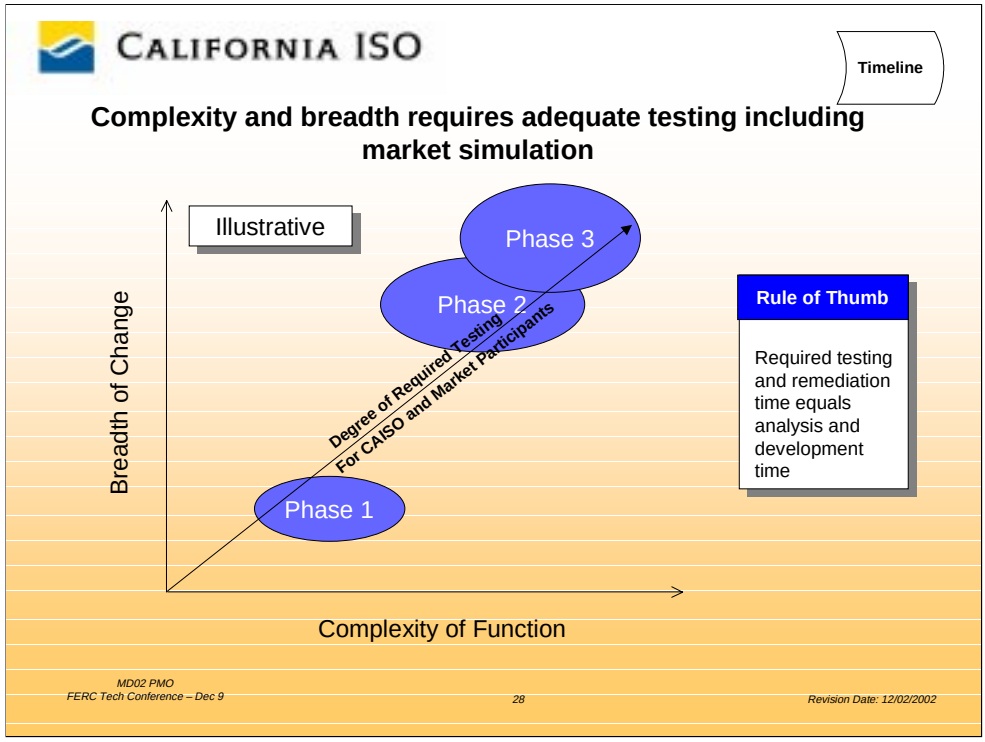
•The addition of the market transaction system (MTS) will provide a data warehouse for historical transaction data independent of the market production systems.

•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.

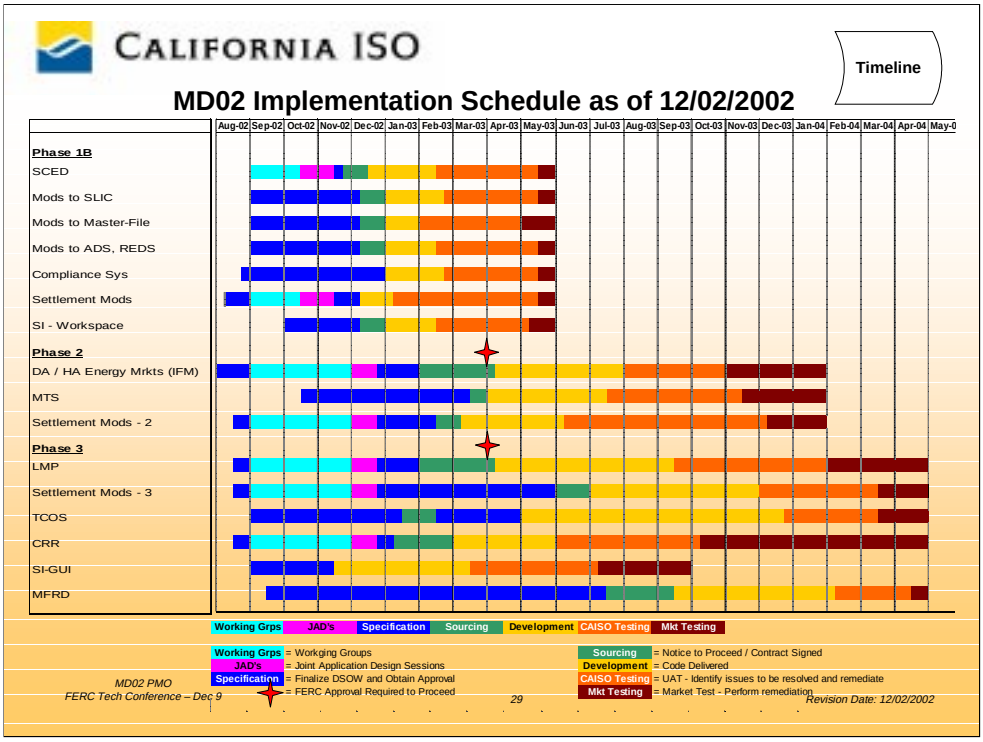
Overall, the MD02 Implementation is a highly complex project that affects every major system at the CAISO. The new market design must be viewed from a long term and comprehensive "end to end" perspective to ensure all the requirements of the new market are achieved.



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.



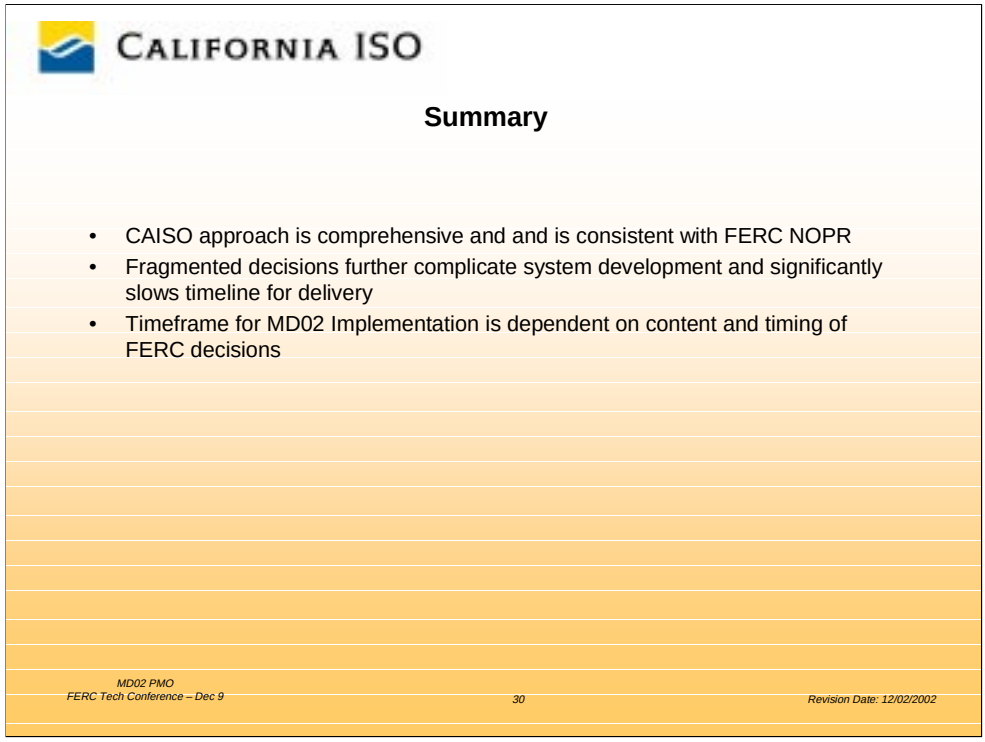
The current implementation timelines deviate from dates originally contemplated by CAISO and implementation dates ordered by FERC. These timeframes reflect employing commercially prudent practices in system development that were not contemplated in previous MD02 filings with the Commission. Furthermore, 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.

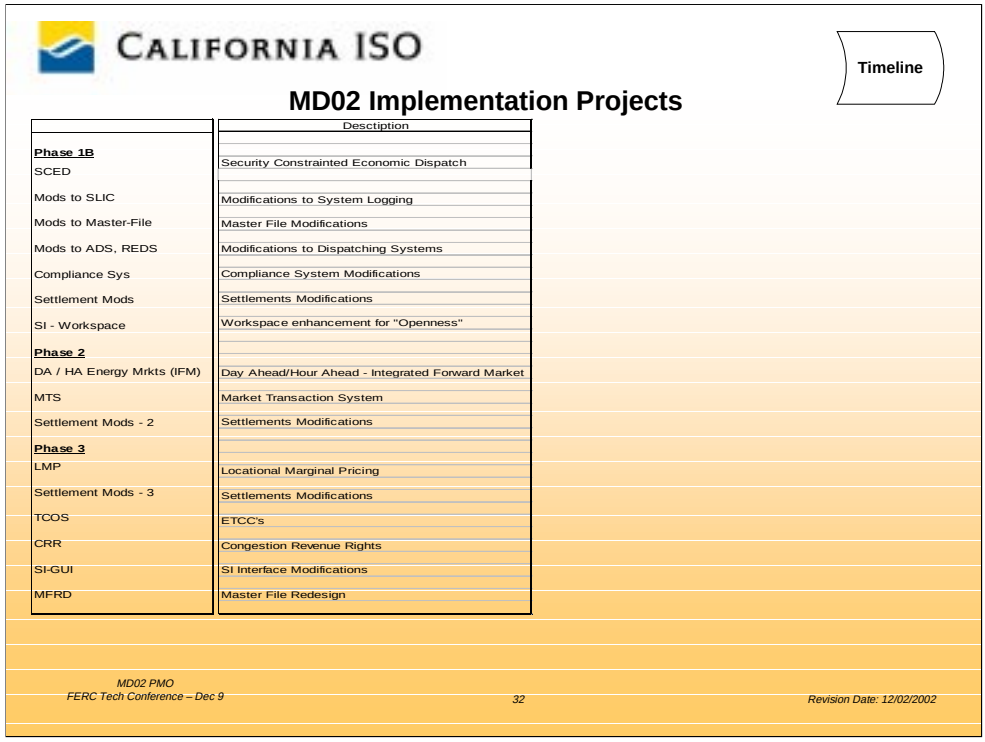


•Want to thank the FERC for putting on the Technical Conference and allowing the CAISO to present its current market systems, what the CAISO is moving towards and its timeline for completion.

•The CAISO understands the importance of working together with the FERC and Market Participants throughout the MD02 Implementation process.

CALIFORNIA ISO

Appendix



Brief description of Project Names in the MD02 Implementation Schedule.

CALIFORNIA ISO

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

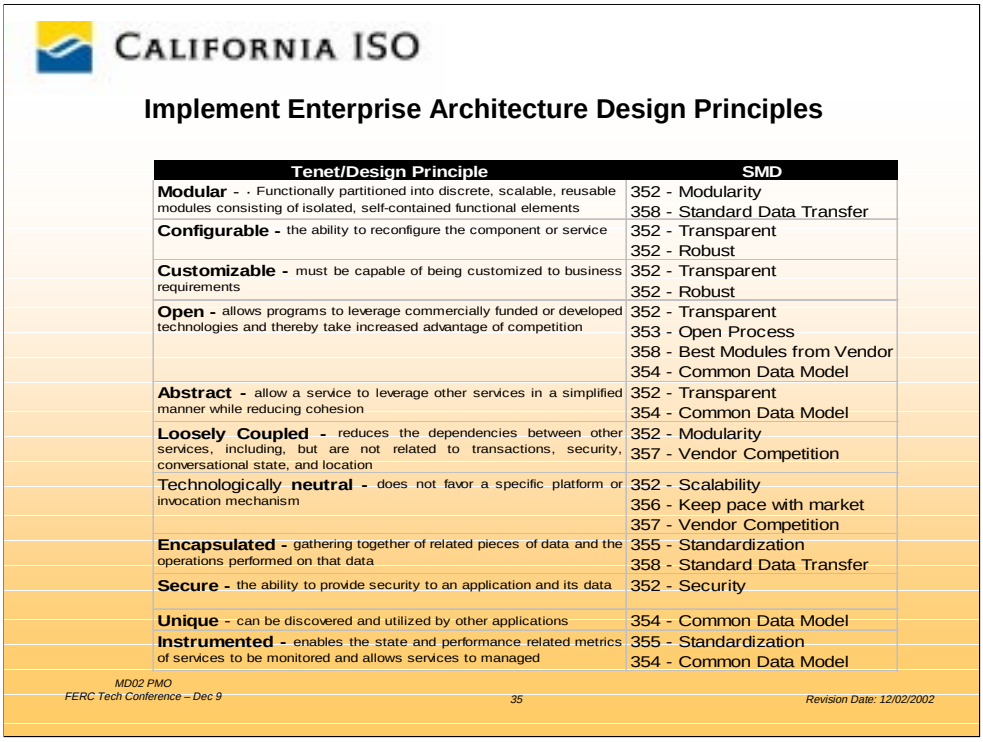
Significant Impacts to Transmission Availability While Honoring ETCs on LMP

- 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

CALIFORNIA ISO

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**



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.

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Anthony J. Ivancovich