



## **Annual Functional Release Lifecycle**

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## 1. Introduction

A key component of the California ISO's technology vision is to offer a reliable and repeatable annual functional release lifecycle backed by proven market design, collaborative stakeholder processes, and highly skilled staff and leadership. The ISO is planning, designing, and implementing innovations in its market and technologies to ensure reliable operations, adapt to increasing renewable penetration, and support regional collaboration. In order to gain efficiencies and best utilization of the ISO and its stakeholder's resources, the ISO executes an annual functional release lifecycle that aligns projects and takes advantage of synchronized delivery of project scope with a combined deployment and activation. The ISO is committed to collaborating with market participants throughout the implementation of projects for a successful execution of the annual functional release.

The release is implemented mainly by the ISO technology division encompassing information technology, power systems technology development and support, and program management. The technology staff is responsible for providing information technology support for operations. In addition, the technology staff develops and supports critical cyber assets and real-time systems required to keep operations going. Key functions include product management, software design, and production support for real-time and operations applications. The technology staff maintains high availability, robustness, reliability, and resilience to all operational needs while making sure all releases, patching, and upgrade enhancements smoothly transition to production without disrupting operations.

The Program Management Office (PMO) leads and manages key initiatives and projects that focus on enhancing customer service and processes. Core functions include release planning, program management, business and system analysis for the strategic plan and the market initiatives roadmap. All PMO efforts have a strong process and quality focus based on Project Management Institute (PMI) and Capability Maturity Model Integration (CMMI) standards and guidelines.

The ISO implementation teams strive to provide our stakeholders and the general public with excellent customer service. The ISO has established systems to enhance the customer experience by ensuring questions that come into the ISO are addressed by the appropriate staff in a timely manner.

## 2. Background

The ISO implementation teams strive to efficiently deliver market design initiatives based on a readiness-based and customer-focused process. The process consists of collaborative release planning, execution using market simulation verification and validation, and effective issue management and resolution. Market participants are invited to participate in all phases of project implementations via frequent and active stakeholder activities and other technical user forums.

The release plan spans a two-year time horizon and includes both policy-driven initiatives and technology upgrades. Each project has a defined scope which is elaborated in a business

requirements specification (BRS) that is shared externally so that stakeholders can determine their impacts and costs. ISO subject matter experts work side by side with project implementation staff as projects transition from planning to design, development, testing, and deployment.

External stakeholders provide feedback and collaborate with the ISO via various communication channels to understand how the ISO prioritizes, initiates, and implements market initiatives and other projects with external impacts. Furthermore, market participants provided feedback with their concerns regarding the pace of implementation and the need for market simulation entrance criteria as well as exit criteria prior to deployment and activation.

The ISO provides this document to serve as a mechanism for further discussion and potential process improvements. The ISO values customer feedback and strives to continuously improve the customer experience in working with ISO systems and resources.

### 3. Scope

This document describes the planning through execution phases of the ISO annual functional release lifecycle process. The annual functional release lifecycle is a yearly process which aligns the delivery of projects that require integration, contain new functionality, may require new or changes to technical specifications, and usually require market simulation. The annual functional release list identifies the projects that are planned for a specific annual functional release (e.g. Fall 2017 Release). Projects that are determined to be integrated (i.e. not independent) are included in the annual functional release plan. Further, integrated projects will likely require changes to external technical specifications or require changes in multiple applications that need to be tested together.

During the impact assessment of a new project, a decision is made regarding whether the project is independent or should be delivered as part of the annual functional release. Independent projects are those that impact a single process or system, do not require changes in technical specifications and do not require a full market simulation. Occasionally, a project may be considered to be independent even if it does not qualify based on this criterion because of special circumstances, such as required timing, size of effort, or other factors. When there are independent initiatives that do not qualify based on the independent project criteria listed in the document, the ISO will discuss it with the market participants and get market agreement on the exception. The project will continue to follow the normal process for functional projects.

The ISO plans for an annual maintenance release in the spring to address system upgrades and other systems maintenance intended to improve quality, performance and usability. The annual maintenance release should not modify functionality, change technical specifications, or require market simulation.

This document describes the annual functional release lifecycle including: phase descriptions, definitions and key deliverables for each implementation phase, the entrance/exit criteria associated with each phase, key interactions with stakeholders, and descriptions of the interfaces to other ISO processes. It is intended to be used externally to help market

participants understand the annual functional release lifecycle process. This document does not include every single detail pertaining to the release lifecycle, but it is intended to include all aspects that impact market participants.

As the testing phase completes, the ISO and market participants turn their attention to (1) achieving a high quality solution in the market simulation environment and (2) planning production deployment and activation activities. All impacted parties will have the opportunity to review detailed production support plans and to participate in training and business continuity protocols.

To ensure market system quality as well as operators' readiness, ISO provides market simulation of policy or tariff changes that impact market participant's external data interfaces to the ISO. The benefits of market simulations are to provide market participants a chance to test their systems, and ISO operators to be trained on different scenarios and situations before new features become effective in production.

Prior to the start of market simulation, the ISO provides release documentation outlining system and process changes via tariff language, business requirements, technical specifications, and Business Practice Manuals (BPMs). The ISO PMO collaborates with market participants to ensure that technical documentation is delivered within agreed timelines, to allow for integration and system development on participants' side, while subject to corrections and updates for unintentional omissions.

The ISO informs market participants when the market simulation entrance criteria is met and the start of the market simulation testing activities. This typically includes sufficient functional, security and other testing, and a review of any open defects or other known issues. The ISO develops structured market simulation scenarios for all new approved policy changes that involve settlement or external interface changes impacting market participants. The ISO also works with market participants to provide support for additional unstructured testing they wish to conduct. The ISO generates settlement statements during market simulation, when appropriate.

The ISO provides a fully integrated, robust, non-production market simulation environment for market simulation scenarios execution. The ISO is responsible for validating that the test environment has adequate data, connectivity, and quality of solution. The ISO will include a robustness check prior to the start of and during active market simulation to ensure that the environment is solving for a majority of support intervals with data being published as expected. The ISO generates settlement statements during market simulation, when appropriate and conducts operations training before go-live to support both testing and operations.

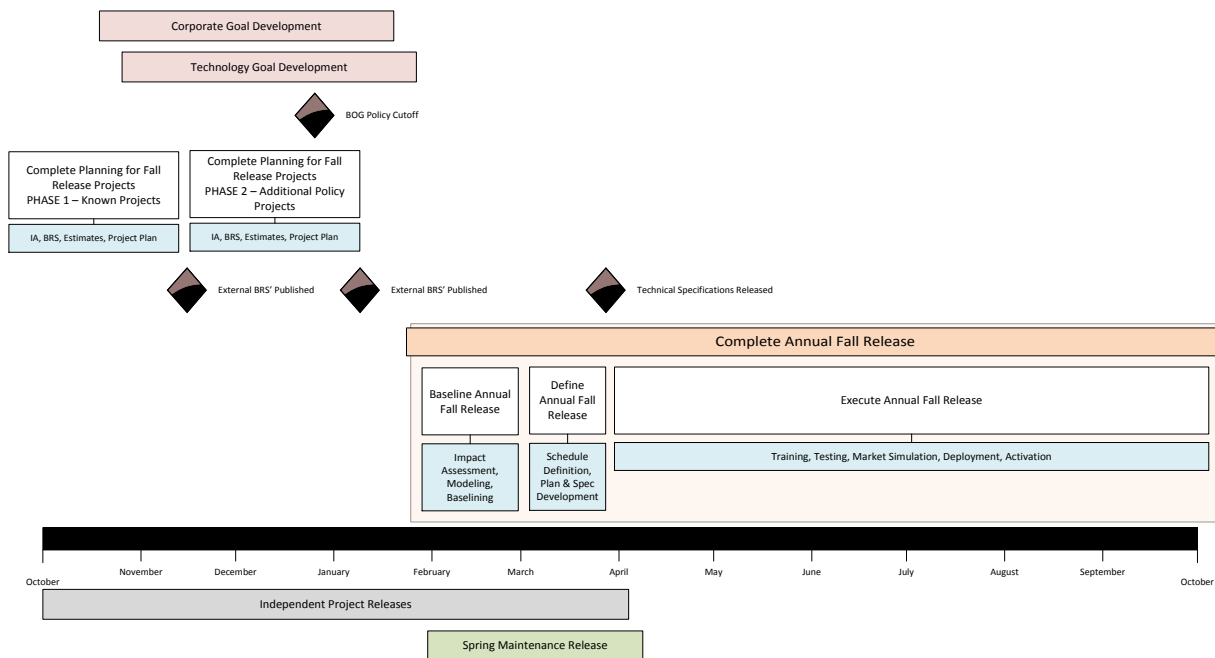
The market simulations environment is available to all market participants during the market simulation for structured and unstructured scenarios. The ISO strives to minimize unplanned outages to the environment and communicate outages in a timely manner. The ISO maintains a dashboard that shows the status of the application availability on the Market Participant Portal in MAP-Stage environment. The ISO utilizes a comprehensive issue tracking and resolution system to ensure all defects are addressed and communicated to market participants in a timely

manner. Based on customer feedback, the ISO is publishing a centralized known issues report with public information.

The ISO executes operations training before go-live and provides user guides to support both testing and operations. The production support plan consists of several days of around-the-clock coverage across operations, technology and other support functions. Once in production, customer support processes are in effect, including a highly responsive customer-facing support team, processes, and tools. The ISO strives for excellence in implementation from inception to successful deployment and activation. Monitoring of market performance and other benefits is conducted regularly to ensure optimal results for all stakeholders.

## 4. Annual Functional Release Lifecycle

The diagram below depicts a high-level view of the annual functional release process. It includes references to other key processes, deliverables, and milestones within the ISO.



The annual functional release lifecycle is made up of three phases: Baseline, Definition, and Execution. These three phases are described in detail below.

### 4.1. Baseline Phase (Initial Functional Release Scope Identified)

Prior to starting the baseline phase, the following key activities are completed: annual corporate and technology goal planning, Board of Governor’s approval of policies expected to be in the annual functional release list and planning for projects expected to go into the annual functional release list (e.g. Impact Assessment, Business Requirements Specification, Estimates, and Project Plan). This ideally occurs between the fourth quarter of the previous year and the first quarter of the release year.

Once these are complete, the baseline phase begins with completing the release level impact assessment. After the impact assessment is complete, the ISO will prepare the fall release list and then model the release to determine if there are enough resources to complete the planned work. If there are not enough resources, the ISO will re-plan and remodel until it is confident that the projects on the release list can be successfully implemented in the fall. Market participants, if they desire, should comment on any changes to the functional release plan during the Release User Group (RUG) and the Market Performance and Planning Forum (MPPF). This list is then baselined and communicated at the next RUG meeting. The baseline phase typically occurs in the first quarter of the release year.

#### **4.2. Definition Phase (Final Functional Release Scope Identified)**

The definition phase also occurs toward the end of the first quarter of the release year. During the definition phase, the ISO drafts the plans and specifications needed for the annual functional release. ISO publishes the final drafts for Technical Specifications, Configuration Guides, Training Plan, and Market Simulation Plan. During this phase, the ISO also reviews the projects by application to determine efficiencies. At the end of this phase, there is a Go/No Go checkpoint to determine readiness for the execution phase.

#### **4.3. Execution Phase**

The execution phase begins in the second quarter of the release year and progresses all the way through to the beginning of the fourth quarter. The first task completed in the execution phase is finalizing the functional overview for the annual functional release. Once this is completed, testing begins, which includes executing the release level test plan and completing security and end to end testing. External training is conducted, when appropriate, in anticipation of the market simulation exercises and testing. A release level market simulation Quality Review Board (QRB) is held to approve the annual functional release moving into Market Simulation. During market simulation, both structured and unstructured scenarios are executed. In addition, a readiness assessment is completed and the Operations training plan is executed. After market simulation, a Go/No Go checkpoint is held and then the code is moved to Stage, where performance and regression tests are completed. ISO publishes the Deployment Plan to detail the sequence and steps of code deployment in production. A production QRB is held in preparation for deploying the code to production and the decision of the QRB is communicated externally through a market notice. The execution phase ends when the ISO activates the functionality in production.

#### **Issue resolution process and timelines**

The implementation team assesses external readiness by reviewing outstanding Customer Inquiries Disputes and Issues (CIDI) tickets, monitoring feedback provided during market simulation and RUG calls, and through other forms of communication and outreach. Market participants are encouraged to provide input regarding their readiness for a project or release deployment for the ISO to factor into the overall decision to go forward or delay a deployment or activation. The implementation team will present the external readiness assessment to the QRB and to the ISO executive team, as needed.

## 5. Exceptions to the Process

The process above describes the steps for the annual functional release process when the initial baseline is unchanged and all checkpoints are good. There are exceptions to this process which are described below

- A. **Expansion to scope of the Annual Functional Release Plan** - At any time during the annual functional release lifecycle (up until migration of code into MAP-Stage), it may be determined that a project needs to be included in the annual functional release list. Changes to the annual function release list could be due to a critical need or a policy. If this occurs, the ISO will re-baseline the annual functional release list, update any definition phase documentation, and notify the market participants at the bi-weekly RUG meeting.
- B. **Reduction to scope of Annual Functional Release Plan** - If it is determined that a particular initiative is not ready to move forward, or if there was any circumstance that occurred which would cause the release to not work as planned, the release team may decide to remove it from scope. This decision may happen anytime between the end of the definition phase and throughout the execution phase, or after the Go/No Go checkpoints and QRBs occur. If this occurs, the ISO will re-baseline the annual functional release list, update any definition phase documentation, and notify the market participants at the bi-weekly RUG meeting.
- C. **Incomplete Release Level Testing** - Toward the beginning of the execution phase, the release level test lead will verify that all project level tests have been completed in Map Test (where applicable). If the tests are not complete, the ISO release team will meet to determine if the release date should slip or if scope needs to be moved or removed. If any change occurs, the annual functional release list will be re-baselined, any definition deliverables will be updated, and the changes will be communicated at the bi-weekly RUG meeting.

## 6. Contingency Planning

The ISO strives to provide backwards compatibility and flexibility in introducing new scope/functionality. The ISO supports two versions of web services to allow market participants to plan their software updates with their business needs. In cases where the ISO is implementing mandatory functionality, it may be necessary to create required new data elements. The ISO strives to communicate these instances as far in advance as possible. The ISO also strives to provide separation between code deployment and functional activation to allow for adjustment in activation of specific functionality without impacting the overall release schedule.

The ISO monitors release level risks and issues in daily release meetings and acts to implement mitigating actions for risk reduction or solutions to current issues. The risk mitigating identification process also sets contingency plans for conditions or scenarios with elevated probability. The higher risks and contingency plans are communicated and discussed with



market participants during RUG calls, market simulation calls, or market planning and performance forums.

The ISO will take action to defer an activation whenever necessary and will strive to maintain other objectives of the annual functional release to minimize impact and rework. These decisions are subject to review with ISO legal and executive staff. Market participants are encouraged to provide their impacts at any point during this process using standard communication and forums.

Additionally, the ISO PMO will work with the ISO Legal department to have more flexible go-live dates in our tariff filings. We will endeavor to use wording such as "... will be implemented by the end of 2017" or "... will be implemented in 4th quarter" when filing the go-live dates with FERC. This will prevent us from being locked into a specific date, so if we have unforeseen issues, we can push out implementation without having to ask FERC for an extension.

## **7. External Deliverables**

### **7.1. External BRS**

The external Business Requirements Specifications (BRS) documents contain the description of a project scope in detailed statements of what is changes are expected of each system, process, or other deliverable. The external BRS is reviewed by ISO subject matter experts, system integrators, and a legal representative. Based on feedback, the ISO PMO will endeavor to add more details in the external BRS and welcomes feedback on requirements to improve their usefulness. Market participants are encouraged to request clarification of specific requirements in the external BRS via CIDI tickets. This process offers a timely response and communicates to both the market participant and the ISO PMO when the issue is resolved. The ISO PMO agrees to provide timely updates of external documentation and welcomes feedback on documents that might require revision to satisfy market participant questions and concerns.

### **7.2. Technical Specifications**

Confidential information and data communicated between the ISO and its participants during the course of planning and market activities are protected through robust system and application security. The ISO publishes access requirements as well as application technical specifications for all production interfaces and publishes new interfaces or modifications in advance of the annual functional release. The ISO intends to publish technical specification changes six weeks prior to the start of market simulation.

In general, the ISO strives to provide backwards compatibility and supports two versions of technical specifications to allow stakeholders ample flexibility in incorporating functional changes based on their business needs.

The public web page where ISO maintains the System Access Information for Market Participants reference document is

<http://www.caiso.com/participate/Pages/ApplicationAccess/Default.aspx>

### 7.3. External Training

The ISO provides extensive customer-focused training to ensure that our customers can successfully participate in our markets and effectively learn how to interact with the ISO. Our training staff consists of certified instructional designers and trainers with industry expertise in market, operations, systems, and regulatory training. The training curriculum focuses on the learner's needs and is designed to support successful participation in the ISO markets.

A schedule of courses is offered annually to enable market participants to receive up-to-date training for new and existing employees. The online training catalog presents current course offerings and is intended as a descriptive training reference. The courses have been grouped into three major categories:

1. **Overview Courses:** The ISO's role within the western energy landscape
2. **ISO Markets:** In-depth information on market functionality and utilization of the individual market applications
3. **Settlements:** Overview of the settlements publishing schedule as well as interpreting and validating post market settlement charges

The training catalog can be viewed at: <http://www.ISO.com/participate/Pages/Training/Training-Catalog.aspx>

The following link to the ISO training web page provides material related to a wide variety of training topics: <http://www.ISO.com/participate/Pages/Training/default.aspx>

External training for specific projects in the annual functional release will be announced via Market Notice in advance. The ISO strives to provide this training prior to Market Simulation. Market participants are encouraged to take advantage of these training opportunities and request additional external training if needed by contacting their client representative.

### 7.4. Market Simulation Plan

The Market Simulation Plan is the document that provides market participants with information needed in order to engage in the release initiatives by testing their systems and procedures prior to go-live, thereby enabling them to smoothly transition and utilize the new features and functionality that will be available when the release goes into production. The market simulation plan includes sections and details for:

- Scope of initiatives included in the market simulation with links to dedicated project pages
- Pre-simulation and simulation activities information and calendars – timeline for MAP-Stage activities including maintenance, unstructured simulation, and structured simulation
- Structured scenarios – provides a list of initiatives with structured market simulation and links to the scenario details
- Market Simulation settlements configuration guides and calendars – schedule of statement publications and meter data submission deadlines

- Market Simulation execution and exceptions – outlines MAP-Stage environment configurations and data flows
- Support guidelines and contacts for the market simulation

### **7.5. Deployment Plan**

The Deployment Plan is the document that provides market participants with a description of the timeline and activities for a release. Specifically, the deployment plan includes sections and details for:

- List of projects included in the release and short descriptions for the scope of each project including links to dedicated project pages
- Release deployment strategy – the sequence and dependencies associated with the release including possible multiple drops and timing of each deployment
- Web services affected by the release and links to their technical specifications
- Deployment and activation timeline – summarizing the systems impacted by each deployment
- Deployment times, outages, and market participants actions – describing in detail the specific dates and times as well as required market participants' actions associated with each system deployment
- Activation and post-activation events, date/time, and market participants actions is applicable
- Communication protocol and support plan for the release

### **7.6. Lessons Learned**

Within one month of the implementation of the Annual Functional Release, the ISO will host a lessons learned exercise involving key ISO team members, market participants and vendors. This will be an open forum to share ideas for how to improve upon the planning and execution of the Annual Functional Release.

## **8. Process Interfaces**

### **8.1. Budget**

The ISO conducts an annual budget and grid management charge stakeholder process. This process results in the annual ISO budget and grid management charge. In June of each year we review the ISO current financial condition with stakeholders and gather their input for the budget process for the next calendar year. We follow up with a meeting in October to review and discuss our draft budget before finalizing it and requesting Board of Governors' approval in December. For reference see ISO Budget and Grid Management Charge web page at

<http://www.caiso.com/informed/Pages/StakeholderProcesses/Budget-GridManagementCharge.aspx>

### **8.2. Program Lifecycle Methodology**

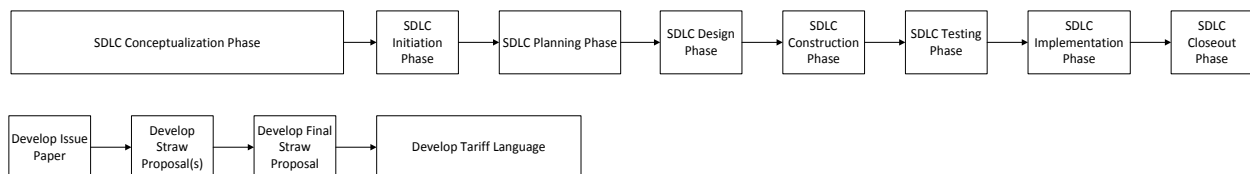
The ISO follows a standard program lifecycle for program and project management that:

- Provides a baseline set of program/project management and system development processes at the California ISO.
- References related processes and procedures for software development and integrating into the corporate standard processes, policies and procedures.
- Specifies typical deliverables.
- Offers criteria specific to project scope for monitoring and measuring the products and activities of the program/project. These are typically documented in the BRS.

This methodology based on best practices from the Project Management Institute (PMI), Carnegie Mellon’s Capabilities Maturity Model (CMMI), the Information Technology Infrastructure Library (ITIL), and the Rational Unified Process (RUP) methodologies. It is geared towards program managers, project managers, analysts, and technical staff, and it is assumed these professionals are familiar with standard Project Management and Software Development Lifecycle (SDLC) methodologies. ISO PMO methodology is posted at

[http://www.caiso.com/Documents/CaliforniaSOPProgramLifecycleMethodologyVersion1\\_7.pdf](http://www.caiso.com/Documents/CaliforniaSOPProgramLifecycleMethodologyVersion1_7.pdf)

The annual functional release is made up of projects and programs. Some projects and programs stem from regulatory policy/stakeholder initiatives and others do not. The diagram below depicts a high-level view of the SDLC process, which includes steps relating to regulatory policy/stakeholder initiatives.



The conceptualization phase is the start of the Program Lifecycle. This phase contains the work done from project request creation through the completion of the pre-inception QRB review. It is required for all market design initiatives.

The initiation phase produces a high level overview document of the project which relates to requirements and scope, which is required to determine feasibility of whether the project should proceed. The ISO also completes a full impact assessment during this phase to determine the impacts to business processes, applications, tariff, procedures, BPM, and other areas.

The planning phase defines what, when, who, and how the project will be carried out. Documents detail the scope, business objectives, and requirements of the system. The test planning and preparation also begins in this phase.

The design phase defines and documents the infrastructure, systems, and application design. Test planning is completed in this phase.

The construction phase is where the ISO builds and/or installs software and hardware components, completes test case development, and drafts training materials.

The purpose of the testing phase is to verify and validation project deliverables and prepare for implementation.

The implementation phase is where the ISO delivers all remaining project deliverables and implements the completed solution in the production environment.

The close out phase ensures formal acceptance and an orderly process for concluding the project and handing it off to the customer.

Non-policy projects also follow the SDLC process and produce the specified project deliverables per the impact assessment.

### **8.3. Quality Review Board**

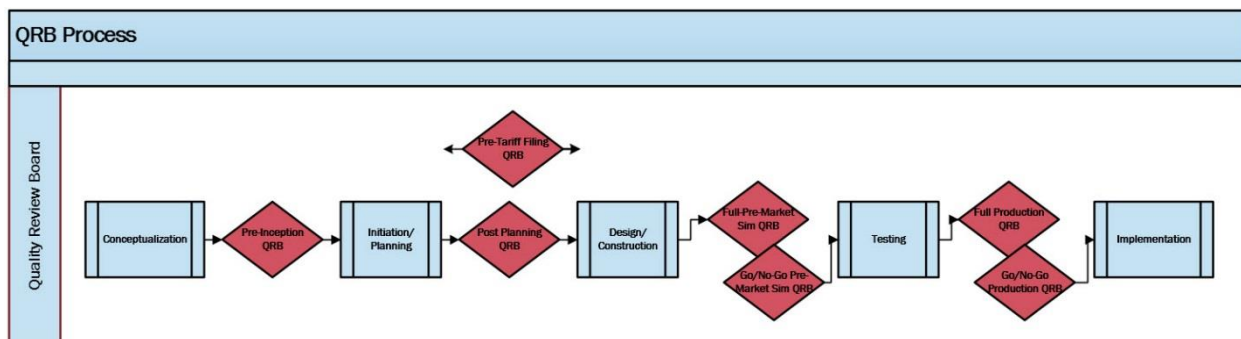
The ISO's Quality Review Board (QRB) is an enterprise-wide team that gates product readiness against promotion criteria, and approves, conditionally approves, or rejects entrance into Market Simulation and Production. The QRB is the quality control mechanism that verifies product readiness and it is the control point for review and evaluation in accordance with standards (PLC, SAS-70, and NERC-CIP). The QRB evaluates:

- Test and defect metrics
- Market simulation results
- Traceability from tariff to requirements and requirements to test cases
- Internal readiness by reviewing training records, user acceptable results and other factors
- External readiness by reviewing CIDI cases, known issues, and other feedback
- Market analysis and monitoring readiness
- Deployment and production activation support plans

The ISO shares with market participants any relevant readiness status criteria that could impact the market simulation timeline, as early as possible. Specific criteria a project must meet when considered for entrance in market simulation exercises at the Pre-Market Sim QRB include:

- Functional testing 100% executed with at least 90% pass rate and no Sev 1 or Sev 2 variances pending
- End to End Testing – 100% executed with 100% pass rate and no Sev 1, or Sev 2 variances pending
- Security testing – 100% executed and 100% passed
- No open critical defects (Sev 1, or Sev 2 – no urgent, or very high defects)
- Structured scenarios 100% execution with at least 90% pass rate
- Market simulation environment with no stability or performance issues
- No known legal impediments to moving forward
- Internal support staff confirms readiness
- List of known issues ready to publish to market participants
- Traceability: 100% coverage of tariff to requirements and requirements to test cases
- Internal training completed

- External training completed
- Market simulation plan completed/posted – final
- Implementation plan completed



## 8.4. Stakeholder Initiative Process

Stakeholder input is essential to ISO planning processes and for the success of new initiatives from policy development to implementation. The ISO is committed to providing ample opportunity for stakeholder input into our market design, implementation and infrastructure planning activities. The stakeholder process will shape the market design and policies through a series of proposals, meetings and stakeholder comments.

The implementation team typically engages during the Stakeholder Initiative Process once the Policy Lead has drafted and posted the initial straw proposal. The implementation team will initiate a new project and assign a Business Analyst and Project Manager. The Business Analyst will conduct an impact assessment which identifies the tariff, BPM, procedure, process, and system impacts based on the initiative scope. The ISO QRB reviews and approves the impact assessment prior to presentation of the initiative to the ISO Board of Governors for decision to move forward with the tariff development.



<http://www.caiso.com/informed/Pages/StakeholderProcesses/Default.aspx>

## 9. Stakeholder Implementation Interactions

**Customer Inquiries Disputes and Issues (CIDI) System** – Allows market participants to submit inquiries, disputes, and issues to the ISO for tracking and resolution.

**Customer Partnership Group (CPG)** - Forums to engage our customers in the planning, design, and implementation phases of ISO projects and applications.

**Market Performance and Planning Forum (MPPF)** - Bi-monthly face-to-face public meeting which covers a broad range of topics, including market performance, policy updates, technical updates, and release updates.

**Release User Group (RUG) Meetings** - Bi-weekly forum for market participants to discuss project milestones and deliverables. Technical issues and discussions are addressed through the TUG meetings.

**Technical User Group (TUG) Meetings** - Monthly discussion forum for participants to brainstorm and evaluate solutions for technology and process based problems for ISO development of prioritized implementation roadmaps. The group covers technical topics including process and technology design, implementation and evolution, and identifies and evaluates resolutions for technical issues. This forum will not discuss release dates, release plans, project status, or policy.

**Release Planning Page** - The Release Planning Page contains implementation information for projects in the annual functional release and also for independent projects. It includes information about RUG meetings, TUG meetings, and other release related documentation and communication.

<http://www.caiso.com/informed/Pages/ReleasePlanning/DefaultOld.aspx>

**Stakeholder Initiative Milestones** - The Stakeholder Initiative Milestones document provides a timeline view of all active initiatives in either the policy phase or the implementation phase.

<http://www.caiso.com/Documents/StakeholderInitiativeMilestones.pdf>