Outage Management Business Requirements

[Company Logo]

Table of Contents

OUTAGE MANAGEMENT PROJECT REQUIREMENTS

The following document is a business requirements document that provides a model of the features needed for a new software application. This application will replace current outage management applications. Due to confidentiality, some content including logos, workflow diagrams, figures, and tables have been removed. The company's name has also been removed.

Project Scope

The scope of this project is to replace and integrate the current outage management applications iTIRS and iTOA with a new application. The future application will allow users to (a) schedule outages, (b) create and issue switching orders, (c) create clearance/hold/recloser orders, (d) enter log entries through automation and manual processes, and (e) generate outage reports based on outage time entered into the application.

Business Requirements

Business requirements are the objectives and outcomes the company wants to accomplish.

Business requirements contain the following:

- Business Requirements
- Detailed Description
- Priority
- Notes

The title and reference id are essential in drafting business requirements. When typing the business requirement always start with the reference id first, followed by the title. The reference id is abbreviated as BR. Detailed Descriptions are a detailed description of the requirement(s). Priority is determined by rank and based on the topic's importance. There are five priority requirements utilized: critical, high, medium, low, and future. See **table 1** for a description of the priority requirements. The notes section contains any notes for stakeholders, delivery team, or partners. This helps the reader to understand the desired outcome.

Table 1. Priority Requirements Description	
Critical	Critical level requirements are critical to the success of the project. The project will not be possible without them.
High	High level requirements must be implemented to ensure that it meets the project's scope.
Medium	Medium level requirements provide some value, but the project can proceed without it.
Low	Low priority requirements consist of "nice to have" features that are implemented when time and cost allows it.
Future	Future requirements are considered out-of-scope and have been included for possible future releases.

Note: The numbers after the underscore represent each requirement created and are in sequential order.

The following table consists of the business requirements needed for accomplishing the project scope.

Business Requirement	Detailed Description	Priority	Notes
BR_001 Application Navigation	Users shall be capable of navigating the application. The application shall be user friendly and intuitive. Furthermore, it must also contain auto-saving features.	High	
BR_002 Application Performance	The application shall respond to commands with a wait time of no more than 3 seconds. The program shall be configurated to recognize issues as soon as they happen. Automatic notifications will be sent to IT support personnel and supervisors.	High	
BR_003 User Access and Profiles	Users will request access to the application through the company's program called Personal Access Manager (PAM).	High	
BR_004 User Roles	The application will store information such as user types and roles. Administrators will have the ability to configure users access to certain functions and features.	High	

BR_005 **User Dashboard**	The application will include an interactive dashboard that is configurable based on the user's role. The user will have the option to customize their dashboards with functions that pertain to their roles.	High	
BR_006 **User Settings**	The application shall recognize user settings every time the user logs into the application. These settings may include areas of responsibility, districts, queries, etc. User settings shall be changeable when the user relocates to another area or desk.	High	
BR_007 **Data Tables**	The application shall respond to API programs. This will allow the application's database to access and exchange prevalent information and records.	High	
BR_008.1 **TMS Model**	The application shall interface with the TMS model (CIM format) for selecting equipment when scheduling outages, creating switching and CHR orders, and generating outage reports. In addition, the application shall facilitate and monitor the correspondence of main devices (e.g., lines, line sections, breakers, transformers, etc.) and any associated equipment.	High	
BR_008.2 **TMS Model**	Users will be capable of manually entering future equipment into the application. This will only apply to present requests and within the TMS model.	High	
BR_009.1 **Configurable Flags/ Condition Flags/ Equipment**	The application shall be configurable in setting flags for equipment and conditions.	High	
BR_009.2 **Configurable Flags/ Condition Flags/ Equipment**	The application shall not modify any equipment attributes on work requests that are in certain states.	High	
BR_010 **Displays & Selectable Menus**	The application will consist of multiple displays and tabs that serve different functions. Displays will contain data fields, dropdown menus,	High	

	calendar/clock selections, radio buttons, etc. Fields will be further defined when modifications are required.		
BR_011 Outage Request States	The application will support work requests in various work status. This shall be configurable by the company's administrators.	High	
BR_012.1 ERCOT Interface	The application shall be capable of interfacing with ERCOT's Outage Scheduler. A separate display will be utilized for completing all ERCOT information.	High	
BR_012.2 ERCOT Interface	The application must support outage requests that are submitted outside of the application to ERCOT.	High	
BR_013.1 Notification Rules	The application shall have the capability of establishing notification rules.	High	
BR_013.2 Notification Rules	The application shall send notifications from administrators. Notifications will be configured based on schedule changes, equipment/equipment flag changes, and changes to typology processors.	High	
BR_013.3 Notification Rules	The application shall use logic to configure notifications when necessary.	High	
BR_014 Audit Trail	The application will create an audit trail of all work request activities.	High	
BR_015 Outage and Request Types	The application shall be configurable for users to select the type of outage and request.	High	
BR_016 Submission Rules	The application will be capable of setting outage request submission rules. The submitter will receive a notification when a submitted outage request does not follow the submission rules.	High	
BR_017.1 Switching Orders	Administrators will have the ability to configure a process for creating switching orders while executing other switching orders.	High	

BR_017.2 Switching Orders: Process	The process for switching orders will be independent from the work request process.	High	
BR_018 Clearance, Hold, and Recloser (CHR) Orders	The application shall allow administrators to establish a process for issuing, releasing, and managing CHR orders.	High	
BR_019 Switching Validation Logic	The application shall validate all CHRs that have been released prior to placing devices back into service.	High	
BR_020 Relating Work Requests to CHRs	The application shall be configurable in relating work requests and CHR orders to common devices.	High	
BR_021 Summary Pages	The application shall allow users to create and save multiple summary pages with different filters from queries.	High	
BR_022 Logging Capabilities	The application shall contain event, switching, and operator logs.	High	
BR_023.1 Outage Reports	The application shall use outage information (e.g., equipment, date, time, etc.) to create daily outage reports, planned reports, and unplanned reports. Reports will be emailed periodically to select recipients.	High	
BR_023.2 Outage Reports	The application shall be capable of generating reports from data tables.	High	

Functional Requirements

Functional requirements are a detailed description of the solutions for fulfilling the business requirements. These requirements consist of the functional requirements, detailed descriptions, priority, and notes. The reference id is abbreviated as FR. The following table consists of the functional requirements needed for accomplishing the project scope.

Functional Requirement	Detailed Description	Priority	Notes
FR_001.1 Application Navigation	The application will be built to function as a web application and be compatible with Google Chrome and Mozilla Firefox.	High	
FR_001.2 Application Navigation	The application shall navigate in the same manner as Windows based applications. The application shall have the capability to copy/paste, toggle forward and backward, print, zoom in and out, and respond to keyboard commands.	High	
FR_001.3 Application Navigation	Users shall have the ability to filter, sort, and search through information within a summary page.	High	
FR_001.4 Application Navigation	The application will allow more than one summary page to be opened at the same time.	High	
FR_001.5 Application Navigation	Users shall have the ability to navigate between pages, execute commands, create documents, and make log entries. This will be accomplished with minimal keystrokes and mouse clicks.	High	
FR_001.6 Application Navigation	The application shall send a warning message that alerts users to save their work before moving on to another page or tab.	High	
FR_001.7 Application Navigation	Within each page, fields will be utilized for entering data by using check boxes, radio buttons, dropdown menus, calendar/clock icons, and manual entry. Designated fields will be configurable when required.	High	

FR_001.8 Application Navigation	The application will contain the following pages and tabs: - Main - Task - Switching Orders - Work Requests - Engineering - Audit Trails - Emails The remaining can be found in **table 2** in the appendix page.	High	
FR_001.9 Application Navigation	A lock feature will be activated when a work request, switching order, and or CHR is in edit mode. Other users will not be permitted to make changes. A pop-up will appear when another user tries to make edits.	High	
FR_002.1 Application Performance	The application will be capable of responding to commands with minimal wait times (3 seconds or less). In addition, search, retrieve, and process data from an issued company laptop.	High	
FR_002.2 Application Performance	Through self-monitoring, the application will stay apprised of its health status. If issues occur, a text message or email will be sent to the appropriate users and support personnel.	High	
FR_002.3 Application Performance	The application will contain redundant servers. Redundancy will be monitored by a watchdog timer. Select users will receive notifications of the average execution time, the health of the processor, lack of ERCOT updates, etc. All TGO personnel will be able to view this information in real-time.	High	
FR_003.1 User Access and Profiles	Access to the application shall be granted from a request made in PAM. An administrator will coordinate with IT to set the approval requirements for all user roles. After approval, a user profile will be created with corporate data such as RACFID, email, phone, job title, etc. This data will be auto populated into the user's profile.	High	

FR_003.2 **User Access and Profiles**	All users will be capable of updating their user information. Coordinators and control room personnel will be given permission to change field user information. Changes to user roles will only be allowed by submitting a request in PAM.	High	
FR_004.1 **User Roles**	The application shall support various employee user roles.	High	
FR_004.2 **User Roles**	Based on the user's role(s), users will have access to certain functions and features. This will be configurable by administrators.	High	
FR_004.3 **User Roles**	All users will have the ability to view, print export, create, and save the following: - Summary Pages - Logs - Switching Orders - CHR Orders	High	
FR_005.1 **User Dashboard**	All user dashboards will initially be set to a standard default layout. All default layouts shall be configurable by administrators.	High	
FR_005.2 **User Dashboard**	Users will have the option to customize their dashboards with designated outage summaries, widgets, tools, and functions.	High	
FR_005.3 **User Dashboard**	Users shall have the ability to search and select pre-defined filters and queries within their user dashboard.	High	
FR_005.4 **User Dashboard**	All user dashboards will contain a notification box that will list all notifications.	High	
FR_006.1 **User Settings**	The application shall recognize each user's login information. User display setup will be saved and uploaded upon login.	High	
FR_006.2 **User Settings**	The application shall have a save feature for any changes that are made within the user settings.	High	
FR_006.3 **User Settings**	When a user issues or releases a CHR order, their name will auto populate into the appropriate fields.	High	
FR_006.4 **User Settings**	Usernames will be recorded and captured when changes are made within the application.	High	

FR_007 **Data Tables**	The application's data shall be accessed through APIs. Users will only be able to view the data in `read-only` mode. Unless changes are needed, the data shall remain accessible in `read-only` mode.	Med	
FR_008.1 **TMS Model**	The application shall process a new TMS model (CIM format) and any other data repositories. Changes will be done manually and periodically.	High	
FR_008.2 **TMS Model**	The application shall allow users to manually enter stations and equipment that do **not** exist in the TMS model.	High	
FR_008.3 **TMS Model**	No equipment shall be modified if they are present in active switching and CHR orders. This will be documented in an exceptions report.	High	
FR_008.4 **TMS Model**	Stations cannot be renamed or deactivated when the station's equipment is in an active switching or CHR order.	High	
FR_009.1 **Configurable Flags/ Condition Flags/ Equipment**	For each flag condition, the application will configure warnings, prompts, and notifications. Flags will be configurable by authorized users. Current flags will be added to the new application.	High	
FR_009.2 **Configurable Flags/ Condition Flags/ Equipment**	The application shall prevent modifications of equipment attributes. This will only apply to work requests that are in the *active, decline* and *complete* states.	High	
FR_009.3 **Configurable Flags/ Condition Flags/ Equipment**	Coordinators will receive an email when changes are made on equipment flags that are in the *received, approved*, and *ready* states. Notifications will also be displayed in their dashboards.	High	
FR_010.1 **Displays & Selectable Menus: Pages/Tabs**	As work requests are submitted and continued through various processes, additional tabs and pages will be used to perform other functions related to the work request. Pages and tabs shall be easily accessible.	High	

FR_010.2 Displays & Selectable Menus: Request Entry Page/Tab	The application will require a request entry page and tab. This will be the starting point for completing a work request. The display page will include fields that require data to be entered before it can be submitted. The user will have the capability to save and continue later.	High	
FR_010.3 Displays & Selectable Menus: Request Entry Page/Tab	The work request entry page shall be comprised of check boxes, radio buttons, calendar date and time selections, and drop-down menus for completing a work request. Once the request has been saved, it is assigned a state that is automatically updated throughout the work request process. Upon submitting the work request, the application will return the user back to the main page with a status update.	High	
FR_010.4 Displays & Selectable Menus: Main Page	The main page will display all information pertaining to a created work request. The page will consist of data entry fields that will be populated by various methods. See **table 2** in the appendix page for a list of all fields.	High	
FR_010.5 Displays & Selectable Menus: Task Page	The task page will comprise of a list of tasks that must be completed before a work request state can be changed. Multiple groups and users will have the ability to develop tasks in each state. Users with administrator permissions will have the ability to create, add, or update tasks.	High	
FR_010.6 Displays & Selectable Menus: Task Page	The application shall be configurable for tasks to be created for different requests, outages, and equipment types. Each task will be selected from a check box or radio button to indicate that the task has been completed.	High	
FR_010.7 Displays & Selectable Menus: Attachment Page	The application will allow users to add attachments by dragging and dropping files or adding a link as an attachment.	High	
FR_010.8 Displays & Selectable Menus: Audit Trail Page	The audit trail page will contain all past and current audit trails. Audit trails will be automated for multiple processes such as work requests, approvals, cancellations, and declines. For an extensive list of audit trail capabilities see **table 2** in the appendix page.	High	

FR_010.9 Displays & Selectable Menus: Email Page/Tab	The application shall contain an email page and tab that allows users to view email requests, switching orders, CHR orders, and attachments to recipients. Email distribution lists will be housed within the database and selectable from a dropdown menu with type and filter search features.	High	
FR_011.1 Outage Work Request States	The application shall be configurable in supporting work requests in various states. The current work request states are: - Create - Cancel - Revise - Active - Complete - Extend	High	
FR_011.2 Outage Work Request States: Changing States	Work requests transition through various state changes. Each state will define where the work request is in the process. Work requests and their work state shall be displayed within a user's dashboard.	High	
FR_012 ERCOT Interface	The application will be capable of interfacing with ERCOT's Outage Scheduler (OS). After a work or extension request has been submitted and reviewed by the outage coordination or control room team, the requests will then be submitted through the ERCOT OS for final approval. This process will be done through the ERCOT page. Each request will be under ERCOT work request states. The ERCOT statuses are the following: - Submitted to ERCOT - Received by ERCOT - Rejected - Canceled - Approved - Declined - Withdrawn	High	

FR_013.1 **Notification Rules**	The application shall send email notifications based on defined rule sets. A user with administrator permissions will have the ability to set-up notifications, select saved email groups, and generate emails without manually entering each contact. Emails will be sent to individuals, groups, and email distribution lists. A log of all email notifications will be saved.	High	
FR_013.2 **Notification Rules**	The application will generate email notifications to the appropriate group(s) when there are changes in work request states. Administrators will have the ability to configure email notifications.	High	
FR_014 **Audit Trail**	The application shall be capable of logging and auditing all changes to CHR orders, outage requests, ERCOT outage requests, and switching orders. Access to these logs will only be available in `read-only` mode.	High	
FR_015 **Outage and Request Types**	The application shall be configurable for users to select or enter the request type. Currently, the company utilizes the following request types: - Recloser - Clearance - Hold - Trip Testing Info - No Hold, Sw & Tag Required - No Hold, No Sw & Tag Required - Stay Normal - RTU/Comm - Relay	High	
FR_016 **Submission Rules**	The application shall be configurable in sending warning notifications and halting requests when certain conditions are **not** met. Not submitting the request type, equipment flag(s), dates/times, etc. will prevent the application from submitting requests.	High	
FR_017.1 **Switching Orders**	The process for generating switching orders shall be independent from the process of generating work requests. Associated data will be added to the switching order.	High	

FR_017.2 Switching Orders	Switching orders will be generated from templates imported from the generic switching database. Data from copied and submitted work requests shall also be used in creating switching orders.	High	
FR_017.3 Switching Orders	The switching order page will consist of data fields that will be populated using drop-down menus, free entry, calendar, clock, radio buttons and check boxes. Each field will be configurable in how data is entered and determining what information is needed.	High	
FR_017.4 Switching Orders	Switching orders shall be locked when they are being created, revised, or issued. This is to prevent multiple users from making edits at the same time.	High	
FR_018.1 Clearance, Hold, and Recloser (CHR) Orders	The application shall give the user the ability to create and issue CHR orders. Equipment devices shall be auto populated from created and revised work requests. A process for adding and deleting equipment devices must be included.	High	
FR_018.2 Clearance, Hold, and Recloser (CHR) Orders	Clearance/Hold/Recloser (CHR) orders shall validate opened and tagged devices based upon S&T order dates and times. If the validation is unsuccessful, the user will be prevented from completing the order and will receive a warning message.	High	
FR_018.3 Clearance, Hold, and Recloser (CHR) Orders	The application shall populate CHRs with specific verbiage designated by the company. This will allow CHR orders to be issued directly. CHR device points will also be auto populated from a work request but will have the option to be edited. Each hold order that is written shall populate with a request number and a second identifier.	High	
FR_018.4 Clearance, Hold, and Recloser (CHR) Orders	The application will prevent issuing CHR orders until all associated switching is complete. Validation will be based on location, device position, proper tag placement, and the switching orders execution date and time.	High	

FR_018.5 Clearance, Hold, and Recloser (CHR) Orders	The application will prevent the user from returning to a switching order until all CHR orders have been released (including any other requests). Validation will be based on location, device position, and the tags removed from isolation devices. The user will click the `validation` button to initiate execution by its date and time.	High	
FR_019.1 Switching Validation Logic	The application shall be capable of running validations before issuing CHR orders and closing switch orders. All listed devices shall be properly switched, tagged, and turned off.	High	
FR_019.2 Switching Validation Logic	The application shall possess a validation button for both switching order and CHR displays. To run the validation, it will utilize clearing/closing switching order dates and times, CHR issued and released dates and times, switching tags, and device tags found within TMS.	High	
FR_019.3 Switching Validation Logic	The application will be configurable in issuing warning messages to users when certain criteria(s) are not met. The program shall also be capable of accurately overriding false warning messages that are sent.	High	
FR_020.1 Relating Work Requests to CHRs	The application shall be capable of detecting the same device(s) in work requests and CHR orders. A field box will display the related devices.	High	
FR_020.2 Relating Work Requests to CHRs	The application will be capable of manually searching related work requests and CHRs. To search for related work requests and CHRs, the user will need to enter the work request number, station name, and device name and number.	High	
FR_020.3 Relating Work Requests to CHRs	When a work request or CHR order is completed or released, the application shall automatically prevent the linking of other work requests and CHRs orders.	High	

FR_021.1 Summary Displays	The application will possess multiple summary pages. The initial summary displays required are Outage request, CHR, Ready and Active, Past Due, Archived, and Calendar View. The user will have the ability to add or remove summary display columns. In addition, adjust the columns width and height.	High	At any point in time, the application will be updated to meet the company's needs.
FR_021.2 Summary Displays	Summary displays will contain links to work requests, switching orders, and CHR orders. Furthermore, they shall be exportable into Excel or generated as a PDF file.	High	
FR_022 Logging Capabilities	The application will include an operator, event, and switching log used for documenting. This should seamlessly respond to creating or editing log entries. The application should not take more than 3 seconds to respond to commands or search and filter request.	High	
FR_023.1 Outage Reports	The previous day follows a timeframe of 00:00 – 23:59 or 12:00a – 11:59p. This report shall be formatted as an HTML file and emailed daily to authorized users.	High	
FR_023.2 Outage Reports	Report templates will be uploaded as separate documents.	High	
FR_023.3 Outage Reports: Ad Hoc	The application shall give users the ability to create customized reports. Custom reports must include the following: - Date Range - Outage Type - Equipment Description - Work Center - Region - Cause Codes The interface should be similar to Microsoft Power BI.	High	
FR_023.4 Outage Reports: Ad Hoc (Email Capabilities)	The application will automatically send ad-hoc reports to designated users and personnel.	High	

FR_023.5 Outage Reports: High Voltage Breaker	The High Voltage Breaker report captures the previous day's extra-high voltage and high-voltage breaker operations.	High	
FR_023.6 Outage Reports: All Breaker Operations	The All-Breaker Operations report captures the previous day's extra-high voltage, high-voltage, and low-voltage breaker operations. The previous day follows the same timeframe mentioned in the High Voltage Breaker report. This report shall be formatted as an HTML file and emailed daily to authorized users. The current structure of the report shall be transferred over into the new application.	High	
FR_023.7 Outage Reports: Unplanned & Emergency Outages	The Unplanned & Emergency Outages report captures the previous day's station and line outages. Outage type codes are used in completing this report. The outage type codes utilized are permanent, temporary, deferred, emergency, and momentary. Outage type codes shall be configurable by company administrators.	High	
FR_023.8 Outage Reports: All-Line Outages	The All-Line Outage report captures the previous day's line outages. Permanent outages, relay fault distance, actual fault distance, and the structure of the event are reported. The previous day follows the same timeframe mentioned in the High Voltage Breaker report. This report shall be formatted as an HTML file and emailed daily to authorized users.	High	
FR_023.9 Outage Reports: NERC TADS	The company must meet NERC's regulatory requirements when reporting NERC TADS. The application shall generate on-demand reports based on NERC's criteria. Transmission standard users shall be responsible for outlining these requirements.	High	
FR_023.10 Outage Reports: NERC Line Inventory	The company must meet NERC's regulatory requirements when reporting line inventory. The application shall generate on-demand reports based on NERC's criteria.	High	

FR_023.11 Outage Reports: NERC Line Inventory	Transmission standard users shall be responsible for outlining NERC TADS reporting requirements. Due to their methodologies of creating lines, the coordination between MAXIMO and TMS is crucial.	High	
FR_023.12 Outage Reports: NERC Station Inventory	The company must meet NERC's regulatory requirements when reporting station inventory. The application shall generate on-demand reports based on NERC's criteria. Transmission standard users shall be responsible for outlining NERC reporting requirements.	High	
FR_023.13 Outage Reports: NATF Line Inventory	The application shall allow transmission standard users to generate on-demand reports based on requirements from the North American Transmission Forum (NATF). The NATF is not a regulatory body; it is a cross-utility forum that the company utilizes for benchmarking. This report shall consist of transmission line inventory requirements outlined in the NATF Line Inventory report template.	High	
FR_023.14 Outage Reports: NATF Station Inventory	The application shall allow transmission standard users to generate an on-demand report based on requirements from NATF. The NATF is not a regulatory body; it is a cross-utility forum that the company utilizes for benchmarking. This report shall consist of station inventory requirements outlined in the NATF Station Inventory report template.	High	
FR_023.15 Outage Reports: Importing	The application shall import data files, assist with data verification and cleanup. This process will be similar to the OTIS – LCRP module import function.	High	
FR_023.16 Outage Reports: Exporting	Users will have the ability to export reports as a PDF, XML, CSV, and or XSLS file.	High	

Technical (Non-Functional) Requirements

Technical Requirements are the solutions for addressing systems, infrastructure, and the architectural aspects for meeting functional and business requirements. They may include performance, physical/virtual sizing, network bandwidth, reliability, and availability. For technical (non-functional) requirements, the reference id is abbreviated as TR. The following table consists of the technical requirements needed for accomplishing the project scope.

Technical Requirement	Detailed Description	Priority	Notes
N/A	N/A	N/A	N/A

Out-of-Scope

Out-of-Scope is any information, policy, and or idea that reaches beyond any requirements from the SMEs. The Out-of-Scope section contains the Out-of-Scope Reference ID and Description. The abbreviation for this section is OOS. The following table consists of information that is outside of the project's objective(s).

Out of Scope Reference ID	Description
OOS_001 Application Navigation	There shall be an app version that is suitable for both tablets and phones. The app should perform in the same manner as the PC version.
OOS_002 User Settings	Users shall have the option to designate orders issued to or released by external TOPs. This would populate the company's controller via user information.

Assumptions & Constraints

Assumptions are any information that is known and deemed intuitive. Constraints are defined as any information that is bound by certain criteria and or restrictions. Assumptions & Constraints contain the Assumption & Constraints Reference ID, Assumption & Constraints, and Description. The reference id for this section is abbreviated as AC. The following table consists of any assumption and or constraints that affect the business requirements.

Assumption & Constraints Reference ID	Assumption & Constraints	Description
N/A	N/A	N/A

APPENDIX

Workflow Diagram's

The following has been removed due to confidentiality.

Table 2

The following has been removed due to confidentiality.

Revision History		
Implemented By	**Date**	**Change Description**
Sade Ariyibi	August 2022	-