

Outage Management System (OMS) – Feature Suggestions

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Dashboard Features

High-Level Summary Section

A top-level overview of network status with key performance indicators:

1. Total Active Outages: Current ongoing outages
2. Affected Customers: Total customers currently without power
3. Restoration in Progress: Number of outages being restored
4. Avg. Restoration Time: Mean duration for restoration
5. SAIDI / SAIFI -> Included in the reporting section

Calendar View (Planned Outages)

- Shows all planned outages on an interactive calendar.
- Color-coded by status (planned, ongoing, completed).
- Filter by branch, feeder, or transformer.
- Click to view outage details (time, area, crew, status).
- Switch between daily, weekly, and monthly views.

Interactive Maps

There are two map types.

1. Mimic diagram is showing electrical circuit view.
2. Geo views to understand physical areas.

A Geo map-based visualization to view live outages, integrating:

- Real-time markers at, PSS, feeder, or Secondary level.
- Color-coded shading for planned (blue) and unplanned (red) areas
- Clicking on a marker shows:
 - Outage area and cause
 - Start time and estimated restoration time (ERT)
 - Progress bar for each outage on the map, indicating percentage completion
 - Assigned crew and status
 - Number of customers affected

Outage Statistics Panel

1. Outage trends (7-day / 30-day view)

Line Chart - Shows a pattern of trends

Y- Number of outages per day

X- Days

2. Top 5 affected areas by outage frequency

Bar Chart - Easily shows which areas had more outages.

Y- Number of outages in each area

X- Area name

3. Outage duration by cause (e.g., equipment failure, weather, human error)

Bar Chart

Y- Average or total duration (hours)

X- Cause

Operations & Crew Monitoring

1. Crew assignment overview by area or job type
2. Task status summary (assigned / on-site / completed)

(Business Value of adding this feature

- Helps restore power faster by tracking crew work in real time.
- Shows which crews are assigned, on-site, or completed.
- Improves coordination between field teams and control room.
- Avoids sending too many crews to one area.
- Helps analyze crew performance later.
- Faster service and happier customers.)

Reliability Indices (Performance Metrics)

1. System Average Interruption Frequency Index
2. System Average Interruption Duration Index

3. Customer Average Interruption Duration Index

(Business value of adding 3rd report ,

- Shows how fast power is restored for each outage.
- Helps find areas that take too long to fix.
- Improves maintenance and planning.
- Helps keep customers happier with quicker service.)

Other Dashboard Features

1. Filters for date range, location, feeder, outage type, severity.
2. Role-based access control for user groups (branch engineer, admin, etc.)
3. Export/Print data for reports
4. Options for dark mode and auto-refresh



Use Cases

High-Level Summary Section

UC 01: Total Active Outages: Current ongoing outages

Goal

Show the count of currently ongoing outages within the selected filters.

Actors

System Operator (primary), Dispatcher, Analyst

Preconditions

- The outage system is working.
- Active status codes are set (like ACTIVE or IN_PROGRESS, but not RESTORED or CANCELLED).

Main Flow

- Outage data is fetched based on time, area, and status.
- The number of active outages is counted.
- The count is shown as a KPI.
- When hovered, a note and last updated time are displayed.
- When clicked, the outage list or map is opened with details such as ID, start time, cause, affected customers, crew, and ERT.

Alternate/Exception Flows

- A1: If no active outages, **0** is shown.
When clicked, the list view opens with the message “No active outages.”
- A2: If access is limited to certain regions, only those are counted.
A shield icon is shown with a tooltip saying “Limited by access scope.”

Data Quality Rules

- “Active” means the outage start time is before now, and restoration has not yet happened, with status in ACTIVE_SET.
- If duplicate records exist, the one with the latest status time is used.

Acceptance Criteria

- The value is the count of records with status in ACTIVE_SET within the selected filters.
- When clicked, the same filters are applied to open the detailed view.

UC 02: Affected Customers: Total Customers Currently Without Power

Goal

Show the total number of customers who are currently without power, based on the selected filters. Allow users to view more details.

Actors

System Operator (primary), Dispatcher, Analyst

Preconditions

- Outage service is available.
- Customer connection data is up to date.
- Active outage statuses are defined (e.g., ACTIVE, IN_PROGRESS).

Main Flow

- The system gets all active outages based on time, region, and status filters.
- For each active outage, count the affected customers.
- Calculate Total Affected Customers = sum of all affected customers in active outages.
- Show this number as a KPI on the dashboard.
- On hover, show a tooltip with the definition and last updated time.
- On click, open a detailed list/map showing affected customers by outage, with columns like:
 - Outage ID
 - Start Time
 - Cause
 - Number of Affected Customers
 - Assigned Crew
 - ERT (Estimated Restoration Time)

Alternate / Exception Flows

- A1: If there are no active outages, "0" is shown.
When clicked, the list view opens with the message "No customers currently without power."
- A2: If access is limited, only customers from allowed regions are shown.
A shield icon appears with a tooltip saying "Limited by access scope."

Data Quality Rules

- “Affected” means customers linked to outages with status in ACTIVE_SET and not yet restored.
- If duplicate outage records exist, use the one with the latest status update.

Acceptance Criteria

- The displayed value equals the total number of customers from outages with status in ACTIVE_SET under the selected filters.
- Clicking the KPI opens the detailed view using the same filters.

UC 03: Restoration in Progress : Number of Outages Being Restored

Goal

Show the number of outages that are currently in the process of being restored, based on the selected filters.

Actors

System Operator (primary), Dispatcher, Analyst

Preconditions

- Outage service is available.
- “In Progress” status is defined (e.g., RESTORATION_IN_PROGRESS).

Main Flow

1. The system fetches outages filtered by time, region, and status.
2. Identify outages with status = *RESTORATION_IN_PROGRESS* (or similar).
3. Count these outages.
4. Display the count as a KPI on the dashboard.
5. On hover, show a tooltip with the definition and last updated time.
6. On click, open the detailed list/map view filtered to show only restoration-in-progress outages, with columns such as:
 - Outage ID
 - Start Time

- Cause
- Assigned Crew
- Affected Customers
- ERT (Estimated Restoration Time)

Alternate / Exception Flows

- A1: If no outages are being restored, “0” is shown.
When clicked, the list view opens with the message “No outages currently being restored.”
- A2: If access is limited, only permitted regions are counted.
A shield icon is shown with a tooltip saying “Limited by access scope.”

Data Quality Rules

- “Restoration in Progress” means outages with status in RESTORATION_IN_PROGRESS and not yet marked as RESTORED or CANCELLED.
- If duplicates exist, use the record with the latest status timestamp.

Acceptance Criteria

- The value shows how many outages are being restored under the chosen filters.
- Clicking it opens the detailed view with the same filters.

UC 04: Average Restoration Time – Mean Duration for Restoration

Goal

Show the average time taken to restore outages within the selected filters.

Actors

System Operator (primary), Dispatcher, Analyst

Preconditions

- Outage service and restoration timestamps are available.
- Completed outages (with actual restoration time) are recorded correctly.

Main Flow

1. The system fetches outages filtered by time, region, and status (RESTORED).
2. For each restored outage, calculate the restoration duration:
Duration = actual_restoration_time – start_time.
3. Compute **Average Restoration Time = mean(duration of all restored outages).**
4. Display this value as a KPI (e.g., in hours or minutes).
5. On hover, show a tooltip with formula, time range, and last update time.
6. On click, open detailed view listing outages with their individual restoration times.

Alternate / Exception Flows

- **A1:** No restored outages → Show “–”; clicking opens list view with “No data available for selected filters.”
- **A2:** Limited regional access → Calculate using only allowed regions; show shield icon with tooltip “Limited by access scope.”

Data Quality Rules

- Use only outages with valid start and restoration timestamps.
- Exclude cancelled or incomplete outages.
- Handle duplicate records using the latest status timestamp.

Acceptance Criteria

- Value correctly reflects the mean restoration time of all outages restored within selected filters.
- Clicking the KPI opens a detailed data view with the same filters applied.

UC 05: SAIDI / SAIFI : Reliability Indices (Reporting Section)

Goal

Provide reliability performance metrics (SAIDI and SAIFI) in the reporting section for trend analysis and compliance.

Actors

System Operator (primary), Analyst, Regulator (reporting user)

Preconditions

- Outage service and customer impact data are available.
- Customer count and feeder mapping are up to date.

Main Flow

1. The system gathers all outage and customer data for the selected time period and region.
2. Calculate:
 - **SAIDI** (System Average Interruption Duration Index) = (Sum of all customer interruption durations) ÷ (Total customers served).
 - **SAIFI** (System Average Interruption Frequency Index) = (Total customer interruptions) ÷ (Total customers served).
3. Display SAIDI and SAIFI values in the Reporting section (not in KPI summary).
4. Allow download/export for reports.
5. On hover, show metric definitions and last updated date.

Alternate / Exception Flows

- **A1:** Missing or incomplete data → Show message “Insufficient data to calculate SAIDI/SAIFI.”
- **A2:** Restricted access → Compute only for regions the user has permission to view; show shield icon.

Data Quality Rules

- Use verified outage and customer datasets.
- Exclude cancelled or test outages.
- Ensure consistent customer base across time periods.

Acceptance Criteria

- SAIDI and SAIFI values follow standard calculation formulas.
- Metrics appear only in the reporting section and reflect selected time and region filters.

Calendar View (Planned Outages)

UC 06: Display Planned Outages on Interactive Calendar

Goal

Show all planned outages on a calendar for easy scheduling and tracking.

Actors

System Operator (primary), Dispatcher, Branch Engineer

Preconditions

- Planned outage data is available.
- Users have access to relevant region or branch data.

Main Flow

1. The system loads planned outage data for the selected time period.
2. Outages are displayed as calendar events with key info (time, area, and status).
3. Users can scroll or navigate through calendar dates.

Alternate / Exception Flows

- **A1:** No planned outages → Show empty calendar with message “No planned outages for this period.”
- **A2:** Limited access → Show only permitted branches or feeders.

Acceptance Criteria

- All planned outages appear correctly on the calendar.
- Dates and times align with actual outage schedules.

UC 07: Color-Coded Outage Status Display

Goal

Visually differentiate outage statuses using color coding on the calendar.

Actors

System Operator, Dispatcher

Preconditions

- Status values are defined (e.g., PLANNED, ONGOING, COMPLETED).
- Color mapping is configured in the system.

Main Flow

1. Calendar events are color-coded by outage status:
 - Planned → Blue
 - Ongoing → Orange
 - Completed → Green
2. Legend or tooltip explains the color scheme.

Alternate / Exception Flows

- **A1:** Unknown status → Display in gray with tooltip “Status unavailable.”

Acceptance Criteria

- Each outage is displayed in the correct color.
- Color legend is visible or accessible on hover.

UC 08: Filter Outages by Branch, Feeder, or Transformer

Goal

Allow users to narrow down the calendar view by specific branch, feeder, or transformer.

Actors

System Operator, Branch Engineer, Analyst

Preconditions

- Filtering options are configured and linked to outage data.

Main Flow

1. The user selects filters such as branch, feeder, or transformer.
2. Calendar updates to show only outages matching those filters.
3. Filters remain active until cleared or changed.

Alternate / Exception Flows

- **A1:** No results for selected filter → Show message “No outages match the selected filters.”

Acceptance Criteria

- Calendar refreshes instantly after applying filters.
- Filtered view accurately shows relevant outages only.

UC 09: View Outage Details by Clicking Calendar Event

Goal

Let users view full outage details by selecting a calendar entry.

Actors

System Operator, Dispatcher, Branch Engineer

Preconditions

- Outage details (time, area, crew, status) are stored and accessible.

Main Flow

1. The user clicks a calendar event.
2. A pop-up or side panel opens showing:
 - Outage Time and Duration
 - Affected Area
 - Assigned Crew
 - Outage Status
3. Users can close the pop-up or navigate to the full outage record.

Alternate / Exception Flows

- **A1:** Outage details missing → Show “Details not available.”

Acceptance Criteria

- Clicking an event opens the correct outage details.
- All details display accurately and consistently.

UC 10: Switch Calendar Views (Daily / Weekly / Monthly)

Goal

Allow users to change between daily, weekly, and monthly calendar views.

Actors

System Operator, Dispatcher, Analyst

Preconditions

- The calendar component supports multiple view modes.

Main Flow

1. The user selects the desired view mode (Daily, Weekly, or Monthly).
2. Calendar refreshes to show events in the chosen layout.
3. Selected mode stays active until changed.

Alternate / Exception Flows

- **A1:** No events in selected period → Show empty view with message “No outages scheduled.”

Acceptance Criteria

- Calendar switches smoothly between view modes.
- Events and time slots adjust correctly for each mode.

Interactive Maps

UC 11: Interactive Maps – Visualizing Live Outages

Goal

Provide an interactive map to view and analyze live outages in both electrical and geographical views.

Actors

System Operator (primary), Dispatcher, Analyst

Preconditions

- Map service and outage data are available.
- Real-time outage feed and network model (PSS, feeder, secondary) are integrated.
- Users have access to relevant regions or network areas.

Main Flow

1. The system loads map data with live outage information.
2. Two view modes are available:
 - Mimic Diagram: Shows electrical network layout (circuit view).
 - Geo View: Shows physical/geographical areas affected.
3. Display markers at different network levels (PSS, Feeder, Secondary).
4. Use color coding:
 - Blue → Planned Outages
 - Red → Unplanned Outages
5. When a user clicks on a marker, a detail popup appears showing:
 - Outage Area and Cause
 - Start Time and Estimated Restoration Time (ERT)
 - Progress Bar showing percentage of restoration completed
 - Assigned Crew and Current Status
 - Number of Affected Customers
6. The map auto-refreshes at regular intervals or on manual refresh.

Alternate / Exception Flows

- **A1:** No active outages → Show map with normal network view and message “No active outages.”

- **A2:** Partial access → Show only permitted areas; display shield icon with tooltip “Limited by access scope.”
- **A3:** Map data not loading → Display message “Unable to load map data” with retry option.

Data Quality Rules

- Outage markers and colors show the latest outage status.
- Map locations match the right feeders or substations.
- Progress is shown based on restoration steps or how much is completed.

Acceptance Criteria

- The map correctly shows real-time outage markers with accurate colors and details.
- Clicking a marker displays complete outage information.
- Map refresh and drill-down functions work as expected.
- Both Mimic and Geo views are available and toggle correctly.

Outage Statistics Panel

UC 12: Outage Statistics Panel – Trends and Insights

Goal

Show key outage statistics and visual trends to help users analyze outage patterns, affected areas, and causes.

Actors

System Operator (primary), Analyst, Dispatcher

Preconditions

- Outage data service is available.
- Historical outage records (at least 30 days) are stored with timestamps, area, and cause.
- Users have access to relevant regional data.

Main Flow

- The system loads and aggregates outage data within the selected time period (7-day or 30-day view).
- The panel displays multiple charts:

a. Outage Trends (Line Chart)

- X-axis: Days
- Y-axis: Number of outages per day
- Shows pattern of outages over time (e.g., daily fluctuations or peaks).

b. Top 5 Affected Areas (Bar Chart)

- X-axis: Area Name
- Y-axis: Number of outages in each area
- Highlights areas with the highest outage frequency.

c. Outage Duration by Cause (Bar Chart)

- X-axis: Cause (e.g., equipment failure, weather, human error)
- Y-axis: Average or total duration (in hours)
- Helps identify which causes lead to longer outages.

Alternate / Exception Flows

- **A1:** No data for selected period → Show empty chart with message “No outage data available for this time range.”
- **A2:** Partial access → Only show permitted regions; display shield icon with tooltip “Limited by access scope.”
- **A3:** Data loading issue → Show message “Unable to load statistics. Please refresh.”

Data Quality Rules

- Ensure timestamps, causes, and area names are consistent and validated.
- Exclude cancelled/test outages.
- For averages, use completed outages with valid start and end times.

Acceptance Criteria

- Charts show the right outage counts, times, and top areas for the chosen period.
- Hovering or clicking shows correct details or filters.
- Switching between 7-day and 30-day views updates data properly.
- Charts refresh automatically or when the user refreshes.

Operation and Crew Monitoring

UC 13: Operations & Crew Monitoring – Real-Time Crew Tracking

Goal

Provide a real-time view of crew assignments and task status to improve outage restoration efficiency and coordination.

Actors

System Operator (primary), Dispatcher, Field Supervisor, Analyst

Preconditions

- Crew management and outage systems are connected.
- Crew locations, assignments, and task status are updated in real time.
- Users have access to crew and region data.

Main Flow

- The system displays a **Crew Assignment Overview** showing crews by area or job type (e.g., repair, inspection, restoration).
- Show **Task Status Summary** with counts for:
 - Assigned
 - On-site
 - Completed
- Allow users to click on a crew or area to view more details such as:
 - Crew name and ID
 - Assigned outage or location
 - Task start time and ERT
 - Current status (e.g., on-site, en route)
- Map or table views update automatically or on manual refresh.

- Supervisors can filter or sort crews by area, job type, or task status.

Alternate / Exception Flows

- **A1:** No active crew assignments → Show “No active tasks” message.
- **A2:** Limited access → Show only permitted regions or crew groups; display shield icon with tooltip “Limited by access scope.”
- **A3:** Data not updating → Show message “Crew data temporarily unavailable” with retry option.

Data Quality Rules

- Crew and task data come from the same updated source.
- Each status change shows the time.
- Test or cancelled jobs are skipped.

Acceptance Criteria

- The dashboard shows live, correct counts for each status.
- Clicking a crew or area shows the right details.
- Data refreshes on time.
- Filters and sorting work as expected.

Other Dashboard Features

UC 14: Apply Dashboard Filters (Date Range, Location, Feeder, Outage Type, Severity)

Goal

Allow users to refine dashboard data by applying filters for date range, location, feeder, outage type, and severity.

Actors

System Operator, Dispatcher, Analyst, Branch Engineer

Preconditions

- Dashboard data service is available.
- Filter parameters are configured and linked to data sources.

Main Flow

1. The user opens the filter panel.
2. Selects one or more filter criteria (date range, location, feeder, outage type, severity).
3. The system updates all dashboard charts, KPIs, and tables based on selected filters.
4. Filter state remains active until cleared or changed.

Alternate / Exception Flows

- A1: No data found → Show “No records for selected filters.”
- A2: Invalid or expired data → Prompt user to refresh or reset filters.

Acceptance Criteria

- All dashboard panels update correctly based on filters.
- Filter selections remain consistent across the dashboard.

UC 15: Role-Based Access Control (RBAC)

Goal

Restrict dashboard data and actions based on user roles (e.g., Branch Engineer, Admin, Analyst).

Actors

Admin (primary), All Users

Preconditions

- User roles and permissions are defined in the system.
- Each role is mapped to specific data access levels.

Main Flow

1. When a user logs in, the system checks their assigned role.
2. The dashboard loads features and data according to their permissions.
 - Admin: full access
 - Branch Engineer: access limited to assigned branch
 - Analyst: read-only access
3. Unauthorized actions (e.g., export, edit) are disabled or hidden.

Alternate / Exception Flows

- A1: Role not configured → Default to minimal access; show message “Contact admin for role setup.”

Acceptance Criteria

- Users can see and do only what their role allows.
- Actions they don't have permission for are hidden or turned off.

UC 16: Export and Print Dashboard Data

Goal

Allow users to export or print dashboard data and charts for reporting or analysis.

Actors

System Operator, Analyst, Admin

Preconditions

- The user has permission to export data.
- Export service (PDF, Excel, CSV) is available.

Main Flow

1. The user selects the Export or Print option.
2. The system generates the file in the chosen format.
3. The file includes applied filters, date, and data snapshot.
4. Users can print or download the file.

Alternate / Exception Flows

- A1: User without export rights → Show message “Access restricted.”
- A2: Export service unavailable → Show “Export failed. Please try again.”

Acceptance Criteria

- Exported or printed data matches what's visible on the dashboard.
- File formats open correctly and maintain layout.

UC 17: Display Options (Dark Mode and Auto-Refresh)

Goal

Provide options for user display preferences, including dark mode and auto-refresh.

Actors

All Users

Preconditions

- Display settings and refresh configuration are available.

Main Flow

1. The user selects **Dark Mode** to switch themes.
2. User enables **Auto-Refresh** to update dashboard data automatically at fixed intervals.
3. The dashboard applies settings immediately and remembers preferences.

Alternate / Exception Flows

- A1: Theme or refresh setting not saved → Default to system theme and manual refresh.

Acceptance Criteria

- Dark mode changes interface themes instantly.
- Auto-refresh updates dashboard data accurately without manual input.
- User preferences persist between sessions.