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Utility Outage Management: SAP ISU, Digital Customer Experience, and the Critical Role of Testing

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Abstract

Utility companies in the electric and gas sectors are continually tasked with improving their response times during outages while maintaining high levels of customer satisfaction. Traditional outage management systems (OMS) and backend infrastructure like SAP ISU (SAP Industry Solution for Utilities) can struggle to meet the growing demands of digital-first, customer-centric service delivery. This paper explores how these challenges can be tackled by integrating SAP ISU with a modern digital customer experience platform. We examine the various stages of this transformation, focusing on improving customer engagement during outages, how SAP ISU enables real-time data handling, the critical role of system integration, and how comprehensive testing is critical to ensure reliability and scalability in emergency scenarios.

Keywords: SAP ISU, Outage Management System (OMS), Emergency Response, Digital Platforms, Customer-Centric Solutions, Utility Outages, Outage Credits, Real-Time Data, SAP Integration, Performance Testing, compatibility testing, Day In The Life testing

I. INTRODUCTION

The delivery of uninterrupted utility services is a primary concern for electric and gas utilities, as outages can have significant repercussions for customer satisfaction, safety, and overall service continuity. As the world moves toward more connected, digital solutions, customers now demand greater transparency, quicker responses, and proactive communication during outages.

Utility companies, particularly those managing electric and gas systems, have traditionally relied on a mix of legacy and new technologies to manage outages. However, these systems are often disconnected, leading to inefficiencies. Moreover, customers expect fast, real-time updates, and easy-to-use platforms to stay informed. To address these challenges, many utilities have embarked on a transformation to integrate their core backend systems—like SAP ISU with digital customer experience platforms and third party outage management systems (OMS). This integration provides a unified solution, enhancing operational performance while improving customer experience during outages.

This paper explores the transformation journey for utility companies that sought to improve its outage management by leveraging SAP ISU integration with digital platforms and OMS. We discuss the key benefits of these integrations, the transformation of customer experience, and the importance of testing these systems to ensure seamless, high-performance operations during emergency response scenarios.

II. CHALLENGES FACED BY THE UTILITY COMPANY DURING OUTAGES

Outages are a natural part of utility service delivery, but their management presents numerous challenges. For a large utility company, the key hurdles during outages include:

A. *Customer Communication Breakdown*

Outages result in customers losing power and essential services like heat and gas while expecting timely updates. Existing communication infrastructures face difficulties when tasked with delivering real-time updates to users. Customers demand real-time updates regarding current outages and expected service restoration times along with safety guidance.

Utilities previously depended on phone call centers and static websites to reach their customers but found these approaches ineffective during widespread power outages. The growing demand for immediate and transparent communication from customers requires utilities to develop more effective communication platforms..

B. *Lack of Real-Time Data*

Utilities must respond to outages quickly and effectively. However, outdated or siloed systems often hinder the ability to access real-time data. Real-time outage detection, progress updates, and resource allocation decisions are necessary to restore service swiftly, but many utilities have struggled with disjointed platforms that slow down decision-making.

C. *Fragmented System Integration*

A typical utility organization uses various systems for different aspects of operations: SAP ISU for customer management and billing, SAP PM for outage management from an operational perspective [1] and OMS for outage detection, and various field management systems for crew dispatching. The lack of integration between these systems can lead to delays in restoring service, inefficiencies, and errors in data handling.

D. *Manual, Error-Prone Processes*

Utility companies continue to depend on manual processes to register outages and dispatch response teams even though automation technology has advanced. Manual processes both decelerate workflow and elevate human error risks which extend outage resolution timeframes and generate customer dissatisfaction.

E. *Delayed Emergency Response*

In the event of a large-scale outage, coordinating emergency response efforts across multiple systems and departments is often chaotic. The absence of a centralized, automated system can delay the dispatch of crews, leading to longer downtime and further frustration for customers.

III. THE ROLE OF SAP SYSTEMS IN HANDLING EMERGENCY RESPONSES DURING OUTAGES

To handle these challenges, utility companies need to develop a more integrated and customer-centric approach to outage management by leveraging SAP ISU and SAP PM alongside modern outage management systems and digital customer experience platforms. SAP ISU serves as the central backend system for managing customer data, billing, and utility services, By integrating SAP ISU with outage management systems (OMS) and customer-facing digital platforms, the utility company was able to streamline operations and improve response times[4].

SAP systems, particularly SAP ISU (Industry Solution for Utilities), play a critical role in orchestrating the response to utility outages. When a disruption occurs, whether due to a storm, equipment failure, or other emergency—SAP ISU integrates seamlessly with SAP PM, outage management systems (OMS) and other customer-facing platforms to ensure a coordinated, efficient response. Below are the keyways in which SAP systems contribute to handling emergency responses:

A. Real-Time Outage Detection and Communication:

Detecting an outage constitutes the initial stage of management which requires accurate logging and communication. Through integration with OMS SAP systems can automatically identify outages utilizing data from field sensors customer reports or additional sources.

1) Customer-Reported Outages and Data Integration:

When customers report outages through digital platforms (mobile apps, website, or IVR), SAP ISU captures and logs the data in real-time and integrates it with the Outage Management System (OMS) [4]. This seamless integration allows the utility to automatically identify the affected areas, cross-reference the outage with the customer's profile, and prioritize the service response based on urgency. SAP ISU triggers workflows within OMS, categorizing the outage and efficiently allocating resources for faster resolution, ensuring that customer needs are promptly addressed.

2) Outage Status Communication:

The SAP ISU system connects with customer-facing applications to deliver outage status updates. The SAP ISU system immediately updates digital platforms with location details and restoration time estimates after logging an outage. During emergency situations clear customer communication becomes essential for expectation management.

B. Managing Work Orders and Dispatching Crews:

Once an outage is detected and reported, the next phase involves responding to the situation by dispatching field crews to address the issue. SAP ISU, in integration with OMS, plays a pivotal role in managing work orders and dispatching the appropriate crews.

1) Work Order Creation and Status Updates:

In response to an outage, the outage details are reported and sent to both the Outage Management System (OMS) and SAP ISU. Based on this information, OMS processes the outage and generates a work order, which includes key details such as the location, outage description, and required actions. This work order is then synchronized with SAP ISU, enabling seamless coordination between back-office operations and field teams. SAP PM then creates a maintenance work order for asset repairs, including specific job instructions and material requirements. As technicians perform repairs, progress updates from SAP PM are sent back to SAP IS-U, allowing customers to track real-time status on

digital platforms. These updates allow customers to view real-time progress and track outage resolution directly on the digital customer experience platforms. Once the repair is complete, the work order is closed in SAP PM, and the outage is resolved in OMS, finalizing service restoration.

a) *Resource Allocation*: SAP IS-U provides critical data to the Outage Management System (OMS), helping it prioritize work orders based on outage severity and criticality. For example, work orders associated with hospitals, critical infrastructure, or high-density residential areas are prioritized by the OMS, ensuring that the most urgent issues are addressed first.
b) *Tracking and Coordination*: As work orders are assigned to field crews, the Outage Management System (OMS) tracks the progress of these orders and updates SAP IS-U in real time. This ensures that the utility can monitor task completion, dispatch additional resources if needed, and track restoration times efficiently, with SAP IS-U providing updates for customer communication.

C. *Customer Communication and Notifications:*

One of the most vital aspects of managing an outage is ensuring clear, timely communication with customers. SAP ISU plays a key role in facilitating this communication by integrating with digital platforms to send real-time outage notifications to affected customers.

1) *Automated Outage Notifications*: SAP ISU integrates with communication systems to automatically notify customers about outages via multiple channels—SMS, email, push notifications, and IVR (interactive voice response). Notifications include important details such as the location of the outage, estimated restoration times, and safety instructions.
2) *Outage Alerts for Registered and Unregistered Users*: The SAP IS-U system provides efficient management of outage alerts to both registered and unregistered customers. The system sends personalized updates to registered customers through SMS, email or IVR and uses their stored contact information to determine these communication channels. Unregistered users can view outage status through the utility's website or app. SAP IS-U provides access to outage data for communication purposes which delivers a smooth experience for both registered and unregistered customers.
3) *Outage Credit Processing*: SAP ISU not only updates customers about outages but also applies outage credits to bills following established criteria including the duration of the disruption. Customer satisfaction depends on this because it shows how the utility maintains its dedication to fair customer compensation. The platform processes credit applications based on pre-defined rules, ensuring timely and accurate adjustments to customer bills.

D. *Integration with Emergency Response Systems:*

During emergencies, such as large-scale storms or widespread infrastructure failures, SAP ISU integrates with other emergency response systems, including Incident Management and Geographic Information Systems (GIS), to help track and manage resources efficiently [2].

1) *Geospatial Data Integration:*

The SAP ISU system works together with GIS systems to generate maps that display both outage locations and the positions of field crews alongside lists of affected customers. Through the integration

system emergency teams can respond faster with enhanced decision-making capabilities in regions that have experienced major damage.

2) Incident Management:

The integration between SAP ISU and incident management systems enables real-time logging and tracking of active outage-related incidents. SAP IS-U serves as a data provider to other systems rather than managing incidents directly to facilitate resolution tracking and issue escalation and to keep customers updated on their progress.

E. Post-Outage Restoration and Analysis:

Once the emergency situation is resolved and the outage is restored, SAP ISU ensures that restoration is thoroughly documented, and customer service continues seamlessly.

1) Work Completion and Reporting:

The system receives restoration data from SAP ISU once work orders reach completion. The system activation leads to follow-up tasks involving post-restoration assessments and customer satisfaction surveys..

2) Customer Feedback:

Customers submit service feedback after restoration work which SAP ISU records. The feedback mechanism allows the utility to evaluate its performance so it can spot areas for enhancement and develop better response strategies moving forward.

3) Outage Reporting and Analytics:

SAP ISU produces reports which support operational activities as well as regulatory requirements. The reports monitor outage duration alongside response times and the effects on customers as well as the credits that were issued. Through this analysis we can detect trends while enhancing responses to future outages and maintaining ongoing improvements in emergency planning.

IV. TRANSFORMING THE DIGITAL CUSTOMER EXPERIENCE

Utility companies must establish an advanced digital platform featuring both a mobile app and a web portal to provide customers instant access to outage news and support services. The platforms must achieve strong integration with SAP ISU and OMS which enables:

a) *Outage Reporting*: Customers can report outages through both mobile app or website. The integration with SAP ISU ensures that outage reports are immediately logged into the system and trigger the appropriate actions.

b) *Real-Time Alerts and Notifications*: Registered customers can enable outage alerts for their accounts. These alerts keep customers updated with outage progress and estimated restoration times. For unregistered users, the utility's website or app provides a way to check outage status.

c) *Streetlight Outage Reporting*: Beyond residential and business customers, the platform allows users to report issues with Streetlights, which are processed in integration with systems like **SAP PM** (Plant Maintenance), helping the utility address public infrastructure problems efficiently.

d) *Outage Map and Restoration Times:* The application and web portal present a live interactive map to track current outage statuses. Users can view affected neighborhoods and their predicted restoration timelines through the app. SAP ISU integration allows this system to access real-time information about work orders and how resources are allocated to restoration efforts.

e) *Storm Tips and FAQs*: Customers receive actionable safety information and tips from the platform to manage severe weather conditions. The platform features an ever-evolving FAQ section which answers common questions about power outages and safety protocols.

f) *Outage Credits*: SAP ISU includes automatic outage credits as a primary feature developed to provide customer rewards. The system calculates outage credits based on how long the service disruption occured to offer compensation for extended downtime periods.

V. The Importance of Testing

Given that outages can occur unexpectedly and impact large areas, it is critical that the system remains reliable under high-pressure scenarios. Performance testing plays a crucial role in ensuring that the integrated SAP ISU system and customer-facing platforms can handle large volumes of data and customer interactions simultaneously without degrading system performance. End-to-End (E2E) testing ensures that all system components work together seamlessly, from customer reporting tools to backend processing, and compatibility testing guarantees that the system functions correctly across different devices, browsers, and operating environments, providing a consistent experience for all users.

1) Critical Scenarios for Performance Testing: Performance testing simulates real-world conditions to ensure that systems operate optimally during outages. Some of the critical scenarios to be tested include*:*

a) *High Traffic and Scalability Testing:* During an outage, many customers will simultaneously access the digital platforms to report issues, track outages, or receive updates. Load testing ensures that the system can handle large spikes in traffic, processing multiple requests without slowdowns.

b) *Data Throughput Testing*: The SAP ISU system manages large quantities of data from customer records to outage reports and billing information. During peak usage times smooth data transactions between the platform SAP ISU and OMS must remain uninterrupted. Testing the system's data throughput ensures that updates and alerts are processed in real time.

2) Day-in-the-Life Scenarios:

To verify the system's robustness under real-world conditions, a series of day-in-the-life testing scenarios need to be tested. These tests simulate typical outages and high-stress situations to ensure that all systems—both backend (SAP ISU, OMS) and frontend (digital platform)—perform as expected.

a) Scenario 1: Widespread Outage Following a Storm: In this scenario, a large storm causes widespread outages across multiple regions. The simulation involves:

- *High Volume of Outage Reports*: Thousands of customers report outages simultaneously through the mobile app and web portal. Performance testing ensures that the system can handle the influx of data without delays.

- *Real-time Data Synchronization*: As outage reports flood the system, SAP ISU, OMS, and the digital platform must update in real-time to ensure that crews are dispatched promptly. This scenario tests the ability of SAP ISU to communicate with OMS to assign crews and track restoration progress.
- *Customer Communication:* The mobile app, website, and SMS system must send timely alerts, showing real-time outage locations and restoration estimates. The system should be tested to ensure updates are immediate and accurate

b) Scenario 2: Simultaneous Regional Outages: In this scenario, multiple outages occur simultaneously, affecting different regions. Performance testing ensures:

- *Automated Prioritization of Outages:* Critical outages receive automatic priority assignment from the system which results in the first restoration of essential infrastructure such as hospitals. The test evaluates SAP ISU's integration with OMS to support decision-making processes that adapt to changing conditions.
- *Data Throughput:* The system must handle multiple data streams (outage reports, customer communications, resource allocation) without delays. Load testing ensures that no data is lost during high-volume transactions.
- *Customer Impact:* The platform must calculate outage credits for affected customers based on the duration of the outage, and this is verified during testing.

c) Scenario 3: High Traffic During Peak Hours: During a storm, customers rush to the digital platform to check outage status, report problems, or inquire about restoration times. Performance testing in this scenario ensures:

- *High-Traffic Handling:* The system is stress-tested to handle millions of simultaneous users checking the outage map, receiving notifications, or reporting problems. The goal is to prevent system crashes or slowdowns.
- *Real-Time Updates:* The system must update information instantly, such as estimated restoration times or crew assignments, ensuring customers receive real-time data without delays.
- *Scalability:* The system must scale to accommodate additional users and traffic as the outage escalates.

d) Scenario 4: Post-Outage Billing and Credit Calculation: After the outage is restored, the utility needs to calculate outage credits based on the duration of the disruption. This scenario tests:

- *Automated Credit Calculation*: The system uses data from SAP ISU to automatically calculate and apply outage credits for affected customers.
- *Customer Interaction:* Customers should be able to view and confirm the outage credit applied to their accounts through the mobile app or web portal.

e) Scenario 5: Storm Tips and Public Communication: This scenario tests the ability of the system to manage communication during severe weather conditions:

- *Storm Alerts and Safety Tips*: The system pushes alerts regarding storm safety, tips for preparing for outages, and emergency contact information to customers through mobile push notifications and SMS.
- *FAQs:* The digital platform is tested to ensure that users can easily access relevant information about safety during outages, restoration times, and power safety.

3) End-to-End System Testing: During end-to-end system testing, the integration between SAP ISU, OMS, and customer-facing platforms is assessed to ensure that all systems communicate accurately and timely. This includes testing the creation and resolution of outages, logging of customer service requests, and the application of outage credits.

4) Compatibility Testing on Multiple Devices and Browsers: In addition to performance testing and sytem integration tesitng, ensuring that digital platforms are compatible across various devices and browsers is crucial for providing a seamless customer experience during outages. With the increasing reliance on mobile apps and web portals for reporting outages, checking restoration statuses, and receiving notifications, utilities must ensure that their systems perform consistently across all devices and web browsers.

To address this challenge, the utility company implemented compatibility testing using BrowserStack, a platform that allows testing on a wide range of real devices and browsers. This testing helped ensure that:

a) *Cross-Device Compatibility***:** The mobile app and web portal were tested across a variety of devices, including smartphones, tablets, and desktops, running both iOS and Android operating systems. This ensured that all customers, regardless of their device, could easily access outage information and report issues [3].

b) *Cross-Browser Compatibility:* The web portal should be tested across multiple browsers such as Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge. Testing across these browsers using tools like Browser Stack ensures that the portal functions smoothly across different browser versions, preventing any performance degradation, compatibility issues, or display inconsistencies [3].

c) *Responsive Design:* The platform's design was tested to ensure it adapts efficiently to varying screen sizes, providing an optimal user experience whether accessed on a mobile phone, tablet, or desktop computer. This is particularly important during peak traffic periods, when customers are accessing outage-related information from various devices.

d) *Real-World Simulations:* Browser Stack also enabled real-world testing by simulating actual user interactions across different environments, including network conditions and device capabilities. This allows the utility companies to identify and resolve any device- or browser-specific issues before the system was rolled out to customers.

V. CONCLUSION

The integration of SAP ISU with outage management systems and digital customer experience platforms enables utility companies to significantly improve operational efficiency and customer satisfaction during outages. By seamlessly integrating data, providing real-time updates, and automating processes, utilities can reduce resolution times, enhance communication, and ensure service continuity. Performance testing plays a crucial role in verifying these systems' ability to handle the demands of large-scale outages, ensuring scalability, data throughput, and real-time functionality without compromising performance. Ultimately, the integration of SAP ISU with digital platforms transforms the customer experience, enabling utilities to offer faster, more reliable service. To ensure continued reliability, utilities should conduct regular performance testing to simulate disaster scenarios and stress conditions, invest in system integration that connects customer-facing platforms, SAP ISU, and OMS for streamlined outage detection and resolution, and focus on scalability to handle high traffic volumes during emergencies. By continuously refining these integrations, utilities can build resilient and responsive systems, enhancing both service delivery and customer satisfaction.

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