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The Imperative for Change in Utilities

Best Practices for Enterprise Asset Management in Utilities

Updated April 2023

Document Outline

Introduction

Since the late 1990s, hundreds of utilities worldwide have implemented SAP to better support their business operations. In that same twenty-year time period, SAP's Enterprise Asset Management (EAM) solution set has evolved considerably. It is now the de-facto industry leader in terms of foundational Asset and Work Management functionality and User Experience in its most current form. Additionally, SAP EAM integrates natively with the core modules of SAP ERP.

The SAP technology environment has evolved as well with in-memory databases such as SAP HANA® providing vast improvements in processing speed, usability, and solution stability all realized since most "legacy" customers implemented SAP.

SAP S/4HANA® is positioned to carry tomorrow's digital utility well into the future. Mobile device capabilities now place SAP's rich EAM functionality in the hands of users anywhere for ease of access and a vastly improved user experience. SAP has also demonstrated commitment to the burgeoning Internet of Things (IoT) and Predictive Maintenance space with its Intelligent Enterprise Asset Management suite – capabilities to further drive the utility industry's success well into the future.

Although massive improvements have been made in technology, tools, and SAP functionality, many utilities have not kept pace with these innovations. Why?

For the most part, over the last 20 years, SAP technology changes were incremental and evolutionary, causing few utilities to adopt every change or improvement as it became available. Even progressive utilities found it difficult to justify the adoption of every feature or functional addition, as the incremental benefits realized through these improvements were modest.

For many utilities today, the result is an archaic landscape where fragmented business processes, siloed data, and intensive manual processing are considered the norm. Utilities that embraced every conceivable incremental improvement were in a constant state of flux. The result was a complicated landscape replete with best-of-breed solutions that lacked native integration and a user base suffering from acute "change fatigue." When it came to implementing enhancements for EAM, it became a no-win situation. Whether an organization embraced the changes or not, they were rarely making an impactful return on their investment.

With that kind of history, you may be wondering - why change now?

Progressive organizations are digitally transforming, and with good reasons: customer expectations for a consumer-grade user experience, increased demand for substantial risk mitigation, changes in the competitive market, and a continually evolving regulatory environment.

SAP S/4HANA brings significant increases in speed, user experience, and data analytics that can help to reinvent the energy industry and future-proof your utility business.

The Imperative for Change

STAKEHOLDERS ARE DEMANDING CHANGE

Keeping pace with the breakneck speed of technological change is particularly difficult for a longstanding, entrenched sector such as Energy and Utilities. During the past few decades, utility customers, communities, and regulators weren't very demanding of utilities, as keeping the lights on and the gas flowing was enough. More recently, however, that narrative has changed dramatically as stakeholders—customers, communities, investors, and regulators—demand more from their utility providers.

The operating environment that is now reality for many utilities is profoundly more challenging. Communities are more frequently overturning the regulated natural-monopoly utility model for community choice aggregation or municipalization models in which local governments procure power for residents. Consumers also expect a seamless and intuitive user experience from service providers, and regulators, and have imposed increasingly stringent enforcement mandates as world events—climate change, environmental rules, and natural disasters—throw their orderly regulation into chaos.

UTILITY CLIENTS MUST MAXIMIZE RETURN ON INVESTMENT

Our utility clients commonly indicate a desire to invest in programs that maximize return over the shortest timeframe possible. Regulated utilities are particularly keen on delivering business benefits reliably as regulators tend to take offsets against cost recovery embedded in customers' cost-of-service based rates. As a result, utilities require a high degree of benefit certainty, but finite three-to-four-year general rate case cycles create a time-boxed duration for benefits realization.

Operational Excellence Delivers Tangible Results

Utilities may not have needed to worry about competition in the past, but today it is a reality. As other asset-intensive industries have long known, operational excellence – consistent, efficient, strategic execution of processes with a clear focus on customer value – maximizes profitability.

Meeting and exceeding expectations requires utilities to achieve:

- Efficiency gains through consistent and predictable industry-leading business processes across the entire Asset Lifecycle
- Better and faster decision-making through data governance, stewardship, management, transparency and advanced analytics across business functions
- Improved customer service through self-service portals and customer-centric business processes and technology
- Risk mitigation through knowledge transfer and process documentation
- Improved regulator confidence through responsiveness, consistency, and reliability of data and information

Rizing believes Operational Excellence for SAP EAM utilities is a continual journey

We can learn from utilities that have evolved during their SAP journeys and continue to experience business benefits from their SAP investments. We can also draw upon emerging trends to ascertain where future improvement initiatives may be found.

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Operational Excellence With SAP Enterprise Asset Management (EAM) in a Utility Environment

Every utility is faced with a similar set of operational challenges and needs to be able to answer these fundamental questions:

- What assets do I own and maintain?
- What are the values of these assets?
- What is the current operational state of these assets, and what work needs to be performed to minimize operational costs and maximize performance?
- Where are these assets located geospatially, and is this information in sync with my SAP data?

Utilities that are considered EAM leaders have processes and integrated systems which allow them to answer these questions quickly and confidently. They have the means to access information easily, disseminate it quickly via reports, mobile devices, and scorecards, and have a regular operational cadence that allows for continual performance improvement.

A STRONG EAM STRATEGY THROUGHOUT THE ENTIRE ASSET LIFECYCLE ADDRESSES:

- Network Planning
- Asset Planning
- Portfolio Management
- Work Management / Work Delivery
- Balanced Scorecard

SAP has EAM solutions specifically designed to address these strategic focus areas and needs of the utility industry.

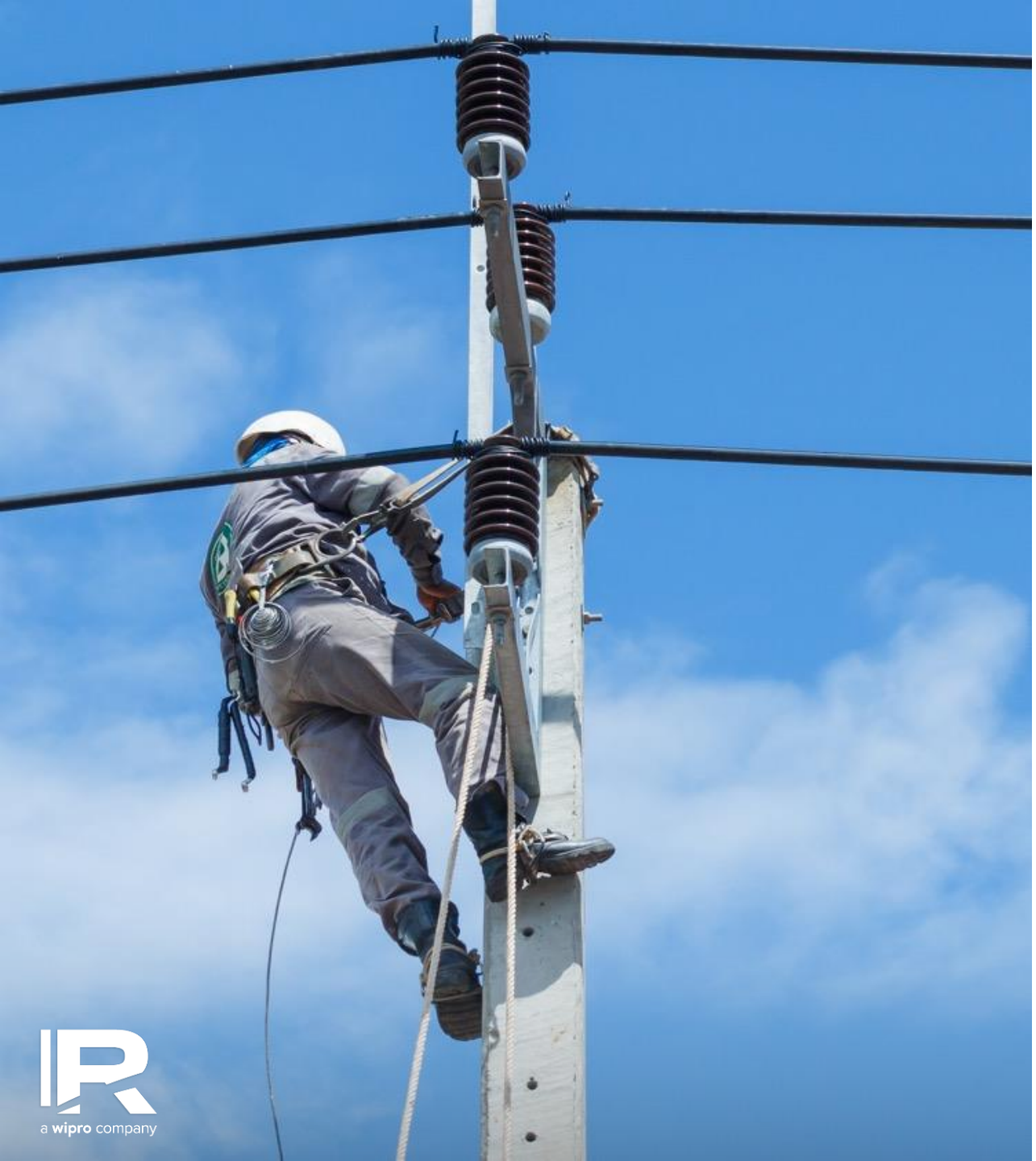
NETWORK PLANNING

Effective Network Planning needs to be highly predictive in order to guarantee an adequate supply of energy as demand rises.

Planning begins decades in advance of potential business needs. It considers asset conditions, asset criticality and risk, financial and budgetary constraints, and regulatory and customer imperatives. The SAP flagship solution for long-term Network Planning is Portfolio and Project Management (PPM).

PPM provides a powerful toolset that allows reliability and network performance engineers to evaluate and propose a slate of both capital and operations and maintenance (O&M) projects needed to maintain, improve, and expand the network as cost-effectively and efficiently as possible. PPM allows users to manage large portfolios of work and offers configurable stage gates that deliberately move projects through a scoring, prioritization and queuing process. PPM allows monitoring and evaluating of all programmatic work from concept to funding to approval to in-service to retirement. The work can also be geo-enabled for a map-based view of planned projects.

Utilities that can accurately forecast future needs in their Network Planning gain clear insights into the asset master data and are able to assess asset criticality to avoid risk and high costs from asset failures.



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Successful enterprises regard Asset Master Data as a valuable enterprise commodity, as it provides them with a fundamental understanding of asset risk and criticality.

Accurate data is a priority

Master data is fully populated, reliable, and audited within a governance structure that rigorously ensures data integrity.

Actionable data includes asset health

Master data captures crucial asset health information (current and predicted) to make data-driven decisions that drive short-term maintenance and long-term replacement strategies. The health index may be a proxy measure of risk, or risk may be captured separately to further embellish risk calculations.

The process tracks the lifecycle costs

The risk profile has a monetary value assigned to enable the monetization of network assets. This value is pertinent to the financial evaluation of solution options and the assessment of risk reduction received for the financial investment made.

Physical assets and network demand are tracked

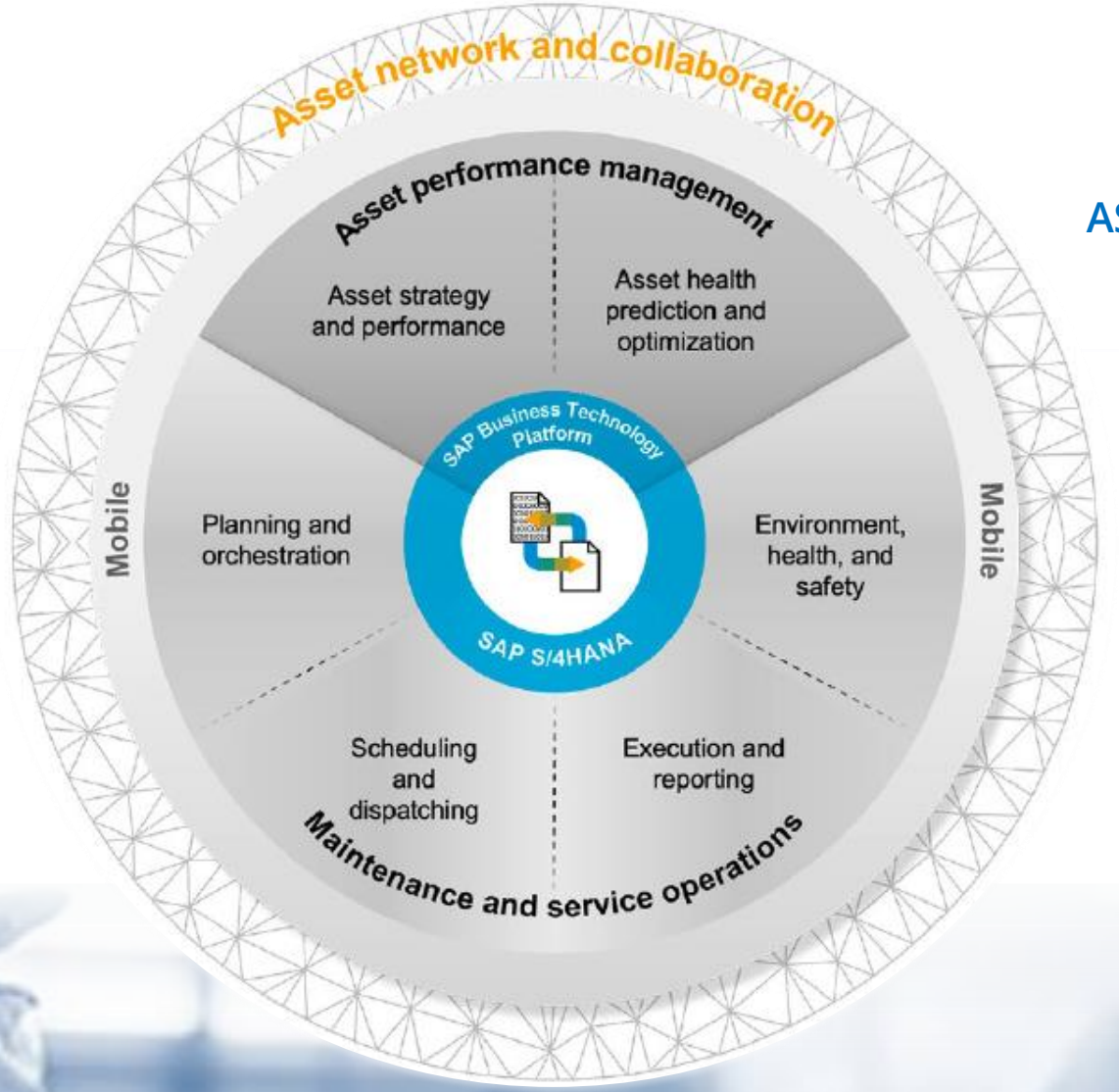
Data is used to identify potential new network connection demands and general connection trends. This data is geospatially linked to existing assets to reflect the potential scope and timing of future work.

ASSET PLANNING

Effective asset planning evaluates capital assets such as pumps, motors, pipes, power lines, etc. with the goal of operational and capital expenditure reduction.

Knowledge about operating conditions, risk, health, age, and criticality is pivotal. Asset planning increasingly focuses on predicting future conditions and potential failures. SAP supports these maintenance and replacement tasks and can be geo-enabled to aid understanding and analysis.

In recent years, SAP has made substantial investments in its Intelligent Asset Management (IAM) Suite of solutions. These IAM tools are designed to be used with SAP's Digital Core and were developed with Reliability, Asset Strategy, and use of the Internet of Things (IoT) solutions in mind.



SAP's INTELLIGENT ASSET MANAGEMENT (IAM) SUITE

Connect assets, people, and processes across planning and execution time horizons with increased insights, decision support, and control to drive efficiency, boost asset performance, and operate more safely and sustainably.

SAP Asset Performance Management

Seamlessly extend Enterprise Asset Management with Asset Performance Management along end-to-end processes to close the loop between maintenance strategy and execution to define, implement, execute and monitor the optimal asset maintenance.

Define Asset Maintenance Strategy
- Define risk and criticality for assets
- Develop maintenance strategies

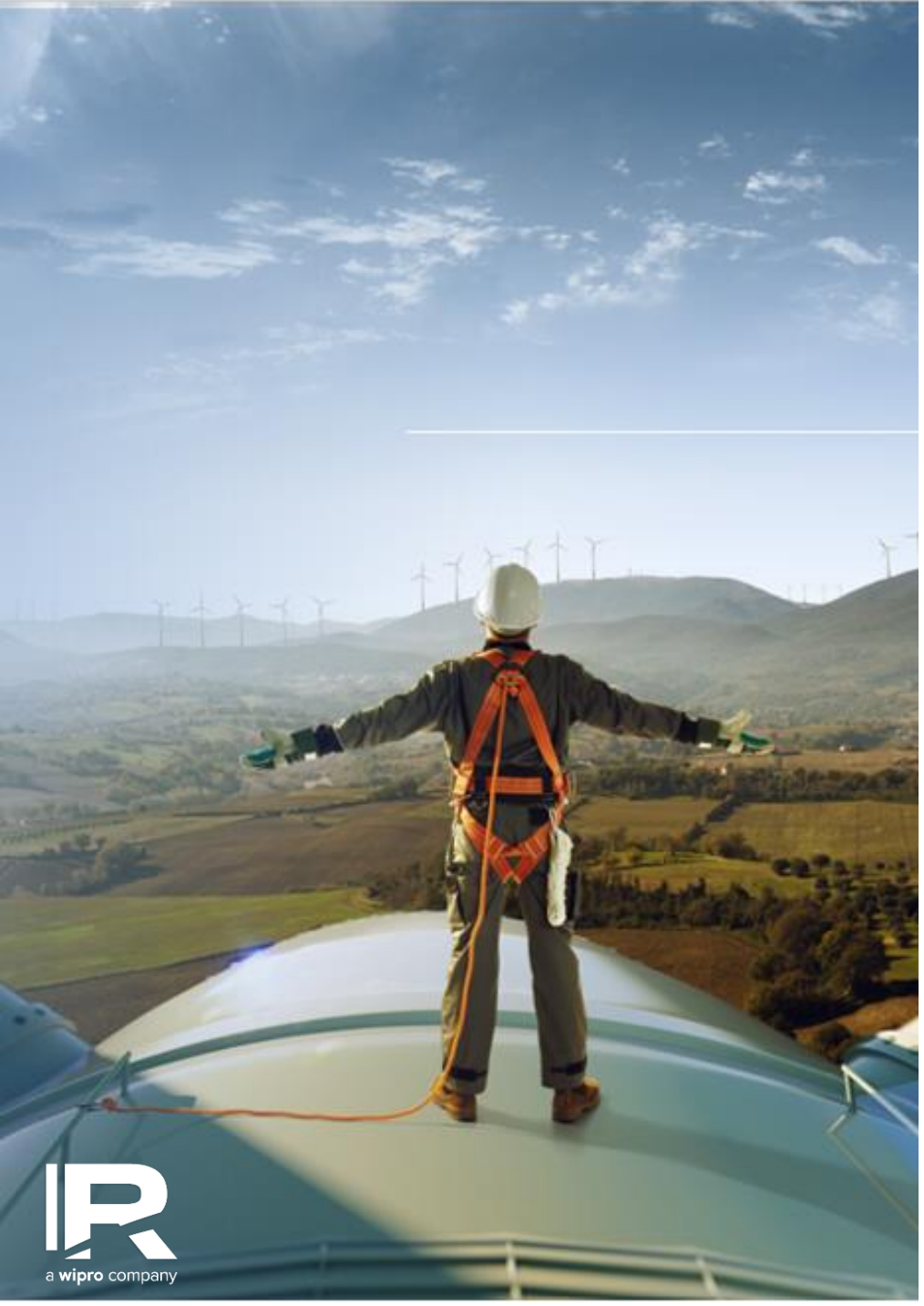
Define Maintenance Plans & Rule
- Define time- and usage-based maintenance
- Define condition-, predictive/prescriptive-, risk-based maintenance

Monitor Asset Health & Maintenance Demand
- Manage asset alerts
- Initiate/screen maintenance demand

Plan Asset Maintenance, Tasks & Resources
- Order planning including all needed resources
- Order scheduling

Perform Asset Maintenance
- Order execution (also mobile)
- Order/notification closeout

Analyze Asset & Maintenance Performance
- Analyze maintenance strategy vs execution in efficiency and effectiveness



Asset Planning Best Practices

Define a Single Asset Repository

Successful utilities have captured assets electronically into a single repository and have linked their geospatial information and SAP registries. They have a routine for determining current conditions and can readily make this data available to personnel as needed to determine key maintenance tasks against these assets. Normal asset operating conditions and tolerances are defined for each asset class; abnormal conditions, failures, and breakdown modes are documented.

Capture Core Maintenance Planning Master Data

Time and condition-based maintenance strategies and plans that reflect external and environmental factors are applied to all assets. Asset conditions are trended, and maintenance effectiveness is assessed.

Create Reliability Centric Maintenance Processes

Leading utilities efficiently leverage operational data as an input into Reliability Centric Maintenance Processes. Sensor and historian data (e.g., SCADA) are critical inputs into reliability algorithms used in solutions such as SAP Asset Performance Management.

Utilize Compatible Units

Asset information is based upon engineering design and construction standards (i.e., compatible units or CUs). It is granular enough and readily available so that advanced analytics can be timely and effortlessly run based upon a construction "baseline", which is the Compatible Unit.

PORTFOLIO MANAGEMENT

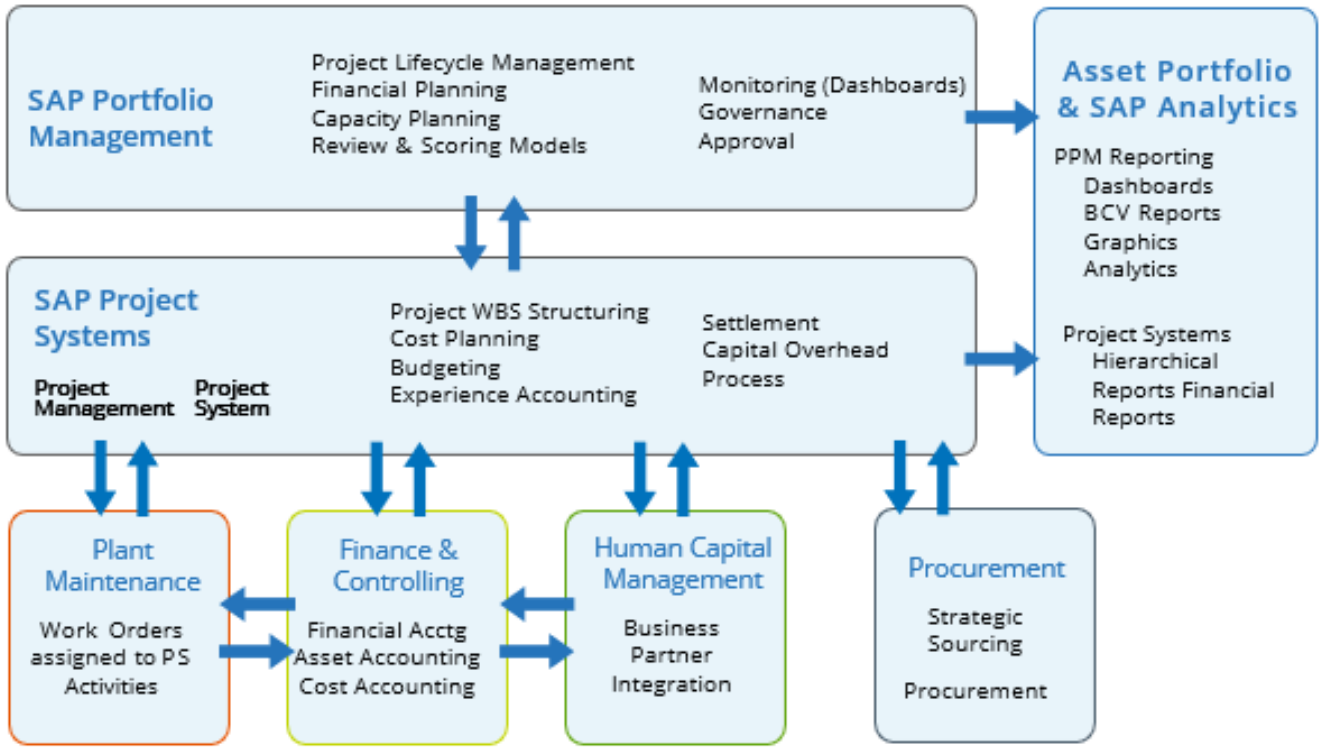
Portfolio Management leverages the project and program data created as part of the broader Network Planning processes. These initiatives inform the longer-term resource plan, and as work moves closer toward execution, resource needs are further detailed and evaluated.

As noted earlier, SAP's Portfolio and Project Management solution (PPM) ranks and scores projects and programs, can be geo-enabled, and provides approval and governance controls.

When used in conjunction with SAP's Project Systems (PS) module, it supports detailed project structuring, budget management and cost planning, expenditure control, and full cost settlements to financial Fixed Assets.

PPM and PS integration to SAP's Finance and Controlling, Human Capital Management, Procurement, and Materials Management modules ensures that portfolio data is consistent and timely.

The SAP Portfolio & Project Management (PPM) Solution



SAP's PPM solution integrates natively to Project Systems

Portfolio Management Best Practices

Project Ideation and Intake

Projects are selected using appropriate evaluation criteria, scoring and strategic alignment criteria, and quality gates and approval thresholds that are clearly modeled in SAP PPM.

Project Financial Planning, Budgeting and Forecasting

Multiple cost planning and forecasting versions and plan accuracies are used (e.g., P90, P50, +/-10% Plan to Actual, etc.).

Project Resourcing and Planned Work Data

These are available in a map view with work clearly defined geospatially across the entire service territory of the utility.

Approval for Expenditure (AFE)

Appropriate workflows and approval thresholds that are well-articulated and modeled in both SAP PPM and Project Systems.

Investment Data Organized for Successful Reporting

Data has well-defined areas of investment that are organized hierarchically and can drive detailed reporting. Areas of investment are defined and reported on across the organization by the line of business, CAPEX vs. Operations and Maintenance, Geographic Region, and/or Asset Class.

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WORK MANAGEMENT & WORK DELIVERY

This process begins with the identification of needed work programs (e.g., deteriorated pole replacement, vault repair, cable remediation) and the translation to or creation of detailed resourcing requirements necessary to satisfy these needs (i.e., human, contractual, equipment, and materials). Development of a resource plan based on specific demands follows.

Work and resource planning refers to activities to be performed such as emergency response, preventive maintenance, reliability engineering, new customer connections, and capital replacement programs. Consistent planning must be performed continually for all workgroups to ensure that necessary resources are identified, budget implications are understood, and limitations and mitigation are recognized. Once prioritized and selected, activities can be reliably executed according to plan.

These activities must be identified months or years in advance to allow sufficient time to plan for, secure and onboard needed resources. For example, the combination of a retirement "bubble" and new work-hour restrictions may necessitate an acceleration of journeyman apprentice programs or external contracting to meet the upcoming workload. By considering all work types across each line of business, the utility can preemptively deal with changes in work volume and resource constraints.

The scheduling function prioritizes work and pre-builds the manpower utilization schedule for the following shift, day, week, and month. Collaboration with stakeholders is required to schedule outages and resources. Scheduling must reflect a single shared view of all capital and O&M (both short- and long-cycle) work. It must include all related activities (e.g., right-of-way, contracts, permitting, outage scheduling, traffic control) for all craft and professional services. A tightly integrated scheduling system is vital for this effort. A geospatial view of all work and automated crew/vehicle locating is critical to optimize resource deployment and utilization.

Work Management Best Practices

Insights into all work and resources are readily available

All work is visible within the work management solution. All resources required to complete work tasks are also visible (e.g., materials, people, plant, and equipment).

Advanced analytics leverage resources more effectively. As related and adjacent work is evident in the work management process and bundled together within the work management system, progressive utilities utilize advanced analytics to modify their work execution plans to take advantage of scale economies by leveraging resources more effectively. For example, reconductoring an entire circuit and replacing all poles and transformers can be bundled instead of performing piecemeal replacement of deteriorated poles and conductors on an emergency basis. This strategy allows other work to be grouped for efficiency and removes the need for subsequent outages, permitting, or the first-responder dispatch.

Labor and material needs are easily derived from work estimates

The financial costs and resource demands for planned work are estimated using assembly or compatible units (CUs). These work estimates are derived directly from the utility's engineering, design and construction standards. They intrinsically identify labor and material needs and typically allow material requirements to be directly ordered to support job progress.

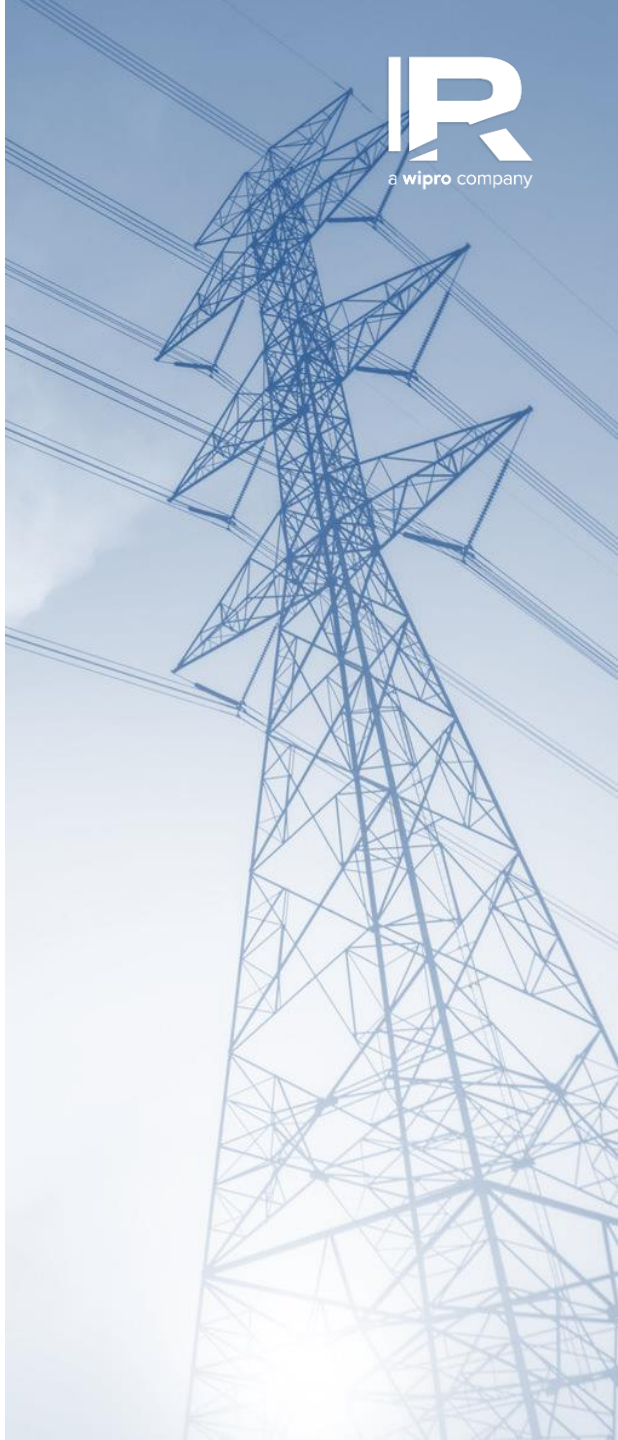
Resources can be easily assigned manually or automatically

Multiple scheduling views are utilized. These typically reflect rough cut/first pass, weekly, monthly, and annual views. Scheduling views are updated regularly, and an electronic scheduling system with automated crew-callout and crew availability self-management enables the assignment of resources manually or automatically. Job task progress on mobile devices aids in predicting job completion and crew availability for subsequent assignments or opportunity work. Customer scheduling windows can be accurately provided, and proactive customer updates on crew status can be automatically generated.

The dispatch process is streamlined

Work is dispatched, acknowledged, and accepted electronically by the assigned resource (internal or external) via a mobile device. As part of the dispatch function, employee availability is visible before dispatch by utilizing mobile devices, detailed task list progression, and automatic vehicle location. People/competencies/skills and discrete operator qualifications are linked from HR records and employee/crew self-service and are visible to dispatchers.

SAP's Field Service Management (FSM) is a cloud-based solution designed to manage planning, scheduling, and dispatching of resources in a complex environment. FSM offers simple drag and drop scheduling and can match job requirements with technician skill sets. Technicians can also be assigned to jobs from a map view by either best-fit skillset or current proximity to the job site.



Work Management Best Practices (cont.)

Advanced engineering calculations are automated by the system

Graphical Work Design (GWD) or Graphical Design Tools (GDT) are used and integrated with SAP's Compatible Units library. The Graphical Design Tool contains integrated advanced engineering calculations (e.g., pole-loading calculations, voltage-drop/flicker calculations, and cable pulling tension determination).

Additionally, tariff interpretation/application allows for automated review and consistency across the enterprise. Automated workflow and integration with SAP material management systems and asset accounting allow for true work management instead of control by virtue of budgets or accounting.

Management of safety and tailboard meetings is informed and consistent

Job safety instructions and tailboard reviews are provided and created as part of the job packet. As work progresses, the actual time is collected against the tasks that comprise the work order. Completion status is updated timely, and as-built assets are created in the system/s of record.

EAM and geospatial systems of record are tightly integrated

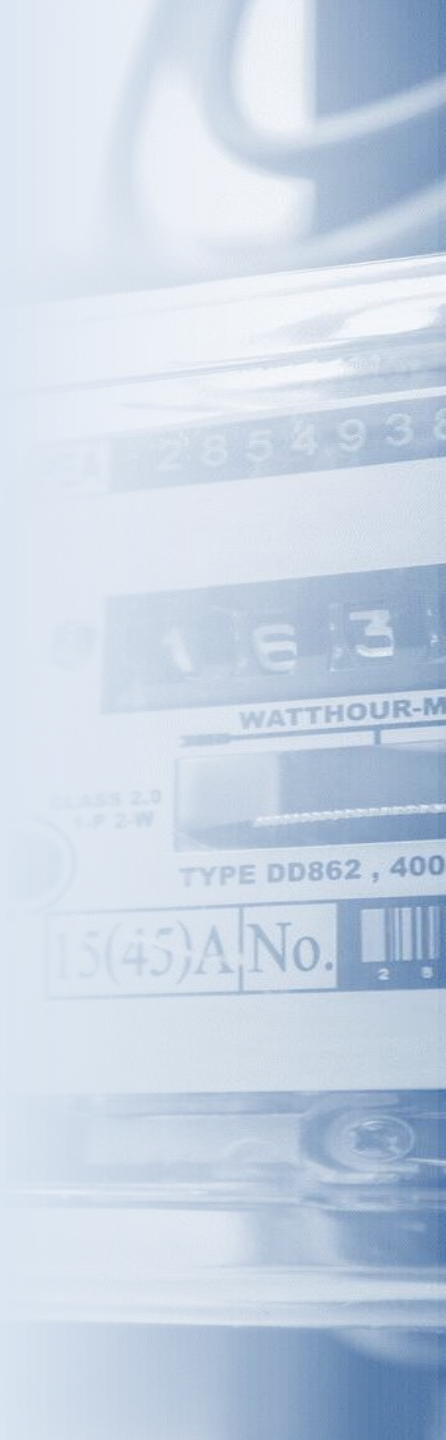
Keeping these systems aligned is critical to eliminate dual maintenance of data and reduce data quality issues. A configurable interface with parameters adhering to a utility's master data governance plan will help ensure this is both possible and sustainable.

Use of geospatial data enables work in the field as well as the office

Digital maps are available, and work can be plotted both in the office and on a mobile device in the field. Maps provide situational awareness and geographical context to maintenance planners, engineers, supervisors, and crew foremen.

SAP's Geographical Enablement Framework (GEF) is an excellent resource for users who may not need to work directly in a GIS system but require the means to perform common EAM functions (e.g., viewing assets, creating work orders) from a map within S/4 HANA.

The provision of a mobile device means that supporting materials are included in the job packet and reference material is readily available to the work crew (technical standards and maintenance instructions, for example).



BALANCED SCORECARD

A balanced scorecard (or similar enterprise level operating reporting methodology) can and should be considered the "North Star" to which an organization aligns; it should be the sustaining mechanism that continually drives operational performance.

Training and Development Operations establish the performance cadence for work. Work is identified, authorized, resource-loaded, planned, designed/engineered, scheduled, dispatched, executed, and closed within a performance management context – that is, the balanced scorecard. Every crew leader, supervisor, district manager, regional manager, director, and executive can quickly and consistently point to good (and great) performance, areas for improvement, and the individual and collective journey to Operational Excellence.

The myriad of KPIs used by most utilities should be distilled to those true Key Performance Indicators that represent, in aggregate, Operational Excellence. Often, utilities label too many metrics as KPIs. Progressive utilities select eight to ten primary metrics and group remaining KPIs into secondary and tertiary metrics. With this streamlined KPI definition, the focus on Operational Excellence is achievable.

Effective management of KPIs requires a balanced scorecard

Primary Metrics – These represent the key performance indicators that the organization should focus upon. When properly weighted and taken together in a balanced fashion, these primary metrics can be distilled to a single view for easy, relative comparison (between regions, districts, supervisors, or foremen/crew). Suggested primary metrics are shown in the chart.

Secondary/Tertiary Metrics – Secondary metrics directly influence the primary metrics. Tertiary metrics are net-level metrics that help to explain or contribute to KPI performance. Secondary and Tertiary metrics represent the next-level metrics that can be used to drill down into to further analyze the organization's performance. On average, there are three to five secondary/tertiary metrics per primary metric.

Organizational Level – The balanced scorecard should be consistent and aligned through the organization both vertically and horizontally, from the senior executive level down to the "deck plate" level where work is performed.

Balanced Scorecard – Primary metrics should be representative of organizational performance. Most importantly, they should be able to self-correct for inherent contradictions or conflict (e.g., safety versus productivity) and should be carefully orchestrated to achieve this proper balance.

Primary Metric Suggestions	Leading	Lagging
Safety (*)	•	•
Productivity (*)		•
Human Performance (e.g., CCCI or switching errors) (*)		•
Cost Effectiveness (*)	•	•
Call-Out Rate (*)		•
Non-Conformance Rate (*)		•
Schedule Adherence (*)	•	•
Customer Satisfaction (*)		•
Outage Information Scorecard	•	•
Driving Courtesy	•	
Vehicle Incident Rate		•
Storm Performance Report		•
Vehicle Telematics Report	•	•
System Reliability		•

Conclusion

Operational Excellence is imperative for utilities, many of which face aging infrastructure and outdated technologies. These issues, along with increasing pressures from regulatory requirements, changes in the competitive market, and growing demand for consumer-friendly experiences compel utilities to take a new approach.

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Contact Rizing's industry experts to empower your team to reach Operational Excellence

Lars Bergmann
Senior Vice President
Global Head Business Development
lars.bergmann@rizing.com
1+ 909-286-6578

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