Utilities Technology Council

Modernizing the Grid for an AI-Driven Future: SCE's Journey with Automation & Orchestration

Written By: Matt Deibel, Manager – Grid Automation Services at Southern California Edison

Utilities Technology Council™

Table of Contents

Utilities Technology Council™

Executive Summary

As utility companies face mounting pressure to modernize aging infrastructure, support clean energy adoption, and improve operational resilience, the need for intelligent, scalable operations has never been greater. Southern California Edison (SCE) is addressing this challenge head-on through a multi-year transformation effort that reimagines how the utility network and infrastructure are managed, maintained, and evolved.

At the heart of SCE's strategy is a commitment to operational consistency, automation, and data-driven decision making. To enable this, SCE has implemented a centralized, vendor-agnostic automation and orchestration framework that supports everything from network refresh projects to AI-powered incident response. These efforts are not only improving day-to-day reliability—they are laying the foundation for long-term scalability, cybersecurity, and intelligent grid operations.

This white paper shares lessons from SCE's journey to date, offering a practical roadmap for other utility organizations seeking to modernize their infrastructure and operations. While no two utilities are identical, the core principles—standardization, interoperability, visibility, and cross-team alignment—are broadly applicable.

Key Takeaways in this white paper:

- Why automation and orchestration are foundational to grid modernization.
- How to align architecture, operations, and AI-readiness through consistent workflows.
- What challenges and early wins SCE encountered—and how they were addressed.
- Practical guidance for utilities considering a similar transformation path.

Introduction: The Need for Transformation

The utility industry is undergoing a fundamental shift. Rising electricity demand, intensifying climate-related risks, and aggressive clean energy targets are accelerating the need for operational transformation. But for SCE, the urgency to change stems not just from external forces—it comes from within.

Internally, manual configuration processes had become a major bottleneck—too slow, inconsistent, and unsustainable for the growing complexity of the network. These inefficiencies created operational risks, reliability challenges, and fragmented data that inhibited the success of advanced analytics and AI initiatives.

Compounding the issue, SCE's infrastructure footprint was rapidly expanding. Major modernization projects such as Field Area Networks (FAN) and AMI 2.0 deployments were adding thousands of new devices and services across the grid. Yet utility affordability mandates and resource constraints meant that SCE could not simply scale operations through additional headcount. Efficiency through automation and orchestration became a critical requirement to support this growth.

At the same time, broader industry trends were amplifying external pressure:

- Regulatory expectations around cybersecurity, service reliability, and grid resilience continued to intensify.
- Customer expectations shifted toward real-time insights and faster service restoration.
- The growing push for AI-driven operations demanded high-quality, structured, and consistent data that manual processes could not reliably produce.

Maintaining the status quo posed serious risks:

- Network and infrastructure reliability would deteriorate without faster, standardized operational practices.
- Operational complexity would outpace the ability of human teams to maintain and refresh critical assets.
- Legacy systems would accumulate risk, creating vulnerabilities in supporting critical grid services.

Recognizing these converging pressures, SCE launched a comprehensive multi-year investment plan (2025–2028) focused on:

- **Grid Modernization** – Upgrading aging infrastructure to accommodate increased electricity demands.
- **Cybersecurity Enhancements** – Strengthening the grid's defenses against growing threats.

However, hardware upgrades alone were not enough. To truly modernize the grid, SCE needed to rethink how infrastructure is managed, services are delivered, and operations are scaled. This required embedding automation, orchestration, and AI-readiness into the core of its operational strategy.

Strategic partnerships with Itential, WWT, and NVIDIA are helping SCE implement this vision—starting with automation frameworks that scale across the enterprise and paving the way for next-generation AI applications that enhance reliability, operational efficiency, and incident response.

Laying the Foundation for AI-Driven Operations with Automation & Orchestration

SCE envisions a future where the grid is intelligent, self-adaptive, and capable of responding to changing conditions in real time. Initiatives like Project ORCA and the development of digital twins aim to enhance network visibility, streamline incident response, and enable predictive maintenance. However, as SCE quickly realized, the journey to AI-driven operations would require transformation across both technology and organizational culture.

On the technology side, manual configuration practices across SCE's infrastructure introduced inconsistencies and inaccuracies into operational data. This fragmented data environment significantly limited the effectiveness of advanced analytics and AI/ML initiatives, consistently undermining results. It became clear that without structured, reliable, and machine-to-machine accurate data, AI would never realize its full potential.

At the same time, SCE recognized that technology alone would not solve the problem. Organizational readiness—developing the right skills, building a culture of data quality, and fostering a mindset open to automation and AI—was equally critical. Teams needed to embrace new ways of working that prioritized structured data, consistent workflows, and cross-system integration as core operational practices.

Building this dual foundation of people and platforms became essential to SCE's strategy for enabling intelligent, adaptive grid operations.

Through its Grid Transformation Office (GXO), SCE invested early in driving organizational change, establishing:

- Education and Organizational Change Management (OCM) programs to build awareness and skill development.
- Micro-learning sessions and brown bag workshops to promote understanding across technical and non-technical teams.
- Recognition programs to celebrate impactful data stewardship and automation initiatives.
- Formal intake and prioritization mechanisms to channel automation opportunities into structured programs.

To operationalize its vision, SCE needed a technology framework that would automate repetitive tasks, orchestrate complex workflows, enforce governance, and systematically improve data quality across all infrastructure environments.

SCE distinguished clearly between automation and orchestration:

- Automation enables specific tasks to be executed without human intervention—such as configuring a device or applying a software patch.
- Orchestration coordinates these automations across systems and domains, ensuring that operations are policy-compliant, auditable, and capable of producing consistent, trusted data at scale.

Through collaboration with Itential and World Wide Technology (WWT), SCE was able to implement a vendor-agnostic orchestration platform. This platform is centered around the orchestration capabilities of Itential—built on an API-centric, reusable and modular workflow architecture—SCE created a scalable operational environment that enables it to:

- Integrate with their entire environment and orchestrate key workflows across network and infrastructure.
- Enforce governance and compliance systematically across infrastructure changes.
- Create clean, reliable datasets that advanced analytics and AI tools can trust and act upon.

This foundation ensures that SCE's operational processes not only meet today's automation needs and create the trustworthy data environment required for AI to thrive, but also fully prepare the organization to support the intelligent, adaptive grid of tomorrow.

The Starting Point for SCE

With the vision for an intelligent, adaptive grid clearly defined, and organizational foundations strengthened through GXO initiatives, SCE faced the critical next step: turning strategy into action.

Building internal alignment and creating cultural readiness was essential—but on its own, it would not deliver operational results. The success of SCE's broader transformation hinged on the ability to operationalize automation and orchestration at scale—moving from isolated ideas and pilot projects to consistent, reliable execution across the enterprise.

This transition from strategy to operational reality brought a new sense of urgency. Grid modernization programs were accelerating, and infrastructure demands were growing. The opportunity to establish AI-driven operations was real—but so were the risks if foundational operational challenges were not addressed quickly and systematically.

Key operational pain points included:

- Manual configurations that introduced operational risks and slowed infrastructure changes.
- Excessive time and effort required for activities like patching and software upgrades.
- Utility affordability pressures constraining operational scaling.
- Data quality inconsistencies undermining predictive maintenance and AI-readiness initiatives.

Internal wins and ROI justification for investment

SCE was able to demonstrate the effectiveness of internal automation efforts with a framework that captured ROI and measure metrics. These measures provided meaningful data to senior leadership resulting in an investment in people, organization, and software tools supporting automation and orchestration.

Selecting the Right Platforms and Partners

To solve these challenges, SCE partnered with WWT to conduct a structured evaluation of automation and orchestration platforms in the Advanced Technology Center (ATC) labs. The evaluation focused on solutions capable of orchestrating complex workflows,

supporting hybrid infrastructure, enforcing governance, and enabling clean, trusted data generation.

After thorough testing and validation, SCE selected:

- Itential as the orchestration platform for infrastructure automation.
- NetBox as the authoritative Source of Truth (SSoT) for network asset management.

Implementation & Initial Use Cases

With the strategic foundation in place, SCE moved quickly to operationalize automation and orchestration efforts across its network and infrastructure environments. Turning strategy into action required a deliberate focus on selecting initial use cases that would deliver tangible results, build trust across the organization, and demonstrate the scalability of the orchestration framework.

Initial Implementation Approach

The first step in SCE's implementation journey was simplifying and standardizing network environments to create a foundation for scalable automation. This included developing LAN Design Standards that unified hardware, software, and configuration practices across different operational environments. By reducing variation and complexity upfront, SCE ensured that automation efforts would be more reliable, consistent, and resilient.

With these standards in place, SCE launched its first automation initiatives, leveraging Itential's orchestration platform to govern workflows across multiple technology domains and systems.

Prioritizing Early Automation Use Cases

SCE strategically prioritized initial automation efforts that could deliver quick wins and validate the broader orchestration framework. Early automation initiatives included:

- Device onboarding and offboarding, particularly tied to network refresh programs.
- Patching and software upgrades across critical network and infrastructure systems.
- Network and infrastructure test automation to validate device readiness, ensure operational resilience, and support automated compliance patching activities.
- Centralized asset intelligence and lifecycle management by automating the consolidation of asset data into a single source of truth. This included support for lifecycle tracking and extensible metadata (e.g., geo-coordinates, warranty status, vulnerabilities, regulatory classifications) to improve visibility, compliance, and operational readiness.

- Integrated known network issues with scriptable resolutions into the ITSM platform to ensure incident traceability, auditability, and efficient escalation — with the goal of reducing MTTR and improving service reliability.

Additionally, SCE deployed LAN Automation workflows, enabling zero-touch provisioning of new network devices and orchestrating image management for hardware upgrades. This approach dramatically reduced manual effort, shortened deployment cycles, and improved consistency across the network.

Expanding Intelligence with Analytics and Assurance

Building on the success of LAN Automation, SCE introduced streaming telemetry and assurance capabilities, layering intelligence onto its automated environments. This enabled real-time anomaly detection, guided troubleshooting, and proactive incident management—further enhancing reliability and reducing downtime.

Integrating Automation with Key Services

Parallel to these infrastructure initiatives, SCE began integrating automation workflows with critical service management systems, including:

- IT Service Management (ITSM) for incident and change management.
- IP address management (IPAM) systems for dynamic network resource allocation.
- Cybersecurity tools to automate compliance validation and monitoring.

These integrations reinforced SCE's commitment to building a unified operational environment governed by a trusted, single source of truth for asset and configuration data.

Expected Outcomes & Business Impact: Defining Automation Goals

As SCE moved from initial implementation into broader operationalization, clear goals and business outcomes were defined to measure the success and value of its automation and orchestration initiatives.

Defining Automation Goals

SCE approaches automation with a strong data-driven mindset. Goals are set not only in terms of project delivery, but in measurable operational outcomes directly tied to business performance.

Key goals include:

- Achieving multi-million dollar savings in operational efficiencies, particularly through major initiatives like the network refresh program.
- Improving core KPIs such as the number of assets managed per headcount and reducing the number of incidents relative to asset growth.
- Enhancing reliability by accelerating the replacement of aging, legacy network assets.

By focusing on both financial impact and operational health, SCE ensures that automation efforts are tightly aligned to enterprise priorities around affordability, resilience, and service reliability.

Expected Operational Efficiencies and Cost Impact

Automation is expected to drive significant operational efficiencies, particularly through:

- Reducing manual effort and errors in large-scale network refresh programs.
- Allowing SCE to refresh legacy assets more rapidly, improving service reliability and reducing risk exposure.
- Supporting the ability to deploy and manage an exponentially growing asset base — including Field Area Networks (FAN), AMI 2.0 devices, and other infrastructure — without a proportional increase in staffing.

By automating repetitive and high-volume tasks, SCE anticipates meeting affordability challenges more effectively while improving grid modernization timelines.

Key Performance Indicators (KPIs) to Measure Progress

SCE will track progress against clearly defined KPIs, including:

- Cost savings generated by automation initiatives.
- Number of assets managed per headcount, demonstrating operational scaling efficiency.
- Incident rates (Priority 1/Priority 2 events) relative to asset counts, measuring reliability improvements.

These KPIs are critical for ensuring that automation and orchestration efforts remain tightly connected to broader business outcomes.

Early Indicators of Success

Even at this early stage, there are strong indicators that SCE's approach is on the right track:

- KPI trends already demonstrate the ability to manage more assets with the same or fewer resources.
- Incident rates are showing early signs of improvement as automation reduces manual configuration errors and improves overall network health.
- Organizational momentum is increasing, with growing demand from teams seeking to leverage the new automation frameworks for additional workflows.

Together, these outcomes validate SCE's strategy of building a scalable, orchestrated foundation for grid operations—one that is not only modernizing infrastructure today but preparing the organization to thrive in the future of intelligent, adaptive, AI-driven energy management.

Lessons Learned & Best Practices (So Far)

Early in the journey, SCE recognized that successful automation and orchestration efforts are shaped as much by operational realities as by technical strategy. Several key lessons have emerged that are guiding the next phases of the program.

Technical Execution Lessons

- The complexity of automation demands more than just scripts and isolated efforts—it requires mature DevOps practices, strong governance models, and the right tooling to manage workflows at scale.
- The decision to leverage a flexible, vendor-agnostic orchestration platform like Itential, rather than pursuing fully custom development, proved critical in accelerating deployment, ensuring scalability, and maintaining governance.

Organizational and Cultural Lessons

- Cultural readiness is just as important as technical capability. Without early investment in organizational change management, education, and leadership engagement, automation initiatives struggle to gain traction.
- Building momentum through small, high-impact wins created trust with leadership and helped the organization move from pilot projects to broader strategic automation programs.
- Stakeholder buy-in has evolved significantly. Early skepticism gave way to growing demand as teams saw firsthand the efficiency and reliability improvements made possible through automation and orchestration.

These lessons are helping SCE build a sustainable automation culture that balances innovation with governance and positions the organization for long-term success.

Looking Ahead: Scaling & Future Roadmap

Building on early successes, SCE is now focused on expanding the scope of automation and orchestration across new infrastructure domains, embedding governance through a formal Center of Excellence (CoE), and preparing the foundation for AI-driven, self-healing grid operations.

Expansion Across Vertical Domains

SCE's automation and orchestration capabilities will extend beyond network refresh programs into critical areas including:

- Field Area Networks (FAN)
- Compute infrastructure
- Nokia MPLS transport networks
- Firewall security systems
- Compliance validation and enforcement workflows

Scaling with Governance and Community

To maintain velocity and governance as automation scales, SCE is establishing a Center of Excellence (CoE) to:

- Formalize best practices for automation development and orchestration design.
- Empower "citizen developers" across the organization to safely contribute automations within a governed framework.
- Ensure consistent integration to the Source of Truth systems and compliance with operational standards.

Enabling AI and Intelligent Operations

Automation and orchestration will play a foundational role in SCE's broader AI initiatives, including Project ORCA, which integrates Large Language Models (LLMs) with real-time network data.

Through agentic Retrieval-Augmented Generation (RAG) models, internal AI capabilities will be able to:

- Query operational environments.
- Drive automated workflows.

- Support predictive maintenance and self-healing responses without human intervention.

To enable these capabilities, Itential will serve as the orchestration execution layer for agentic workflows. Automation workflows built in Itential can be securely exposed as APIs, allowing AI agents to discover, trigger, and manage infrastructure actions based on real-time context and policy. This integration ensures that AI-driven decisions translate into safe, compliant, and auditable operations — bridging the gap between intelligence and infrastructure.

Over time, this approach will allow SCE to scale from basic AI-assisted responses to fully autonomous, closed-loop operations across the grid.

Challenges and Uncertainties Ahead

While the roadmap is clear, challenges remain:

- Building organizational trust to support autonomous, self-healing operational models.
- Seamlessly integrating emerging AI capabilities into production systems without compromising reliability, security, or regulatory compliance.

By continuing to invest in both cultural maturity and technical excellence, SCE is positioning itself to meet these challenges and realize the full potential of intelligent grid operations.

Conclusion

SCE's experience highlights the critical factors for utilities embarking on a journey toward automation, orchestration, and AI-driven operations: culture, data quality, strategic technology investments, and leadership engagement.

Key Takeaways for Peer Organizations

- Prioritize **data quality and governance** early—poor data quality is a barrier to both automation and AI success.
- Invest in **flexible, scalable orchestration platforms**—platforms that can grow and adapt with your organization's needs.
- Focus on **cultural change and organizational readiness**—technology alone will not deliver the value.
- Secure **executive sponsorship and leadership engagement**—automation initiatives must be championed from the top to gain enterprise-wide traction.

Final Thoughts

No matter where an organization begins, the most important step is to start today. Building a foundation for automation, orchestration, and AI does not happen all at once; it is a journey of continuous improvement, fueled by small wins that create lasting momentum.

Each step forward strengthens the organization's ability to innovate, adapt, and deliver more resilient, efficient, and intelligent grid operations for the future.

To learn more about SCE, visit sce.com.
To learn more about Itential, visit itential.com.