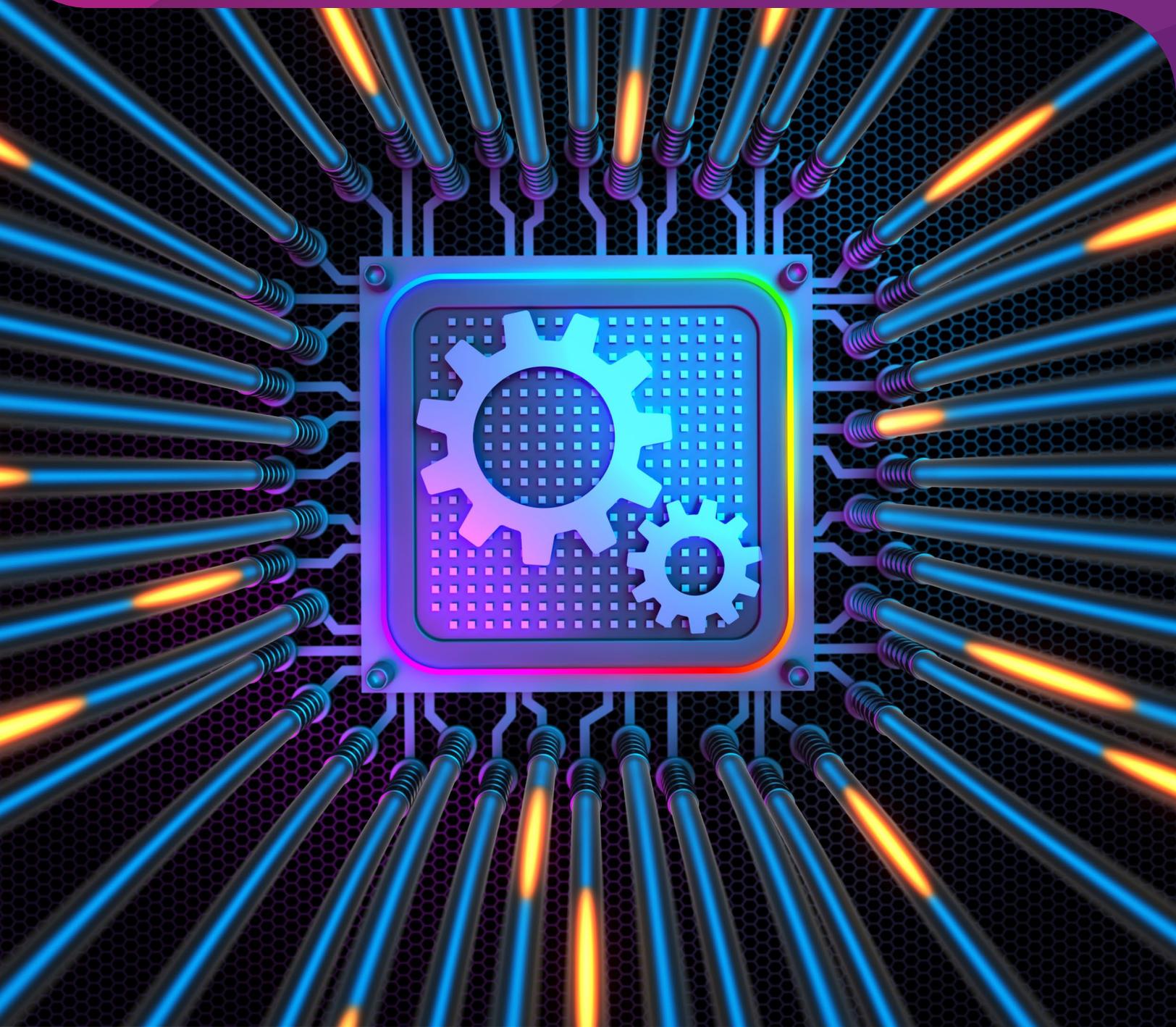# Accelerate your Network Automation Journey with Muse

Sam Bucci, Chief Operating Officer

Summary

Automating network operations can significantly reduce operating costs, enhance customer retention, and improve competitiveness. A study by Analysys Mason[1] indicates that automation can lower operational costs by up to 56% through more efficient network provisioning, configuration, deployment, and management. Furthermore, the study shows a 10% increase in revenue resulting from faster service activation.

Despite these advantages, the widespread implementation of automation takes time due to the complexity and expense associated with deploying new automation software, tools, and processes while minimizing the impact on ongoing network operations.

A significant part of the response to this challenge is low-code platforms, which are becoming a transformative force in simplifying software application development. These platforms enable network operations personnel with limited coding expertise—known as citizen developers—to implement and manage automated workflows, as well as other network operations tasks.

Ribbon is a leader in implementing low-code platforms, incorporating them as a fundamental part of our Muse IP Optical Multilayer Automation Platform (MAP). From its inception, Muse has been conceived as a network automation platform, offering a comprehensive suite of applications for network control, analysis, design, and planning. These applications significantly simplify the introduction of network automation within IP Optical Networks.

This paper explores the advantages of IP Optical network automation and explains how Muse automates and streamlines various network operations using its low-code platforms. It concludes with a use case illustrating how these elements can function together to achieve advanced closed-loop service provisioning.

[1] Quantifying the Benefits of Optical Network Automation, Analysys Mason, January 2024

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Basics of IP Optical Network Automation

Automation is the application of technology to configure and control an IP Optical network with little human involvement. There are two types of automation.

Standardized automation is based on industry standards developed over many years and has essentially become an extension of the network. Examples include A-Z provisioning (auto-routing), Zero Touch Provisioning (ZTP), and Wavelength Switched Optical Networks (WSON). Network operators apply this type of automation uniformly.

Customized automation provides unique or tailored implementations that address the requirements of service providers based on their specific network engineering and operational methodologies. **This paper focuses on customized automation**.

Here, the role of network operations staff shifts to managing automated operations rather than performing tedious tasks, making them more productive and greatly reducing human error. While customized automation may use standard mechanisms like telemetry to obtain network data, how automated routines handle this information varies for each operator.

Table 1 provides examples of how customized automation (hereafter referred to as automation) can assist service providers in addressing profitability challenges throughout the network operations lifecycle.

| Operations Area	Automation Examples	Benefits
Network Planning and Engineering	• Synchronize information on actual deployed network resources with database views • Continuously monitor network resource use and trends and identify where improvements are needed • Deploy equipment and update software rapidly and accurately	• Optimized use of Capex • Reduced operating costs
Service Delivery and Assurance	• Assist in designing and testing new services • Provision services with minimal human intervention (closed-loop service provisioning) • Continuously monitor service performance • Correct deficiencies preemptively • Understand outage impacts on services and prioritize restoration activities • Perform bulk service moves	• Higher revenues • Faster time to revenues • Higher customer satisfaction
Network Health and Maintenance	• Monitor network health and trends, and detect impending problems • Continuously monitor and optimize equipment performance • Correct impending problems preemptively • Pinpoint the root cause of hard failures and intermittent problems • Reconfigure the network upon failures to maintain service availability, and later manage reversions to previous configurations	• Higher network availability • Reduced operating costs

Table 1 – Network Automation Benefits and Examples

Low-Code Platforms Help Solve the Automation Challenge

Conventional methods of software development require extensive custom development, dependence on professional services, and numerous revisions.

Low-code software development platforms address this challenge. They use intuitive graphical interfaces, drag-and-drop tools, and pre-built templates, allowing people with limited coding skills, known as citizen developers, to create quality applications. This approach speeds up time to market, reduces development costs, and simplifies collaboration.

Although the low-code concept has existed for some time, it has only recently achieved a level of maturity capable of supporting sophisticated, robust, and maintainable applications. Network operations personnel can now utilize low-code platforms to independently automate processes based on their priorities, without relying on extensive custom software development projects.
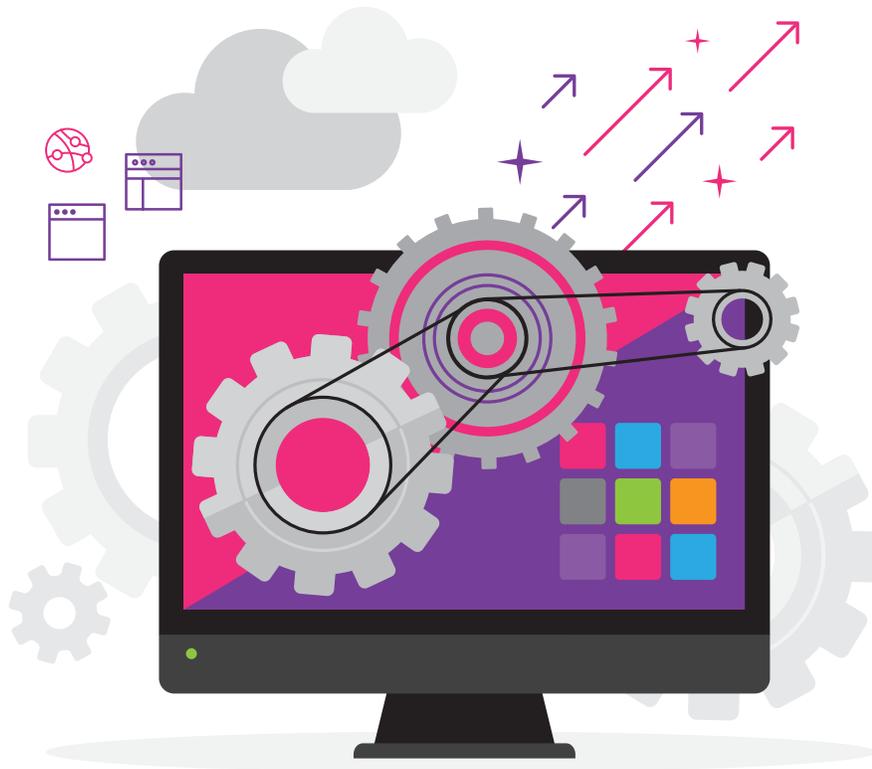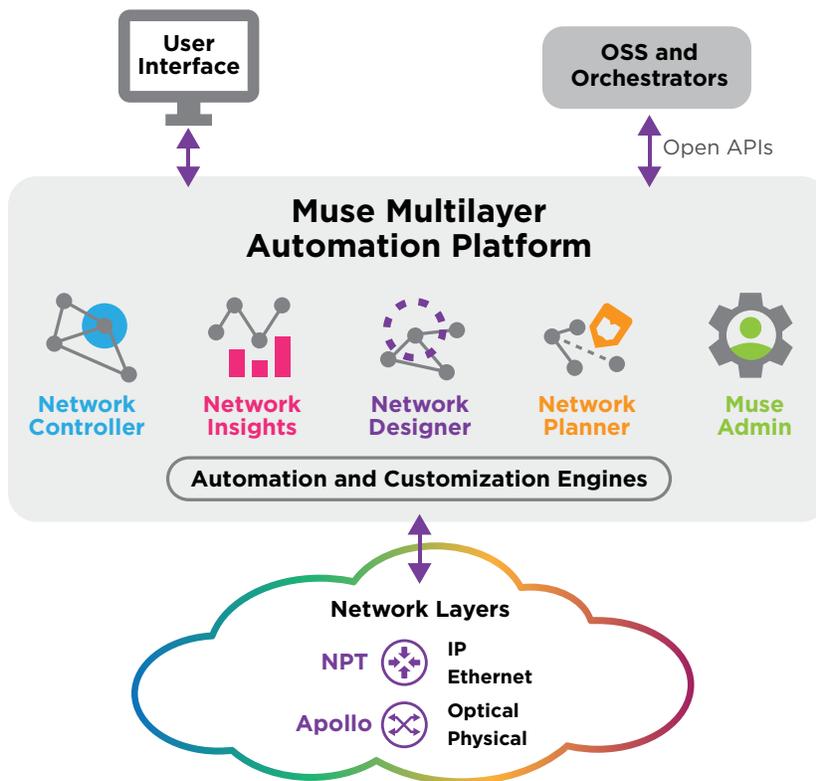
Muse Multilayer Automation Platform (MAP)

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Reasons that Muse excels in implementing low-code platforms include:

• Muse low-code platforms operate seamlessly across all network layers, L0 to L3.

• Muse low-code platforms are a native part of Muse's ecosystem; they are not an external add-on capability. The low code capabilities can call on each other and have native access to all network data.

• Muse low-code platforms integrate smoothly with other systems. For instance, Muse automated workflows can be initiated from external systems via APIs and are capable of executing API/SSH commands on other systems.
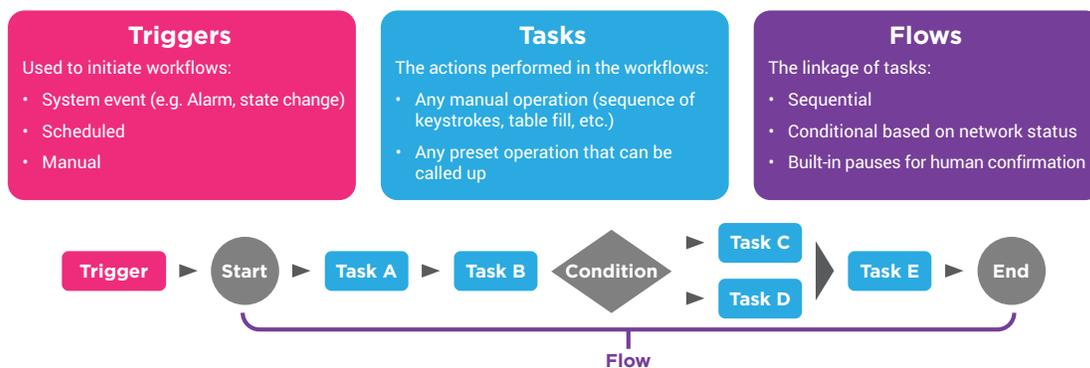

Figure 1: Muse Multilayer Automation Platform (MAP)

Moreover, Muse applies low-code capabilities across the entire operations lifecycle.
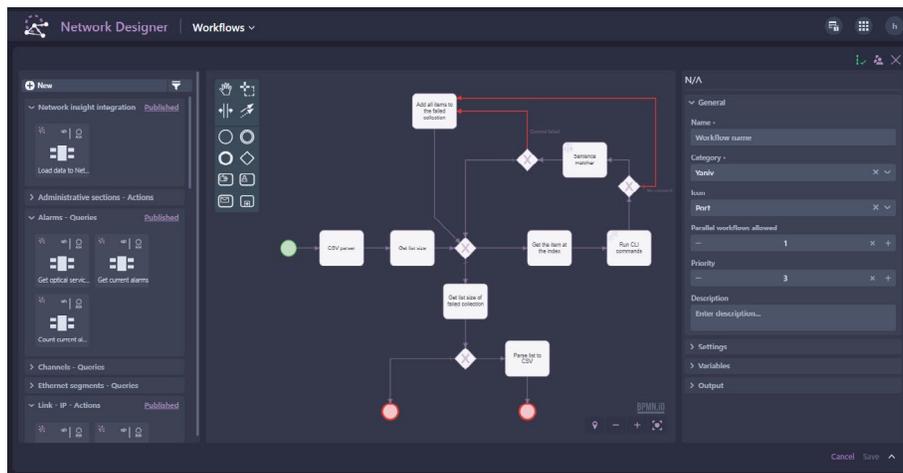
Workflow Automation

Muse low-code workflow automation allows service providers to implement automation at their own pace. Figure 2 illustrates the extensive capabilities that operators have to set execution triggers, define tasks, and manage workflows. *Any operational sequence can be converted into an automated workflow.* Crucially, these workflows can undergo comprehensive testing before activation, ensuring that operators have confidence in their performance. This assurance can be achieved, for instance, by incorporating pauses for confirmation, which may be eliminated over time as familiarity and trust in the system grow.

Triggers
Used to initiate workflows:
- System event (e.g. Alarm, state change)
- Scheduled
- Manual

Tasks
The actions performed in the workflows:
- Any manual operation (sequence of keystrokes, table fill, etc.)
- Any preset operation that can be called up

Flows
The linkage of tasks:
- Sequential
- Conditional based on network status
- Built-in pauses for human confirmation

Trigger ► Start ► Task A ► Task B ► Condition ► Task C / Task D ► Task E ► End

Flow

Figure 2: Muse Low-Code Automation Process

Figure 3 shows a screenshot of Muse workflow automation.


Figure 3 – Workflow Automation Screenshot

Service Creation

Muse offers a comprehensive catalog of pre-defined templates for L0-L1-L2-L3 services, suitable for provisioning individual customer services and network slice service classes. These templates enhance time-to-market efficiency, support the design of innovative new services, and minimize human errors by specifying all permissible service parameters and default values, including:

- Global Parameters – Topology, Protection, Scale, etc.
- End-Points Parameters – Interface Role, VLANs, Optical Channel, etc.
- Rates and Bandwidth – Bandwidth and QoS profiles, OTN rates, etc.
- Path Computation – Path metrics (latency, number of hops, etc.), Include/Exclude admin-sections, etc.
- SLA and Assurance – KPI thresholds, Assurance test schedules, etc.

Muse low-code tools allow operators to modify existing service templates and create new ones from scratch. Figure 4 presents a Muse Service Template screenshot highlighting L2VPN Services.
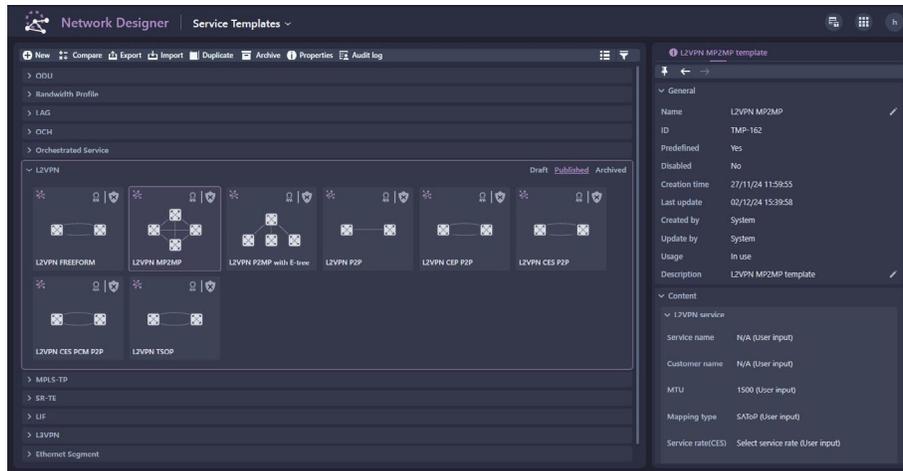

Figure 4 – Muse Service Template Screenshot highlighting L2VPN Services

Network Design

Muse low-code node design templates enable operators to model and incorporate 3rd-party network equipment in a network design, including DWDM platforms, OTN switches, IP routers, and microwave radio gear. All nodes and equipment can be integrated into the network control topology and services and can be managed via dedicated southbound interfaces.

Figure 5 shows a Muse Node Template screenshot. The templates' extensive modeling tools enable users to:

- Model any related sub-entities – Traffic cards, common cards, transceivers, etc.
- Illustrate the node's physical properties – Size, number of slots, supported ports, etc.
- Define the node's capabilities – Functional technology, supported protocols, available service types, etc.
- Map SNMP MIBs for end-to-end alarm monitoring
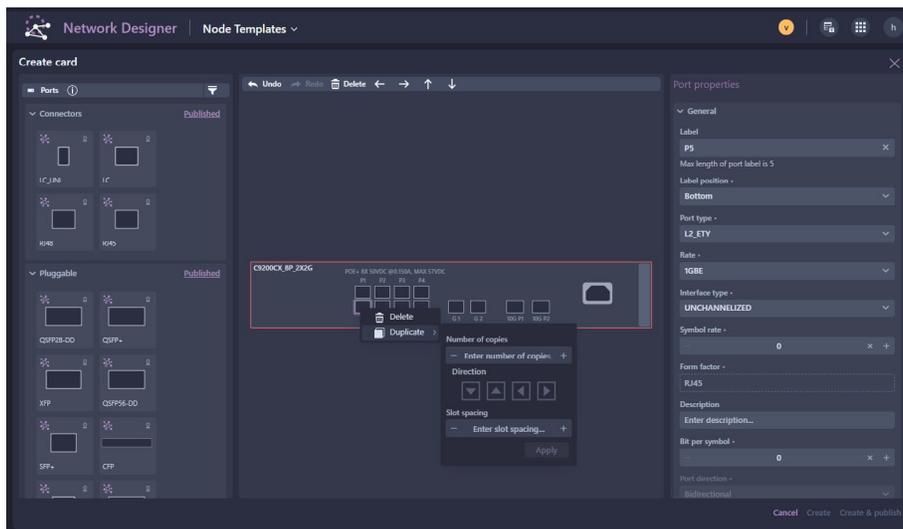
Figure 5 – Muse Node Design Template Screenshot

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Network Insights (Analytics)

Muse Network Insights transforms raw data into actionable information, assisting network operators to effectively operate and optimize their networks. Additionally, it provides inputs for automated workflows. Figure 6 presents an overview of the Network Insights architecture.
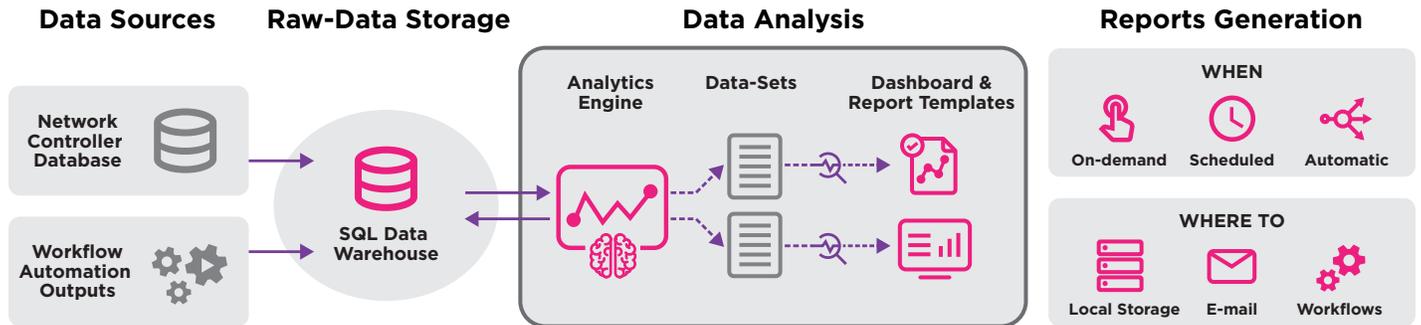

Figure 6 – Muse Network Insights High-Level Architecture

Muse data sets encompass physical, logical, and service inventories, as well as OTN and IP services performance, and alarms. Users have the ability to write their own SQL queries to generate custom data sets. Pre-defined dashboards and reports address various aspects of network and service inventory, performance, availability, and utilization. Utilizing Muse's low-code tools, operators can modify these dashboards and reports or create new ones from scratch. Figure 7 provides a screenshot of chart creation.

By enabling the customization of data sets and data presentation, Muse offers network operators a sophisticated intelligence tool to maximize the value of their networks.
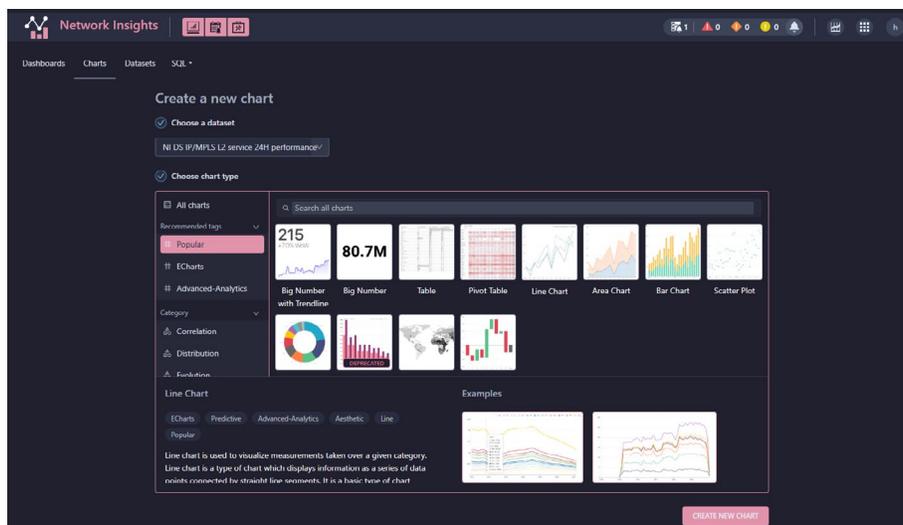

Figure 7 – Muse Network Insights Chart Creation Screenshot

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Closed Loop Service Provisioning Use Case

Among various operations processes, service provisioning stands out as it converts network capabilities into customer value. By automating service provisioning, providers can accelerate revenue generation, enhance customer satisfaction, and decrease costs. As illustrated in Figure 8, Muse can construct a fully automated closed-loop service provisioning process.

The process starts with service definition. A service provider operator, or an end-customer via a portal, selects a service template and populates it with performance parameters that define its Service Level Agreement (SLA). Although this initial step is inherently manual, Muse low-code tools can be used to create new templates or modify existing ones.

In subsequent steps, network operators string together Muse low-code automated workflows to construct a closed-loop service provisioning process suited to their operational environment.

1. **Network configuration** – Muse identifies and assigns the network resources to support the service.
2. **Service verification** – Muse verifies that the service meets its SLA using pre-defined or customer modified assurance tests.
3. **Service activation** – Muse activates the service.
4. **Service Monitoring** – Muse continuously monitors the service performance against its SLA. If any aspect deviates from the established parameters, an alert is issued, or Muse attempts to rectify the issue autonomously if feasible.
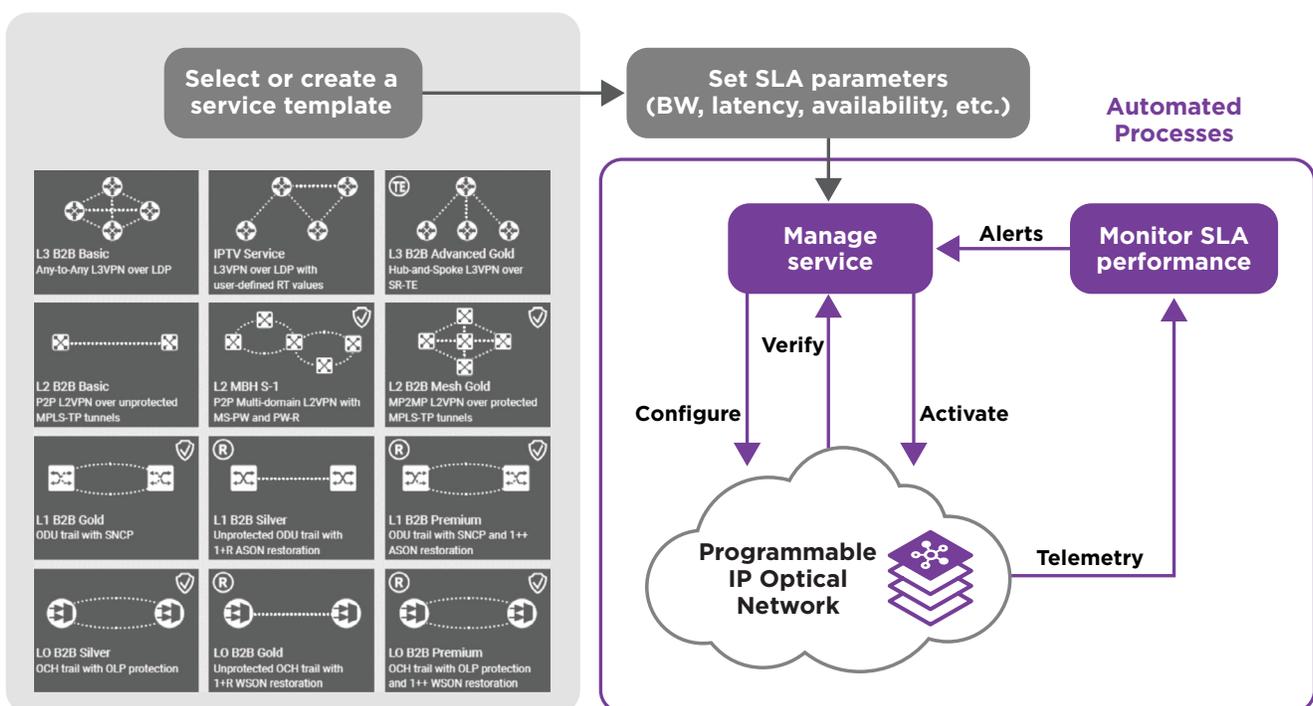

Figure 8: Muse Closed-Loop Automated Service Provisioning

Explore Muse in More Detail

Low-code platforms offer substantial benefits by enabling network operations staff to become citizen developers. This allows them to automate and streamline network operations without the need for specialized software development skills or costly professional services. The Muse Multilayer Automation Platform is a prominent leader in this domain. For more information about Muse, click on the links below or contact us to schedule a demonstration.

Muse Webpage

Link to Automation Demo Video

Link to Other Muse Capabilities

Contact Us Contact Ribbon to find out how to Automate your IP Optical Networks

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About Ribbon

Ribbon Communications (Nasdaq: RBBN) delivers communications software, IP and optical networking solutions to service providers, enterprises and critical infrastructure sectors globally. We engage deeply with our customers, helping them modernize their networks for improved competitive positioning and business outcomes in today's smart, always-on and data-hungry world. Our innovative, end-to-end solutions portfolio delivers unparalleled scale, performance, and agility, including core to edge software-centric solutions, cloud-native offers, leading-edge security and analytics tools, along with IP and optical networking solutions for 5G. We maintain a keen focus on our commitments to Environmental, Social and Governance (ESG) matters, offering an annual Sustainability Report to our stakeholders. To learn more about Ribbon visit rbbn.com.