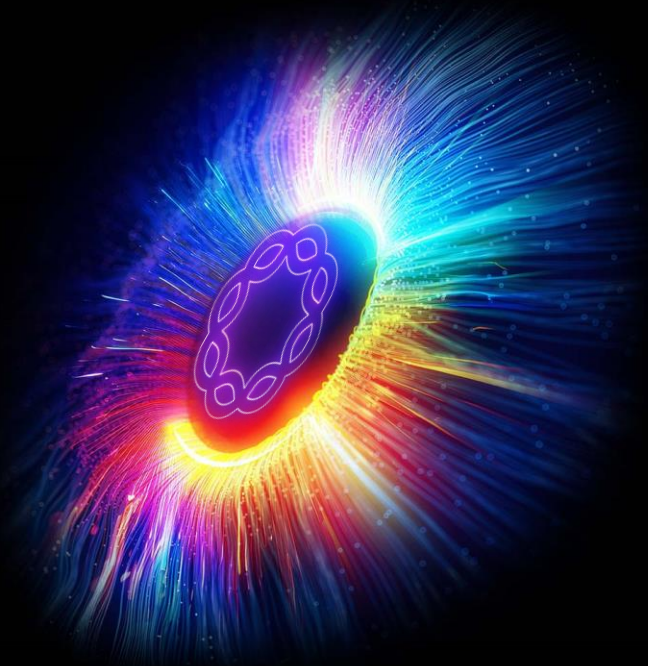


ribbon
INSIGHTS



Muse Intelligent Automation

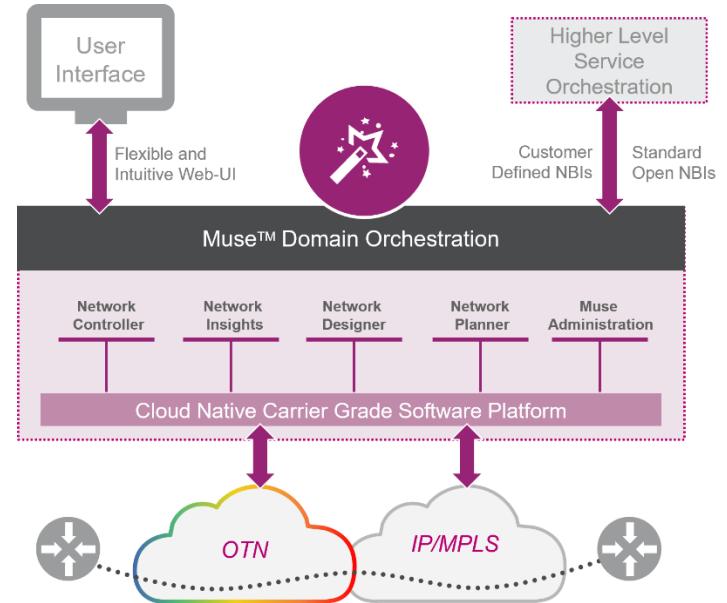
Harel Misha

Head of IP Optical Software Line of Business



What is Muse?

- Ribbon's SDN Applications Suite
- Multiple roles:
 - “Legacy” FCAPS
 - NMS and EMS functionalities for IP Optical networks
 - SDN Capabilities
 - Open Interfaces, Automation, Insights and Analytics
 - Network Planning
 - Topology and site design, Optical Simulations, Demands Optimization
- Cloud-Native Eco-System
- Multi-Vendor Architecture
 - Separation between SBIs and Business Logic



SDN Market Trends and Requirements



Network Automation to **reduce OpEx** and **improve Time to Market**



Advanced Analytics to **improve CapEx utilization**



Multi-Vendor capability to **remove vendor-locking**



Flexible integration with OSS/BSS/Service Orchestrator systems



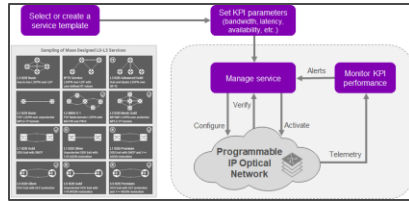
Cloud Native architecture to meet **modern security and infrastructure** standards

Muse – Answering Market Trends

Network Automation

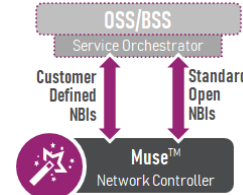


Workflow Engine

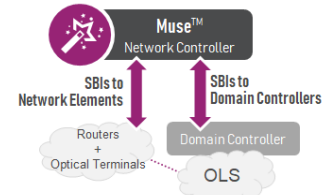


Closed Loop Automation

Multi-Vendor and OSS Integration

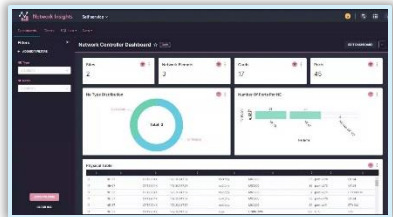


Flexible NBI



Flexible SBI

Advanced Analytics



Network Insights



Network Health

Cloud Native Architecture



Microservices Architecture



K8S Infrastructure

The Low-Code Approach

- A global trend of delivering tools that enable the creation or enhancement of applications without coding or compiling
- Low-Code platforms facilitate faster time-to-market for solutions that are better tailored to specific needs
- Muse's Low-Code tools empower users to customize the system based on both current and future network requirements
- New capabilities can be introduced either by the users themselves or through professional services offered by Ribbon.

Muse Low-Code Capabilities

Service Templates

- Define services properties
- Define services SLA and Assurance tests
- Templates customize the provisioning wizards

Automation Workflows

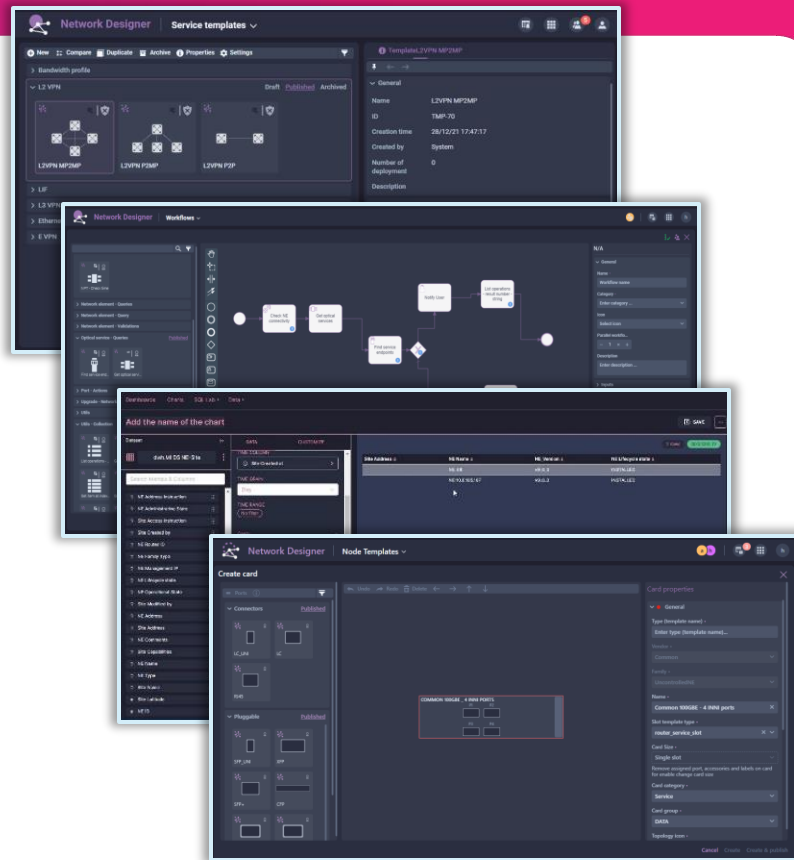
- Create automation flows with triggers and actions
- Create your own actions using scripts
- Automate any repetitive action – Troubleshooting, Upgrades, etc.

BI and Analytics

- Self service Business Intelligent tool
- Create your own widgets and dashboards
- Create user defined analytics reports

Network Elements Templates

- Model any 3rd party NE to be presented in Muse
- Define size, slots, cards, capabilities
- Add the models to the network for representation, and manage them via dedicated SBIs



Low-Code Workflow Engine - Automation in Your Pace

Implement network automation at your own pace tailored to your specific needs

1

Define your automations

Create your own workflows based on your needs

2

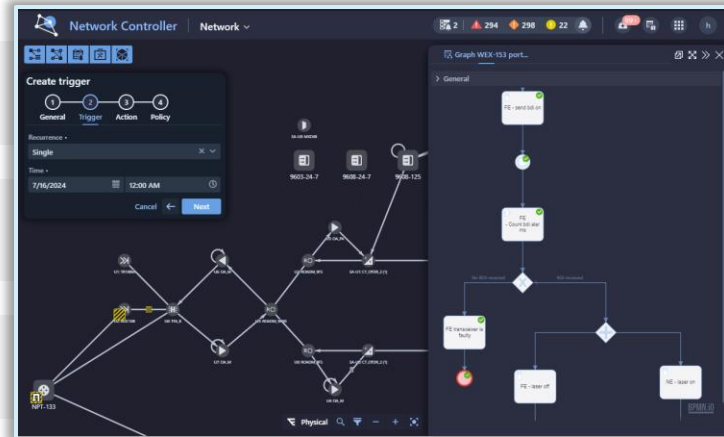
Choose how to execute them

Manual, Scheduled, Triggered or via API

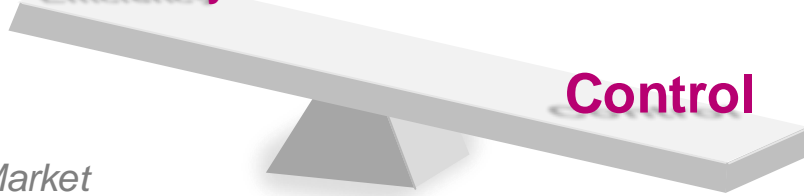
3

Control the process

Monitor the active operations, stop/pause at any time



Efficiency



Be proactive

Reduce OpEx

Improve Time-To-Market

Introduce automation gradually

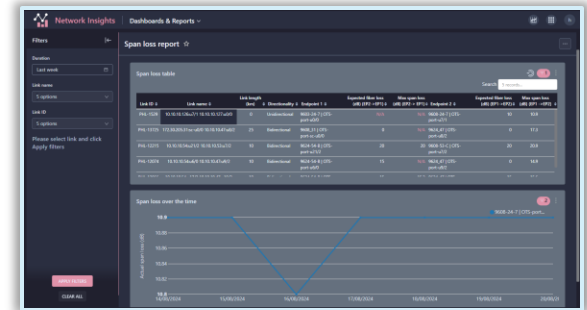
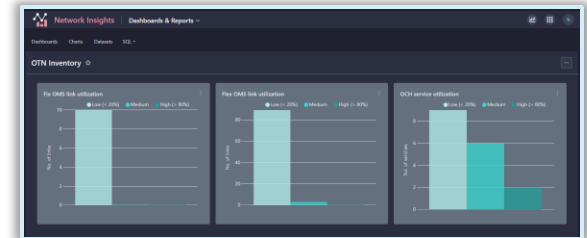
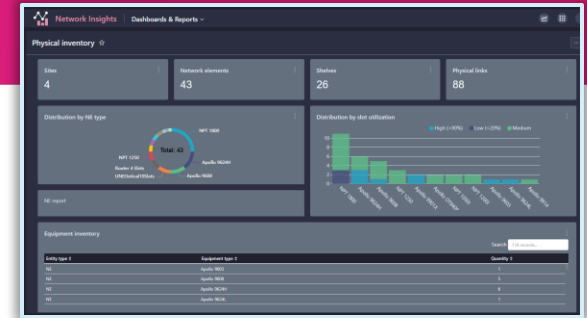
Run automations on demand

Supervise what happens in your network

Insights and Analytics

Enhance your CapEx utilization through the use of Business Intelligence reports

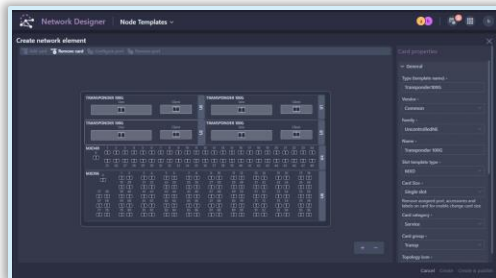
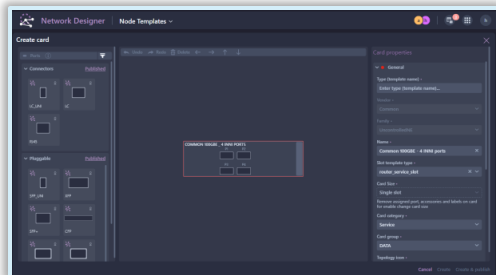
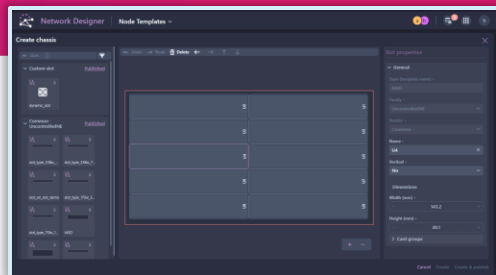
- BI reports that provide insights about the network and services
- Use Pre-Defined reports or create your own using Low-Code tools
- Automatic synchronization with the most updated network data
- Integration with the Workflow Engine to gather data from any source



Node Designer

Achieve End-to-End network visualization and monitoring

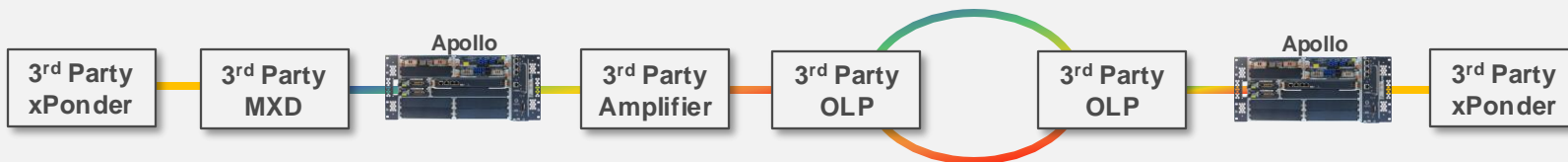
- Model 3rd party equipment -
 - OTN, IP routers, Radio
 - Size, number of slots, supported ports
 - Functional technology, supported protocols, available service types
- Add nodes instance in the topology and services
 - Optical terminals connected to Apollo OLS
 - Routers and switches as PEs or clients of NPT IP services
 - Radio links underlying physical layer
- Map SNMP Alarms MIBs
 - End-to-End alarms monitoring



Using Node Templates in Network Controller – Optical Nodes

- Model 3rd party optical components as cards in NE templates
 - Transponder/Muxponder, Mux/Demux, Amplifier, ROADMs, etc.
- Define the relevant cross-connects in the card model
 - 1:1 (e.g. transponder's client to line) or 1:N (e.g. MXD's line to channels)
- Add the nodes to Network Controller
 - Represent them in the topology and optical services
- Optical components can be monitored for alarms using SNMP Low-Code mapping

Represent Optical Component



Using Node Templates in Network Controller – IP Nodes

3rd Party PE Nodes

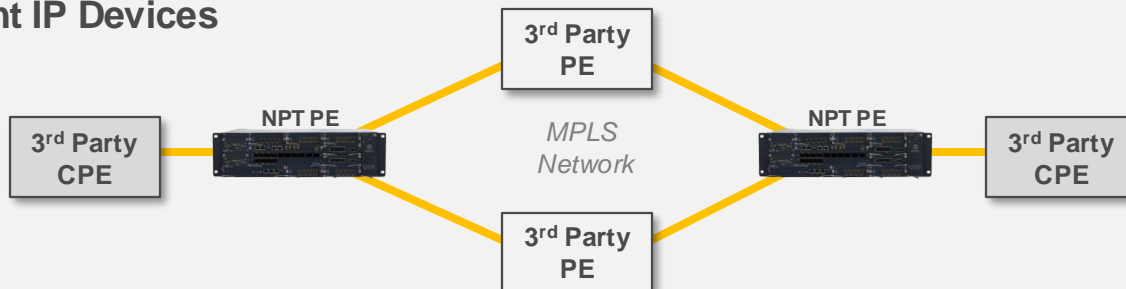
- Routers in the MPLS network topology
- Represent an IP service end-points
 - “Virtual” VSI/VRF/EVI are created on the node
- Displayed as PEs in the topology and Schematic View

3rd Party CPE Nodes

- A customer premises switch or router
- Represent a client connected to the NPT UNI port
 - Selecting it during service provisioning will select the connected UNI port
- Displayed as a client in the topology and Schematic View

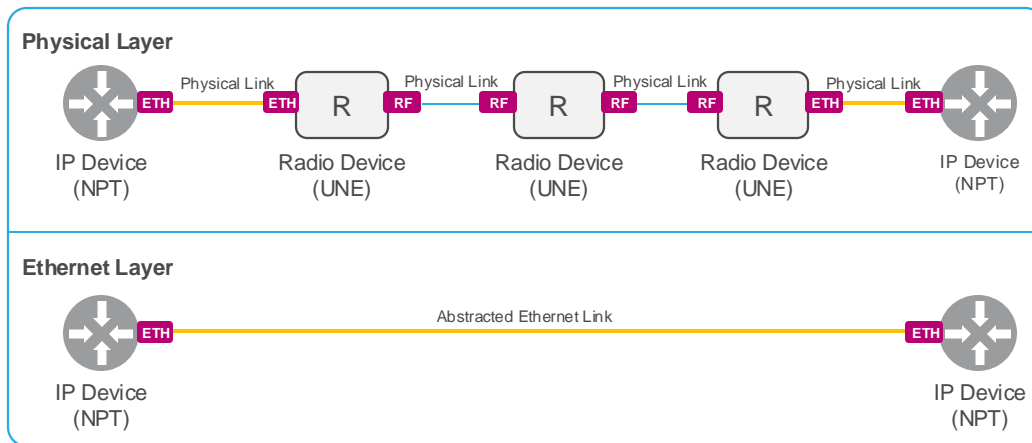
IP Nodes can be monitored for alarms using SNMP Low-Code mapping

Represent IP Devices



Using Node Templates in Network Controller – Radio Nodes

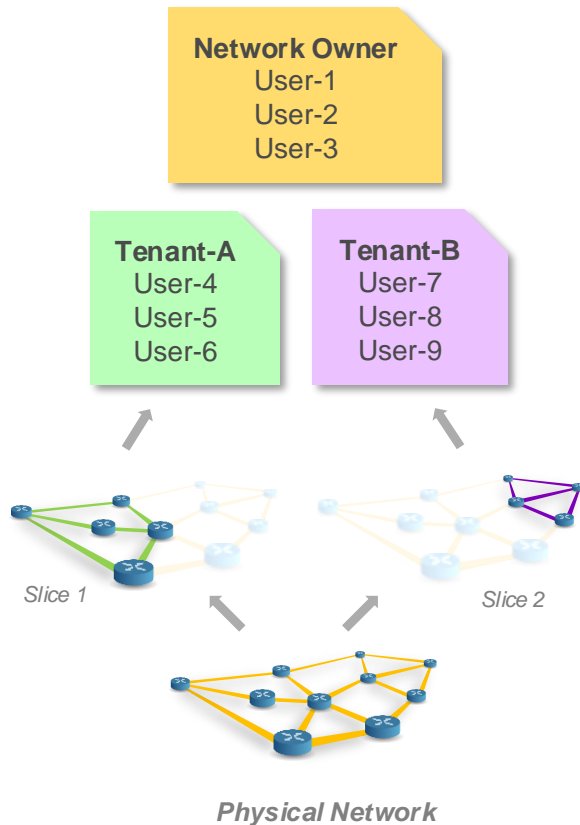
- Radio devices are represented in the physical topology between NPT IP devices
- Radio links are abstracted in the Ethernet and IP/MPLS layer – Transparent to the functionality
- Alarms and SRLG are propagating from the radio physical links to the Ethernet and IP/MPLS links
- Radio devices can be monitored for alarms using SNMP Low-Code SBI
- A failure in a radio link (e.g. link bandwidth reduction alarm) can trigger workflows for automation



Network Sharing - Slicing and Multi-Tenancy

Expand your offer from network services to network resources

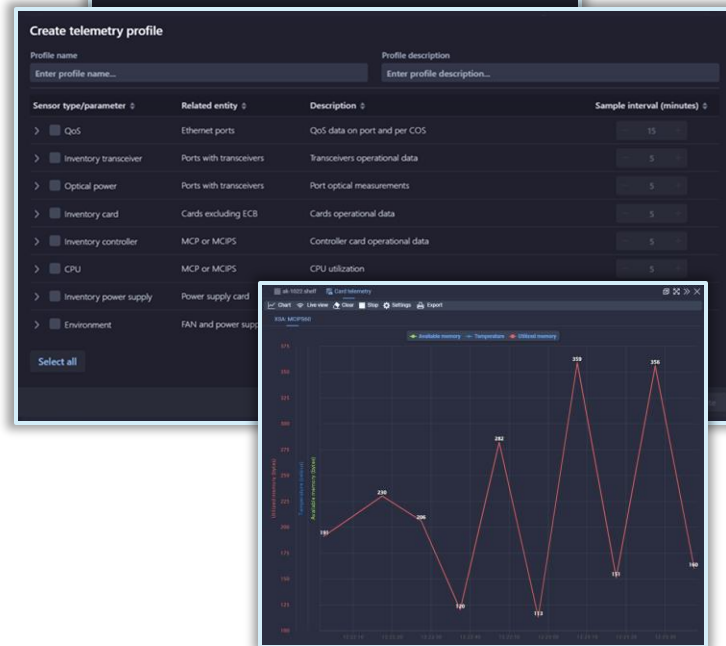
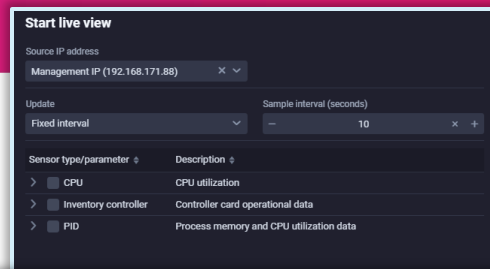
- The **Network Owner** creates different tenants
 - Each tenant has its own users
- The **Network Owner** assigned slices to tenants
 - Each slice is a collection of network resources – NEs, Cards, Ports, Links
- When a **tenant user** logs-in he can access only his resources
 - Filtered topology, service lists, alarms list, shelf-view
 - Can provision services only on his slice resources



Streaming Telemetry

Gain access to more information for insights and analytics

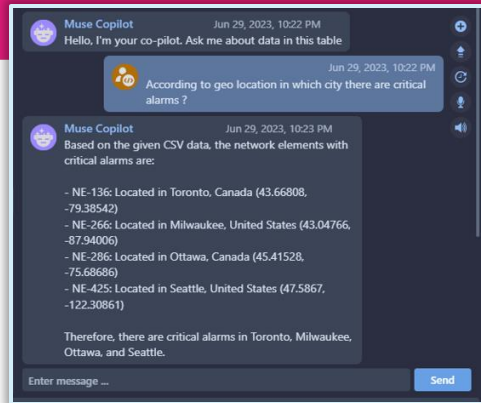
- **gRPC/gNMI Dial-Out SBI for collecting telemetry data**
 - Data is pushed by the NEs to Muse on pre-defined intervals or upon change
- **Telemetry Profiles define the sensor types and sample intervals**
 - CPU and Memory Utilization
 - Environmental Sensors: Temperature, Fan Speed, Power
 - Optical Powers
 - QoS: Pass/discarded packets per interface/CoS
- **Two types of collection methods:**
 - History Collection:
 - Constant collection of sensors data visible in the UI and Network Insights for analysis
 - Live View:
 - On-Demand, limited-time, high-rate sensor data collection for troubleshooting



Muse Agent – A Natural Way to Operate Networks

Embrace a more intuitive and interactive user experience

- Enables natural language conversations with Muse applications
- Ask questions and gain insights and suggestions
- Request to perform actions and network configurations



How many NEs have critical alarms?

There are currently 36 NEs with critical alarms in the network.

Which are the most utilized links in my core network?

The links from NE_A to NE_B and from NE_C to NE_A are the most utilized with 84% utilization.

How many L3VPN services are configured in the NYC site?

The NYC site includes 3 NEs and 10 L3VPN services.

Wrap-Up

Added-Value Application Suite



Automated

Reduce OpEx and minimize human errors by automating NOC operations



Multi-Layer

E2E IP-Optical network visibility for easy provisioning, troubleshooting and maintenance



Open

Flexible, open and standard interfaces for quick integration in SDN eco-systems



Secured

Secured SW platform with encrypted APIs and advanced RBAC for maximum security

Thank You

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INSIGHTS

