JUNIPER CONTRAIL HEALTHBOT 101

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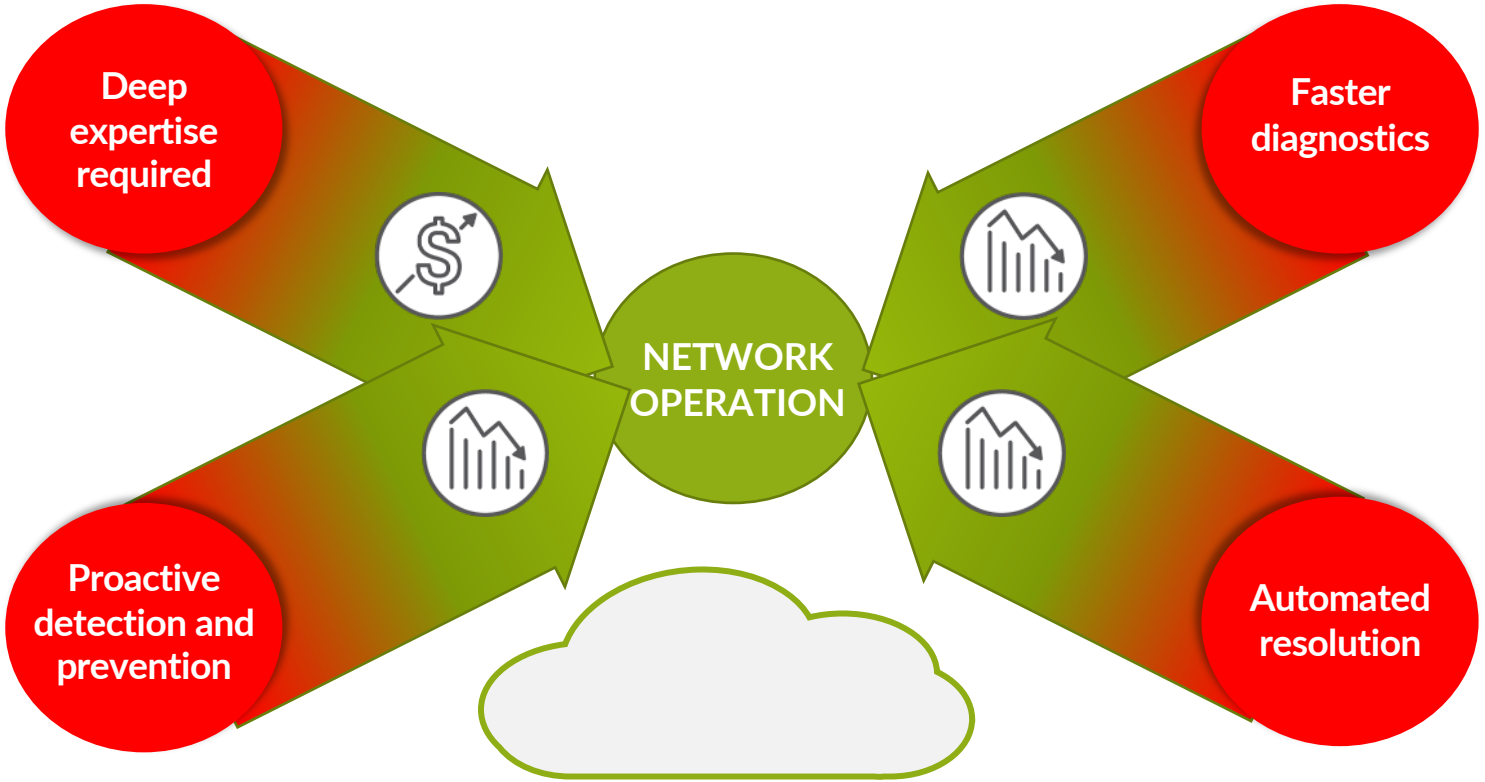
Juniper Network

Engineering Simplicity

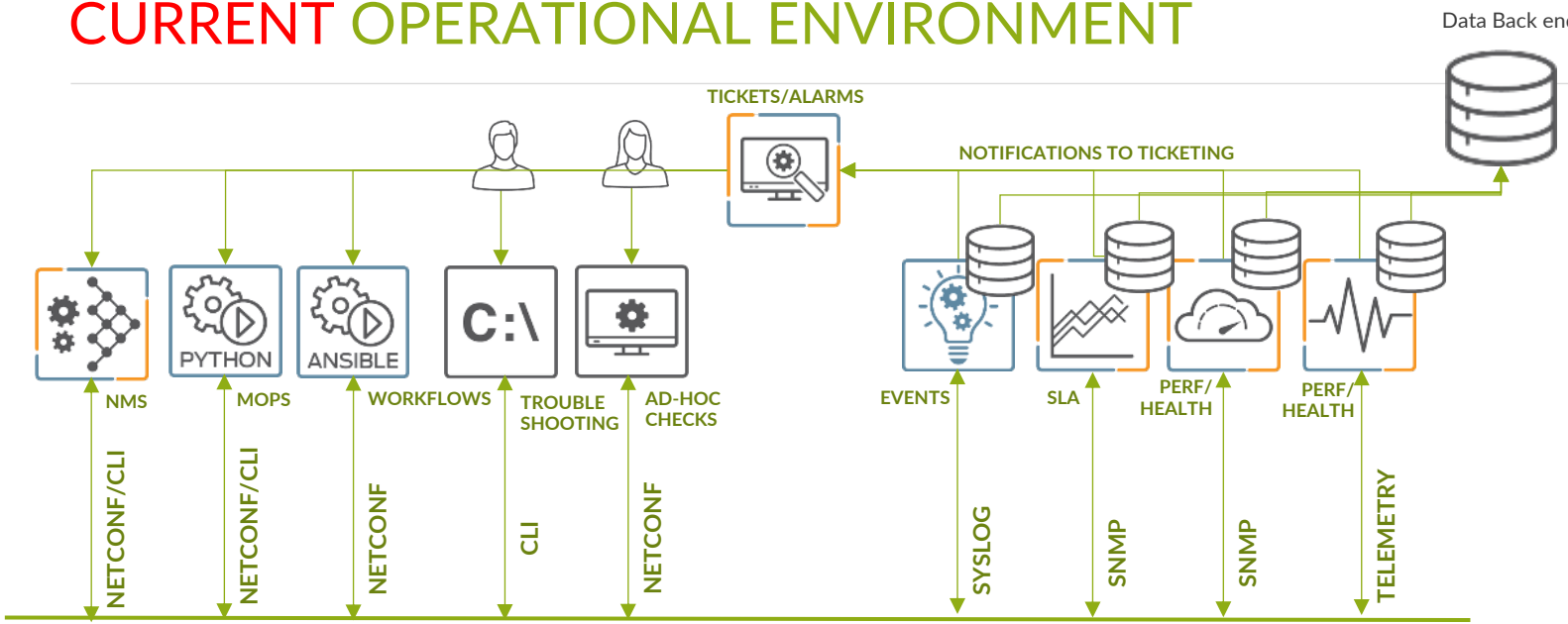
LEGAL DISCLAIMER

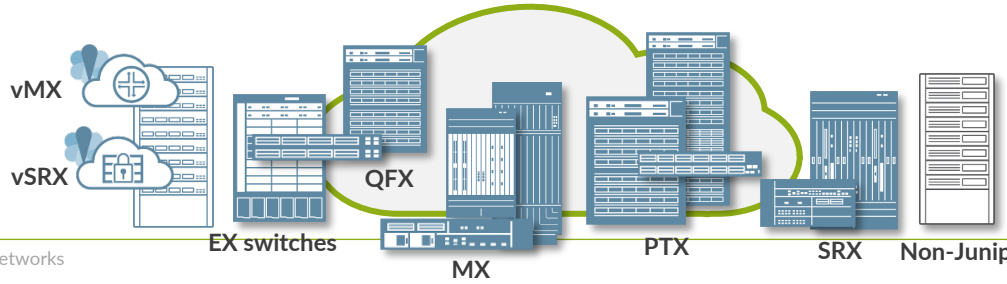
This product roadmap sets forth Juniper Networks' current intention and is subject to change at any time without notice. No purchases are contingent upon Juniper Networks delivering any feature or functionality depicted on this roadmap

CURRENT OPERATIONAL CHALLENGES



CURRENT OPERATIONAL ENVIRONMENT





- ✘ Data Siloes
- ✘ Heterogeneous
- ✘ Human troubleshooting
- ✘ Slow change

NETWORK MONITORING AND DIAGNOSTIC

today

- Basic monitoring capabilities.
- Legacy mechanisms (SNMP)
- Not real time.

Implications

- Limited insights
- Late response.
- Expensive / inefficient.

today

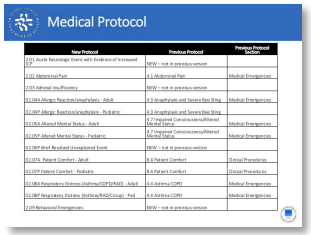
- Manual.
- Reactive
- Not normalized
- Slow

Implications

- Long diagnostic and remediation times.
- Resource intensive.
- Dependent on available human resources.

LET´S VISUALIZE A HOSPITAL ICU

Medical protocols

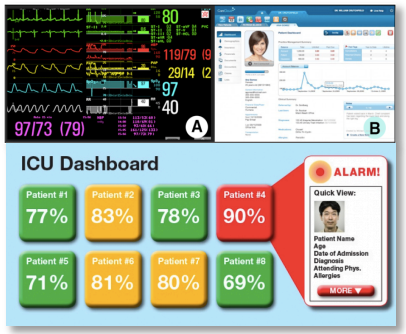


Doctor / Personnel (human intelligence)

Patient

Telemetry Sensors

Dashboard & real time results

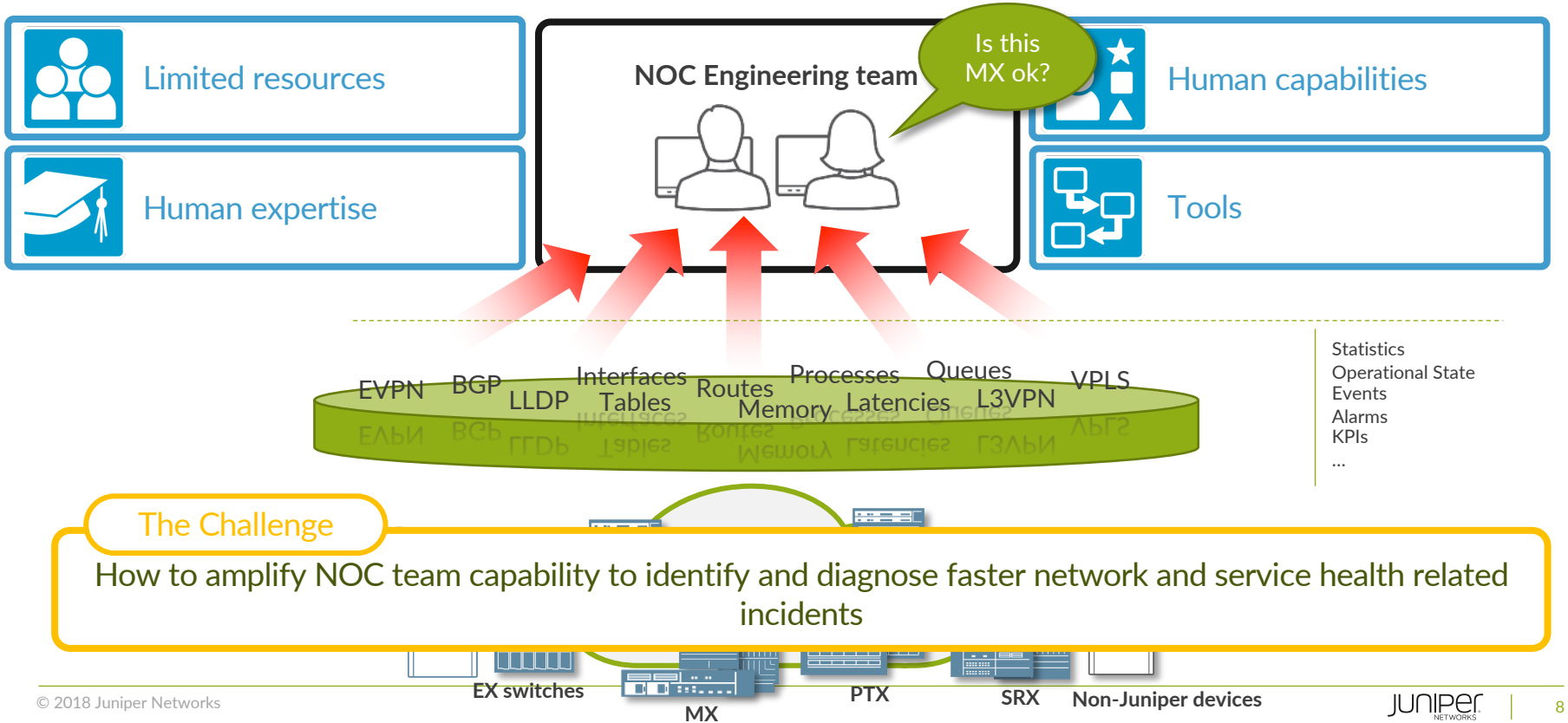


A Patient (**human body**) is a complex system. **Doctors/personnel** need to follow **defined protocols** (by **expert community**) to properly **monitor health and diagnose**, and need tools to analyze and visualize results.

KEY ATTRIBUTES FOR A CRITICAL SYSTEM MONITORING AND DIAGNOSTICS

	ICU Room	Network (today)	Network (tomorrow)
Complex system	Human patient	Network	Network
Real time telemetry	Vital signs sensors	Limited	Real time streaming Telemetry
Intelligence	Doctors / nurses	NOC engineers	NOC engineers + ML assisted operations
Normalized protocols	Medical protocols	Not normalized Informal, tribal	Normalized monitoring and diagnostics protocols
Expert community	Medical specialists community	Fragmented	Crowd sourced expert community
Tools	ICU Dashboards, etc.	SNMP tools, etc.	Anomaly detection, failure prediction, cross correlation, ML algorithms

THE NETWORK OPERATIONS CENTER CHALLENGE



The Challenge

How to amplify NOC team capability to identify and diagnose faster network and service health related incidents

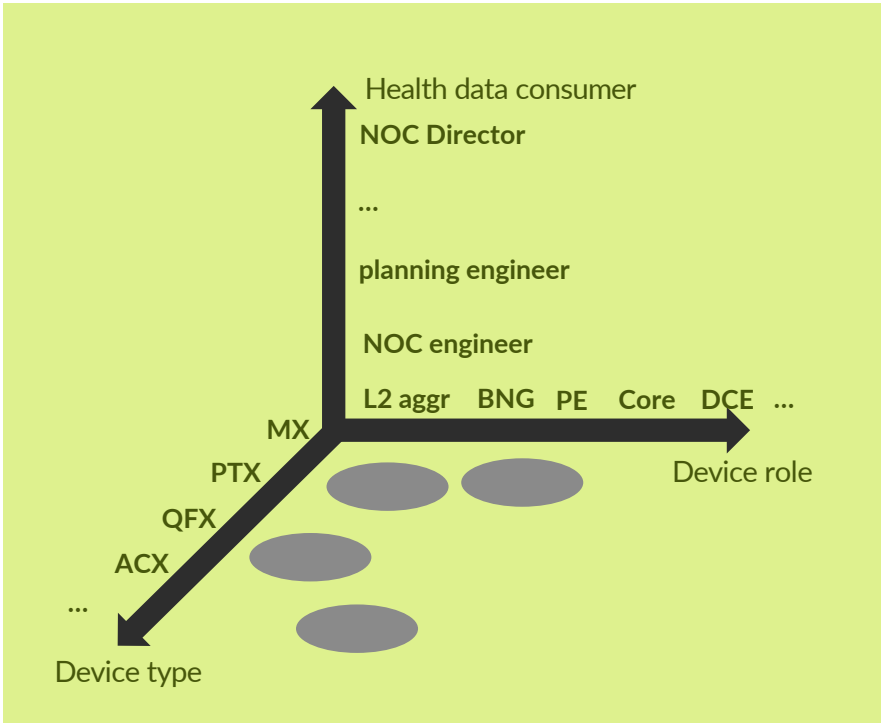
NETWORK DEVICE HEALTH MONITORING

Q: Is this MX ok?
A: It depends, what does “ok” mean?

Q: PFE memory is at 75%, is that bad?
A: It depends.

Device health monitoring is highly contextual.

- Device type
- Device role/configuration
- Consumer of the data

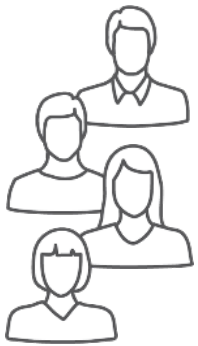


BRIDGING THE EXPERTISE GAP WITH CONTRAIL HEALTHBOT

Expert community
MX, SRX, QFX, BGP, EVPN, L3VPN, Memory, MPLS, PTX, Cisco, …

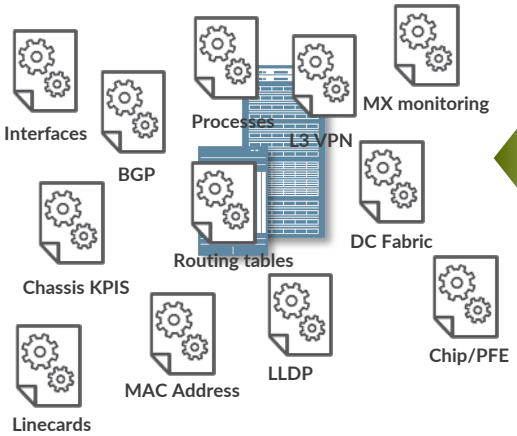
Contrail Healthbot

NOC Engineering team



Subject Matter Experts

Open library of DIM Playbooks



Diagnostics Intent Model (DIM)

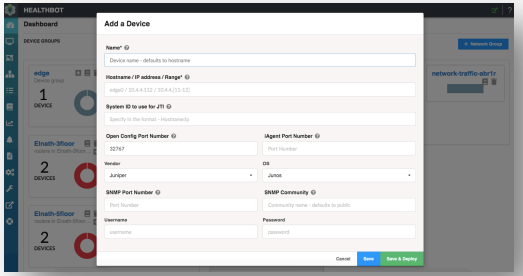
```
topic protocol.bgp {
   description "Monitors BGP sessions statistics i.e. neighbor state, detects
flaps, route damping and max received-routes count and notify anomalies";
   rule check-bgp-received-routes-dynamic-threshold {
                              ...
      field received-routes {
            sensor bgp-sensor {
               path /network-instances/network-
instance/protocols/protocol/bgp/neighbors/neighbor/afi-safis/afi-
safi/state/prefixes/received;
                           }
                              ....
      field received-routes-dynamic-threshold {
                           formula {
                              dynamic-threshold {
                                 algorithm k-means;
                                 learning-period 7d;
                                 pattern-periodicity 1h;
                                 field-name "$received-routes";
                              }
                           }
                           type string;
```

Domain Specific Language

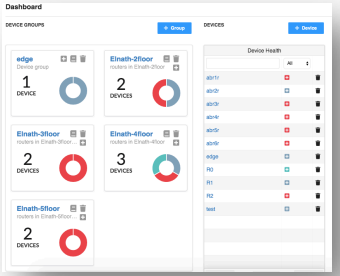
* All operations available through GUI and API

HEALTHBOT WORKFLOW

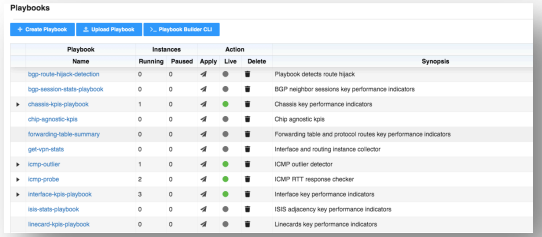
1 Discover devices



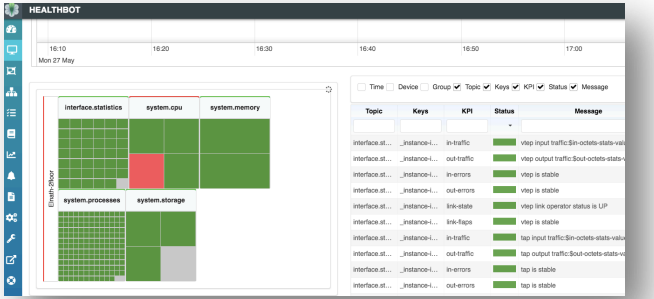
2 Organize your devices in device groups



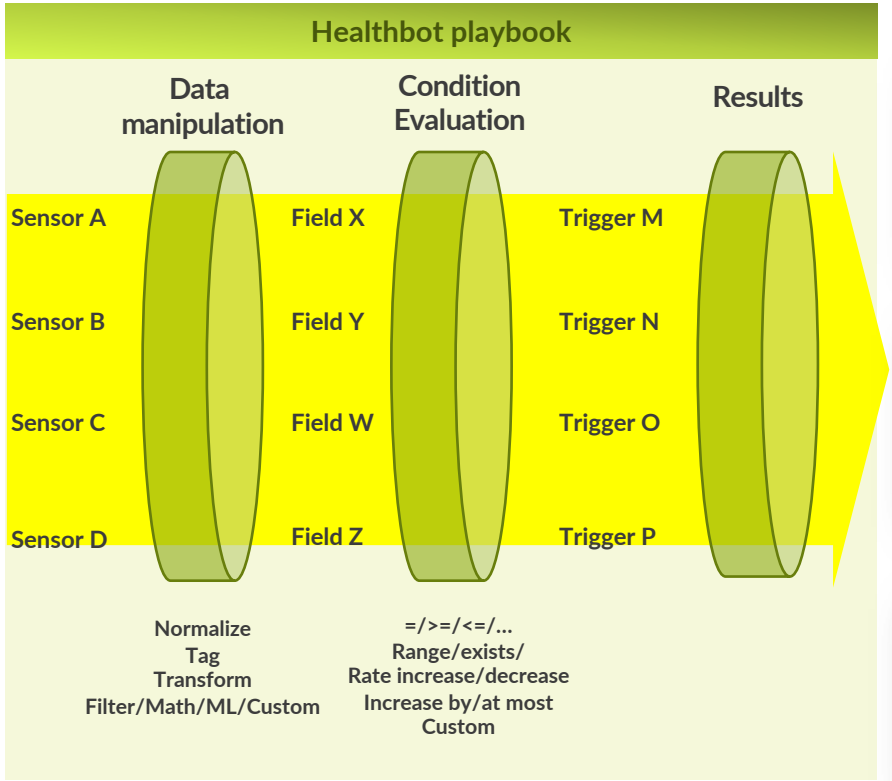
3 Select playbooks to apply



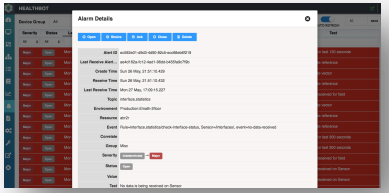
4 Let Healthbot monitor your devices



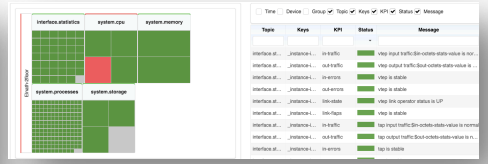
MONITOR THE HEALTH OF A SUBSYSTEM



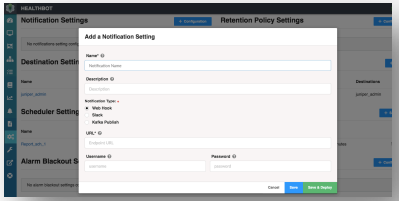
Local Alarm



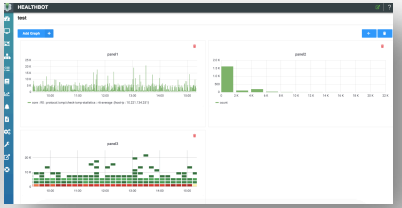
Visualize Health status



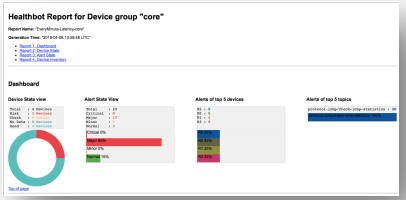
External notification



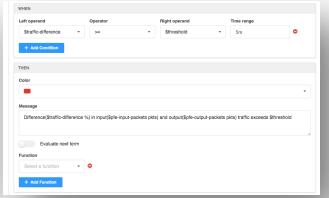
Visualize data



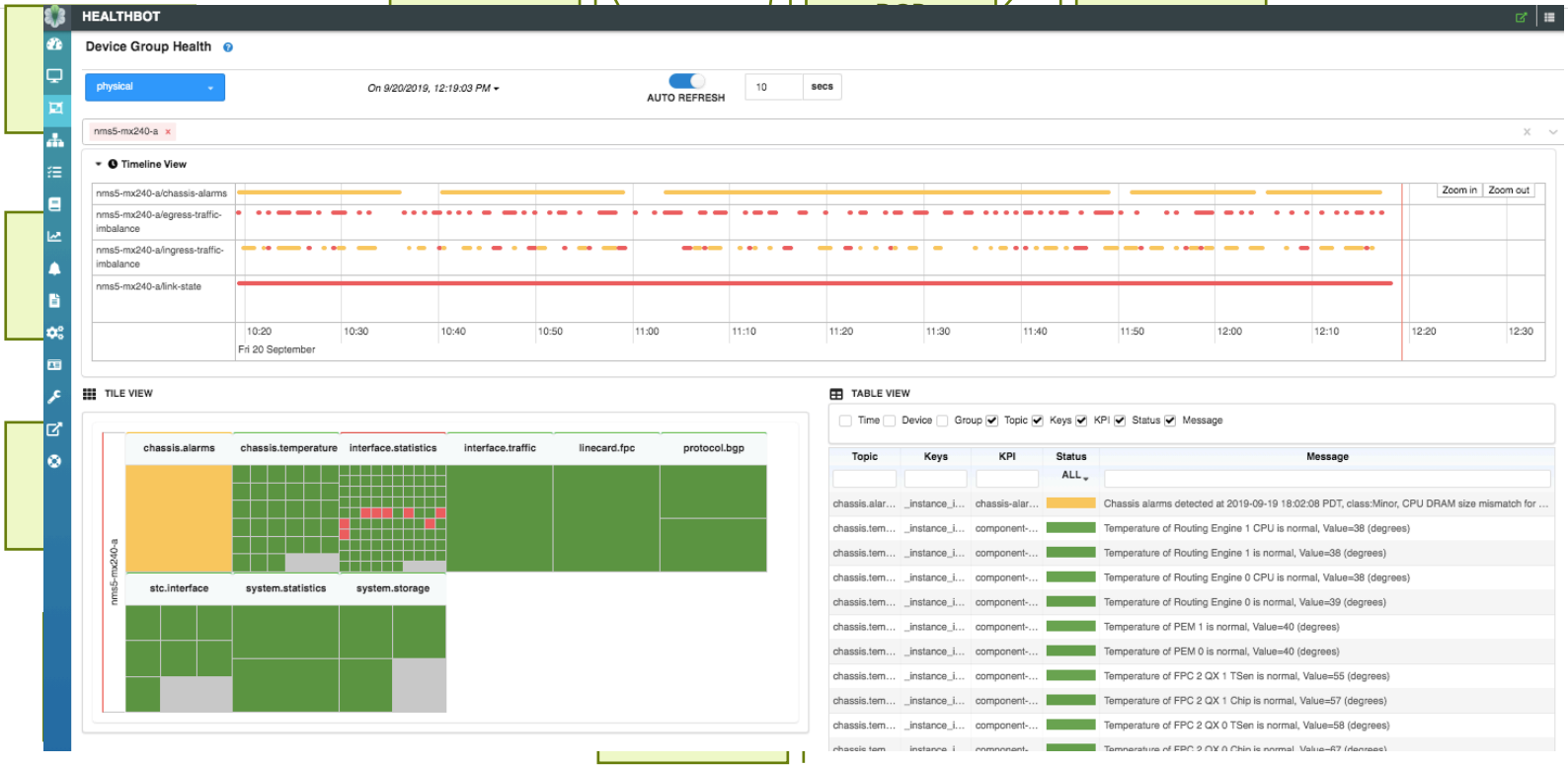
Generate reports



Trigger actions



IS THIS MX OK?



PEOPLE

PROCESS

TECHNOLOGY

THE NETWORK OPERATIONS CENTER CHALLENGE

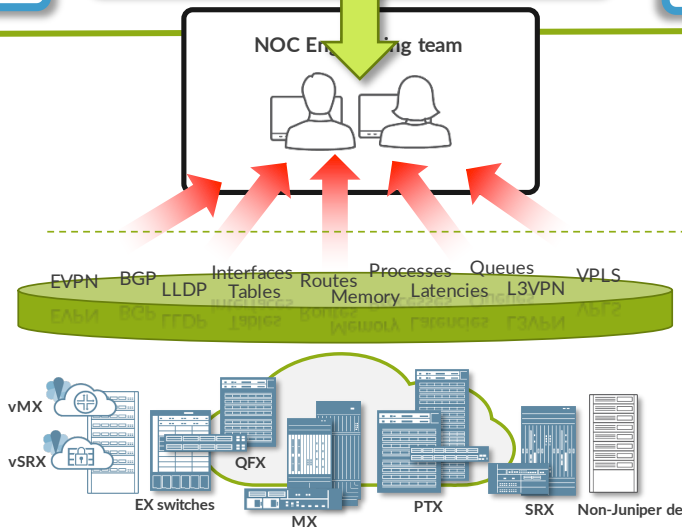
Expert community
MX, SRX, QFX, BGP, EVPN, L3VPN, Memory, MPLS, PTX, Cisco, …

Contrail Healthbot

ML/AI Generated insights
Anomaly detection, cross-correlation, outlier detection, prediction, automated clustering, …

Expert community knowledge amplify NOC team expertise

- Limited resources
- Human expertise



Machine generated knowledge amplifies NOC team capabilities

- Human capabilities
- Tools

Statistics
Operational State
Events
Alarms
KPIs
…

HOW HEALTHBOT HELPS THE OPERATIONS TEAM? LAYERS IN THE PROBLEM

Is it a problem of how to shorten diagnostics and problem resolution time?

Is it a problem of how to interpret the data?

Is it a problem of how to analyze the data?

Is it a problem of frequency of the data?

Is it a problem of lack of sufficient data?

Playbook library, community, Cloud of Knowledge, Notifications, UDAs

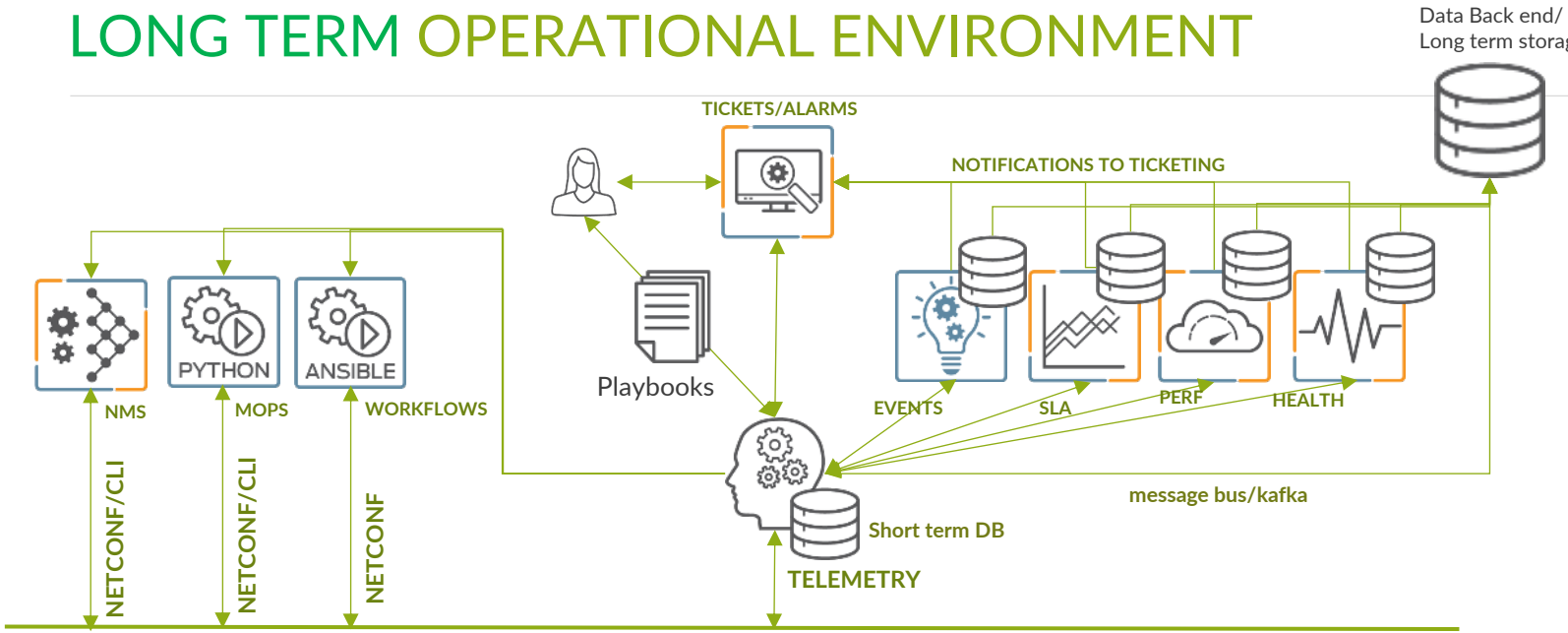
Expertise encapsulated on Playbooks

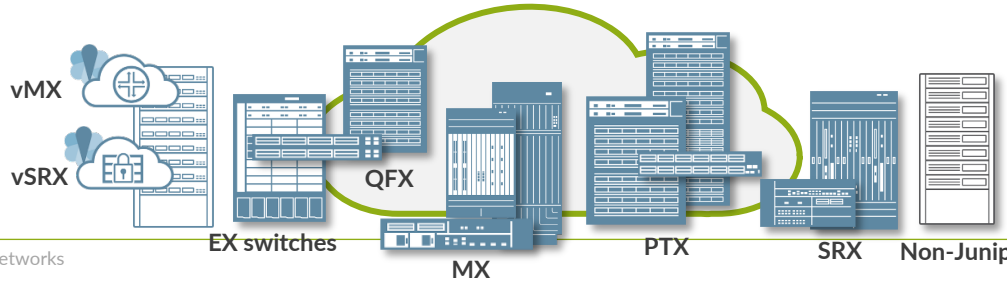
Playbook/rule programming model
ML/AI Algorithms

Real time streaming telemetry: JTI, OC gRPC

SNMP, Netconf, CLI, Syslog, JTI, gRPC. Zoom-in/out

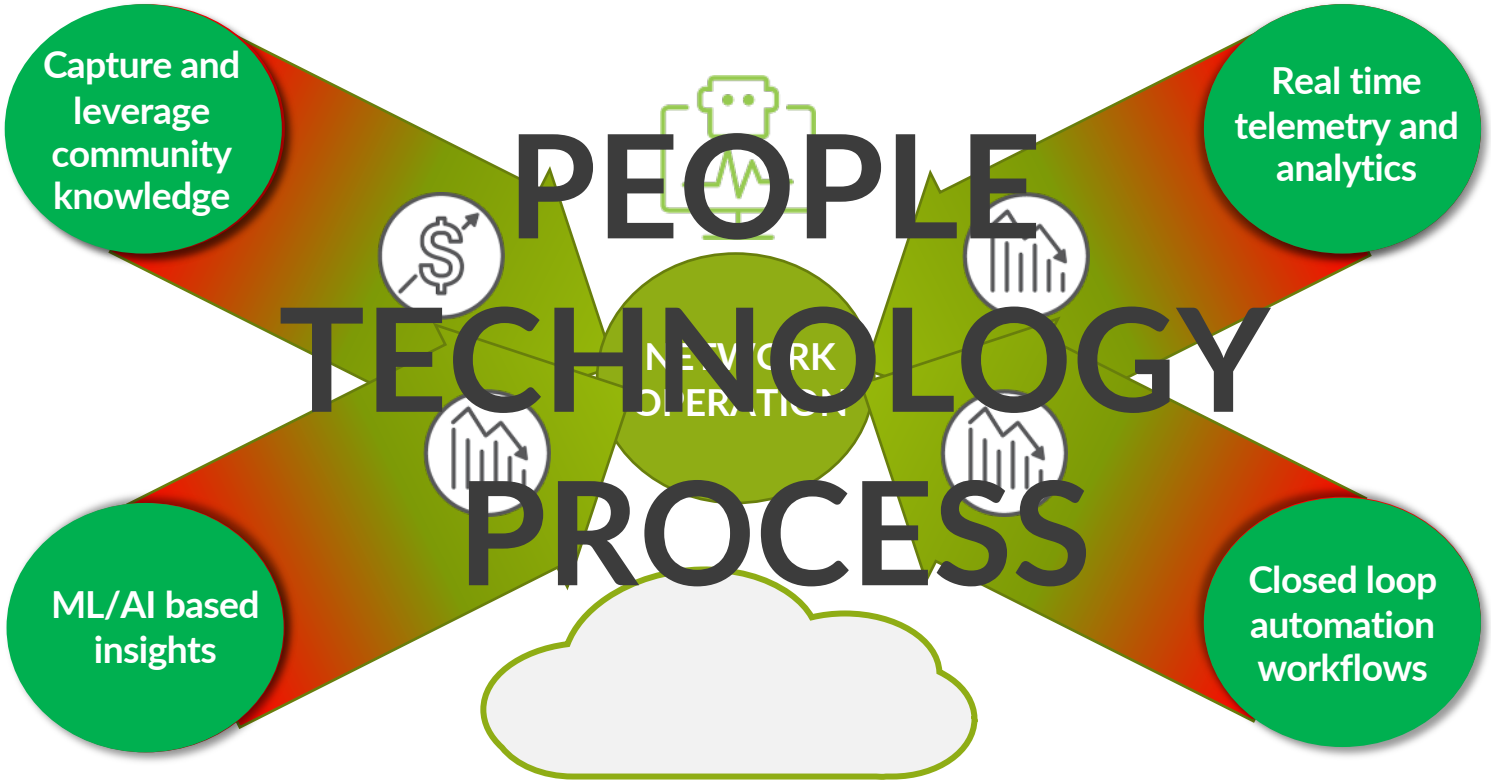
LONG TERM OPERATIONAL ENVIRONMENT





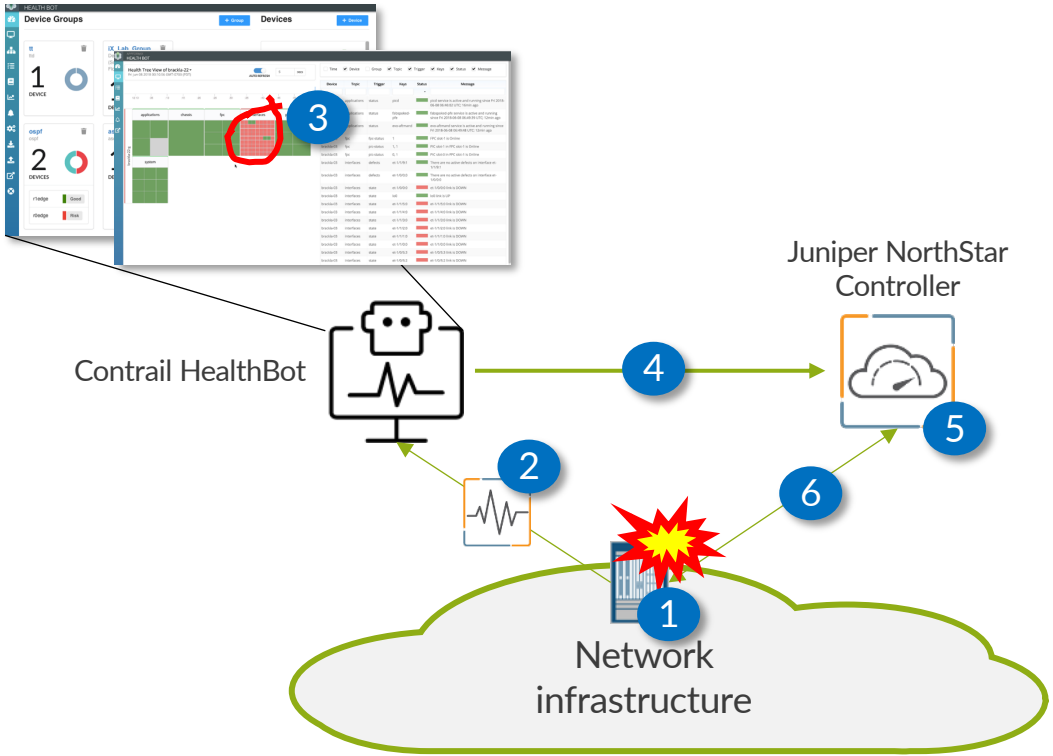
- ✓ Consolidated data
- ✓ Homogeneous
- ✓ Machine diagnostics/inferences
- ✓ Agile

TRANSFORMING THE OPERATIONAL ENVIRONMENT



Playbook available

HEALTHBOT – NORTHSTAR INTEGRATION: NODE/LINK MAINTENANCE MODE



1. Network Node develops a [potentially] failure condition
2. Telemetry signals changes or anomalies
3. Playbook running on HealthBot detects or predicts condition
4. User Defined Action calls NorthStar REST API Requests node to be set in maintenance.
5. NorthStar sets node into maintenance
6. LSPs and traffic re-routed from failing node.

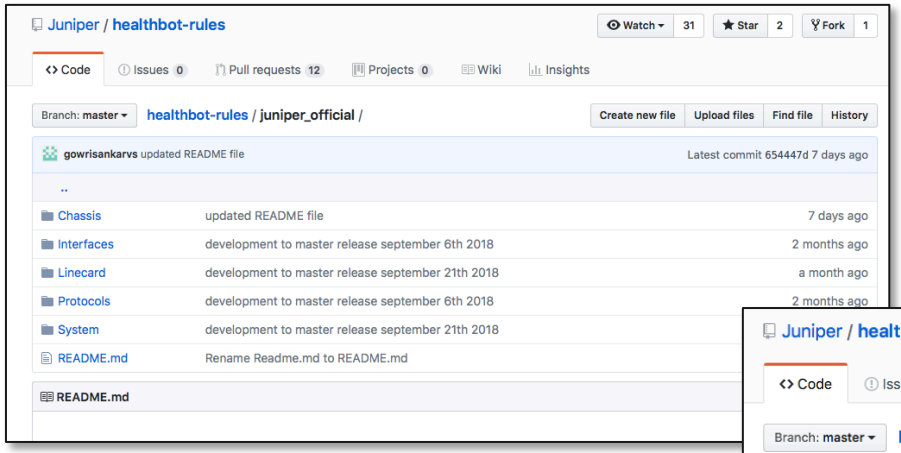
Benefits

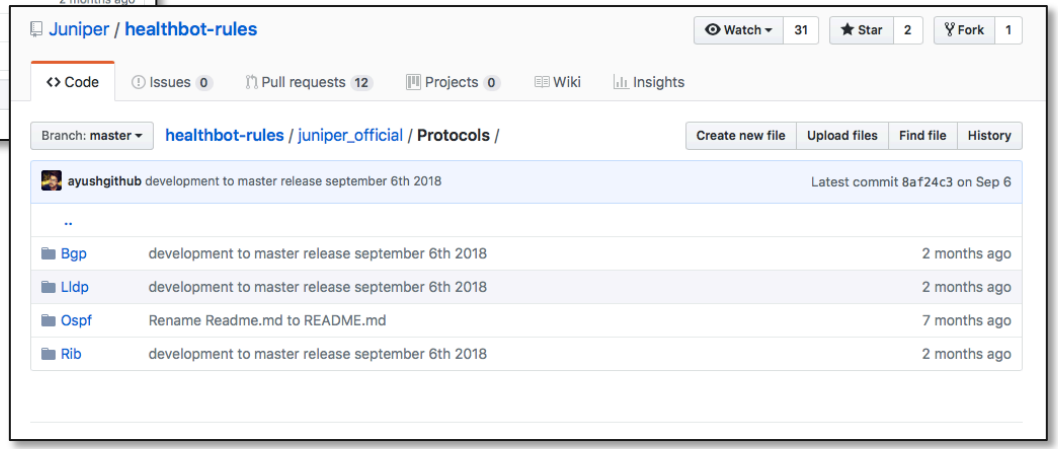
- Faster condition detection.
- Faster remediation action.
- Reduced or avoided down-time (make before break).

MULTIPLE USE CASES

1 Traffic black hole detection	Detect the existence of an anomalous traffic drop on PFEs or Fabrics.
2 BNG Health Monitoring	Assessment of multiple BNG health KPIs to evaluate overall system condition.
3 Microburst detection	Identify the existence of traffic bursts that may result in traffic drops
4 PFE Wedge conditions	Identify the existence of errors on PFEs that lead or predict the existence of a PFE Wedge
...	
5 Routing protocols diagnostics	Monitor and evaluate behavior of different routing protocols and identify root cause of anomalies
6 Routing table health analysis	Evaluate routing and forwarding state and identify anomalies
7 Capacity planning rules compliancy	Enforce capacity planning rules and detect anomalies.
8 Service health monitoring	Evaluate end-to-end service health (pseudowires, EVPN, etc.)
...	

HEALTHBOT PLAYBOOK LIBRARY





Juniper Github repository
https://github.com/Juniper/healthbot-rules/

Juniper provided and community provided

THANKS!