

The background is a vibrant, abstract composition of numerous overlapping, elongated, teardrop-like shapes in various colors including dark blue, light blue, green, yellow, orange, and red. These shapes radiate from a central point, creating a starburst or sunburst effect. Some shapes have white circular cutouts. Scattered around the main burst are several small, solid-colored circles in blue, yellow, and red.

TURN IT UP

CISCO *Live!*

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The bridge to possible

Automating Transport SDN Use-Cases

Rob Piasecki, Senior Architect, CCIE #23765
Venu Gopal Kothamasu, Senior Software Architect
BRKSPG-2019



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Agenda

- Industry Trends & Drivers
- E2E Architecture & Framework
- T-SDN Use-Cases
- Solution Details
- Next Steps
- Conclusion

Industry Trends & Drivers



Communications Service Providers

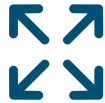
Bandwidth Continues to Grow 50% Year-over-Year

The world has gone mobile

Changing Customer Expectations With AI, VR



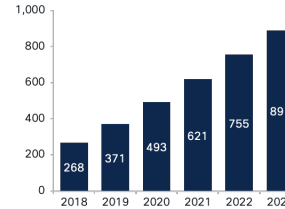
3X Mobile Data Traffic Growth (13-44 Mbps) From 2018-2023



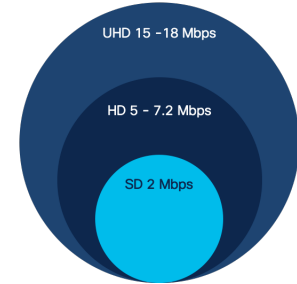
Ubiquitous Access to Apps & Services

Massive IP traffic growth, driven by video

27% CAGR 2018-2023



Connected 4K TV Sets (M)



Rise of cloud computing

Changing SP Architectures/ Service Delivery



Changing Enterprise Business Models
Efficiency & Capacity

Digitization leading to IoT

Emergence of the Internet of Things



People

+



Process

+



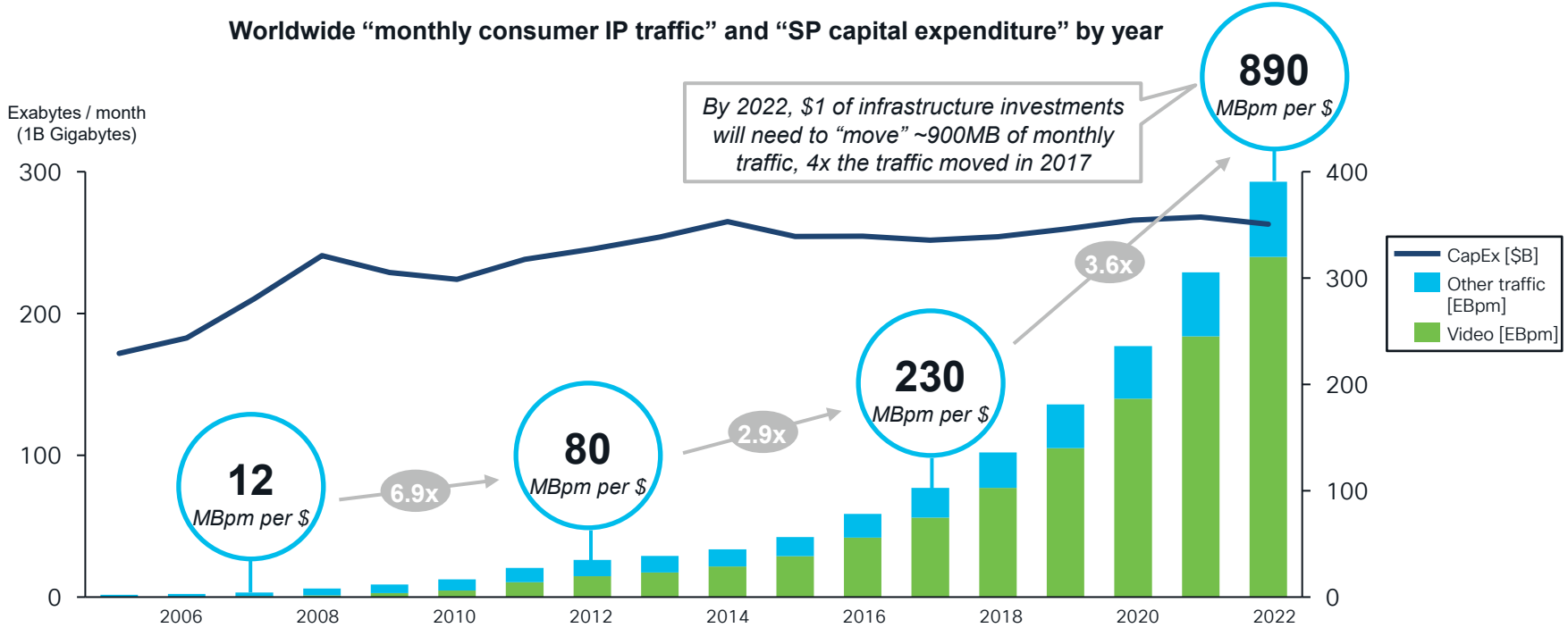
Data

+



Things

Do More With Less



OPEX Pressures are Driving SPs to Take On Automation Initiatives

- CSPs' network OPEX has been increasing since 2012
- OPEX as a percentage of revenue grew from 11% in 2012 to 15% in 2017
- Revenue declined by 13% during the same period
- This is an unsustainable trend that will be exacerbated with the advent of 5G, and cloud enabled services



50% of CSPs consider network automation to be a top-three initiative

Opex reduction is the main driver for network automation for 72% of CSPs



52% of CSPs are already implementing basic network automation use cases

Source: Analysys Mason

Analysis Mason : Network automation: a solution framework for service agility and cost economics in cloud enabled 5G networks ; February 2020

Analysis Mason : Network automation survey: CSPs' automation initiatives ; MARCH 2020

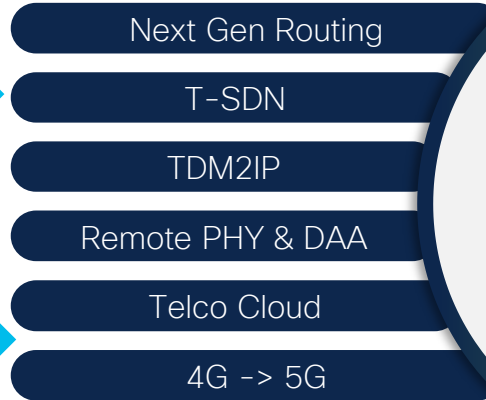
In Order to Successfully Manage Adoption of These Trends, SPs Need to Think Holistically

Technology Transformation

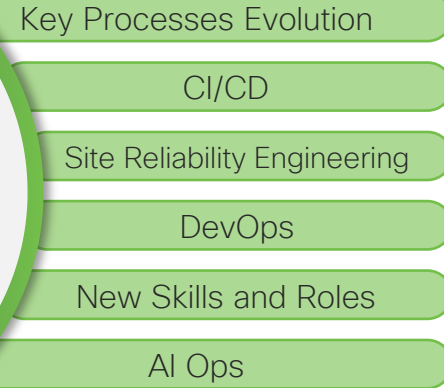
Operations Transformation

This Session

BRKSPG-2018
BRKNWT-2000



Automation
&
Service
Assurance



E2E Architecture & Framework



SP Automation & Assurance Function Taxonomy

Customer
Facing
Services

Service
Catalog

Service
Administration

Service
Monitoring

External API
Gateway

Resource
Facing
Services

Design-Time Services

Service
Design Center

Network
Design

Service
Catalog

Workflow
Design

Resource
Catalog

Capacity
Planning

VNF Catalog

Simulation &
Staging

Run-Time Services

Assurance

Inventory
Management

Resource
Management

Fault
Management

Topology

VNF
Management

Policy
Management

Service
Assurance

Container
Management

SLA
Management

Network
Optimization

Capacity
Management

Compliance
Management

Orchestration

Service
Implementation &
Testing

Resource
Onboarding

VNF Onboarding

Workflow
Management

Analytics

Network
Analytics

Service Analytics

Customer
Experience
Analytics

ML Service

Baseline
Services

Security

Data
Protection

Identity
Management

Access
Control

Intrusion
Detection /
Prevention

Firewalling

Lawful
Intercept

Policy
Enforcement

Security
Analytics

CI/CD & Test Automation

CI/CD Pipeline

RFS Check

Deployment
Automation

Service
Activation Test

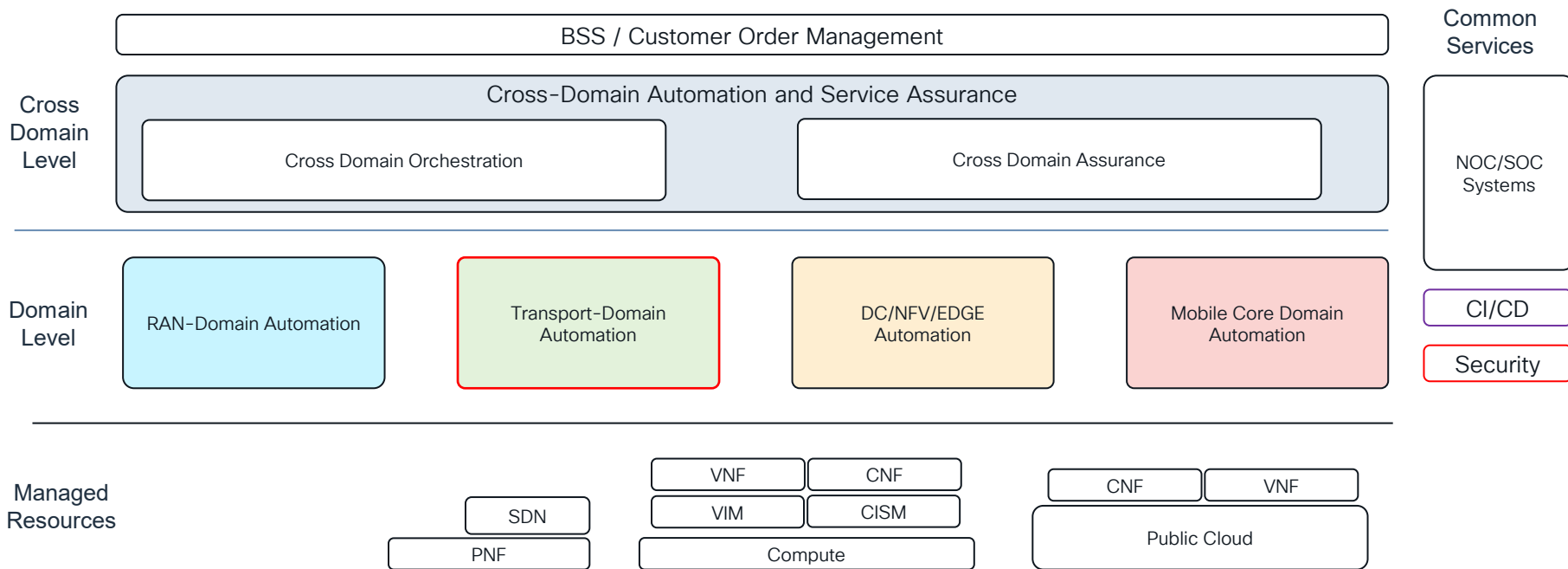
Test Case
Library

Test
Regression
Suite

Test
Automation
Framework

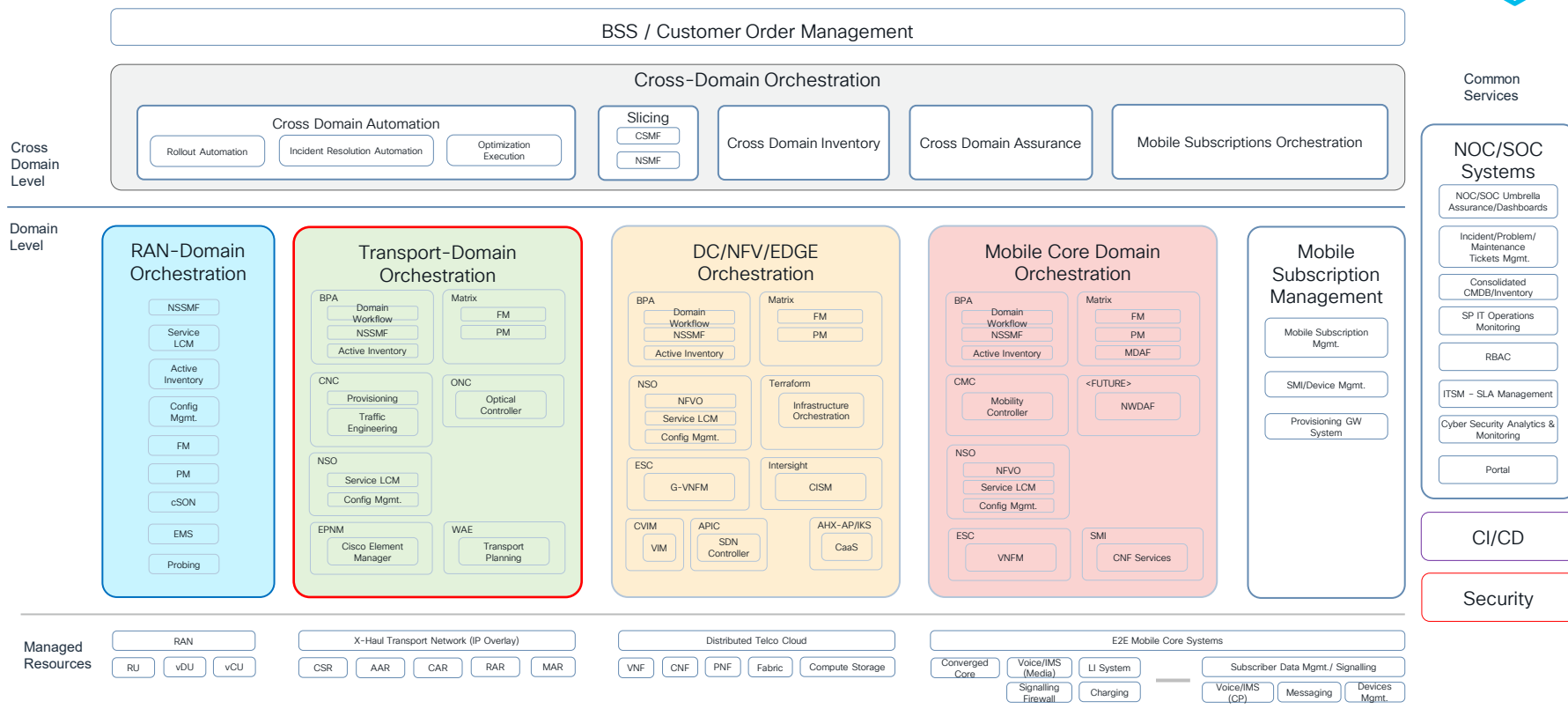
Version
Management

End to End Automation and Service Assurance

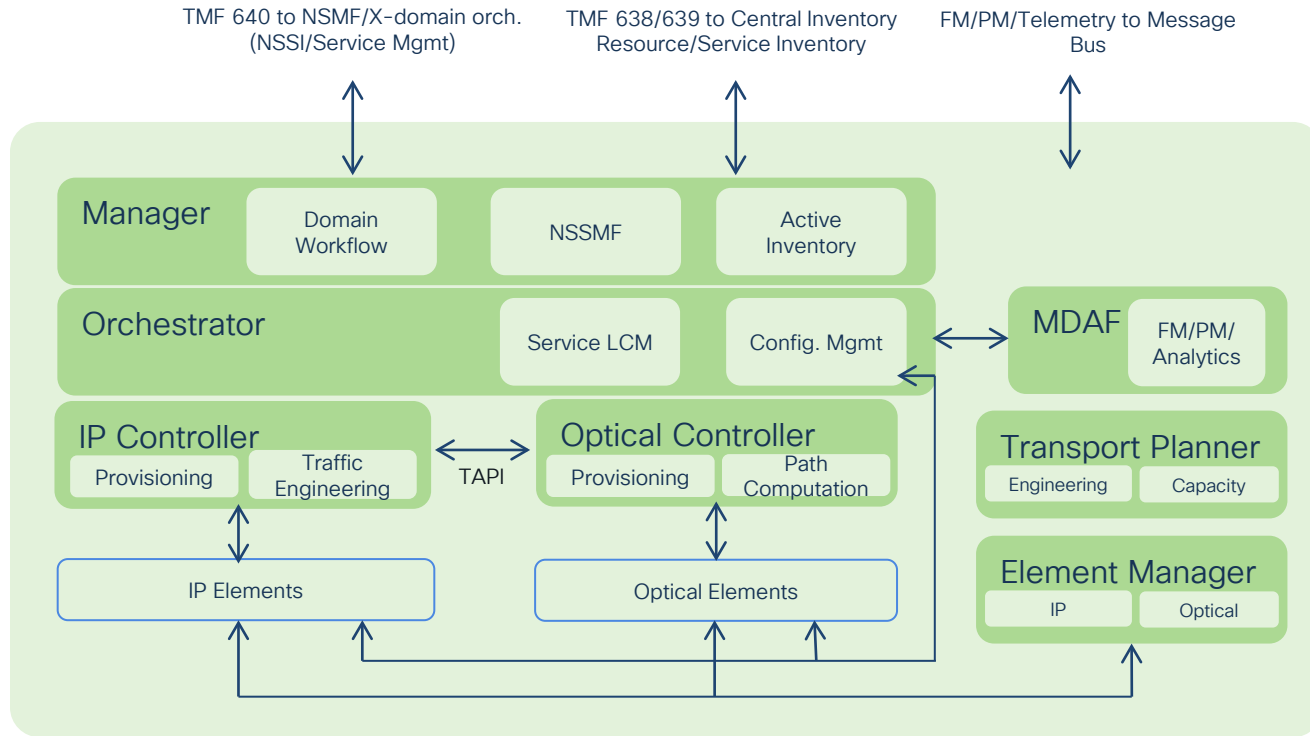


End to End Cross Domain Automation

Reference



Transport Domain Automation



Key Requirements

- Topology Modeling
- NSSMF service Modeling
- PM & Telemetry Modeling
- Local RFS Inventory
- Transport element provisioning, LCM & Day N config
- NSSMF Instantiation, LCM & Day N configuration
- Transport element PM & Telemetry Collection
- Alarm and PM analytics for local closed loop, SLA reporting and Trouble shooting
- Open and Standard APIs

T-SDN Use-Cases



Top use cases

Bandwidth Optimization

Bandwidth On Demand

Closed-loop Automation

Secure Zero Touch Provisioning

Capacity Planning

Topology & Inventory

Service Migration

Golden Config Compliance

Application Workload Mgmt

CI/CD

DevOps

Service Provisioning

Closed-loop Performance
Remediation

Analytics

OS Upgrade

Service Assurance

Realtime Network Optimization

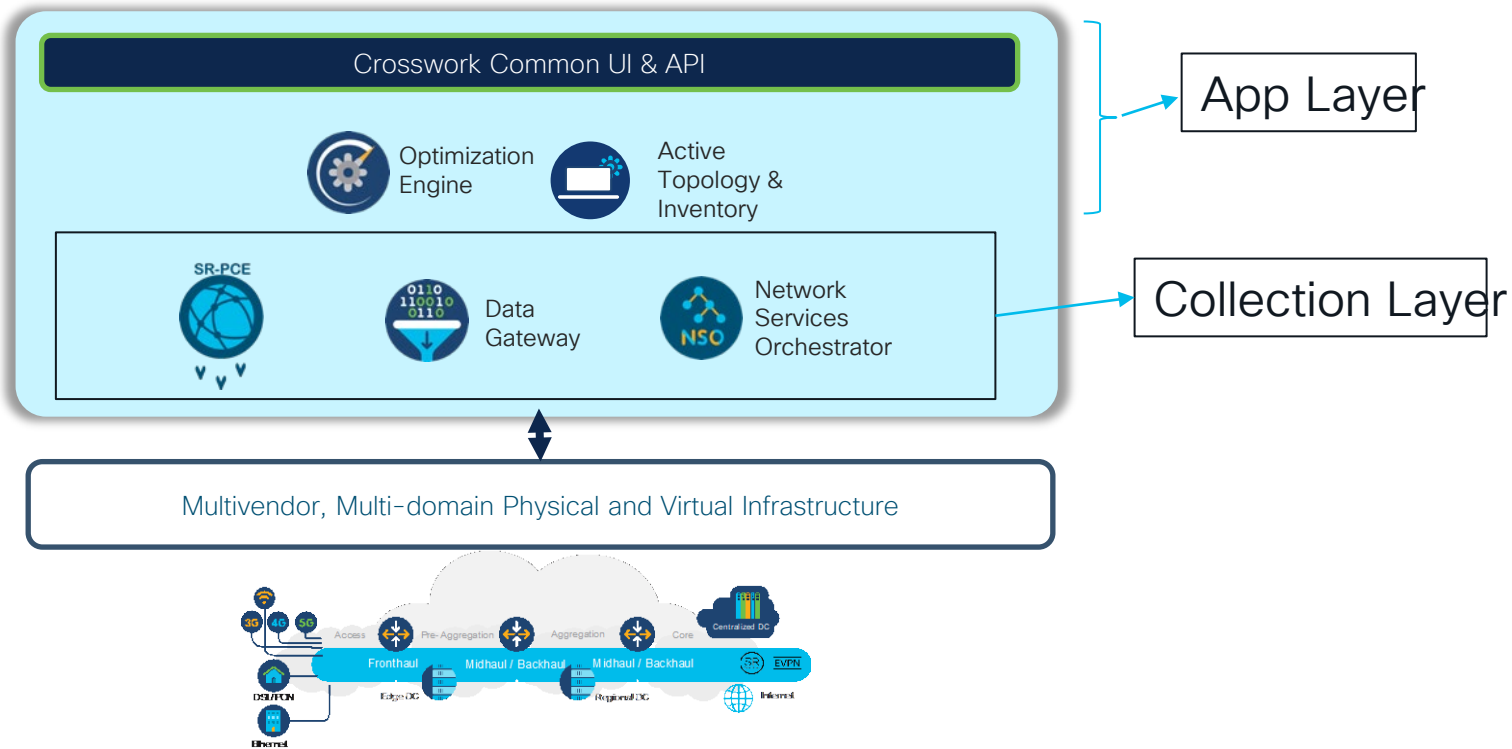
Disaster Recovery

Solution Details



Cisco Crosswork Network Controller 1.0

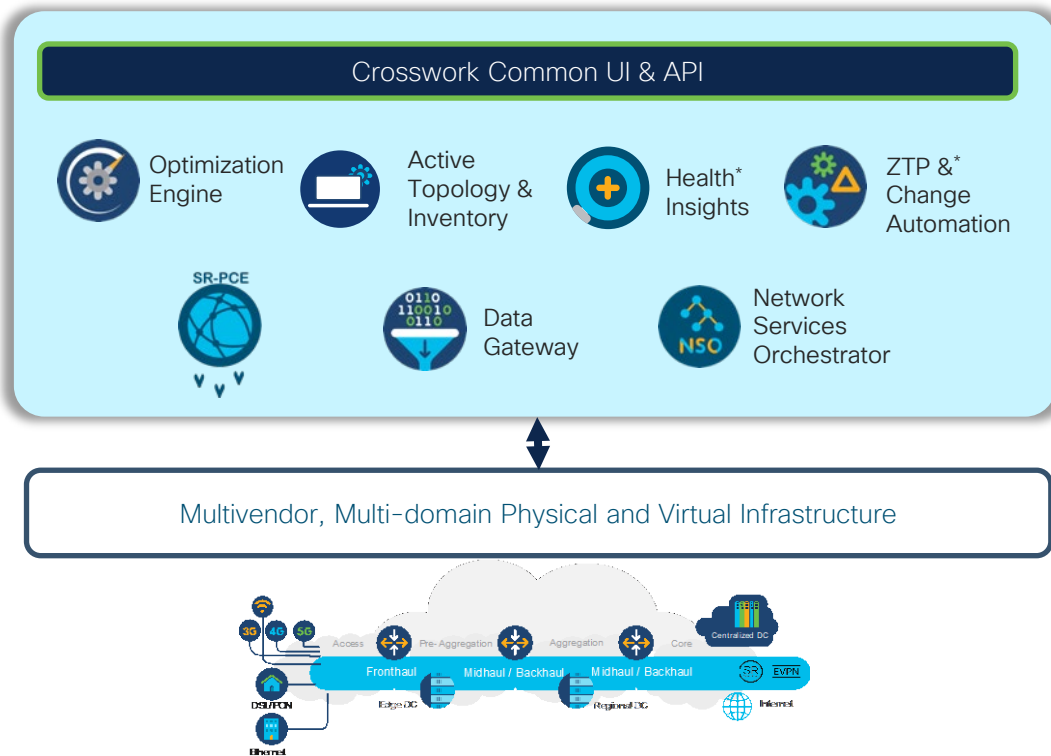
Turnkey solution for deploying and operating IP transport networks



Cisco Crosswork Network Controller 2.0

*GA: April 2021

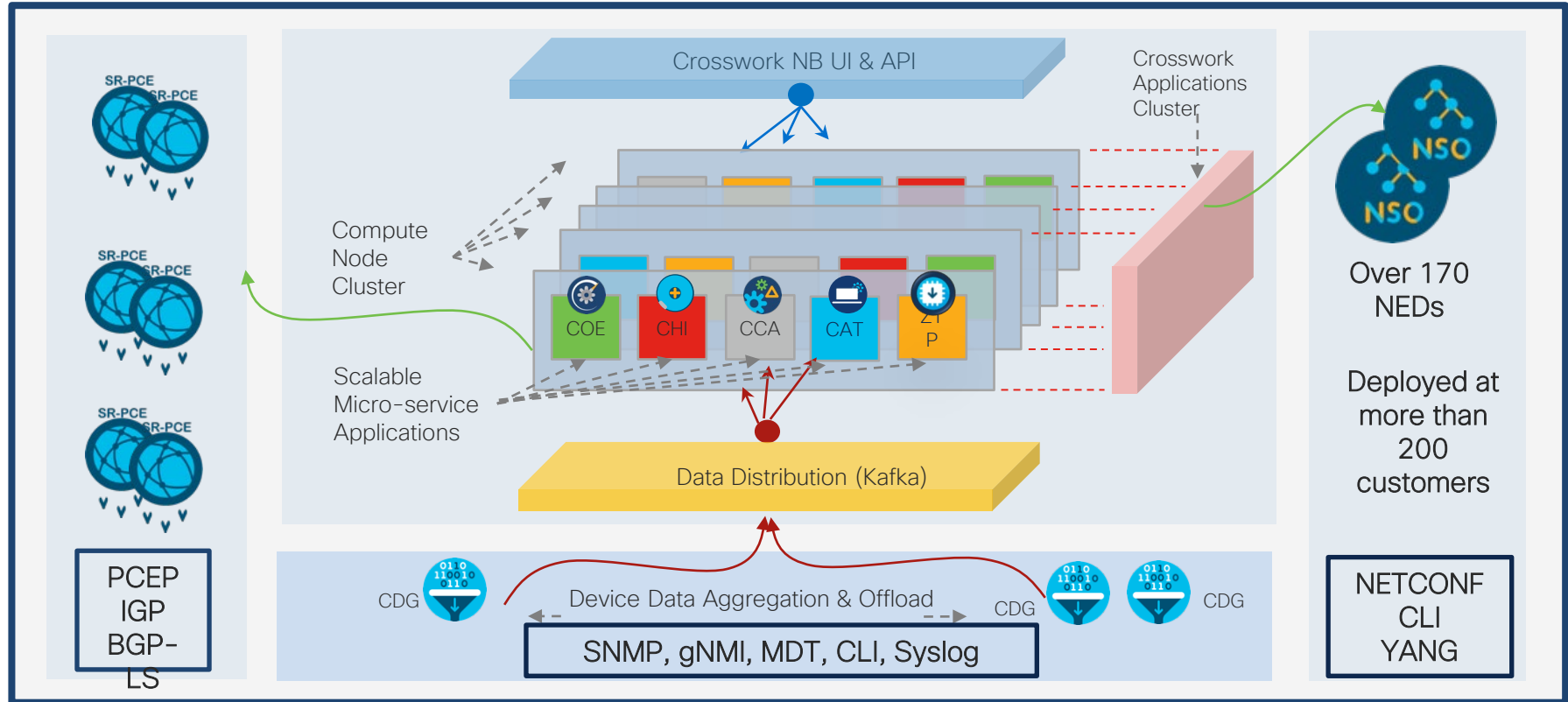
Turnkey solution for deploying and operating IP transport networks



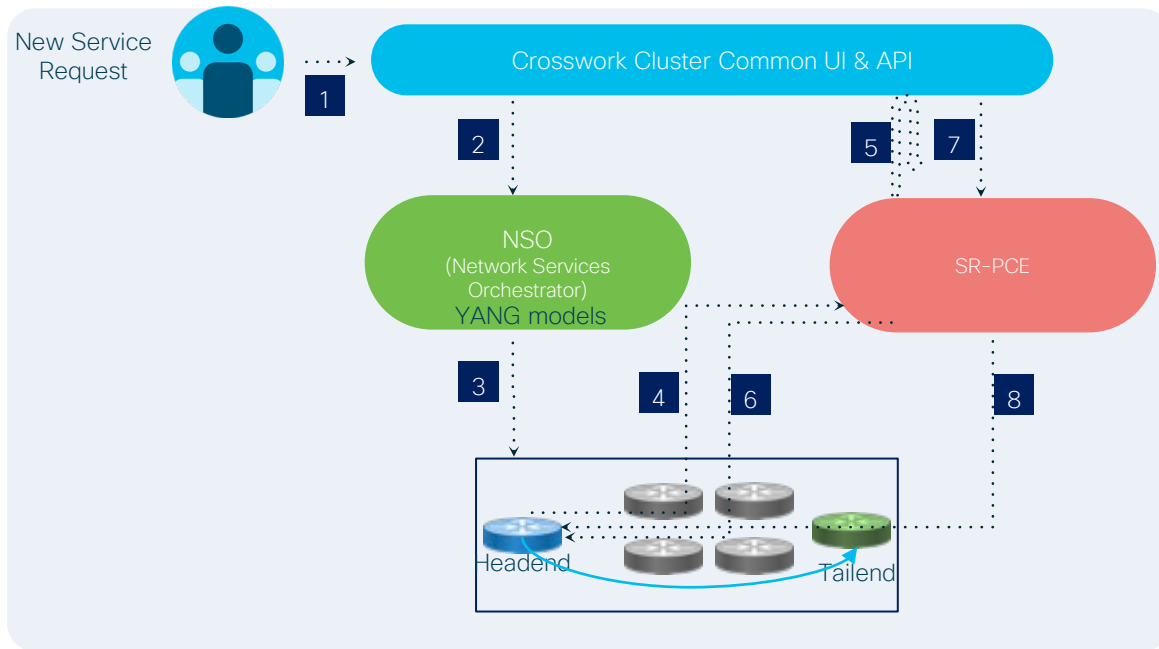
Crosswork Network Controller (CNC) 2.0

GA : April 2021

Industry's Broadest Multivendor Support With Standards Based Implementation



Service Provisioning, Realtime Optimization & Visualization



SR Policy Optimization

Objective

Latency/IGP/TE/Delay Metric Minimization

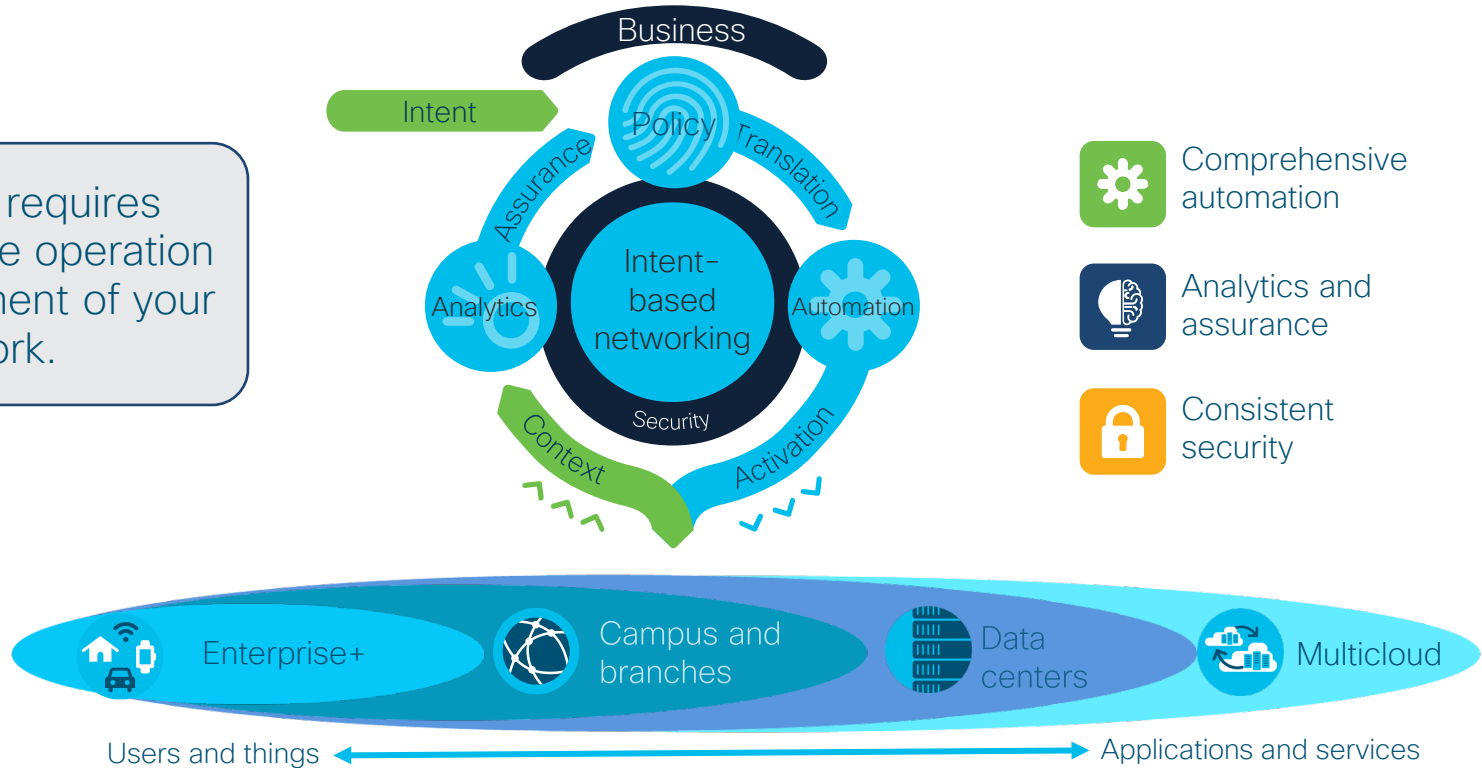
Constraints

Affinities, Disjoint Paths, Bandwidth

1. User requests VPN service & associated SR Policy with SLA (e.g., bandwidth, latency)
2. Crosswork delegates the request to NSO
3. NSO configures Service & SR-TE policy at headend
4. Headend requests path from SR-PCE via PCEP
5. (If request involves bandwidth, SR-PCE gets path from Crosswork)
6. SR-PCE sends path to headend via PCEP
7. (If request involves bandwidth and the path needs to change, Crosswork pushes new path to SR-PCE)
8. SR-PCE updates headend via PCEP for path changes

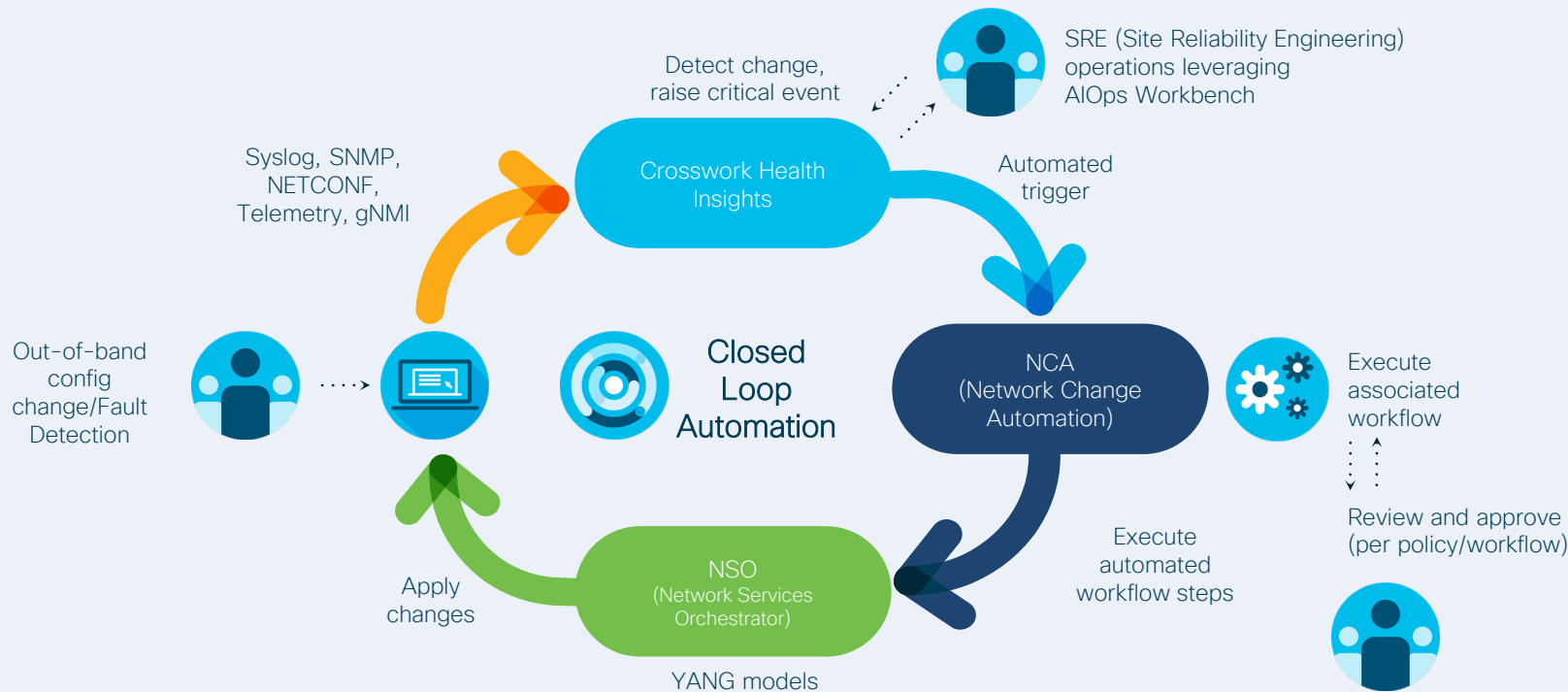
Closed-loop Network Optimization

IT success requires automating the operation and management of your network.

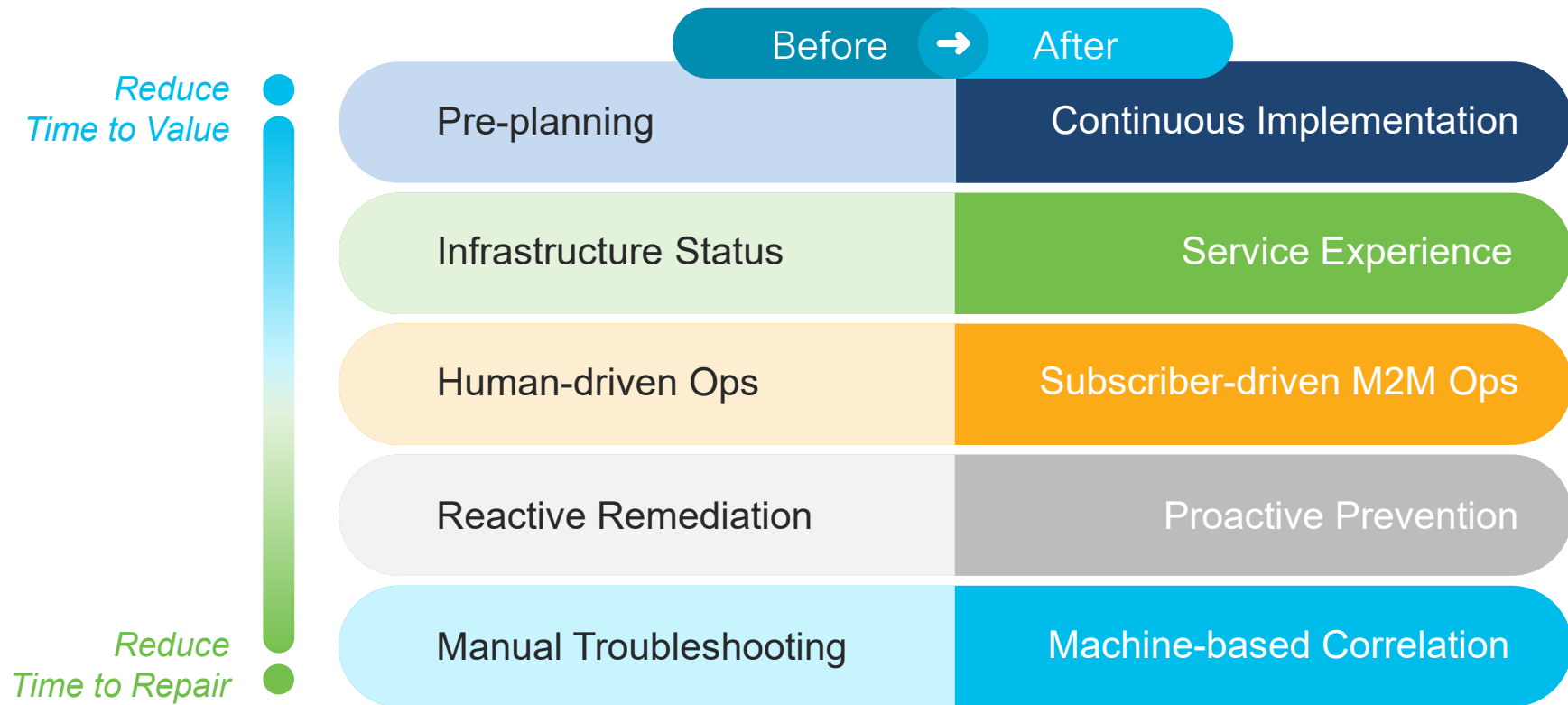


Service Anomaly Detection & Automated remediation

Putting it all together, delivering Closed-Loop systems



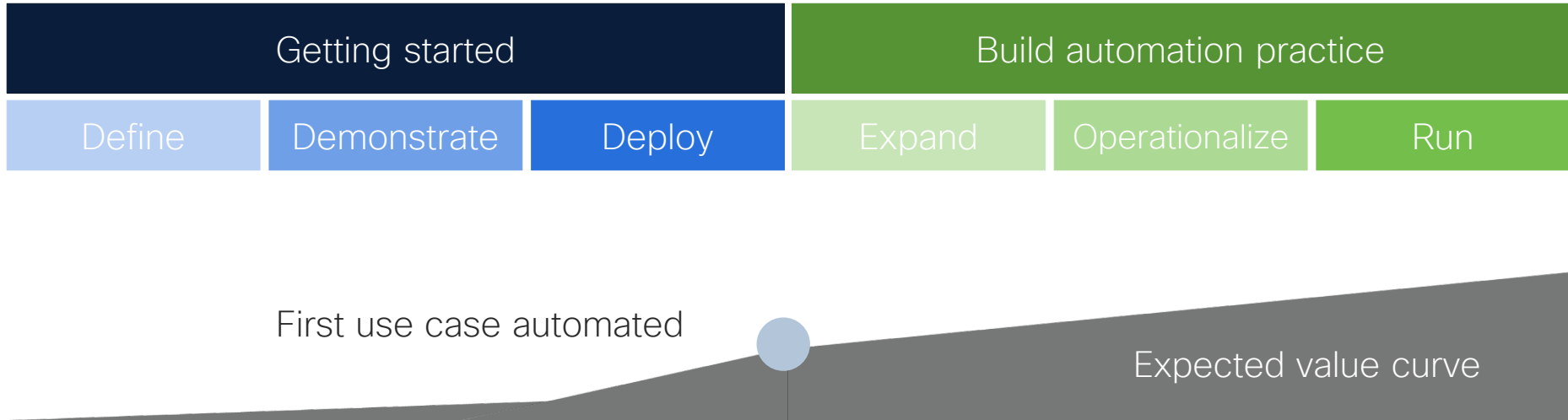
Modernize Operational Outcomes with Cisco Crosswork



Next Steps



Automation Value Curve



Automation Value Proposition per Step

Getting started

Define

General automation knowledge increased

Demonstrate

Stakeholder
awareness created

Mindshift towards
automation begun

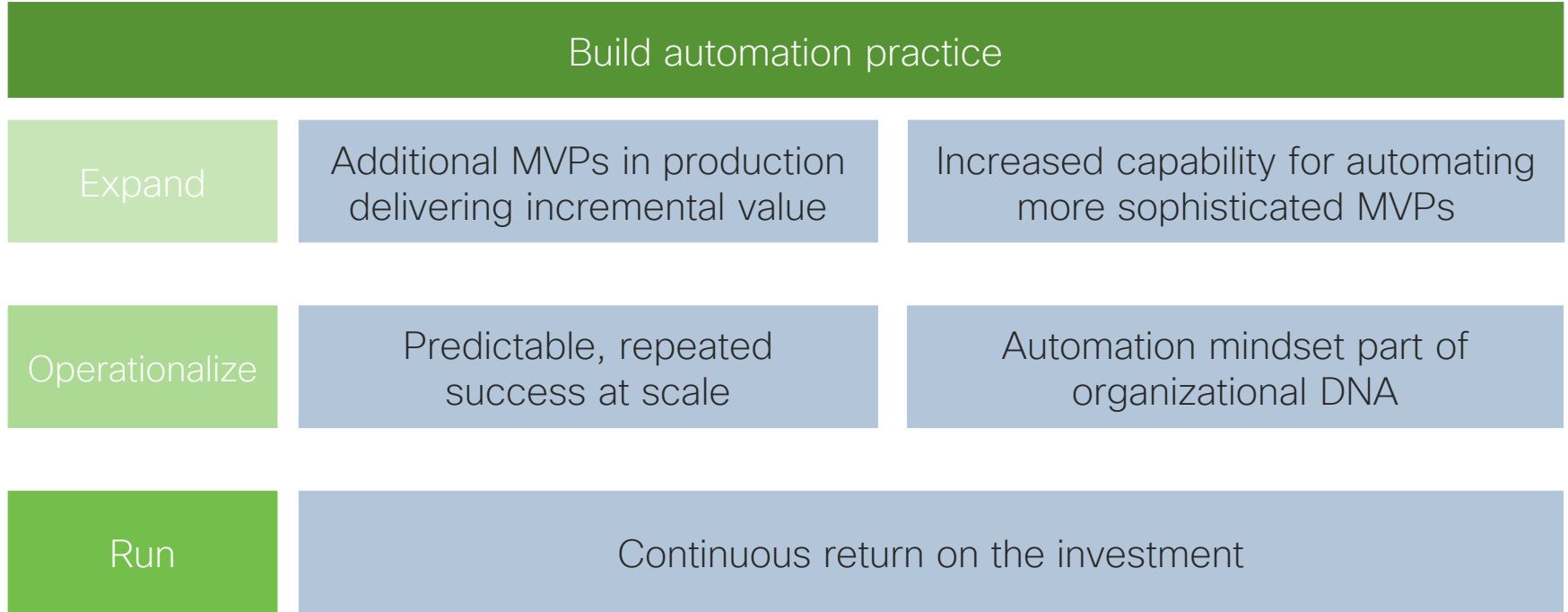
Increased organizational
readiness for automation

Deploy

Positive momentum built

First small MVP use
case in production

Automation Value Proposition per Step



Conclusion



Additional References

- Cisco-Light Reading Webinar on **Automating Software Defined IP Transport Networks**:
https://www.lightreading.com/webinar.asp?webinar_id=1666
- Crosswork Network Automation DevNet:
<https://developer.cisco.com/docs/crosswork/>
- Network Services Orchestrator Dev Center:
<https://developer.cisco.com/site/nso/>
- Network Automation Delivery Model:
<https://developer.cisco.com/docs/network-automation-delivery-model/#network-automation-delivery-model>

Product References

SR-PCE (a.k.a. XR Transport Controller): *(Feature within IOS-XR)*

https://www.cisco.com/c/en/us/td/docs/routers/asr9000/software/asr9k-r7-1/segment-routing/configuration/guide/b-segment-routing-cg-asr9000-71x/b-segment-routing-cg-asr9000-71x_chapter_01011.html

Crosswork Network Automation:

<https://www.cisco.com/c/en/us/products/cloud-systems-management/crosswork-network-automation/index.html>

WAN Automation Engine (WAE):

<https://www.cisco.com/c/en/us/products/routers/wan-automation-engine/index.html>

Network Services Orchestrator (NSO):

<https://www.cisco.com/c/en/us/solutions/service-provider/solutions-cloud-providers/network-services-orchestrator-solutions.html>

Evolved Programmable Network Manager (EPN-M):

<https://www.cisco.com/c/en/us/products/cloud-systems-management/evolved-programmable-network-ept-manager/index.html>

Continue your education



Demos in the Cisco campus



Meet the engineer 1:1 meetings



Walk-in labs



BOFSPG-1450 - Your Transport SDN
Automation Journey





The bridge to possible

Thank you

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