Software Upgrade Automation

Identify and Remediate Network Software Risks through Process Automation & Orchestration

Mahalaxmi Muddaliar
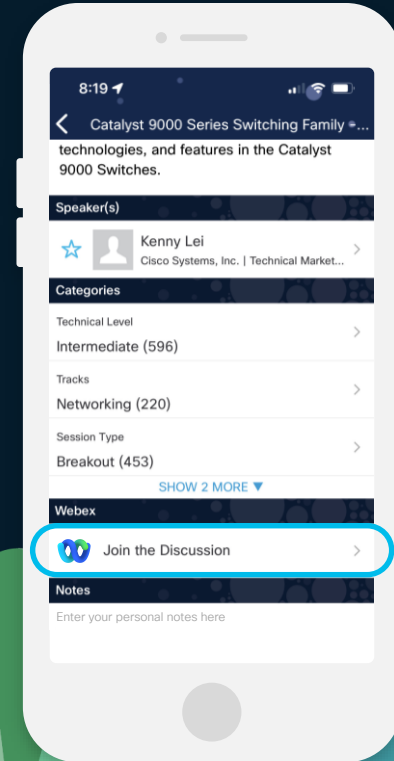CX Product Manager
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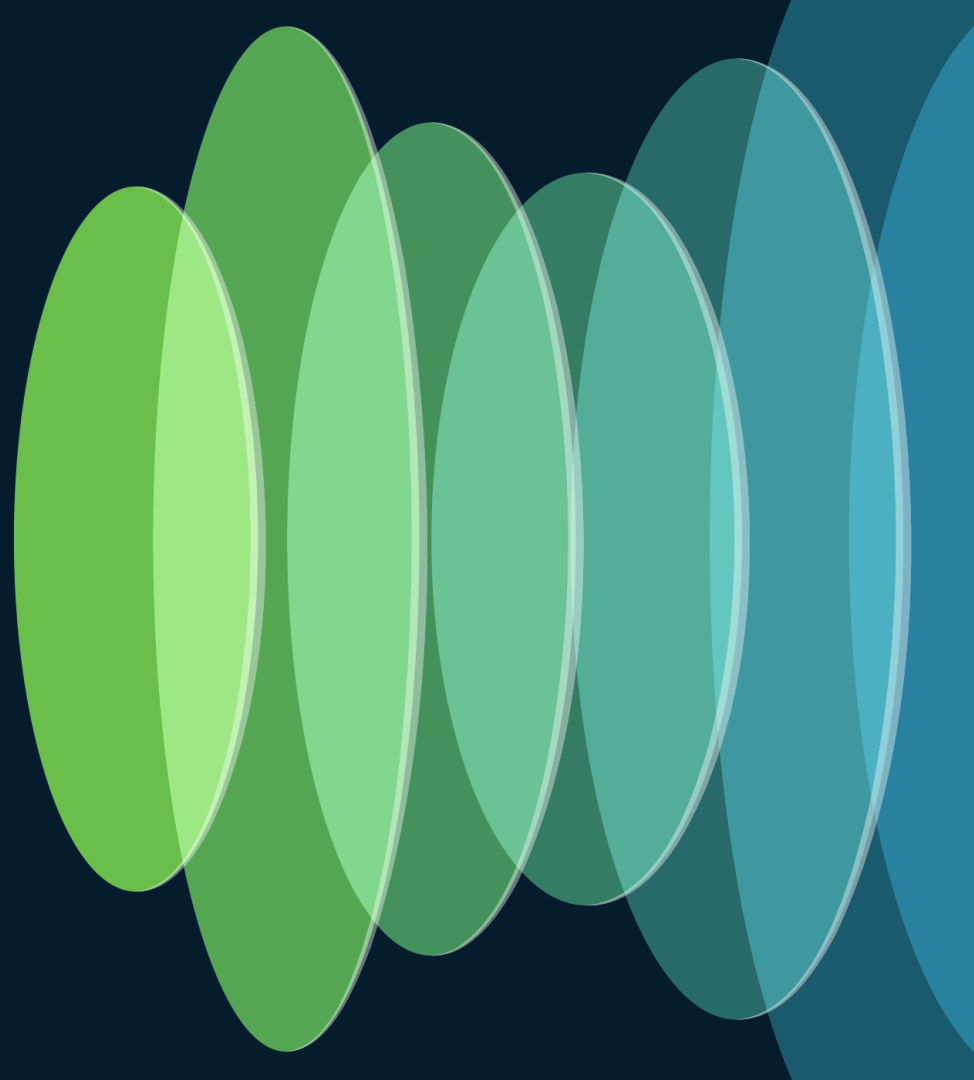by the speaker until June 7, 2024.

Agenda

- What is Software Management?

- Software Management Automation Imperatives

- Automation Solution

- Demo

- Case Study
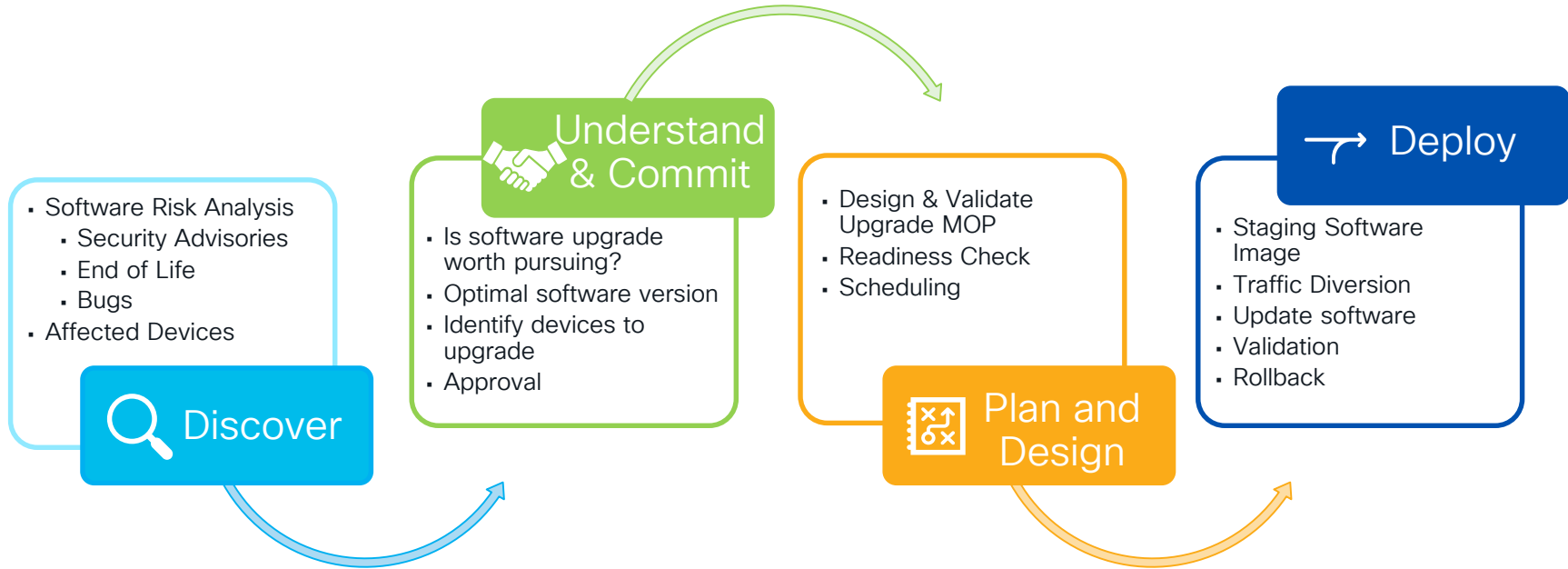
- Takeaways

Software Management

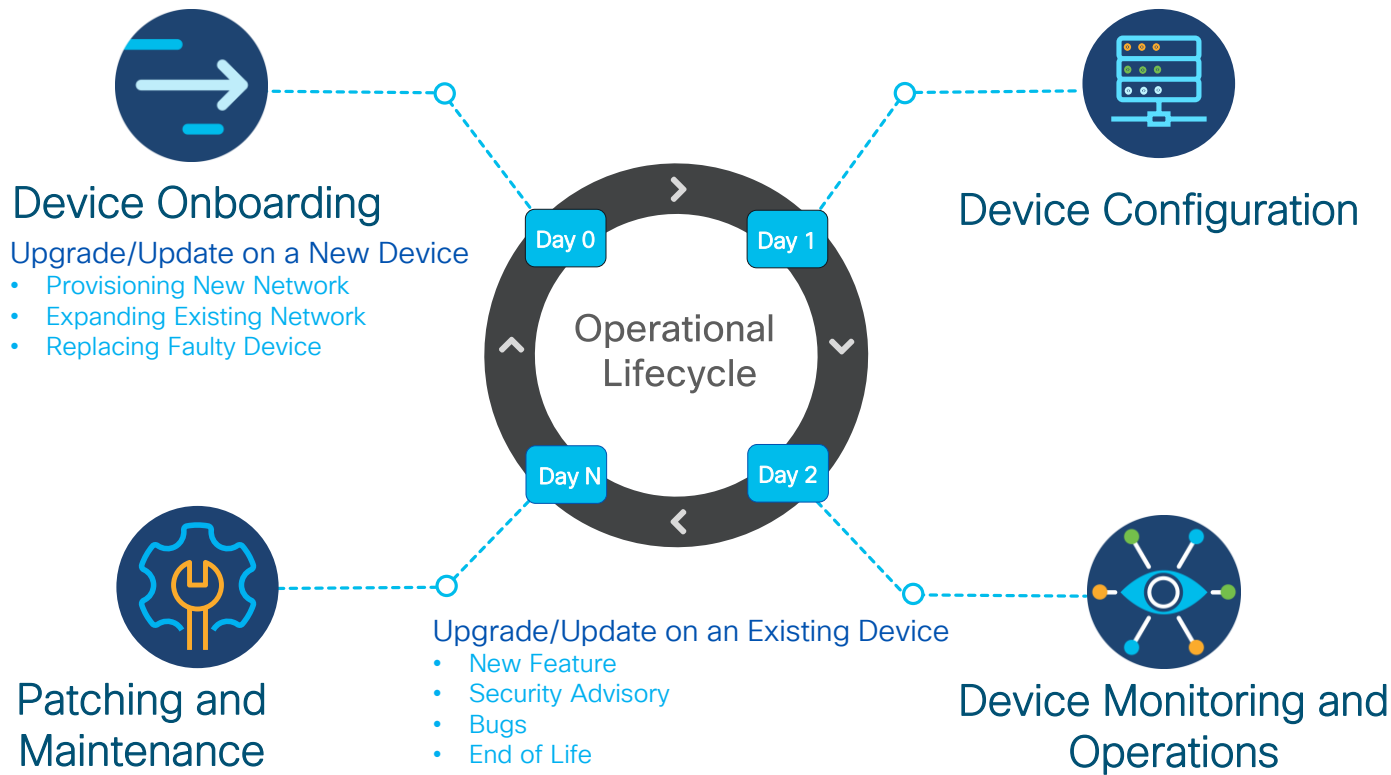# What is Software Management?

In simple words,
Software Management is the practice of monitoring, evaluating, and understanding the software running on your network to detect any security or performance risks, followed by updating this software to the vendor-recommended versions, ensuring your network operates efficiently and safely.

Software Management Journey

Discover
- Software Risk Analysis
  - Security Advisories
  - End of Life
  - Bugs
- Affected Devices

Understand & Commit
- Is software upgrade worth pursuing?
- Optimal software version
- Identify devices to upgrade
- Approval

Plan and Design
- Design & Validate Upgrade MOP
- Readiness Check
- Scheduling

Deploy
- Staging Software Image
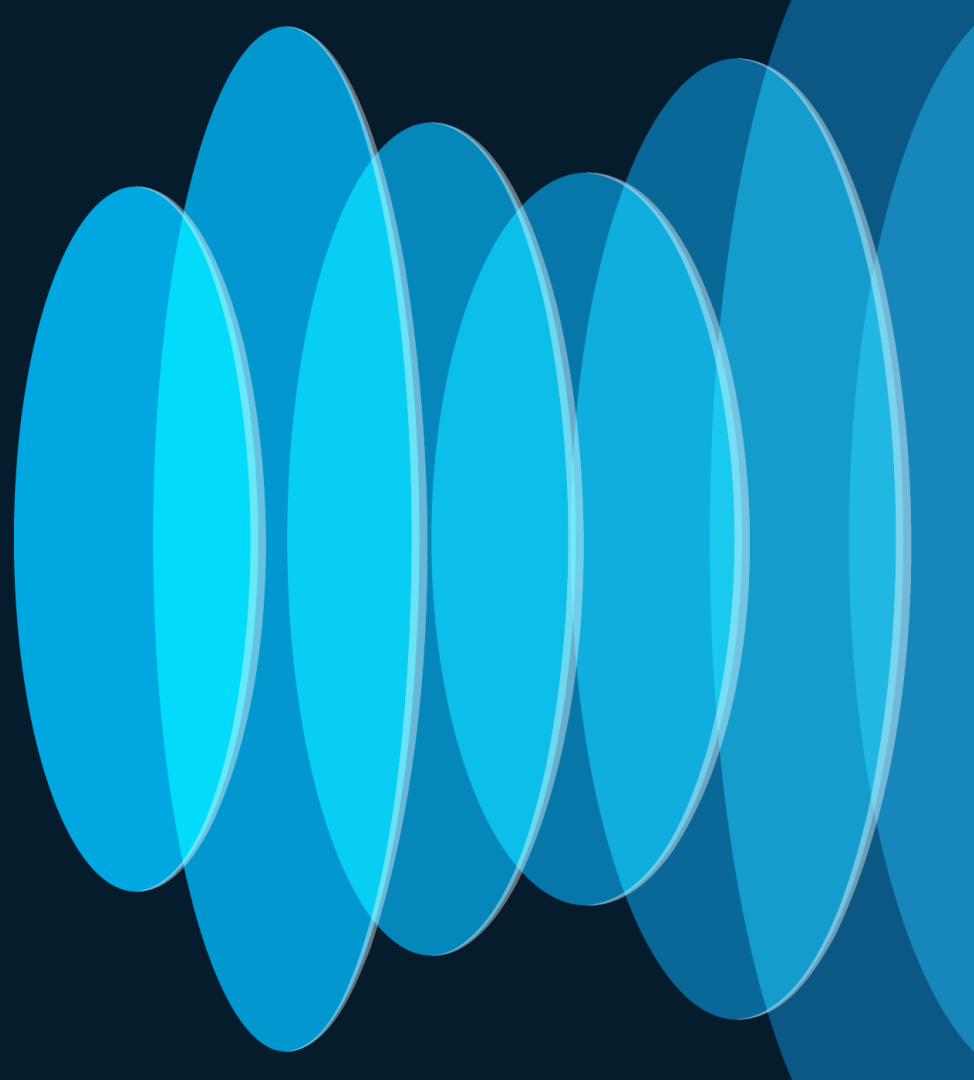- Traffic Diversion
- Update software
- Validation
- Rollback

When is a Software Update required?

Software Update use cases

Device Onboarding

Upgrade/Update on a New Device
- Provisioning New Network
- Expanding Existing Network
- Replacing Faulty Device

Day 0

Day 1

Operational Lifecycle

Day N

Day 2

Device Configuration

Patching and Maintenance

Upgrade/Update on an Existing Device
- New Feature
- Security Advisory
- Bugs
- End of Life

Device Monitoring and Operations
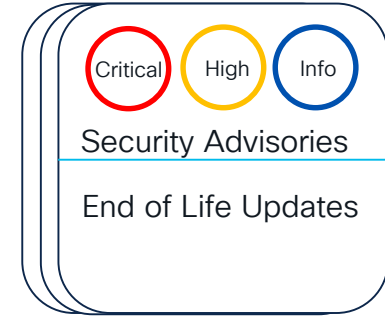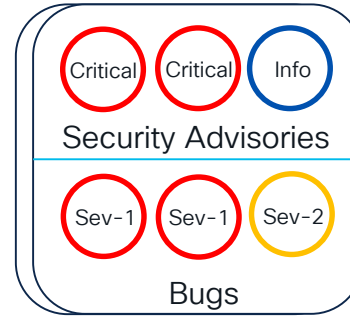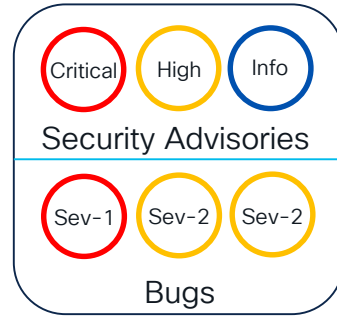
Automation Imperatives

Identifying and fixing software vulnerabilities is challenging and ongoing

Software Announcements

Security Advisories: Critical, High, Info — Bugs: Sev-1, Sev-2, Sev-2

Security Advisories: Critical, Critical, Info — Bugs: Sev-1, Sev-1, Sev-2

Security Advisories: Critical, High, Info — End of Life Updates

June 5, 2024   July 5, 2024   July 15, 2024

Network Assets

Customer Challenges

Challenges

- Multi Vendor Network
- Varied MOPs based on different device types
- Limited maintenance windows and need mass scale upgrade
- Challenging, time consuming and error-prone process
- Integration with External Solutions
- Devices are way behind in software version and need multiple upgrades
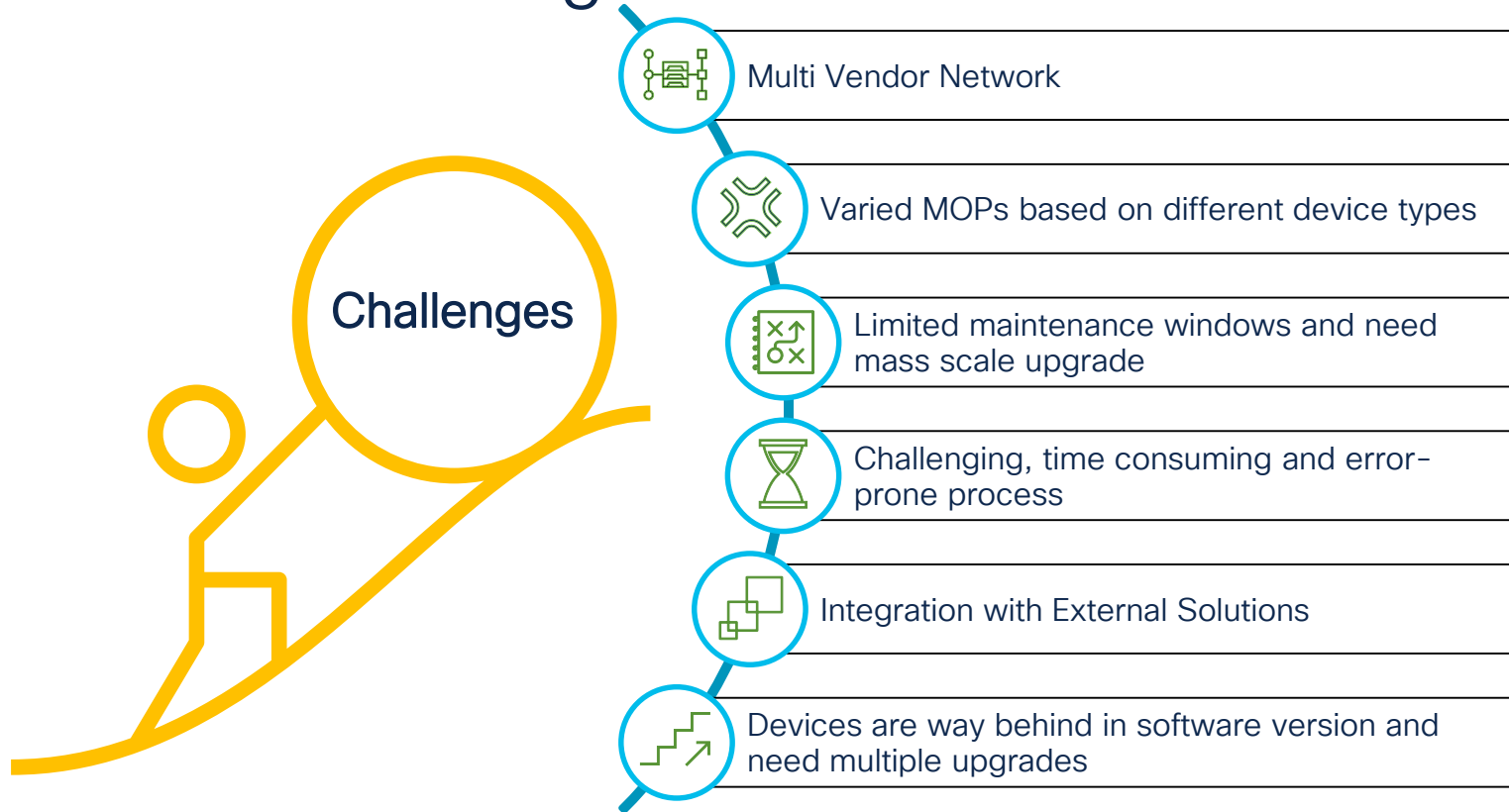
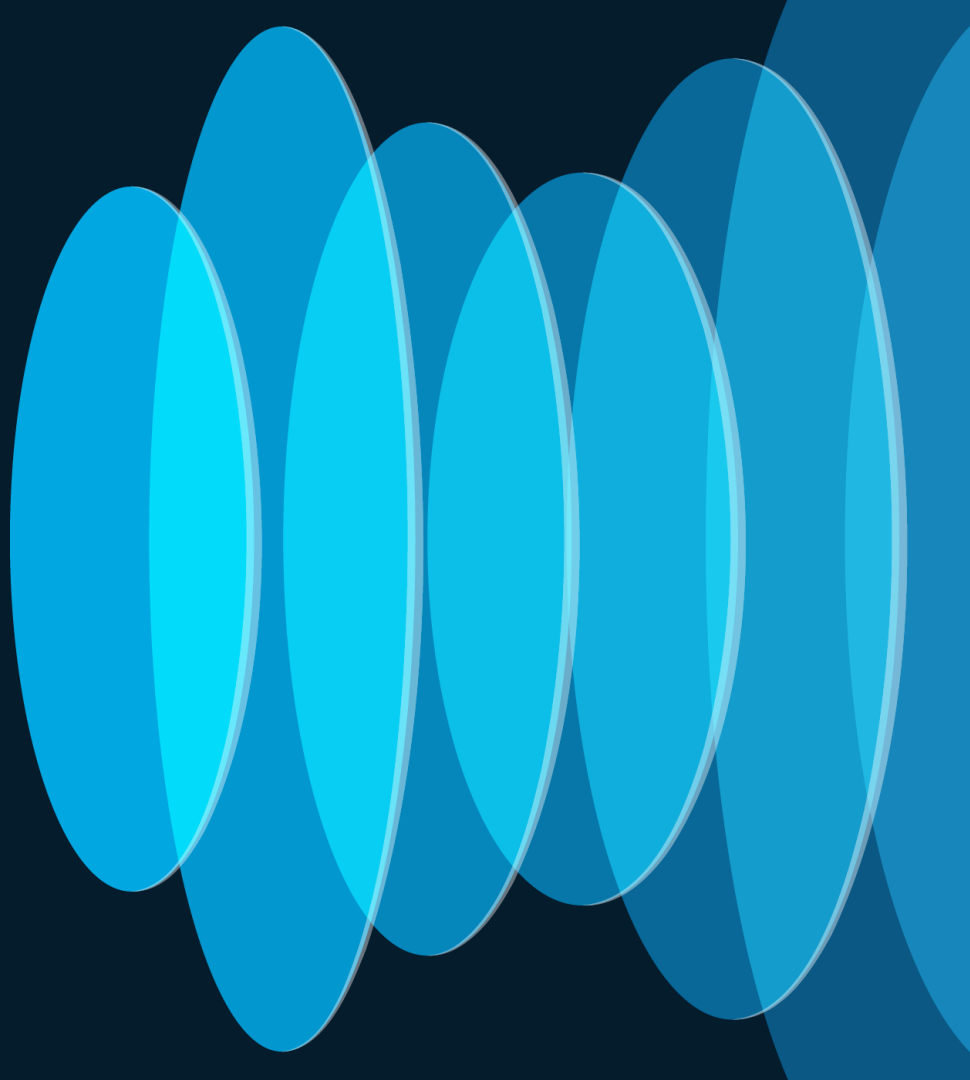# What do Customers need?
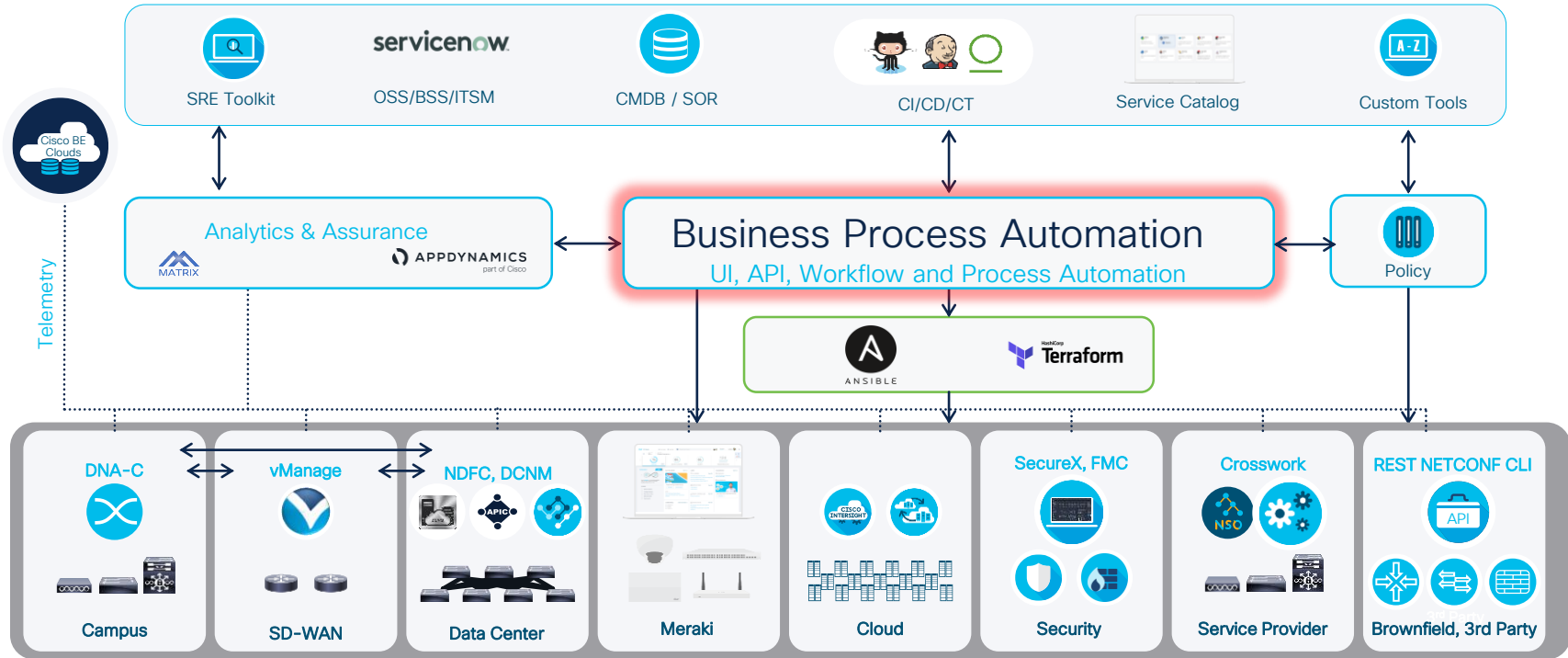## Solution Requirements

Ops Admin

Operator

Use Cases

1. I need a way to quickly identify software risks and vulnerabilities exposed to my network assets and get insights on Vendor recommended software versions

2. I need a way to quickly identify all the assets in my network whose software images must be upgraded

3. I need to provide a centralized list of software images and their versions (from all the vendors) for the software upgrade process to use them.

4. I need to pre-define the upgrade process along with pre and post checks for each vendor device model/family.

5. I need to schedule upgrades for non-conformant assets during maintenance windows across geo-regions, monitor the upgrade progress and get detailed reports.

Automation
Solution
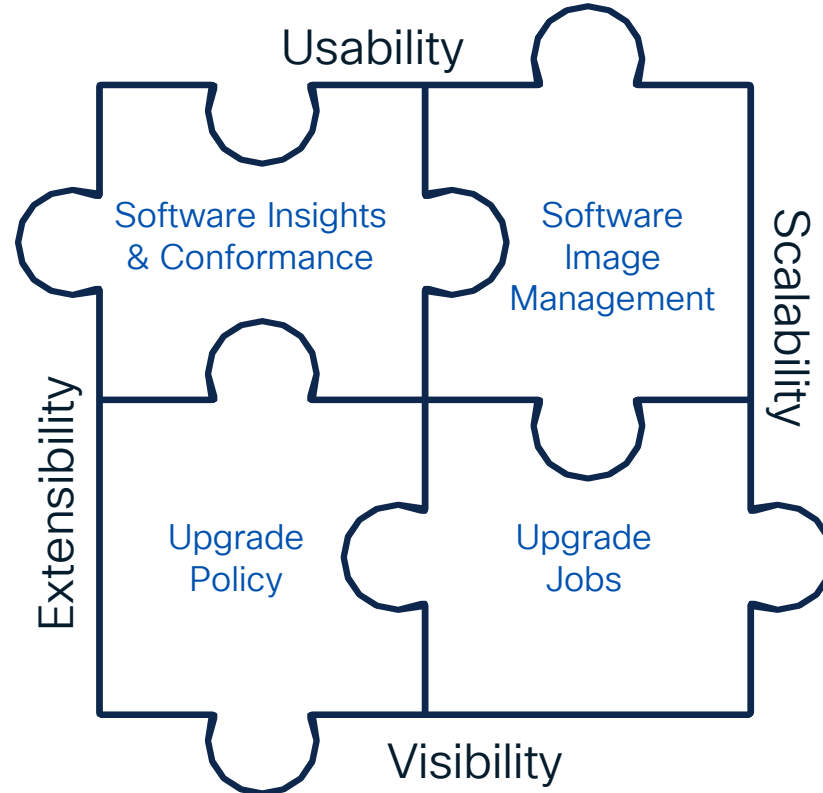
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Automation and Orchestration Framework

BPA OS Upgrade Application
Solution Model

Usability

Software Insights & Conformance

Software Image Management

Scalability

Extensibility

Upgrade Policy

Upgrade Jobs

Visibility

Requirements to Solution Capabilities

Use Cases

Ops Admin

Operator

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Software Insights

Conformance policies
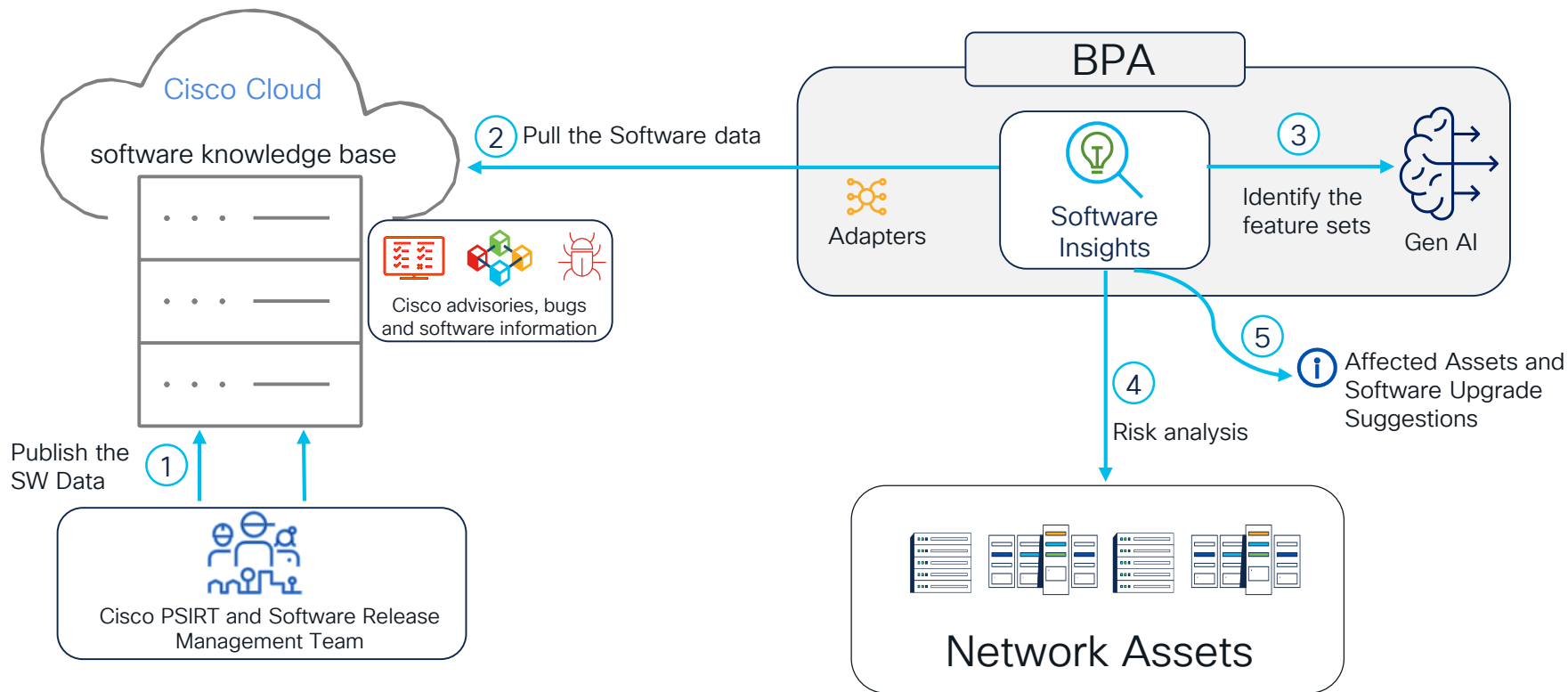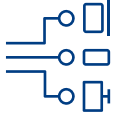
Software Image Management

Upgrade policies

Upgrade jobs

Software Insights Architecture

Cisco Cloud

software knowledge base

Cisco advisories, bugs and software information

BPA

② Pull the Software data

Adapters

Software Insights

③ Identify the feature sets

Gen AI

⑤ Affected Assets and Software Upgrade Suggestions

④ Risk analysis

Publish the SW Data ①

Cisco PSIRT and Software Release Management Team

Network Assets

Core Components of MOP Automation

Workflow Engine
BPMN compliant open-source workflow engine

Form Designer
Approvals, Error handling, Human intervention

Process Templates
Pre/Post checks, Run operational commands

Adapter Framework
Adapters for integration with External Systems

Solution Features

Unified user experience across domains

Policy driven MOPs - easily customizable

Conformance check

Insights data

Scheduling

Batching (sequential and parallel), queueing

Config backups

Realtime pre/post validations

Workflow progress with live logs
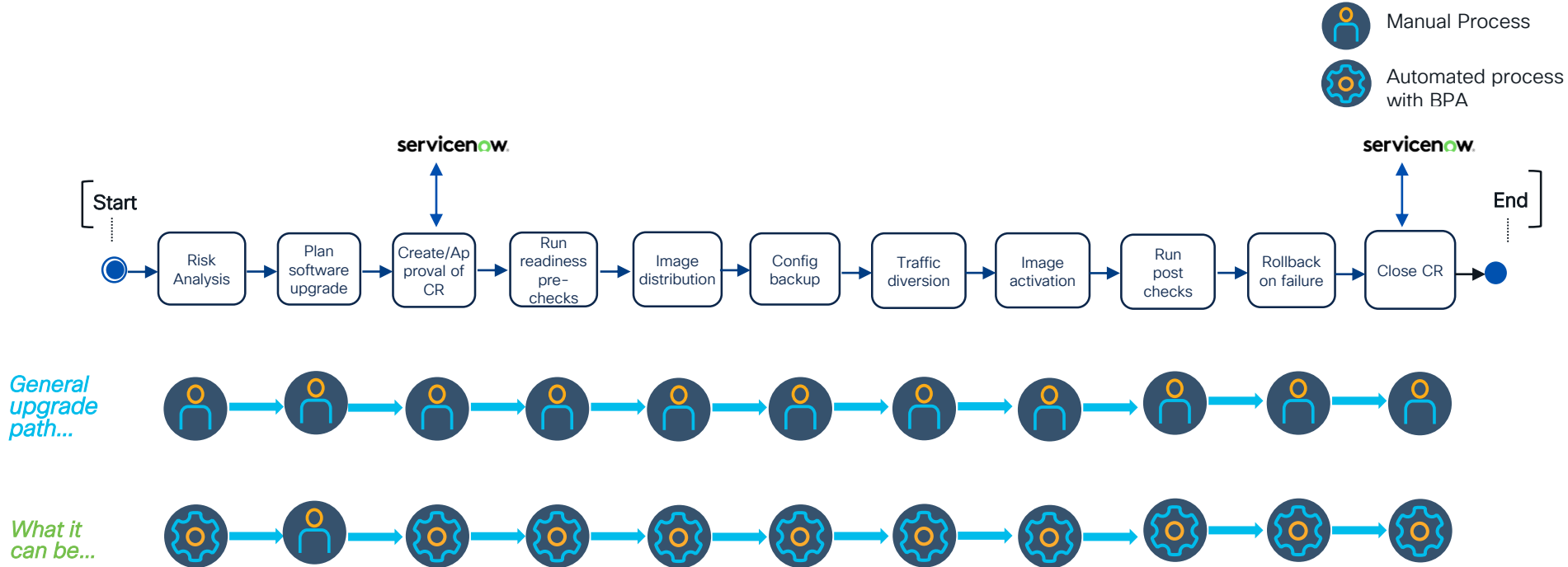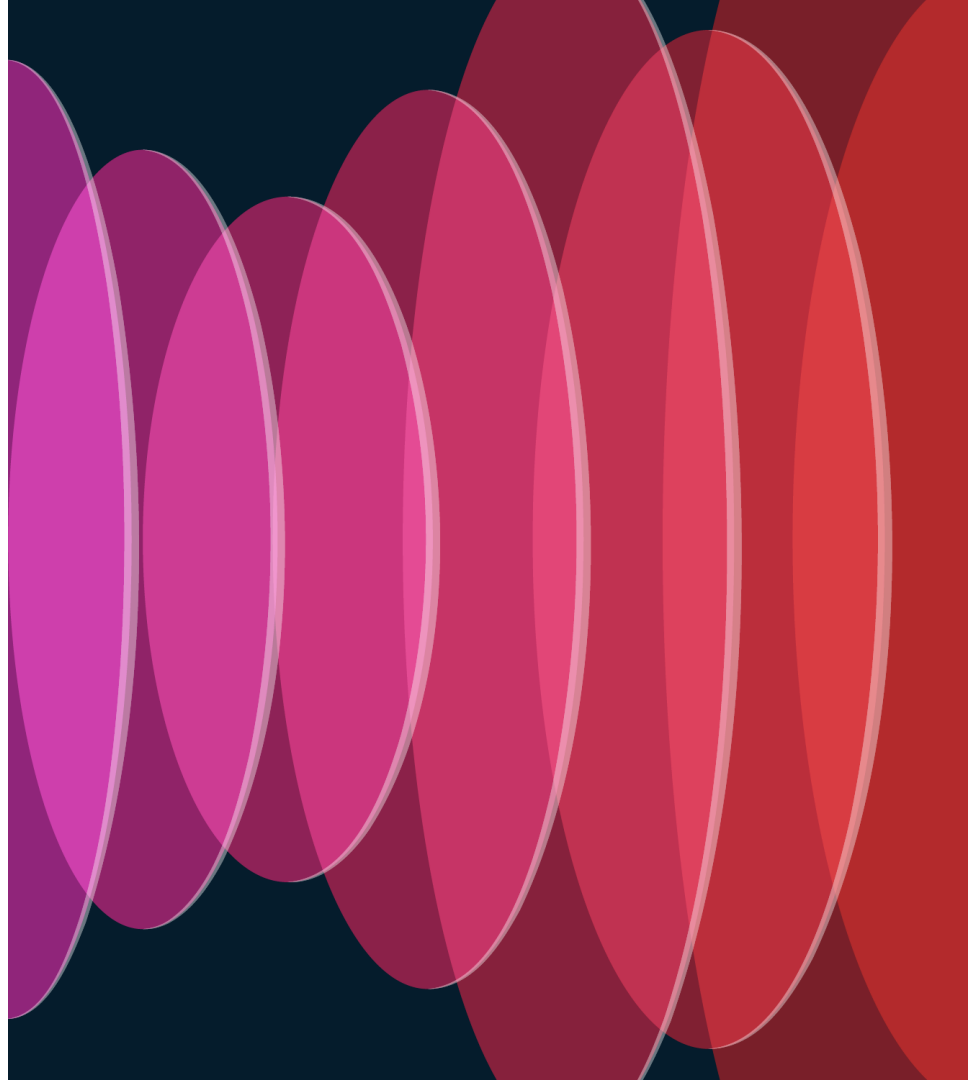
Human Intervention

Detailed reporting

API enabled

General vs. Automated Software Upgrade Path

Manual Process

Automated process with BPA

servicenow.

servicenow.

Start

End

Risk Analysis → Plan software upgrade → Create/Approval of CR → Run readiness pre-checks → Image distribution → Config backup → Traffic diversion → Image activation → Run post checks → Rollback on failure → Close CR

General upgrade path...

What it can be...

Demo

Demo

1 Mia
Ops Admin

Which assets in my network are at risk and need software updates?

Software insights & **Software Conformance**

- Sync and fetch latest advisories, bugs and EoX information
- Create conformance policy
- Run conformance checks

Assets that are at risk & need updates

Demo

2 Alex
Operator

I need to update software for these assets

Upgrade jobs

- Create upgrade job
- Batching assets
- Backup configuration
- Schedule during maintenance windows
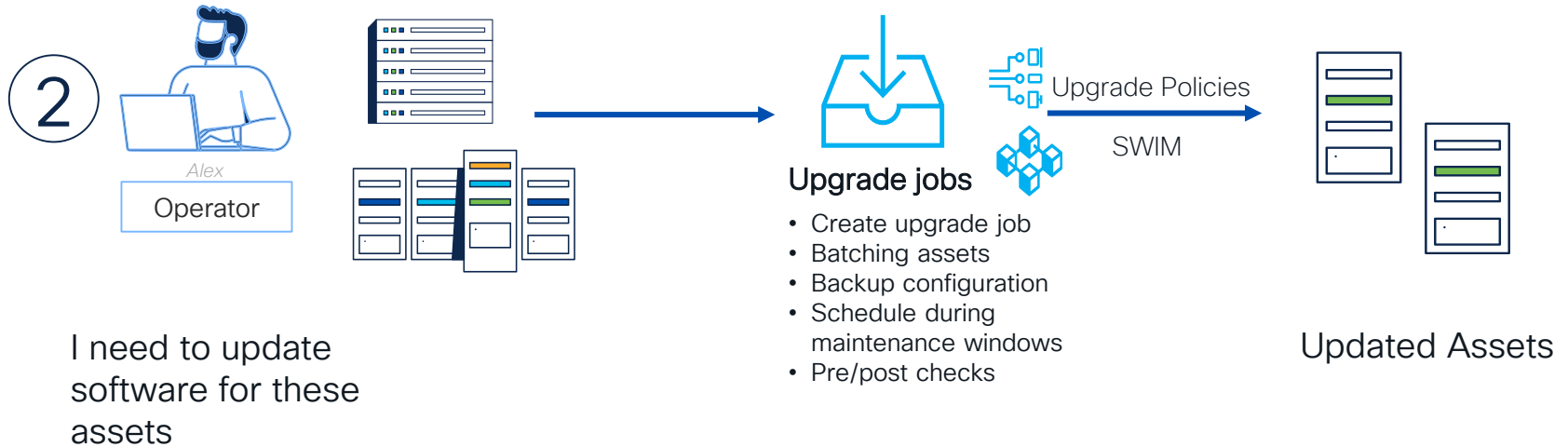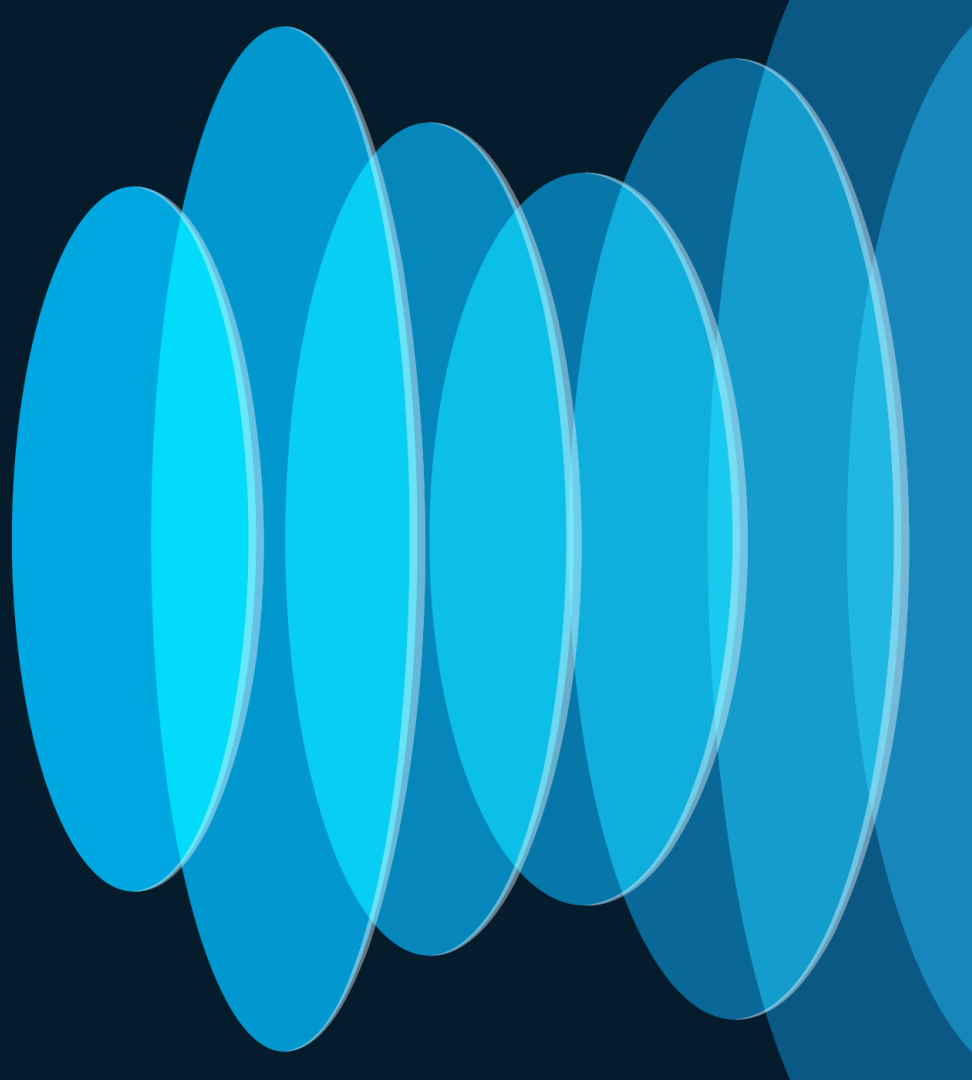- Pre/post checks

Upgrade Policies

SWIM

Updated Assets
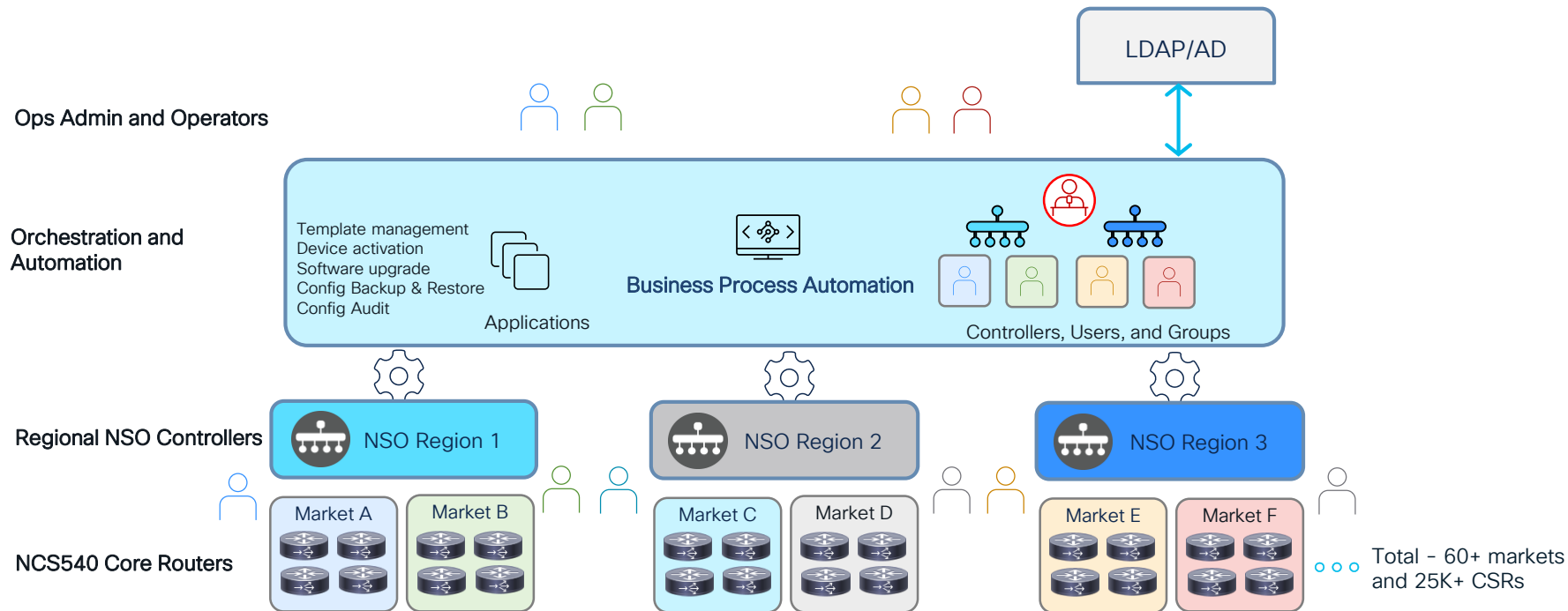
Case Study

Network Value Realization through Process Automation

Tier 1 SP Customer in USA – 25K CSR(Cell Site Router) Upgrades

LDAP/AD

Ops Admin and Operators

Orchestration and Automation

Template management
Device activation
Software upgrade
Config Backup & Restore
Config Audit

Applications

Business Process Automation

Controllers, Users, and Groups

Regional NSO Controllers

NSO Region 1

NSO Region 2

NSO Region 3

NCS540 Core Routers

Market A
Market B
Market C
Market D
Market E
Market F

Total – 60+ markets and 25K+ CSRs

Network Value Realization through Process Automation

Challenges/Situation

- Objectives:
  - ✓ Lower operational costs
  - ✓ Faster provisioning and Time to Market
  - ✓ Higher quality network with superior Reliability

- Customer was looking for a readily available solution to **automate Software upgrade at scale**.

- **Very tight timeline** to complete software upgrade of more than 25k devices within 2 months.

Solution

- BPA's Software Upgrade automation solution (Business Process Automation) was **readily available**, having a lot of flexibility and customization.

- OS Upgrade: Automate SW distribution, activation and commit for 25000 nodes. SW conformance

- This solution was proposed to Dish and was adopted with **10-15% of customization** to tailor to their specific needs.

Outcome

- Customer completed software upgrades of 20000+ router in a **record 60 days**, can **scale up to 1000 upgrades** per night.

- Otherwise, Manual software upgrade takes 10 hours per site. It would take > 1 year to complete 25000+ routers.
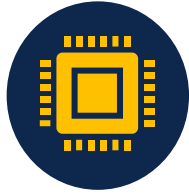
Testimonial

Customer accomplished upgrading 25000+ NCS540 devices in around 60 days and considered it a **success**. They upgraded anywhere from 400 to 600 Cisco devices in a few hours per night using BPA. Customer is calling the NCS540 7.8.2 upgrades effort as a very successful one.

Impact of Automation

Tier 1 SP customer in USA

95%

Increased efficiency
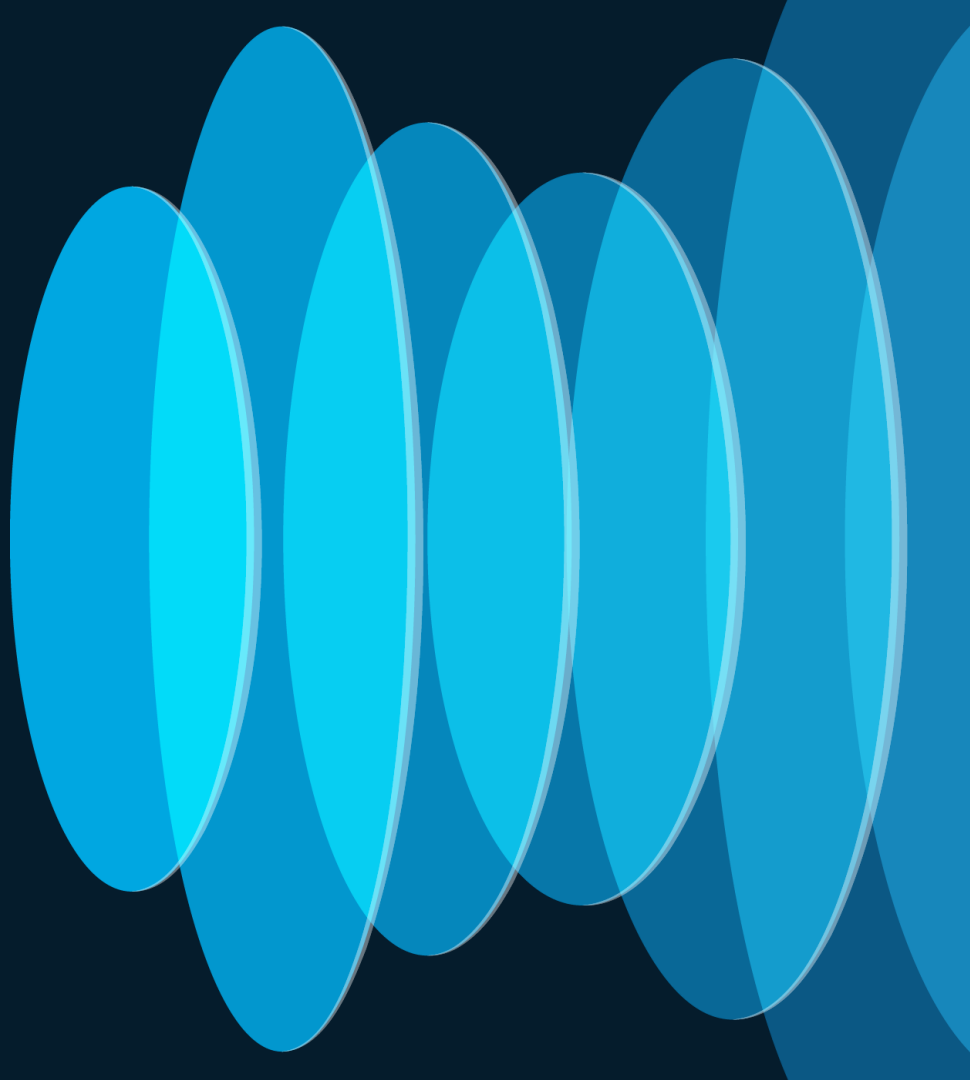
80%

Reduction in time and effort

75%

Cost reductions per upgrade cycle

70%

Decreased cycle time

Takeaways

Key Takeaways

- Software Risk Assessment is critical to maintain Network Stability and Security.

- Network downtime due to Software Upgrade failure is very expensive, and automation is key to avoid such errors and increase productivity.

- Automation solution driven by business intents provides a flexible solution that allows easy adoption to the changing processes.

- Streamline Software management process across multi–platform/vendor environments through Process Automation.

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