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ALL IN

The bridge to possible

Nationwide Insurance Journey with Programmability and Automation

Mike Jones, Associate Vice President, Network Technology, NATIONWIDE INSURANCE
Hoda Alshami, Manager, Technical Product Manager, NATIONWIDE INSURANCE

CSSPRG-1653

Cisco Webex App

Questions?

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with the speaker after the session

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1. Find this session in the Cisco Live Mobile App
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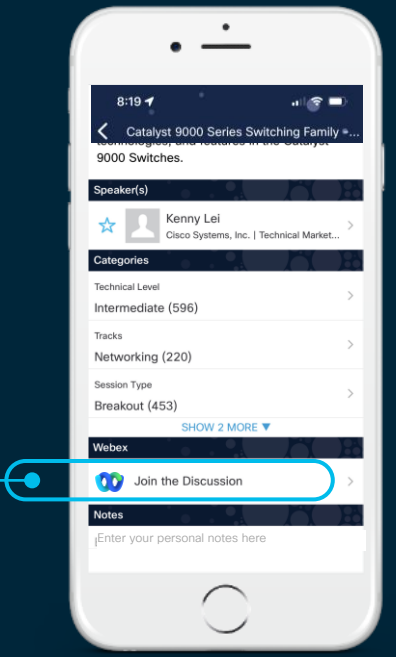

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Agenda

- Who We Are
- DevNetOps Journey
- DNAC Enables DevNetOps
  - Configuration Template Standardization
  - Provision Automation – Day-0, Day-N
  - Network Observability

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Nationwide®
is on your side

At Nationwide, we exist to protect people, businesses and futures with extraordinary care.
Knowing that customers trust our On Your Side promise during the worst and best moments of life is an honor and a privilege.

A range of offerings

We're here for you through all of life's moments.

For your ride
- Private passenger vehicles
- Commercial vehicles
- Classic cars
- Sport vehicles

For your home
- Homeowners
- Renters
- Condo
- Personal liability/umbrella

For your free time
- Recreational vehicles
- Boats
- Sports vehicles
- Motorcycles
- Snowmobiles
- Travel

For your business
- Commercial
- Farm and ranch
- Commercial agribusiness
- Corporate life
- Retirement plans
- Excess and surplus

For your family
- Life
- Auto
- Homeowners
- Dogs
- Cats
- Birds and exotic pets

For your future
- Annuities
- Mutual funds
- Retirement plans

We are a FORTUNE 100 company

A1 Moody's
received: 3/10/09
affirmed: 5/27/20

A+ AM Best
received: 10/17/02
affirmed: 12/17/20

A+ Standard & Poor's
received: 12/22/08
affirmed: 6/23/20

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MISSION

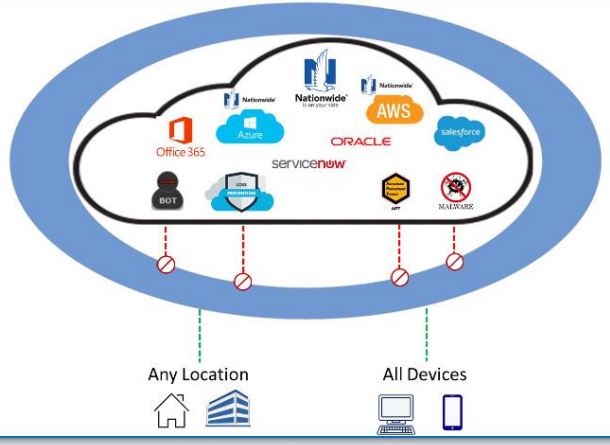
To protect people, businesses and futures with extraordinary care

VISION

To be the most trusted, most caring and most customer-focused protection company

Ease of Access

- Work from anywhere, anytime
- Transparent Access
- Connectivity Agility



Secure

- Zero Trust Architecture
- Security as a Service
- Regulatory Compliant

Nationwide Network Technology... our future is now

ON

Always on & Reliable

- Resilient Architecture, diverse and redundant
- Operational Excellence, Standardization
- Automation and Observability

Nationwide®
is on your side

Efficient and Effective

- Value focused Investments
- More OpEx vs CapEx
- Network and Vendor Flexibility

STRATEGY

Put the customer at the center

Enable consistent delivery of extraordinary care

Improve operations for speed, efficiency and expertise

Manage our business for long-term financial strength

VALUES

We value people

We are customer focused

We act with honesty and integrity

We trust and respect each other

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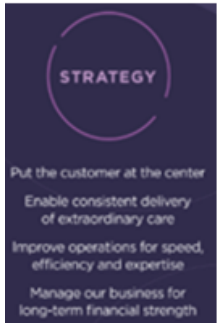

Always on & Reliable

- Resilient Architecture, diverse and redundant
- Operational Excellence
- Standardization & Automation

Network Roadmap

Always on & Reliable…

- **Focus on the User Experience as the key metric**
- Enables our user to focus on their work and not managing technology
- **Automation First Mindset**
- **Supports Integration and flexibility for Network Observability**
- **Implement proactive alerting** – fix before it breaks

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Programmability & Automation Path

Mindset

Automation 101

Skills

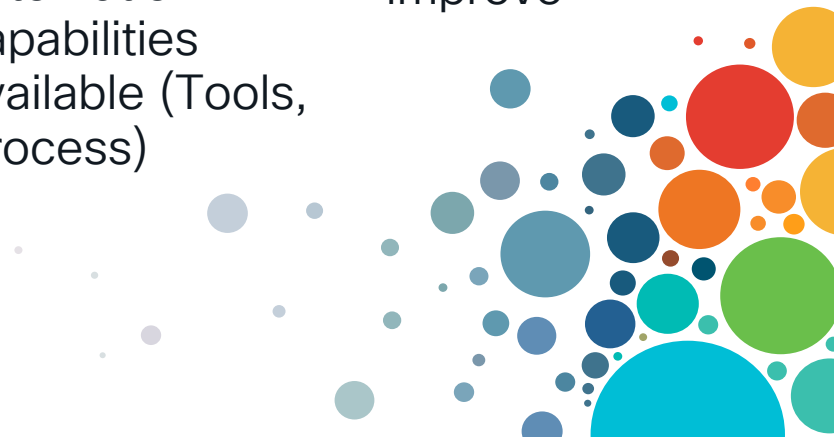
Seed product team with automation skills (software Engineers, automation leads)

Environment

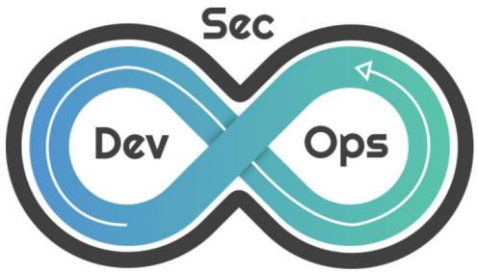
Make automation capabilities available (Tools, Process)

Sense & Response

Execute, measure, and continually improve



Moving Network from Operations to Product Evolution and Innovation



Adoption of DevOps and DevSecOps mindset, practices and tools for building a **culture** of **shared responsibility (Network Engineers, Developers)**, **transparency**, and **faster feedback** to minimize downtime, resolve issues faster and build new capabilities with higher quality and stability.

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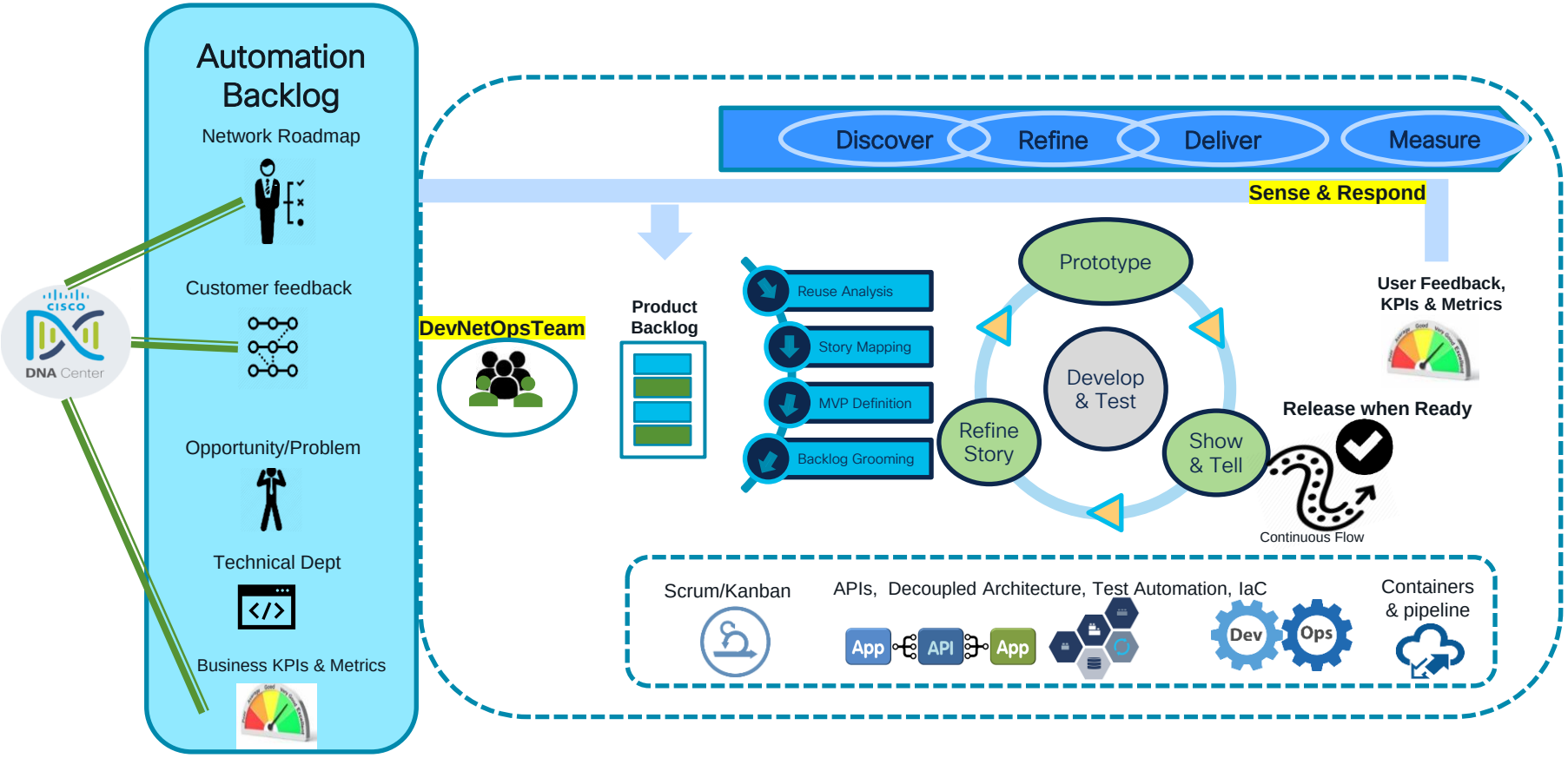
DevNetOps Delivery Framework



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DNAC Enables DevNetOps

- Configuration Template Standardization
- Provision Automation - Day-0, Day-N
- Network Observability

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Template Standardization

Goal

- Standardize ALL router, switch configs
  - One stop shop config template repo- in GitHub
  - All provisioning using standard config templates
  - Sync templates to standard-templates repository
  - Detect drift from standard config templates

Challenges

- DNAC, non DNAC devices
- No Current template- Config in text files
- Discrepancy in current configs
- Finding common templating language

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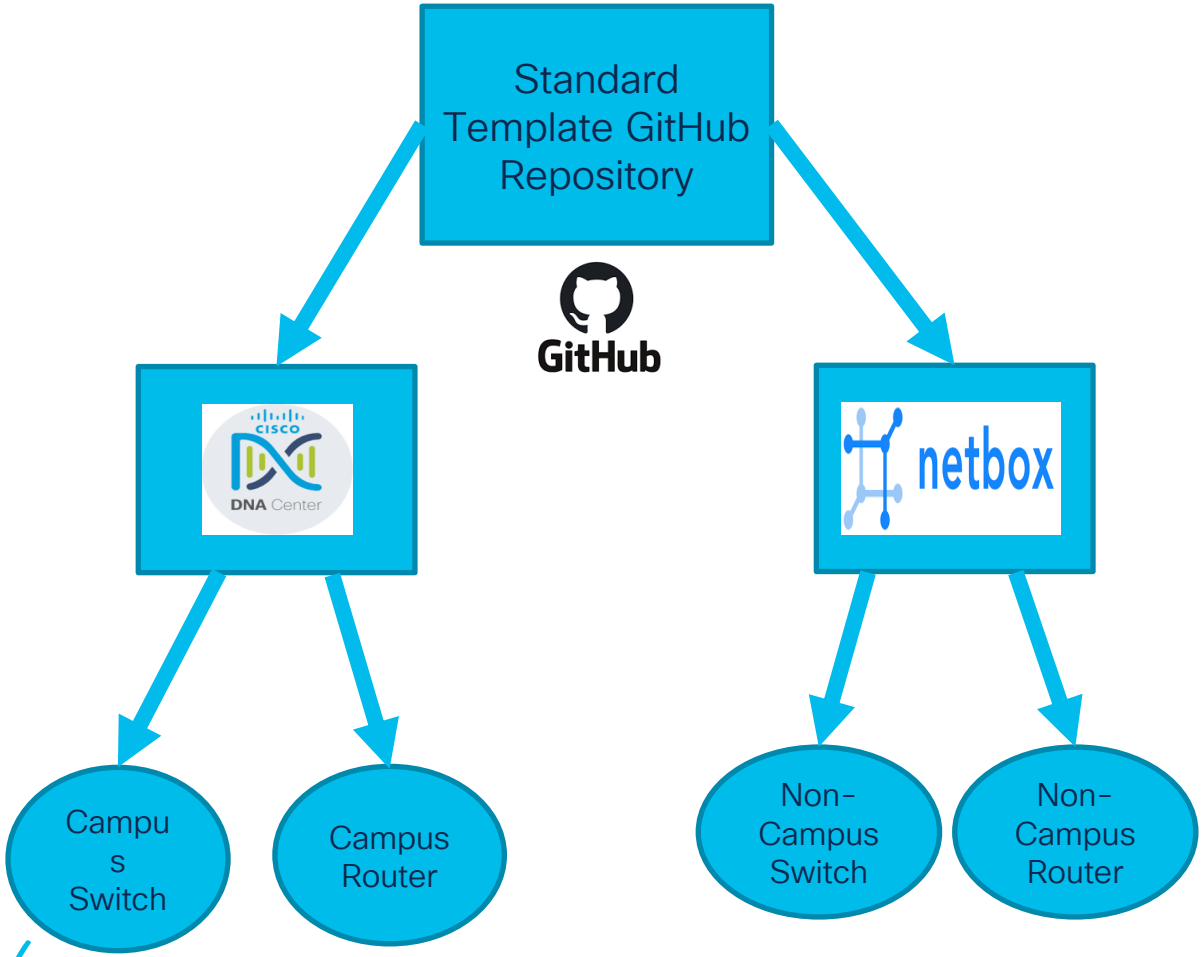

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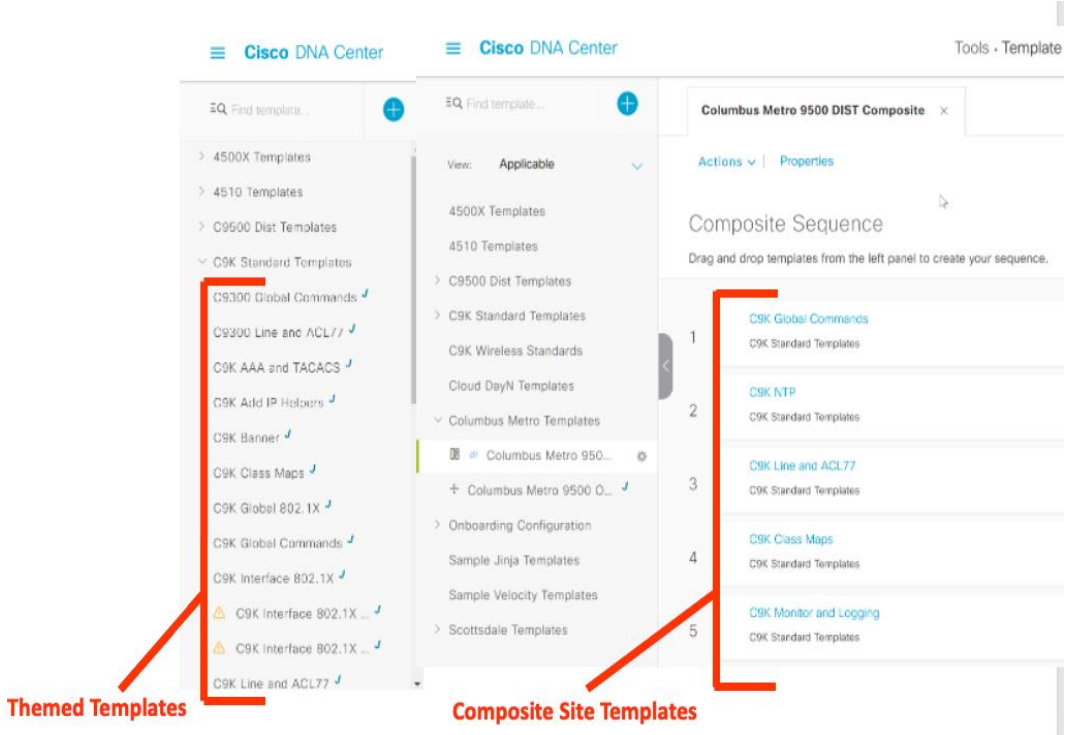
Template Standardization

- Template Creation & Generalization
  - Break DNAC templates into smaller, themed templates
  - Compare DNAC templates against other non-DNAC device configs
  - Use current production config as Source of truth.
  - Utilize NetMRI to pull device configs for comparison
- Common templating language for DNAC, NetBox
  - Moved from Velocity to Jinja2



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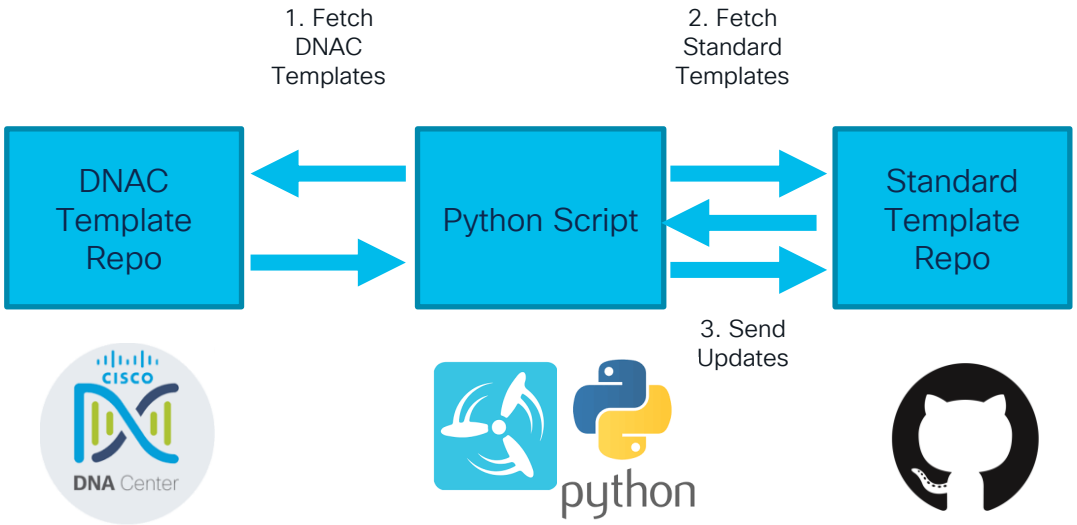
Template Standardization- Solution



Continuous Integration
Concourse
DNAC template API client
Cisco DNAC Python SDK
GitHub Repository API Client
Custom Python API Client

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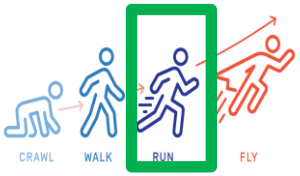
Provision Automation – Day-0, Day-N



Goal

- Streamline and Automate provision for Day-0 and Day-n
- Develop API based config deployment
- User friendly bulk provision

Challenges

- Multiple Tools
- Lack of Automation
- Speed to market
- Prone to manual error
- Bulk Provisioning

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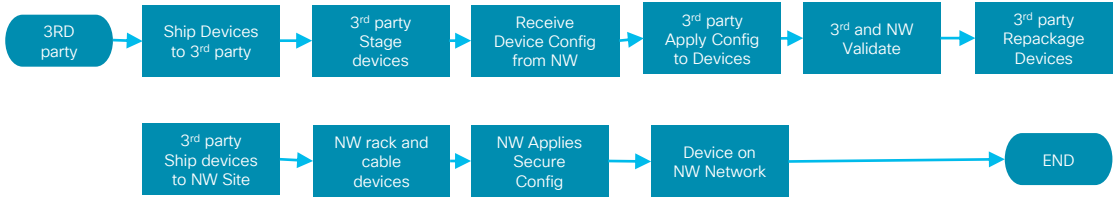
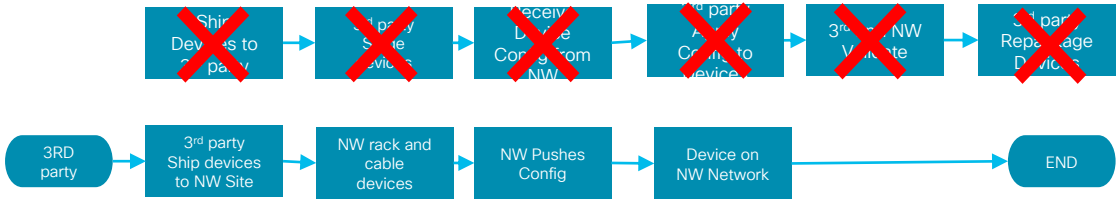
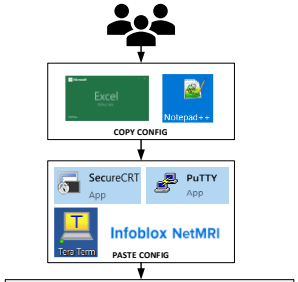
Build Process Old vs. New

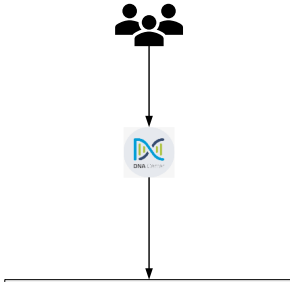
Build Process – Old Way



Build Process – New Way







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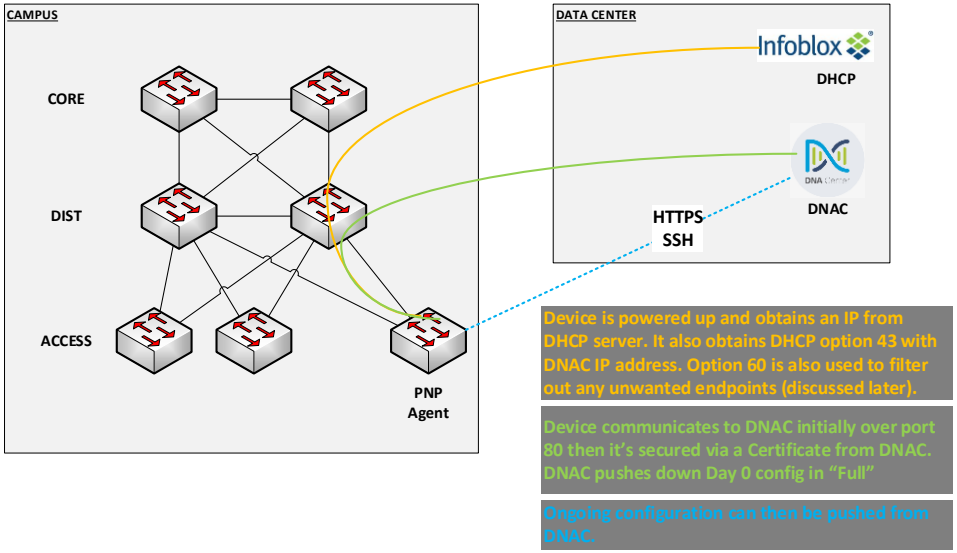
Provision Automation (Plug and Play - Day-0)



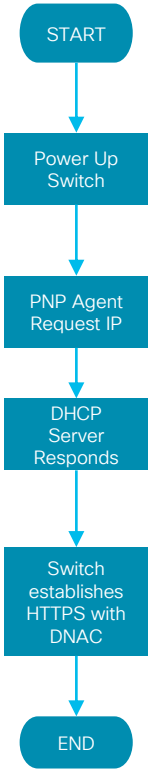
DIST

```
interface TwentyFiveGigE1/0/13
description e-ntac-dnacntr-asw01
no switchport
ip address
ip helper-
ip helper-
no ip redirects
no ip unreachables
no ip proxy-arp
ip pim sparse-mode
ip ospf network point-to-point
ip ospf hello-interval 1
```

ACCESS

```
interface Vlan 1
description e-ntac-dnacntr-asw01
no switchport
ip address dhcp
```

Automated Device Discovery



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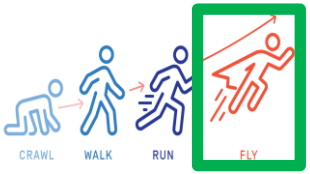
Bulk Provision Automation



User Requirements

- Automated mechanism to bypass the GUI
- Specify configuration to deploy
- Specify devices to receive config update
- View configuration diff
- Commit deployed changes to config

Outcome

- API based config Automation
- Scalable automation to populate template variables with data from other systems
- Select templates outside of site profile

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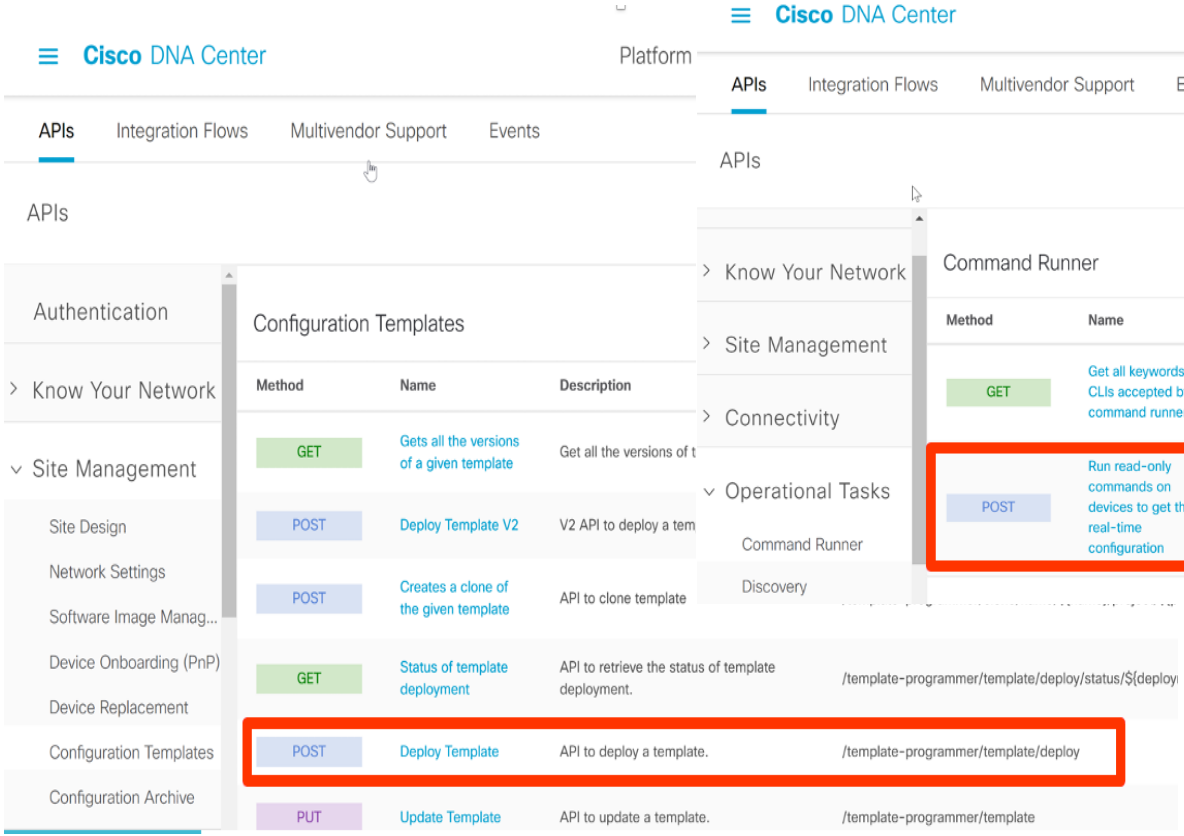
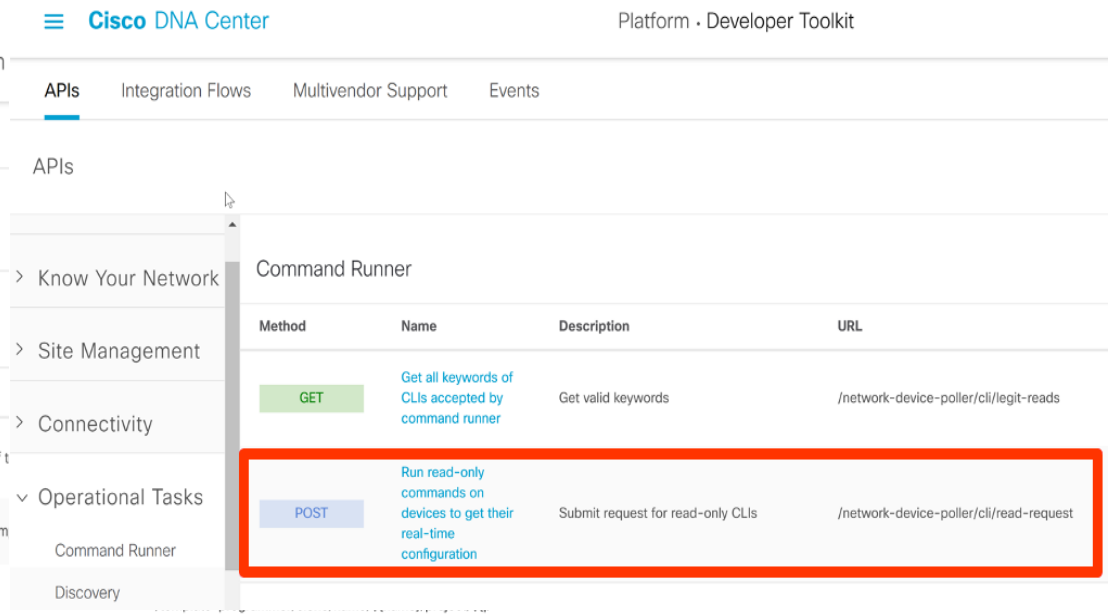
DNAC APIs





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Diff creation: difflib

"This module provides classes and functions for comparing sequences… can produce information about file

before.json - e-ntac-dnacntr-asw01.nd.nwie.net - show run		after.json - e-ntac-dnacntr-asw01.nd.nwie.net - show run	
1	show run	1	show run
2	Building configuration...	2	Building configuration...
3		3	
4	Current configuration : 44273 bytes	4	Current configuration : 44266 bytes
5	!	5	!
6	! Last configuration change at 21:27:19 EDT Thu Oct 21 2021 by dnaclab	6	! Last configuration change at 13:55:52 EDT Sun Oct 24 2021 by dnaclab
7	! NVRAM config last updated at 21:18:46 EDT Wed Oct 20 2021 by dnaclab	7	! NVRAM config last updated at 21:18:46 EDT Wed Oct 20 2021 by dnaclab
8	!	8	!
9	version 17.3	9	version 17.3
10	service tcp-keepalives-in	10	service tcp-keepalives-in
11	service tcp-keepalives-out	11	service tcp-keepalives-out
525	interface Loopback0	525	interface Loopback0
526	description whatever3	526	description whatever3
527	ip address 10.5.80.88 255.255.255.255	527	ip address 10.5.80.88 255.255.255.255
528	!	528	!
529	interface GigabitEthernet0/0	529	interface GigabitEthernet0/0
530	description hello World 22 10.5.80.88	530	description Test Description 2
531	vrf forwarding Mgmt-vrf	531	vrf forwarding Mgmt-vrf
532	no ip address	532	no ip address
533	negotiation auto	533	negotiation auto
534	!	534	!
535	interface TenGigabitEthernet1/0/1	535	interface TenGigabitEthernet1/0/1

```
from difflib import HtmlDiff

if __name__ == '__main__':
    with open('./config-before-change.txt', 'r') as before_file:
        before_lines = before_file.readlines()

    with open('./config-after-change.txt', 'r') as after_file:
        after_lines =after_file.readlines()

    html_differ = HtmlDiff()
    diff_contents = html_differ.make_file(
        fromlines=before_lines,
        fromdesc="campus_switch_a running config BEFORE",
        tolines=after_lines,
        todesc="campus_switch_a running config AFTER",
        context=True
    )

    with open('./config-diff.html', 'r') as config_diff_file:
        config_diff_file.write(diff_contents)
```


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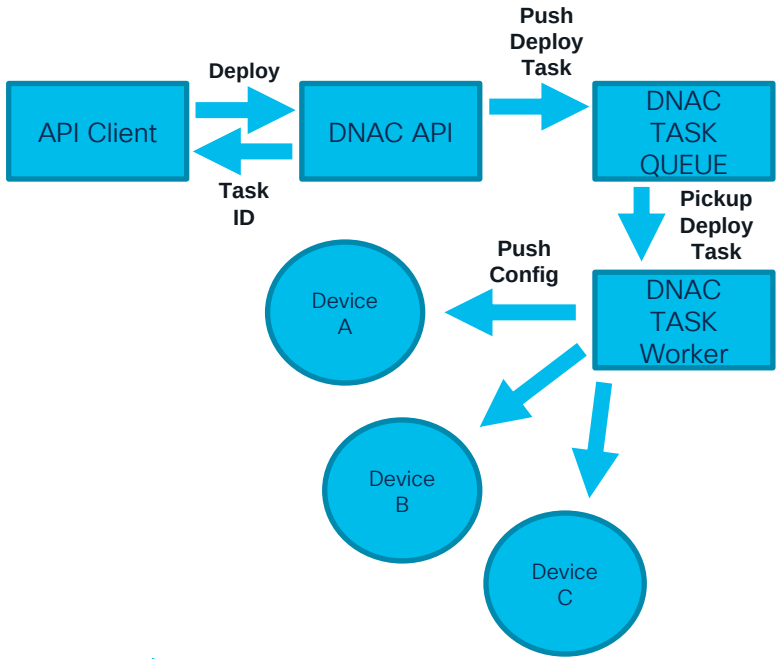
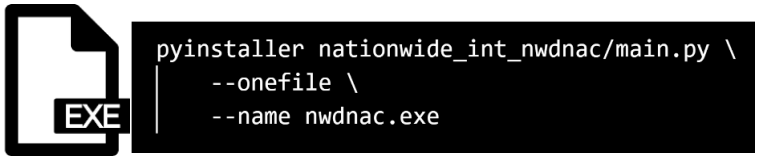
Bulk Provision Automation



CLI Impl Libs
Credential Management: Keyring
DNAC API Client: dnacentersdk
Excel parser: openpyxl
CLI parser: argparse
Diff creation: difflib
Distribution: setuptools, twine
Distribution: pyinstaller



The user can run the packaged app without installing a Python interpreter or any modules.

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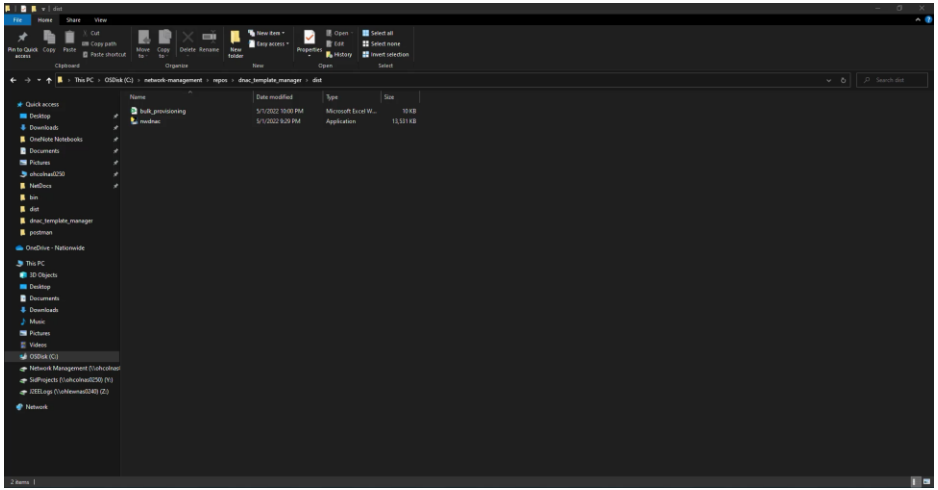
Recorded Demo



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Network Observability

Goal

- Expand DNAC utilization for network monitoring
- Integrate DNAC Assurance with enterprise network performance and availability platform (IBM-Netcool) to monitor and alert on wireless devises
- One eyes-on-glass for Network Technology Operation Center (NTOC)

Challenges

Schemas do not match

DNAC EVENT


```
{
    "version": "1.0.0",
    "instanceId": "heartbeat-
    "eventId": "HEARTBEAT-5-0
    "subDomain": "Devices",
    "severity": 5,
    "details": {
        "Assurance Issue Details": "Event forwarding heartbeat",
        "Device": "DNAC-EVENT-FORWARDER",
        "Assurance Issue Status": "resolved"
    },
    "ciscoDnaEventLink":
}
```


SCHEMAS DO NOT MATCH

NETCOOL EVENT


```
{
    "customerEventIdentifier": "
    "severity": "minor",
    "eventManager": "DNAC",
    "eventCategory":
    "configurationItem":
    "message": "High Input/Output error Rx 100.0 percent Tx 0.0 ...",
    "eventDetail":
}
```


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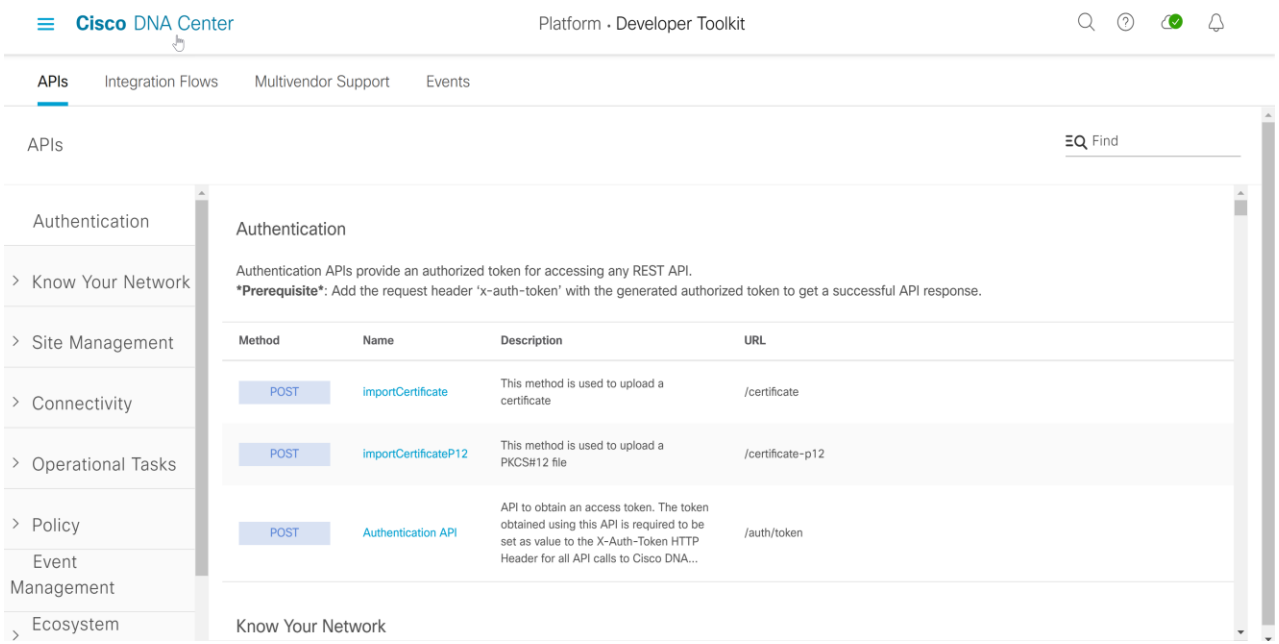
DNAC APIs



Cisco's Recommendation: Use middleware to transform, forward events

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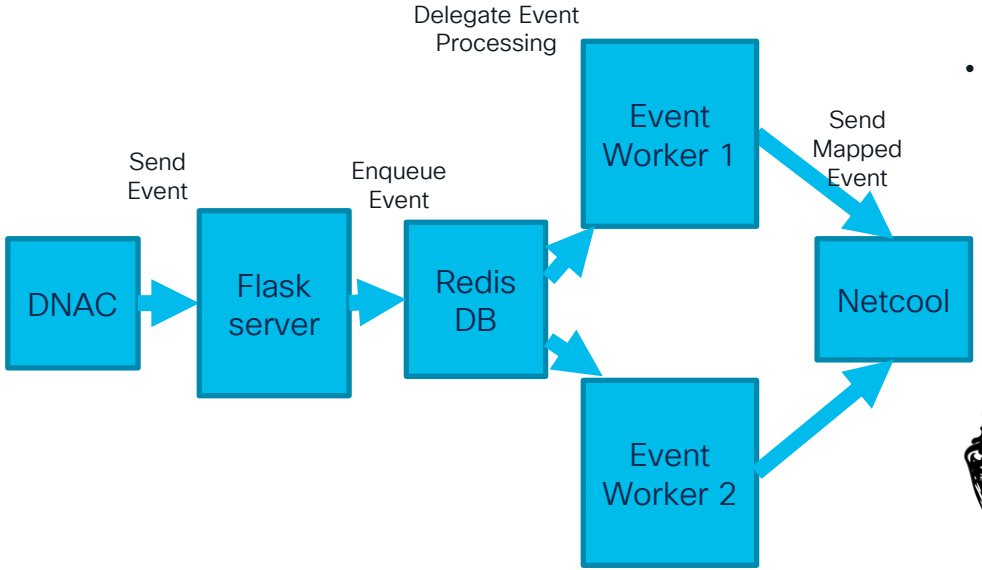
Wireless Event Forwarding



- Programming Language – Python
- Python server frameworks
  - Flask – Small, flexible
- Python request queues
  - Redis + Python RQ

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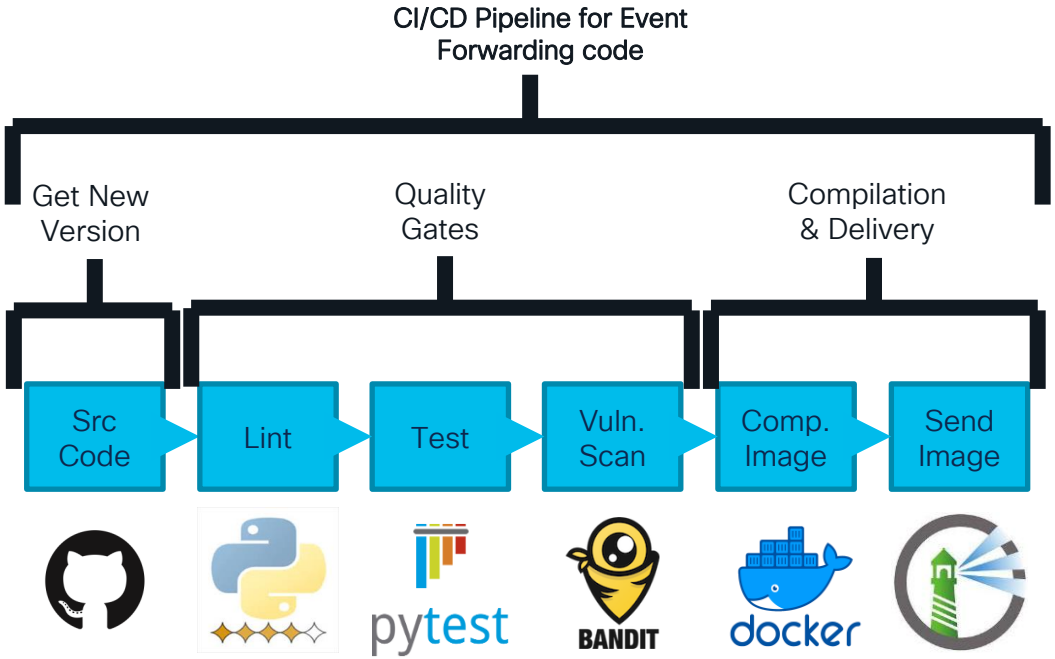
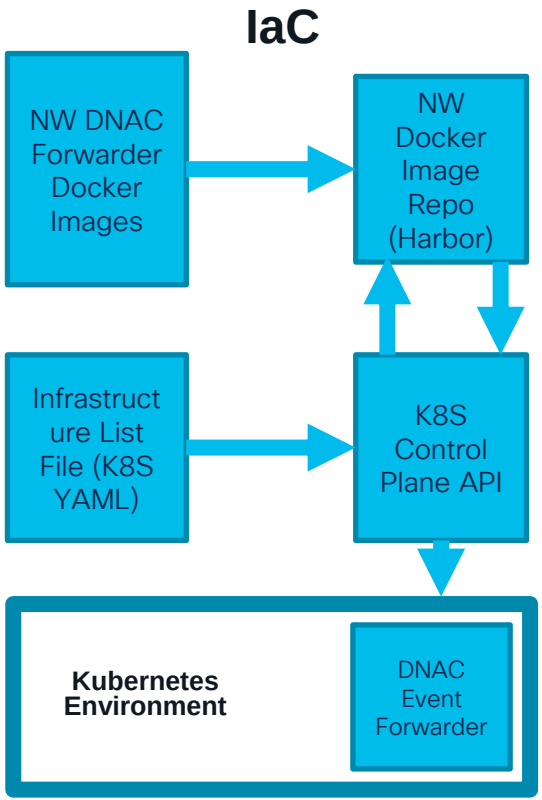
Build it the Right Way





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