



The bridge to possible

Model-Driven DevOps

The Enterprise Automation Framework You've Been Looking For!

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DEVNET-2273

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Steven Carter

15 years @ Cisco

- Large Scale Automation
- Cloudy Things (Especially secure/air gapped)
- Splunk (C2C, Network Visibility)

Enjoys:

- Flying ^{7 Kids}
- Martial Arts
- Peace & Quiet

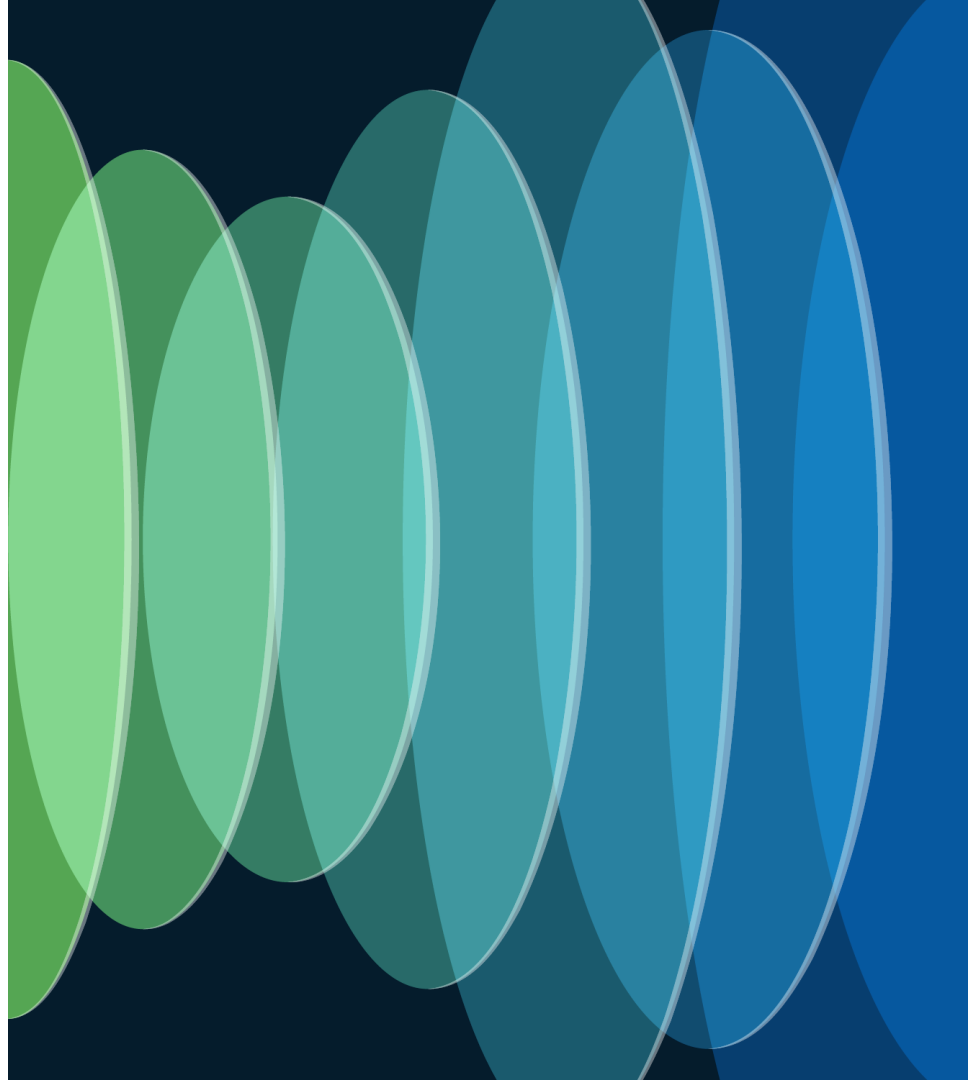
cisco *Live!*



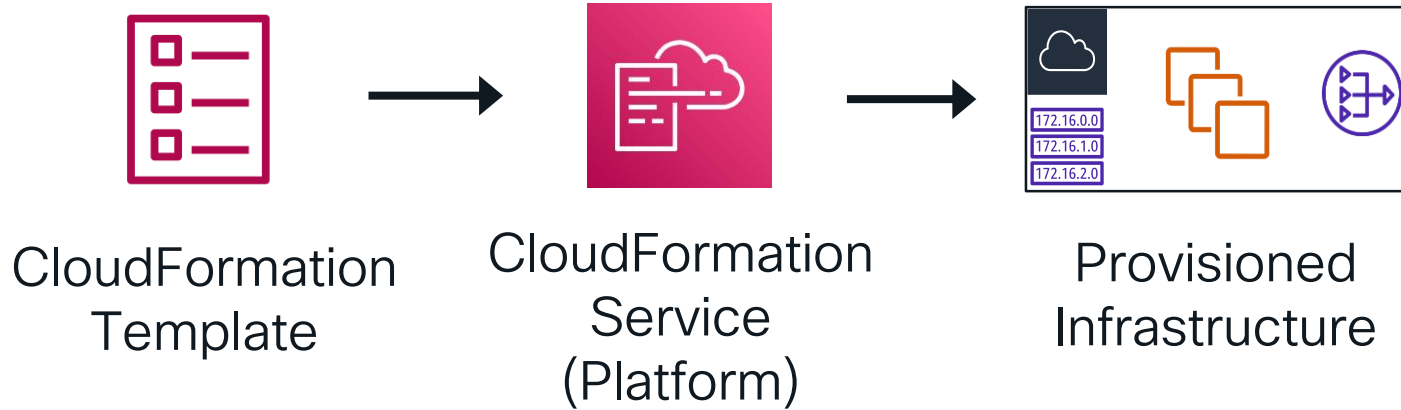
Agenda

- Introduction
- Model-Driven DevOps
- Implementation
- Demo
- Conclusion

Introduction



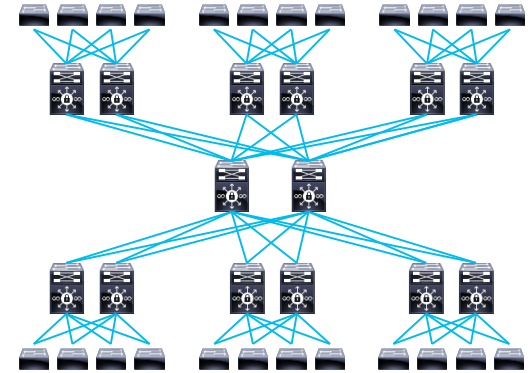
Cloud Ops Today



Network Ops as Cloud Ops

```
bgp:
  global:
    config:
      as: 65082
  neighbors:
    neighbor:
      - neighbor_address: 10.11.12.2
        config:
          peer_group: TST
          peer_as: 65086
```

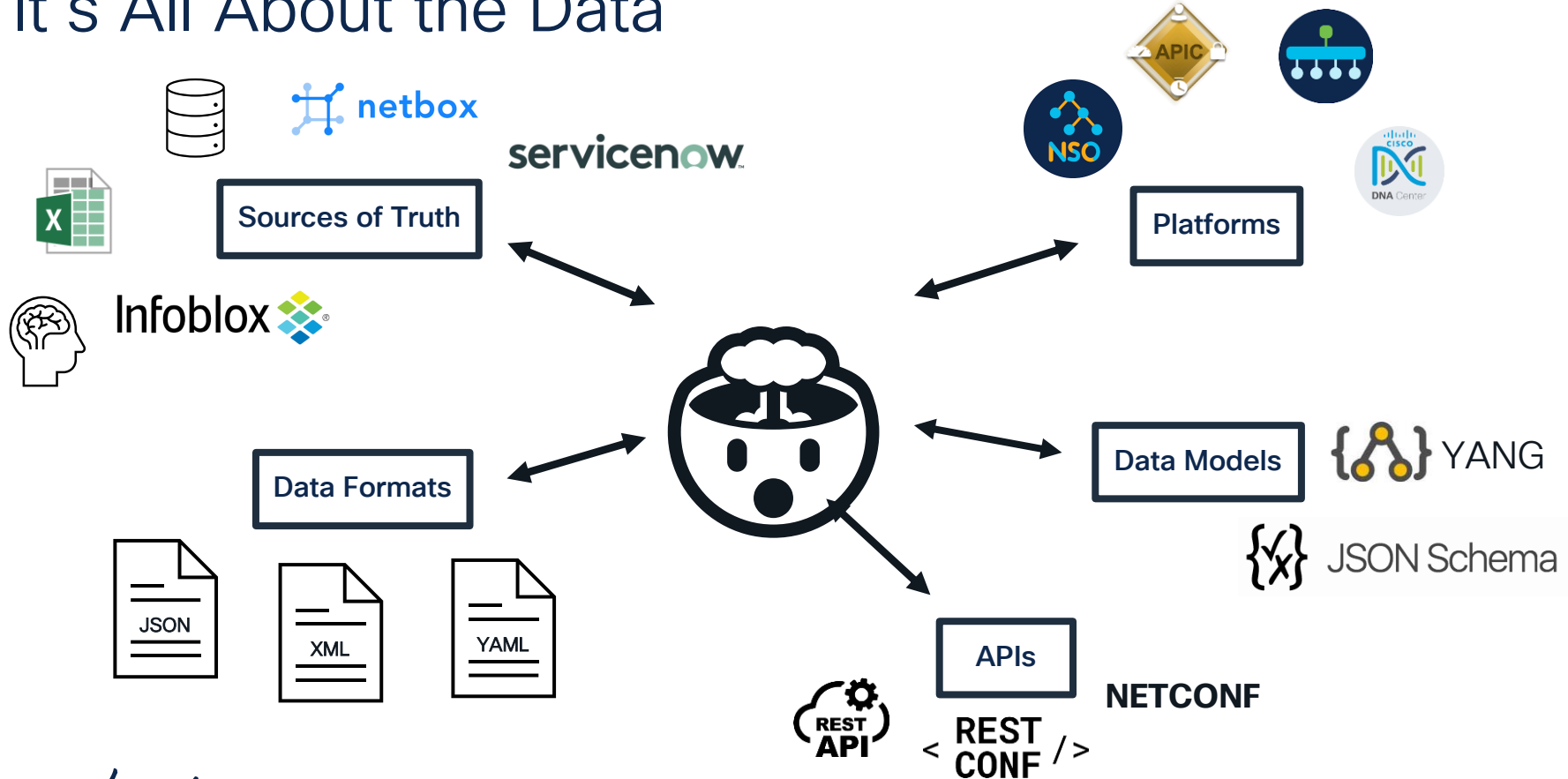
SoT



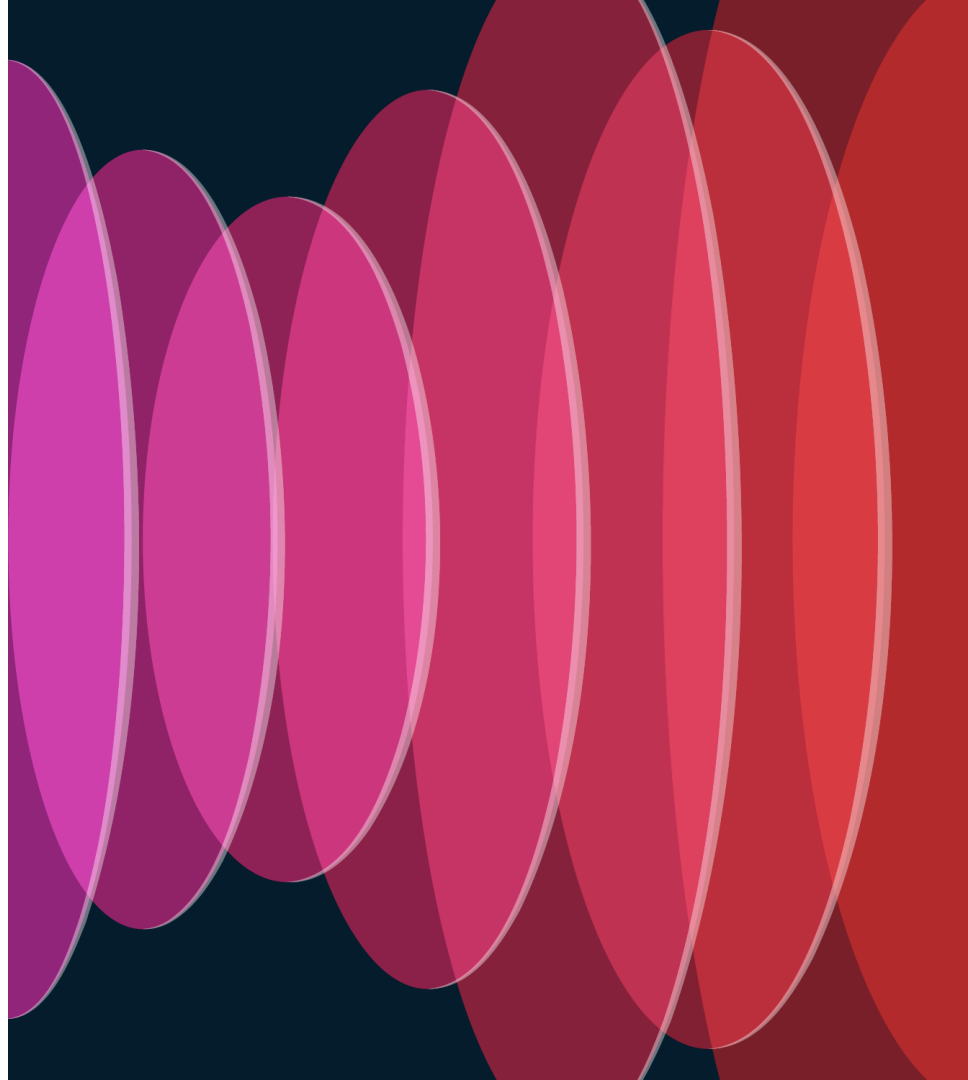
Network
Instance(s)



It's All About the Data



Model-Driven DevOps



Model-Driven DevOps



A structured approach to Network DevOps based on Data Models:

NOT magic

NOT one application to solve all of your problems

NOT a “Single Pane of Glass”



Industry-standard DevOps Model

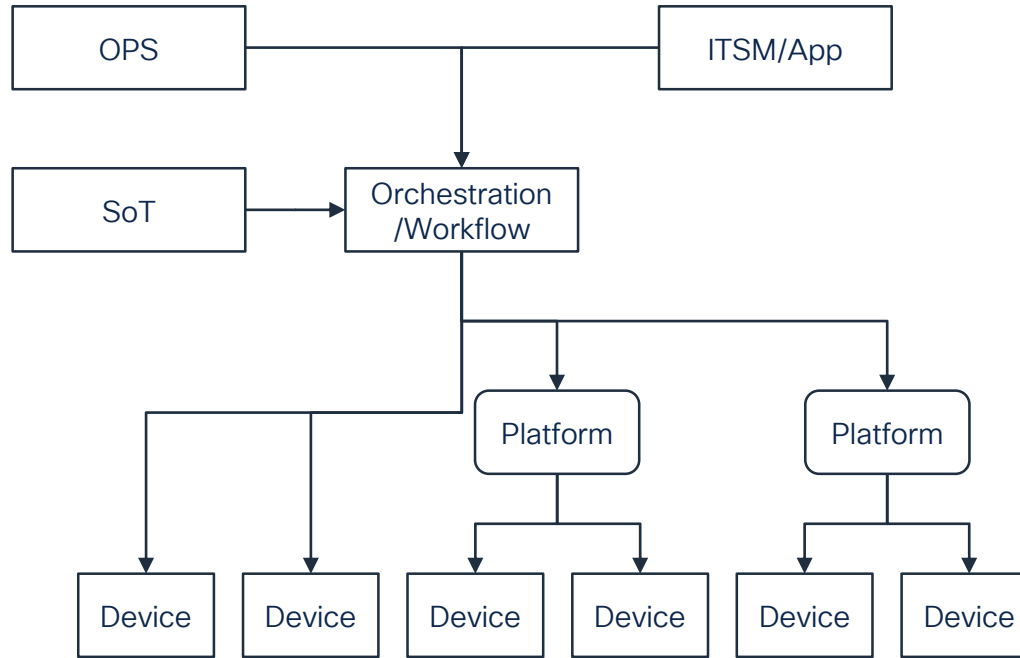


Industry-standard DevOps tooling

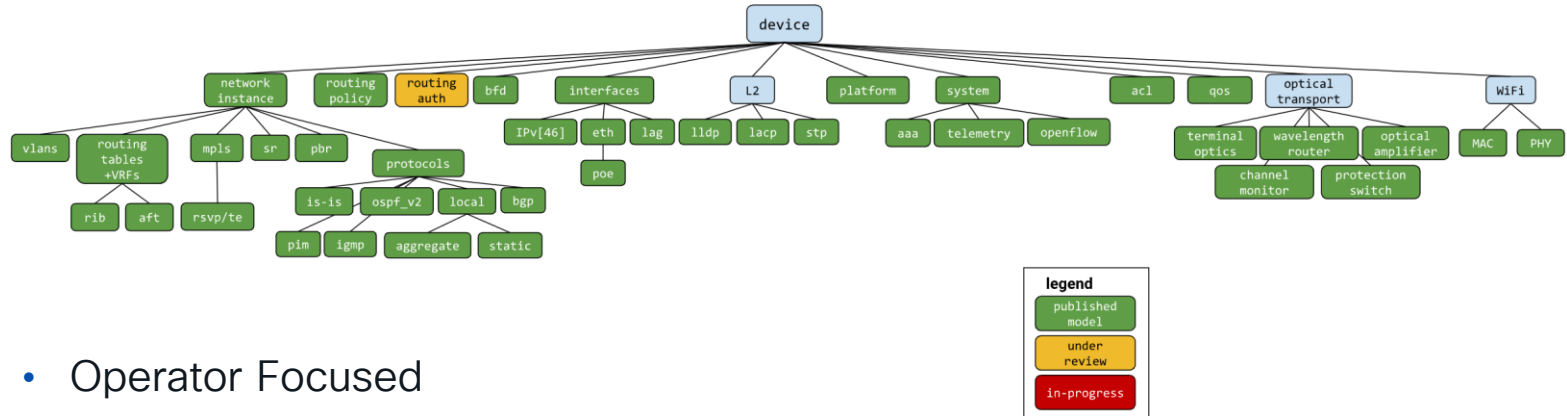


Data Models organize and simplify data and reduce coding requirement

Model-Driven DevOps Framework

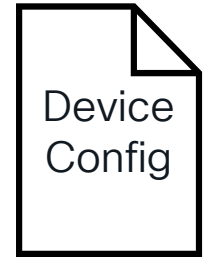
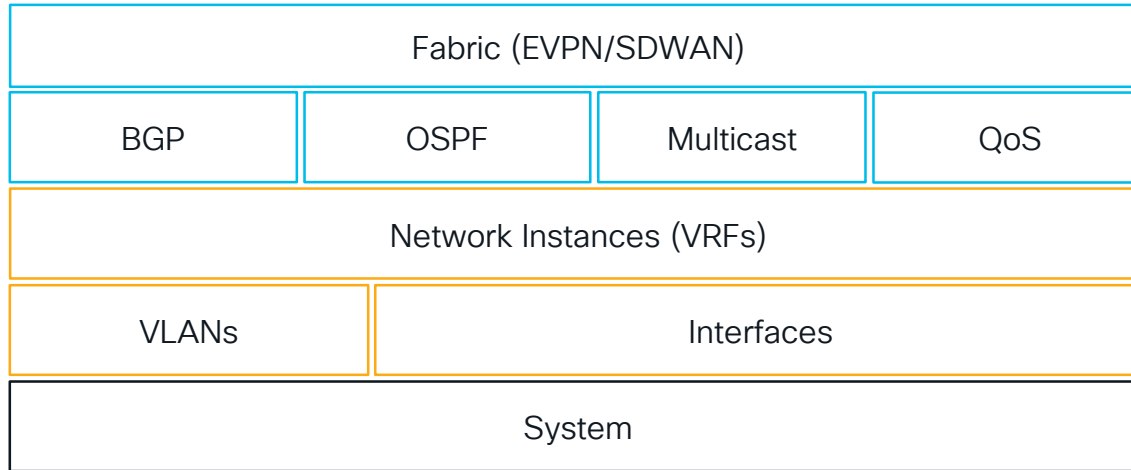


OpenConfig

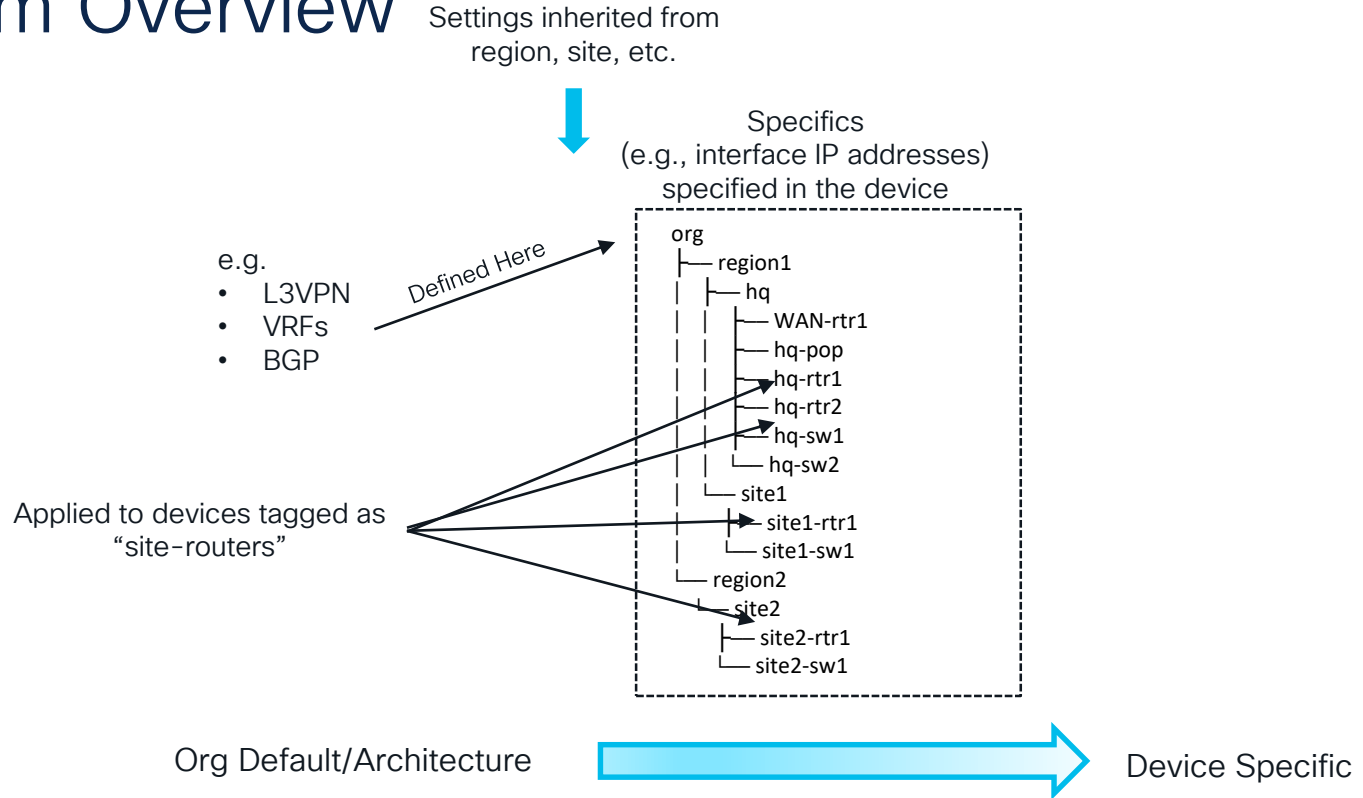


- Operator Focused
- Model-Driven Management
- Foundation for Programmable Infrastructure
- Software-defined, Declarative Configuration

Network of Apps/Services

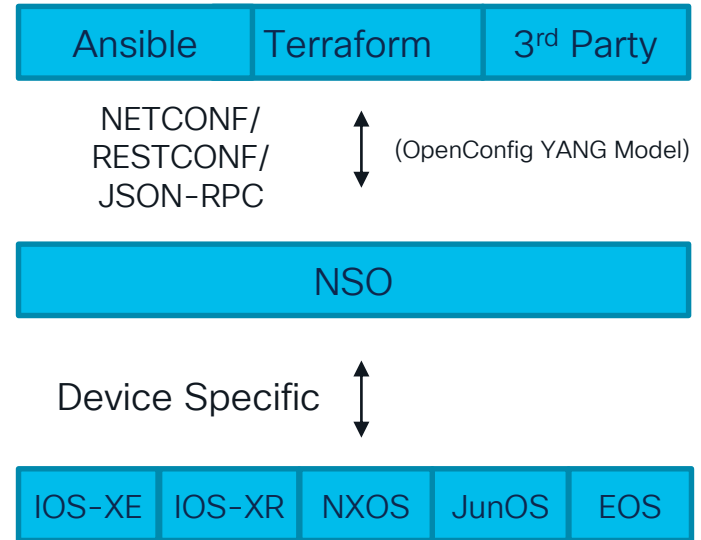


Algorithm Overview

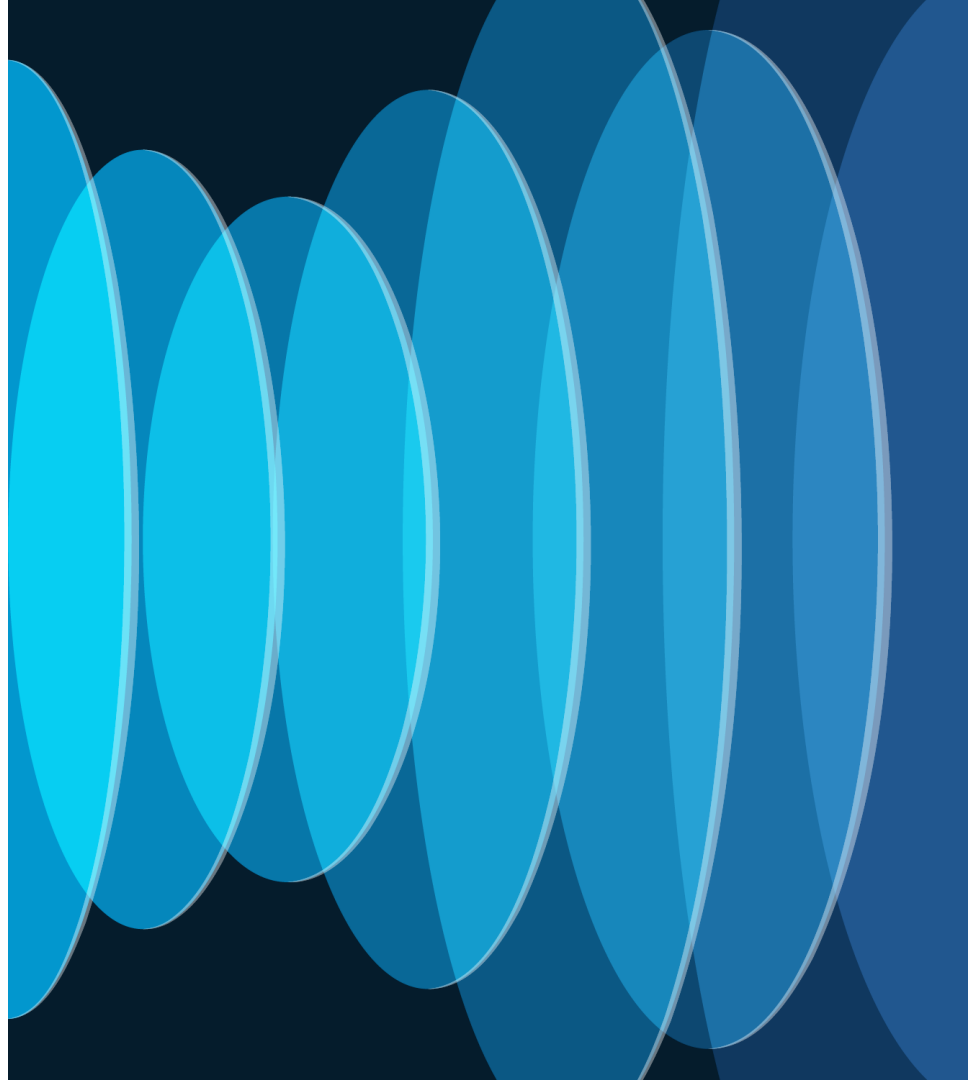


NSO OpenConfig Service

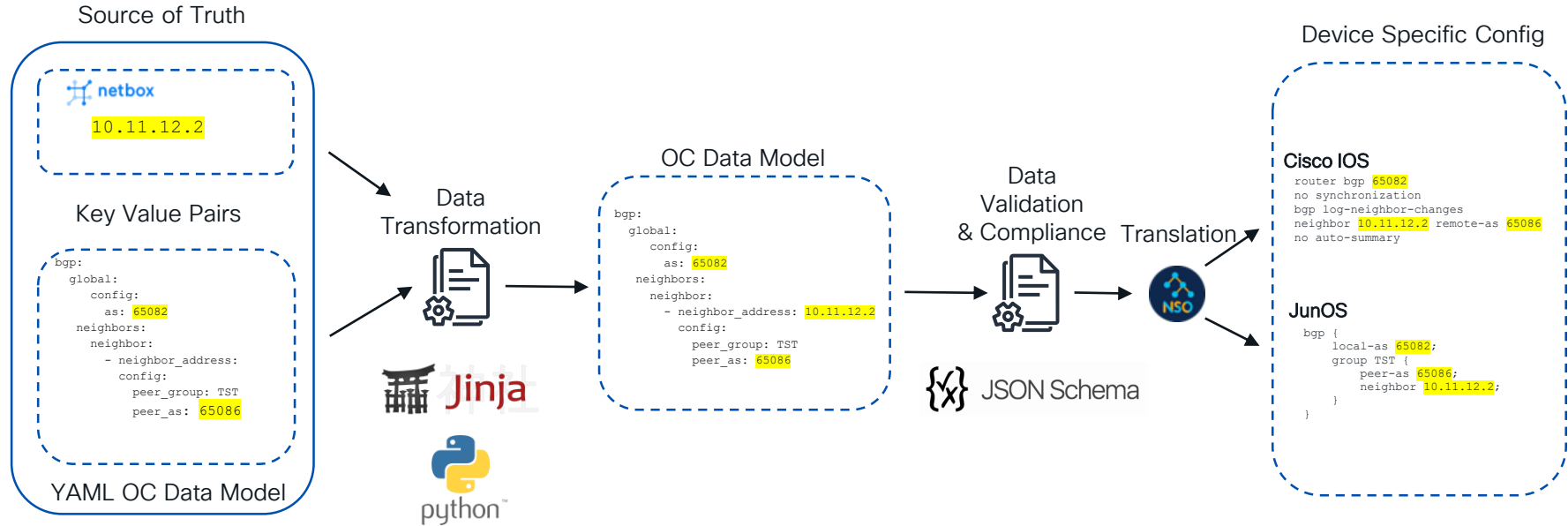
- Use NSO to provide an Open, Consistent, Model-Driven API across R&S to drive innovation
- Service approach enables phased deployment
- Min-diff reduces transitions and increases scalability
- Provides rollback across all platforms
- Provides:
 - Reduced burden on apps
 - Cloud-to-prem bridge
 - Cisco-as-a-platform



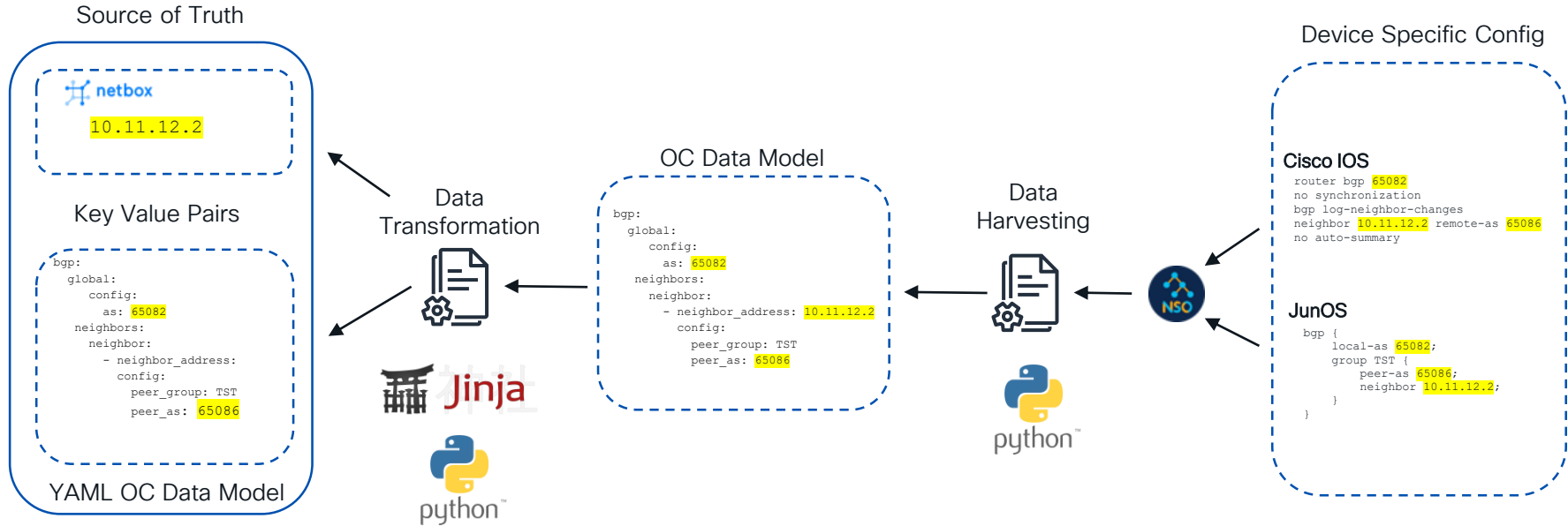
Implementation



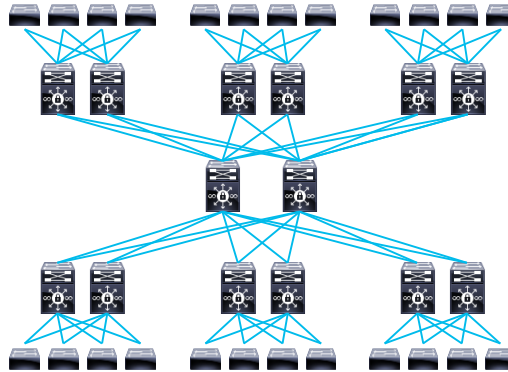
Implementation Overview



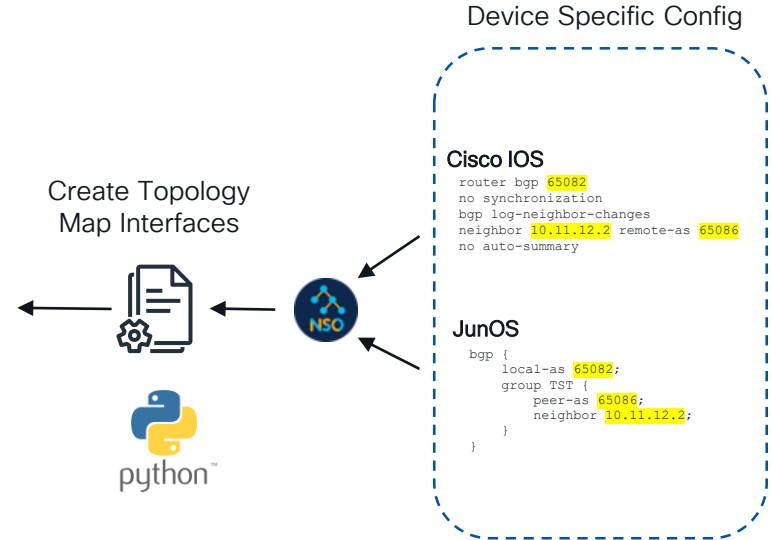
Harvesting Data



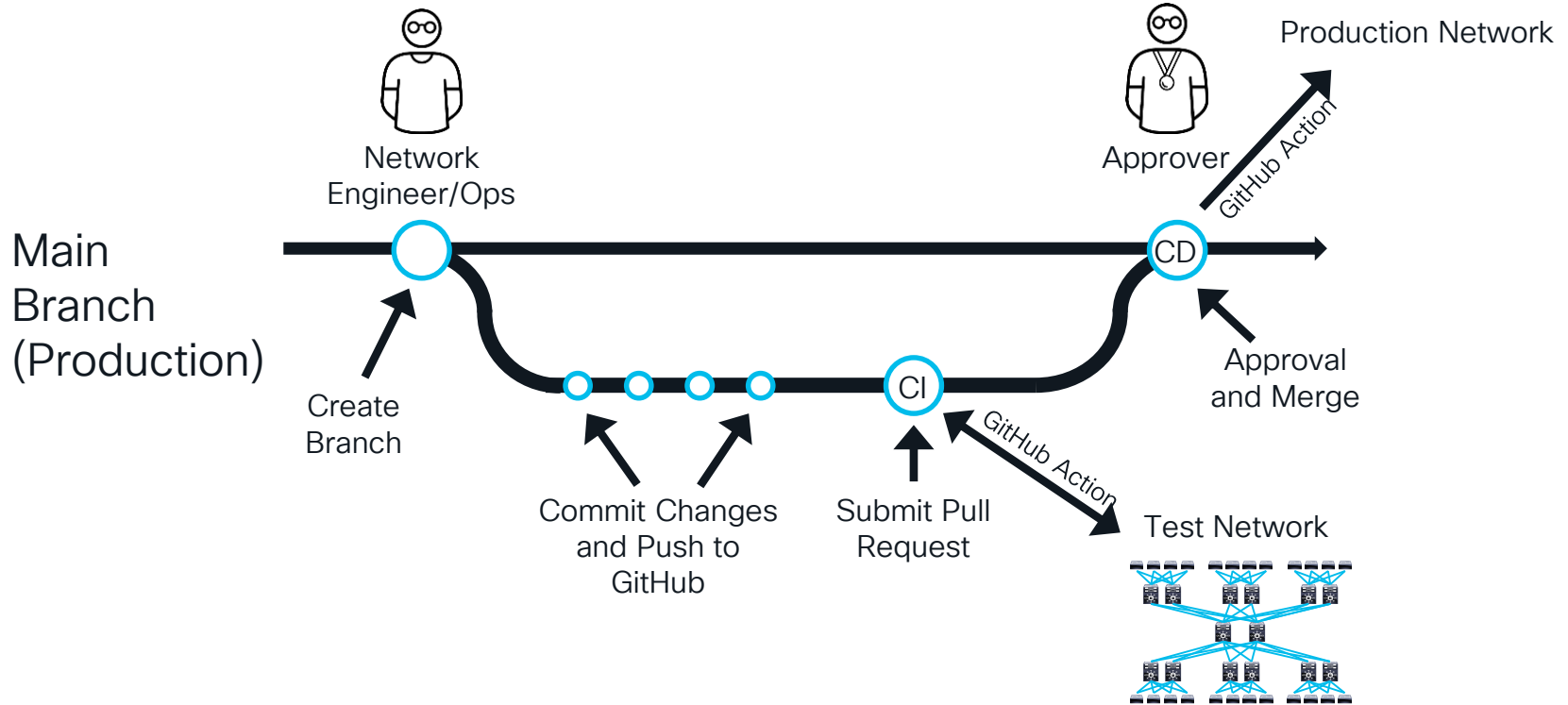
Create Topology



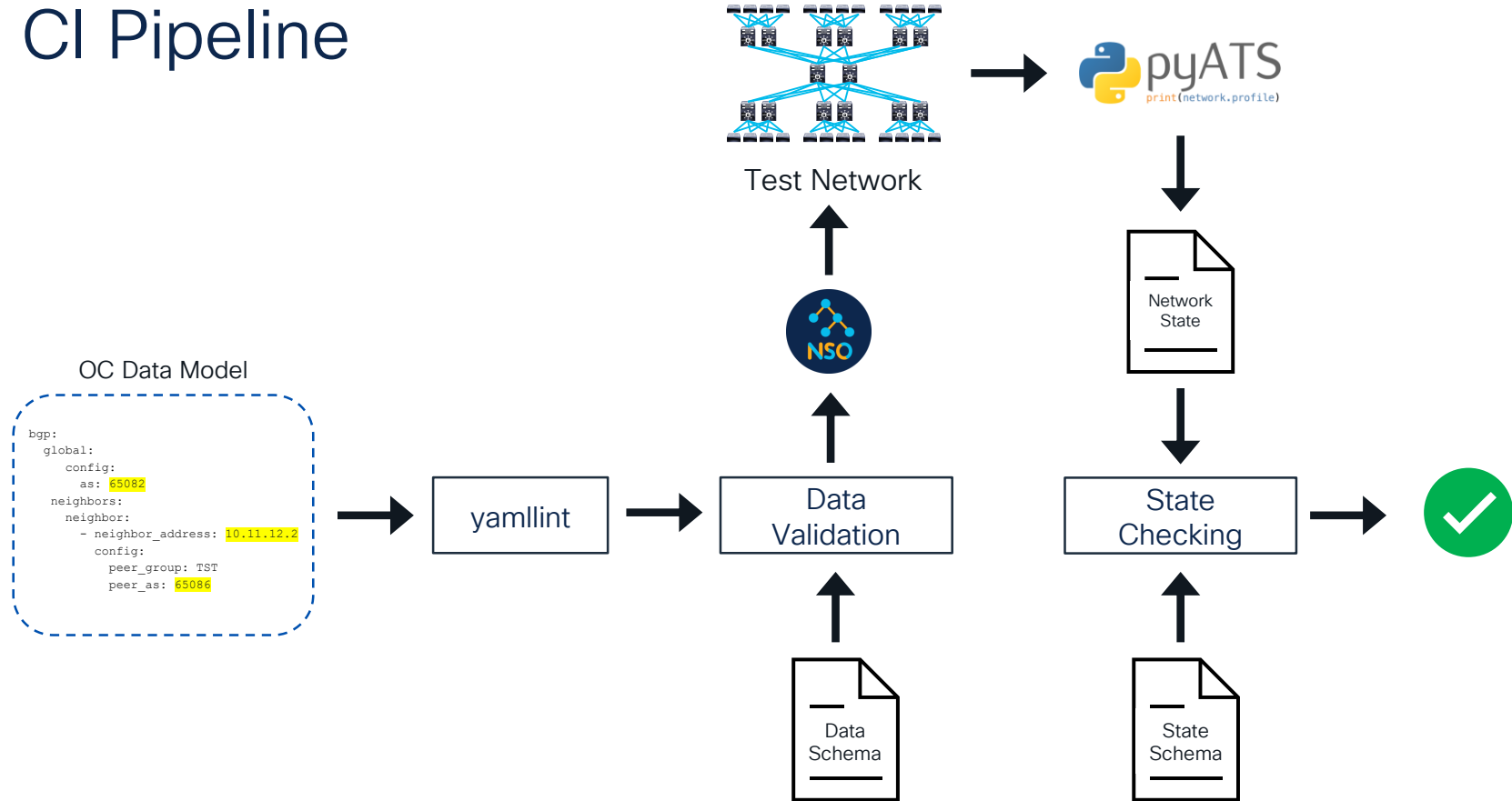
CML
Topology



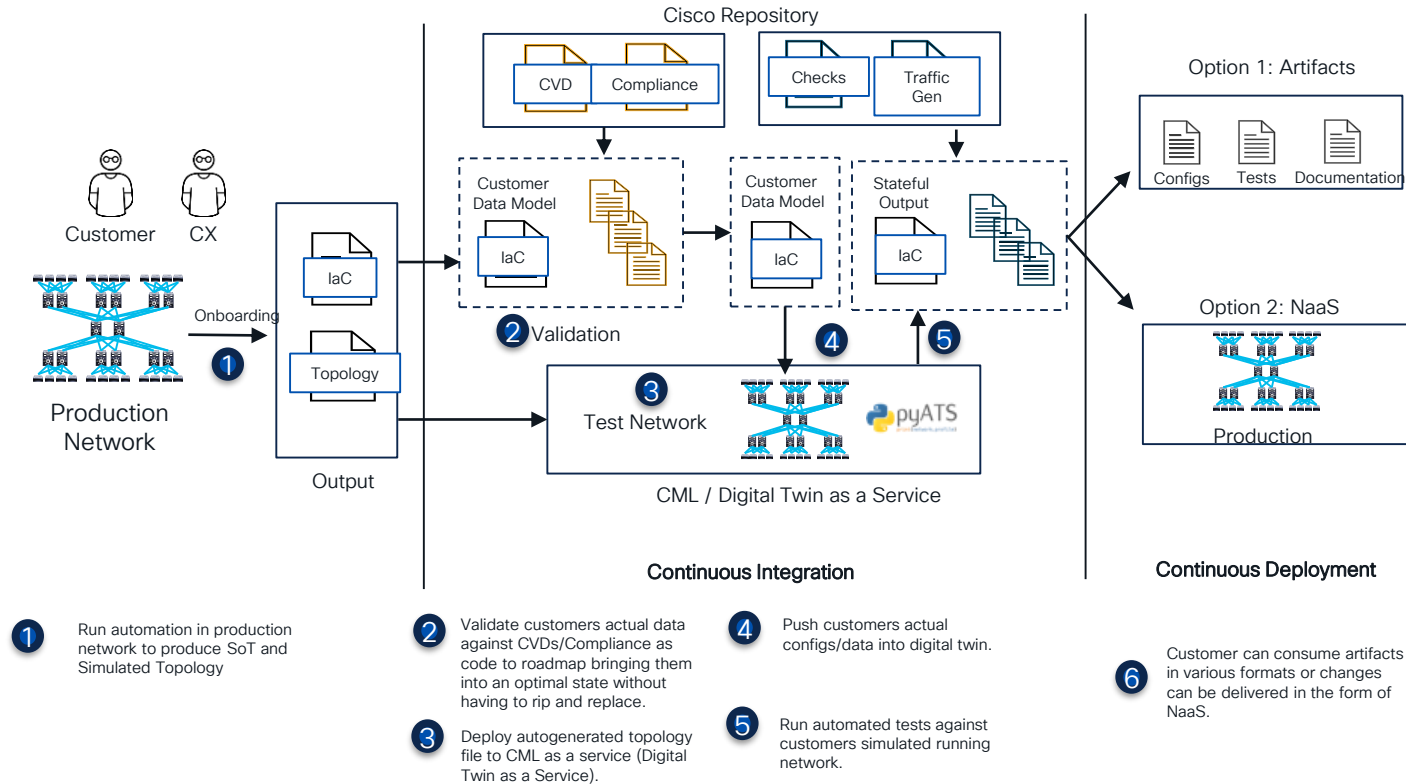
Workflow



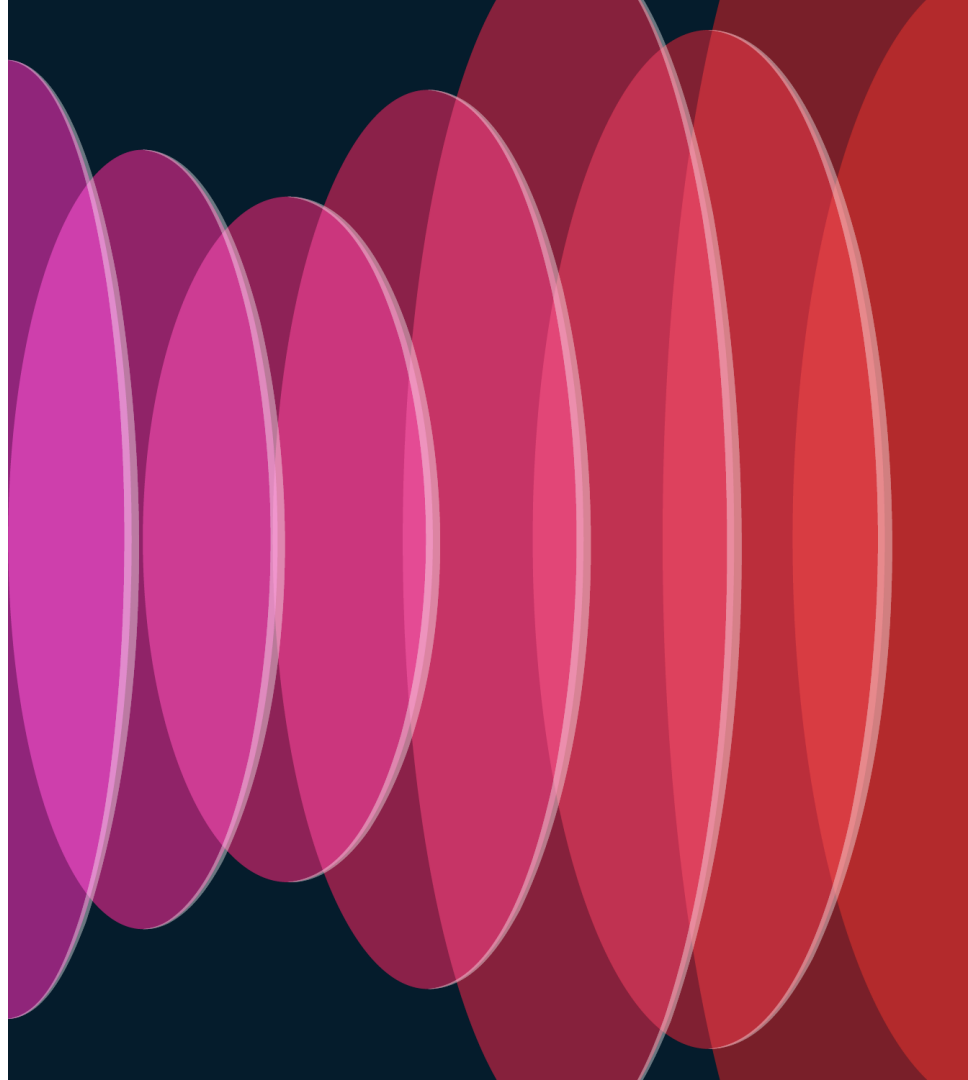
CI Pipeline



MDD: Reproducible Process



Demo



PUBLIC SERVICE ANNOUNCEMENT: Ansible Responsibly!

This is an example of the data the module will take, NOT an example of how you should write a playbook

Hardcoding variables in this manner make your IaC more rigid, harder to maintain, and prone to error

Examples

```
- name: Update by id
  cisco.meraki.networks_appliance_ssids:
    meraki_api_key: "{{meraki_api_key}}"
    meraki_base_url: "{{meraki_base_url}}"
    meraki_single_request_timeout: "{{meraki_single_request_timeout}}"
    meraki_certificate_path: "{{meraki_certificate_path}}"
    meraki_requests_proxy: "{{meraki_requests_proxy}}"
    meraki_wait_on_rate_limit: "{{meraki_wait_on_rate_limit}}"
    meraki_nginx_429_retry_wait_time: "{{meraki_nginx_429_retry_wait_time}}"
    meraki_action_batch_retry_wait_time: "{{meraki_action_batch_retry_wait_time}}"
    meraki_retry_4xx_error: "{{meraki_retry_4xx_error}}"
    meraki_retry_4xx_error_wait_time: "{{meraki_retry_4xx_error_wait_time}}"
    meraki_maximum_retries: "{{meraki_maximum_retries}}"
    meraki_output_log: "{{meraki_output_log}}"
    meraki_log_file_prefix: "{{meraki_log_file_prefix}}"
    meraki_log_path: "{{meraki_log_path}}"
    meraki_print_console: "{{meraki_print_console}}"
    meraki_suppress_logging: "{{meraki_suppress_logging}}"
    meraki_simulate: "{{meraki_simulate}}"
    meraki_be_geo_id: "{{meraki_be_geo_id}}"
    meraki_use_iterator_for_get_pages: "{{meraki_use_iterator_for_get_pages}}"
    meraki_inherit_logging_config: "{{meraki_inherit_logging_config}}"
    state: present
    authMode: 8021x-radius
    defaultVlanId: 1
    dhcpEnforcedDeauthentication:
      enabled: true
    dot11w:
      enabled: true
      required: true
    enabled: true
    encryptionMode: wpa
    name: My SSID
    networkId: string
    number: string
    psk: psk
    radiusServers:
      - host: 0.0.0.0
        port: 1000
        secret: secret
      visible: true
    wpaEncryptionMode: WPA2 only
```



Meraki Dynamic Inventory:

- Devices & Networks
- Grouping by types
- Treats network as an endpoint
- Allows for targeted application



Netbox Dynamic Inventory:

- Regional Hierarchy
- Tags
- IPAM Allocations
- CMDB Information



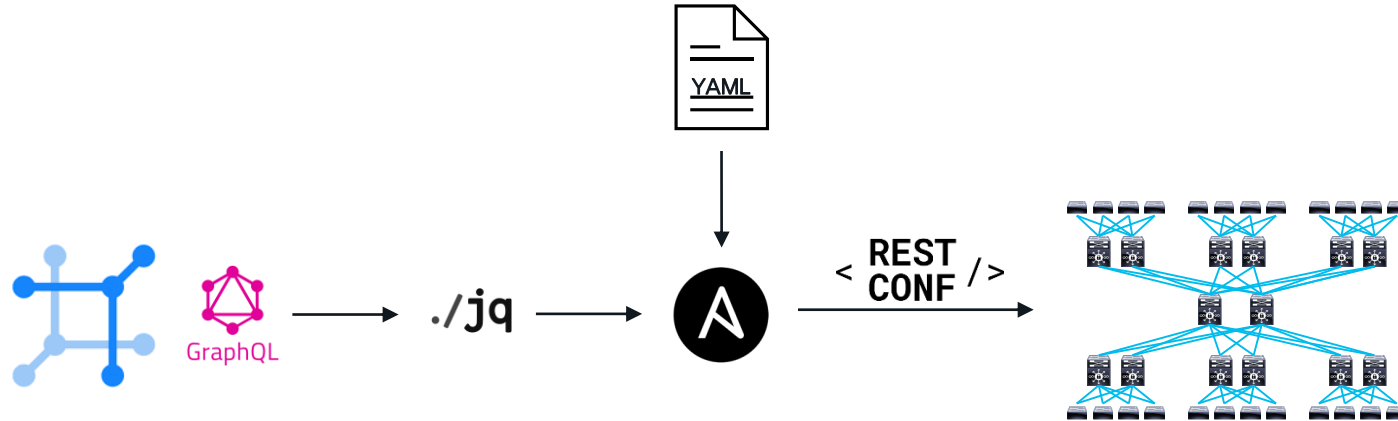
Ansible Group/Host Vars:

- Devices & Networks
- Grouping by types
- Treats network as an endpoint
- Allows for targeted application

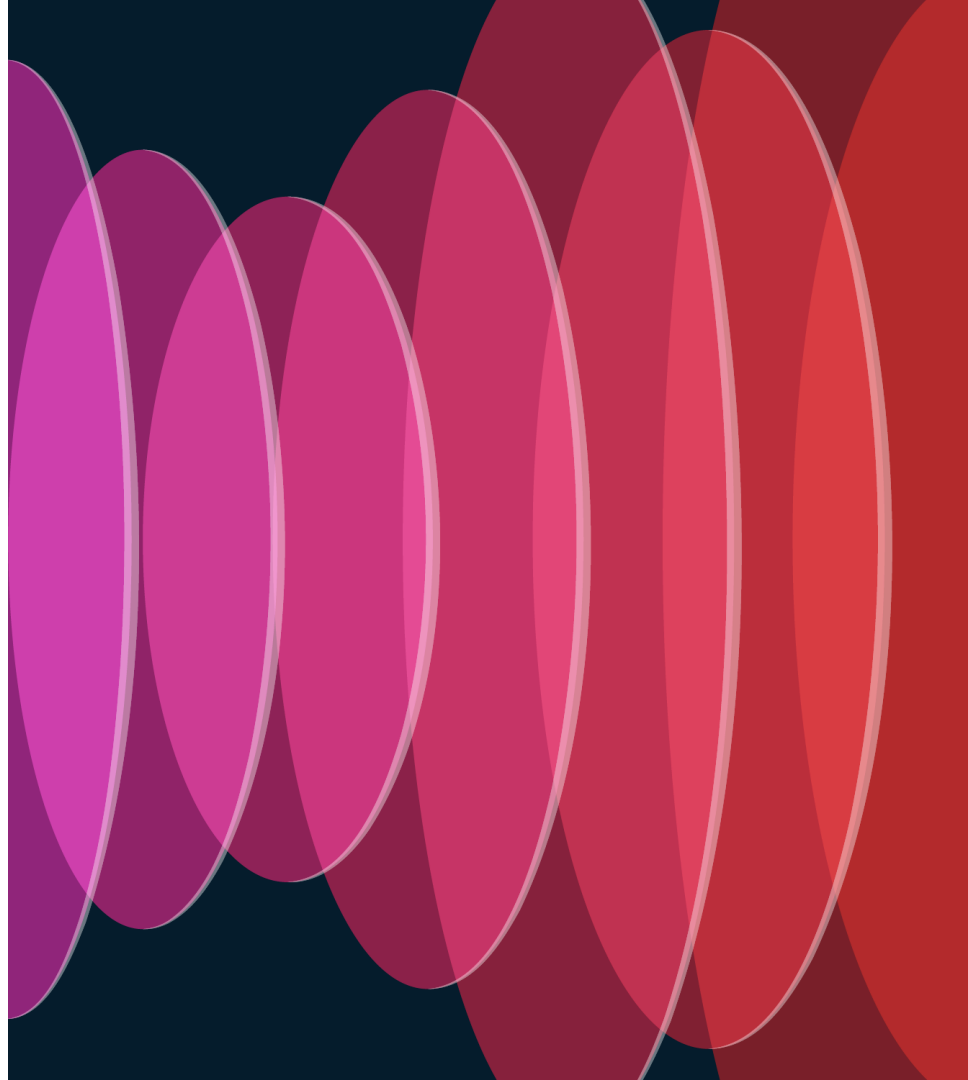


```
- hosts: network
  connection: local
  gather_facts: no
  tasks:
    - name: Update Target Network Wireless SSIDs
      cisco.meraki.networks_wireless_ssids: "{{ combined_item }}"
      loop: '{{ meraki_data["networks"]["wireless"]["ssids"] }}'
      vars:
        add_keys:
          state: present
          meraki_base_url: "{{ meraki_base_url }}"
          networkId: "{{ networkId }}"
          combined_item: "{{ item | combine(add_keys) }}"
```

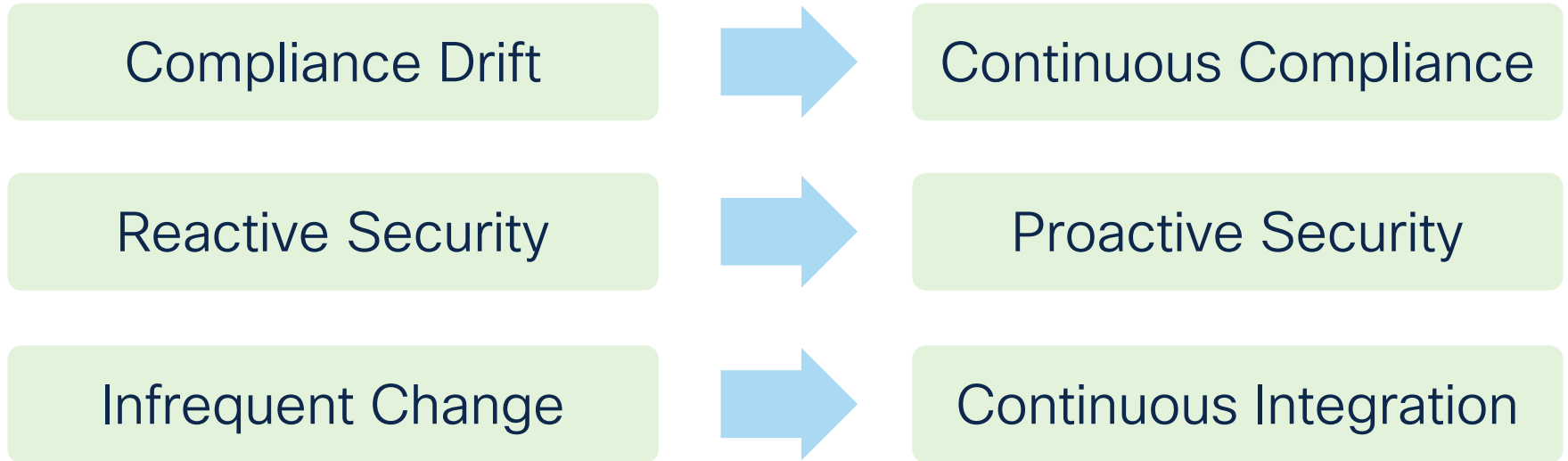

Data Movement and Translation Demo

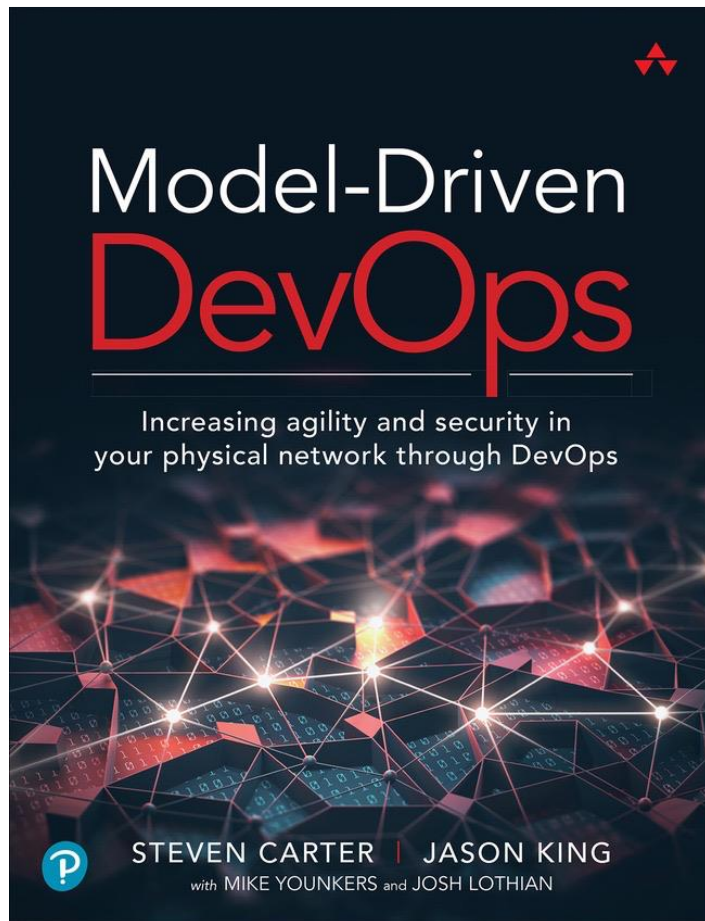


Conclusion



MDD Desired End State





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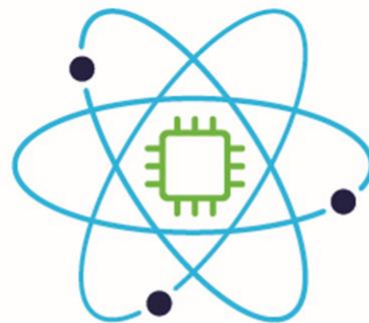
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The bridge to possible

Thank you

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