



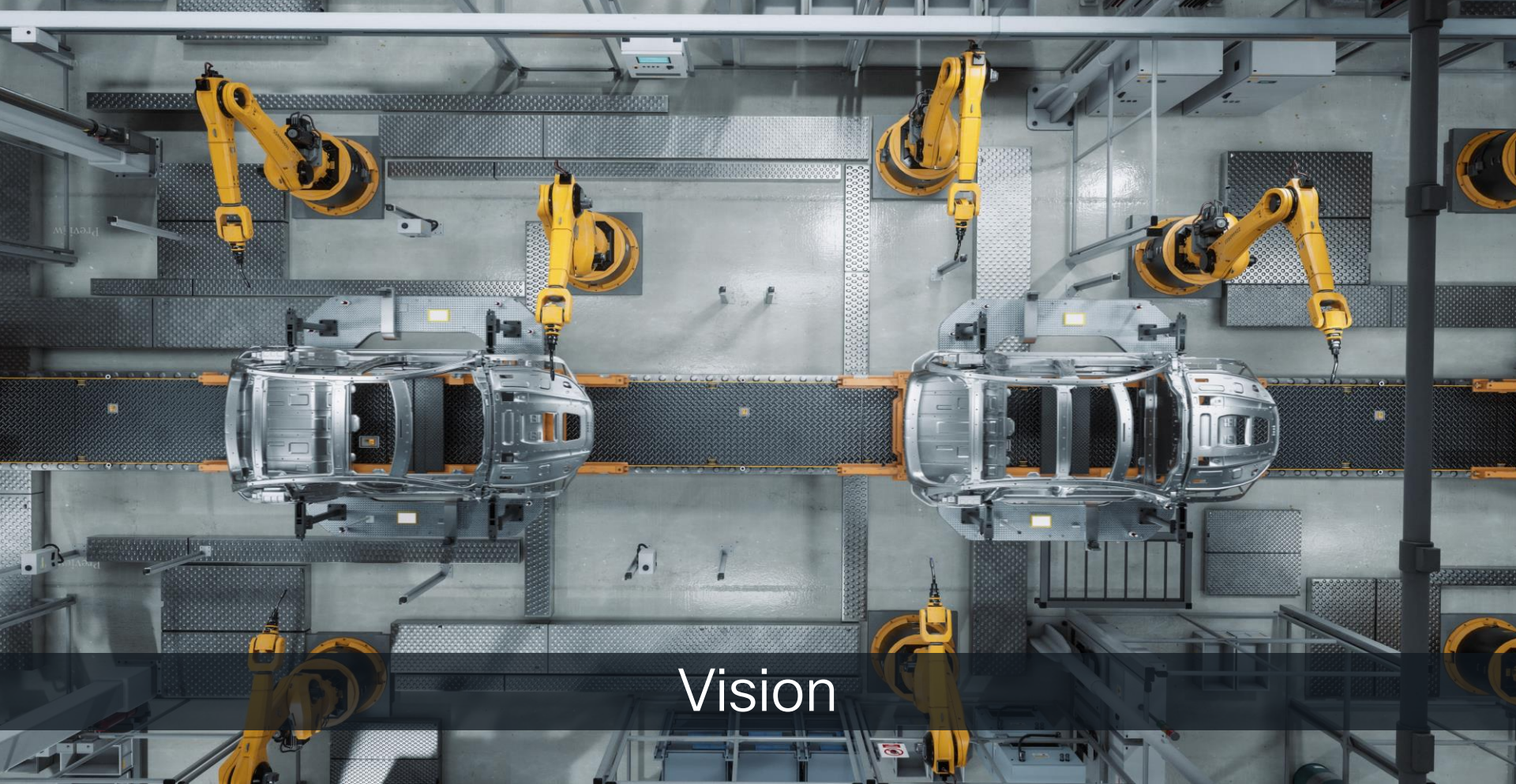
The bridge to possible

Best Practices for Hybrid Cloud Automation

Chris Gascoigne, Principal SE
[@chrisgascoigne@hachyderm.io](mailto:chrisgascoigne@hachyderm.io)
BRKCLD-1022

CISCO *Live!*

#CiscoLive



Vision



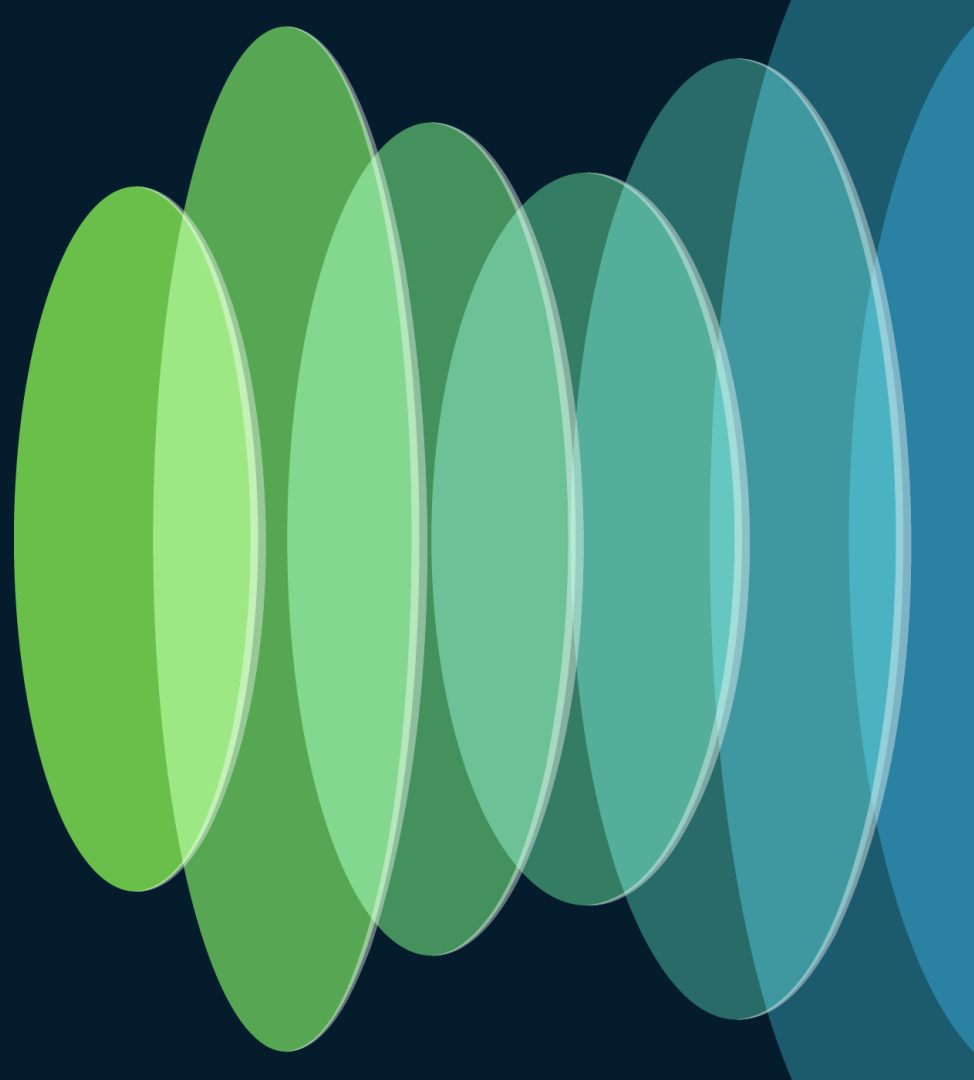
Reality



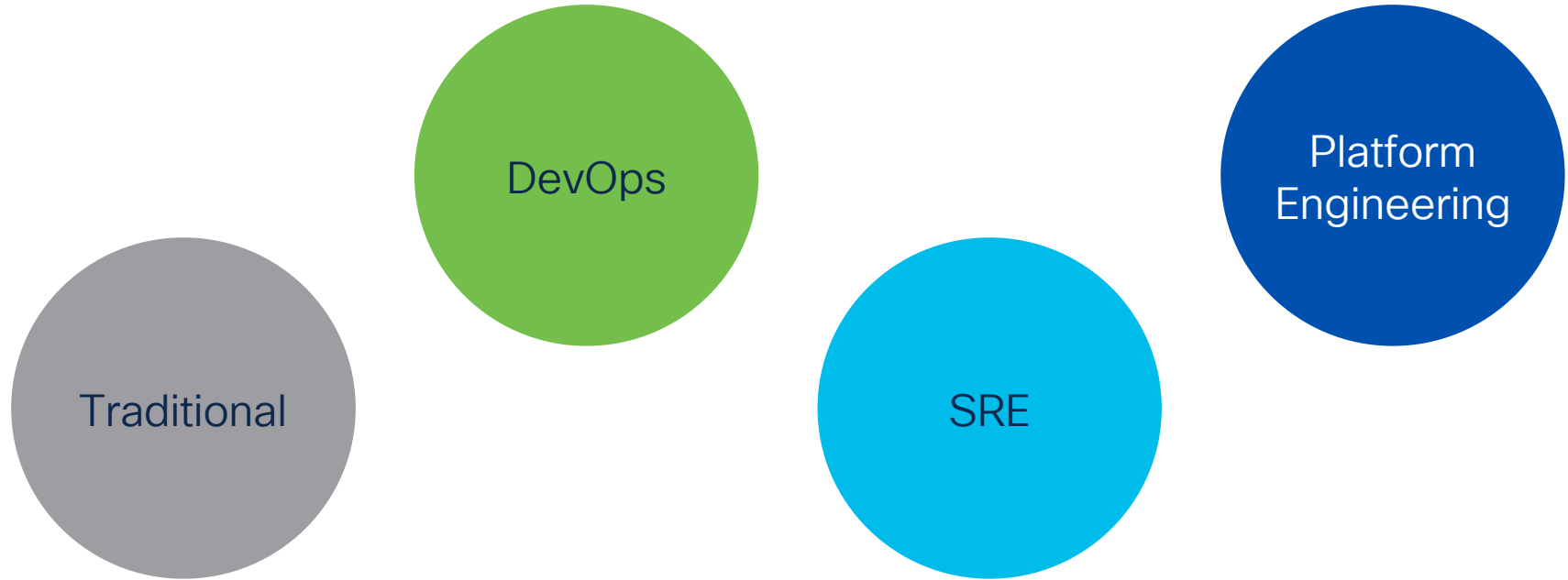
Agenda

- Introduction
- Data Centre and Hybrid Cloud Architecture Best Practices
- Infrastructure as Code and Automation Tools
- Service Catalogues and ITSM
- Conclusion

Introduction



Evolution of approaches



Platform Engineering

“By 2026,

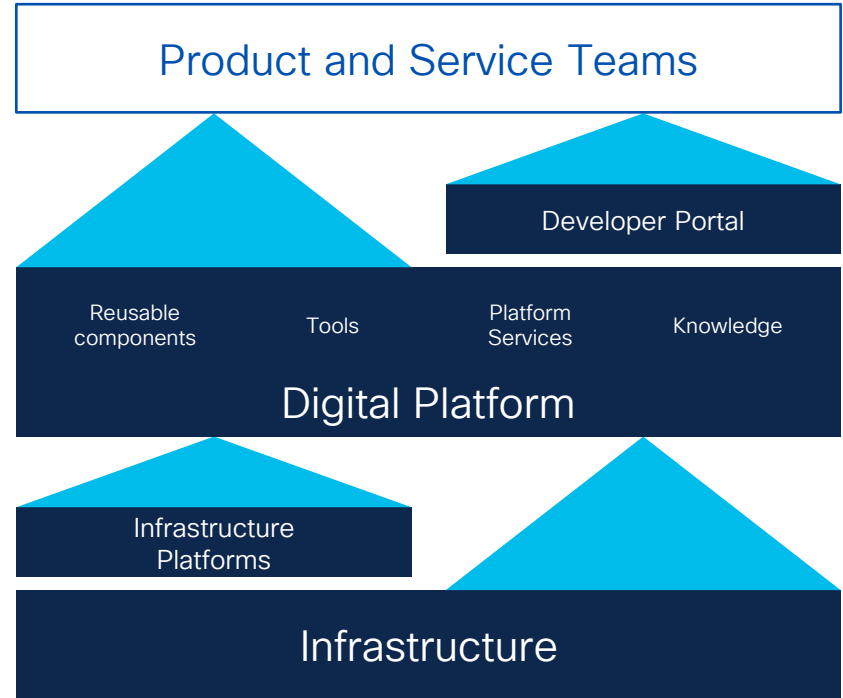
80%

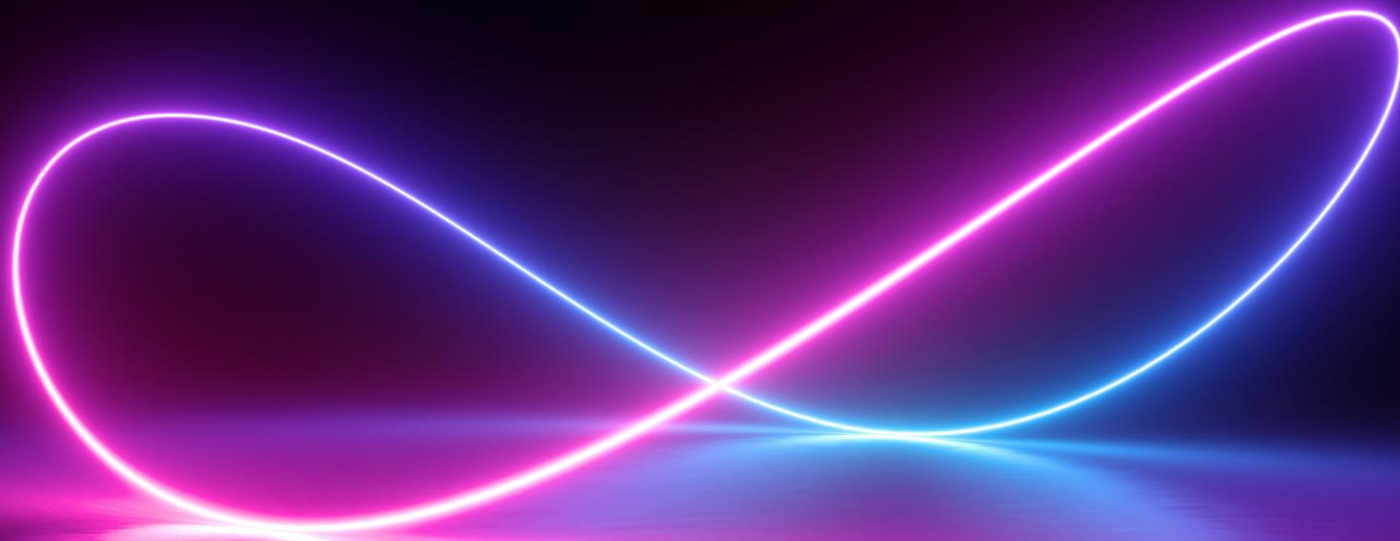
of software engineering organizations will establish platform teams as internal providers of reusable services, components and tools”

- Gartner Top Strategic Technology Trends 2024

Optimise developer experience
to accelerate business value

Curate and build internal
platforms



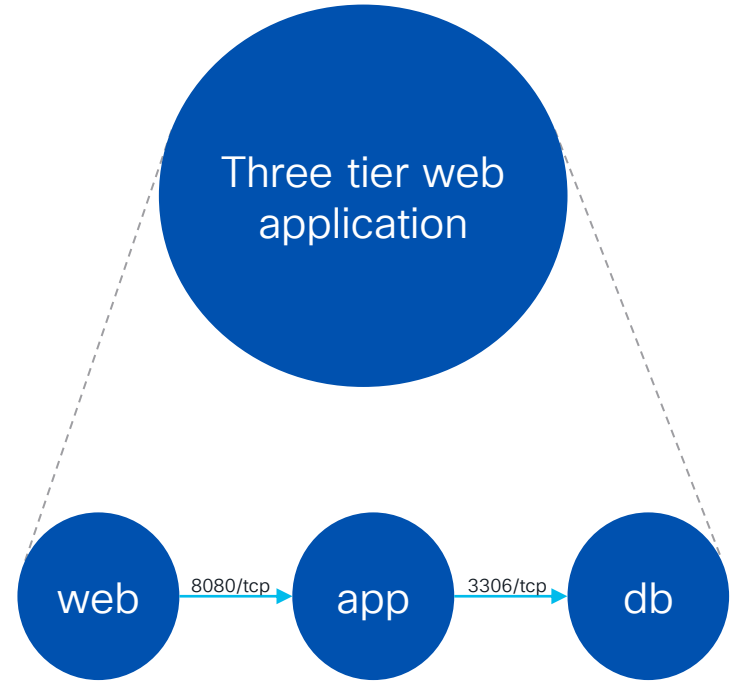


Automation **is** Abstraction

What do we mean by “Abstraction”?

“The essence of abstraction is preserving information that is relevant in a given context, and forgetting information that is irrelevant in that context.”

- John V. Guttag



Automation **is** Abstraction

Who is the consumer of your abstraction?

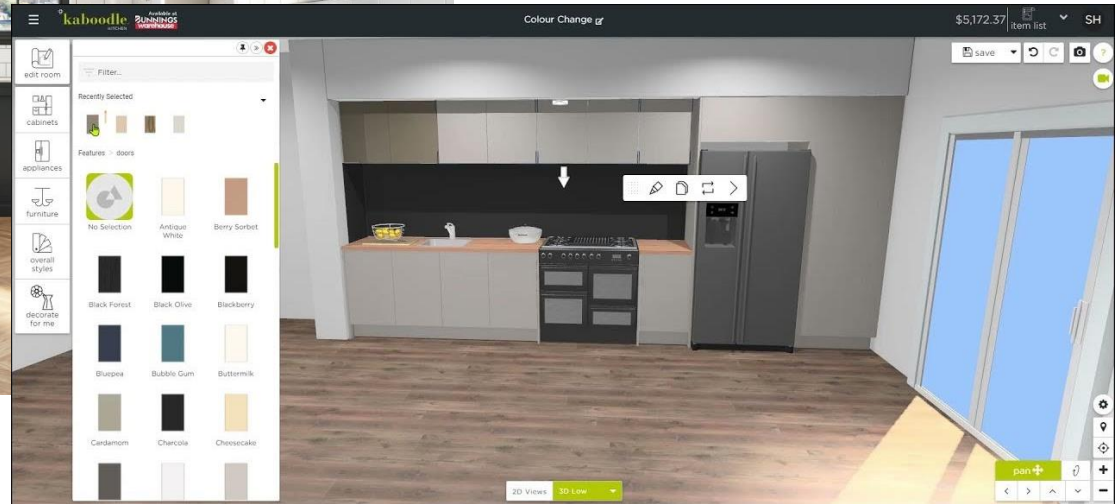
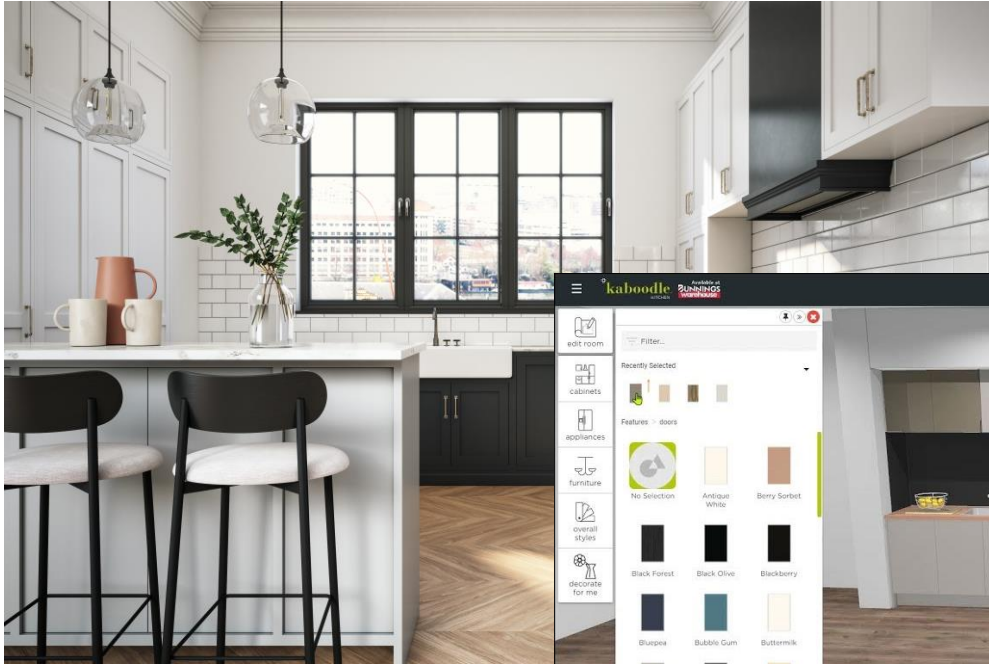
Do you want to be in the abstraction-building business?

What do you want your abstraction to be?

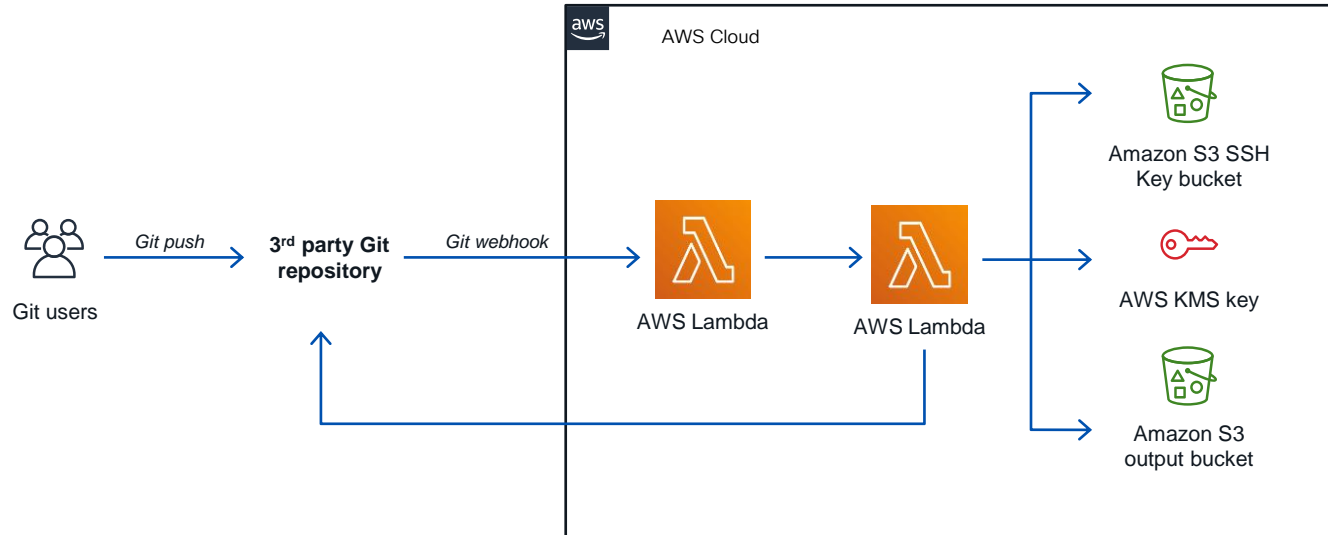
Which use cases does it need to cover?

Which use cases does it **NOT** need to cover?

Composability



Composability





Operating Model

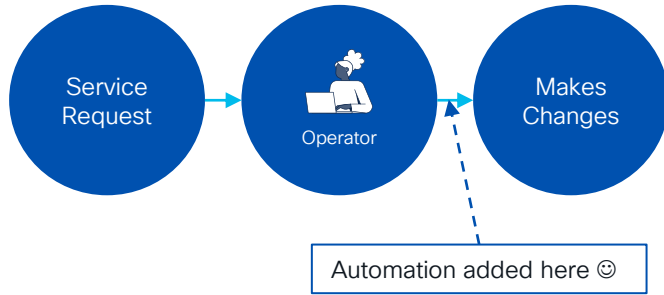


Who is your “customer”?

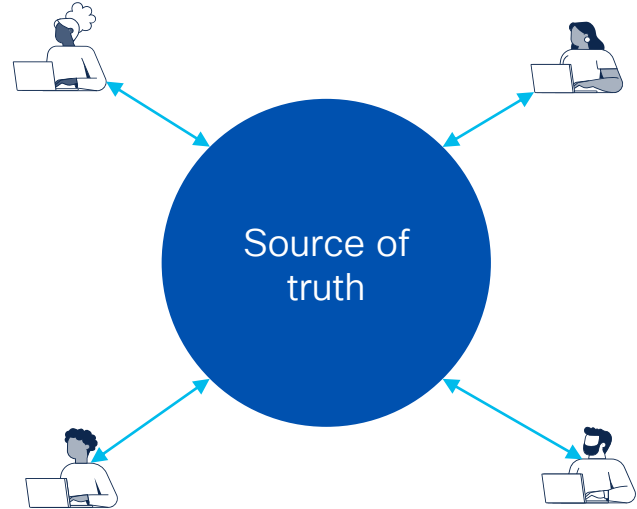
Are you trying to automate deltas (changes) or desired state?

What is the business workflow?

Operating Model

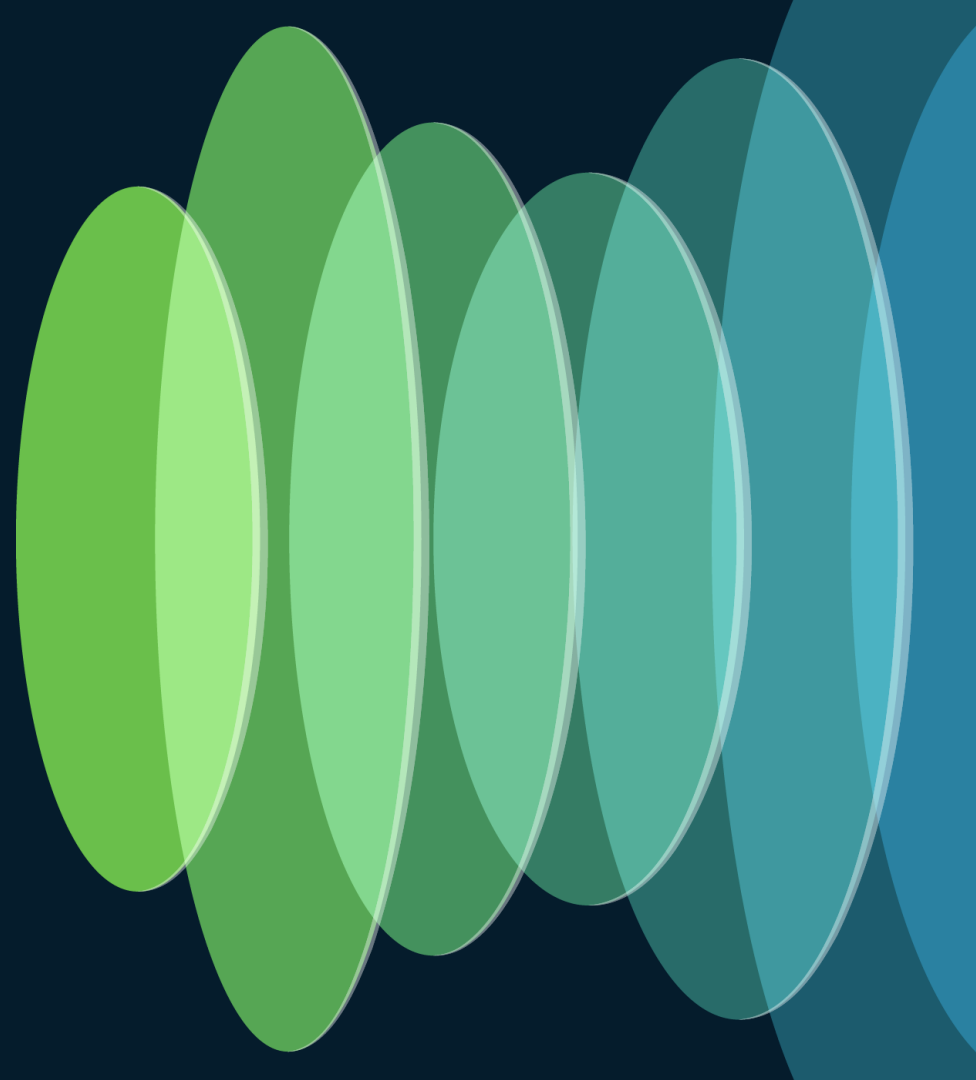


Service Request Model



GitOps Model

Infrastructure as Code and Automation Tools



“The enabling idea of infrastructure as code is that the systems and devices which are used to run software can be treated as if they, themselves, are software.”

Kief Morris, *Infrastructure as Code*



Which tool is best?
Which one should I
use?

... it depends

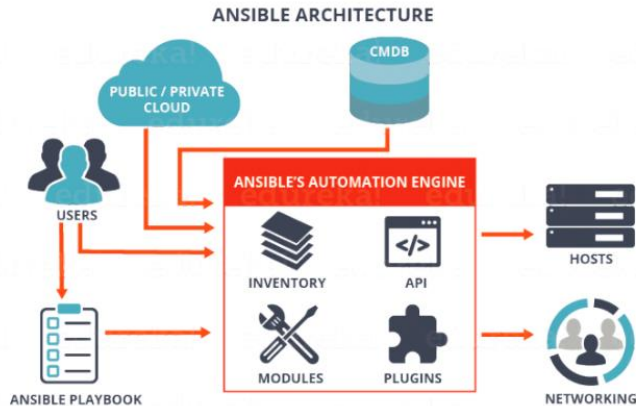


When all you have is a **hammer** ...
...everything looks like a **nail**



One tool to rule them all?

What is Ansible?



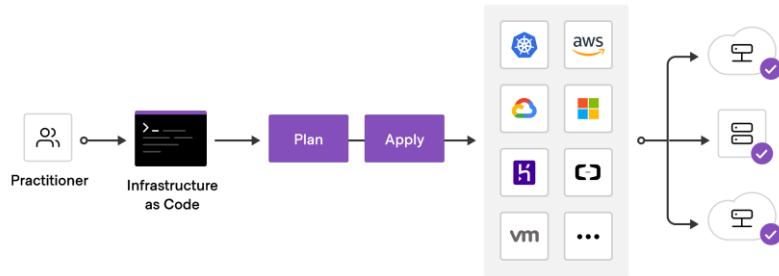
- Open-source Configuration Management Tool
- Commercial offerings from RedHat
- Declarative (when possible) and idempotent
- Can manage a wide range of systems: VMs, network devices, cloud instances, etc.
- Agentless
- Python server-side dependencies
- Stateless – Need “undo” run book

What is Terraform?



HashiCorp

Terraform



- Open-source Infrastructure Provisioning Tool
- Commercial offerings from HashiCorp
- Declarative and idempotent
- Immutable infrastructure concept
- Can manage a wide range of systems: VMs, network devices, cloud instances, etc.
- Agentless, single binary file
- Zero server-side dependencies
- **Stateful – can reverse/destroy changes**

Cisco Intersight: Automate

Create automated workflows to...

- Accelerate delivery of apps and infrastructure
- Reduce risk with standardization
- Simplify cross-domain orchestration

Automate anything, anywhere

Orchestrate infrastructure and workloads, across on-prem and public clouds

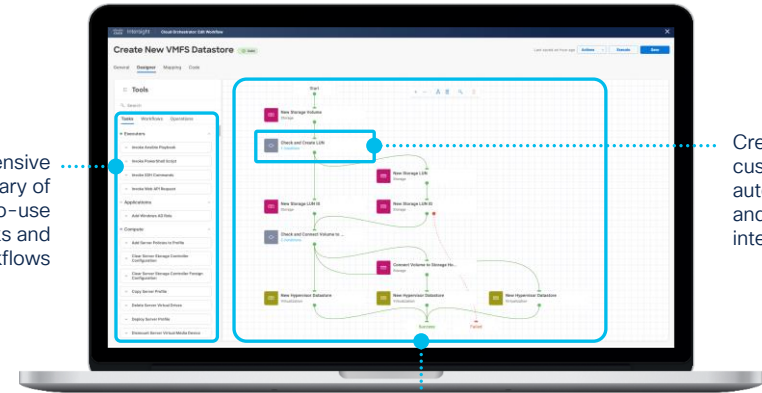
Easy-to-use, low-code orchestration

Create and execute complex workflows with a GUI-based designer

Boost IT operations

Benefit from a library of curated tasks and workflows

Extensive library of ready-to-use tasks and workflows

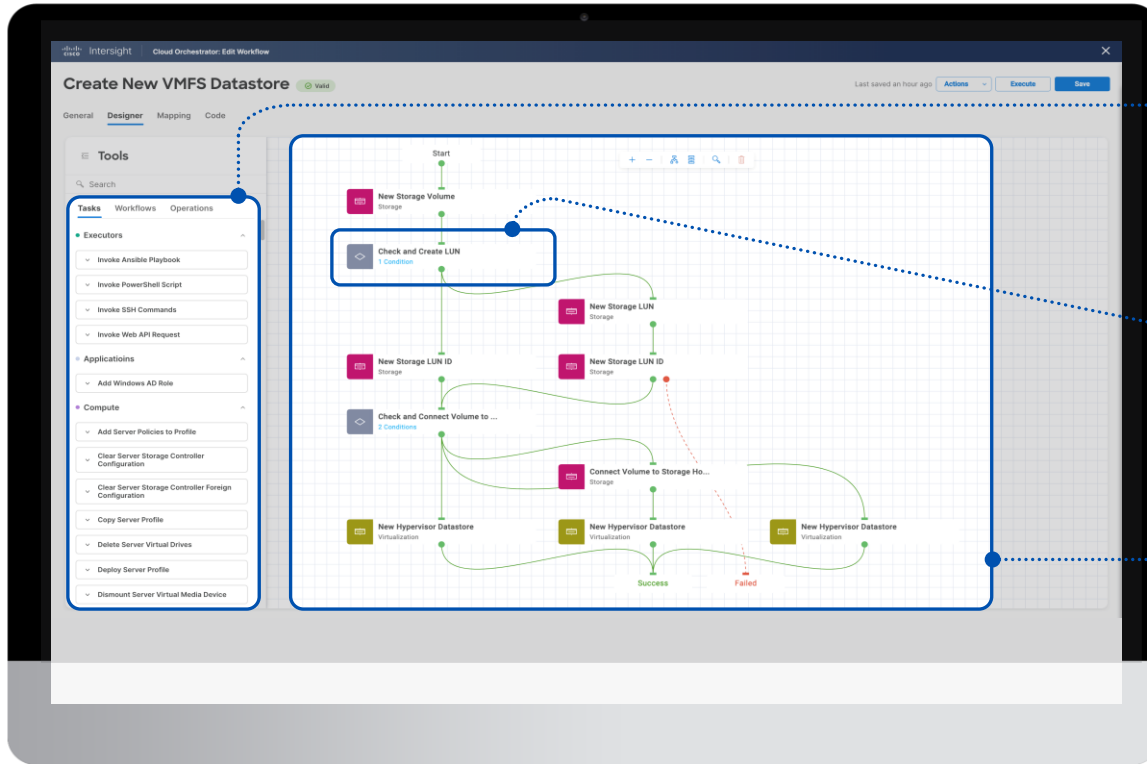


Create custom automation and integration tasks

Simple drag-and-drop workflow authoring

“With consistent and repeatable workflows offered by Cisco Intersight, IT teams can save time and decrease operational costs.” – ESG

Cross-domain orchestration with Intersight

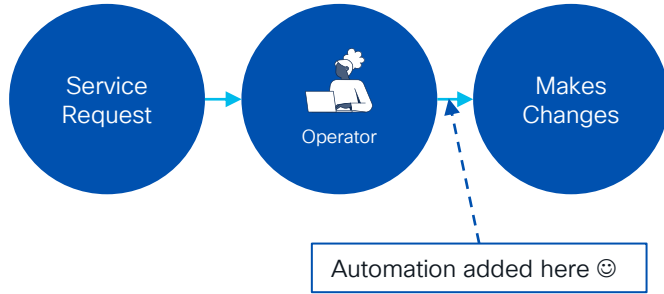


Extensive library of ready-to-use tasks and workflows

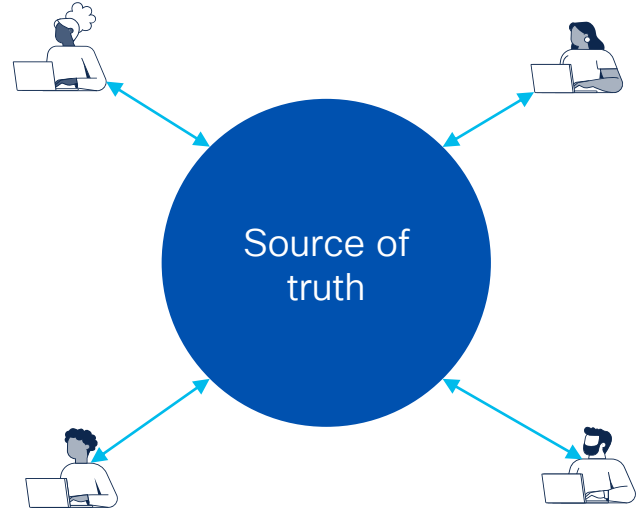
Create custom automation and integration tasks

Simple drag-and-drop workflow authoring

Coming back to the Operating Model



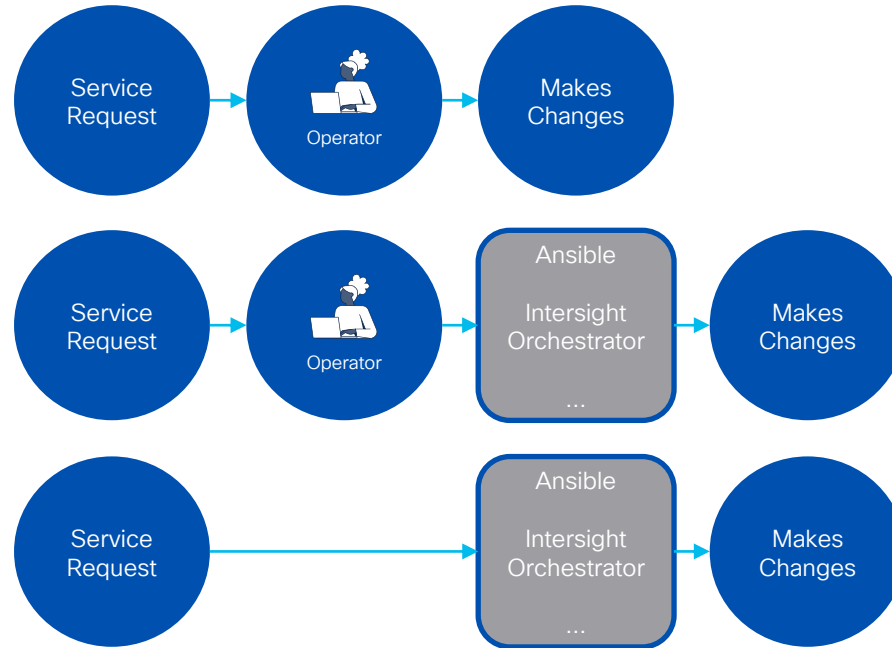
Service Request Model



GitOps Model

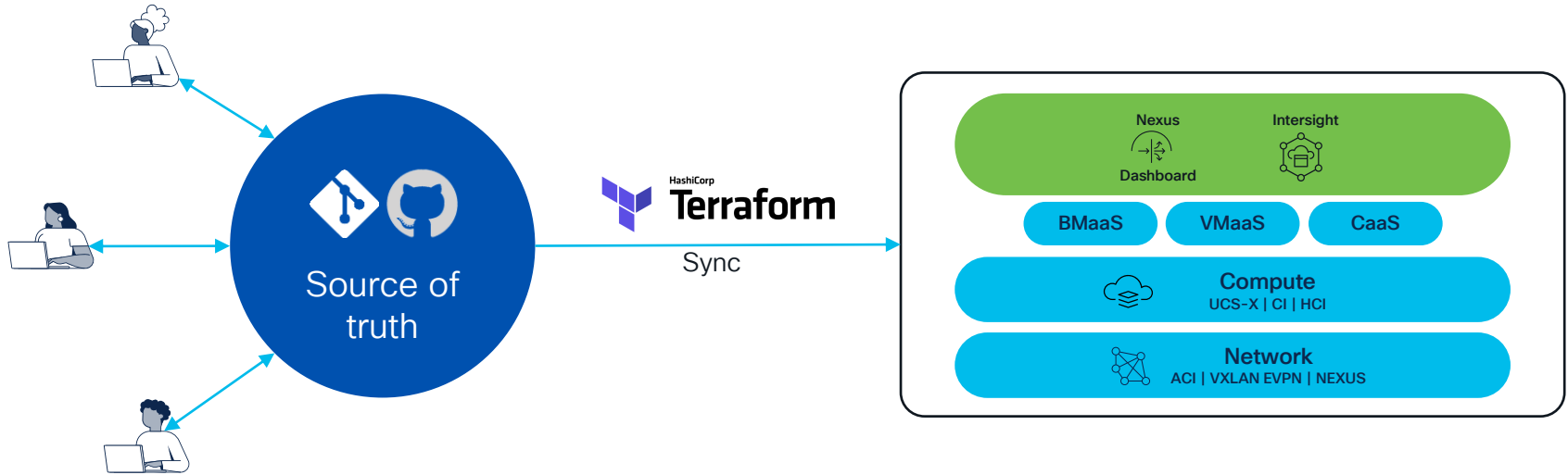
Coming back to the Operating Model

Service Request Model

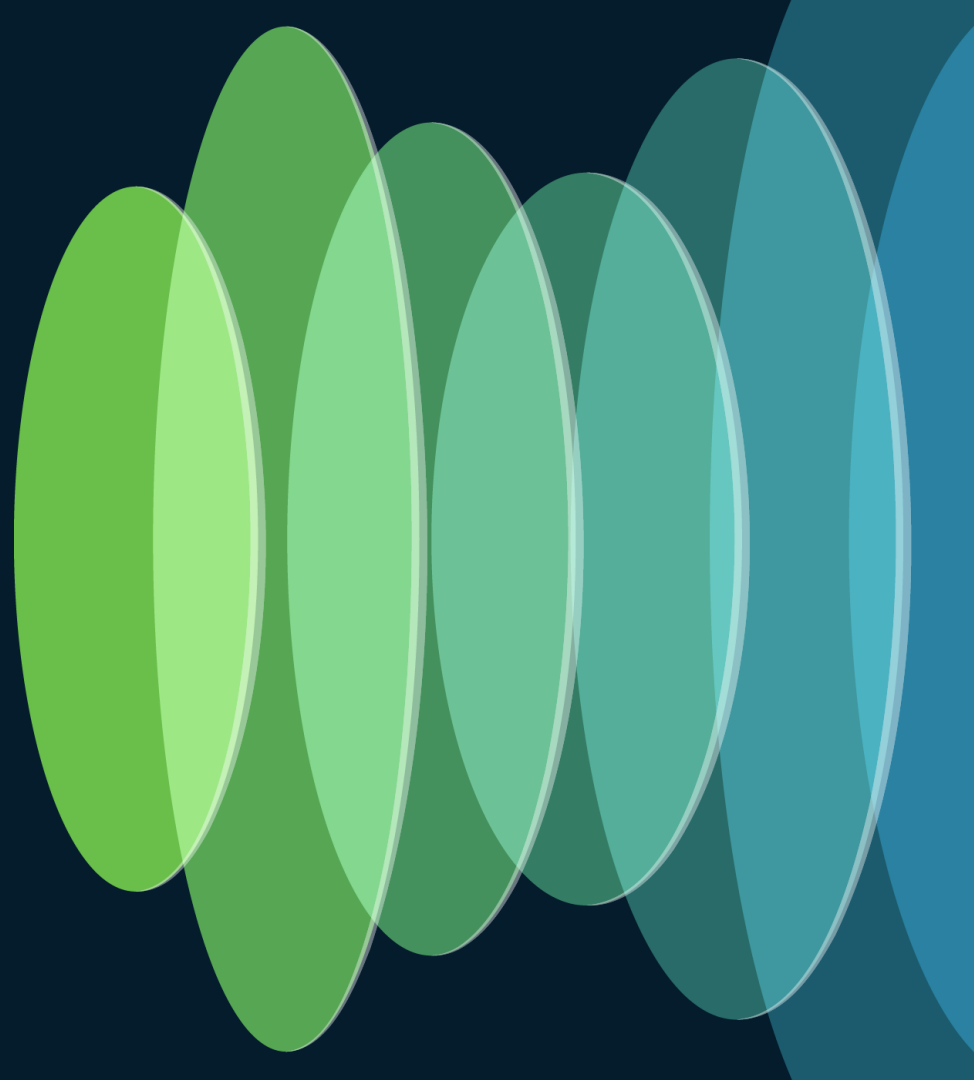


Coming back to the Operating Model

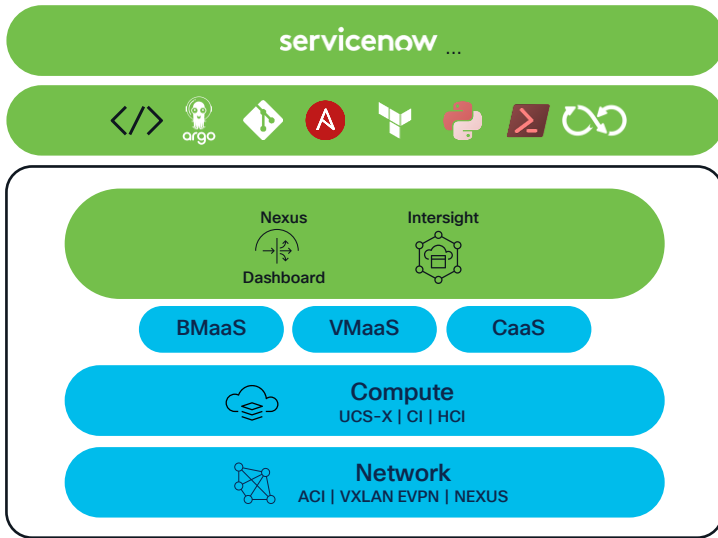
GitOps Model



Data Centre and Hybrid Cloud Architecture Best Practices



Common cloud experience



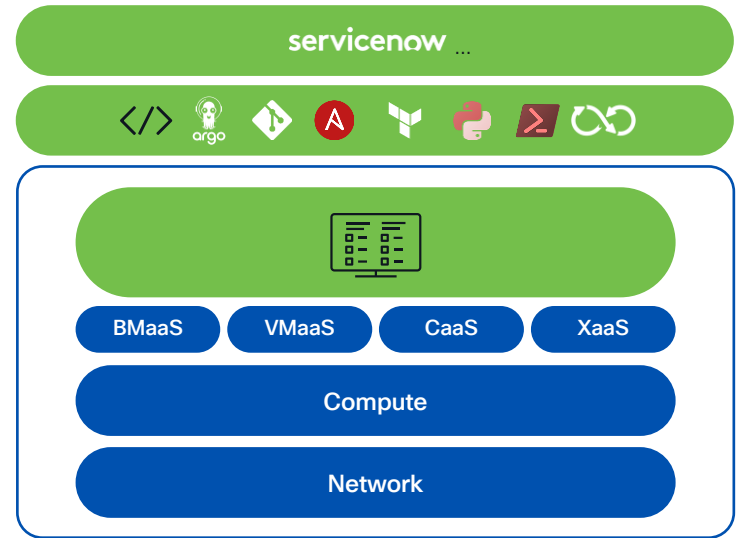
IT Service Management / Operations

Automation

Operations

Services

Infrastructure



Data center



Edge



Colocation

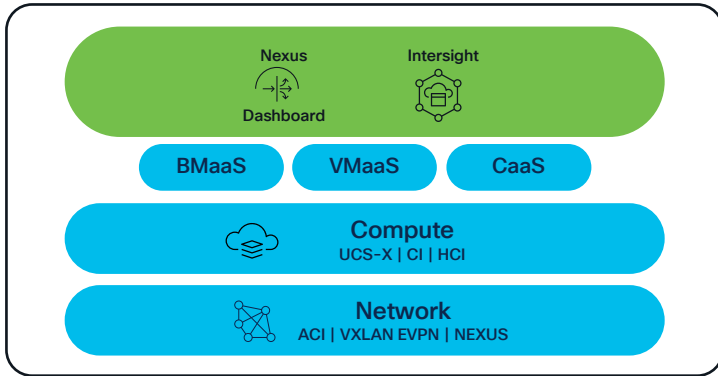


Public cloud

Hybrid cloud experience



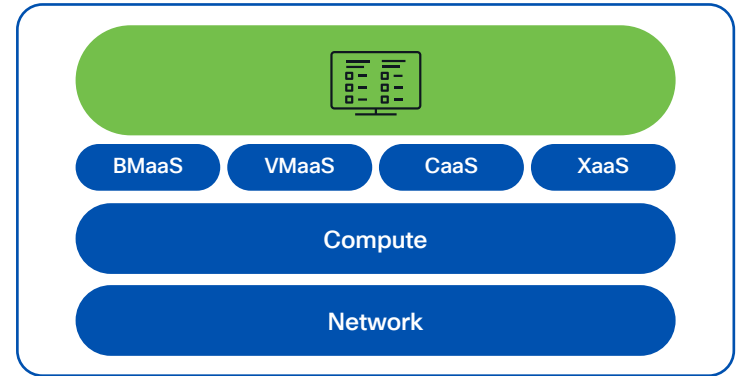
servicenow ...



Operations

Services

Infrastructure



Data center



Edge

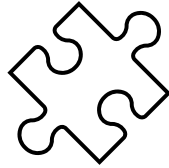


Colocation



Public cloud

Puzzle Pieces

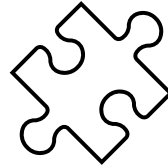


Intersight

REST

Ansible

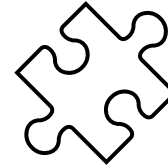
Terraform



UCS
Manager

Non-REST API

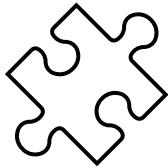
Ansible



UCS Integrated
Management Controller

REST

Ansible

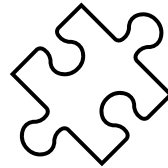


Nexus Dashboard
Orchestrator

REST

Ansible

Terraform

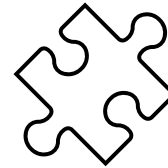


ACI

REST

Ansible

Terraform

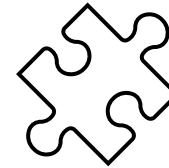


Nexus Dashboard
Fabric Controller

REST

Ansible

Terraform



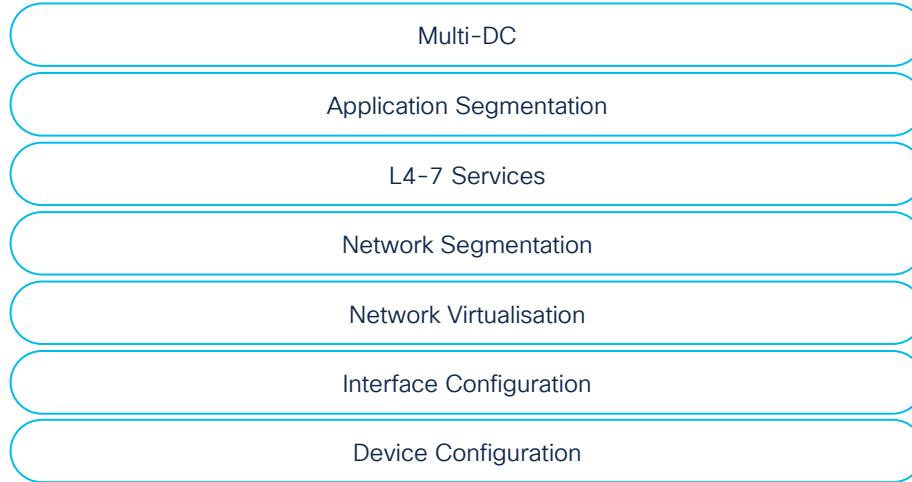
NX-OS

REST

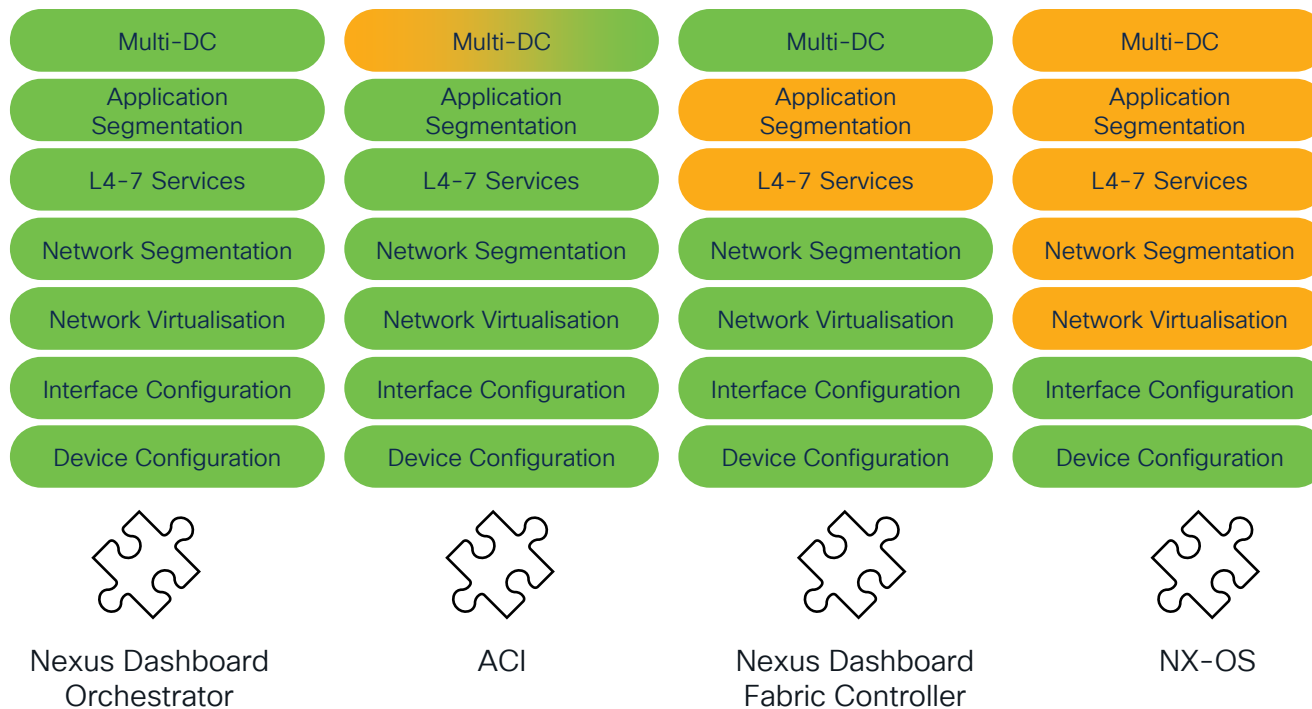
Ansible

Terraform

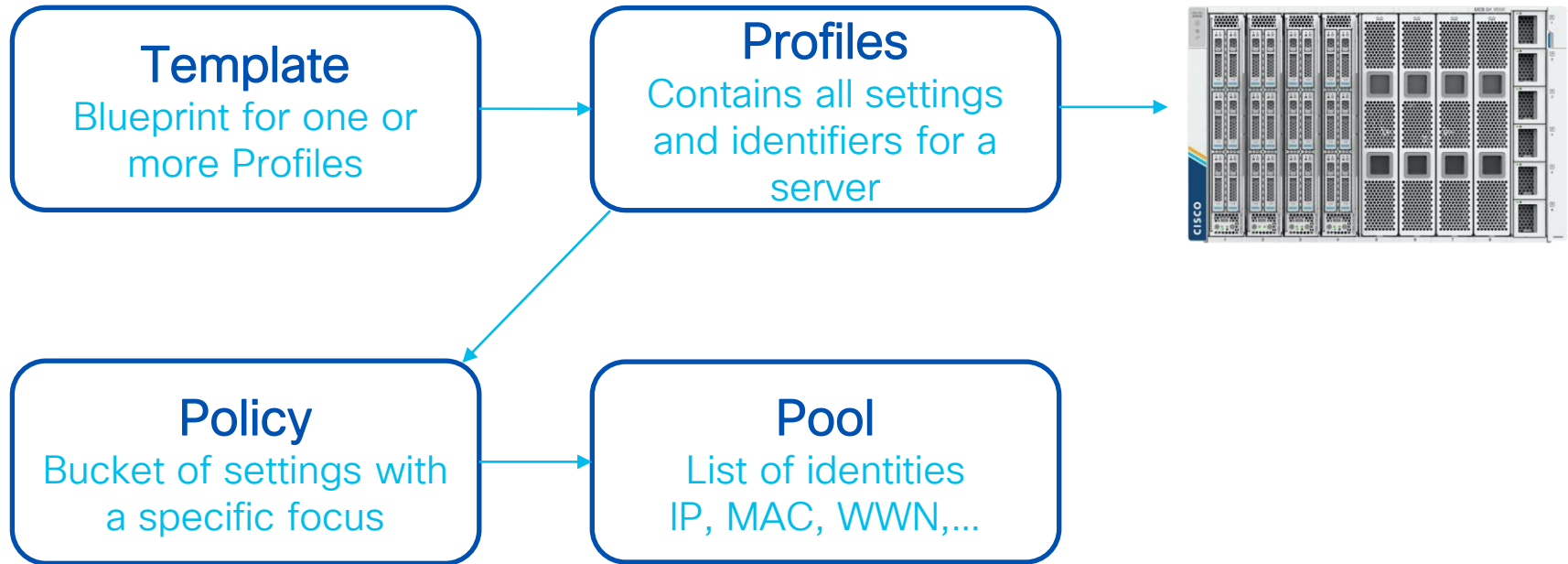
Coming back to abstraction



Coming back to abstraction



The policy dividend - UCS example



The policy dividend - ACI example

Containers of switches and their interfaces

Leaf 101



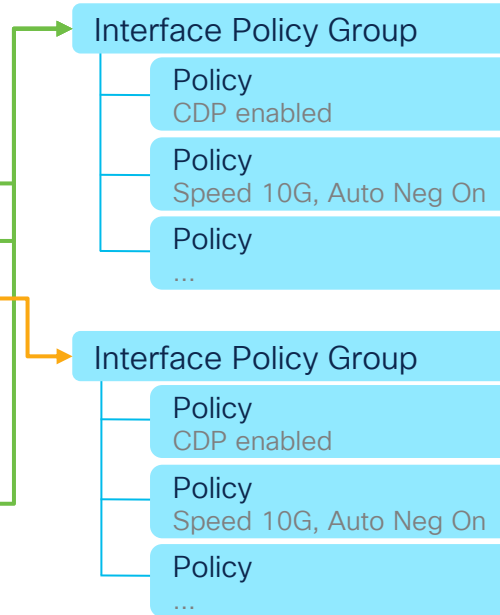
- Interface Selector (e1/1-5)
- Interface Selector (e1/10,12)
- Interface Selector (e1/20-25)

Leaf 102

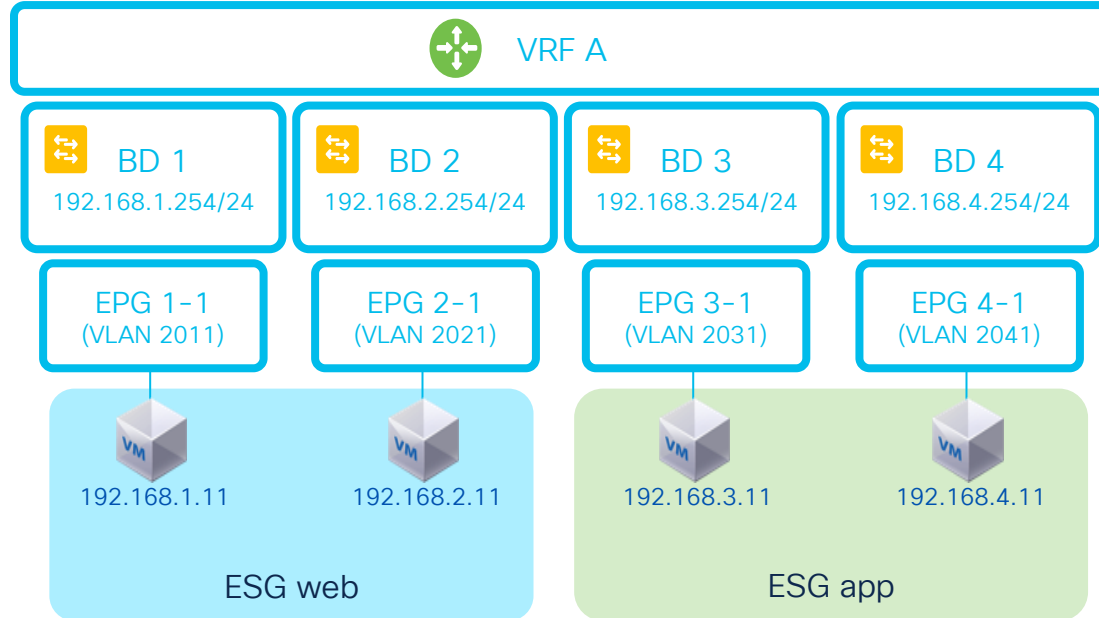


- Interface Selector (e1/1-5)

Configurations to be reused



Take advantage of Endpoint Security Groups



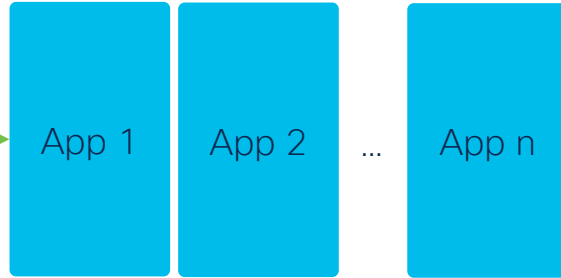
Split Automation

```
main.tf x
main.tf > resource "mso_schema_template_app_epg_contract" "web-to-outside-prov"
94   ## web-to-app contract
95   resource "mso_schema_template_contract" "web-to-app" {
96     schema_id = mso_schema.schema_id
97     template_name = local.template_name
98
99     contract_name = "web-to-app-ctrct"
100    display_name = "web-to-app-ctrct"
101    scope = "application-profile"
102
103    filter_relationships = {
104      filter_schema_id = mso_schema.schema_id
105      filter_template_name = local.template_name
106      filter_name = mso_schema_template_filter_entry.web-to-app.name
107    }
108    directives = ["none"]
109  }
110 }
```

DevOps
App Teams



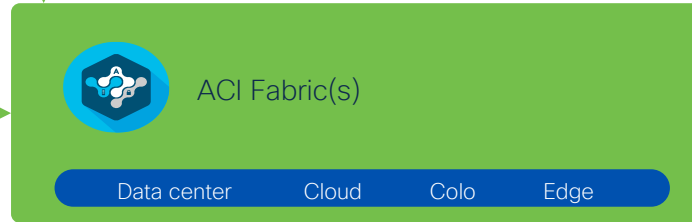
Application Network Profile



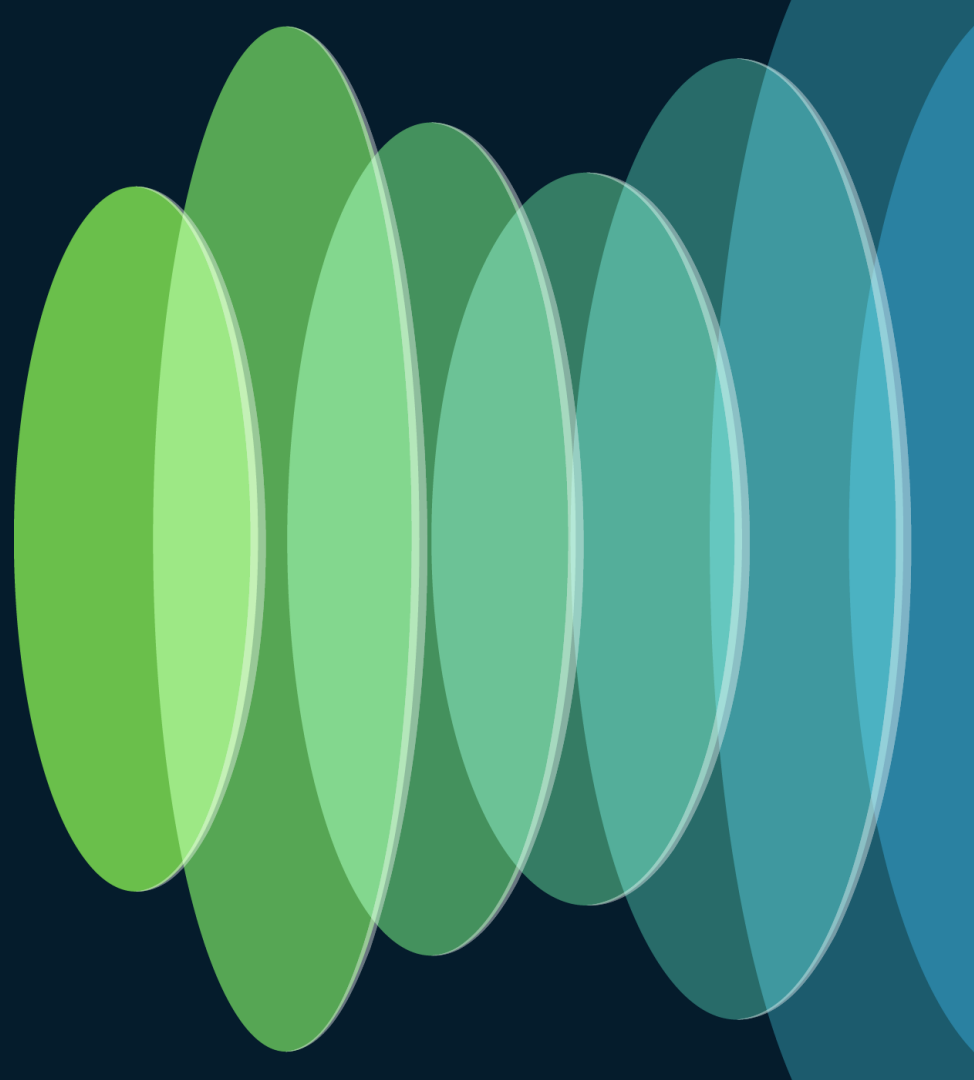
NetOps
SecOps



Tenants
VRFs
IP Addressing
External
Connectivity



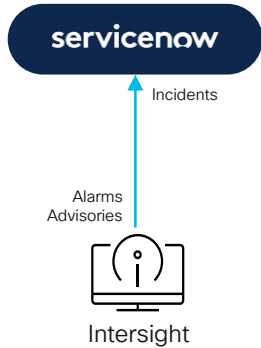
Service Catalogues and ITSM



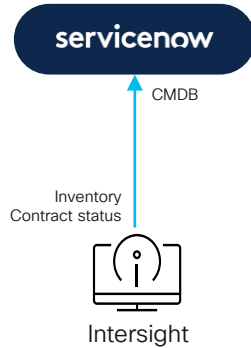
Available ServiceNow Integrations



Cisco Intersight - Incident Management Integration



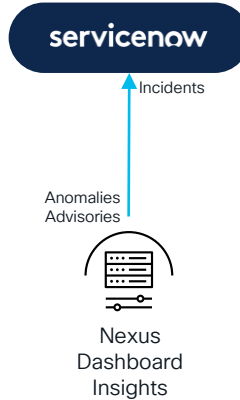
Service Graph Connector for Cisco Intersight



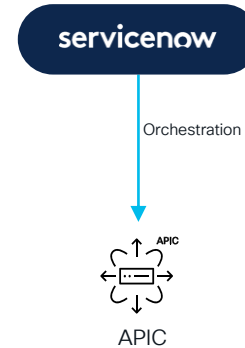
Cisco Nexus Dashboard Integration



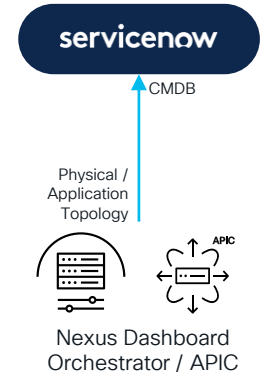
Cisco Nexus Dashboard Insights Application



Cisco ACI Orchestration



Cisco ACI Application



ServiceNow Incidents in Nexus Dashboard

Connector for ServiceNow

Overview

Incident Management

Configuration

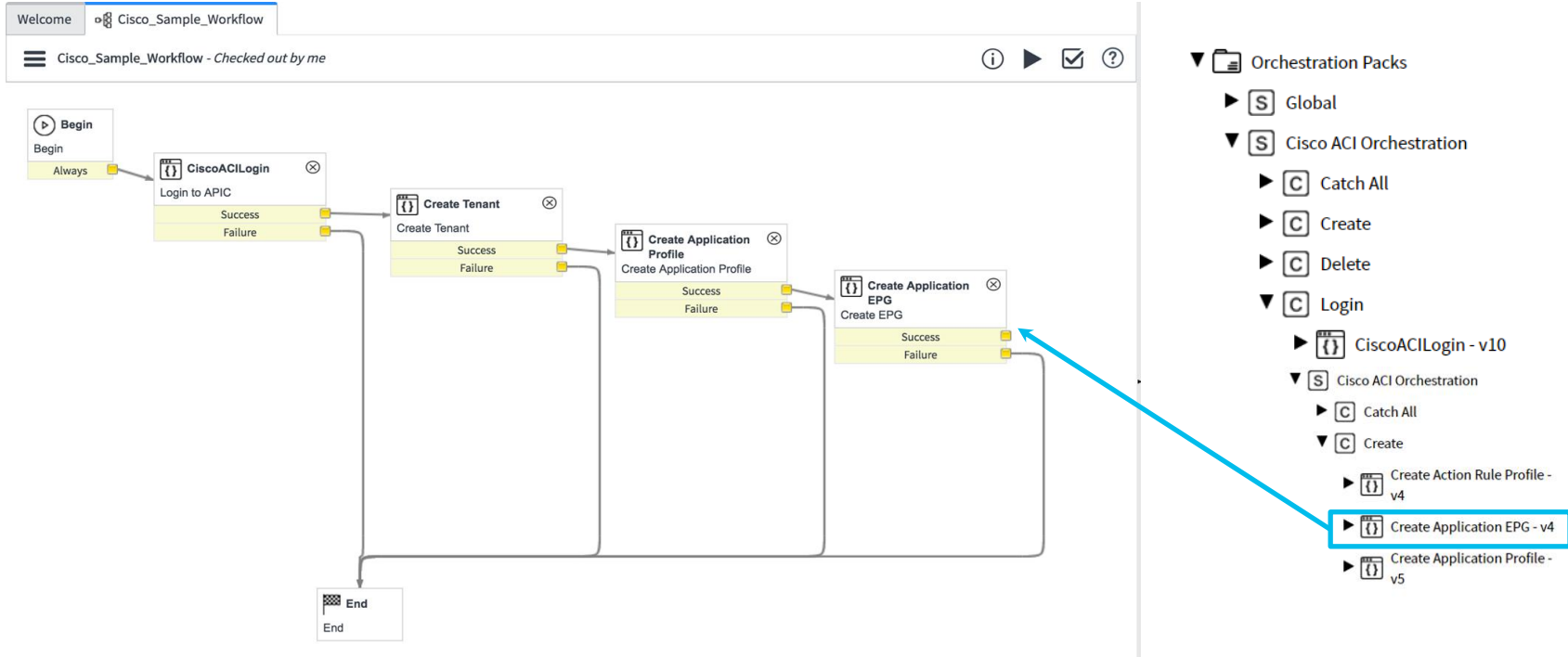
Incident Management

Filter by attributes Actions

<input type="checkbox"/>	Number	State	Priority	Assigned To	Short Description	Updated	Updated By
<input type="checkbox"/>	INC0000001	🟡	🟡 2 - High	Charlie Whitherspoon	Can't read email	2022-01-26 07:22:42	admin
<input type="checkbox"/>	INC0000004	🟡	🔴 1 - Critical	Bud Richman	Forgot email password	2021-04-16 13:16:24	admin
<input type="checkbox"/>	INC0000005	🟡	🔴 1 - Critical	Bud Richman	CPU load high for over 10 minutes	2021-04-16 18:02:00	system
<input type="checkbox"/>	INC0000006	🟡	🔴 1 - Critical	Howard Johnson	Hangs when trying to print VISIO document	2021-04-16 13:15:59	admin
<input type="checkbox"/>	INC0000008	🟡	🔴 1 - Critical	ITIL User	Printer in my office is out of toner	2021-04-16 13:16:02	admin
<input type="checkbox"/>	INC0000009	🟡	🔴 1 - Critical	David Loo	Reset my password	2021-04-16 13:16:04	admin
<input type="checkbox"/>	INC0000010	🟡	🟢 4 - Low	Don Goodliffe	Need Oracle 10GR2 installed	2021-04-16 13:16:35	admin
<input type="checkbox"/>	INC0000011	🟡	🟡 3 - Moderate	ITIL User	Need new Blackberry set up	2021-04-16 12:56:31	admin
<input type="checkbox"/>	INC0000012	🟡	🟡 5 - Planning	David Loo	Customer didn't receive eFax	2021-04-16 12:56:12	admin
<input type="checkbox"/>	INC0000013	🟡	🔴 1 - Critical	David Loo	EMAIL is slow when an attachment is involved	2021-04-16 12:54:48	admin

10 Rows Page 1 of 5 1-10 of 22229

ACI Automation from ServiceNow



NDO Inventory Data in the CMDB

servicenow Service Management

Network M

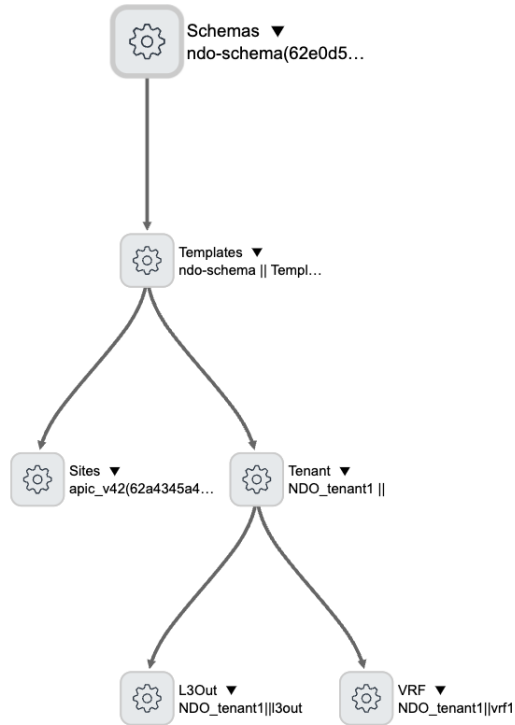
Schemas Search Schema Name Search

All

	Schema Name	NDO	Schema ID
<input type="checkbox"/>	ndo-schema	Test_NDO 10.1.105.15	62e0d5031c000014bbc76327
<input type="checkbox"/>	SN_ndo_schema	Test_NDO 10.1.105.15	62e0e0e81c0000c5bcc7632e
<input type="checkbox"/>	Test	Test_NDO 10.1.105.15	62dfdd5b1c00001c9dc76325

Actions on selected rows...

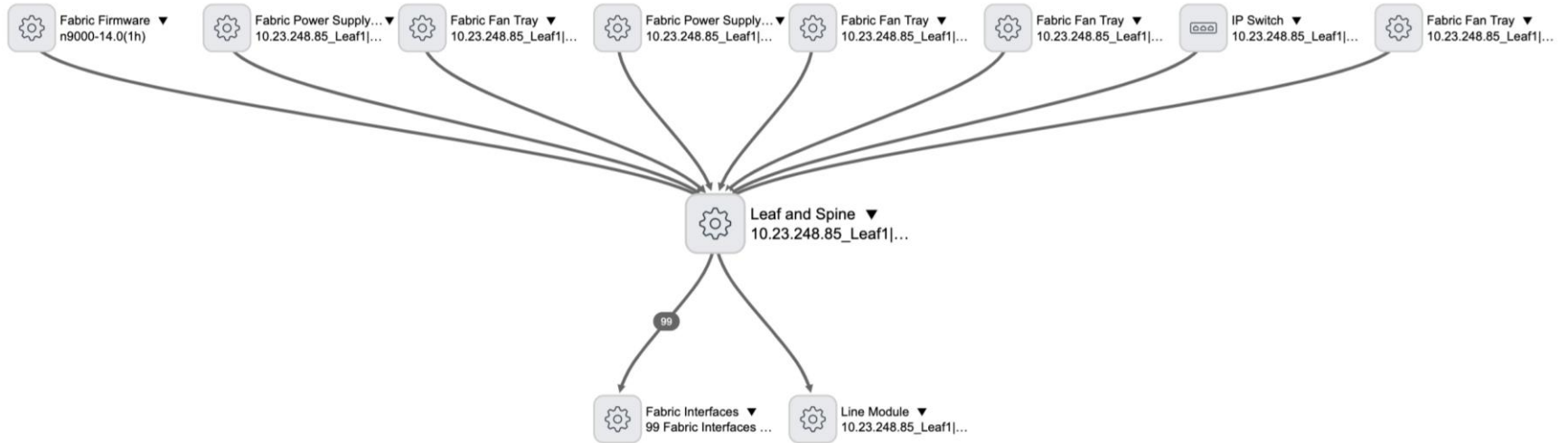
Dependency tree visualization



NDFC and ACI Inventory Data in the CMDB

Fabric Interfaces											
Search Mode Search											
1 to 20 of 1,161											
All											
	Name	ACI Cluster	Interface Name	Fabric Node Name	Discovery source	Switching State	Speed	Mode	ConfVLAN	Layer	Usage
<input type="checkbox"/>	leaf101 SAL18474KNC eth1/32 <small>Crest_APIC 192.168.10.102</small>		eth1/32	leaf101 SAL18474KNC	Cisco ACI	disabled	inherit	trunk		Layer2	discovery
<input type="checkbox"/>	9TANQWIWNAS Ethernet1/26 (empty)		Ethernet1/26		Cisco NDFC		10Gb	trunk			INTERFACE_ETHERNE
<input type="checkbox"/>	9F81AEVTVBH Ethernet1/63 (empty)		Ethernet1/63		Cisco NDFC		10Gb	trunk			INTERFACE_ETHERNE
<input type="checkbox"/>	95G12RV9DSH Ethernet1/54 (empty)		Ethernet1/54		Cisco NDFC		10Gb	trunk			INTERFACE_ETHERNE
<input type="checkbox"/>	95G12RV9DSH Ethernet1/63 (empty)		Ethernet1/63		Cisco NDFC		10Gb	trunk			INTERFACE_ETHERNE
<input type="checkbox"/>	leaf101 SAL18474KNC eth1/28 <small>Crest_APIC 192.168.10.102</small>		eth1/28	leaf101 SAL18474KNC	Cisco ACI	disabled	inherit	trunk		Layer2	discovery
<input type="checkbox"/>	leaf101 SAL18474KNC eth1/19 <small>Crest_APIC 192.168.10.102</small>		eth1/19	leaf101 SAL18474KNC	Cisco ACI	disabled	inherit	trunk		Layer2	discovery
<input type="checkbox"/>	9TANQWIWNAS Ethernet1/38 (empty)		Ethernet1/38		Cisco NDFC		10Gb	trunk			INTERFACE_ETHERNE
<input type="checkbox"/>	9TANQWIWNAS Ethernet1/22 (empty)		Ethernet1/22		Cisco NDFC		10Gb	trunk			INTERFACE_ETHERNE
<input type="checkbox"/>	9CT63TURL2L Ethernet1/7 (empty)		Ethernet1/7		Cisco NDFC		10Gb	trunk			INTERFACE_ETHERNE
<input type="checkbox"/>	95G12RV9DSH Ethernet1/50 (empty)		Ethernet1/50		Cisco NDFC		10Gb	trunk			INTERFACE_ETHERNE
<input type="checkbox"/>	95G12RV9DSH Ethernet1/59 (empty)		Ethernet1/59		Cisco NDFC		10Gb	trunk			INTERFACE_ETHERNE
<input type="checkbox"/>	leaf101 SAL18474KNC eth1/24 <small>Crest_APIC 192.168.10.102</small>		eth1/24	leaf101 SAL18474KNC	Cisco ACI	disabled	inherit	trunk		Layer2	discovery
<input type="checkbox"/>	leaf101 SAL18474KNC eth1/15 <small>Crest_APIC 192.168.10.102</small>		eth1/15	leaf101 SAL18474KNC	Cisco ACI	disabled	inherit	trunk		Layer2	discovery

Dependency tree visualization for Switches



ACI EPGs Inventory Data in the CMDB

servicenow Service Management LH Lionel Hercot

Network M Application EPGs New Search Discovery source Search

1 to 20 of 58

Name	ACI Cluster	EPG Name	Application Profile Name	Tenant Name	Discovery source	DN	Deleted
ndo-main Test_AP1 Test_EPGs	apic_v42	Test_EPGs	ndo-main Test_AP1	ndo-main	Cisco NDO		false
q6qen q6qen q6qen	Crest_APIC 192.168.10.102	q6qen	q6qen q6qen	q6qen	Cisco ACI	uni/tn-q6qen/ap-q6qen/epg-q6qen	false
esha_tenant demo_ap demo_epg	Crest_APIC 192.168.10.102	demo_epg	esha_tenant demo_ap	esha_tenant	Cisco ACI	uni/tn-esha_tenant/ap-demo_ap/epg-demo_epg	false
md_test md_test test_acc_epg	Crest_APIC 192.168.10.102	test_acc_epg	md_test md_test	md_test	Cisco ACI	uni/tn-md_test/ap-md_test/epg-test_acc_epg	false
rclm6 rclm6 rclm6	Crest_APIC 192.168.10.102	rclm6	rclm6 rclm6	rclm6	Cisco ACI	uni/tn-rclm6/ap-rclm6/epg-rclm6	false
fsyuy fsyuy fsyuy	Crest_APIC 192.168.10.102	fsyuy	fsyuy fsyuy	fsyuy	Cisco ACI	uni/tn-fsyuy/ap-fsyuy/epg-fsyuy	false
zp1ja zp1ja zp1ja	Crest_APIC 192.168.10.102	zp1ja	zp1ja zp1ja	zp1ja	Cisco ACI	uni/tn-zp1ja/ap-zp1ja/epg-zp1ja	false
b73z9 b73z9 b73z9	Crest_APIC 192.168.10.102	b73z9	b73z9 b73z9	b73z9	Cisco ACI	uni/tn-b73z9/ap-b73z9/epg-b73z9	false
infra ave-ctrl ave-ctrl	Crest_APIC 192.168.10.102	ave-ctrl	infra ave-ctrl	infra	Cisco ACI	uni/tn-infra/ap-ave-ctrl/epg-ave-ctrl	false
lm891 lm891 lm891	Crest_APIC 192.168.10.102	lm891	lm891 lm891	lm891	Cisco ACI	uni/tn-lm891/ap-lm891/epg-lm891	false
1490_aniket_test_tenant nobody_exists_o...	Crest_APIC 192.168.10.102	application_epg_sample	1490_aniket_test_tenant nobody_exists_o...	1490_aniket_test_tenant	Cisco ACI	uni/tn-1490_aniket_test_tenant/ap-nobody...	false
test_tfr1 demo_ap demo_epg	Crest_APIC 192.168.10.102	demo_epg	test_tfr1 demo_ap	test_tfr1	Cisco ACI	uni/tn-test_tfr1/ap-demo_ap/epg-demo_epg	false

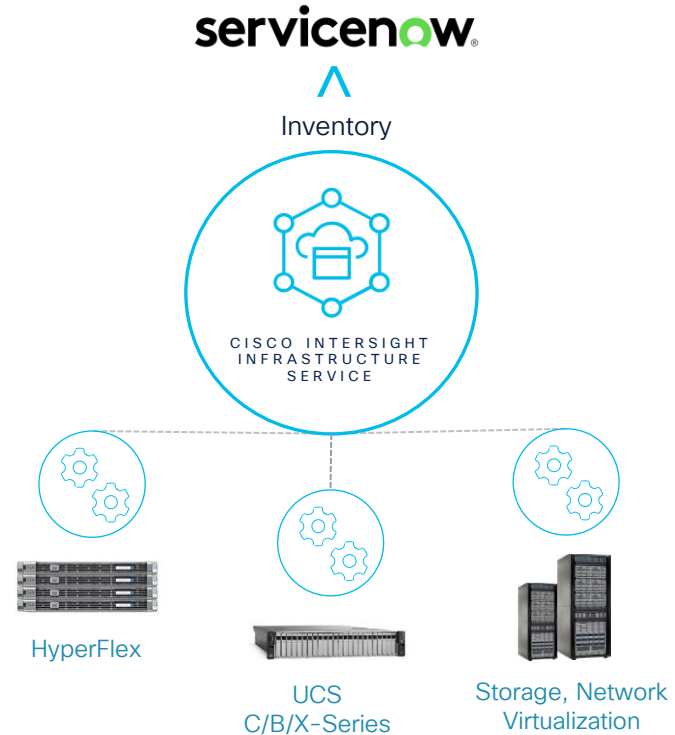
Service Graph Connector for Cisco Intersight

ServiceNow

- Cloud-based platform for IT management workflows

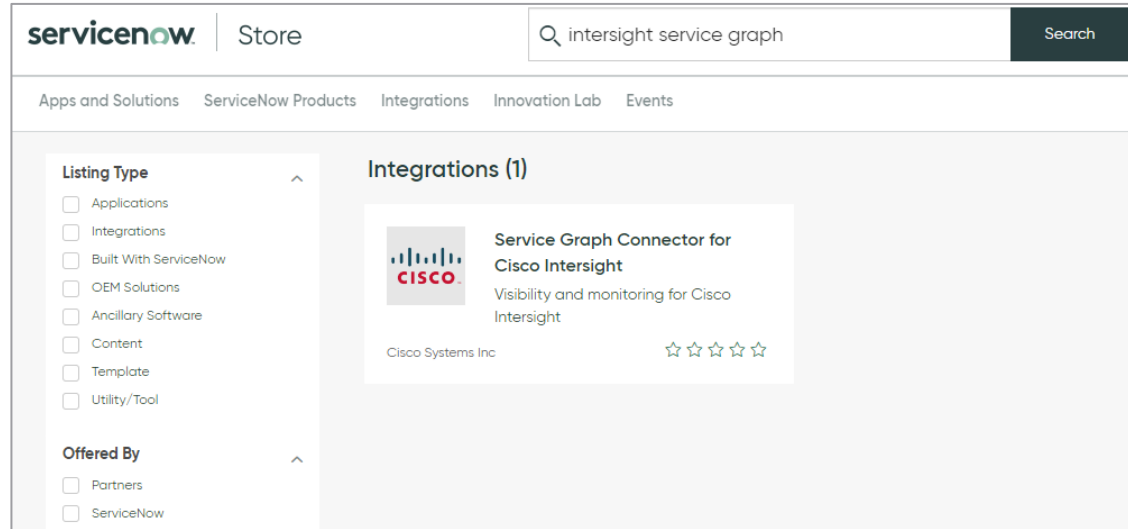
Service Graph Connectors

- Import third-party data into ServiceNow CMDB
- Ensures data quality, timeliness, and consistency
- Works out-of-the-box and complies with ServiceNow Common Service Data Model
- Synchronize inventory data between Cisco Intersight and ServiceNow



Service Graph Connector: Features

- Populate CMDB using Service graph
- Assets, Event, Change Management
- Supports for all Intersight claimed devices including 3rd party Servers, Storage, Nexus, MDS Switches
- Intersight License Tier: Advantage



Certified and listed on ServiceNow store

Service Graph Connector: Key benefits



Enhanced Visibility

- Automatic view of Data Center Infrastructure inventory and relationships.
- Insight into servers, storage, network devices, and virtual machines.



Actionable Insights

- Understanding dependencies between workloads and infrastructure.
- Quick response and effective incident management.



Faster Time to Resolution

- Proactive prediction and prevention of service outages.
- Faster incident resolution and improved service availability.

Service Graph Connector Overview

Uses the Intersight API

- API access can be Read-Only
- Additional RBAC within ServiceNow

App Features

- Device Inventory and Sync
- Relationships between Configuration Items (FIs/Chassis/Servers/Virtualization)
- Reconciliation Engine (avoids duplicate CIs)

The screenshot displays the ServiceNow interface for the Cisco Intersight Integration with CMDB. The top navigation bar includes 'servicenow', 'All', 'Favorites', 'History', 'Workspaces', 'Admin', and a 'Guided Setup' button. A search bar is located in the top right corner. The main content area is titled 'Cisco Intersight Integration with CMDB' and shows a progress indicator of '0% Complete'. The interface is divided into two main sections:

- Configure the connection:** This section features a circular progress indicator showing '0%' and a 'Get Started' button. Below the indicator, it states 'Status: Not Started'. The text reads: 'Configure authentication credentials and HTTP Connection used to send requests to the Intersight API. In this section, the below details need to be provided:' followed by a list: 'API Key ID', 'Secret Key', and 'Connection details'. A note says: 'Once you setup these details. Please test connection by importing 20 test records. When you finish each task, mark the step as complete.'
- Configure the Scheduled Import:** This section features a circular progress indicator showing a lock icon and a 'Preview' button. Below the indicator, it states 'Status: Locked'. The text reads: 'By default, the "SG-Cisco Intersight Data" scheduled import is disabled. Unlock by completing Configure the connection.'

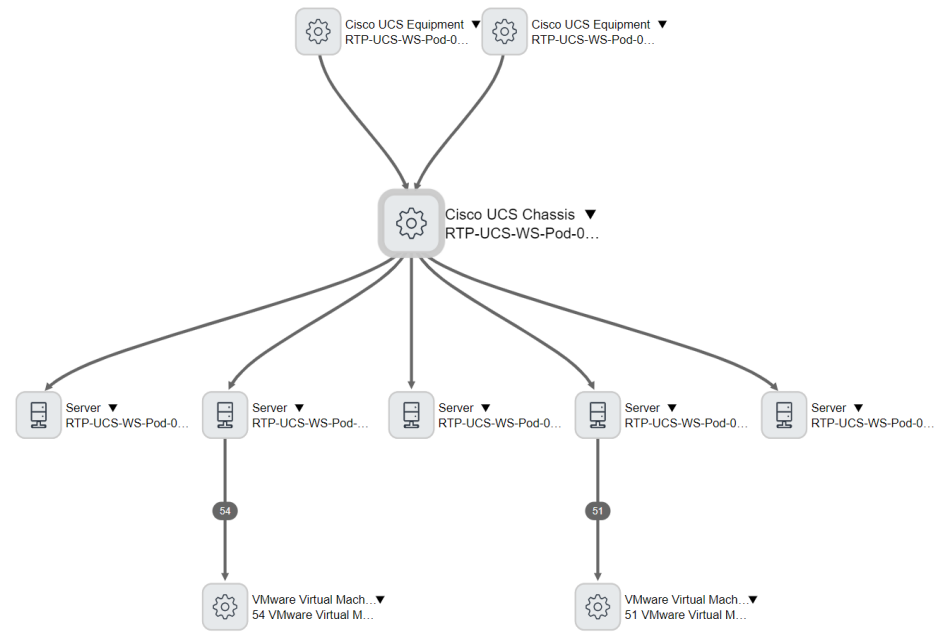
On the right side, there are two task lists:

- 0 / 4 Tasks completed:** Enter API Key ID, Enter Secret Key, Configure Intersight Connection, Test Connection.
- 0 / 1 Tasks completed:** Configure the Scheduled Import Job.



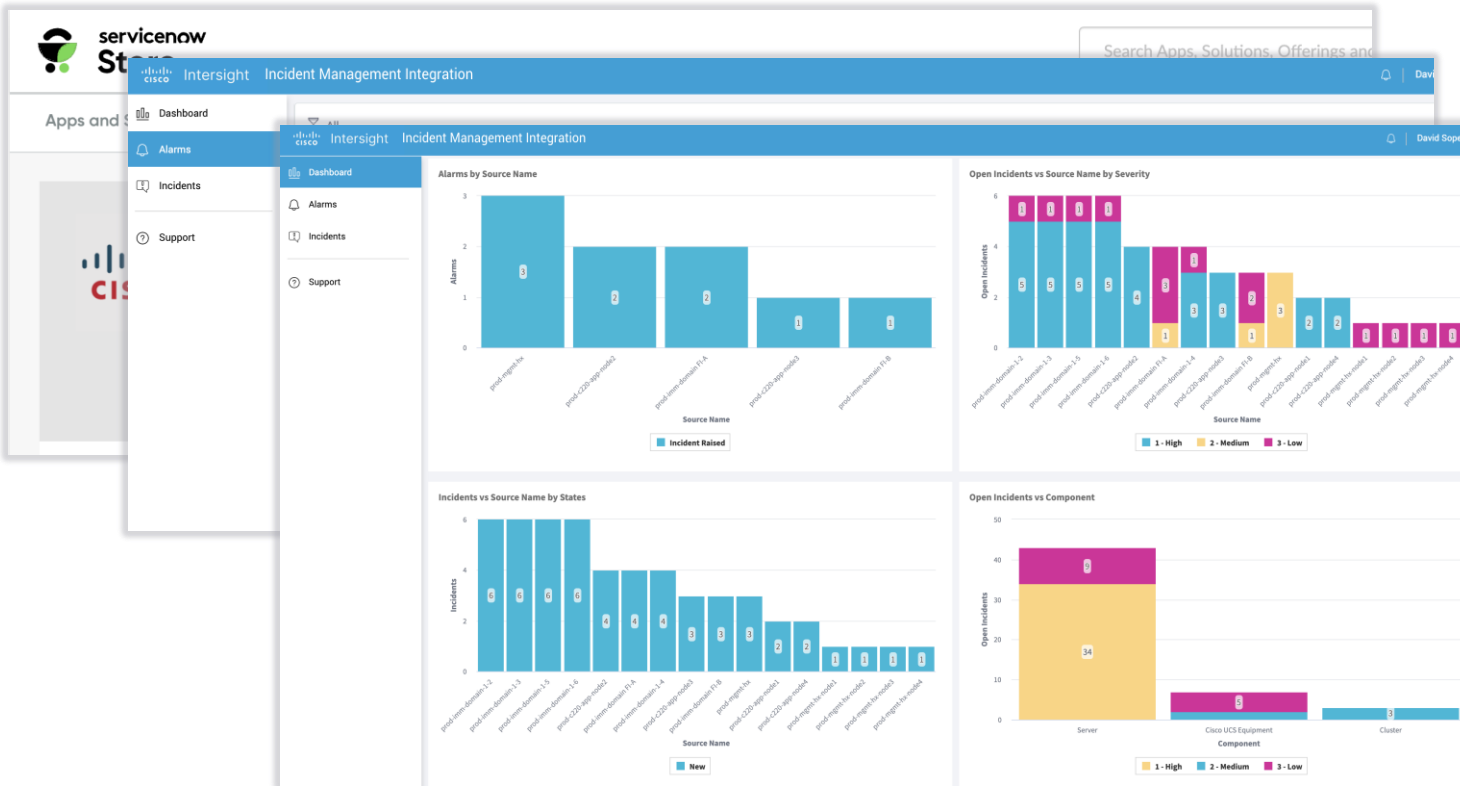
Layout: Vertical

Filter







- RTP-UCS-WS-Pod-01-1-5
- RTP-UCS-WS-Pod-01-1-3
- RTP-UCS-WS-Pod-01-1-2
- RTP-UCS-WS-Pod-01-1-1
- RTP-UCS-WS-Pod-01-1
- RTP-UCS-WS-Pod-01 FI-B
- RTP-UCS-WS-Pod-01 FI-A
- RTP-UCS-WS-Pod-01-1-4

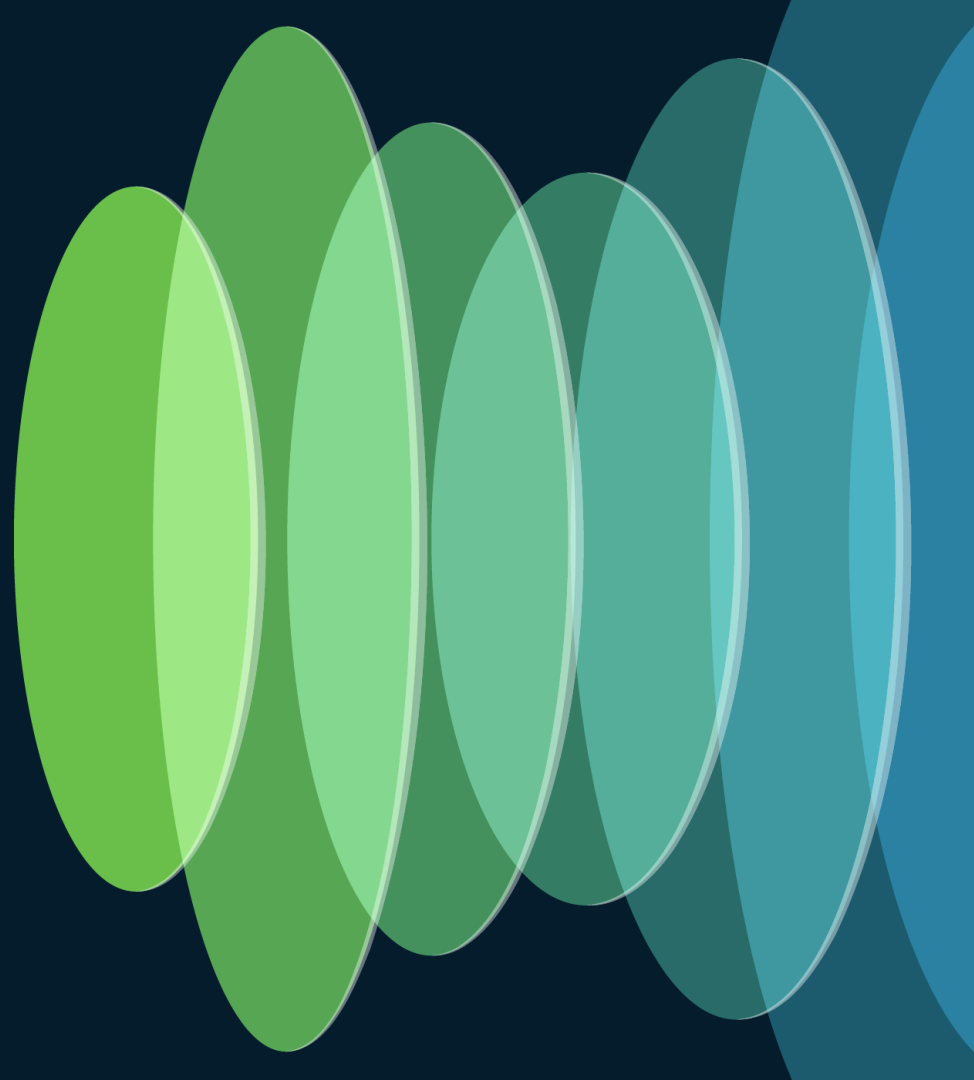
Intersight Incident Management Integration



ServiceNow :: Infrastructure as Code

 ServiceNow	Cloud Provisioning and Governance: Terraform Connector Cloud Provisioning and Governance connector for Terraform	IN PRODUCT ☆☆☆☆
	 HashiCorp Inc	Terraform Infrastructure as code for provisioning, compliance, and management of any... ★★★★☆
 ServiceNow	Ansible Spoke Simplify and accelerate how you integrate with Ansible	☆☆☆☆
	 ServiceNow	Flow Templates for DevOps Add DevOps automation to low-code apps fast IN PRODUCT ☆☆☆☆

One more thing ...



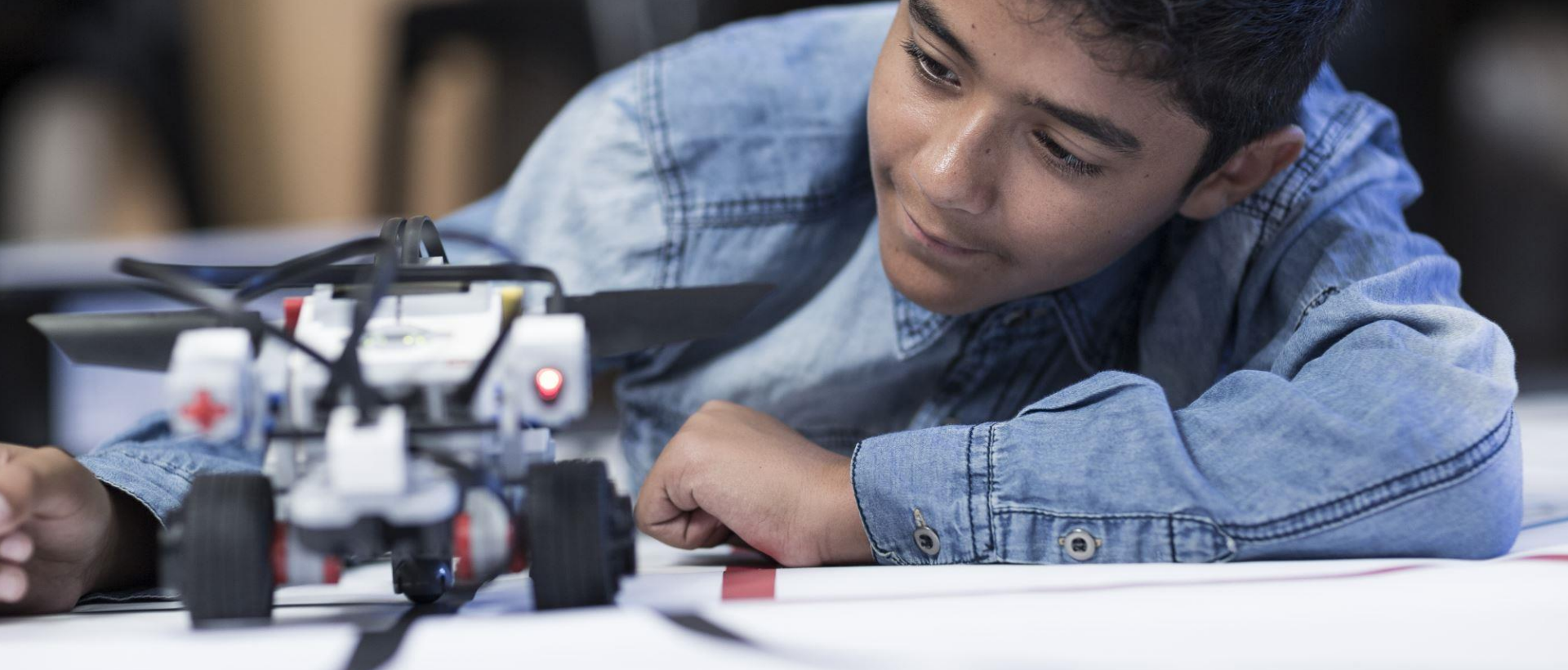


stahnma
@stahnma



Everybody has a testing environment. Some people are lucky enough enough to have a totally separate environment to run production in.

8:07 AM · Aug 22, 2015



Let's talk about **testing**

Where to start?

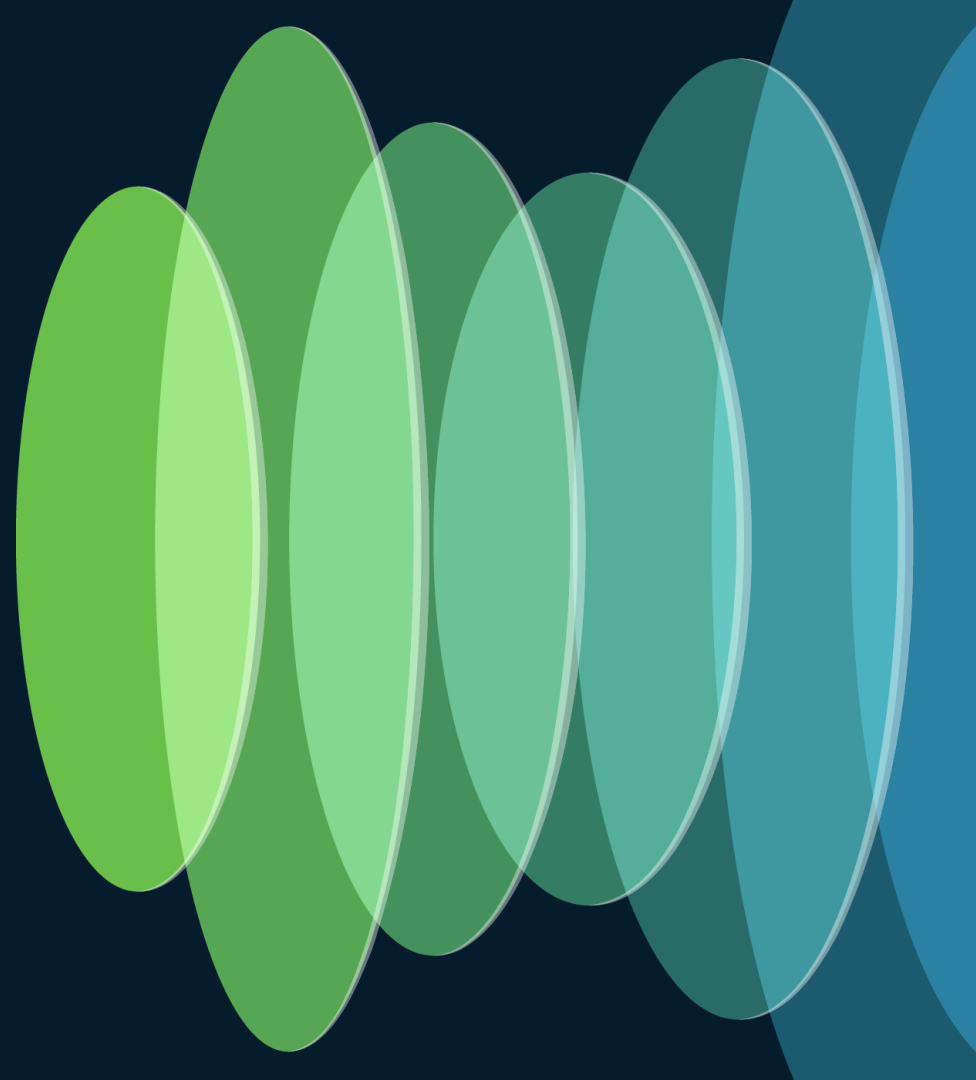
“Start with the things that change often”



“Start with the things that are a common source of errors”

“Start with the things that are simple”

Key Takeaways





Understand your **abstractions** and **operating model**



Let your **operating model** drive **tool selection**



Let your customer and desired **abstraction**
drive your **infrastructure architecture**



The bridge to possible

Thank you

CISCO *Live!*

#CiscoLive

CISCO *Live!*



GO BEYOND

#CiscoLive