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Real World Automation

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BRKDCN-1789

cisco Live!
Barcelona | January 27-31, 2020

Cisco Webex Teams

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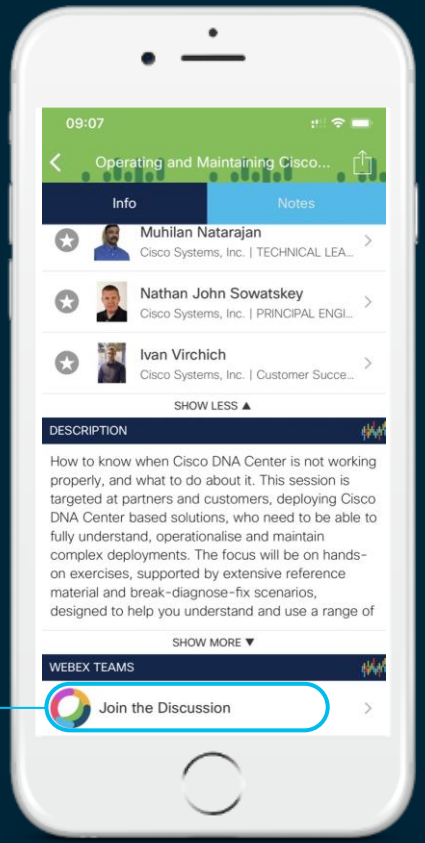


Agenda

- Introduction
- Automation Framework Parameters
  - Why do we care about Automation?
  - How do we start Automating?
- Real World Automation Adoption
- Demo
- Wrap-Up

Introduction to Automation

Establish Vocabulary

Automation – The ability to perform individual, repetitive tasks

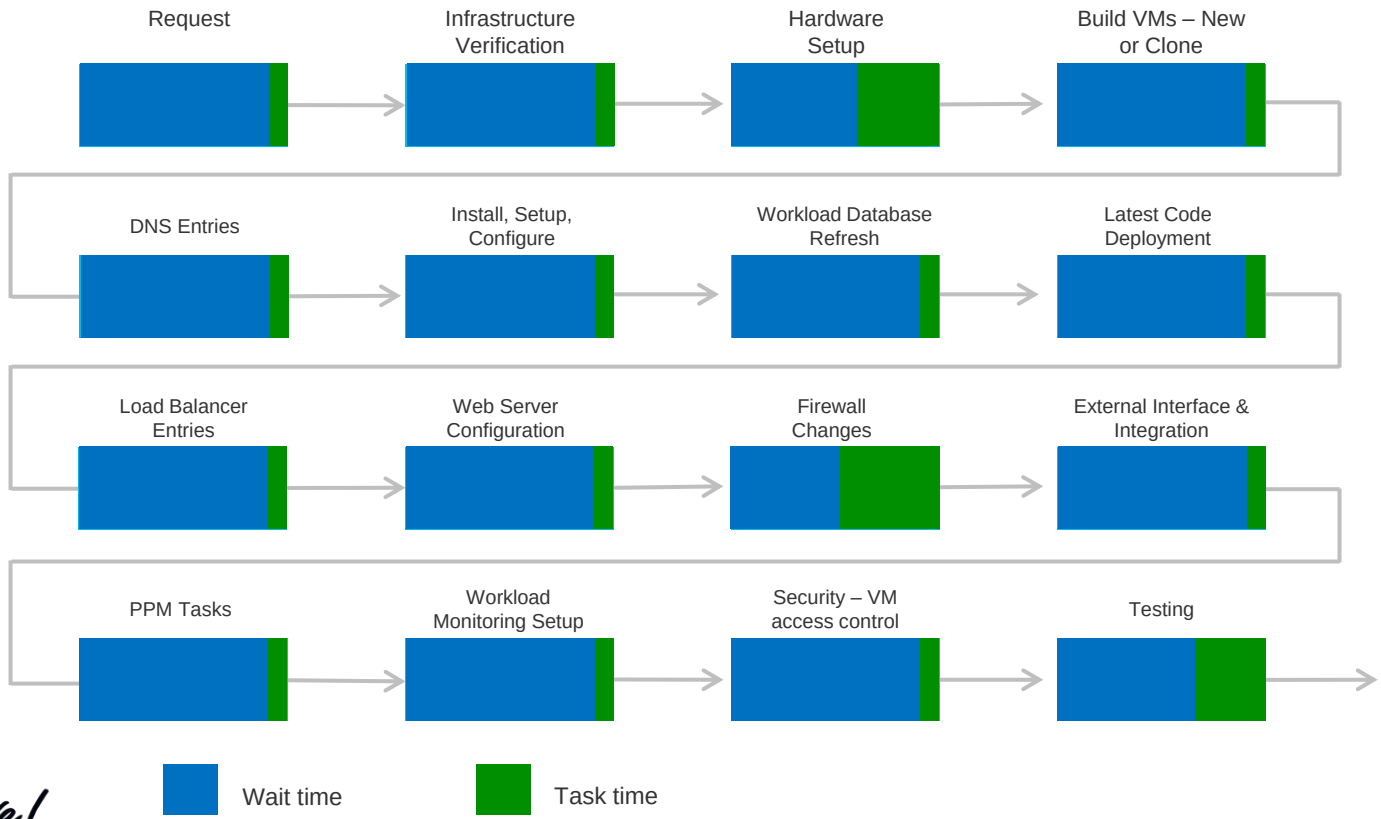
Orchestration – the arrangement and coordination of *automated* & non-automated tasks, ultimately resulting in a consolidated process or workflow.

What's Driving Automation?

- Cloud, containers, and microservices
- The explosion of APIs
- Infrastructure Complexity
- The increasing speed of software development
- The human element: Maximizing talent
- The different kinds of "costs"

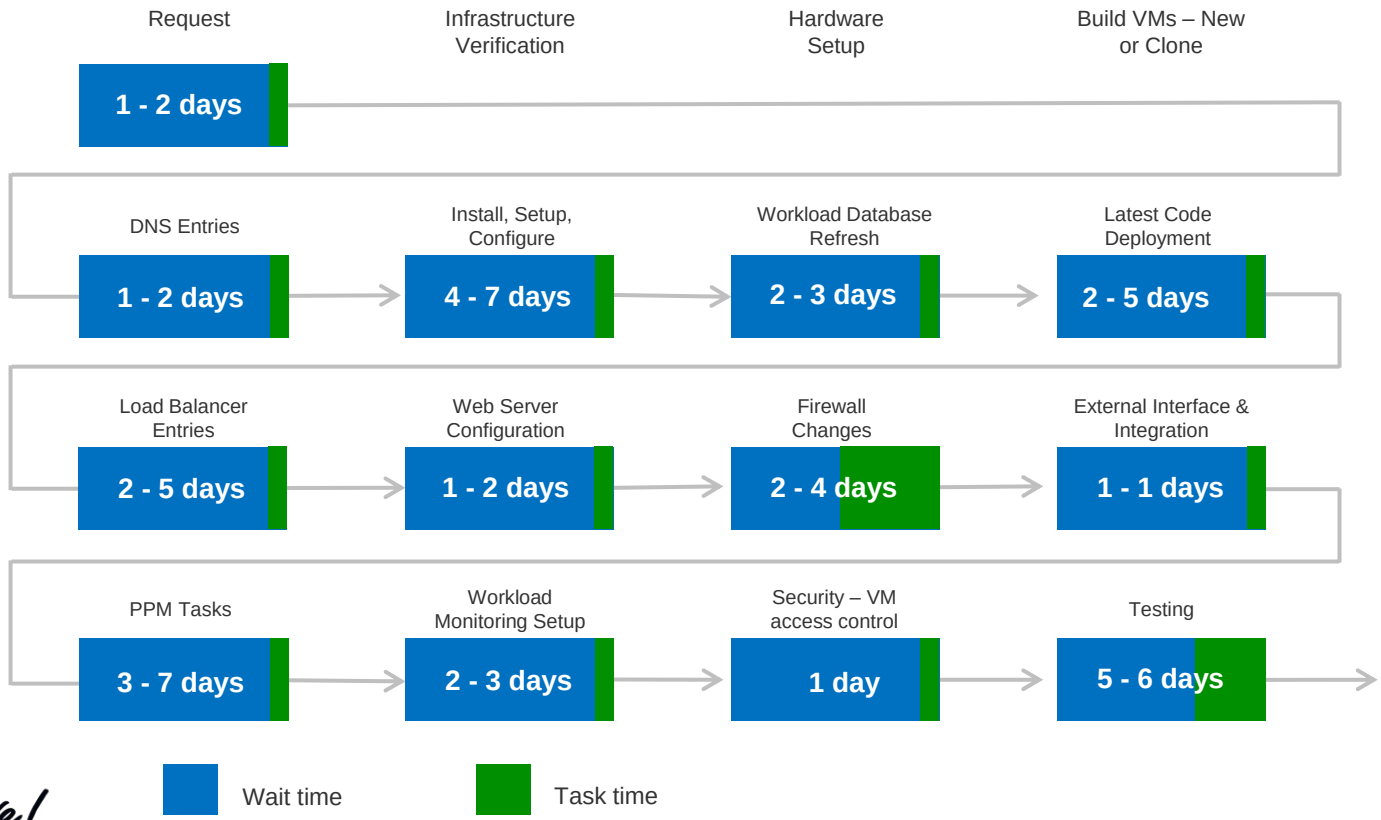
Steps to Deploy an Enterprise Application

47-86 Days



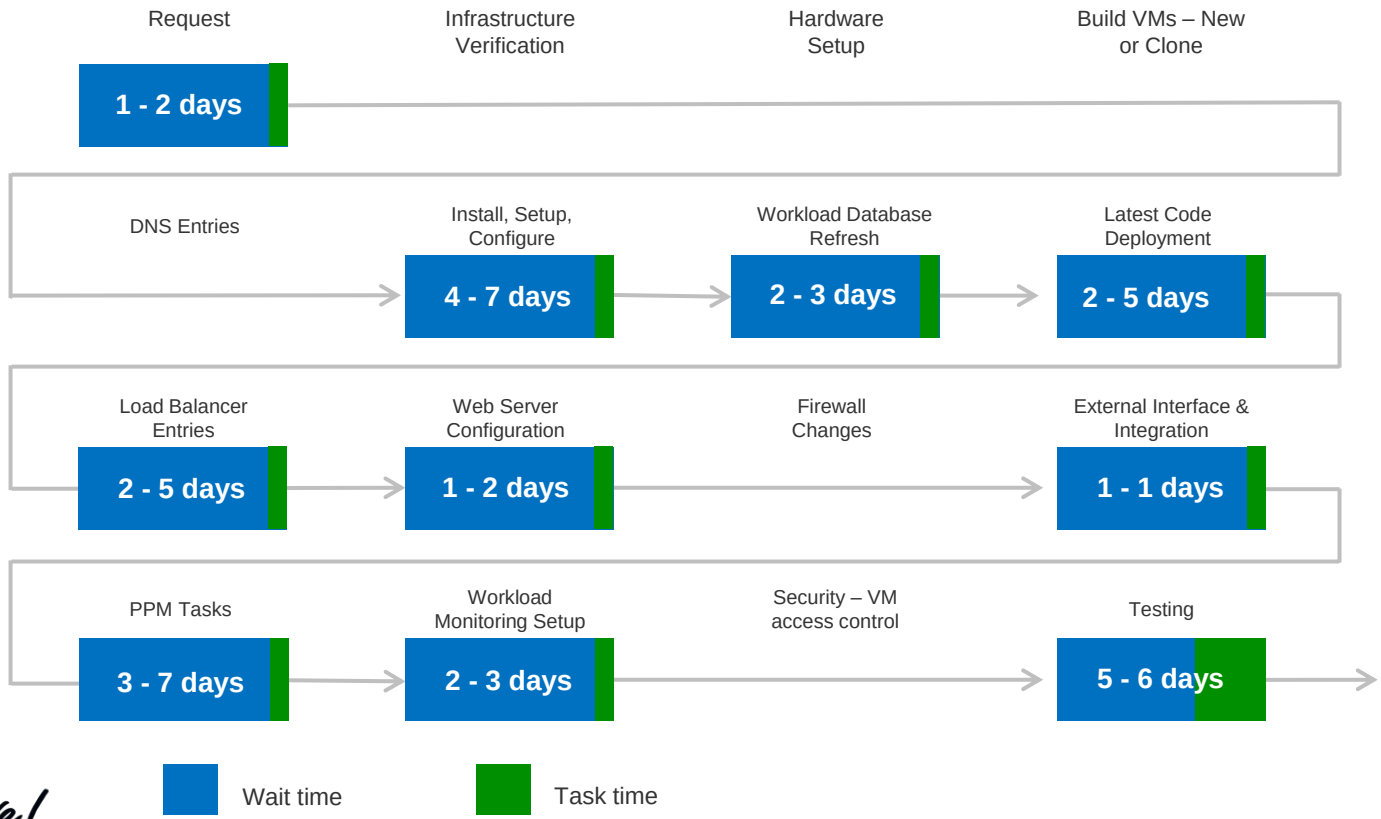
Deploy with VM Automation

27-48 Days



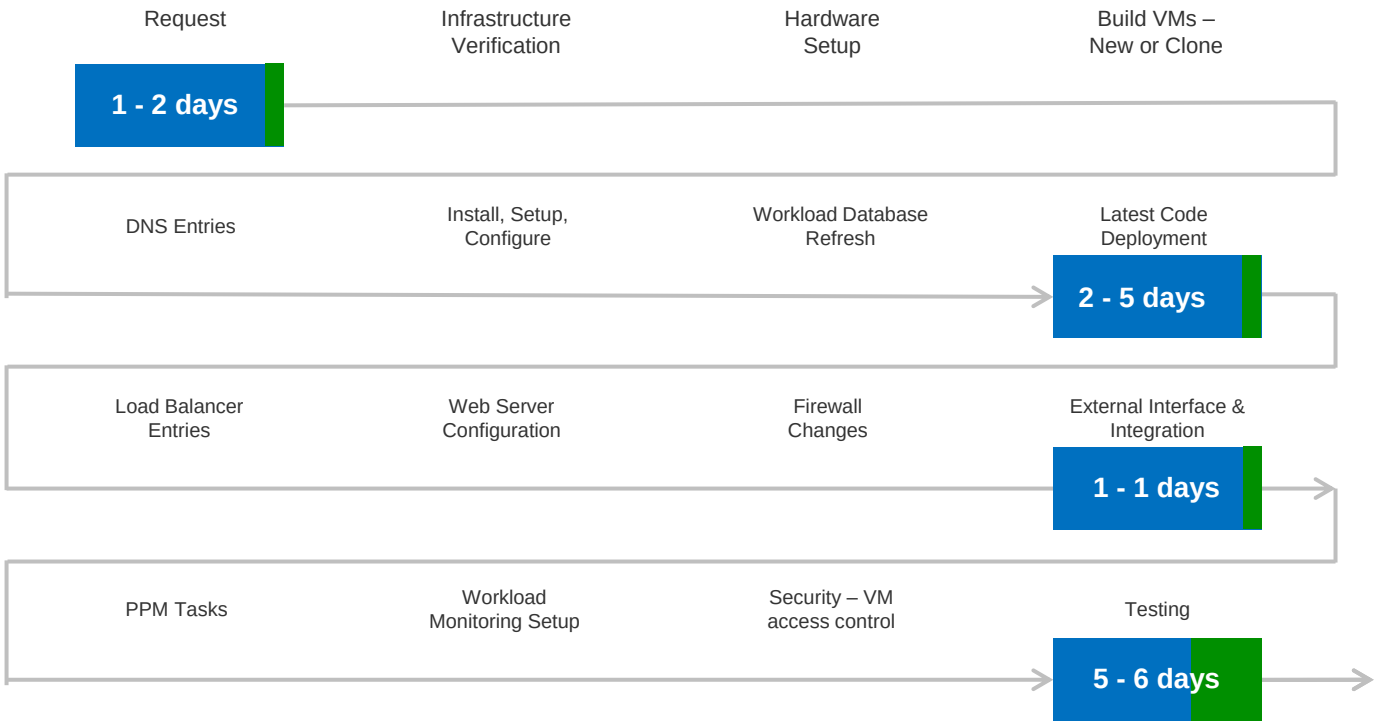
ADD Network and Security Automation

23-41 Days



Complete Application Automation

9-14 Days



Why Do Customers Want to ***Automate***?

- "I have *repetitive tasks* that we are doing ***manually*** – I need to free up my people to do other value-added work"
- "I need to ***deploy new services quicker***; customer demand is drowning me"
- "I have an aging workforce that I can't replace with experienced network operators – I ***need to capture that IP*** into automated workflows"
- "I need a way to ***do more with less***" (Ops Budgets are declining)

Why Do Customers Want to *Orchestrate*?

- "I *want to glue my systems together* to achieve an end-to-end workflow that reflects our service life-cycle – request, implementation, sustainment, modification, decommissioning"

- "Cisco offers many management tools – some do provisioning of services, others do monitoring – why *can't they be tied together* as a solution?"

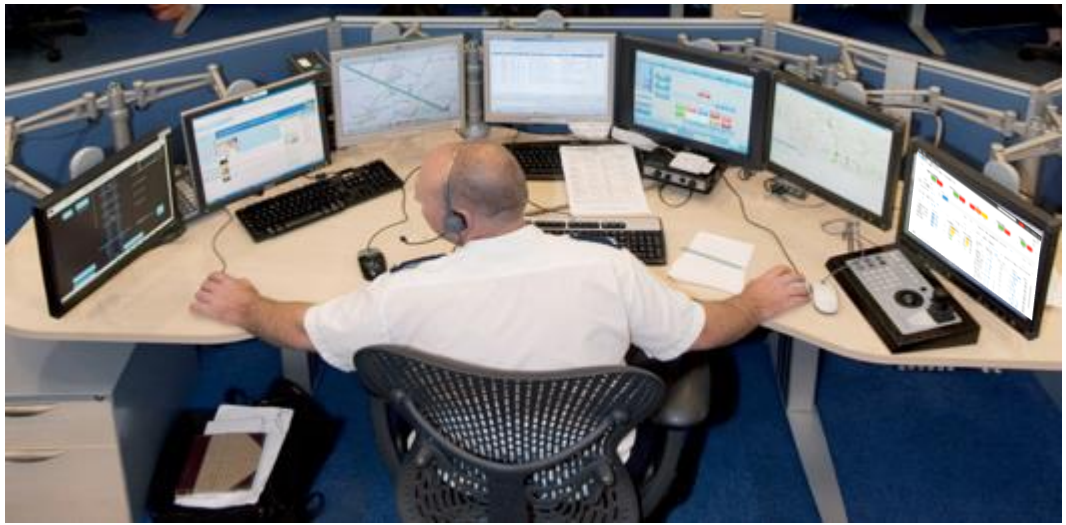
How Do You Deal With Multiple Tools and Data Sources?

Prime Infrastructure | DCNM | WAE | NSO | APIC | Ansible | UCSD | Call Manager | DNA-C | AppD

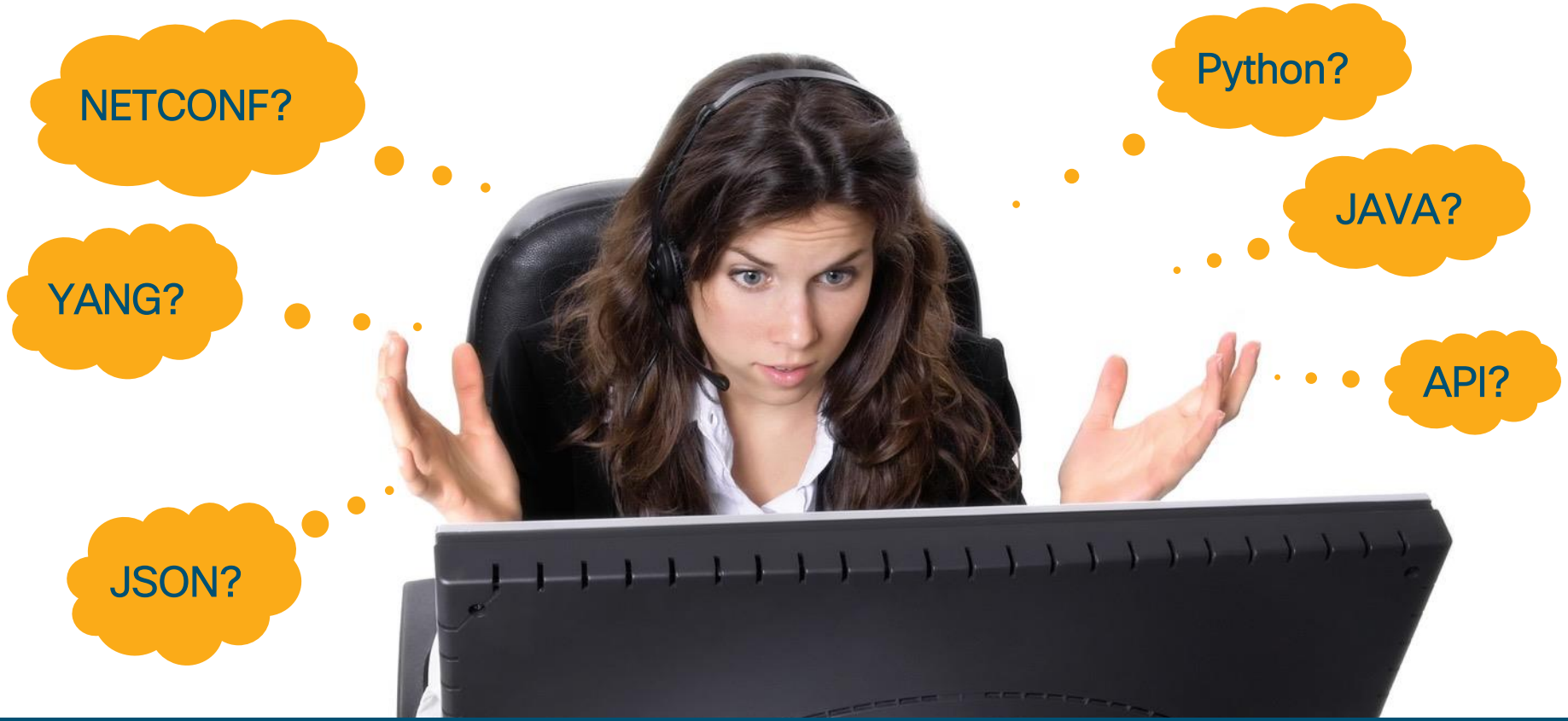
Prime Collaboration | Chef | PNDA | Tetration | Spark | WLC | Routers | Switches | UCS | APs

Swivel-Chair Management

Splunk | vCenter | SevOne | HPOV NNMi



git | Remedy ARS | Service Now | OpenStack



Tomorrow's Operators Need Different Skills

Challenges that need Solving?

Business Challenges

Customer Experience

Speed, agility time to market

Monitoring systems & workloads

Infrastructure growth

Technical Challenges

Data Silo's

Time to Remediate

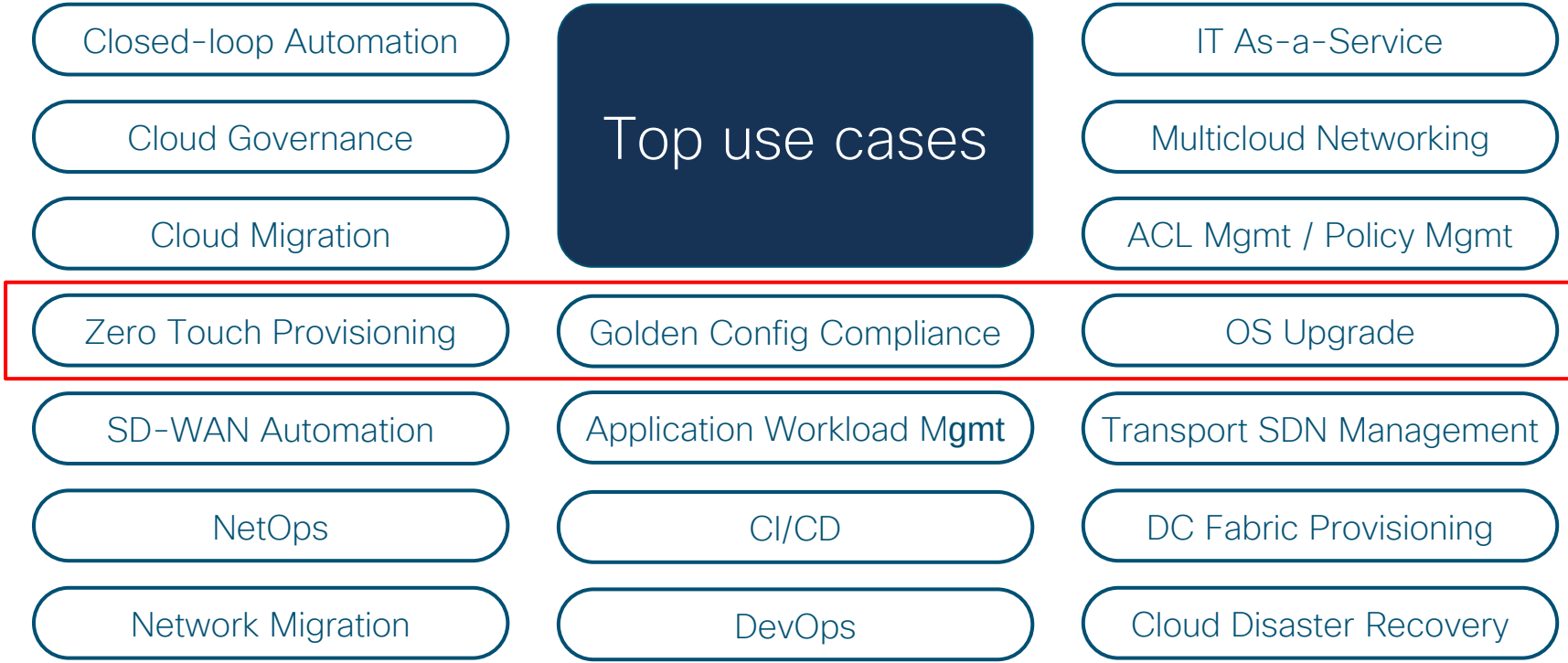
Human error

ONE.
WHAT PROBLEM
ARE WE TRYING TO SOLVE?

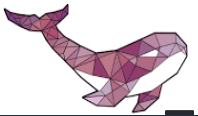
Approaching the Automation Journey

“The single biggest problem in communication is the illusion that it has taken place.”

George Bernard Shaw



Todays Tools for Enterprise Automation



Nagios®

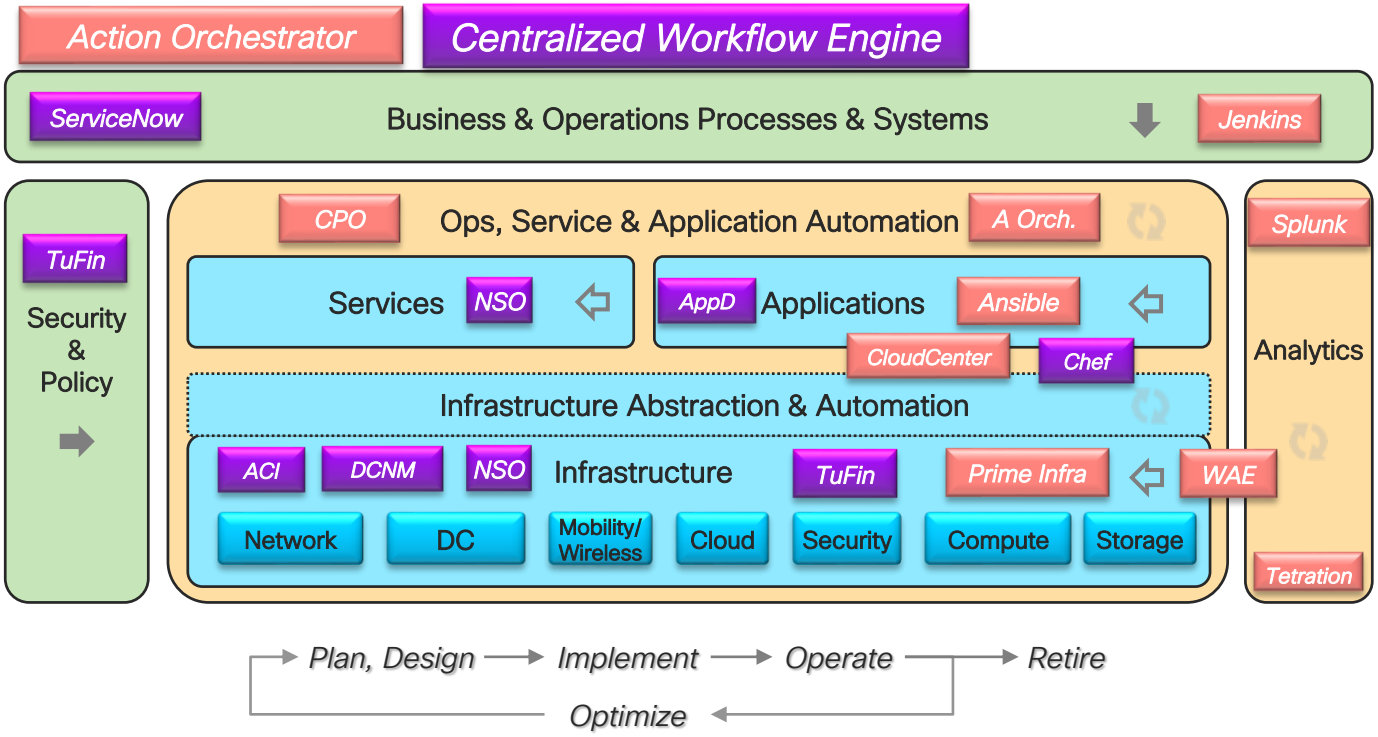
And MANY MORE.....

splunk>

CHEF

Mark Up Languages

Sample Automation Framework



Color key:

Orgs and systems with intent and requirements

Primary targets of automation and analytics

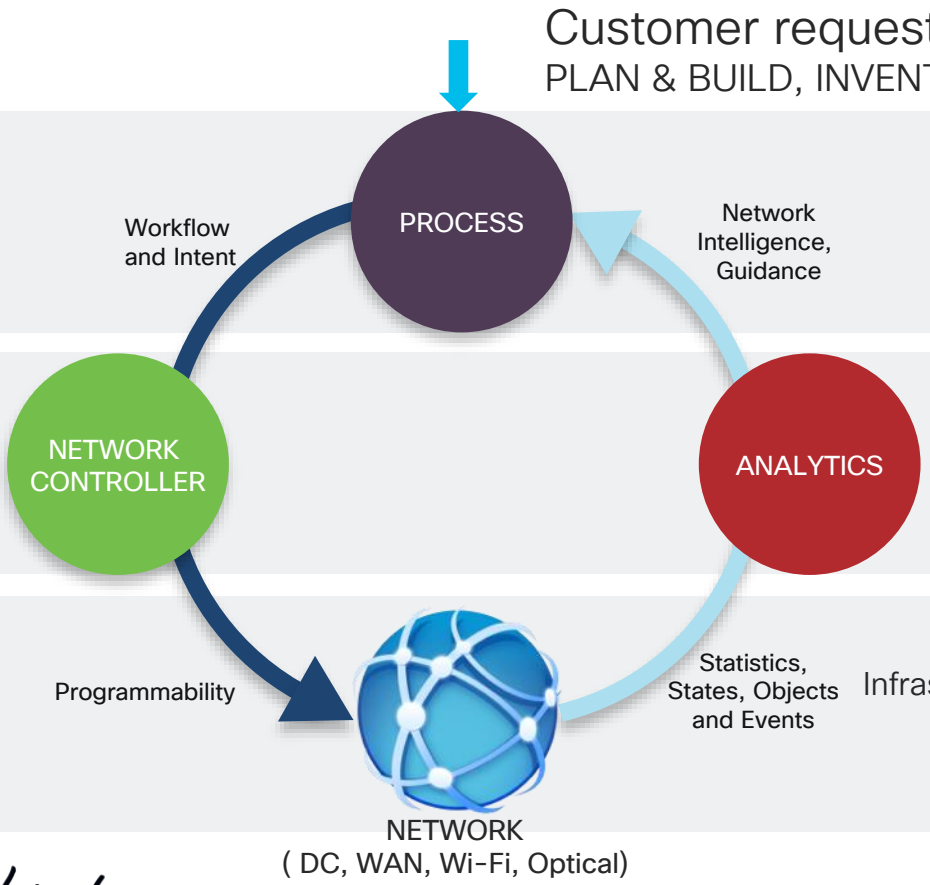
Software and services bring it all together

Lifecycle

Potential Tool

Customer Owns

Network Automation



Process Automation

Plan, Design,
Build, Test and Deploy

Execute and Monitor

Run time
(NSO, NFVI, ACI, Viptela/VMS)
Telemetry
Enforce intent

Target

Infrastructure (Server, Storage , Network)
Virtualization(VM's and VIM)
NFVI
Overlay, vNetworks

Cisco Automation Solution

Develop a robust, scalable and secure Automation & Orchestration solution

Open and Programmable with “Infrastructure as Code”	Co-Dev model with CI/CD Pipeline for rapid service creation	Automate processes and workflows with northbound integrations	Leverage in SecOps to deliver Managed Security Services	Multi-Domain **Cross-Domain** **Multi-Vendor**

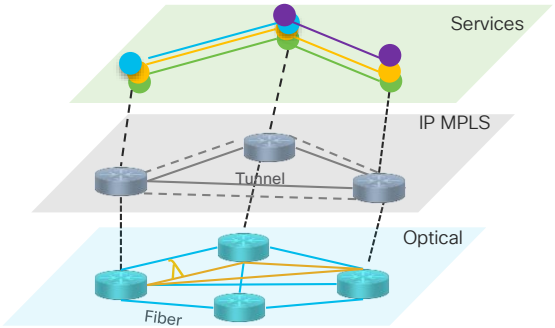
Foundation for Closed-Loop Automation to Simplify Operations

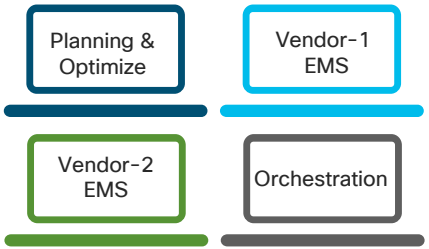
Some More Use Cases ...

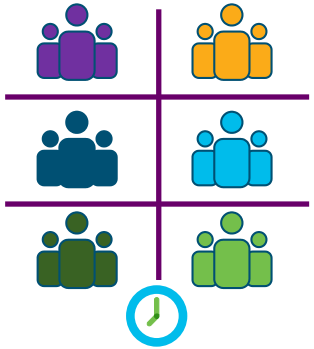
VISIBILITY	QUALITY	PRODUCTIVITY
Intelligent Network Visibility	SLA Management	Offload engineering from time consuming manual tasks.
	Capacity Forecasting	
Intelligent Planning and Decommissioning	Intent Based Provisioning, Optimization, Billing	Knowledge Base Re-use
Usage Monitoring	Fault Prediction	On Demand Capacity/BW Adjustment
Traffic Flow Classification	Problem Remediation	Change Automation

The Challenges of Network Operations at Scale

Network Complexity & Scale	Silo Management Stacks	Operations Islands

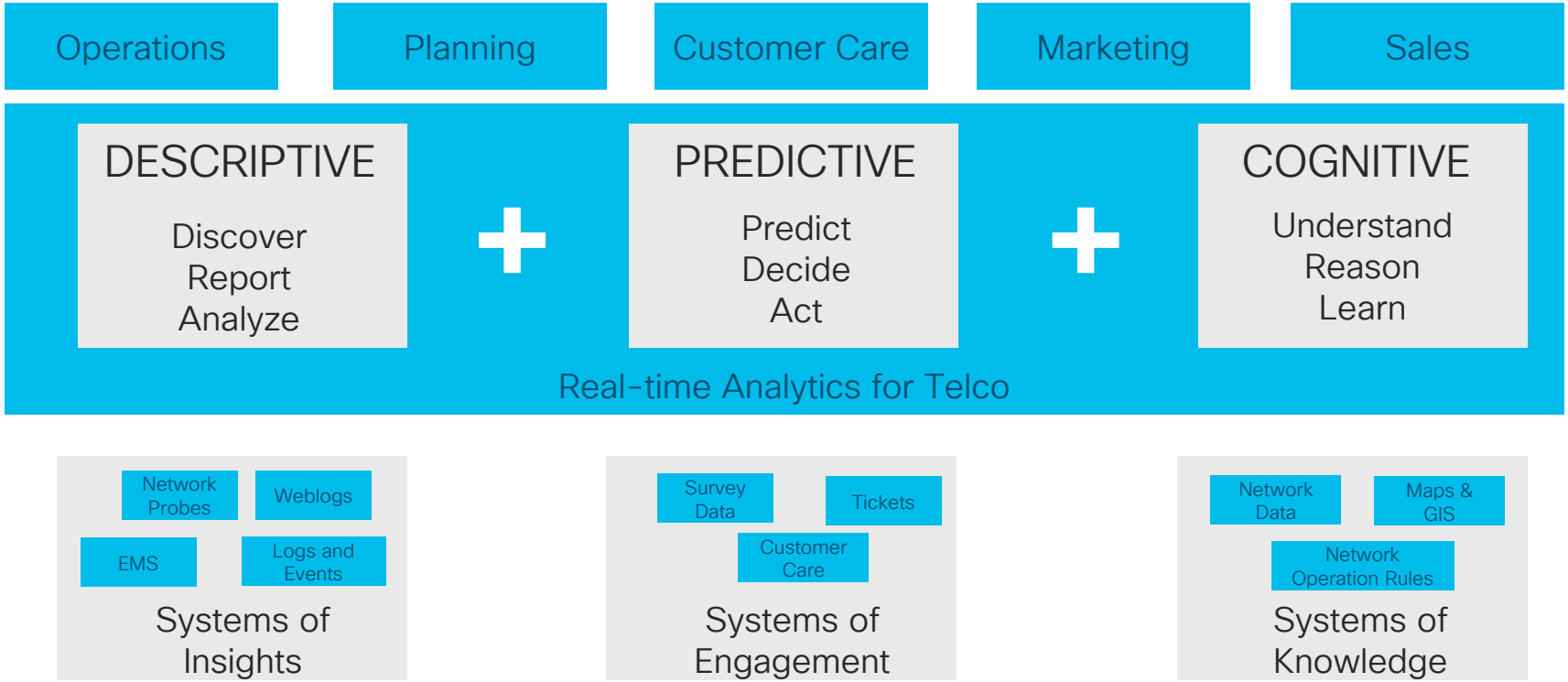






VISIBILITY	QUALITY	PRODUCTIVITY

Analytics as key enabler for success in Operations



Automation Implemented across the service lifecycle

Automation initiatives might prove to be pointless if we are only automating provisioning…

Analytics initiatives might prove pointless if the analytical insights cannot be translated into timely actions

We must automate Service Assurance:
Performance, **Capacity** and Fault Management

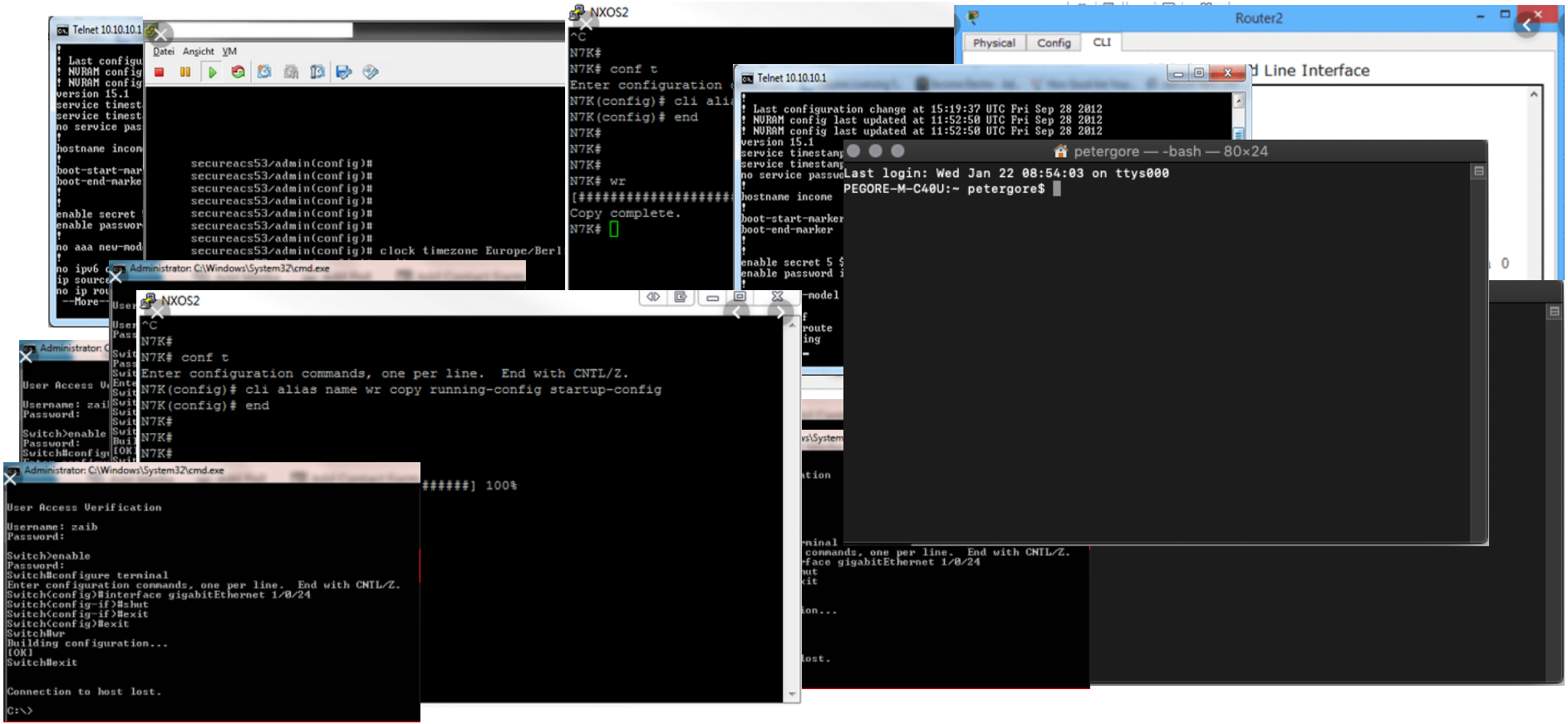
Service Assurance and Analytics

Service Assurance Platform

- Multi-domain, Multi-Vendor End-to-End View across Infrastructure and Applications Layers
- Machine Learning for Anomaly Detection, Correlation, and Forecasting
- Data Correlation Enabling Discovery of New Insights
- Pro-active Diagnosis & Remediation
- Agile & Flexible Dashboards
- Integrates with Automation Tools to Trigger Actions based on Analytics Insights

Examples of Automation

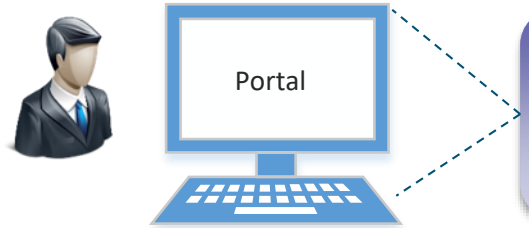
Configuration Management – Old Way



Phased Approach to Automation

- Phase 1:
  - Automate your Manual Activities– Pick your battles…
    - enables efficiency, accuracy, and cost savings
- Phase 2:
  - Group components to service models – Automate Operational Processes
    - Enables assurance and automated remediation, reporting, monitoring
- Phase 3:
  - Integration
    - enables coupling service models into the rest of the business work flow

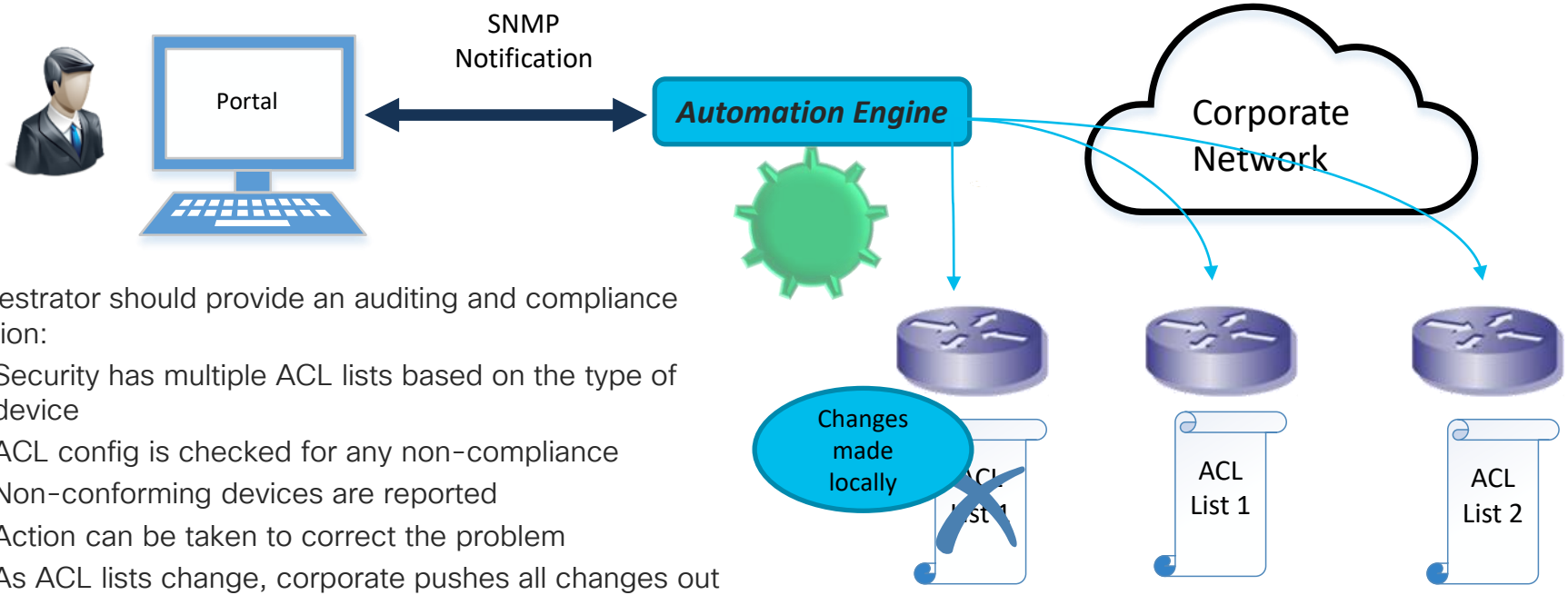
Config Management: “Password replacement”
(Cisco or 3rd party devices)



The service catalog allows a user to select the type of equipment going into a location and then configure services. The exact same services can be configured in other offices where different vendors won the bid.

ACL Management

Corporate security keeps a list of ACLs which must be current in all routers and firewalls at all times. Any remote changes must be detected and corrected

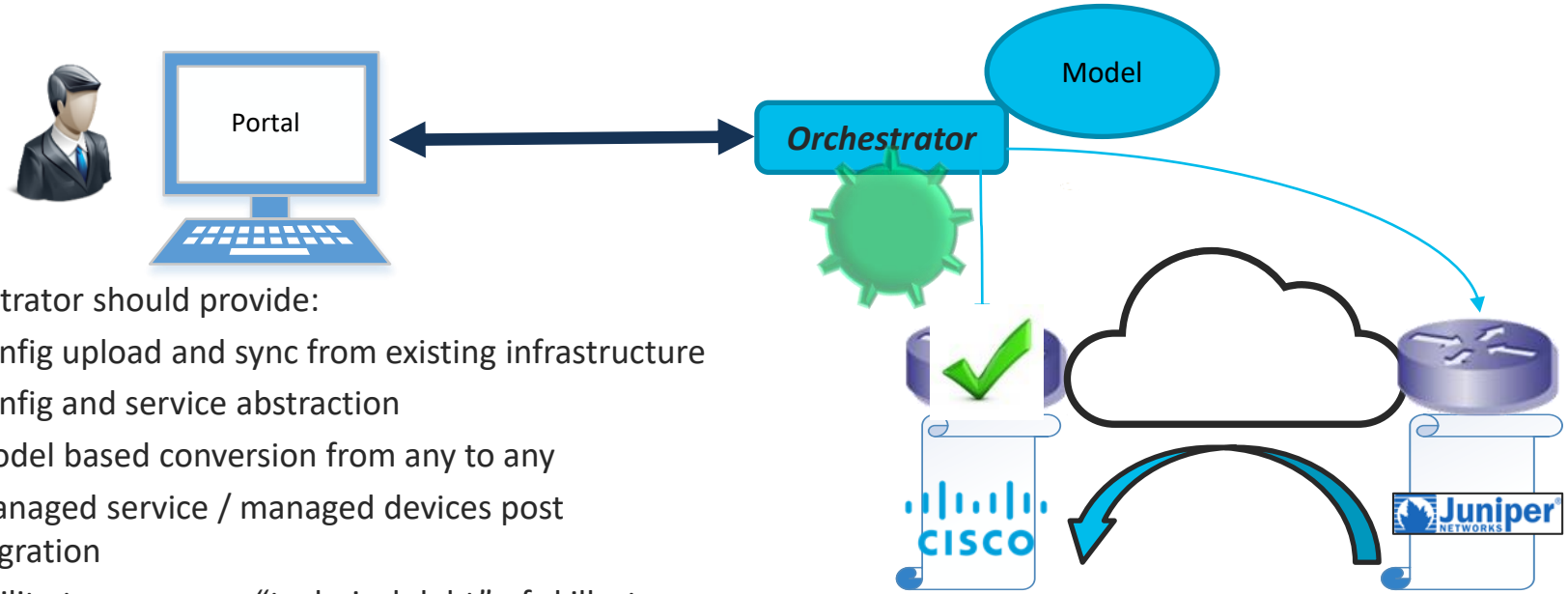


Orchestrator should provide an auditing and compliance function:

- Security has multiple ACL lists based on the type of device
- ACL config is checked for any non-compliance
- Non-conforming devices are reported
- Action can be taken to correct the problem
- As ACL lists change, corporate pushes all changes out to all lists automatically

Network Migration

An orchestrator speeds and simplifies configuration migration, whether from an older version of an existing device or a complete migration to a new vendor



Orchestrator should provide:

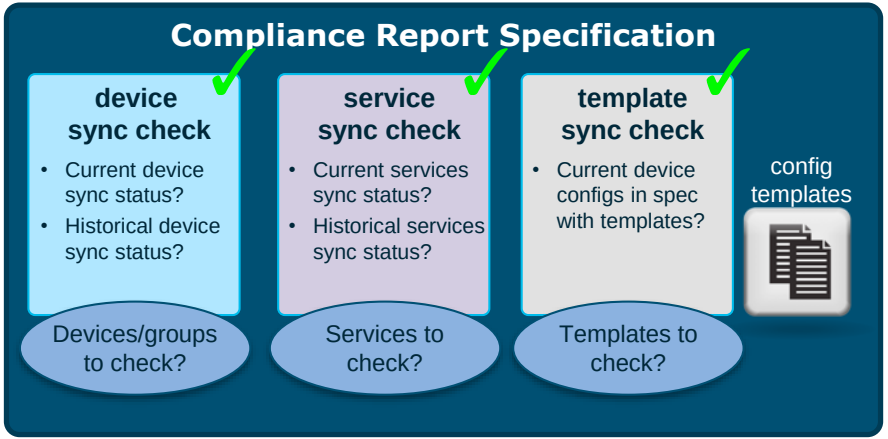
- Config upload and sync from existing infrastructure
- Config and service abstraction
- Model based conversion from any to any
- Managed service / managed devices post migration
- Ability to overcome “technical debt” of skillset curve going from one vendor to another

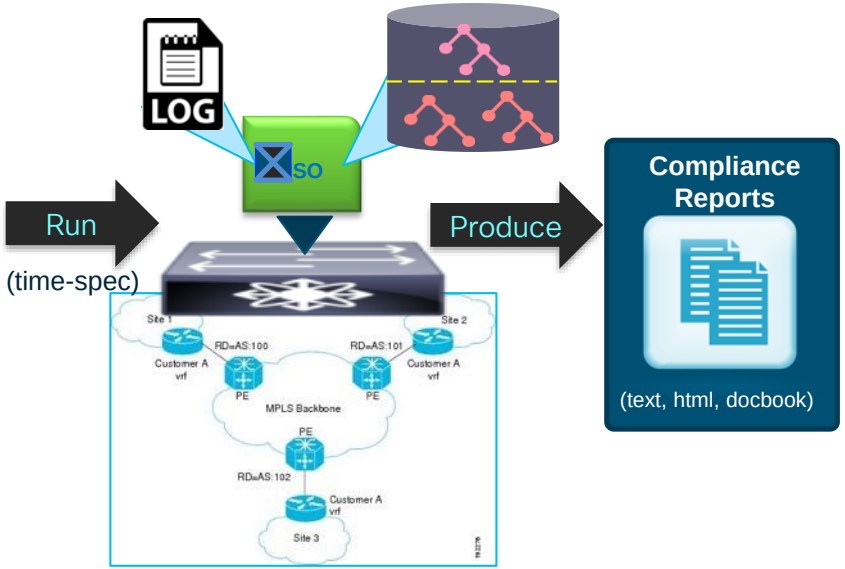
Compliance

Compliance Checks

Sweep for configurations and artifacts (ACLs, policies, etc.)

- The Orchestrators Compliance Reporting tool asks these questions…
  - Are requested devices in-sync or out-of-sync… (i.e. device state)
  - Are services deployed to the requested devices in-sync or out-of-sync… (i.e. service state)
  - Do the device-templates match the configuration on the requested devices… (i.e. config state)





Compliance Examples

HealthCare Provider

4
Hours

Automation

28
Change
Windows

Automation Decimation

Cisco's Contribution to Automation

Network Infrastructure


OpenStack


OPNFV


OpenDaylight

Fast Data Project (FD.io)


Contiv

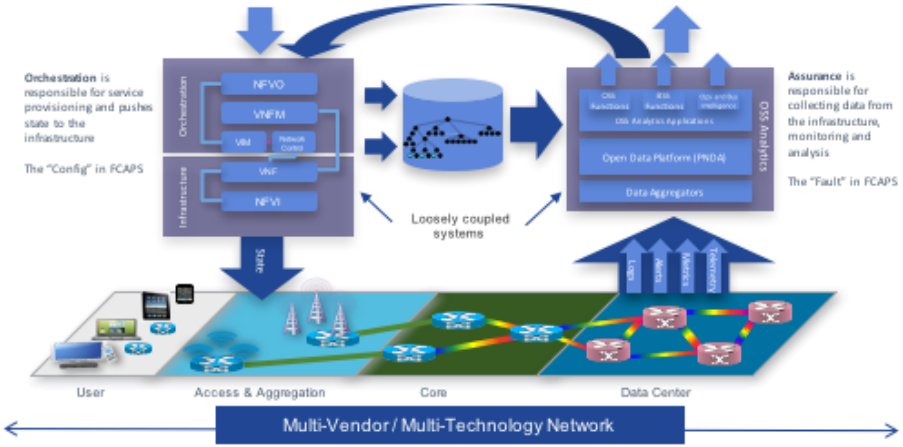
Generate and Analyze Traffic

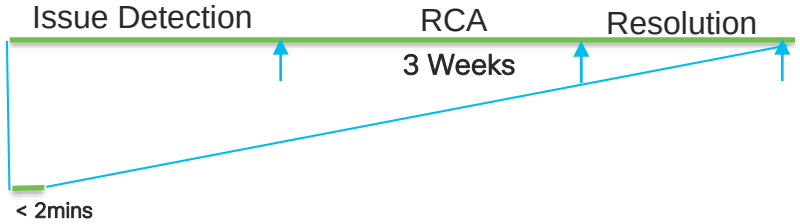

PNDA

- Open source contributions
  - Ansible modules for plug-ins
- Programmable architectures (ACI, CAT9K, N9K, etc)
- Container technology
- Sponsor more than a dozen open source organizations
- Serve on the boards of the Linux Foundation, Cloud Native Compute Foundation, Cloud Foundry, and OpenStack to name just a few.

Customer Case Study: Large US Operator

Self Healing Network: Closed Loop Assurance





Example Use Case

Proactive identification of IP Pool exhaustion

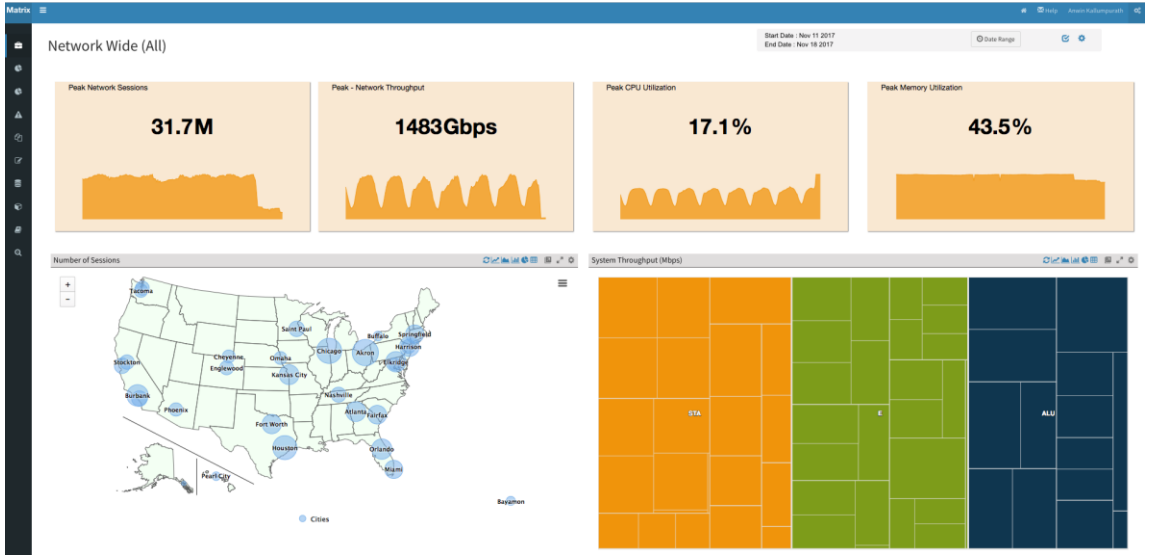
- 108 PGW, 183APN, 6 IP Pools per APN
- 12572 Metrics Monitored every 15 mins
- Issue detection and resolution in less than 2 mins
- Automated Root cause analysis and remediation done through NSO

2-3 Weeks
To
<2mins!

- Faster MTTR
- Improved Customer Satisfaction
- Lower Operational Expense

Customer Case Study: Large N. America Operator

Network Operations : Performance Management and Proactive Network Audits



Key Highlights

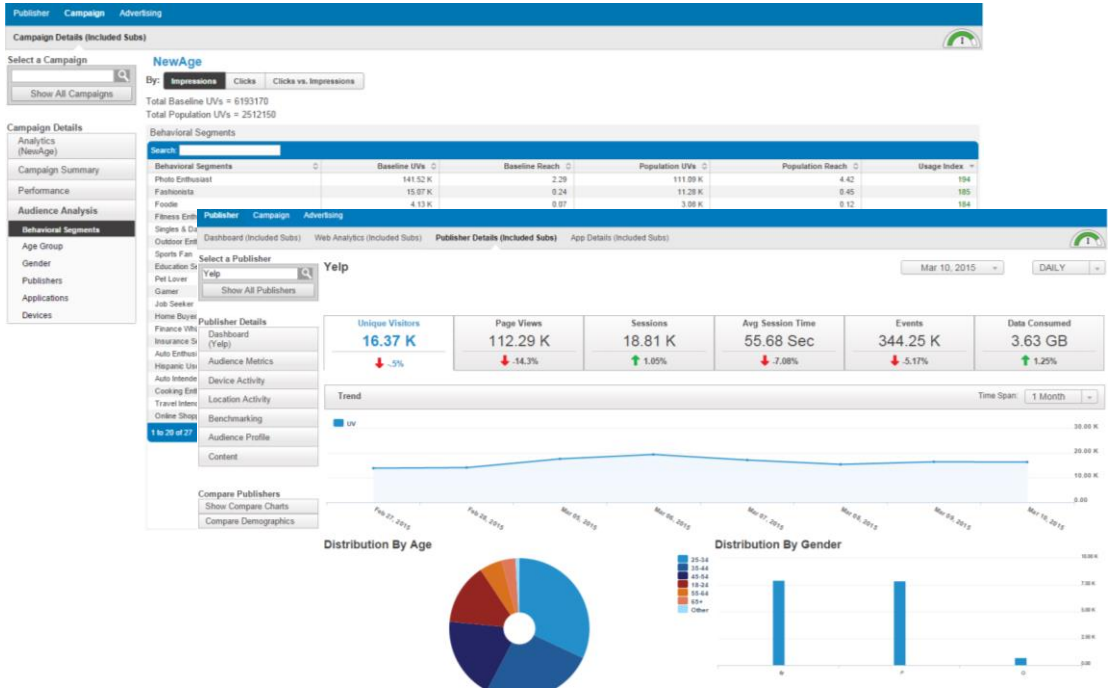
- Network Operations and Planning Dashboards
- Automated Network Configuration Audit and Change analysis
- Automated Audit of 70,000 KPI's
- Machine Learning based Anomaly detection and alerting

Benefits

- User specific dashboards for network operations, network planning and optimization team
- Over 80% improvement in the time taken for network audits

Customer Case Study: North American Operator

Customer Experience: Data Monetization



Key Highlights

- Profiling and segmentation subscribers based on usage patterns
- Deeper insights of demographic profile of users to contents consumed for targeted advertisement and campaign insights.

Benefits

- New monetization use cases for adding new revenue streams

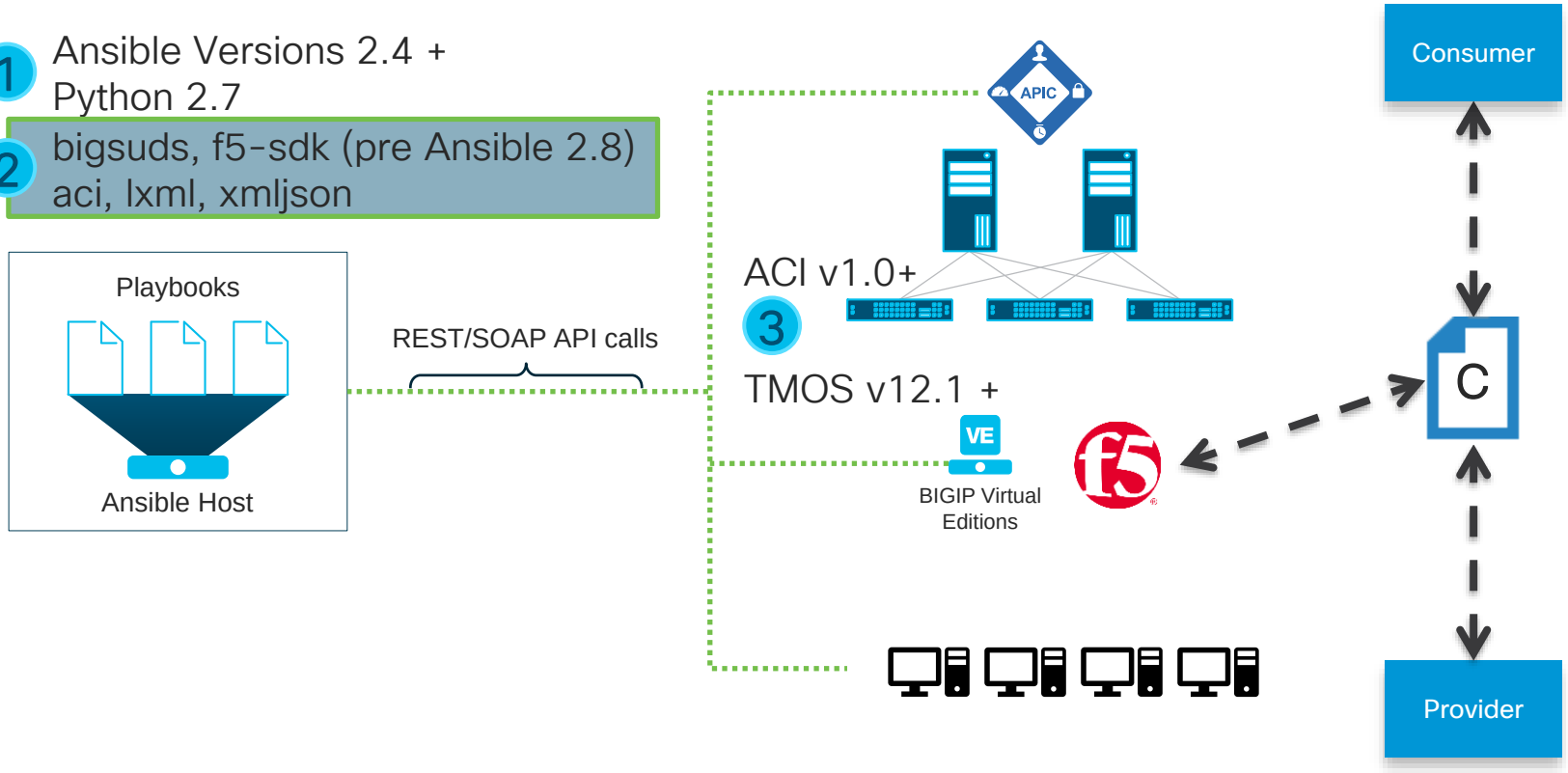
Infrastructure Automation Demo

Infrastructure Automation - Use-Case

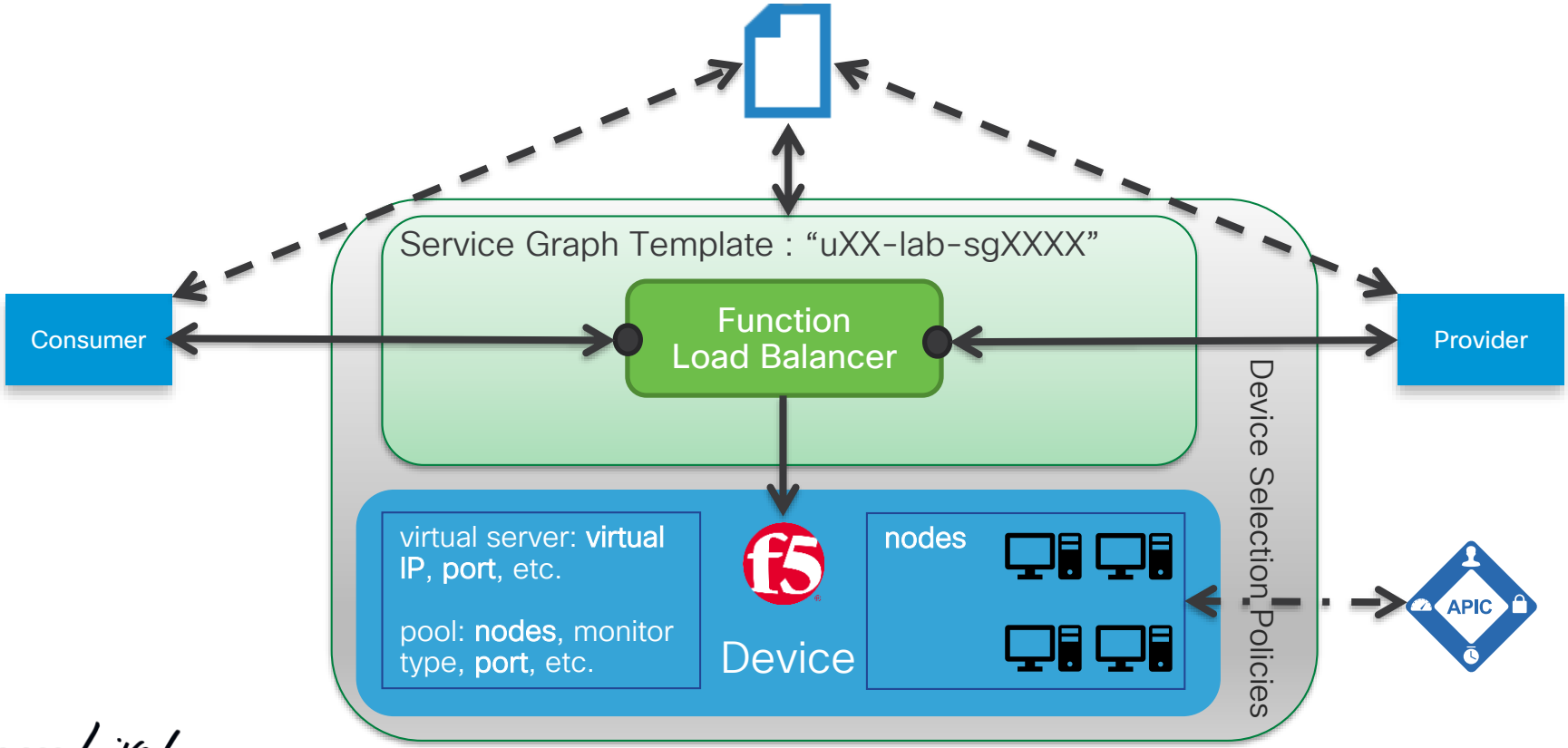
- Configuring Service Insertion and Load Balancer VIP
  - Adding existing Web servers to with a load balancer virtual IP
    - Create network service insertion, LB VIP configuration
- Automate application deployment
  - Multi-tier application for Development
    - LB VIP, Web front-end, Middle-tier, DB
- Application scale-up / scale-down
  - Support seasonal application load
    - Server build, LB VIP update, etc.

Infrastructure Automation Demo Setup

1. Ansible Versions 2.4 + Python 2.7
2. bigsuds, f5-sdk (pre Ansible 2.8) aci, lxml, xmljson



Ansible Playbooks



Live Demo...
Infrastructure Automation

Demo GitHub Repository

https://github.com/jeye/BRKDCN-1789

Automated DevOps Deployment Use-Case and Demo

cisco Live!

Daily task for a Developer

- Standup meetings
- Coding – product, unit test, other test code, etc.
  - asking for advice, giving advice, etc.
- Updating code with changes – branch, commit, pull request, code review, deploy and merge
- Building and deploy the new code
- Debugging, etc.

Reference: https://guides.github.com/introduction/flow/

Why we use automation during product development?

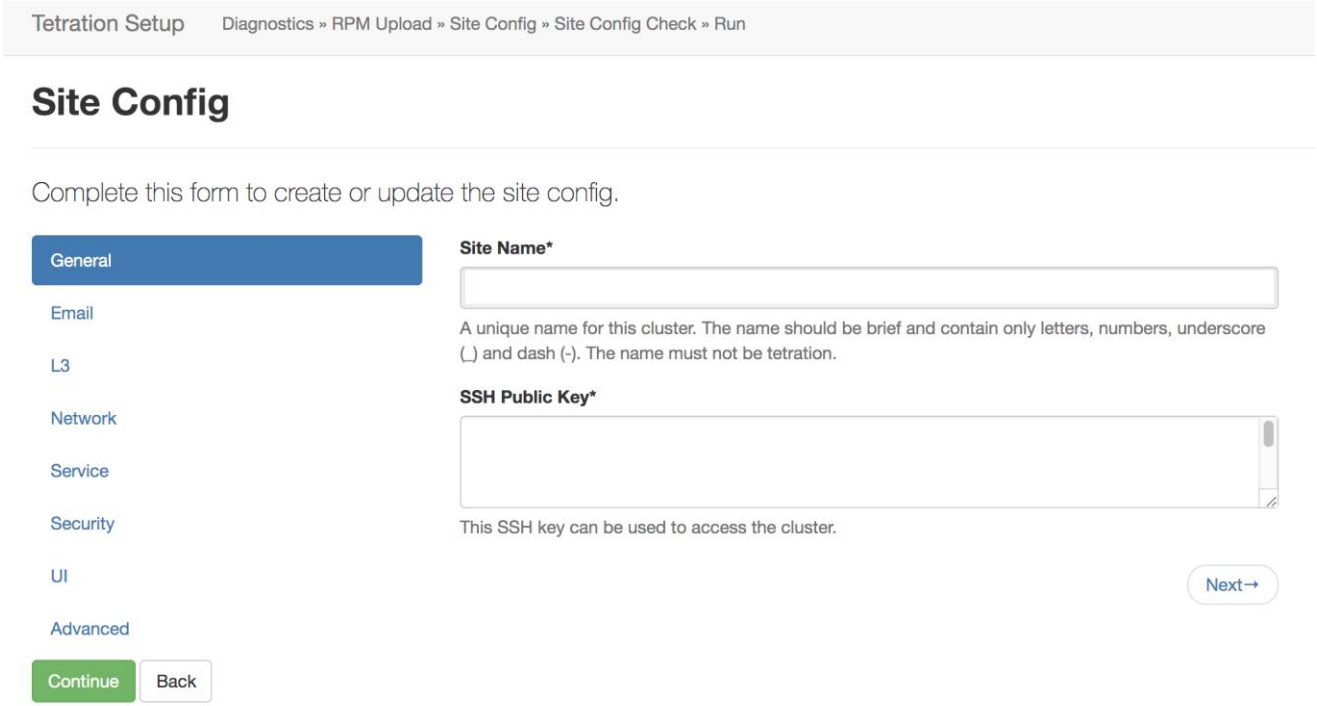
- Agile code development
  - Source code commit, merge, etc.
- Compile and build binaries
- Quality Assurance and test cases against the code and build
  - Unit tests
  - Integration tests
  - Acceptance tests
  - and more tests

Reference: https://www.agilealliance.org/agile101/

Demo – Deploying Cisco Tetration using automation

- Part of the Cisco security product portfolio
- Backend built with components of Hadoop
- 52 VMs for the minimum deployment
- 106 VMs for large deployment
- Opensource automation is used to perform software deployment, upgrade, patches, etc.
- Other infrastructure and configuration parameters are entered in the setup UI

Cisco Tetration Deployment Initial Setup Parameters



- Multiple installation files per installation
- 20+ parameters to setup Tetration cluster the first time
- Deployment run time 1-2 hours

Live Demo...
Development software deployment

CI/CD Pipeline 101

- CI – Continuous Integration
  - Building the software code
  - Running the unit tests against the newly build
- CD – Continuous Delivery
  - Running acceptance tests
  - Deploy new build to staging
  - Running sanity tests
- A **CI/CD** pipeline usually consists of the following discrete steps: commit, build, automate tests and deploy

Reference: https://www.atlassian.com/continuous-delivery/principles/continuous-integration-vs-delivery-vs-deployment

How we use CI/CD in development?

- Build the binaries
  - Java, GoLang, C++, etc.
- Automated test cases execution
  - unit test, regression test, etc.
- Deploy nightly builds, alpha builds, beta builds, etc.
- Automated sanity test cases execution
  - end-to-end testing, scale testing, etc.

Conclusion

Key Walk-Away Points

- Understanding the Business requirement
- Automation, Service Assurance and Analytics are key pillars of Next Gen Operations Environment
- Model-driven orchestration, within and across domains, is essential for service lifecycle integrity
- Appropriate logic placement across OSS, Workflow Automation, and Orchestration is key
- Clean and timely data is critical to drive actionable insights
- Adapt the organization to a DevOps methodology

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