



Infrastructure as Code for Network Operations:

An Executive's guide for achieving 100% change success

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ITLGEN-1513

You can achieve!

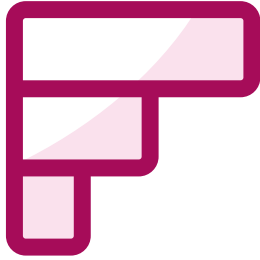
98+%

Change success rate

5x

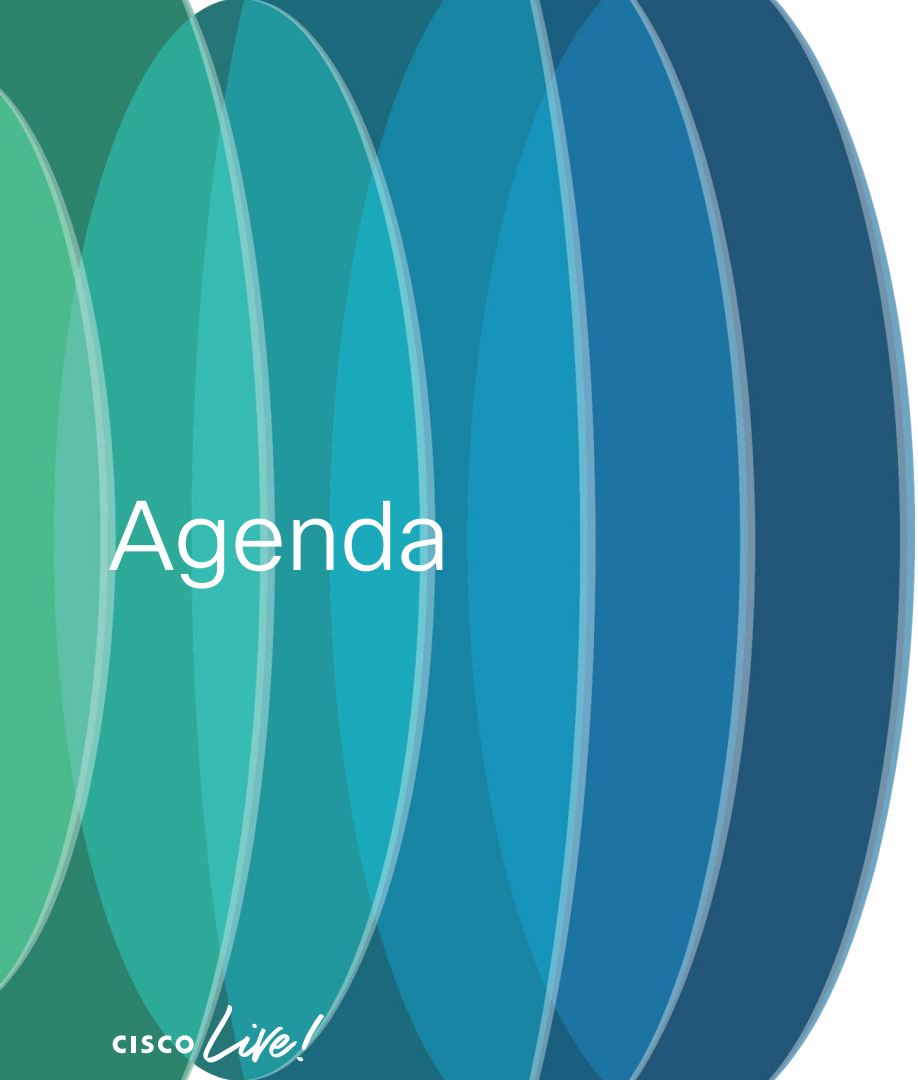
Faster change implementation





If you could have 100% change
success at 5x the speed, how many
more changes would you make in a
year?

① Start presenting to display the poll results on this slide.



Agenda

“Meet you where you are”

Diagnosis of change failure

The solution

Questions

Did you purchase a fully-formed, operational network
from a **single vendor**?

Did you purchase a fully-formed, operational network from a **single vendor**?

Will your **buying choices change** in the next few years?

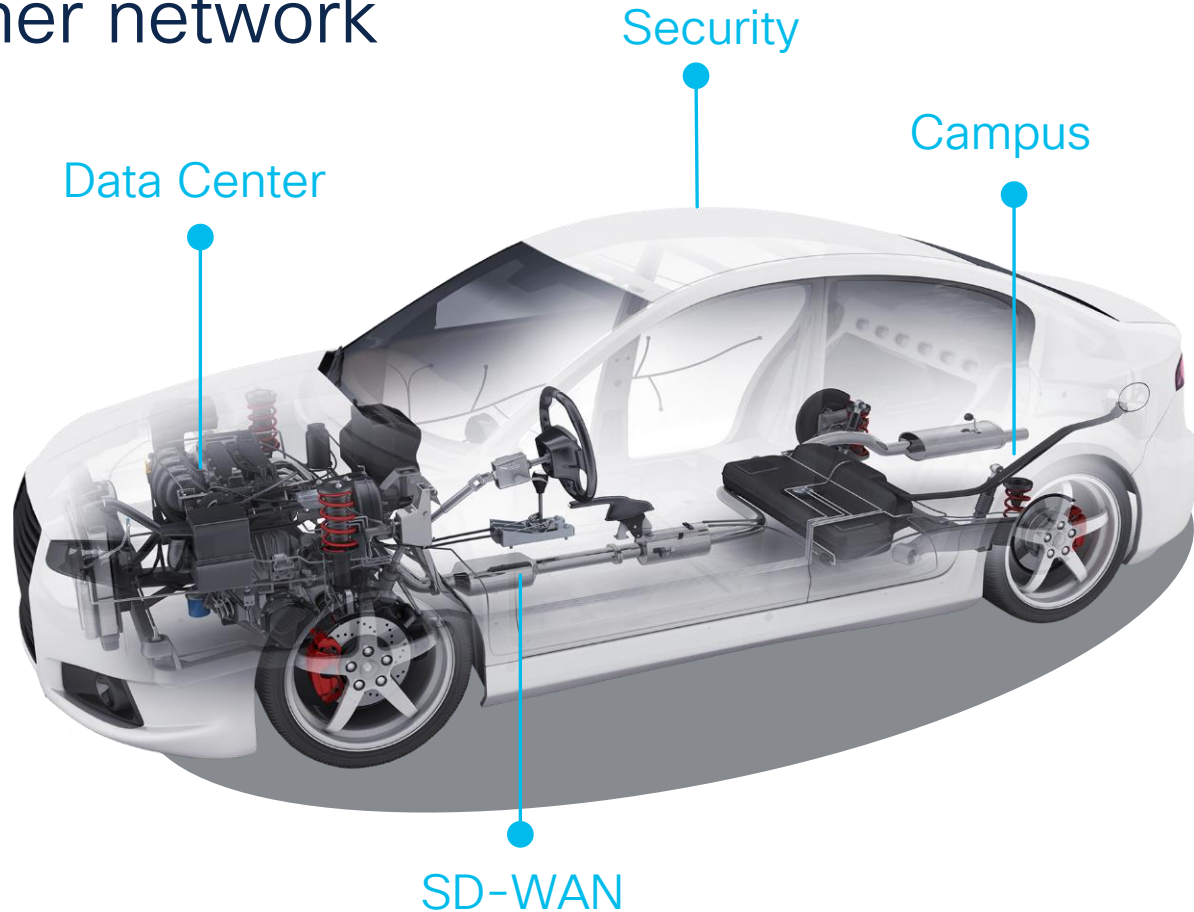


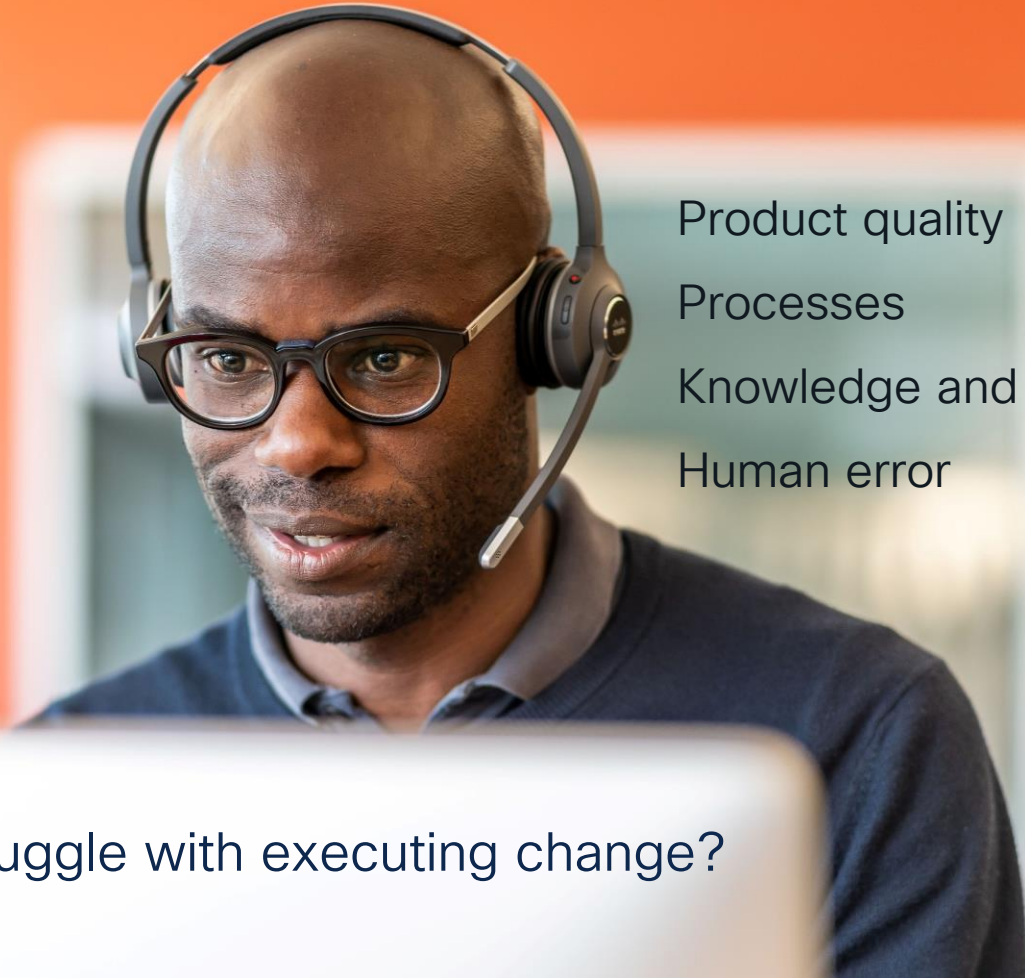
Who owns building and servicing the network for your business?

Who builds and services your car?



Customer network





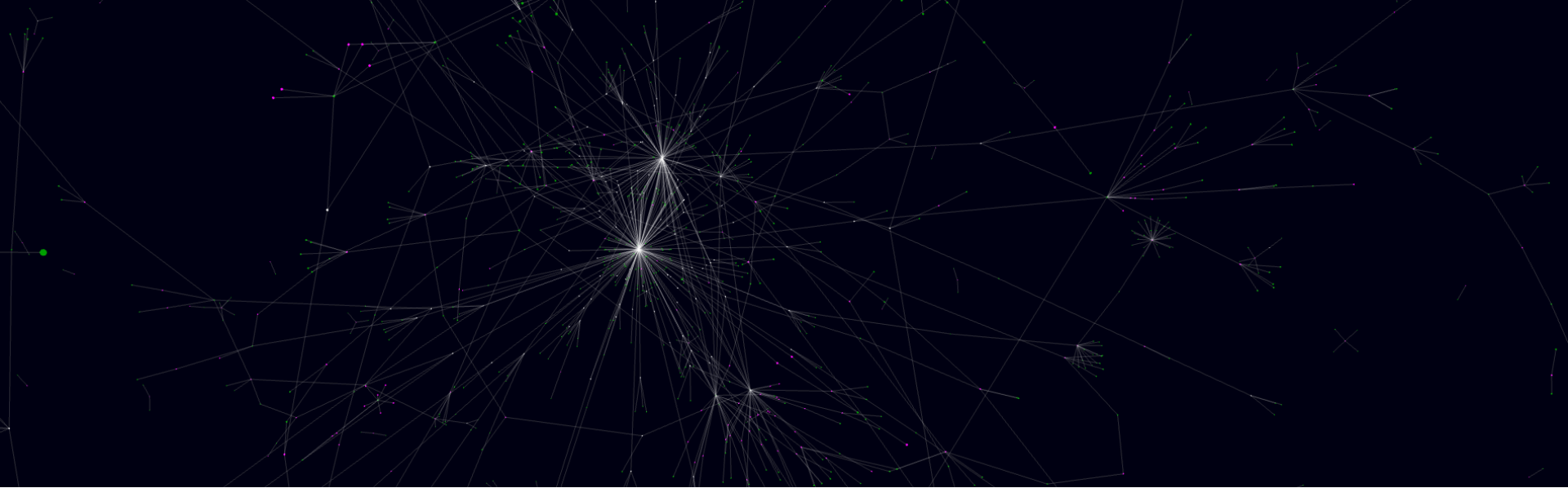
Product quality

Processes

Knowledge and experience

Human error

So why do we struggle with executing change?



Three factors of a failed change

1 Knowledge of current state

Configuration and expected behavior

```
dev@dev: /var/log
dev@dev:~$ sudo tail -f /var/log/dmesg
[ 15.073663] IPv6: ADDRCONF(NETDEV_UP): eth0: link is not ready
[ 15.074775] iwlmwifi 0000:02:00.0: L1 Enabled; Disabling L0S
[ 15.082320] iwlmwifi 0000:02:00.0: Radio type=0x2-0x0-0x0
[ 15.258959] type=1400 audit(1370089688.827:11): apparmor="STATUS" operation="profile_replace" name="/sbin/dhclient" pid=1187 comm="apparmor_parser"
[ 15.259329] type=1400 audit(1370089688.827:11): apparmor="STATUS" operation="profile_load" name="/usr/lib/lightdm/lightdm/lightdm-guest-session-wrapper" pid=1184 comm="apparmor_parser"
[ 15.346289] iwlmwifi 0000:02:00.0: L1 Enabled; Disabling L0S
[ 15.353864] iwlmwifi 0000:02:00.0: Radio type=0x2-0x0-0x0
[ 15.389973] init: isc-dhcp-server pre-start process (1259) terminated with status 127
[ 15.434935] IPv6: ADDRCONF(NETDEV_UP): wlan0: link is not ready
[ 15.436188] IPv6: ADDRCONF(NETDEV_UP): wlan0: link is not ready

dev@dev: /etc/wpa_supplicant
# On Debian GNU/Linux systems, the text of the GPL license,
# version 2, can be found in /usr/share/common-licenses/GPL-2.

if [ -n "$IF_WPA_MAINT_DEBUG" ]; then
    set -x
fi

# quit if we're called for the loopback
if [ "$IFACE" = lo ]; then
    exit 0
fi

# allow wpa supplicant interface to be specified via wpa-iface
# useful for starting wpa supplicant on one interface of a bridge
if [ -n "$IF_WPA_IFACE" ]; then
    WPA_IFACE="$IF_WPA_IFACE"
fi

44,1 17%
```

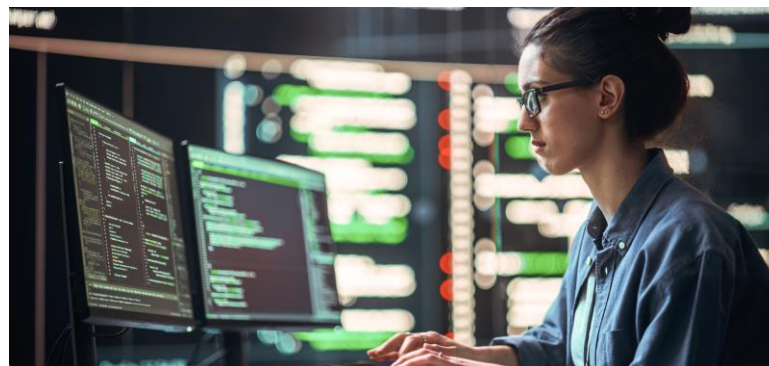
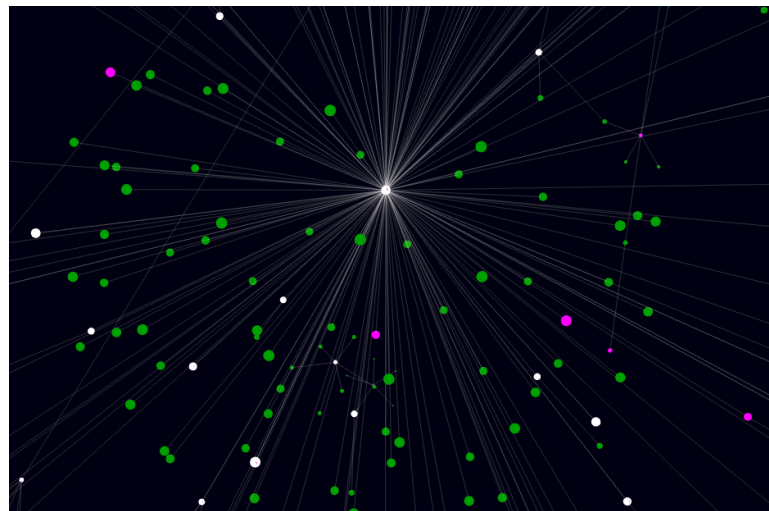
```
dev@dev:~$ sudo tail -f /var/log/dmesg
64 bytes from lga15s28-in-f0.1e100.net (74.125.226.192): icmp_req=181 t
tl=252 time=15.8 ms
64 bytes from lga15s28-in-f0.1e100.net (74.125.226.192): icmp_req=182 t
tl=252 time=14.5 ms
64 bytes from lga15s28-in-f0.1e100.net (74.125.226.192): icmp_req=183 t
tl=252 time=16.4 ms
64 bytes from lga15s28-in-f0.1e100.net (74.125.226.192): icmp_req=184 t
tl=252 time=23.1 ms
64 bytes from lga15s28-in-f0.1e100.net (74.125.226.192): icmp_req=185 t
tl=252 time=12.3 ms

dev@dev: /etc
gnome-settings-daemon pam.conf vtrgb
gnome-vfs-2.0 pam.d wgetrc
gconf papersize wildmidi
group passwd wireshark
group-passwd wdm.conf
grub.d pcmcia wpa_supplicant
gshadow perl x11
gshadow pkcs11 xdg
gtk-2.0 pm xml
gtk-3.0 pnm2ppa.conf xul-ext
guvcv polkit-1 zsh_command_not_found

dev@dev: /etc$

dev@dev: /var/log
auth.log.4.gz kern.log.3.gz unattended-upgrades
boot kern.log.4.gz upstart
boot.log lastlog vbox-install.log
bootstrap.log lightdm vmware-installer
btmpt mail.err vnetlib
btmpt.1 mail.log wtmp
ConsoleKit netserver.debug_15620 wtmp.1
cups netserver.debug_15633 Xorg.0.log
dist-upgrade news Xorg.0.log.old
dmesg pa-powersave.log
dmesg.0 pa-powersave.log.1

dev@dev: /var/log$
```





Three factors of a failed change

2 First of its kind



CISCO *Live!*

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Three factors of a failed change

3 Workflow

Manual orchestration of tasks

FinTech - Cisco CHANGE TEMPLATE v.192.168.0.1

SHORT DESCRIPTION (Summary):

This change fulfills SR SCTASKXXXXXXXXX || RITMXXXXXXXX || RITMXXXXXXXX to create IPG and update the existing Interface Profiles 1_INTP & 2_INTP.

SCHEDULE:

Start Date and Time (UTC): (2024/04/23 18:00:00)

End Date and Time (UTC): (2024/04/23 22:00:00)

DESCRIPTION:

The secret is out!



Software developers have been using **Infrastructure as Code** for years.

Why are network teams still applying change manually via command line?



Cisco has built decades of service expertise into **intelligent data models and pipelines** to apply software management principles to the **network infrastructure** space

Achieving change success requires more than DevOps tools and technology

DevOps toolchain



Infrastructure as Code



Business process
and analytics



Services as Code

Operating models, automation, observability, and integration with
your business processes

Achieving change success requires more than DevOps tools and technology

DevOps toolchain



Workflow

Infrastructure as Code



State
First of its kind

Business process
and analytics



State
Workflow

Services as Code

Operating models, automation, observability, and integration with
your business processes

Data models for your configuration



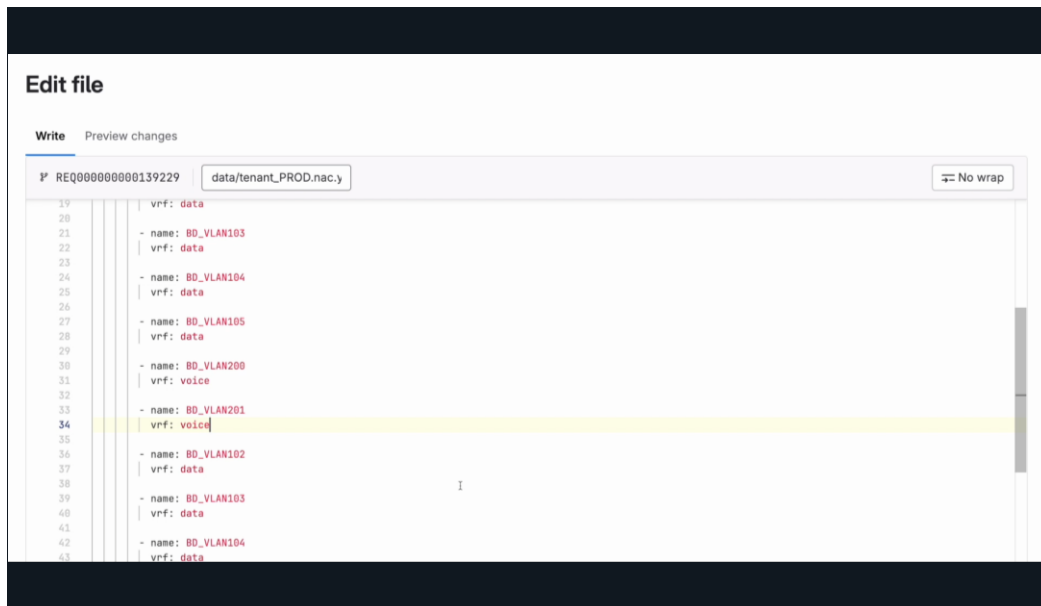
Human readable **intent-based** configuration



Central **single-source of truth** for configuration



Performs pre-change validation checks to **prevent human error** and **enforce compliance** with business rules and best practices.



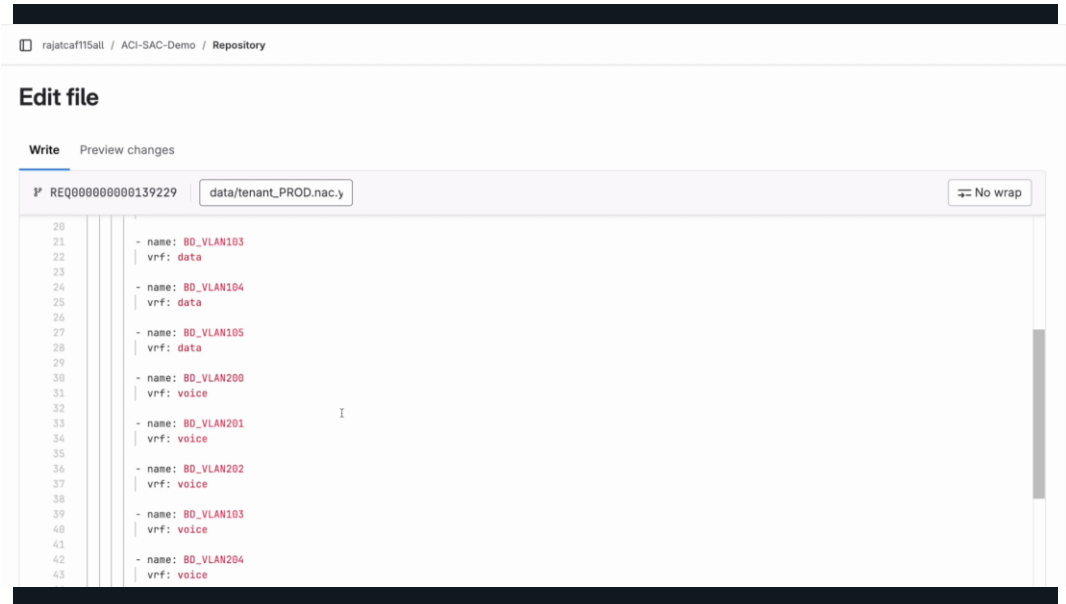
Request configuration changes just like you manage source code



Develop configuration changes on a branch, and issue a **merge request** to start deployment



Leverages **version control** and **human review** for tracking network config just like source code



Intelligent pipeline protects engineers from making service disrupting changes



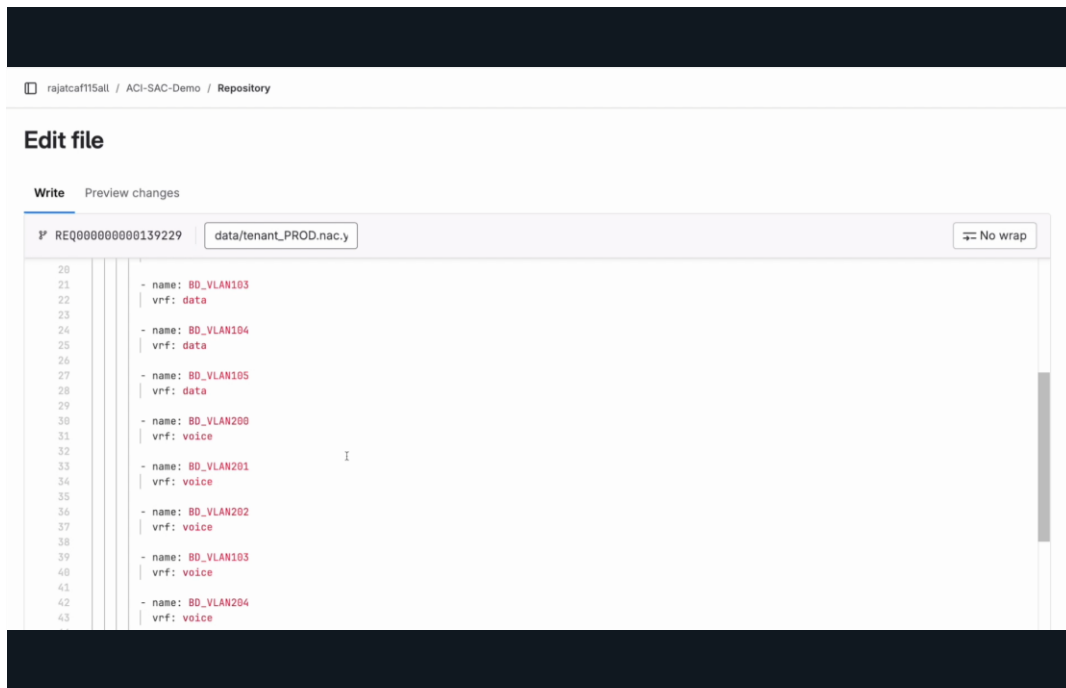
Automated deployment
execution



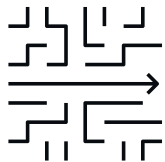
Integrated **post-change
validation** verifies
configuration integrity



Direct **service validation**
integration with
ThousandEyes to ensure
change has not disrupted
your critical business
services



Helps reduce the pressure put on your team



Stop expecting people to behave as consistently as software does!

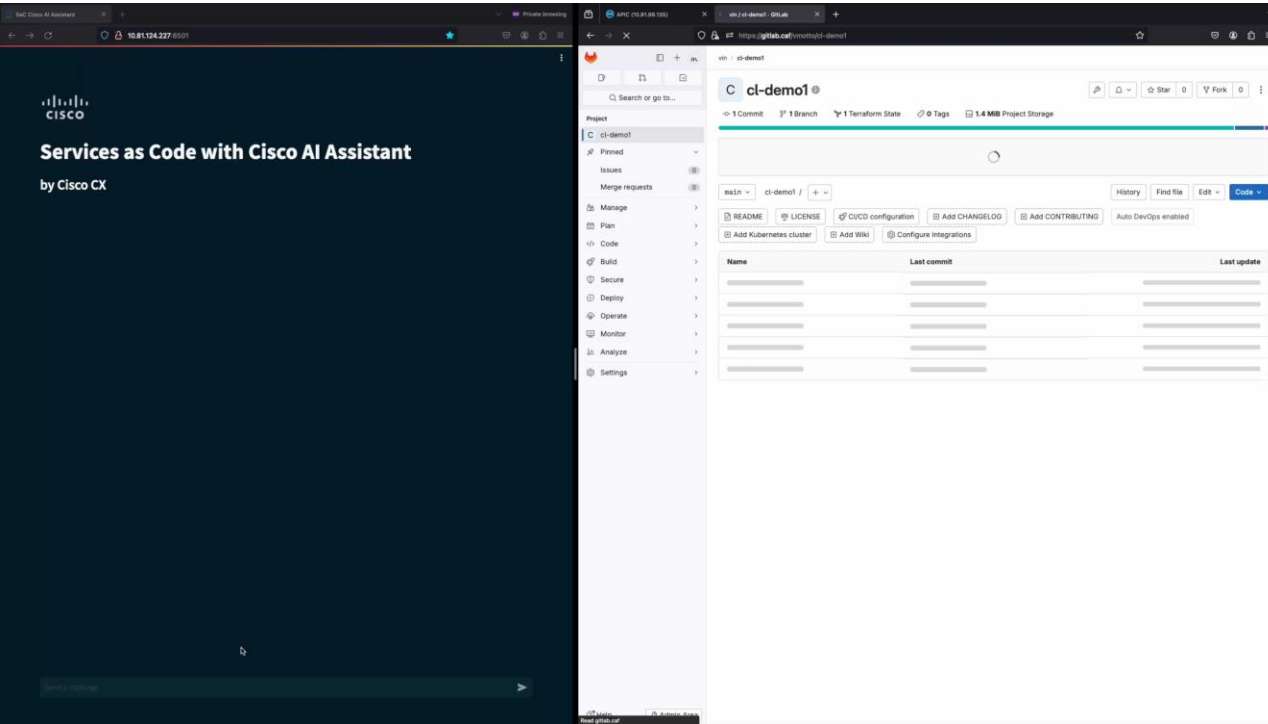
Transformational shift in your team's way of working. But they don't need to learn how to write code.

Implementation is as **easy as editing a text file** that describes your intent

Configuration commands, validations, and **health checks are built-in** to reduce post-implementation surprises

```
apic:
  node_policies:
    nodes:
      - id: 101
        pod: 1
        role: leaf
        serial_number: SN-1-101
        name: leaf-101
        oob_address: 10.51.77.94/24
        oob_gateway: 10.51.77.254
        update_group: MG1
        fabric_policy-group: all-leafs
        access_policy-group: all-leafs
      - id: 3101
        pod: 1
        role: leaf
        type: remote-leaf-wan
        serial_number: ABC1234568
        name: RLEAF3101
  tenants:
    - name: Marketing
```

Cisco's AI Assistant helps you understand state



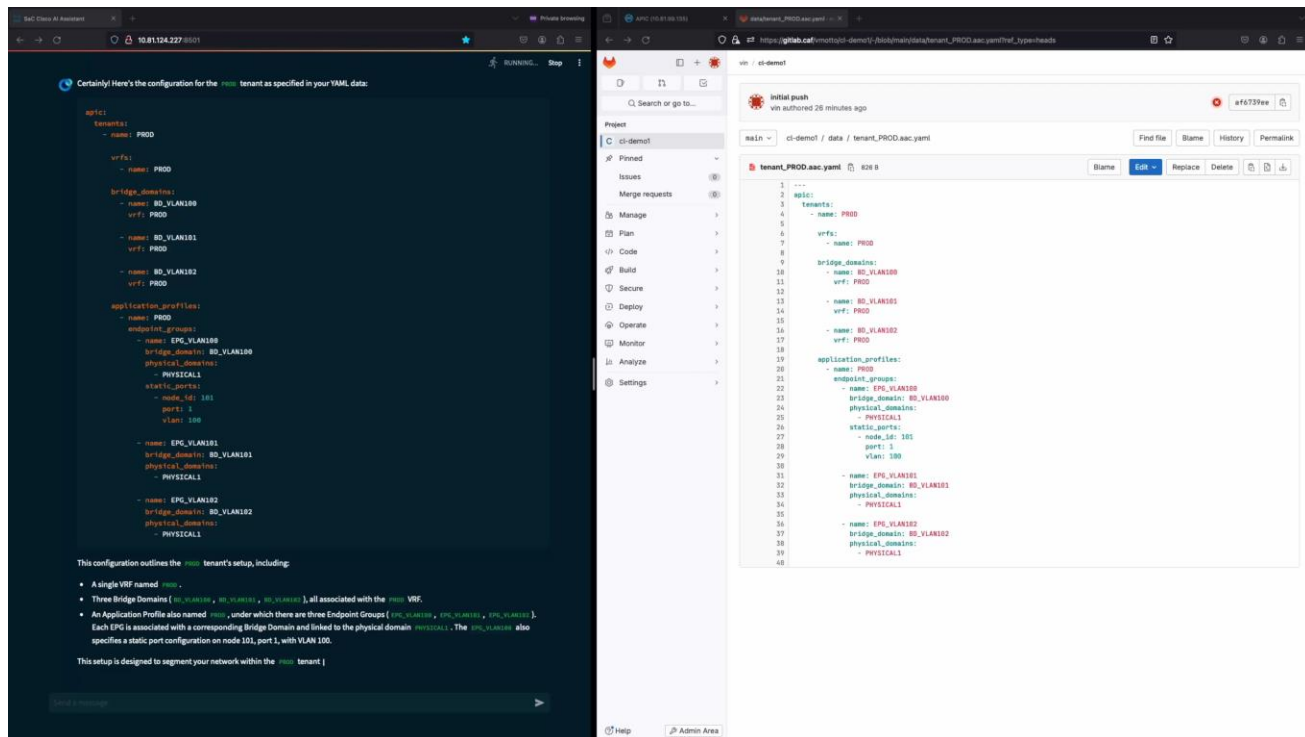
An intelligent assistant **understands your configuration** and can analyze and respond to your engineers.

So, you can ask it questions about the configuration even if you don't understand the configuration syntax.

Cisco's AI Assistant helps you configure

The assistant can also generate the configuration based on the intent for your desired change.

Do your engineers dislike filling out change requests? It will also generate the merge request for human change review and approval.



Cisco's AI Assistant helps you troubleshoot

The screenshot displays the Cisco AI Assistant interface. On the left, a dark-themed editor shows a configuration file with sections for ports, VLANs, and static ports. Below the editor, a text prompt asks the user to write a brief and concise merge request description for the changes. On the right, a light-themed 'New merge request' form is visible. The form includes fields for 'Title (required)' (containing 'added static port bindings in PROD tenant'), 'Description' (with a rich text editor), 'Assignee' (set to 'Unassigned'), 'Reviewer' (set to 'Unassigned'), 'Milestone' (set to 'Select milestone'), and 'Labels' (set to 'Select label'). The 'Merge options' section shows 'Delete source branch when merge request is accepted' checked. At the bottom, a commit history shows a recent commit titled 'added static port bindings in PROD tenant' by user 'f202fs18'.

If there is an issue during deployment, the Assistant will even **assess the error** and **provide recommendations** and possible remediations to correct the issue.



100%

successful change windows, 5x faster

100%

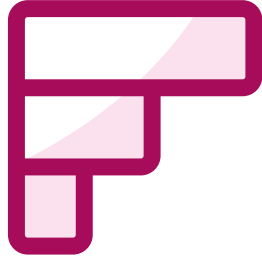
automated and repeatable

40%

time saving during Implementations

90%

time savings for operations

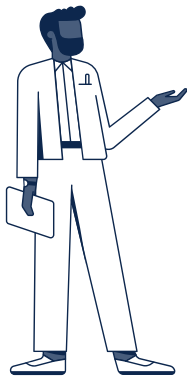


When do you think your teams will be ready to integrate Services as Code?

① Start presenting to display the poll results on this slide.

Continue your journey

For everyone



See [live demos](#) in the CX Booth at the World of Solutions

For your engineers



Get [hands on experience](#) at our walk-in lab for SD-WAN as Code



Check out other [technical sessions](#) for Infrastructure as Code

Technical sessions



Presentations

BRKDCN-2673



Kick-start your automation with ACI as Code

BRKDCN-2606



Intro to Infrastructure as Code for ACI using Ansible

BRKDCN-2607



Intro to Infrastructure as Code for ACI using Terraform

BRKDCN-2946



Infrastructure as Code for NXOS and NDFC with Ansible

DEVWKS-1098



Infrastructure as Code for NXOS with Terraform

DEVNET-1016



Infrastructure as Code for SD-WAN



Scheduled Labs

LABDEV-2376



ACI and Firepower with Network as Code

LTRDCN-2459



ACI and FMC with Network as Code