A Real-World Approach to Intent-based Networking and Service Orchestration

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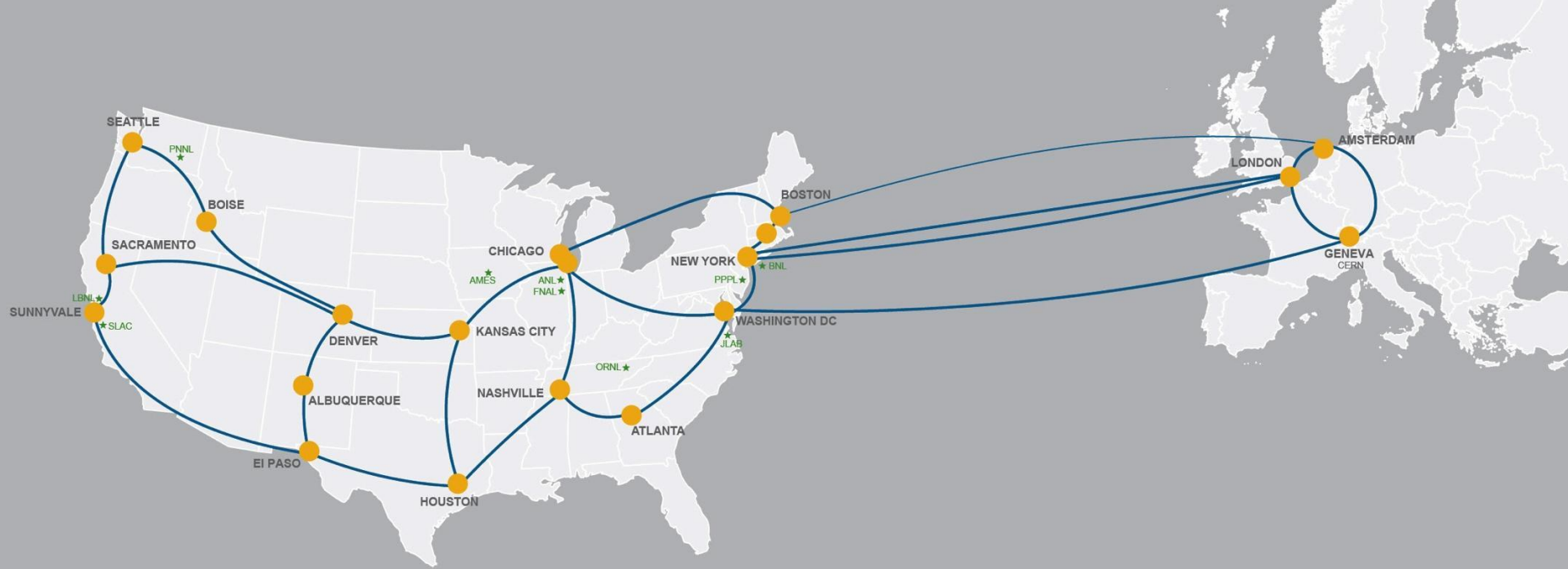Network Automation Software Engineer

Energy Sciences Network (ESnet)
Lawrence Berkeley National Laboratory
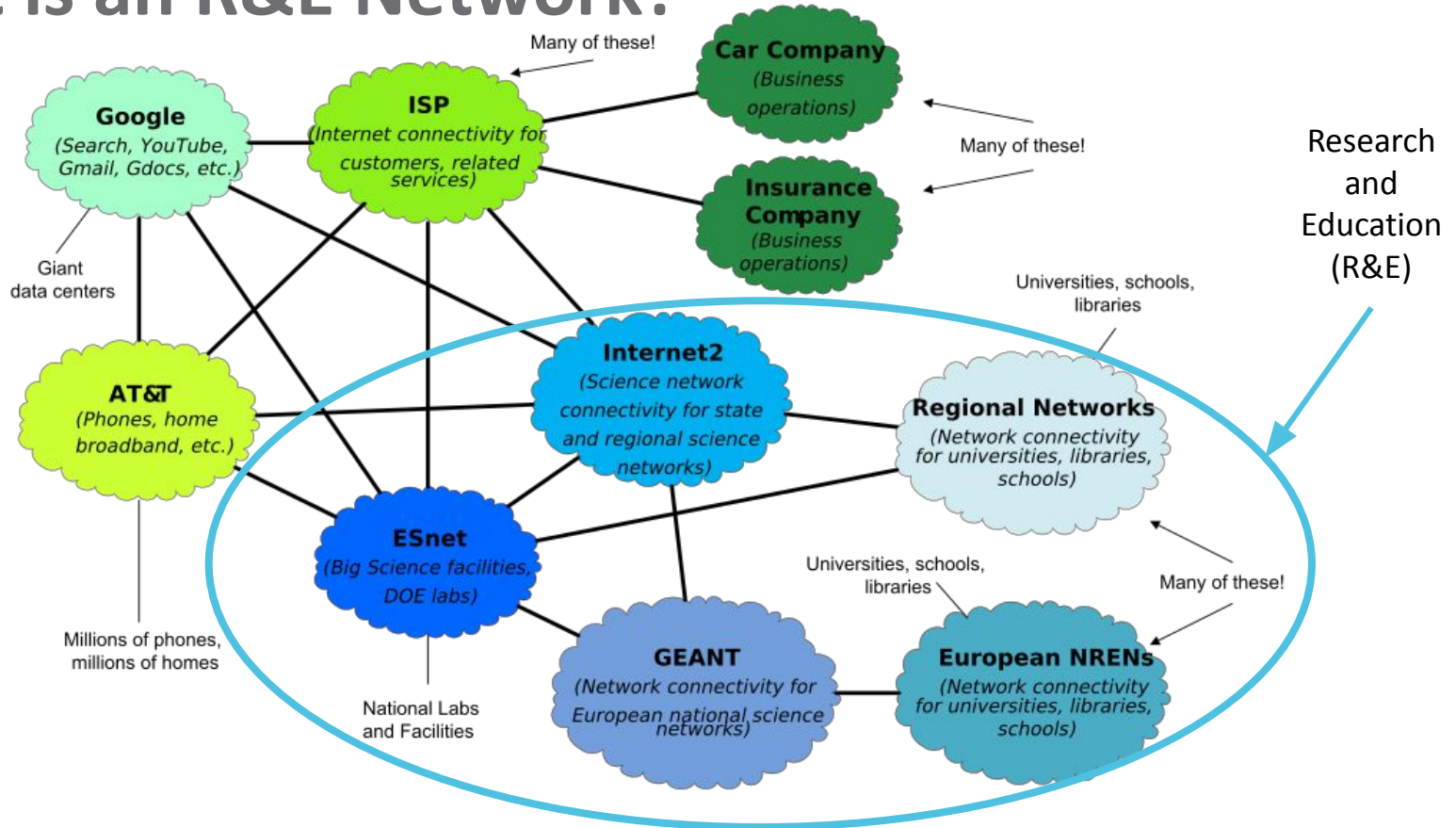U.S. Department of Energy

CHINOG

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What is ESnet?

What is an R&E Network?

R&E vs. Commercial ISPs:

Normal ISP:[1]

ESnet:[2]

What is Intent Based Networking?

- A high level definition of a Network Service

- Describes a service, but not *how* to implement it.

- Abstracts service offerings from implementation details

What is Orchestration?

- Coordination of multiple computer and network systems

- Translates network *intent* into network *configuration*

- Workflow-based method for provisioning services

- Method for ensuring consistency in service delivery

What is Orchestration *NOT* ?

- A replacement for network engineers

- A way to have one network engineer do the job of multiple engineers

- A single tool to run all of ESnet

Benefits of Orchestration

- Orchestration creates consistent configurations for complex services

- Reduces the chance for human error

- Makes the network more reliable

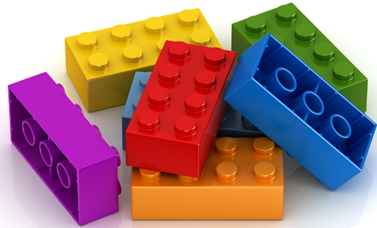- Allows engineers to focus on more design than deployment (less busy-work)
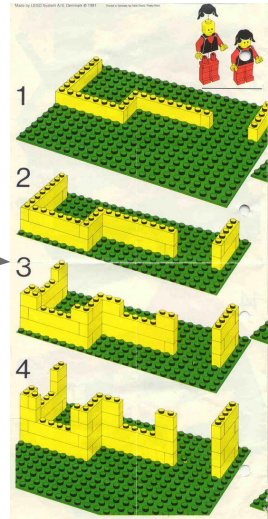
ESnet6 Provisioning Stack
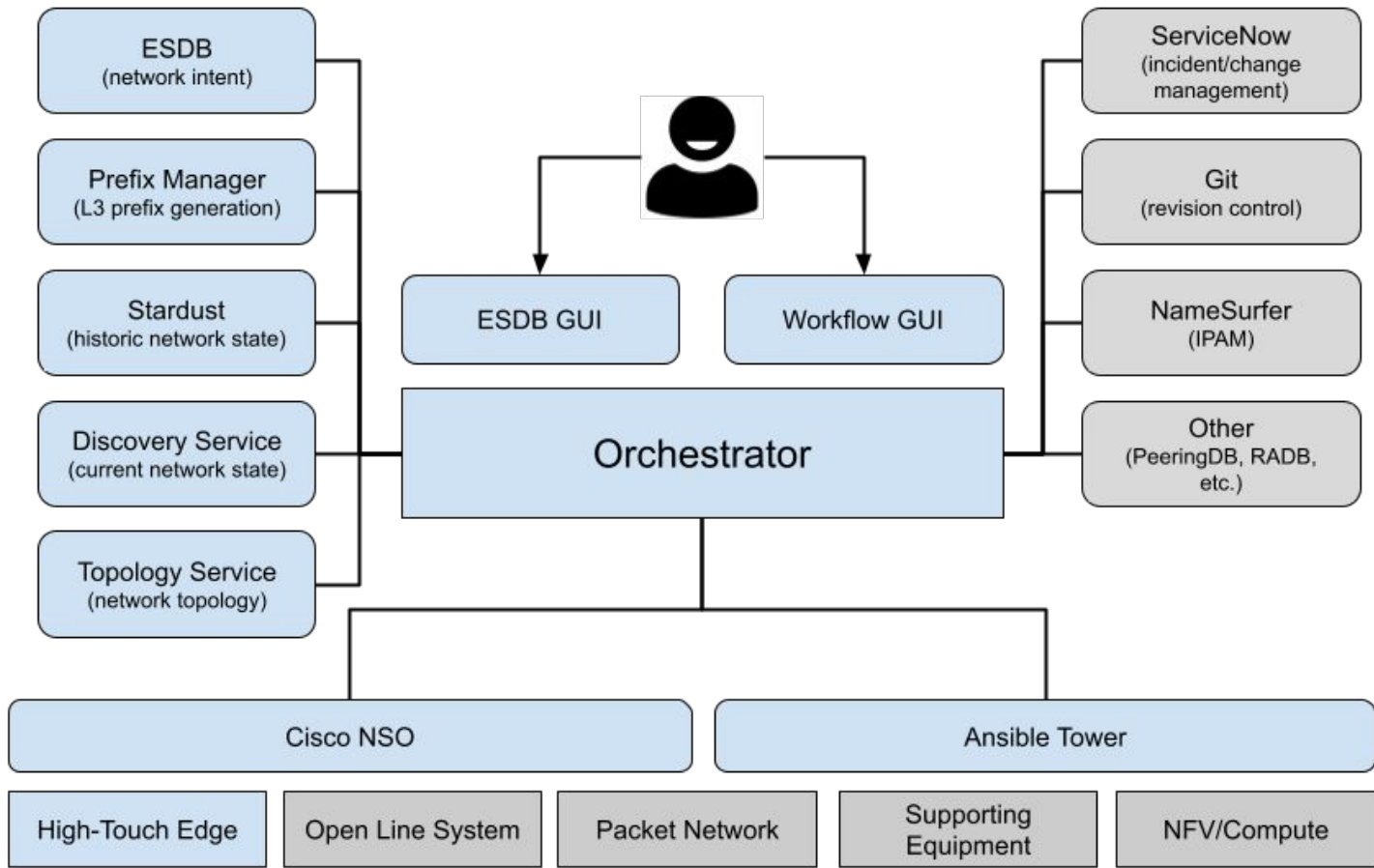
What are workflows?
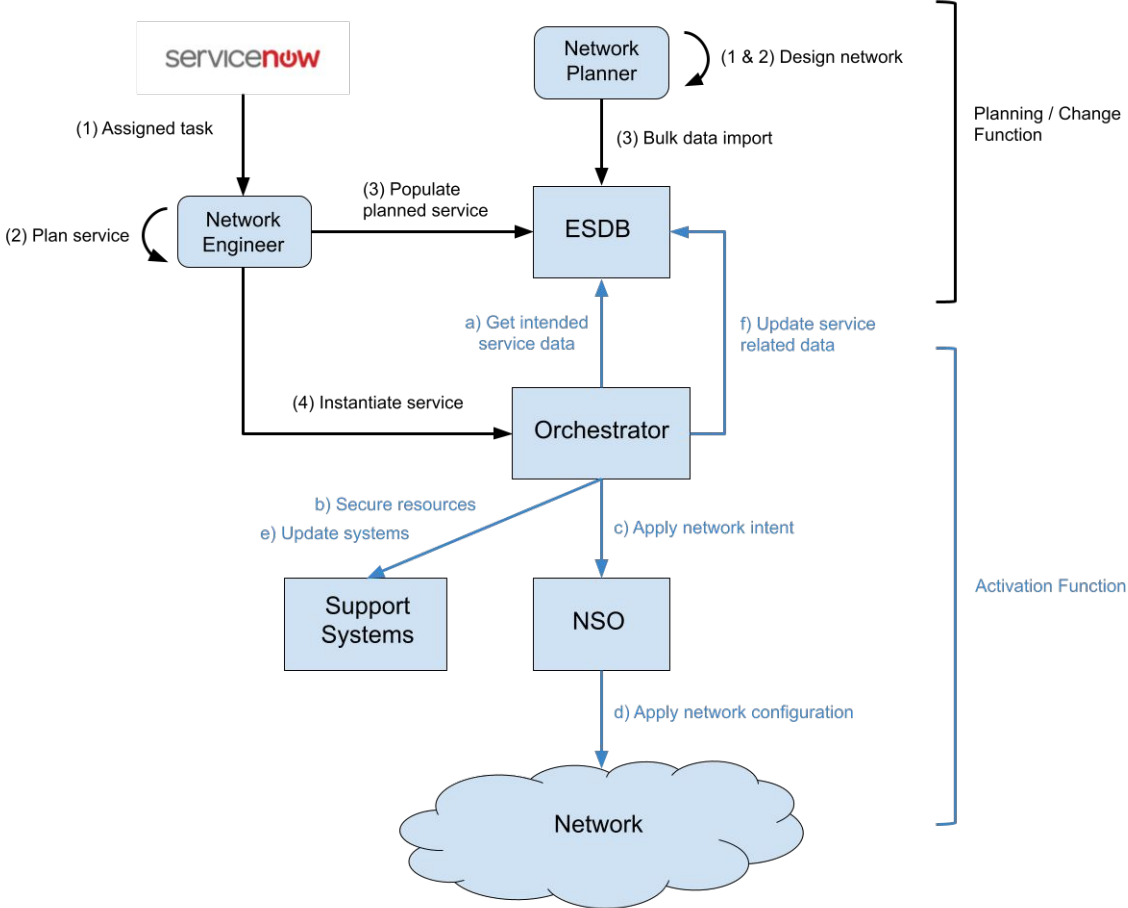
Finite resources exist in other systems

The workflow contains the "Steps" needed to complete the work

Orchestrator stores the final product until we break it all apart again
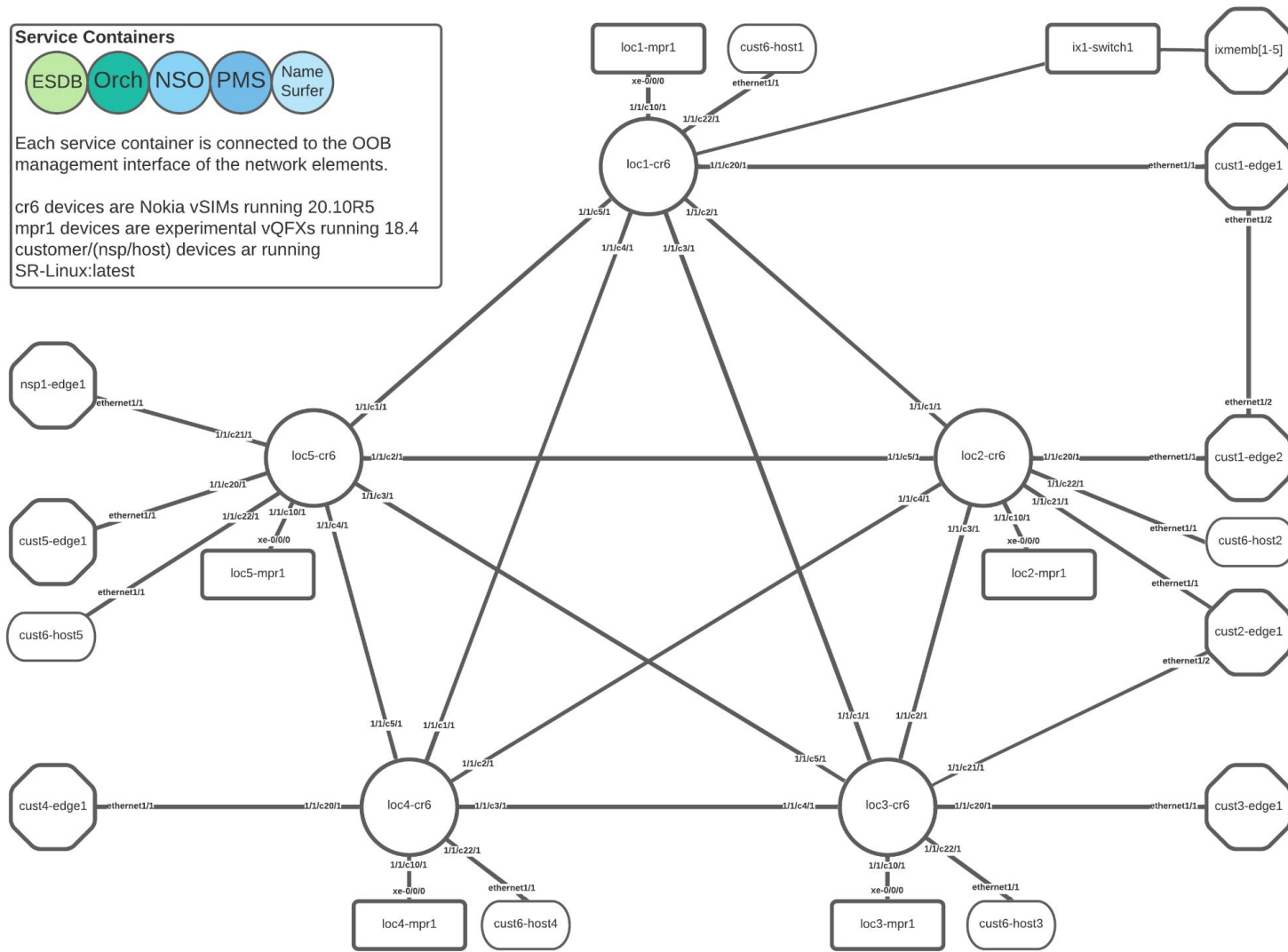
ESnet6 Provisioning Workflow

Service Containers

ESDB | Orch | NSO | PMS | Name Surfer

Each service container is connected to the OOB management interface of the network elements.

cr6 devices are Nokia vSIMs running 20.10R5
mpr1 devices are experimental vQFXs running 18.4
customer/(nsp/host) devices ar running
SR-Linux:latest

Demonstration

- Physical Connectivity Service (PCS)

- Service Edge

- Prefix List

- Layer3 IP Transit Service (IPT)

References

- [1] Title: "Shinkansen N700 with Mount Fuji", Author: tansaisuketti, Source: WikiMedia Commons, License: CC BY-SA 3.0

- [2] Title: "Shinkansen N700 with Mount Fuji", Author: austrini, Source: WikiMedia Commons, License: CC BY 2.0