Agile Network Management: The Impact of Automation and Orchestration

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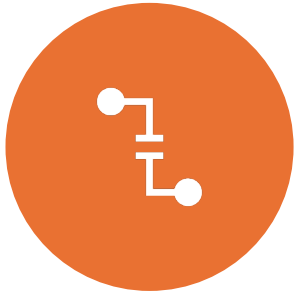
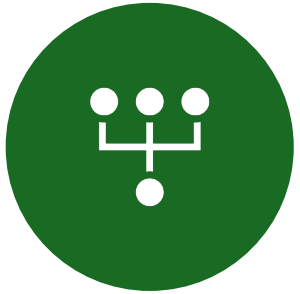
How well are we performing today?

*Uptime report 2024



Network-related issues are the largest single cause of IT service outages



Could have been prevented with better management, processes and configuration

Significant, serious or severe outage cost more than $100,000

Human error, whether directly or indirectly, contributes to a significant majority (2/3 – 4/5) of all downtime incidents

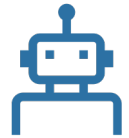
The Shift

Rigid and Manual Processes

Difficulty Scaling

Static and Reactive

Agility

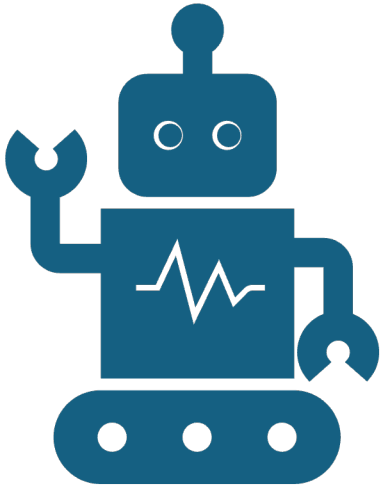


Intelligence

Flexibility

Essential ingredient required:

Single Source of Truth



Translating intent...

Activating...

Network as you imagined it

Building a responsive and efficient network architecture

Task automation

Workflow automation

End-to-end orchestration

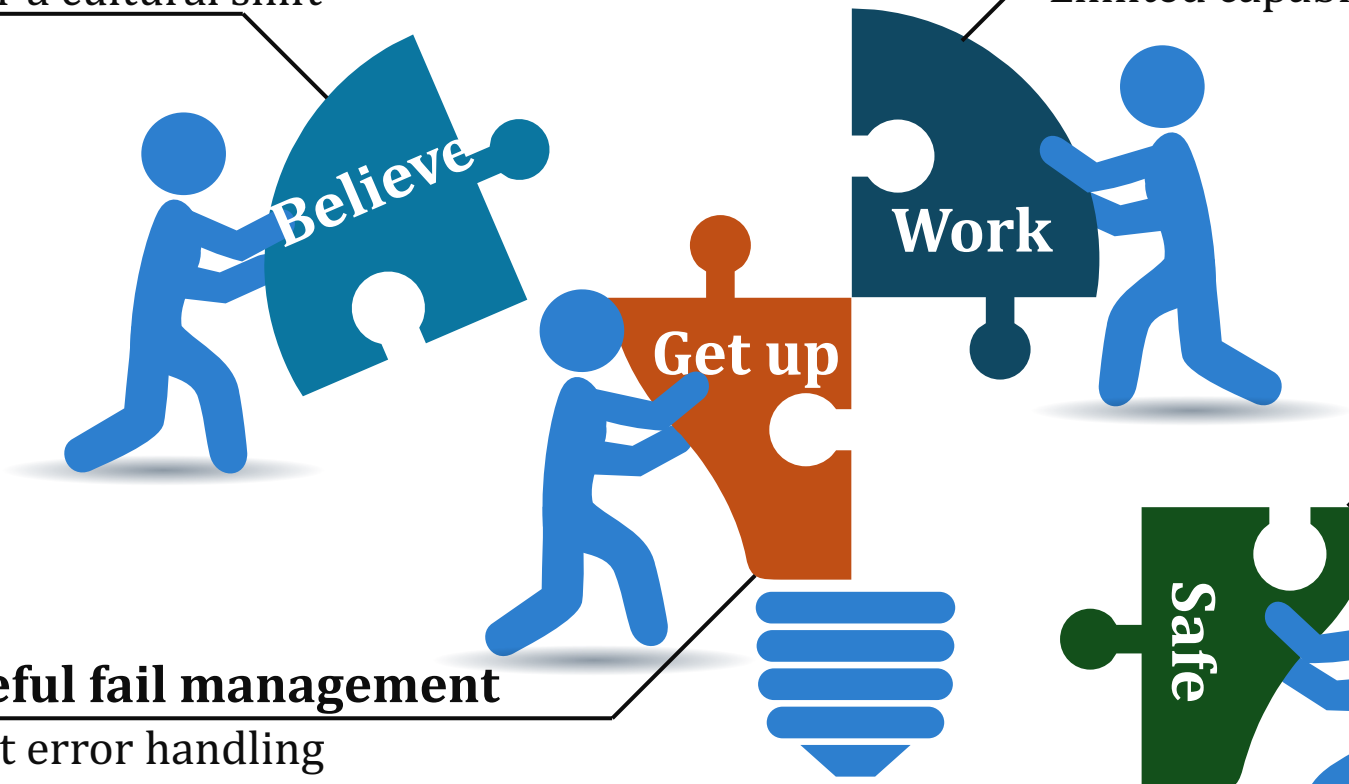
API-driven networks

Self -* Zero-Touch

Tackling Issues

Heterogeneous Environments & Legacy Systems
Interoperability challenges
Limited capabilities and compatibility

Lack of Trust
Need for a cultural shift

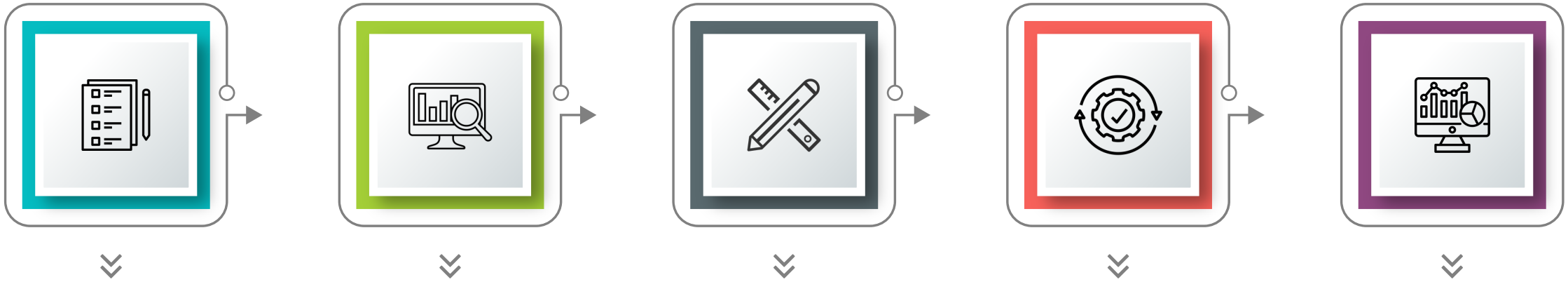


Security risks
Increased attack surface

Graceful fail management
Robust error handling
Proactive error detection
Automated recovery procedures

Moving Beyond A&O

The Journey Continues...



Foundation

- ✓Automation
- ✓Orchestration

Integrate

- ✓ Continuous integration
- ✓ Continuous Deployment

IaC

- ✓Version control
- ✓Consistency
- ✓Rollback

Real-time

- ✓Monitoring
- ✓Logging
- ✓Adaptability

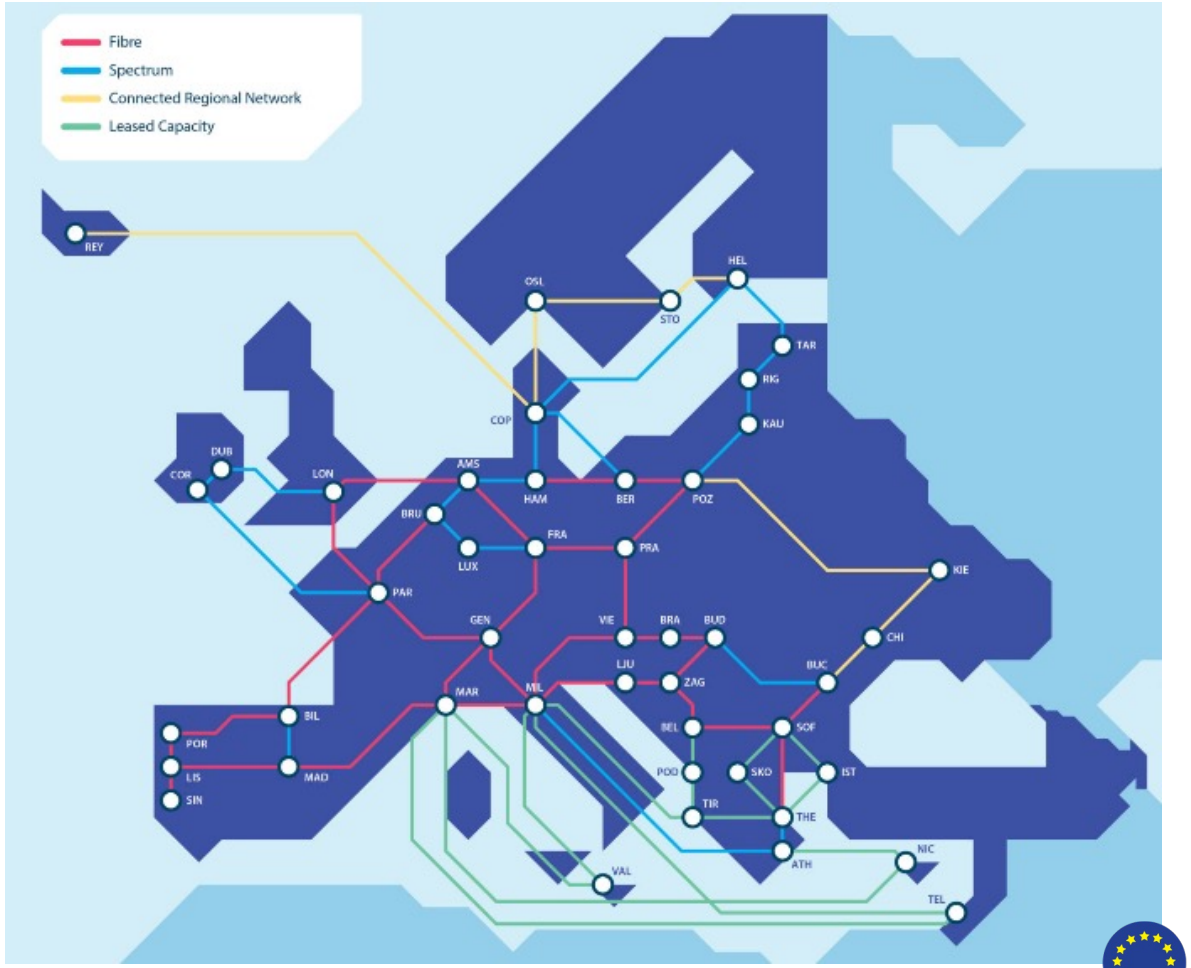
NetDevOps

- ✓Network engineering
- ✓Software development
- ✓Network operations

The Case of GP4L

in the GÉANTs GN5-1project

The GÉANT Network



- High bandwidth, high speed and highly resilient pan-European backbone
- Interconnecting European NRENs
- over 20 years of support for Europe's research and education communities

- 37 partners
- 500 contributors
- 50M users

The Global Platform for Lab (GP4L)

01

GP4L Experimental Testbed

A P4 distributed infrastructure for researchers to run network experiments

GP4L Digital Transformation Use Cases

Automation and orchestration solutions that underpin agile networks

02

03

GP4L Community Collaboration

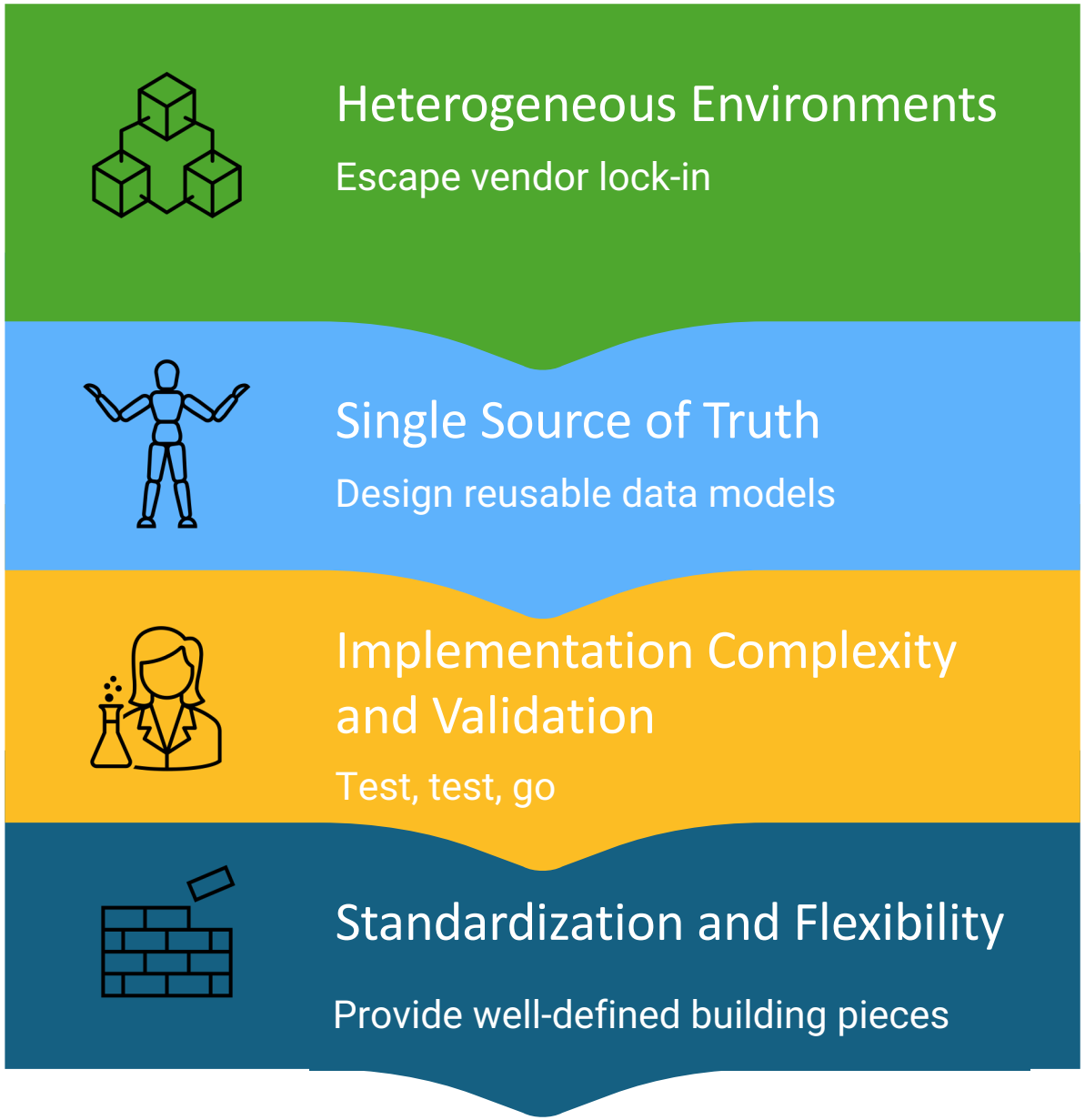
Open discussion and collaboration on pilots

- Service Provisioning Pilot for PIONIER

https://geant-netdev.gitlab-pages.pcss.pl/gp4ldocs/

GP4L Experimental Testbed

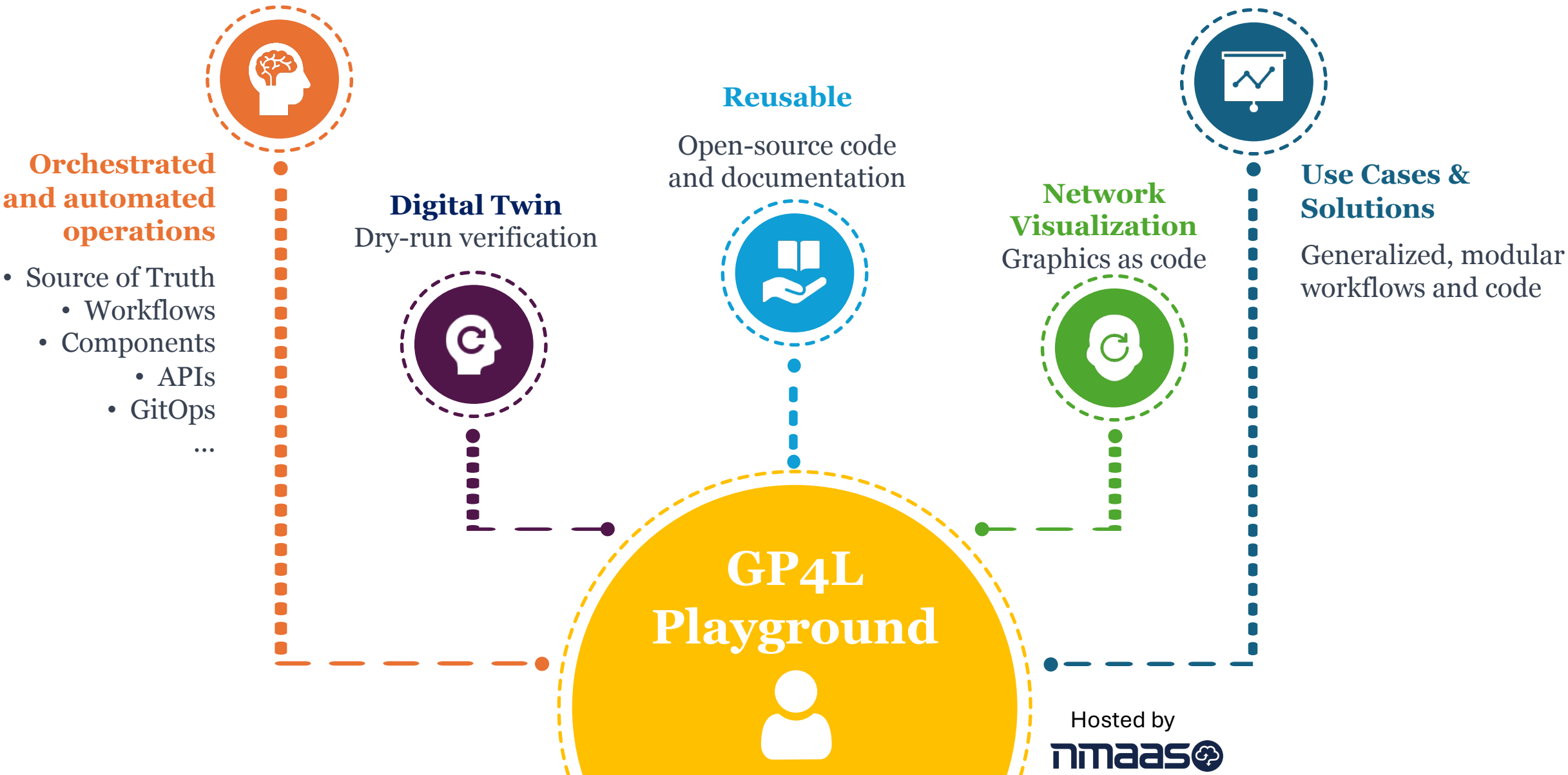
A programmable network infrastructure that can be used to run cutting-edge network experiments.



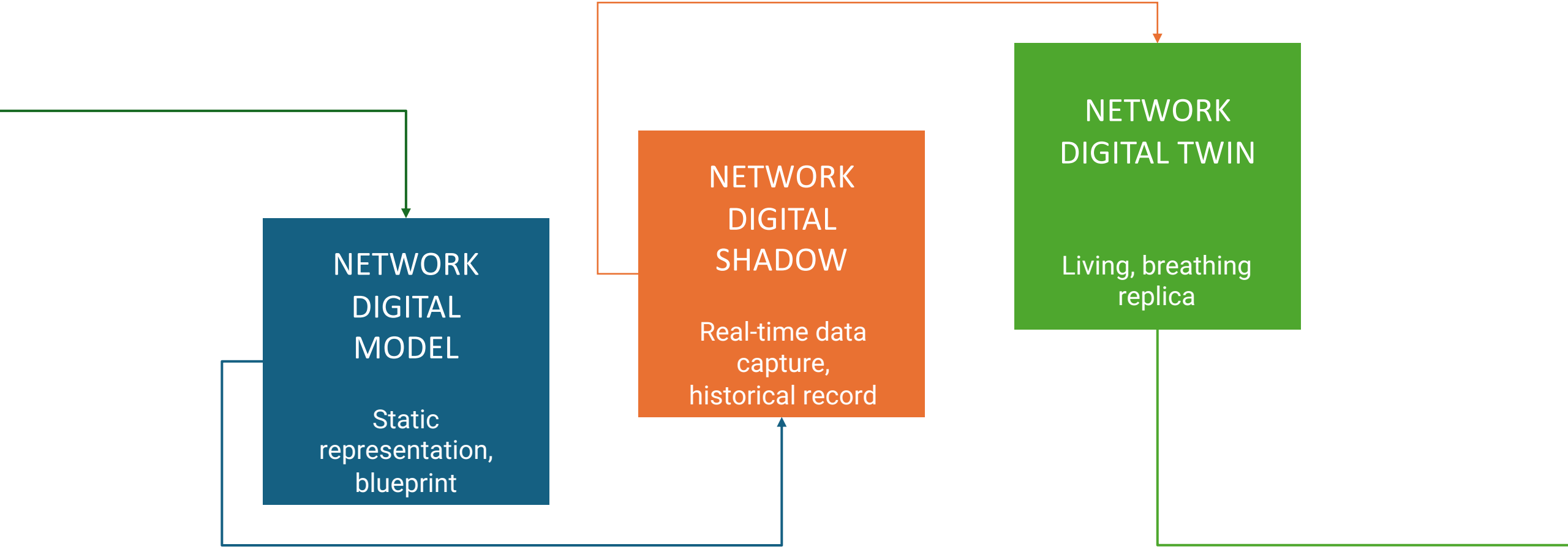
GP4L's Approach

Overcoming common challenges in the community

GP4L principles and activities



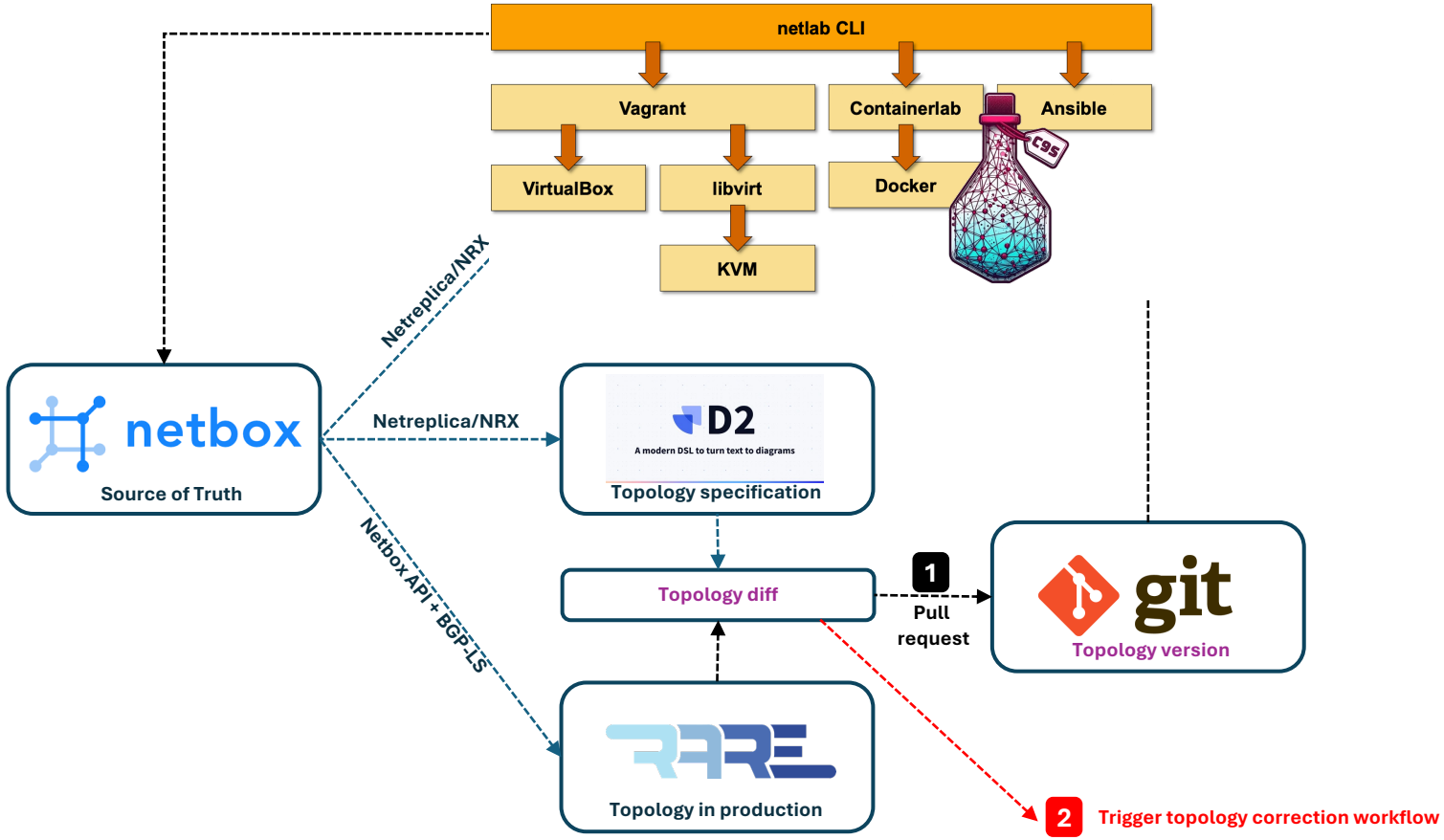
Towards a dynamic replica



Tools conception “around” the network ecosystem

Model → Production

Production → Model



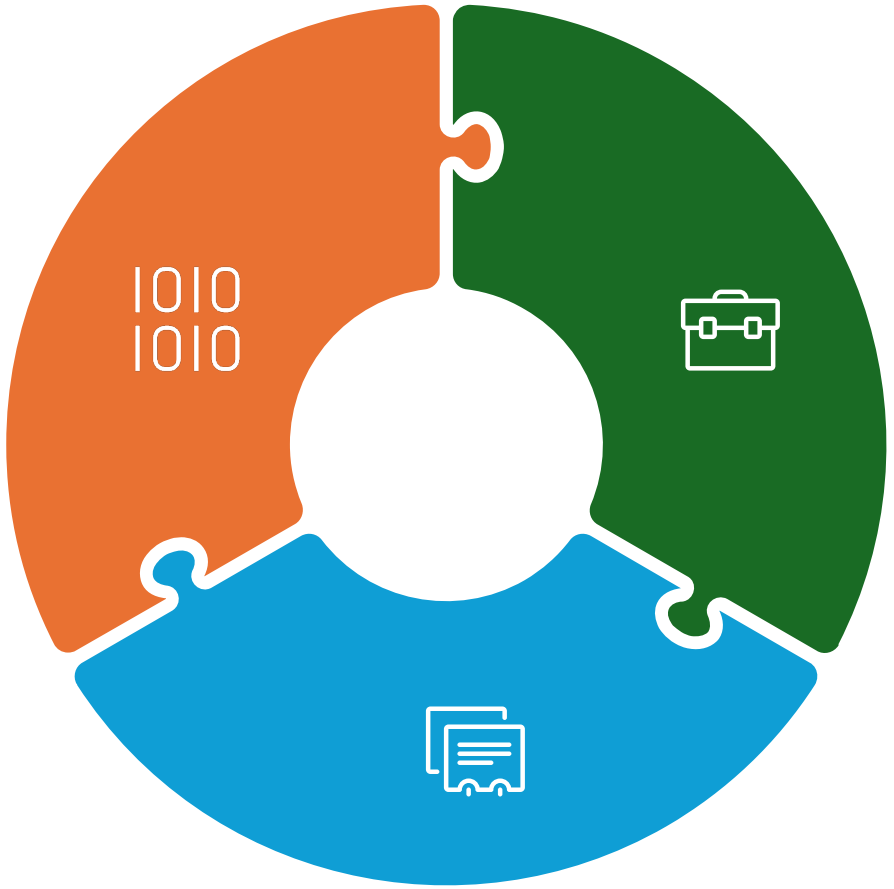
via GP4L Automation & Orchestration

Leaves something to be desired

High quality data

Powerful modelling

Correct up-to-date information



Always available NOS

Mismatching

VMs vs containers

Identical replica

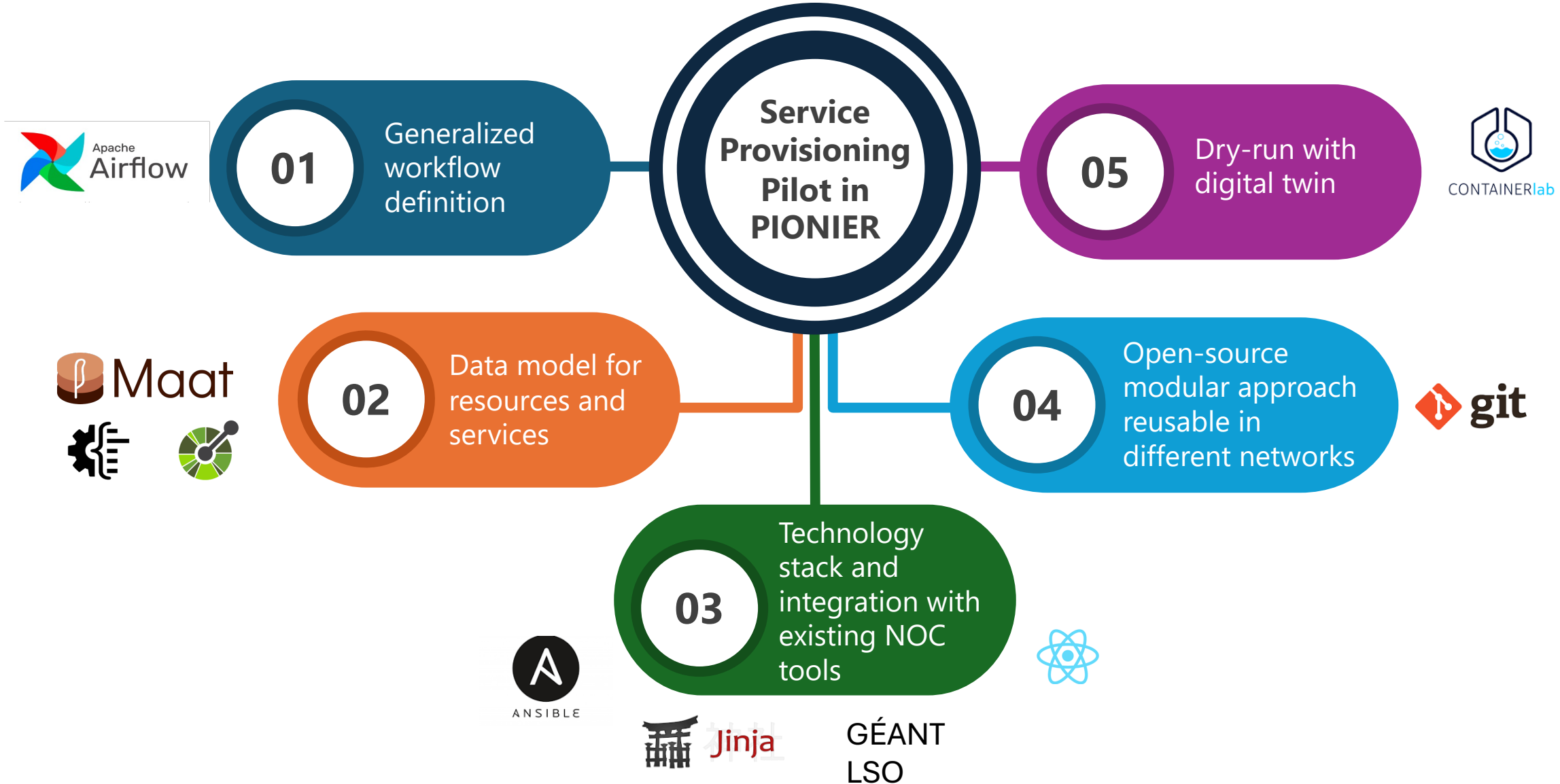
Unexpected hardware behavior

Full control plane

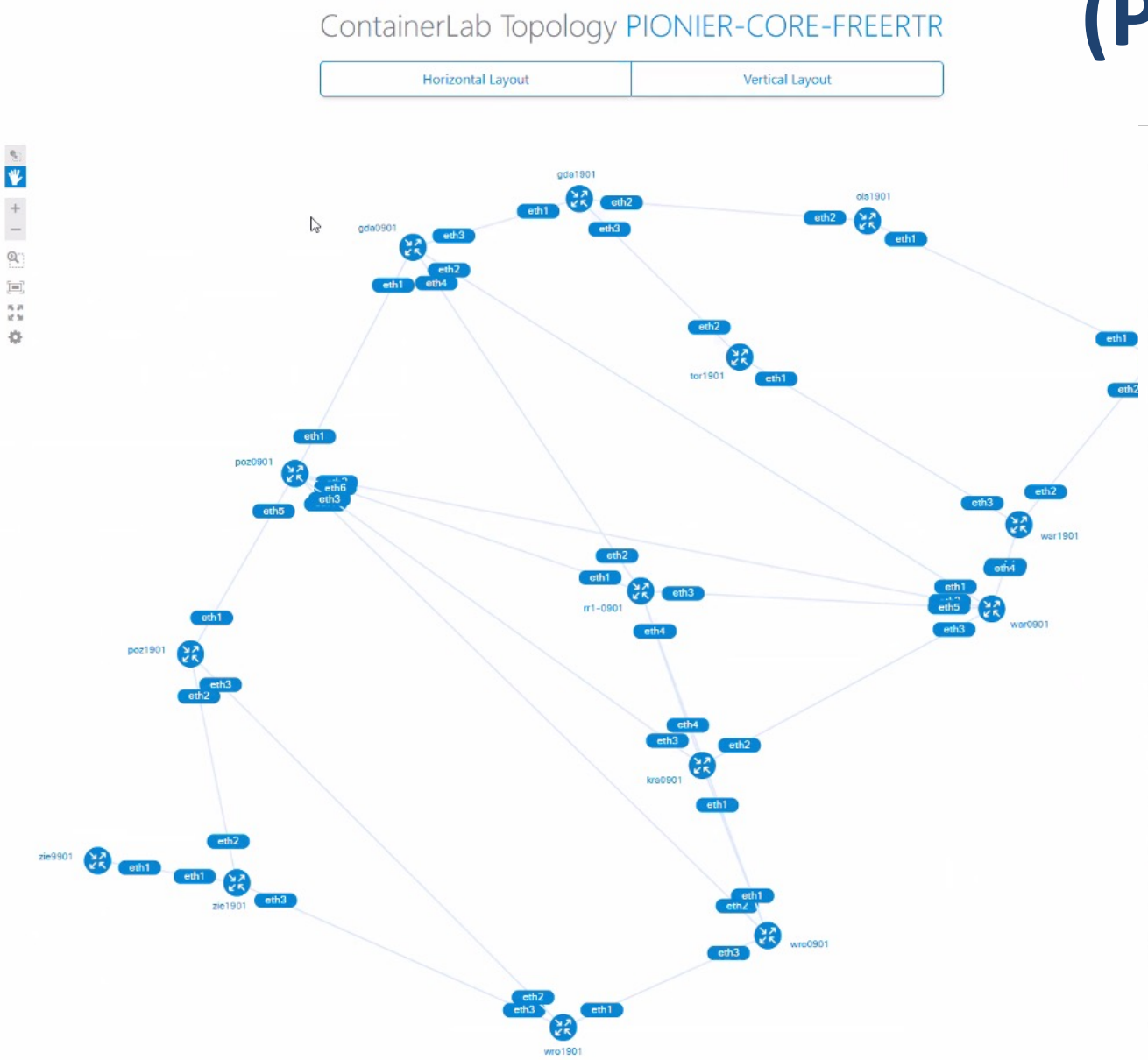
Scope of events

GP4L Joint Collaboration

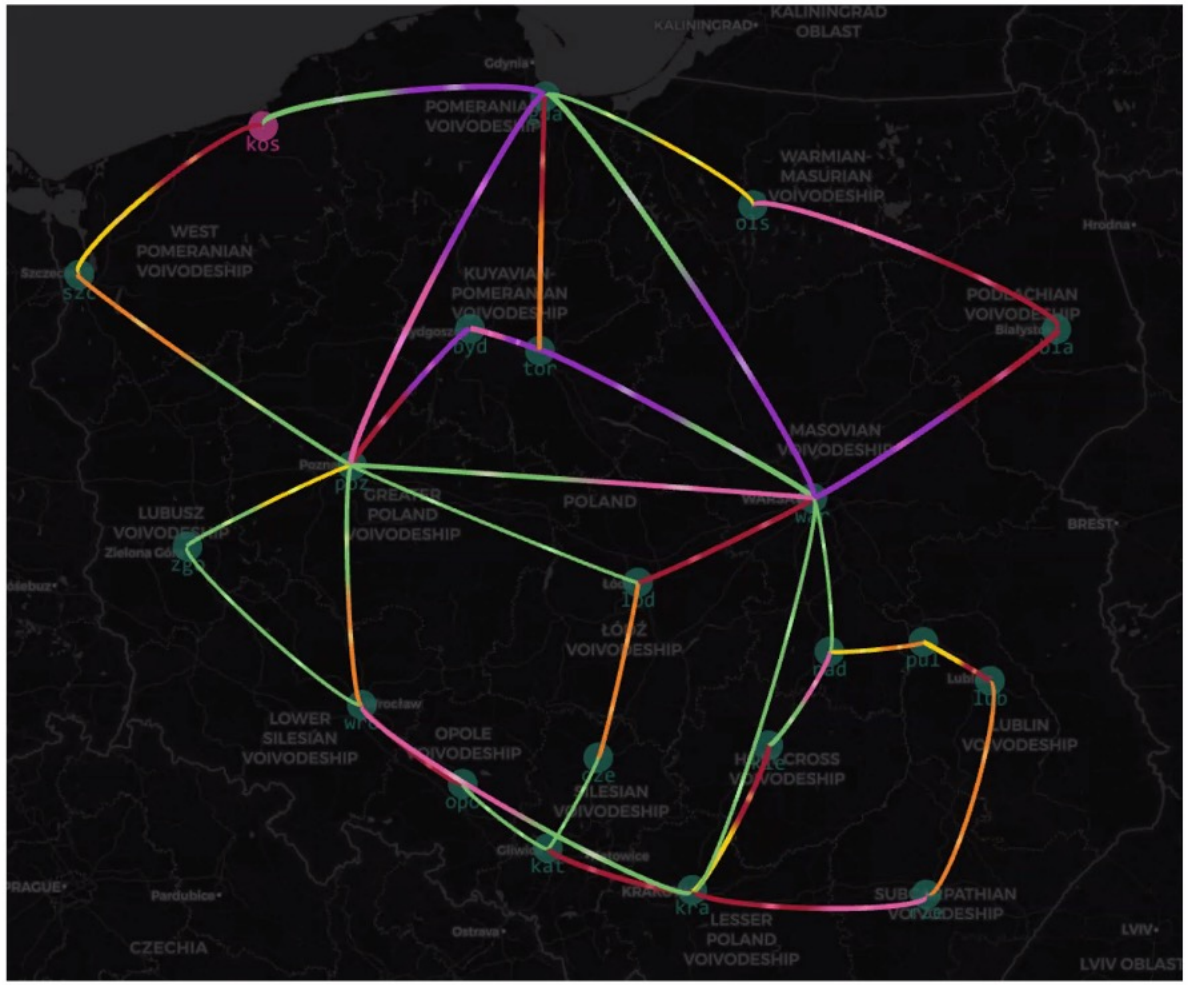
PIONIER
POLISH OPTICAL INTERNET



Generalized service provisioning implementation (PIONIER)



Vizualization panels



Benefits of a Standardized Approach

System-Level Integration

- facilitates wider system integration
- network setup becomes part of a broader picture

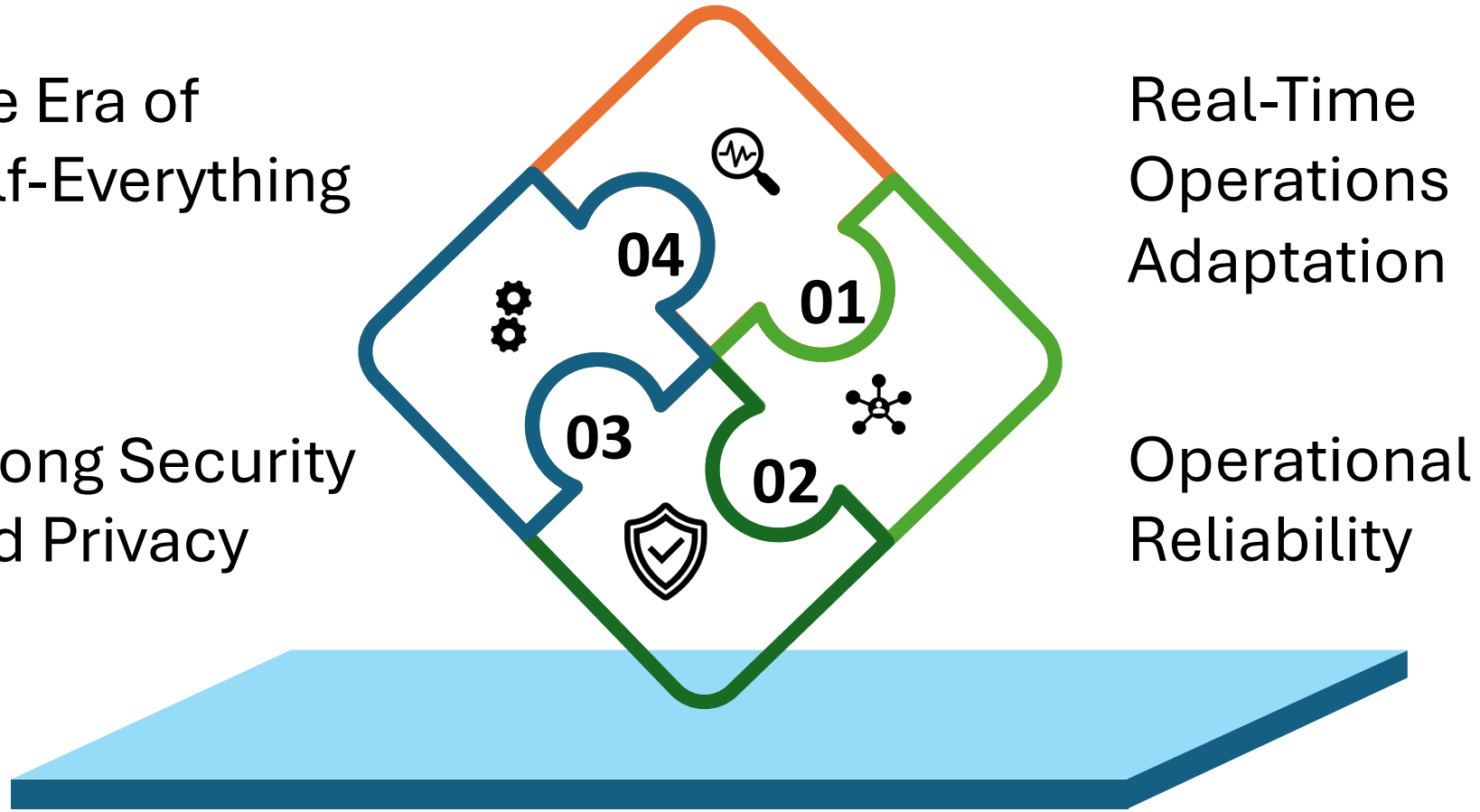
Enhanced Collaboration and Reuse

- interoperable solutions allow components to be reused
- implementations are easily shared across organizations

Challenges and The Future

The Era of Self-Everything

Real-Time Operations Adaptation



Strong Security and Privacy

Operational Reliability

Thank You

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