Infrastructure Testing

The Road to Reliability

11.03.2020, DevOps Gathering 2020

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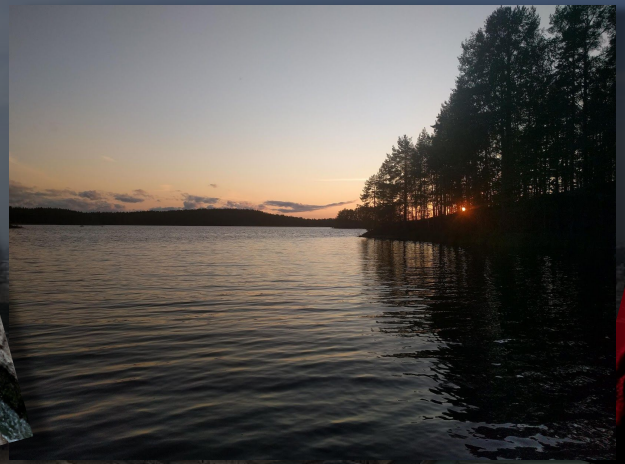
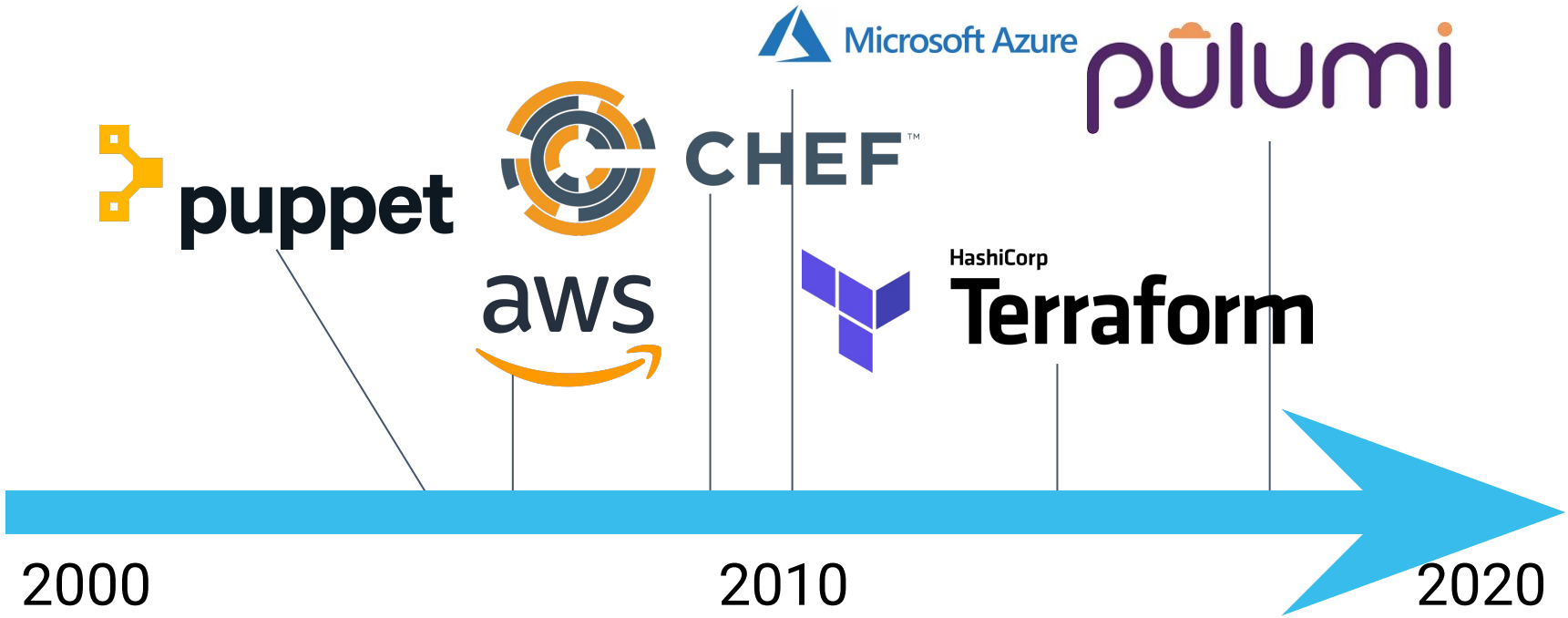


Infrastructure & Automation Lead at Novatec

Consultant, Trainer, Traveller, Music Addict

Quick show of hands ...


puppet
aws
CHEF
Microsoft Azure
pulumi
HashiCorp
Terraform
2000
2010
2020

NOVATEC


Working on Infrastructure
has changed … a lot!

We moved the responsibility ...

… but our **engineering** lags behind

- Version Control
- Pipelines
- Transparency
- Steady environment
- **Testing**

Why?

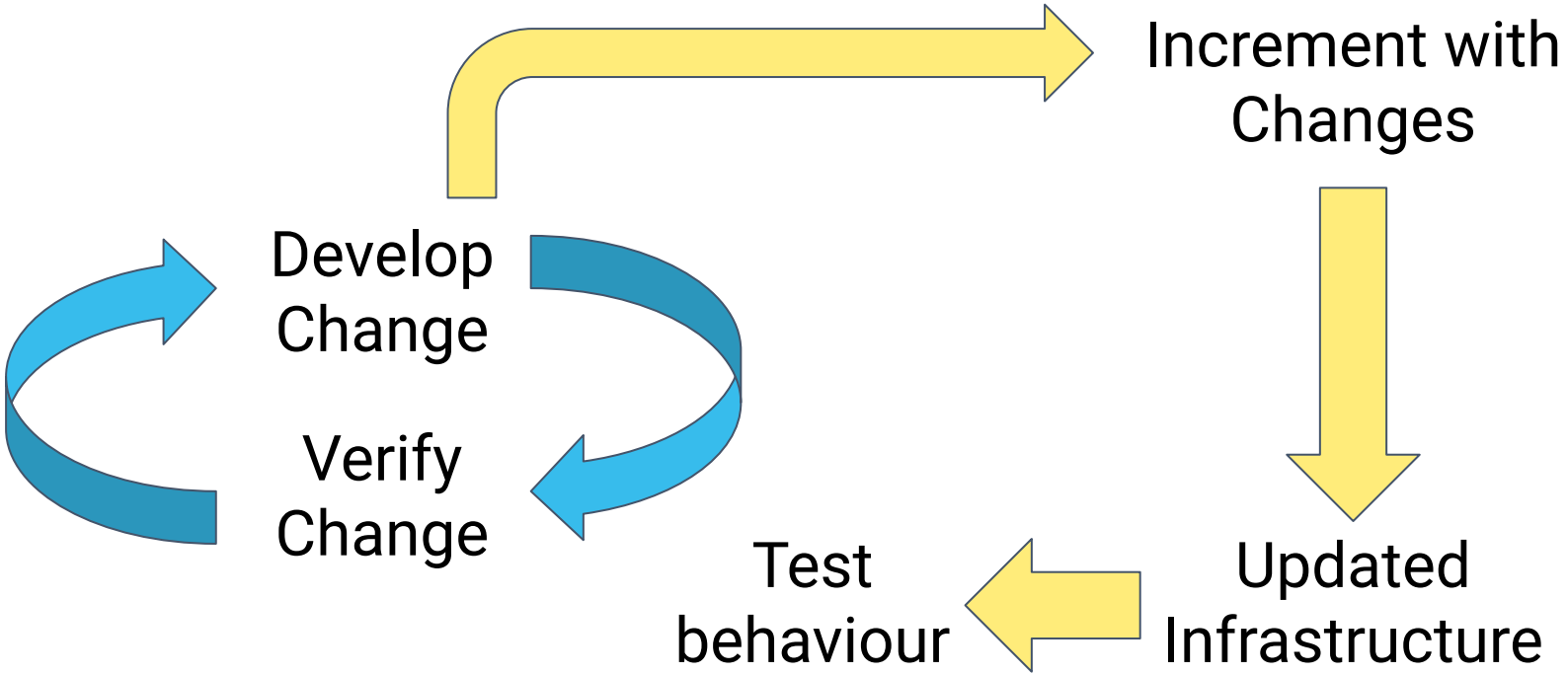
Yes, why?

- **Why not!**
  - Why do you test your application code?
  - Why should infrastructure code be different?
- **Logic:** If the infrastructure code contains any sort of logic
- **Verify**: The infrastructure behaves as (we think) we specified it in code
- **Validate**
  - Codifying expected behaviour triggers thinking about it
  - Are we implementing the right thing?
- **Invariants:** Make sure hard requirements always hold true
- **Robustness** against changes (uncover interdependence)

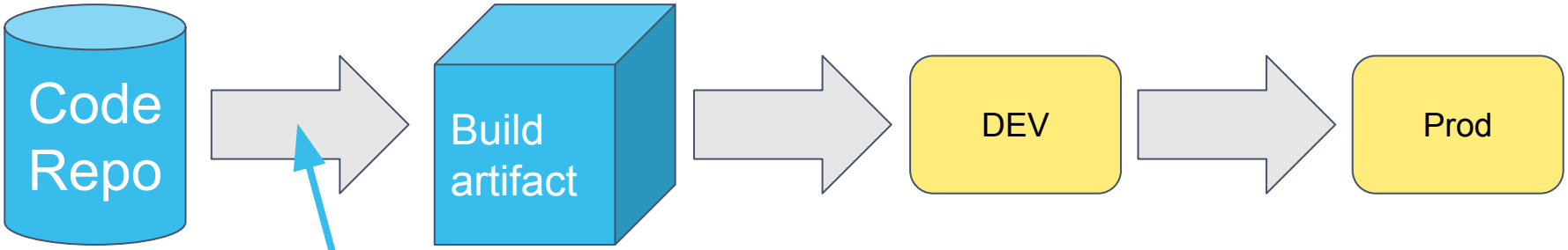
Testing is important for automation!


What is your
Workflow? ~

The Development Cycle

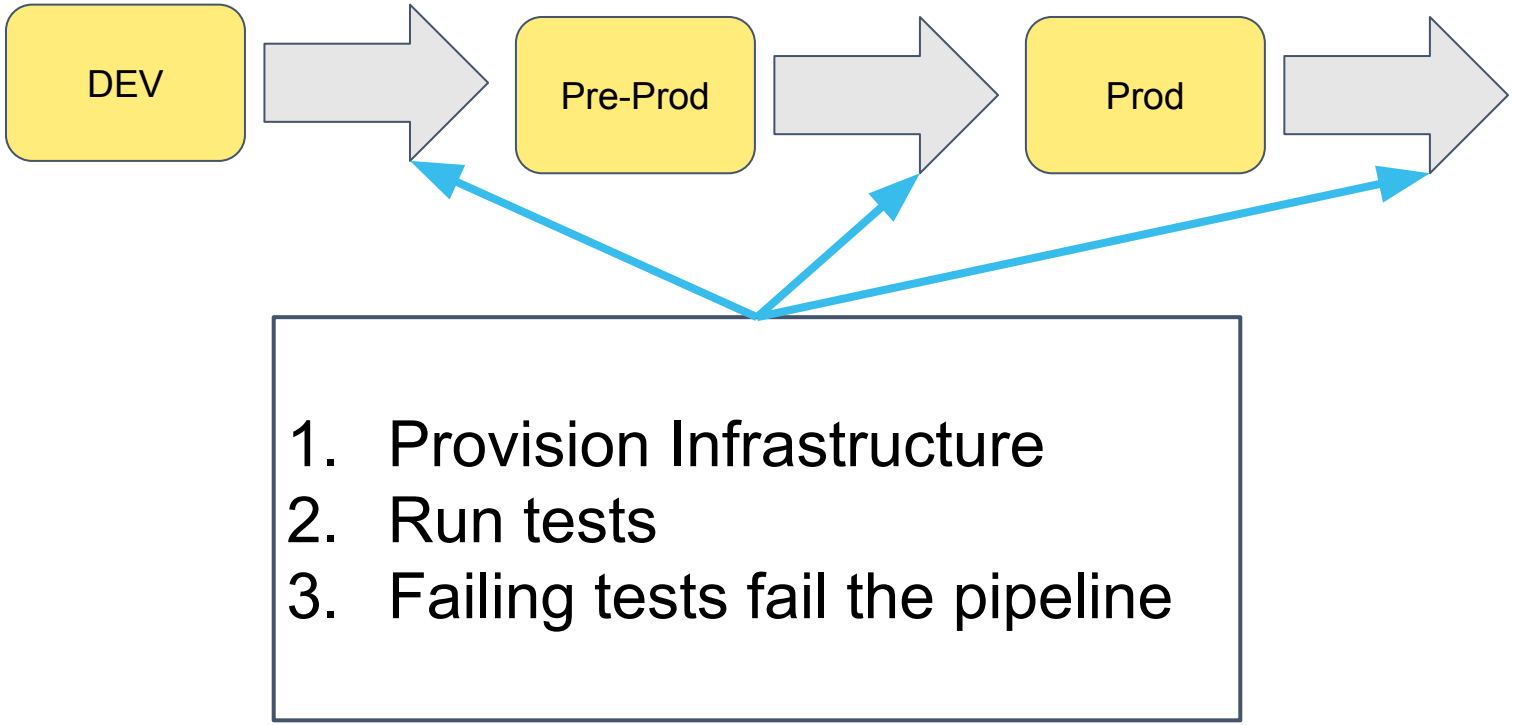


In the Build Pipeline



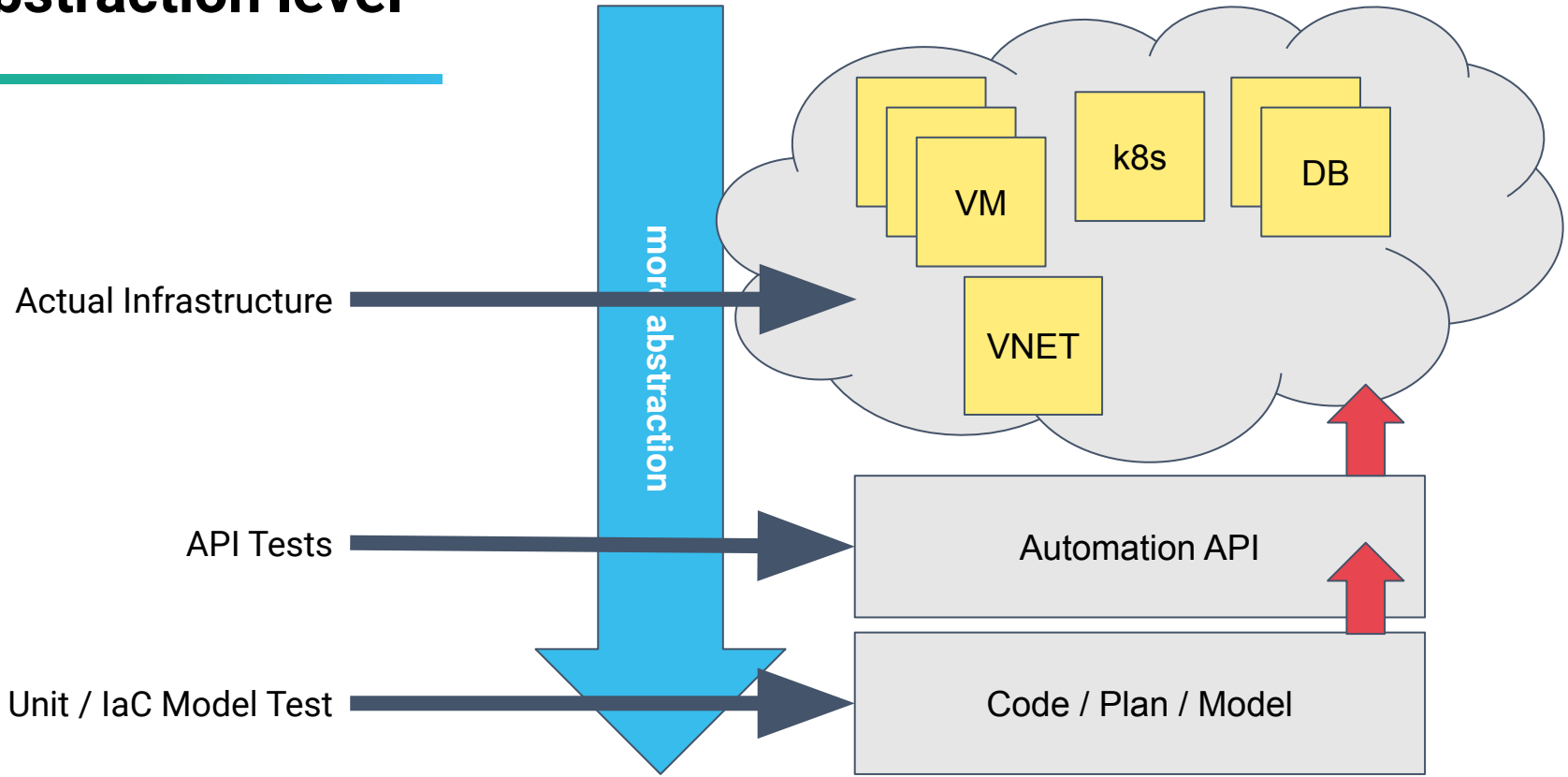
1. Build and test infrastructure code
2. Failing tests won't produce a usable artifact

In the Deployment Pipeline



Abstraction Level?

Abstraction level



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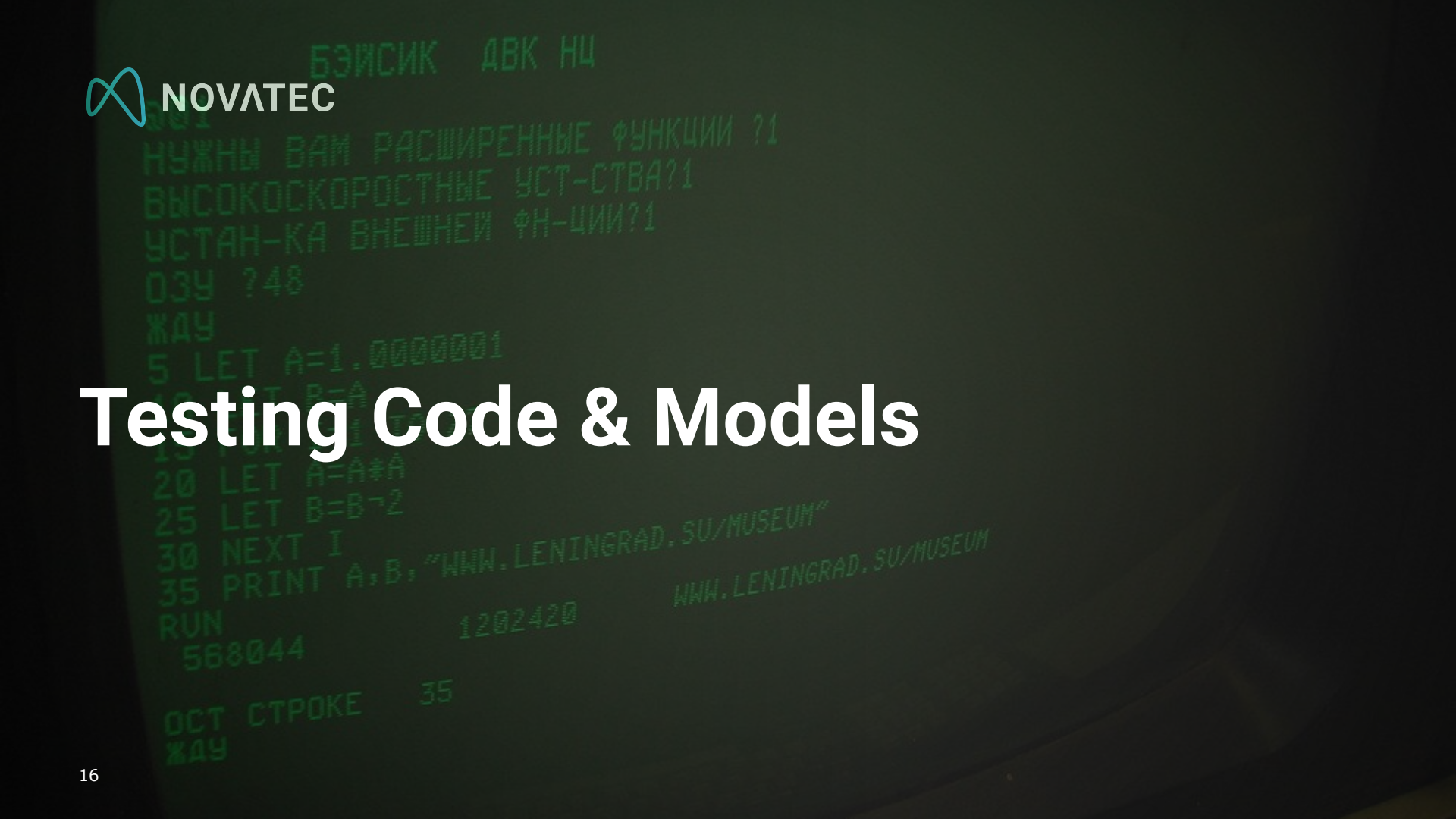
Test Abstraction Mnemonics

- **Model tests**: I don’t trust my code
- **API tests**: I don’t trust my tool (nor my code)
- **Real infrastructure tests**: I have trust issues :)

Real infrastructure tests are expensive, but the only way to know for sure ...



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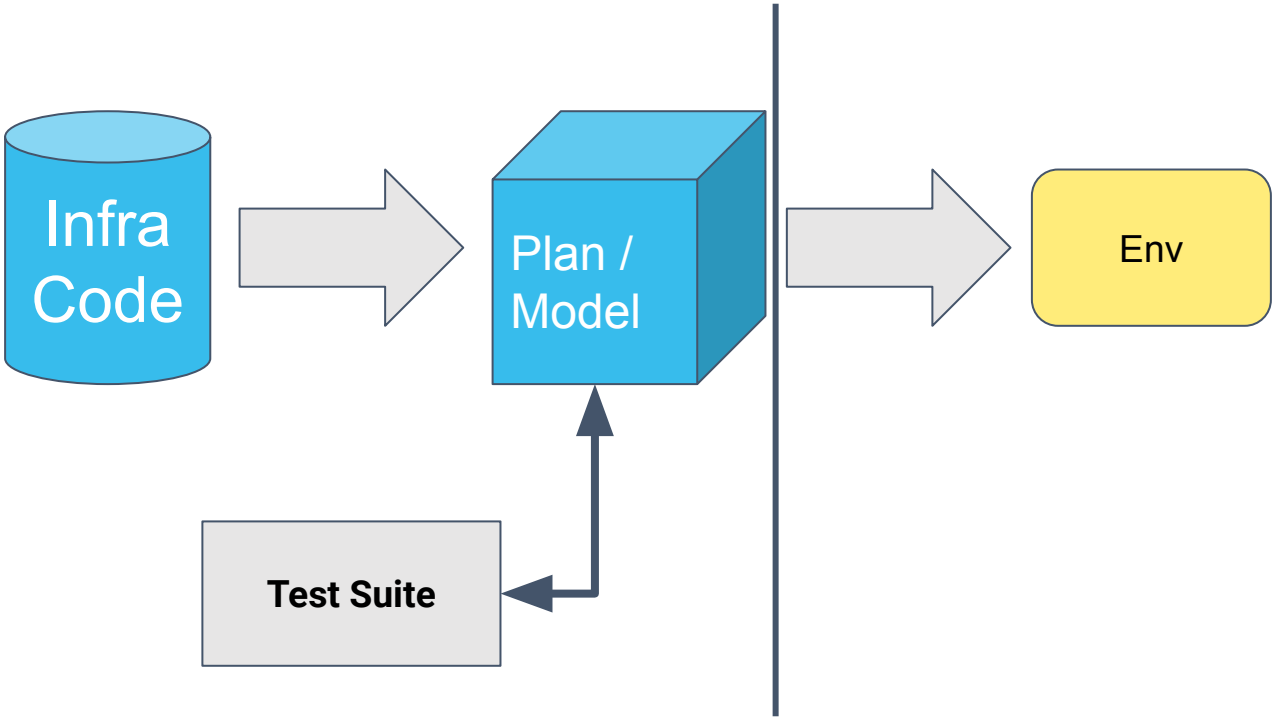
Testing Code & Models


Infra Code
Plan / Model
Env
Test Suite

Model testing is **fast** and **cheap** and helps detecting **faulty logic** and **illegal inputs!**

Pulumi Model Testing

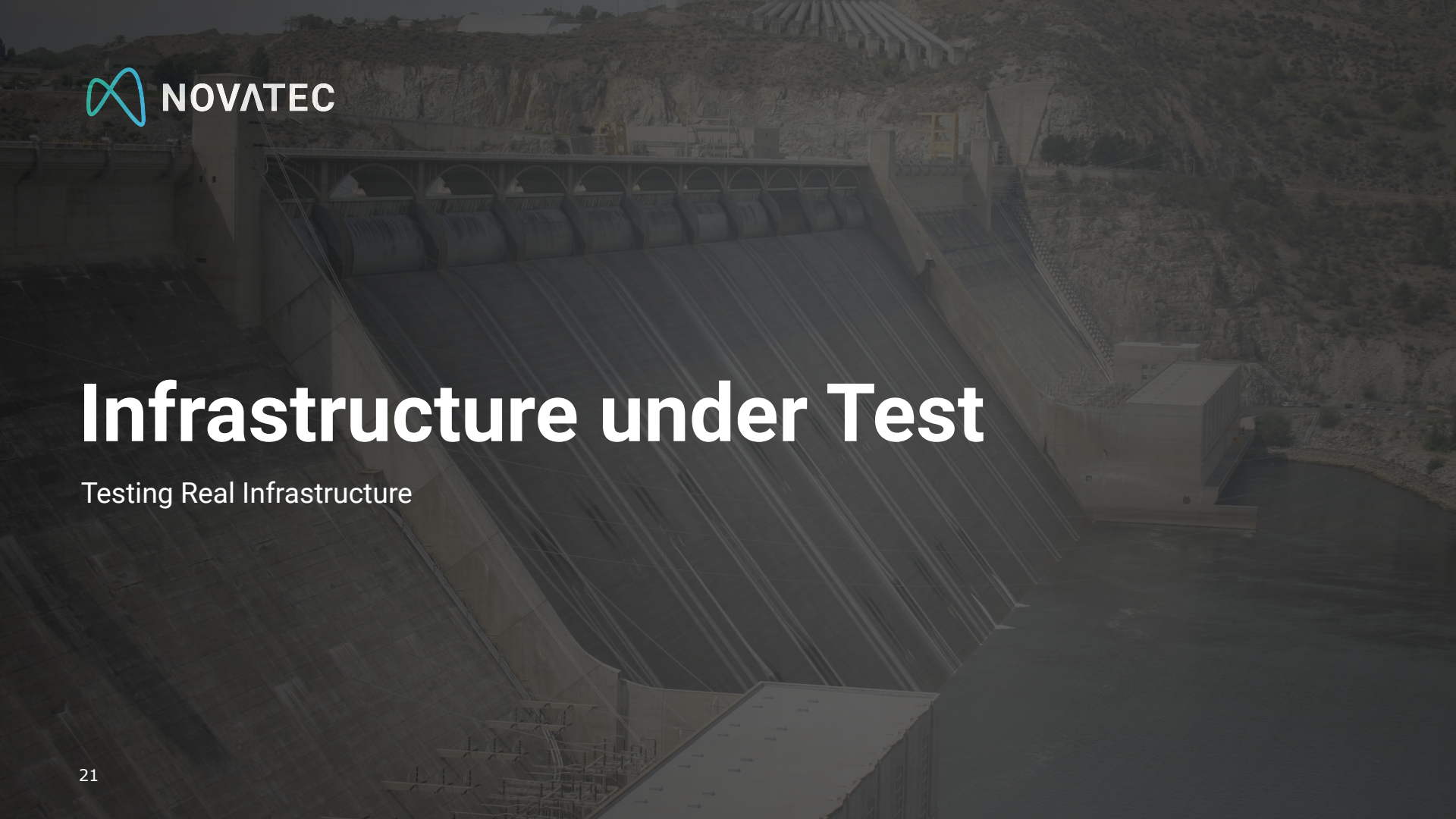
The example shown in the presentation can be found here:

https://github.com/i7c/infratests

And what about Terraform?

You will have to apply some hacks to do model testing here. You can get your hands on a terraform plan:

```
terraform plan -no-color -out "tf.plan"
terraform show -json "tf.plan"
```



Infrastructure under Test

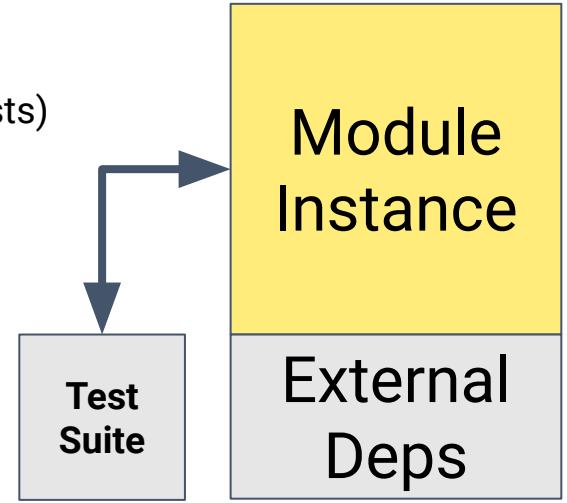
Testing Real Infrastructure

Classification of IuT Pieces

- Dedicated ↔ Reused
- Ephemeral ↔ Persistent
- Immutable ↔ Mutable
- Testing ↔ Productive

Example 1: Dedicated, Ephemeral, Immutable, Testing

- Test **an abstraction** in the Infrastructure Code Base (Module Tests)
- Test is comprised of
  - required external resources
  - module instantiation
- For every test execution: **Create, Test, Destroy**



Tests run off site and assert that the module works as expected.

Example 1: Dedicated, Ephemeral, Immutable, Testing

Pros

- Isolated
- No interference with prod. infrastructure
- Cheap compared to persistent IuT

Cons

- High execution times / slow iterations
- Only tests the abstraction
- Glue code might be extensive
- Modules are not always good for starting

JUnit Test Suite

The example shown in the presentation can be found here:

https://github.com/i7c/infratests

Example 1b: Dedicated, Persistent, Mutable, Testing (3)

- Keep test infrastructure around
- Provision updates, not from scratch
- Faster
- Higher quality, if prod is also mutable!

Example 2: Reused, Persistent, (Im)Mutable, Productive

- Test **Productive** infrastructure as it changes
- Can enhance a pipeline **(stages)**
  - Test rollouts (automation)
  - **Safety net** for High Availability
- **Mutable:** Provision infrastructure then check
- **Immutable:** Provision infrastructure, check, then switch

Keep in mind: Tests may interfere with your production workload!

How to find good test cases?

- Test things your team has **broken** before!
- Test **updates**!
- Test **critical paths** for availability!
- Test **contracts**!

Thank you for being here! Questions? Discussions?

Feel free to reach out:

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References

https://github.com/i7c/infratests

https://www.pulumi.com/blog/testing-your-infrastructure-as-code-with-pulumi/

https://github.com/gruntwork-io/terratest

https://www.inspec.io/

https://github.com/hashicorp/terraform-config-inspect

Third-party images:

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