“GUI is dead, long live IaC”

IaC in the aspect of cloud automation
using a standardized module library

Olympic High Jump

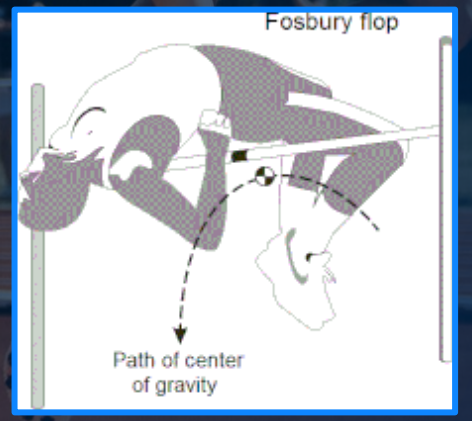
Motto: “*Faster, Higher & Stronger*”

? Techniques

- Standing Jump
- Scissors
- Straddle
- Western Roll

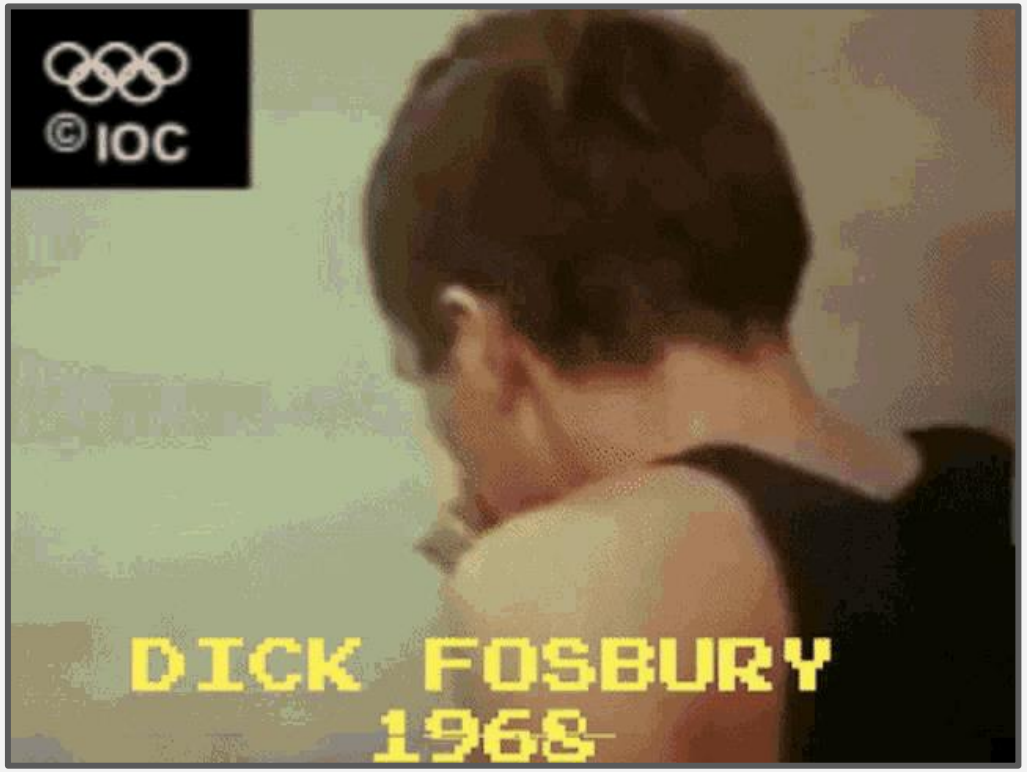
Fosbury Flop

- In 1968, Mexico City at the Olympic Games
- High Jump + Engineering Know-How = Center of gravity
- Newspapers wrote, …like a “two-legged-camel”… 🐫
- Result: 2,24 m – Gold Medal, Olympic Record 🥇
- *“I think quite a few kids will begin trying it my way now.”*



Revolutionary

“Fosbury Flop”



It is now the only way to do high jump! – Revolutionary!

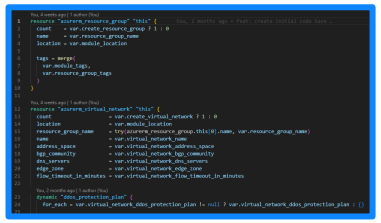
Technology Shift/Change

Why: “*Infrastructure as Code*” (IaC)

Techniques

GUI Deployment

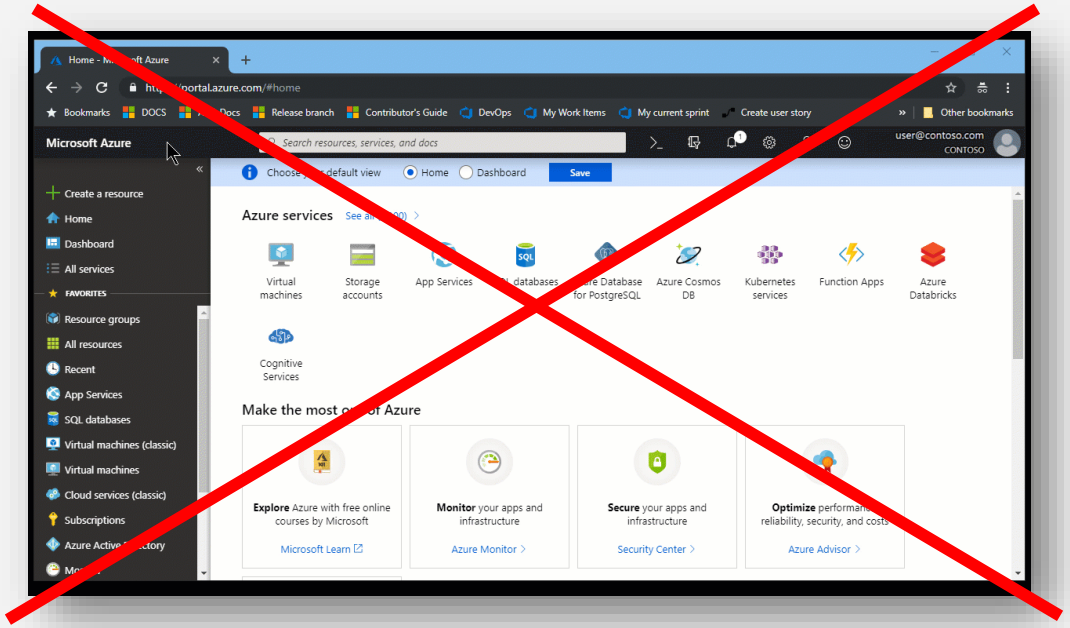
Fosbury Flop



Cloud Automation

Mindset of IaC?

Mind change administration interface




```
You, 4 weeks ago | 1 author (You)
resource "azurerm_resource_group" "this" {      You, 2 months ago • feat: create initial code base …
  count    = var.create_resource_group ? 1 : 0
  name     = var.resource_group_name
  location = var.module_location

  tags = merge(
    var.module_tags,
    var.resource_group_tags
  )
}

You, 4 weeks ago | 1 author (You)
resource "azurerm_virtual_network" "this" {
  count                = var.create_virtual_network ? 1 : 0
  location             = var.module_location
  resource_group_name  = try(azurerm_resource_group.this[0].name, var.resource_group_name)
  name                 = var.virtual_network_name
  address_space        = var.virtual_network_address_space
  bgp_community        = var.virtual_network_bgp_community
  dns_servers          = var.virtual_network_dns_servers
  edge_zone            = var.virtual_network_edge_zone
  flow_timeout_in_minutes = var.virtual_network_flow_timeout_in_minutes

  You, 2 months ago | 1 author (You)
  dynamic "ddos_protection_plan" {
    for_each = var.virtual_network_ddos_protection_plan != null ? var.virtual_network_ddos_protection_plan : {}
```

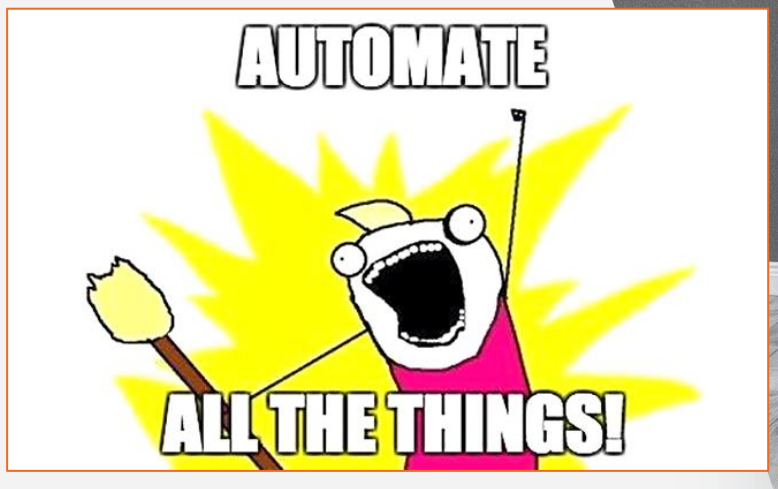
„Click-Click-Cloud“
„Clicky-Bunti“

„Transition 2 cloud“
→ Shift from “*static*” to “*dynamic*” infrastructure

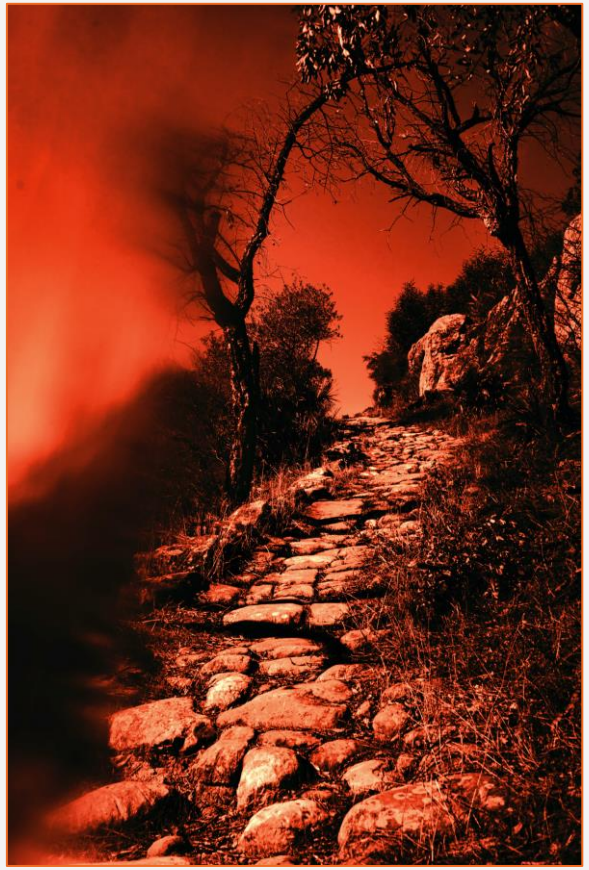
Cloud Operating Model

Using **IaC** deployment **templates** & **modules** in building out **your** individual Cloud Infrastructure!

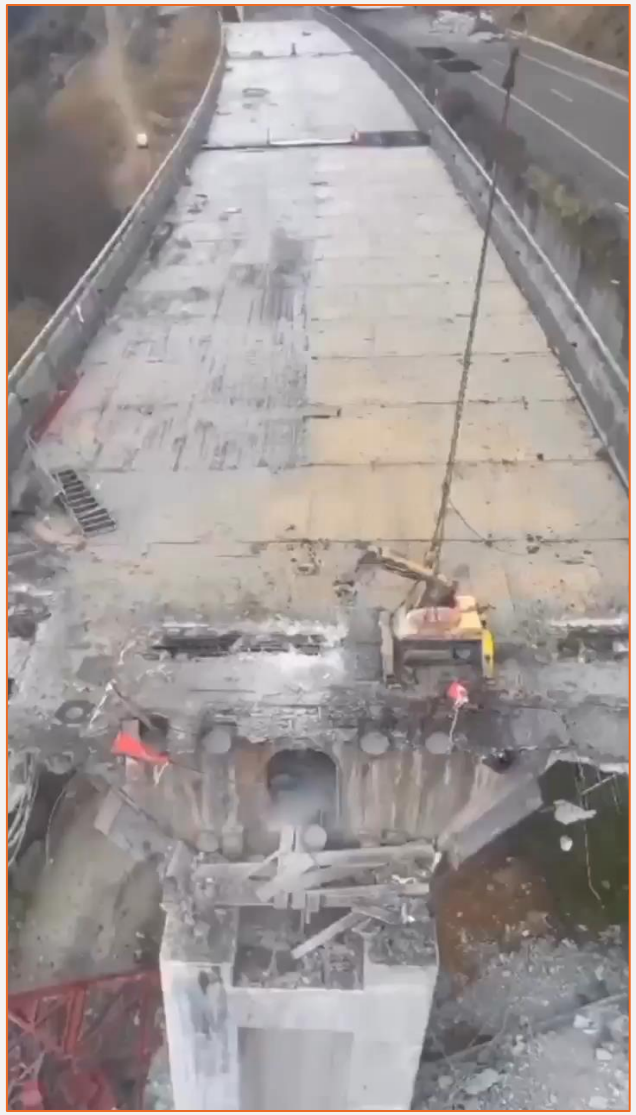
Why using IaC instead of a GUI?



Avoid: Road to “*Modularization Hell*” 🔥😈🔥



Hell – How bad Cloud Automation (IaC) works?



Focus on IaC

What is IaC?

Managing/Provisioning of **infrastructures** using **code**.

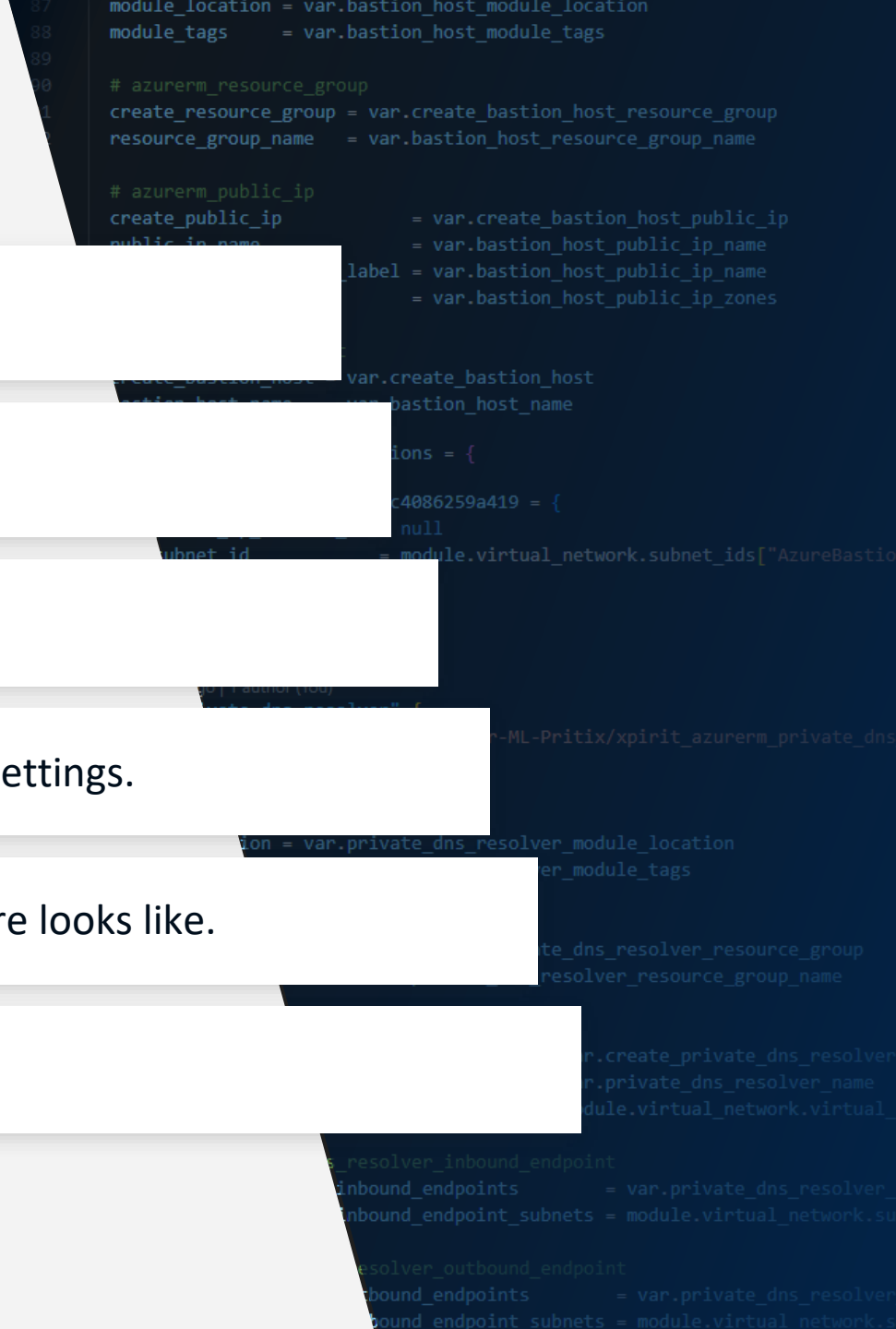
How resources, applications and environments are **configured**.

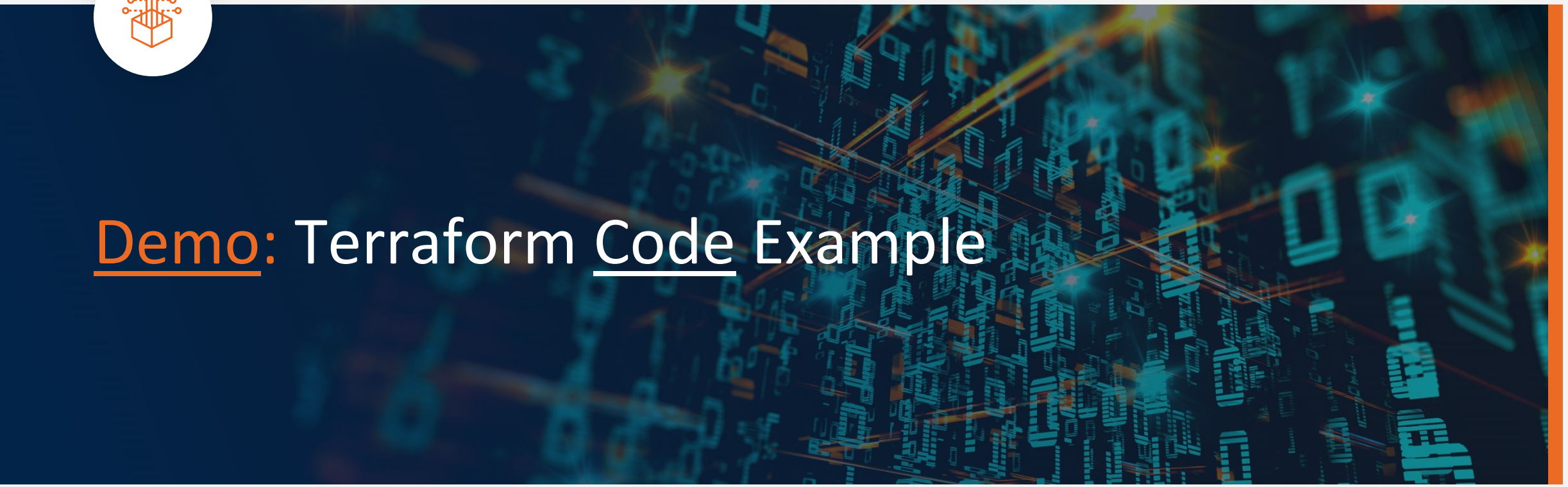
Code describes the resources and the whole **architecture landscapes**.

Declarative syntax can be used to specify the resources and detailed settings.

Human readable code files (`.tfvars`) describe how the infrastructure looks like.

Definition of **variables** and their **values** of the environment.





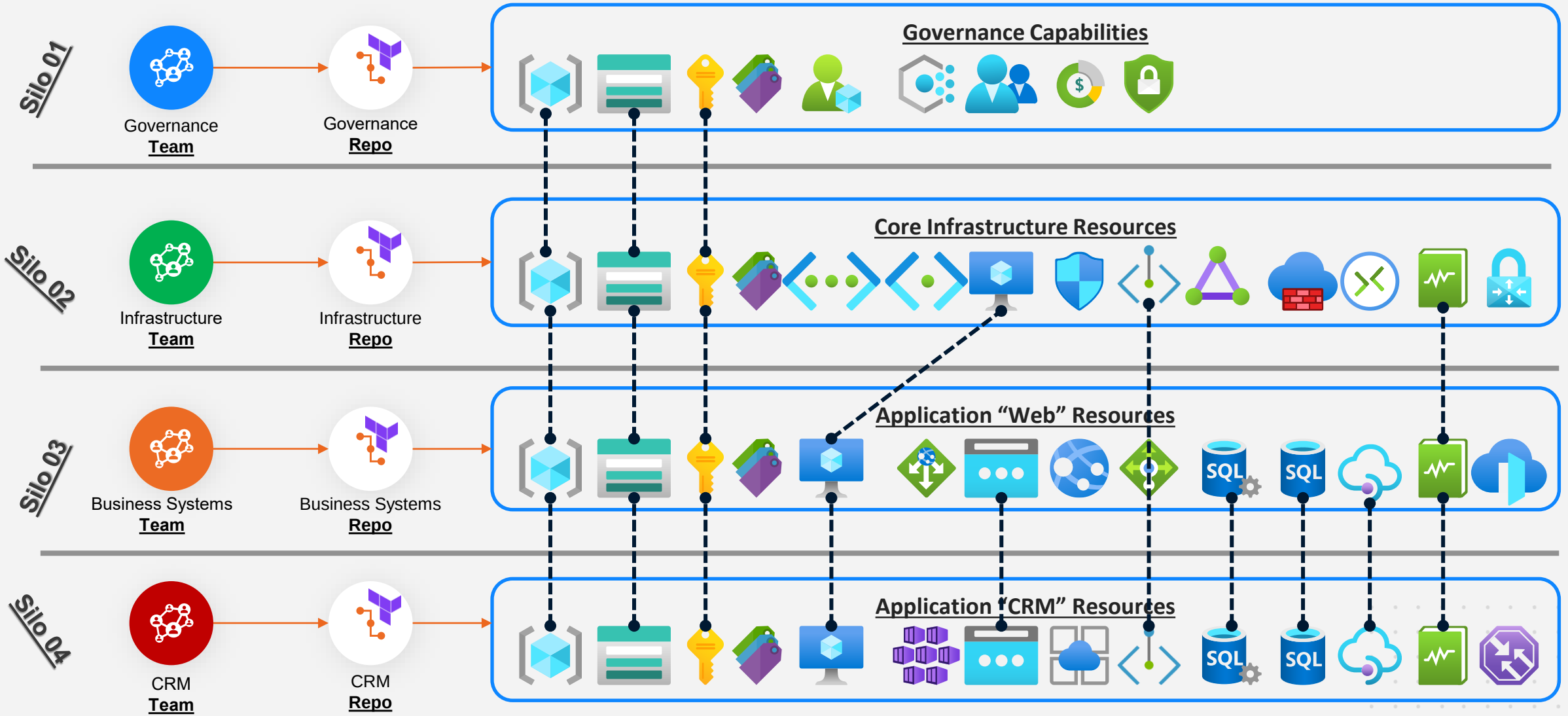
Demo: Terraform Code Example

Advantages of using an IaC approach

- Reusability - Creation of "repeating" infrastructures (**standardization/template**).
- Speed - **Faster** creation of resources and environments.
- Parallelization - Several developers can work on the same infrastructure **simultaneously**.
- Documentation - The **code definition file** is also the documentation of the environment.
- Consistency - The code reflects the **overall state** of the environment.
- Tracking - Use of source code management (**version control**).
- Order - Order of resource creation is managed **automatically**. Automate changes.
- Error/state handling - **No check** necessary if resources already exist ("*Desired State*").
- Quality - Less **human error** by using the same code ("*no-brainer*").
- Reproducibility - The **same code** always leads to the **same result**.
- Cost Reduction - Remove **manual** tasks. People refocus their efforts on enterprise tasks.

How IaC? – Modularization

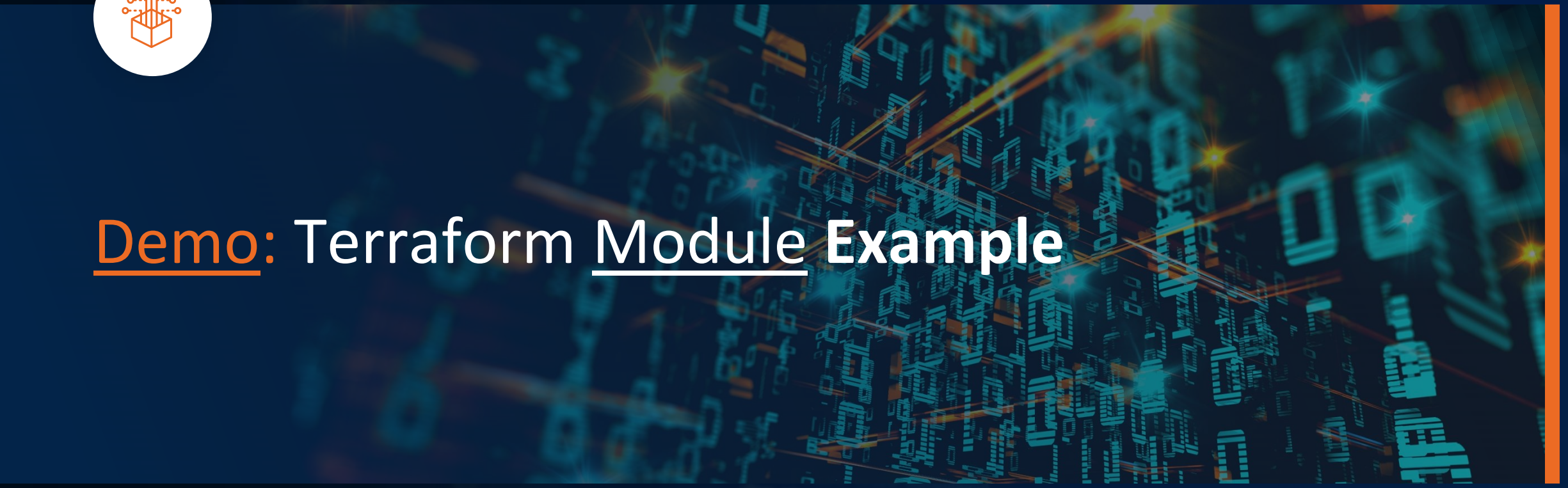
IaC – Status quo Situation



What is a module?

- Create lightweight **abstractions**
- Don’t describe **physical** objects
- Describe infrastructure in terms of its **architecture**
- Package and **reuse** resource configurations
- Separated in code **repositories**
- **Independently** usable & testable

“A module is a container for multiple resources that are used together.”



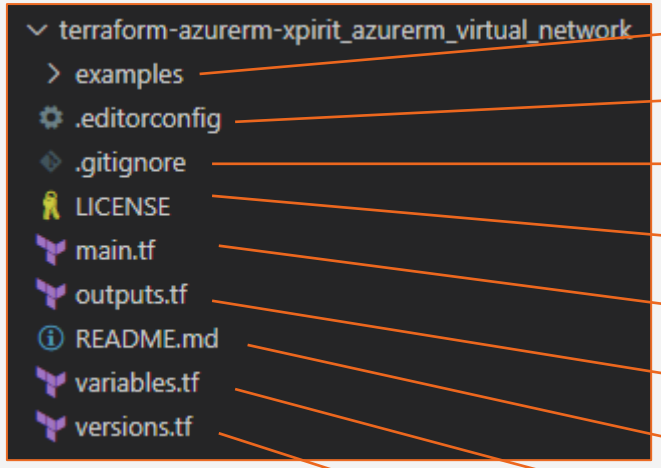
Demo: Terraform Module **Example**

Standard (Terraform) Module Structure

1. **file** & **directory** layout

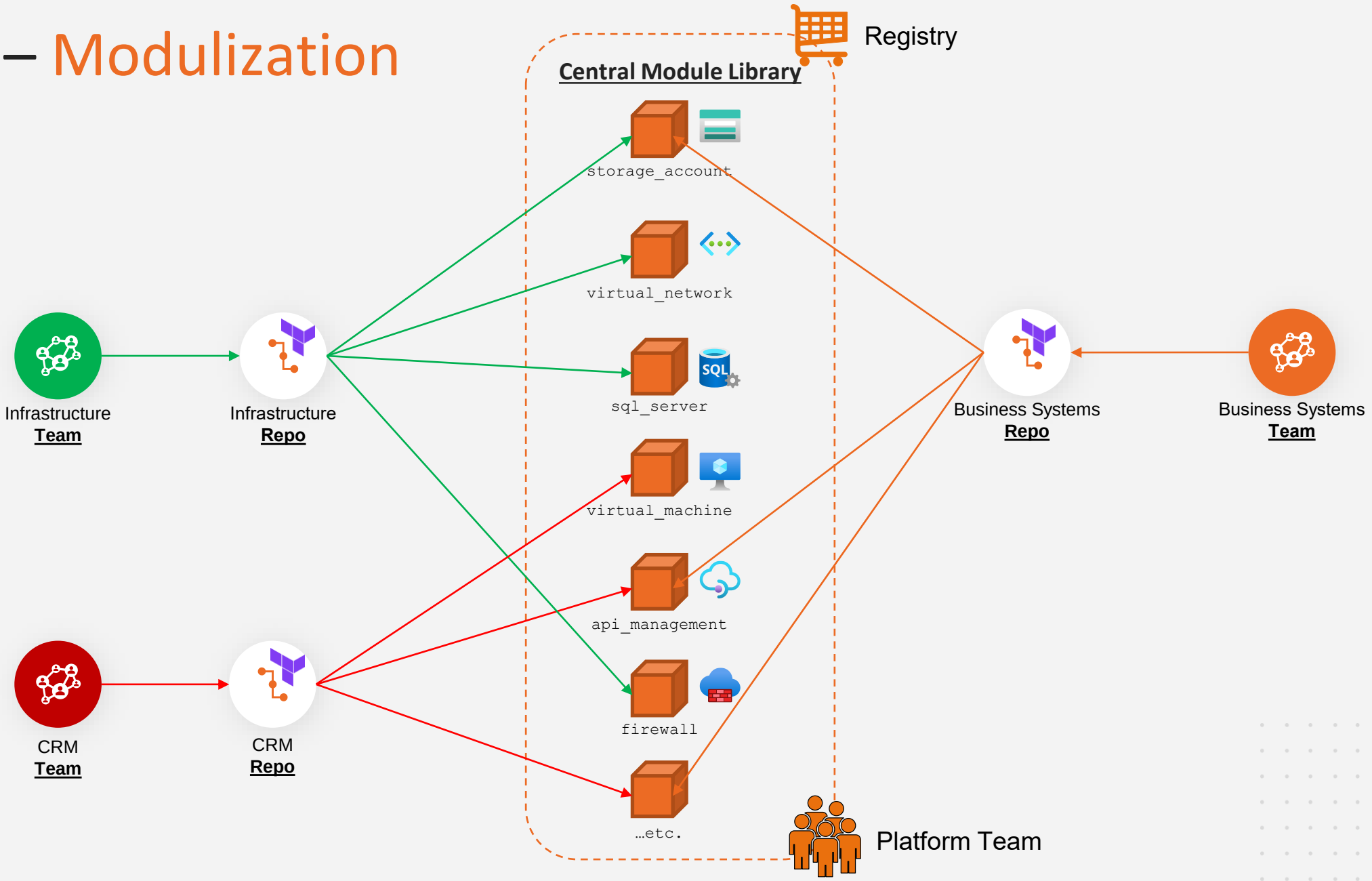
2. Distributed in separate repositories

3. Structure to generate documentation

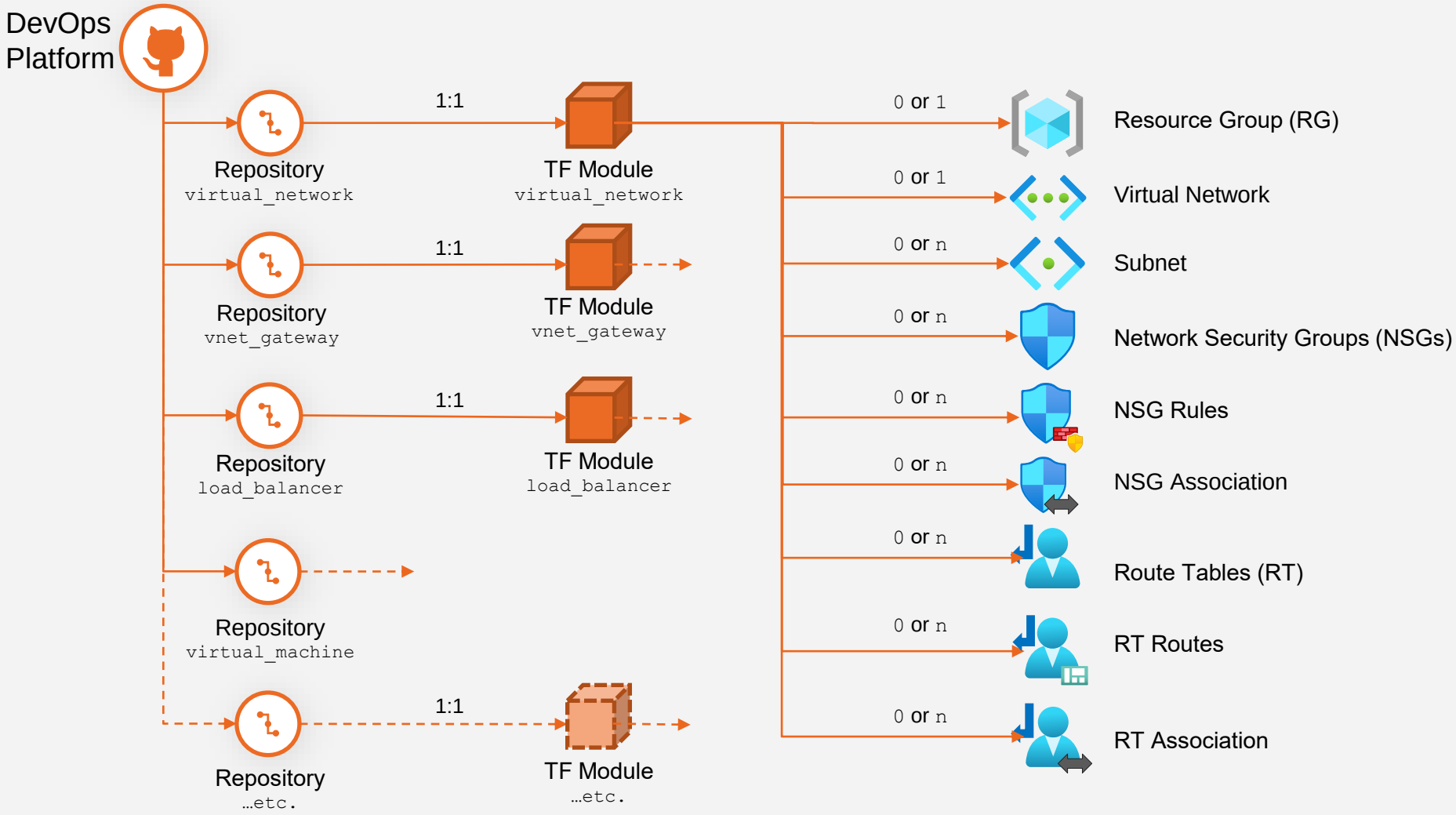


- `examples/` – separate subdirectory for each example incl. `README.md`
- `.editorconfig` – maintain consistent code style (Example)
- `.gitignore` – specifies untracked files that Git should ignore (Example)
- `LICENSE` – which this module is available (publicly, privately)
- `main.tf` – primary entry point, containing all needed resources
- `outputs.tf` – to return results to the calling module
- `README.md` – what the module should be used for (basic documentation)
- `variables.tf` – (declaration) to accept values from the calling module.
- `versions.tf` – (constraint) define supported terraform & provider version

IaC – Modulization



Standard Module Architecture



Creating Good Modules

1. Do one thing and do it as simply as possible
2. Provide options, but not too many option
3. Add value, do more than wrap a resource
4. Version appropriately
5. Make them easy to obtain
6. Keep them updated
7. Start simple and evolve
8. Create great documentation
9. Evangelize and engage
10. KISS & DRY → But avoid “thin wrappers”

Source: Sam Cogan (Video: Reuse, Don’t Repeat) & Thomas Thornton (Link)

How to publish Modules?

Use a Terraform Registry

TF Cloud helps teams to **provision** infrastructure.

Support for **versioning** and list of **providers** and **modules**.

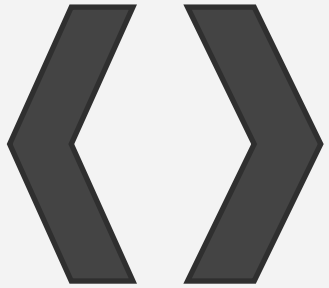
Handles **downloads** and **access** with TF Cloud API tokens.

Consumers do not need **direct** access to the module's repository.

Public Registry

https://**registry**.terraform.io

Share Terraform providers and Terraform modules public.



Private Registry

https://**app**.terraform.io

Hosted on an organization's private registry and are only available to members

Demo: Terraform Cloud – **Private** Registry

How to publish Modules?

- Local file system

```
module "dd34208a_7c40_4dd2_beb5_4a5bf4d21d22" {
  source = "../../../module-library-azurerm/terraform-azurerm-xpirit_azurerm_management_group"

  create_management_group                                = true
  management_group_name                                  = "c06835d9-1135-4b19-b403-749c06443f4c"
  management_group_display_name                          = "mg-pritix"
  management_group_subscription_association_subscription_ids = []
}
```

- Directly from the repository

```
module "dd34208a_7c40_4dd2_beb5_4a5bf4d21d22" {
  source = "git::https://github.com/rapster83/terraform-azurerm-xpirit_azurerm_management_group?ref=v3.42.0-0.0.3"

  create_management_group                                = true
  management_group_name                                  = "c06835d9-1135-4b19-b403-749c06443f4c"
  management_group_display_name                          = "mg-pritix"
  management_group_subscription_association_subscription_ids = []
}
```

- Private registry

```
module "dd34208a_7c40_4dd2_beb5_4a5bf4d21d22" {
  source  = "app.terraform.io/Customer-ML-Pritix/xpirit_azurerm_management_group/azurerm"
  version = "3.42.0-0.0.2"

  create_management_group                                = true
  management_group_name                                  = "c06835d9-1135-4b19-b403-749c06443f4c"
  management_group_display_name                          = "mg-pritix"
  management_group_subscription_association_subscription_ids = []
}
```

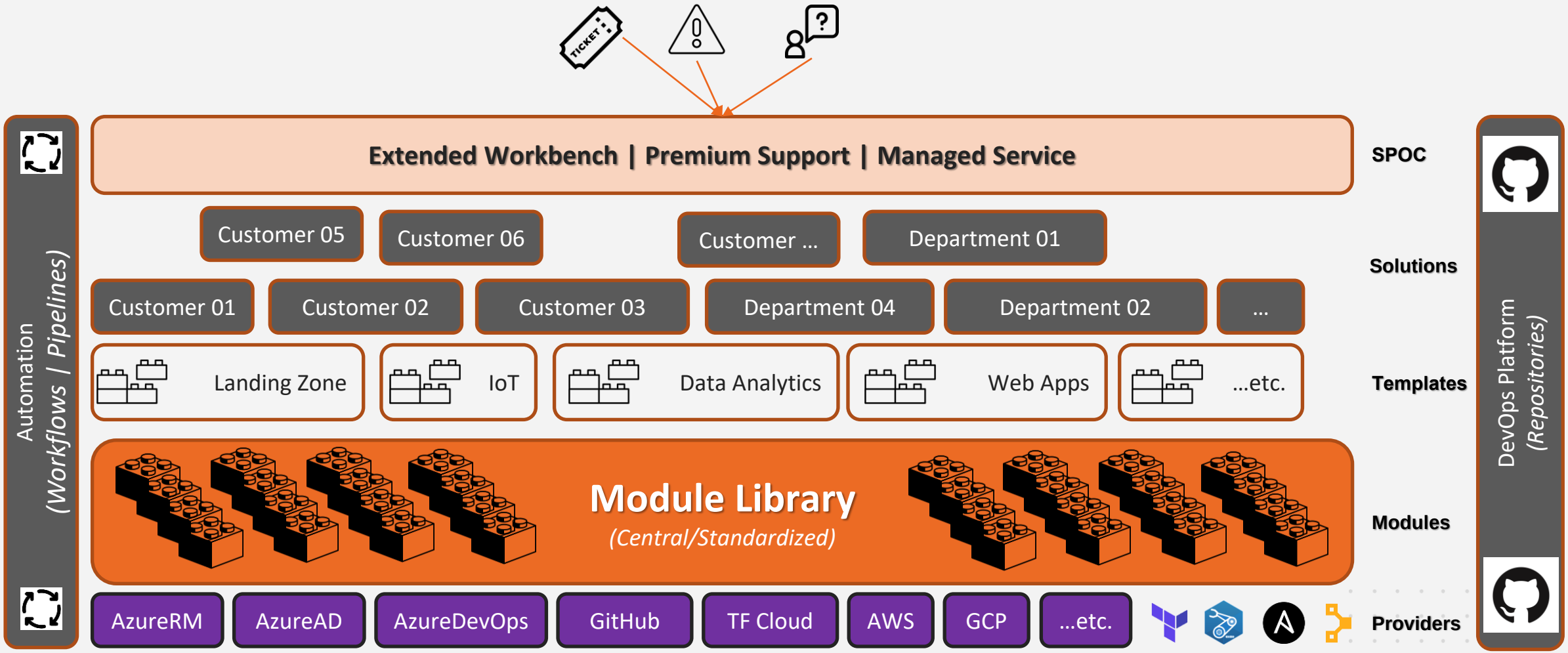
- Public registry (→ TF Registry)

```
module "dd34208a_7c40_4dd2_beb5_4a5bf4d21d22" {
  source  = "azrappster83/management_group/azurerm"
  version = "4.0.0"

  create_management_group                                = true
  management_group_name                                  = "c06835d9-1135-4b19-b403-749c06443f4c"
  management_group_display_name                          = "mg-pritix"
  management_group_subscription_association_subscription_ids = []
}
```

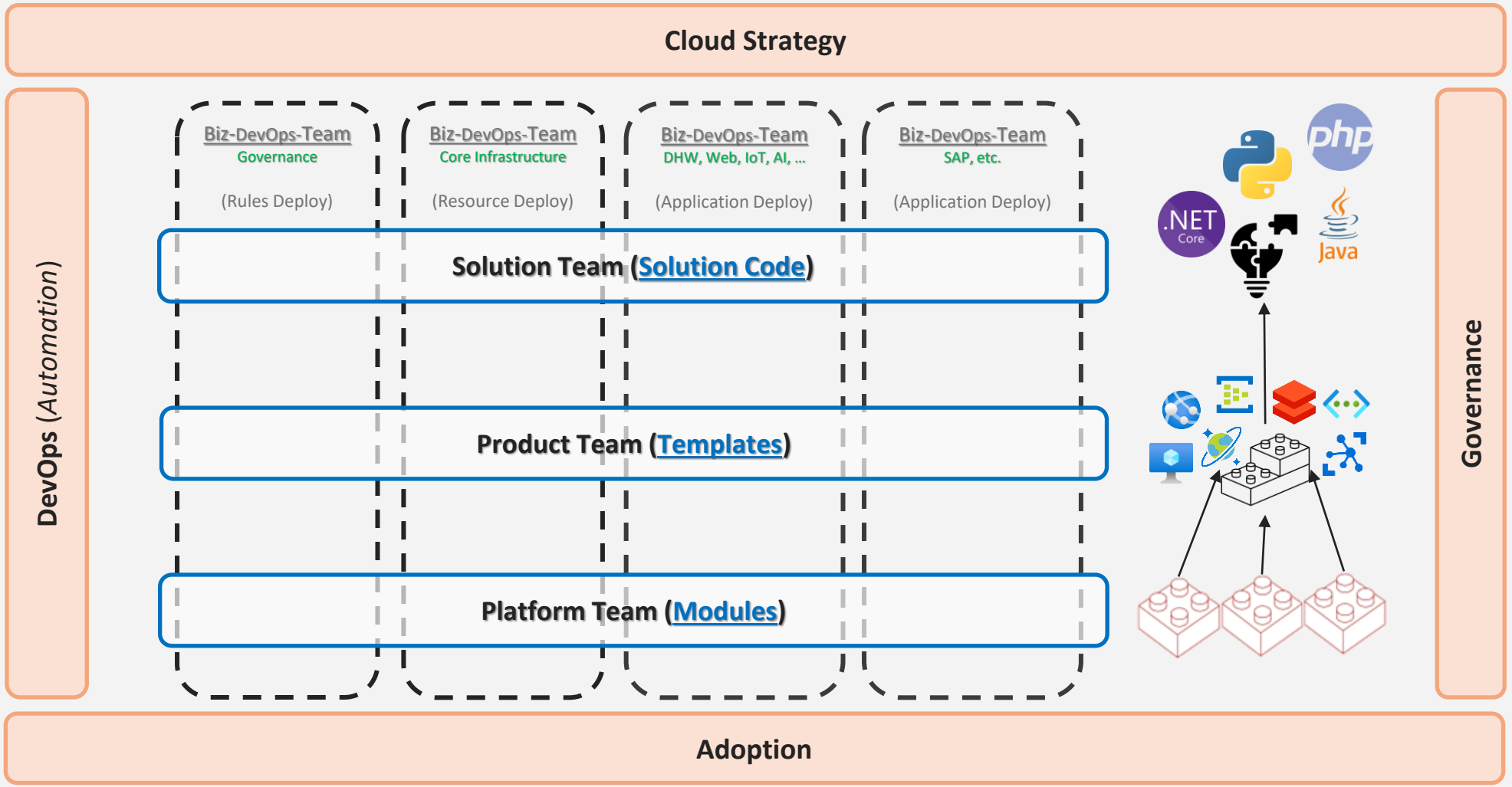
Cloud Operating Model

IaC – Organization (Modules & Templates)



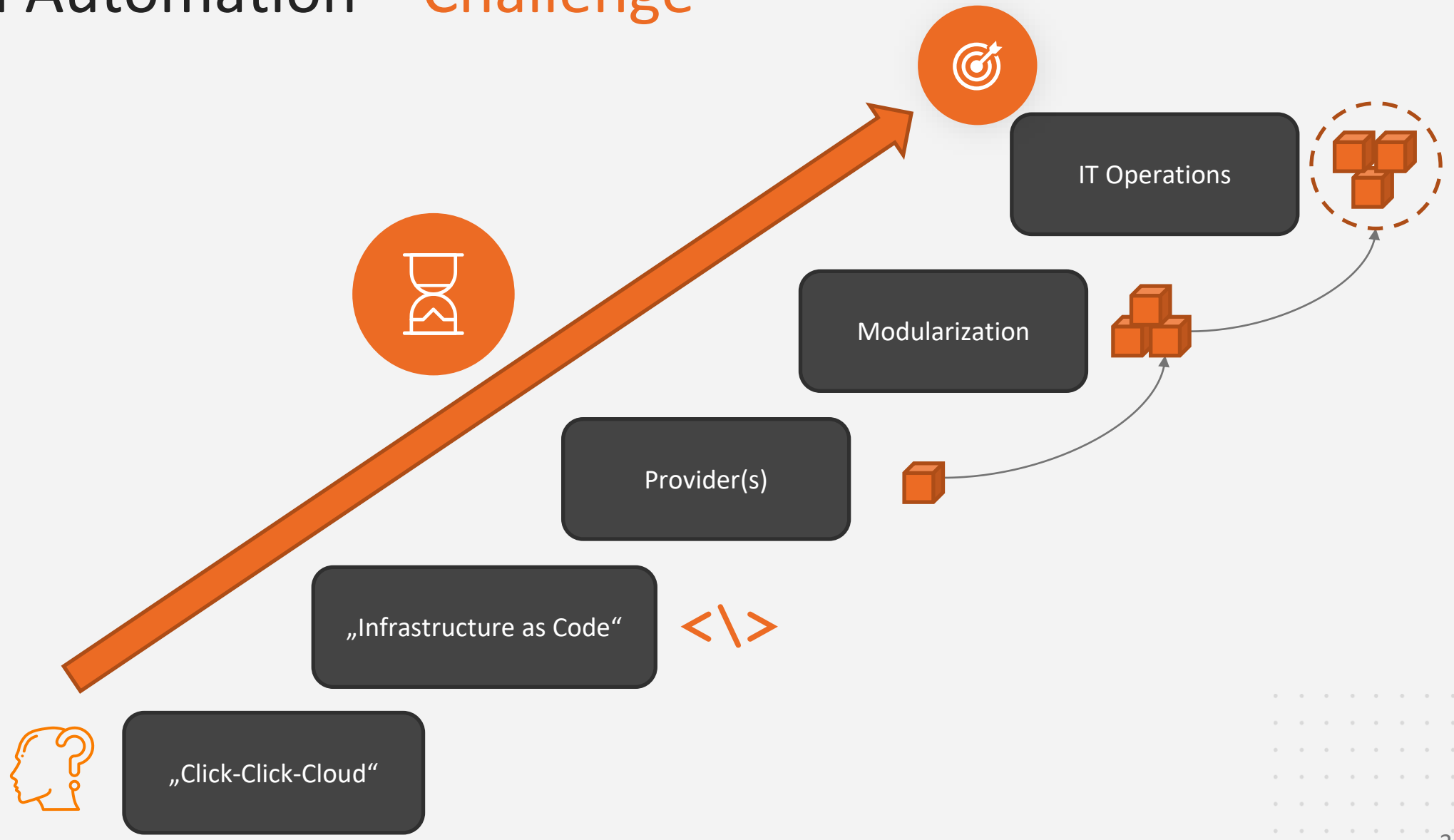
Future Cloud Operationing Model

Principal: *"You deploy it" – "You own it"* *"You build it" – "You run it"*



Essentials (Summary)

Cloud Automation – Challenge

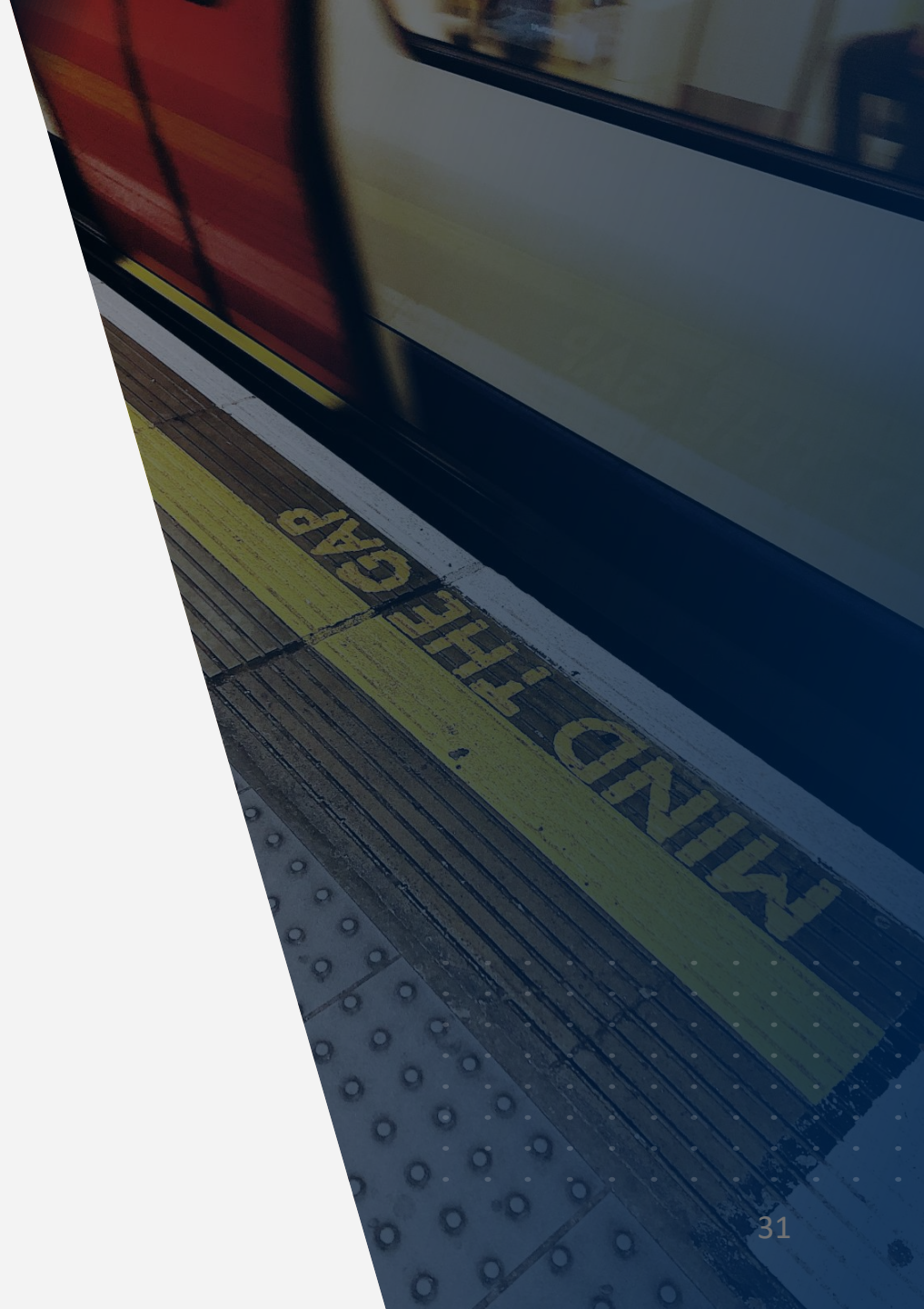


Mind the Gap

*"…In a cloud-first and increasingly automated world, infrastructure and operations (I&O) leaders must **rethink** how infrastructures are utilized and managed…"*

*"Strategic infrastructure **standardization**, modernization and **automation** efforts will be **critical** for successful digital transformation."*

Source: Gartner (*4 Predictions for I&O Leaders on the Path to Digital Infrastructure*)



Modularization Best-Practices

1. Establish **central** (standardized) module libraries (**Registry**)
2. Multi-Cloud **Scenarios** → Multi-Provider **Modules**
3. Be familiar provider docs, updates and changelogs
4. Keep pace with the provider **releases** (“*Don’t get left behind!*”)
5. Strive for feature completion & automation
6. Provide `default` values and `descriptions` for variables
7. Put code guidelines in place (naming consistency)
8. Use `versions.tf` in the **module**
9. Follow the “*shit in – shit out*” principal (less validations)
10. Separate the state files into logical pieces → 😈

Stefan Rapp

Cloud Solution Architect (CSA)
Xpirit Germany GmbH

https://www.linkedin.com/in/rapster83

@rapster83

https://blog.misterazure.com

Microsoft CERTIFIED EXPERT

- 15 years in IT Consulting
- 6 years MS Development & Infrastructure
- Since 2018 Azure Governance & Infrastructure
- Application Modernization towards Azure
- Pushing IaC (Terraform) at customers

33

Thank you (Q&A)

Blog : https://blog.misterazure.com

GitHub : @rapster83

LinkedIn : https://www.linkedin.com/in/rapster83/