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Zabbix in Mining: Benefits of Host Discovery and Automatic Creation of Maps and Hosts

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Vale S.A.

IT Analysts

Agenda

Introduction.

Our Adoption Journey.

Motivation for Change.

Comparison Between Tools.

Cases

1. Data Collection from PIMS.

2. Monitoring Dam Surveillance Cameras.

3. Discovery and Automatic Creation.

Introduction

Who we are

Gil Amaral (ZCS AS-2211-067)

- From Minas Gerais
- Married, two children
- +20 years in Telecom, Automation, Electrical, Mining, Monitoring, and Observability

Frederico Torres

- Born in Rio de Janeiro, Living in Vitória (Brazil)
- Married to Alessandra
- +30 years in Technology, Linux, DevOps Observability and Project Management . . .
- I Love to cook ☺

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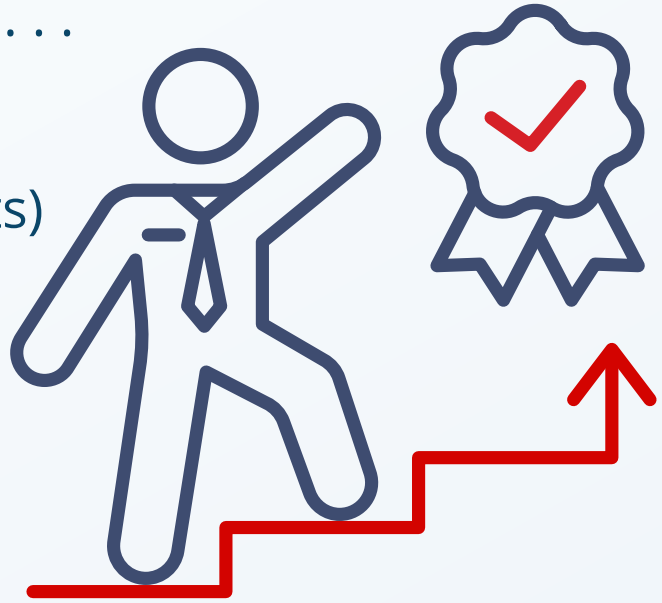
Our Adoption Journey

- Started in 2012 with a commercial tool for IT only
- 2019 new scenario - integration between IT and OT
- The previous tool worked very well for 11 years. . . . .
- PoC with Zabbix started in mid-2021
- Zabbix Go Live in April 2023 (monitoring 30 K hosts)
- What makes Zabbix stand out:
  - ✓ Reliable, Flexible, Scalable
  - ✓ Costs (annual savings of + US$ 1 MM)
  - ✓ Of course, the most important thing of all... Zabbix never stops!



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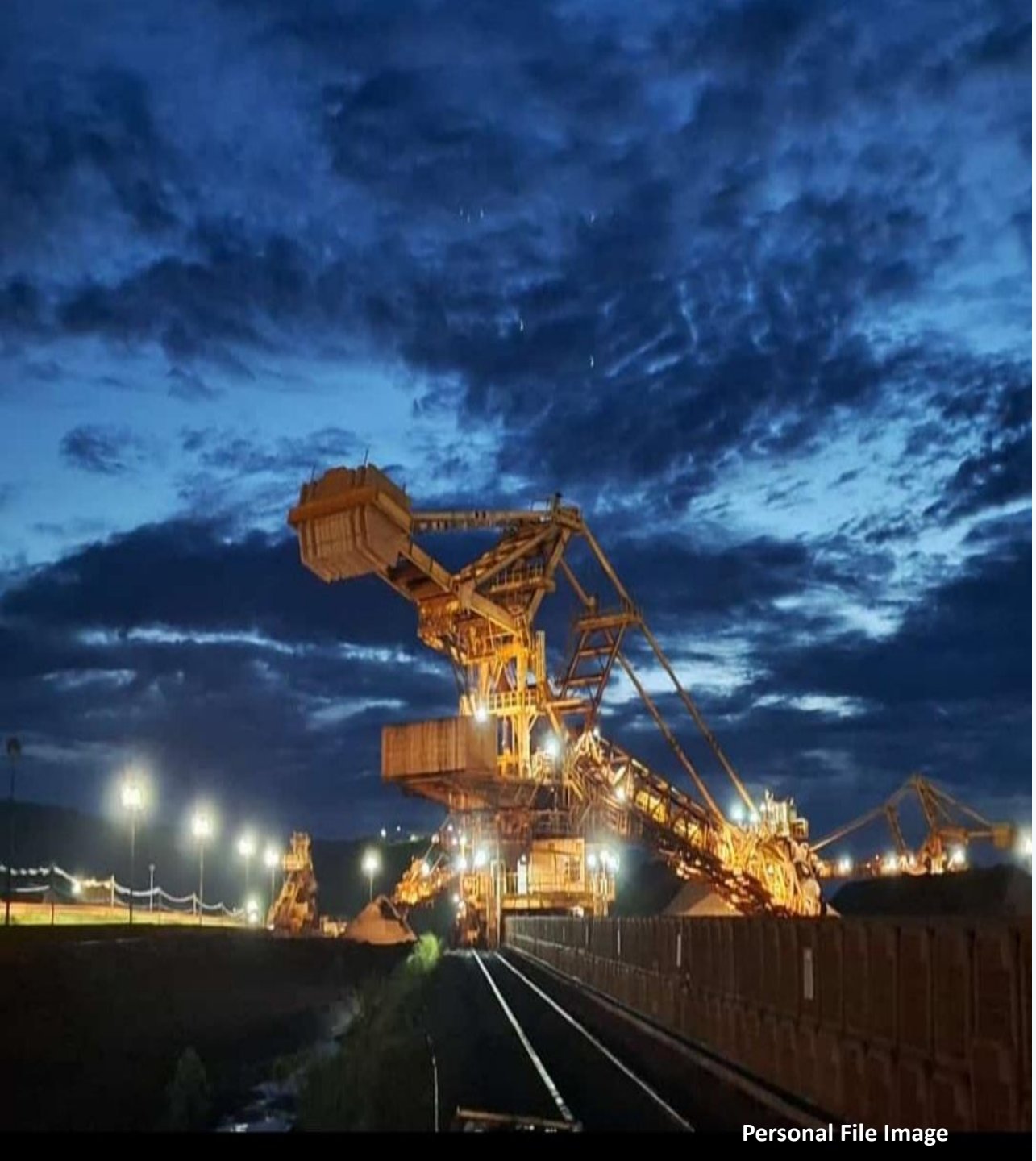
Statistics

Vale & Zabbix Scenario

- 10 Servers
- 60 Proxies
- 45 K Hosts
- 7.2 MM items
- 1.6 K Users
- 4.0 K NVPS

- 300 MM tons
- 150 K employees
- in 30 countries
- LTE, WiMAX, LoRa, MPLS, SDH, Radio, DWDM, SDN, Energy, Automation, Cloud



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Case 1

Data Collection from PIMS

Plant Information Management System

Case 1 – Data Collection from PIMs

Overview

Before Zabbix “we” couldn't collect data from the OT environment

- The device was not connected to the network
- The data was too sensitive to be available
- The device is critical

What is a PIMS System?

Plant **I**nformation **M**anagement **S**ystem

PIMS stores all information from various sources of an industry, allowing data visualization.

Each item is called a TAG and we have +700 K

Case 1 – Data Collection from PIMs

Real-world problem in the field

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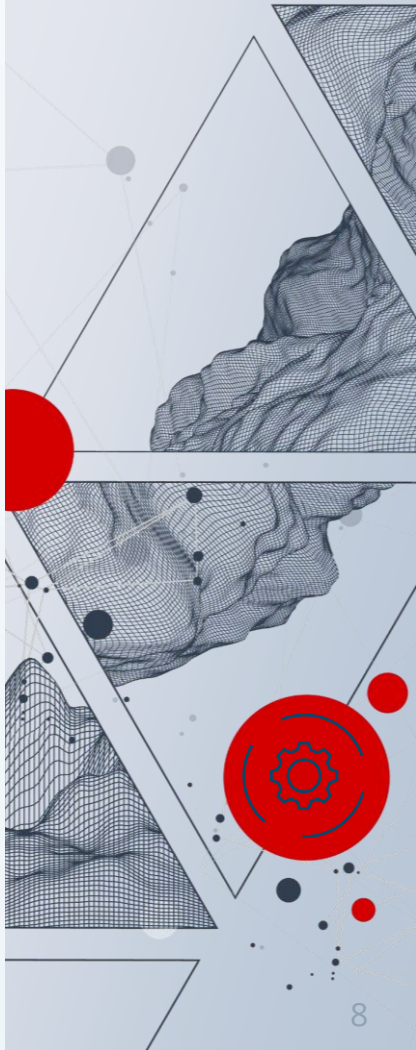
Scenario

- The Production Line **stops** every time the equipment (BWE) gets close to the antenna due to RF saturation caused by high radio TX Power.
  - 2023:
    - ✓ 12h stoppage
    - ✓ + 7 Kt transported
    - ✓ + $ 700 K USD
  - Objective:
    - ✓ Reduce exposure to risks for maintenance teams
    - ✓ Reduce failures due to RF saturation
    - ✓ Cost Avoidance



Case 1 – Data Collection from PIMS

Solution

HTTP GET

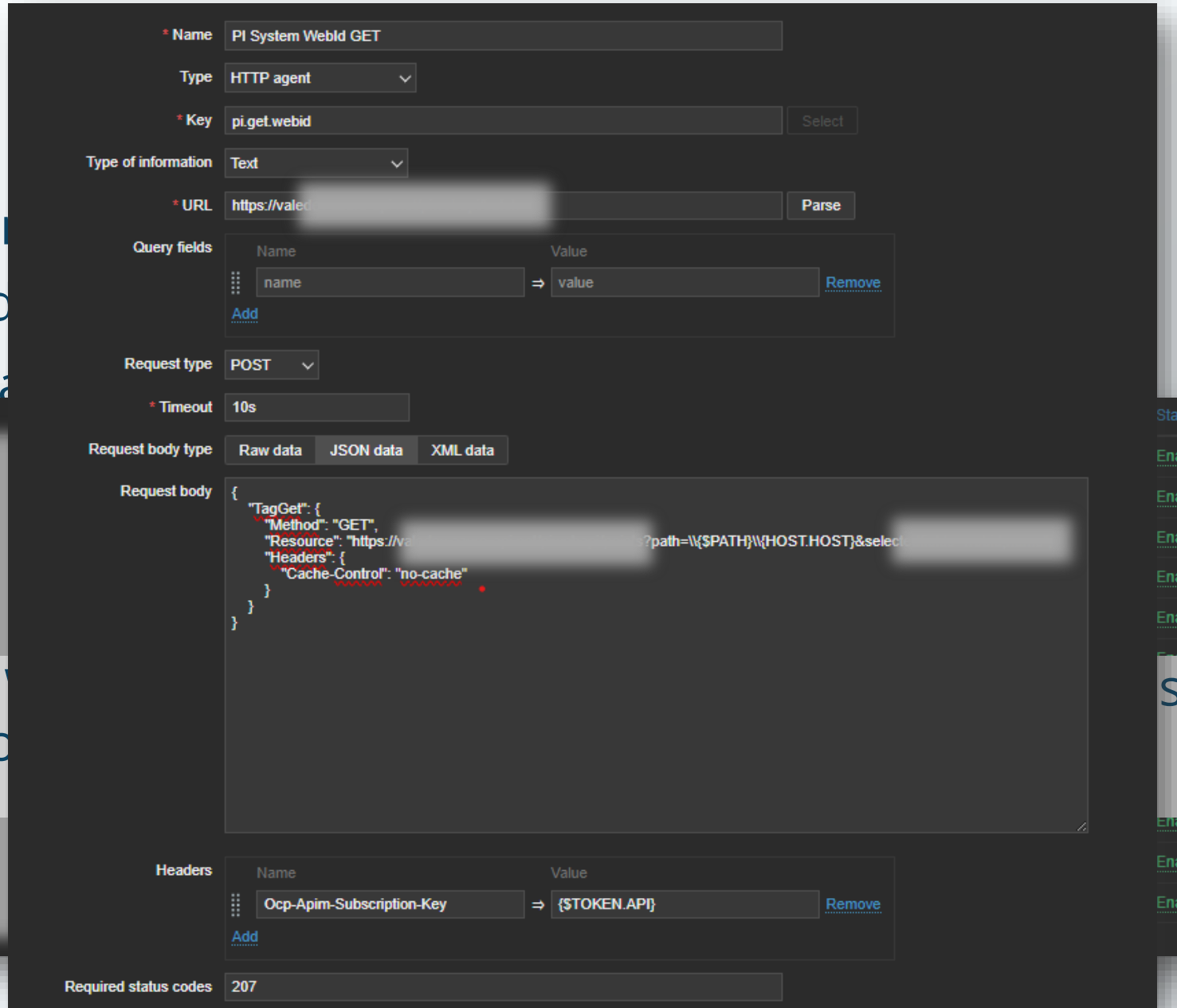
Collections ever

TAGs registered

The Template ha

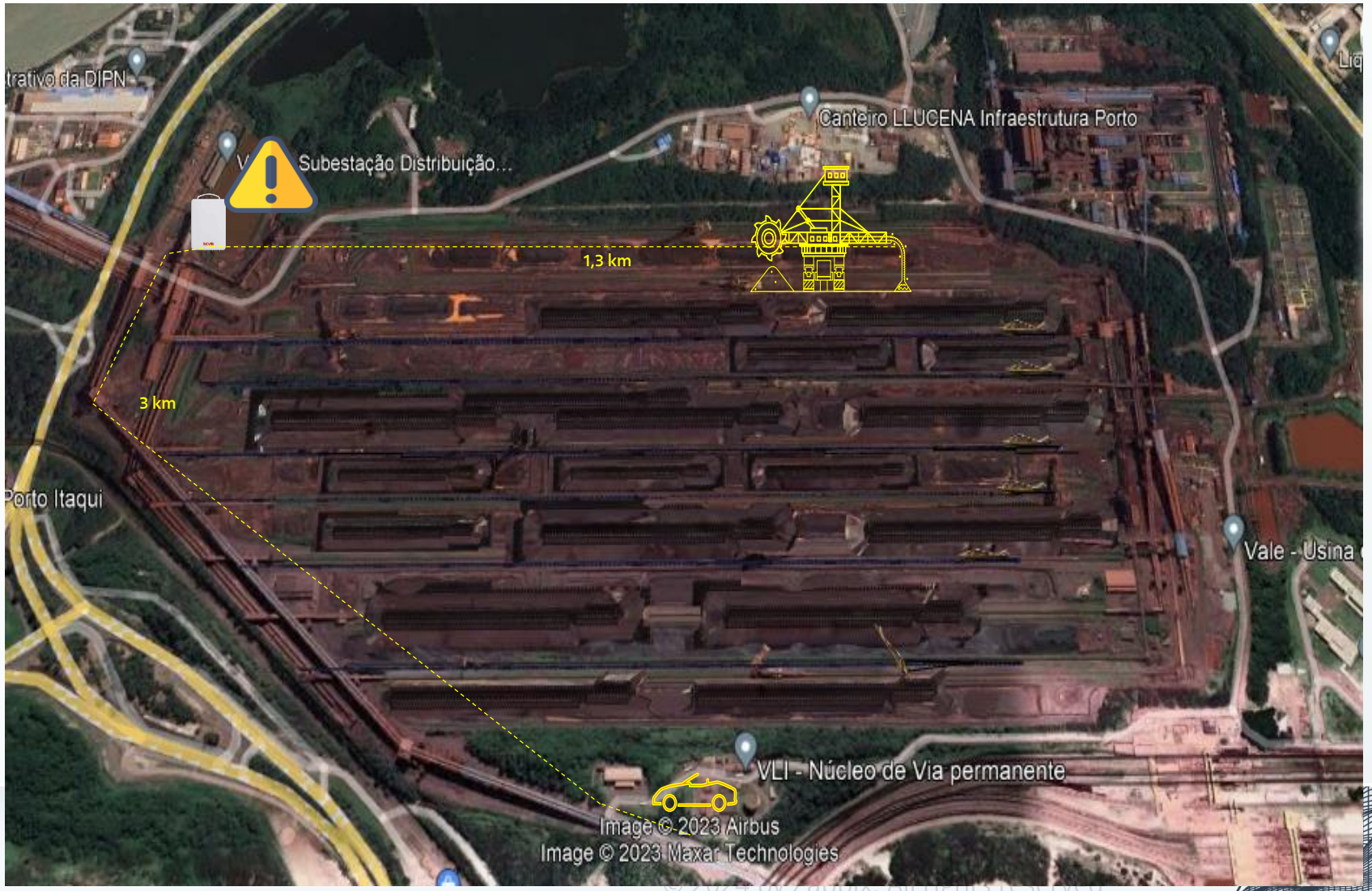
The PI System W
JSON format to

s a POST in



Case 1 – Data Collection from PIMs

Real-world solution in the field



- **BWE in Motion**
- **RF Saturation**
- **Maintenance Activation**

Case 1 – Data Collection from PIMs

Zabbix send remote command to adjust TX Power

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Problem	Duration	Ack	Actions	Tags
Máquina em Baliza 72-106: Ajuste Potência CFTV	13s	No	2	device-proxy: SLS-PO... device-type: Wireless
Máquina em Baliza 72-106: Ajuste Potência CFTV				
Máquina em Baliza 72-106:	1m	No		device-proxy: SLS-PO... device-type: Wireless

Time	User/Recipient	Action	Message/Command	Status	Info
2023-09-04 13:19:27			Remote command	Executed	
2023-09-04 13:19:27			Remote command	Executed	
2023-09-04 13:19:24					

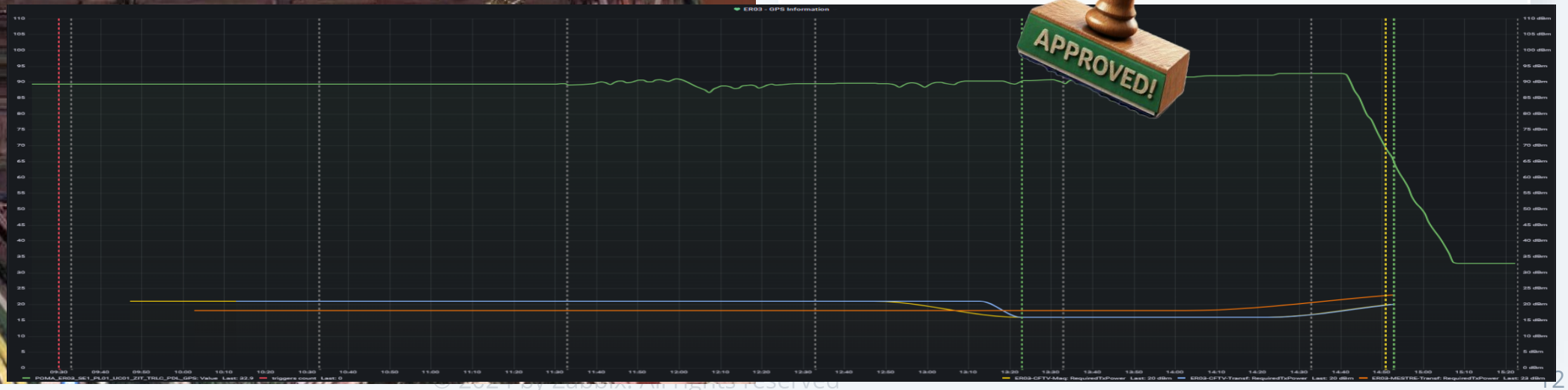

Image Google Earth

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Case 2

Monitoring Dam Surveillance Cameras

https://github.com/vsmjoao14/zabbix-monitoring-camera-recording

Monitoring Dam Surveillance Cameras

Legally obligated to retain the images for 90 days

- How we did before Zabbix
  - The work was all done manually by a human analyst
  - Needed to validate if all 100 cameras were functioning
  - Check the cameras recordings
  - Validate the images

This work took around 4 hours per day. Even so, it was still susceptible to human error.

Camera Recording Validation

Linux Shell Script - FFmpeg Utility

- We use Zabbix to access the Network Video Recorder to validate
  - If the images are being recorded
  - How long are these images stored
  - How much time do we have left to store more images
- Alarms on triggers
  - Camera is not recording
  - Camera with less 90d recording

Benefits of Automation

- Time Reduction:

The inspection that previously took 4 hours is now completed in just 3 seconds.

- Efficiency:

Automation eliminates the possibility of human errors, ensuring a reliable inspection.

- Real-Time Monitoring:

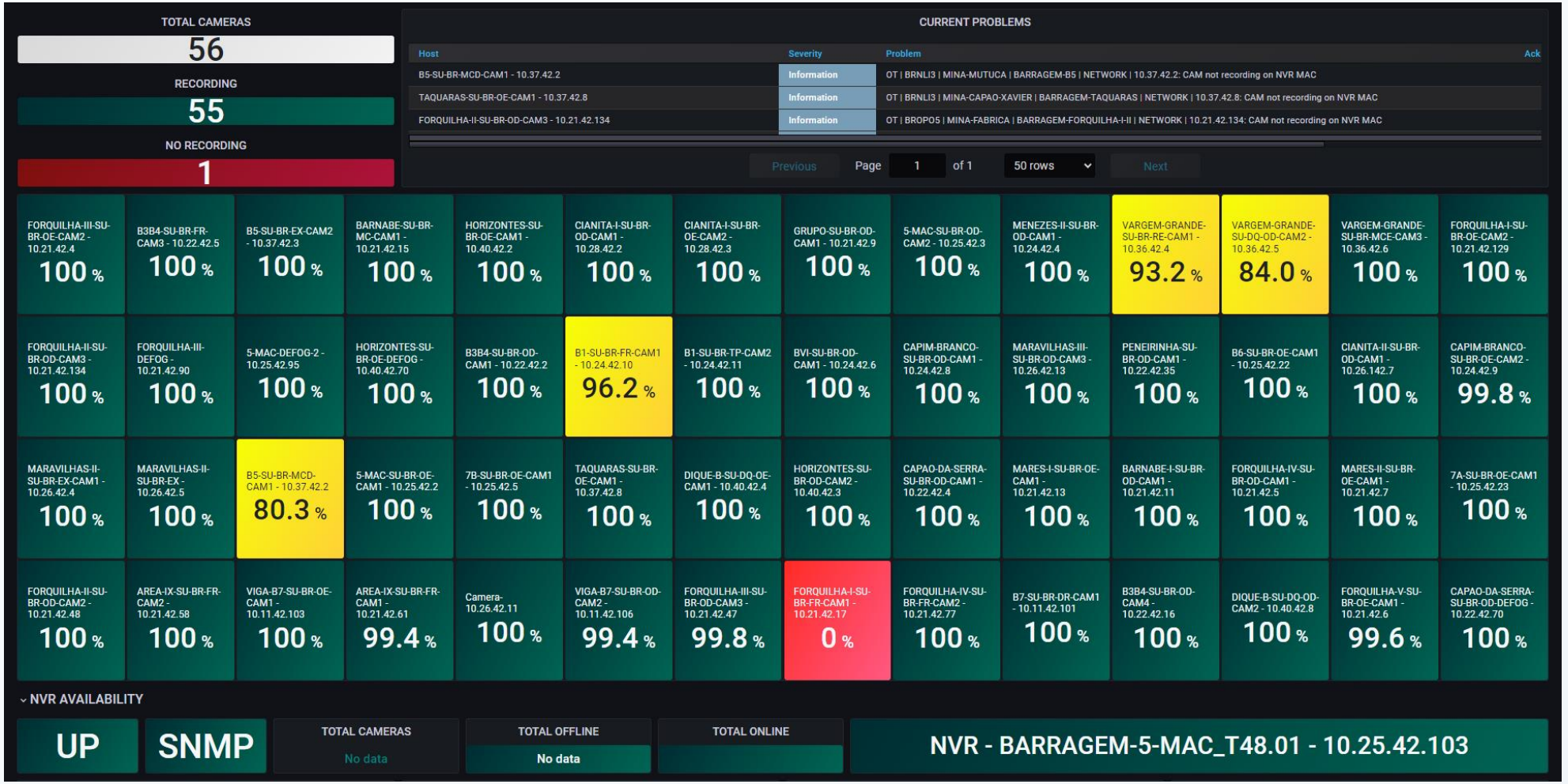
The colorful dashboard allows analysts to quickly identify items that need attention.

- Increased Productivity:

With the reduction in inspection time, analysts can focus on other important tasks.

Resulting in significant time savings, decision-making and increasing productivity.

Unified Visualization Dashboard



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Case 3

Host Discovery and Auto Map Creation

https://github.com/matheuskshn/Zabbix-Map-Manager

Challenges and Motivation

- Previous Tool:
  - The tool was reliable and effective for 11 years
  - Generating maps and host connections automatically
  - Just required indicating the' network IP address

- Current Situation with Tool Migration:
  - We need to manually create more than 800 maps
  - Add about 30,000 devices
  - Make connections between them and create all triggers and alarms

First Version – Map Creation

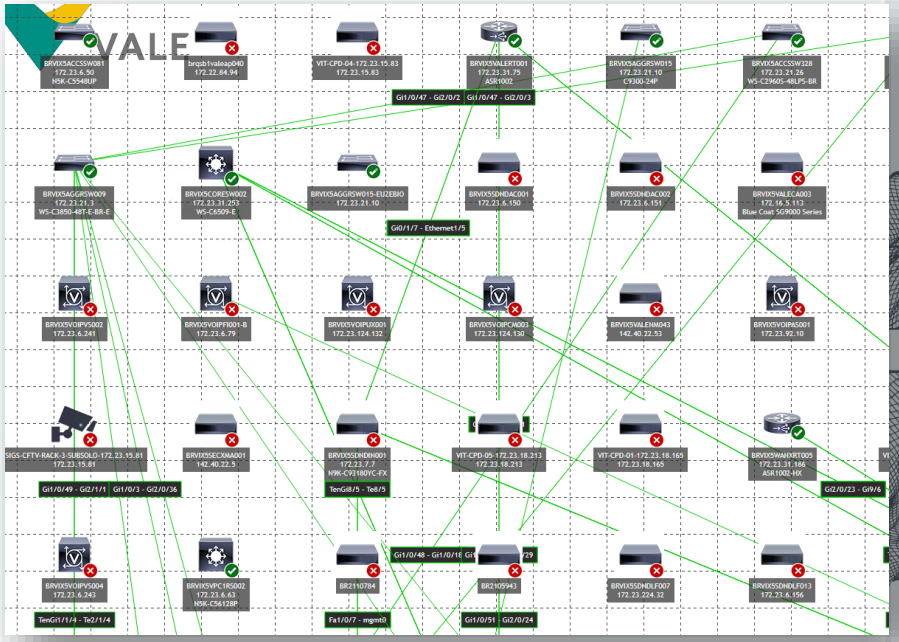
- First draft:
  - Create maps more easily and quickly
  - Discover the neighborhood
  - Reduce the incidence of errors
  - Create a standard for icons, colors and shapes

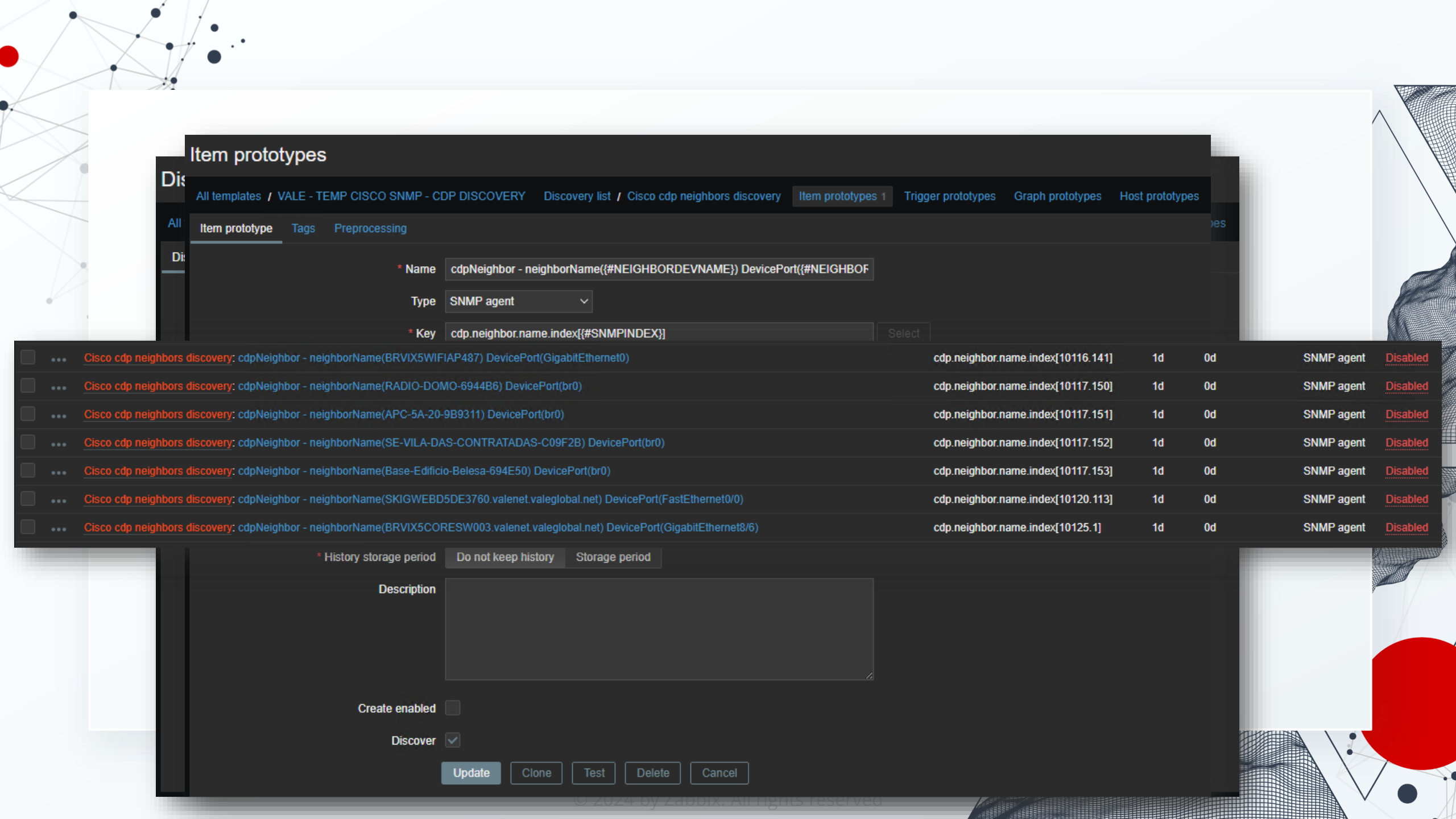
First Version – Map Creation

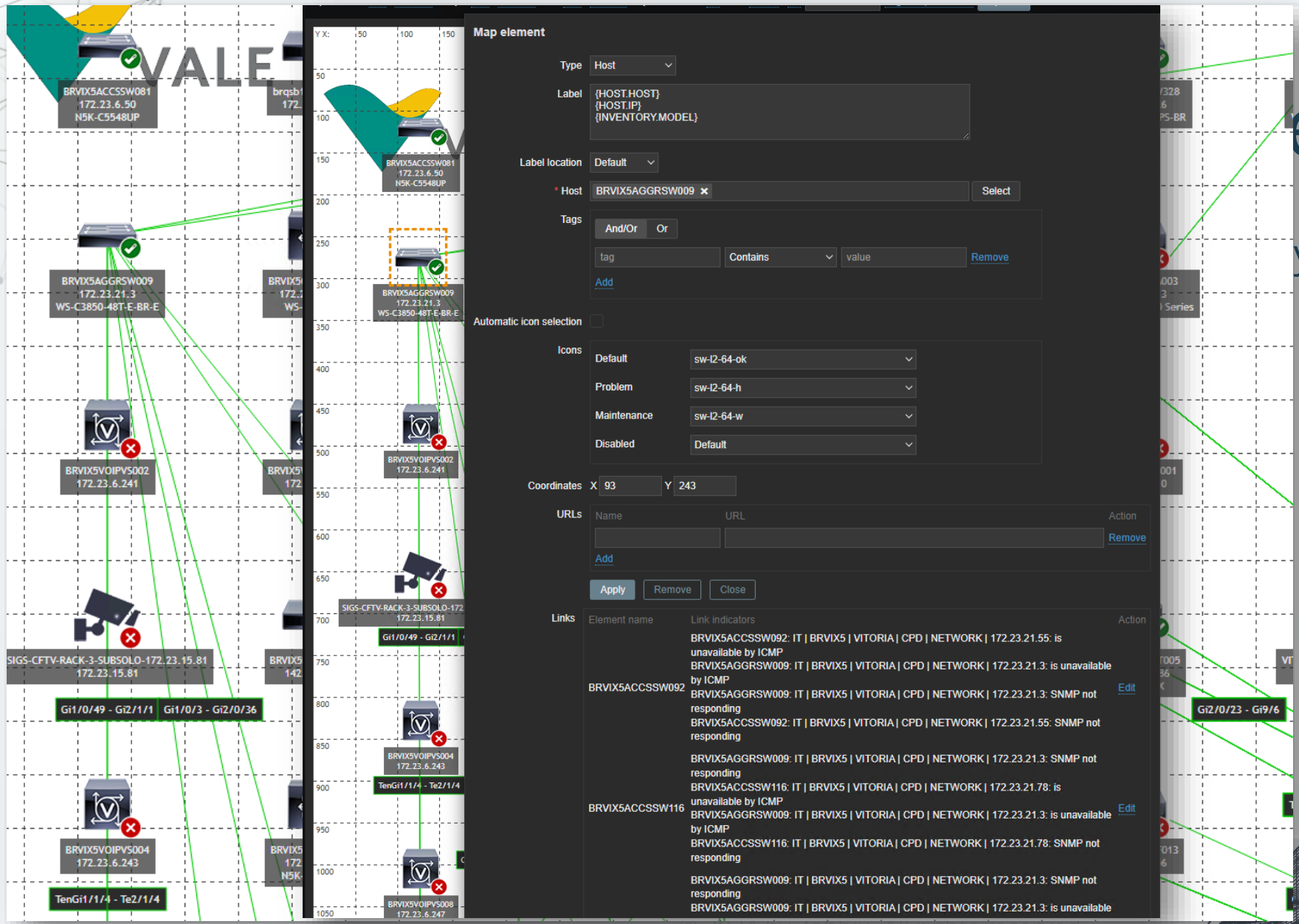
- Python + PyZabbix (Started via terminal)
  - Based on a hostgroup
  - Size (based on the number of hosts)
  - Each element was created with Label
  - Icons based on the hostname pattern

Second Version – Link between hosts

- Implemented link creation between hosts
  - Feed the Ansible inventory with target IPs
  - CDP playbook Ansible
  - Txt output "show cdp neighbors"
  - Python script transforms txt into csv
  - Collect neighbor IDs in Zabbix
  - Using the csv file inserted into the script
  - Based on the IDs, it created map elements with their links







eation

y for each link:

Nome do Mapa

Informe o nome do mapa que deseja criar:

Exemplo: VALE/IT/BRAZIL/ES/VITORIA/BRVIX5/CPD-DATACENTER

- [ ] Adicionar um grupo de hosts
- [ ] Adicionar hosts
- [ ] Adicionar IPs
- [ ] Adicionar hosts por filtro
- [ ] Criar Link entre os elementos
- [ ] Adicionar Trigger nos links

Criar Mapa

Who Making it Happen: The Hidden Heroes!

Allan Dymitri

Anderson Carvalho

Douglas Ponciano

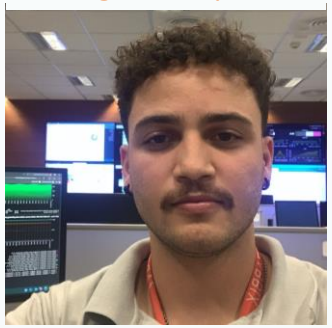
Edson Nunes

Euzebio Viana

Fabiana Milanez

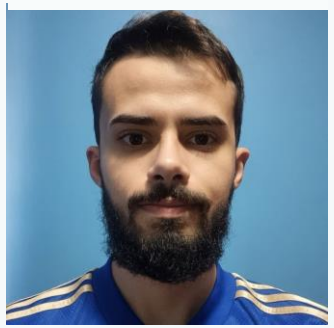
Heitor Cortat

Higor Campos



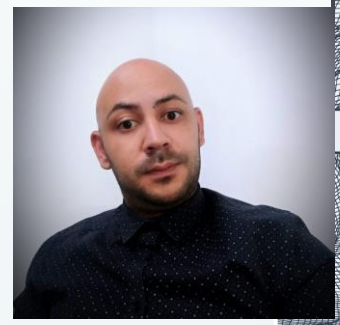
Igor Soares

João Victor



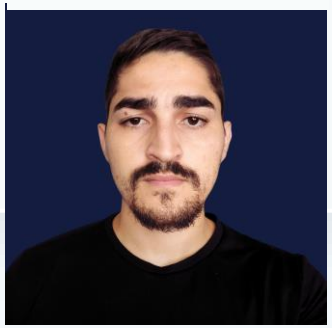
Lucas de Oliveira

Marcell de Oliveira



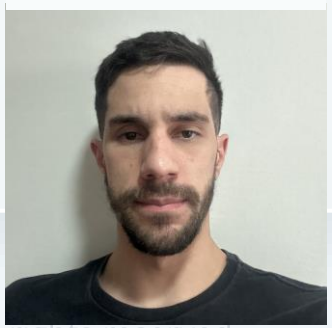
Marcos Vinicius

Matheus Lino



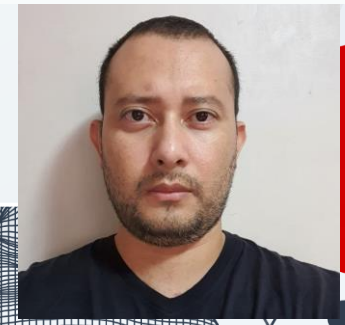
Maycon Borges

Nikolas Ferreira



Thiago Campos

Wanderson Pamplona



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Marcos Vinicius

Matheus Lino

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Nikolas Ferreira

Thiago Campos

Wanderson Pamplona

Thank You All !

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