



**eSAAM 2023**

**on Cloud to Edge Continuum**

# **PIACERE Integrated Development Environment**

**Gorka Benguria Elguezabal (tecnalia)**

**[gorka.benguria@tecnalia.com](mailto:gorka.benguria@tecnalia.com)**

Oct. 17, 2023

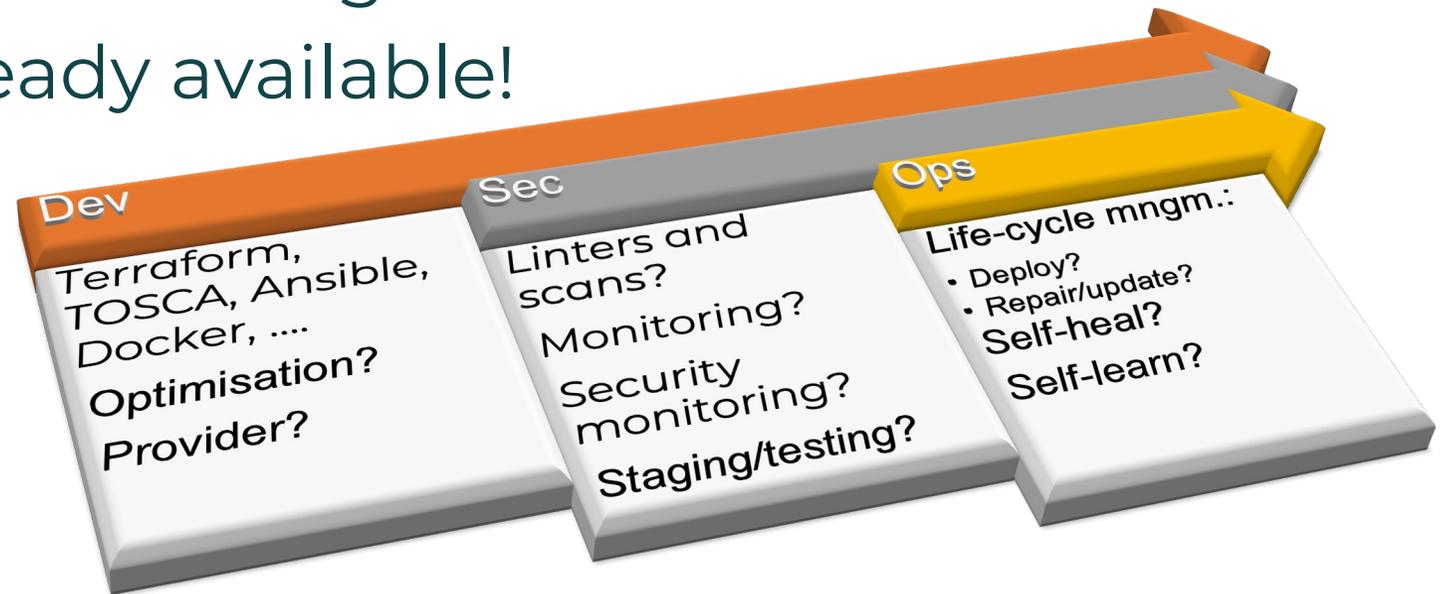
Ludwigsburg, Germany

# PIACERE Project

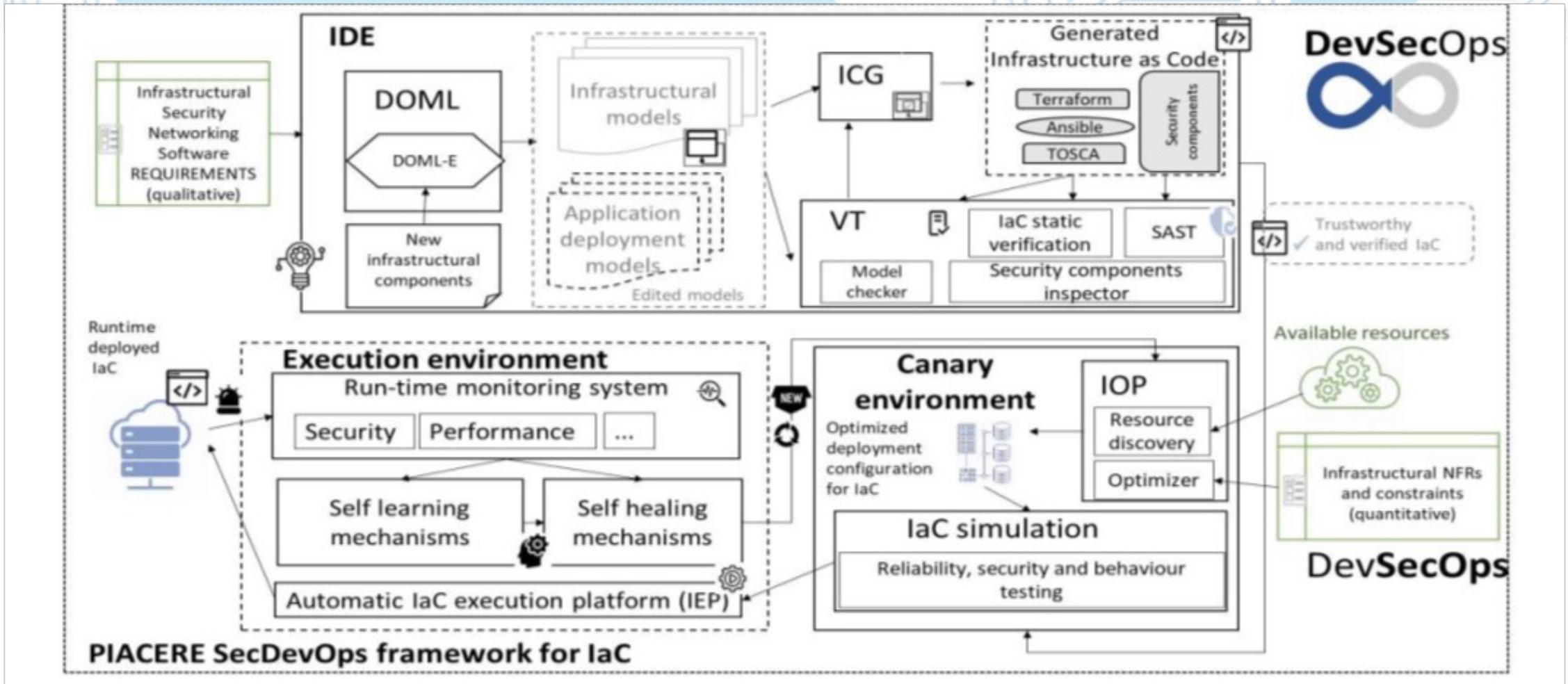
**Vision:** DevSecOps framework for the **development, deployment** and **operation** of **trustworthy** infrastructure-as-code.

**Goal:** Framework with **tools** integrated in the IDE.

**Status:** **PoC version** already available!

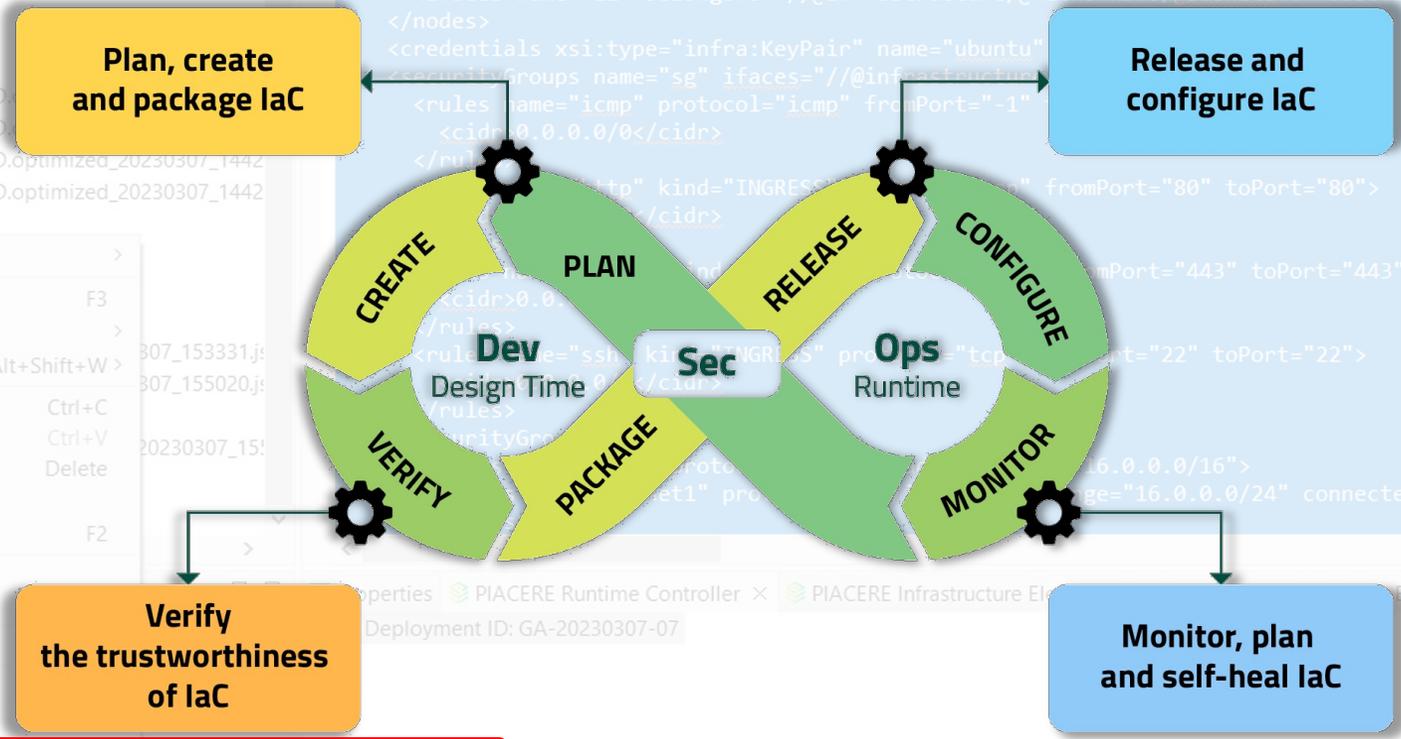


# The PIACERE Solution



- **DOML – domain specific language**
- **Model checker**
- **laC Optim. Platform + catalogue**
- **laC Code Generator (Terraform, Ansible, ...)**

- **PIACERE runtime controller**
- **Canary sandbox environment**
- **laC Execution manager**



- **laC security inspector**
- **Component security inspector**

- **(Security) monitoring**
- **Self-learning**
- **Self-healing**

# DevSecOps Modelling Language (DOML)

- **End-user declarative language enabling the modelling of provisioning, deployment, and configuration of infrastructure**
- **multi-layer approach. An application can be described in four layers: application layer, abstract infrastructure layer, concrete infrastructure layer and optimization layer.**
- **Extensible**
- **EMF based and using Xtext Framework**
  - **Enables DOMLX to facilitate integration with other technologies**

# DevSecOps Modelling Language (DOML)

```
doml amurica
properties {
  entorno="pre"
  proyecto="amurica"
}

// Application Definition
application amurica {
  software_component Gestaut {
    // Interfaces should be separated by commas, but the IDE needs to be fixed
    provides { http, https }
    consumes { dbAccess, search }
  }
  software_component ElasticSearch {
    provides { search }
    consumes { dbAccess }
  }
  software_component Edi {
    provides { edi }
    consumes { dbAccess }
  }
  dbms postgres {
    provides {
      dbAccess
    }
  }
}

infrastructure abstractInfra {
  // Networks
  net vpc {
    cidr "10.100.0.0/16"
    protocol "TCP/IP"
    subnet subnet1 {
```

# IDE (Integrated Development Environment)

- **Enables end users to access all piacere tools (design time and runtime)**
- **Two main integration approach depending on the needs of the tools: context menus and custom views**
- **Additional elements added to facilitate user experience**
  - Preferences
  - Perspectives
  - Project type

# VT (Verification Tools)

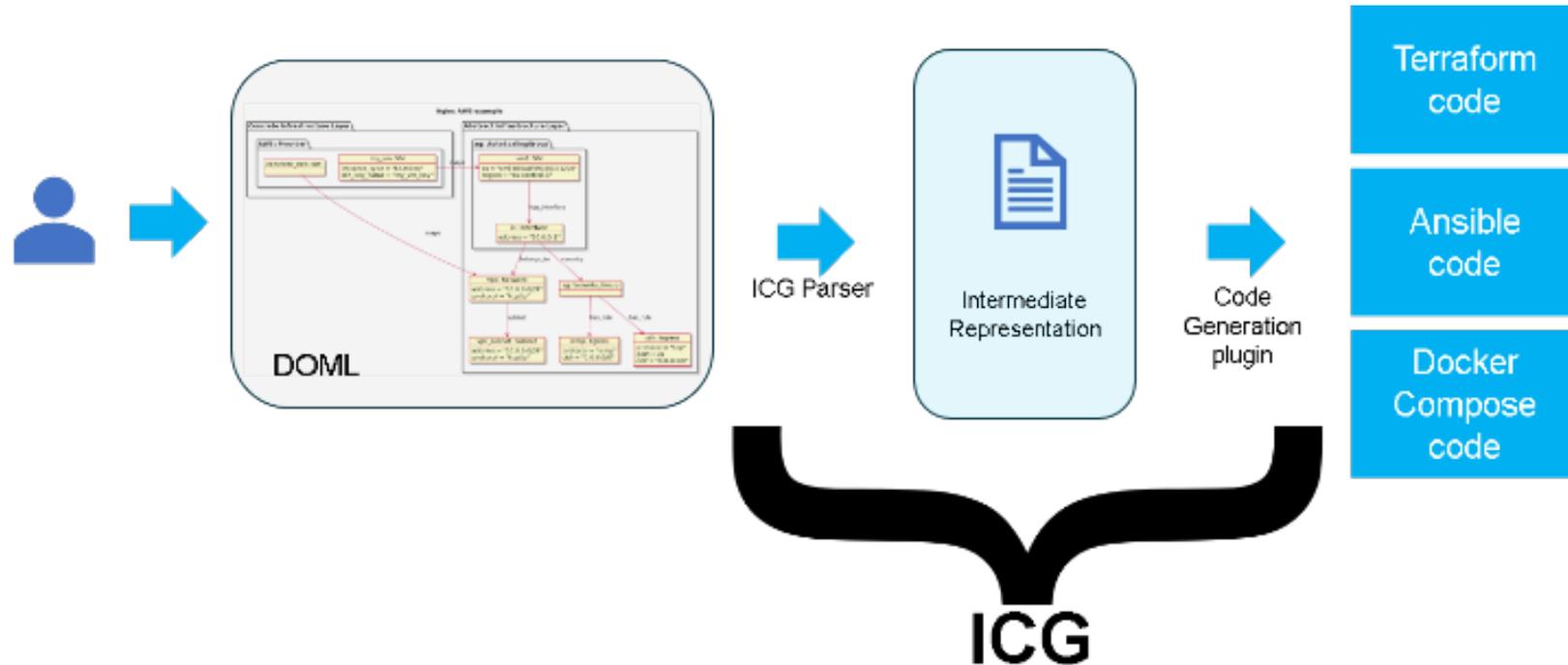
- **DOML Model Checker**
  - Validate DOML models and verifying their consistency and correctness
  - It is a service
  - IDE communicates with it through a REST API, leveraging the DOMLX format
  - Powered by the Z3 Theorem Prover and built with Python
- **IaC Security Inspector**
  - After the design phase
  - Checks cover syntactic problems of the IaC languages
  - Checks IaC component and their dependencies

# IOP (PIACERE Optimizer Infrastructure)

- **find the optimum infrastructure to be deployed considering**
  - The data provided as input
  - The infrastructure catalogue
- **Objectives considered**
  - Cost
  - Availability
  - Performance
- **Different requirements possible**
  - maximum cost for the overall configuration
  - a minimum performance
  - ...
- **Relays on multiobjective algorithms NSGA**

# ICG (Infrastructural Code Generator)

- Translates DOML into IaC supporting currently terraform and ansible languages



# Conclusion

- **The motivation of the IDE was to**
  - Facilitate the usage
  - Cover all phase in a single point
  - Increase the quality
- **We have presented the Design time support of the IDE**
  - There is a runtime support as well
- **We are in the final tuning of the environment through the applications in three use cases**
  - Transport
  - Government
  - Real time applications



Thank you!



[www.piacere-project.org](http://www.piacere-project.org)



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Thank You

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