



Towards Sustainable Deployment of Microservices over the Cloud-IoT Continuum, with FREEDA



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The FREEDA Project

Research project co-funded by **PRIN 2022**

University of Pisa



University of Bologna



Politecnico di Milano

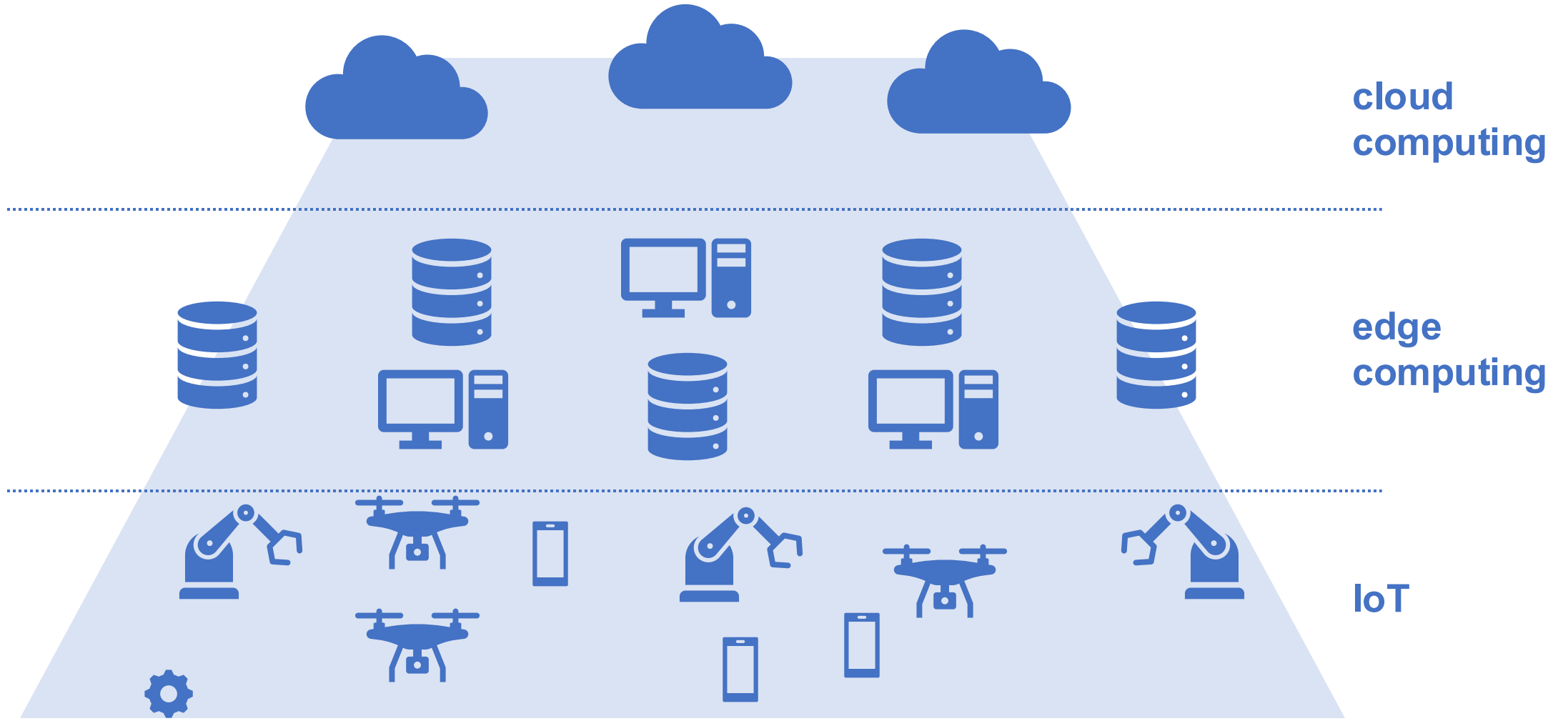


Objective: Sustainable and failure-resilient Cloud-IoT deployment of microservices

<https://freeda.di.unipi.it>



The Cloud-IoT Computing Continuum

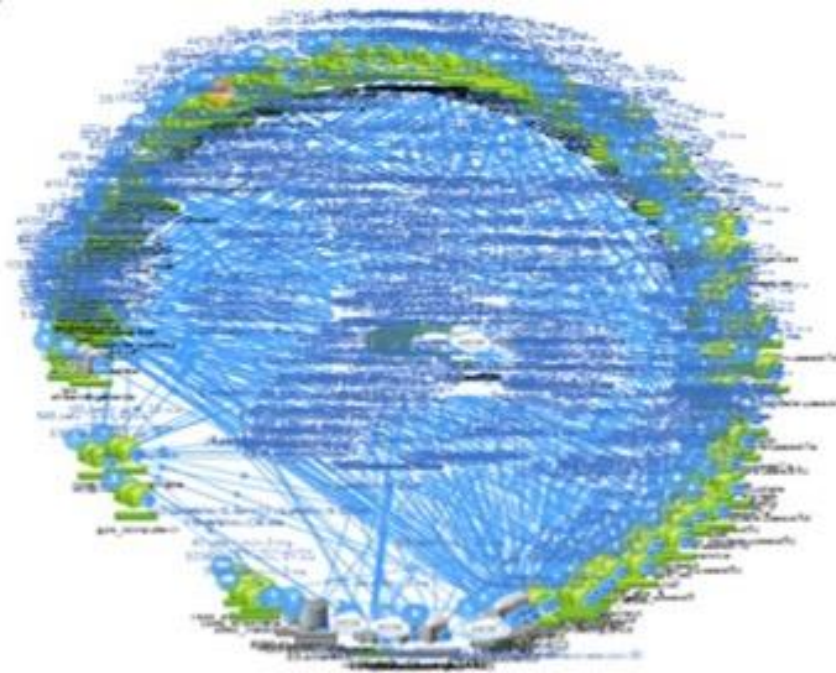


High heterogeneity and variability \Rightarrow Need to face possible QoS-degradations and faults 3

Microservice Applications



amazon



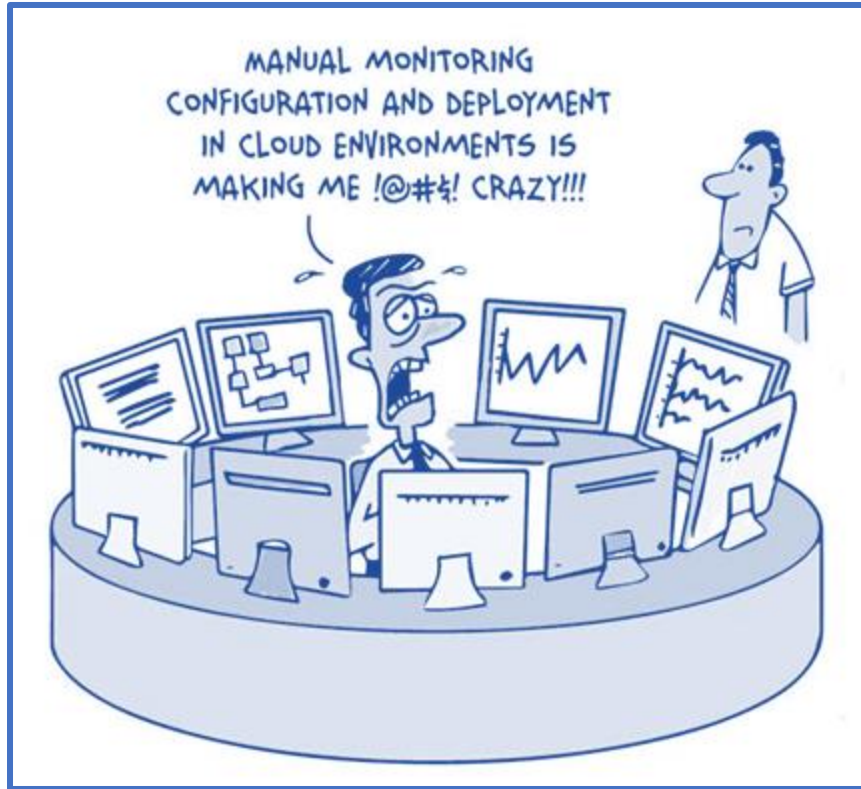
NETFLIX

We need to manage numerous independently deployable services that must **coordinate**, communicate, and remain consistent while ensuring **scalability**, **reliability**, and **maintainability**.

THE
DEATH
STAR



Supporting DevOps



Tasks like **monitoring**, **configuration**, and **deployment** become overwhelming without automation and proper tools.

The Need for Sustainable ICT

ICT has a **significant impact** on global **energy** demand

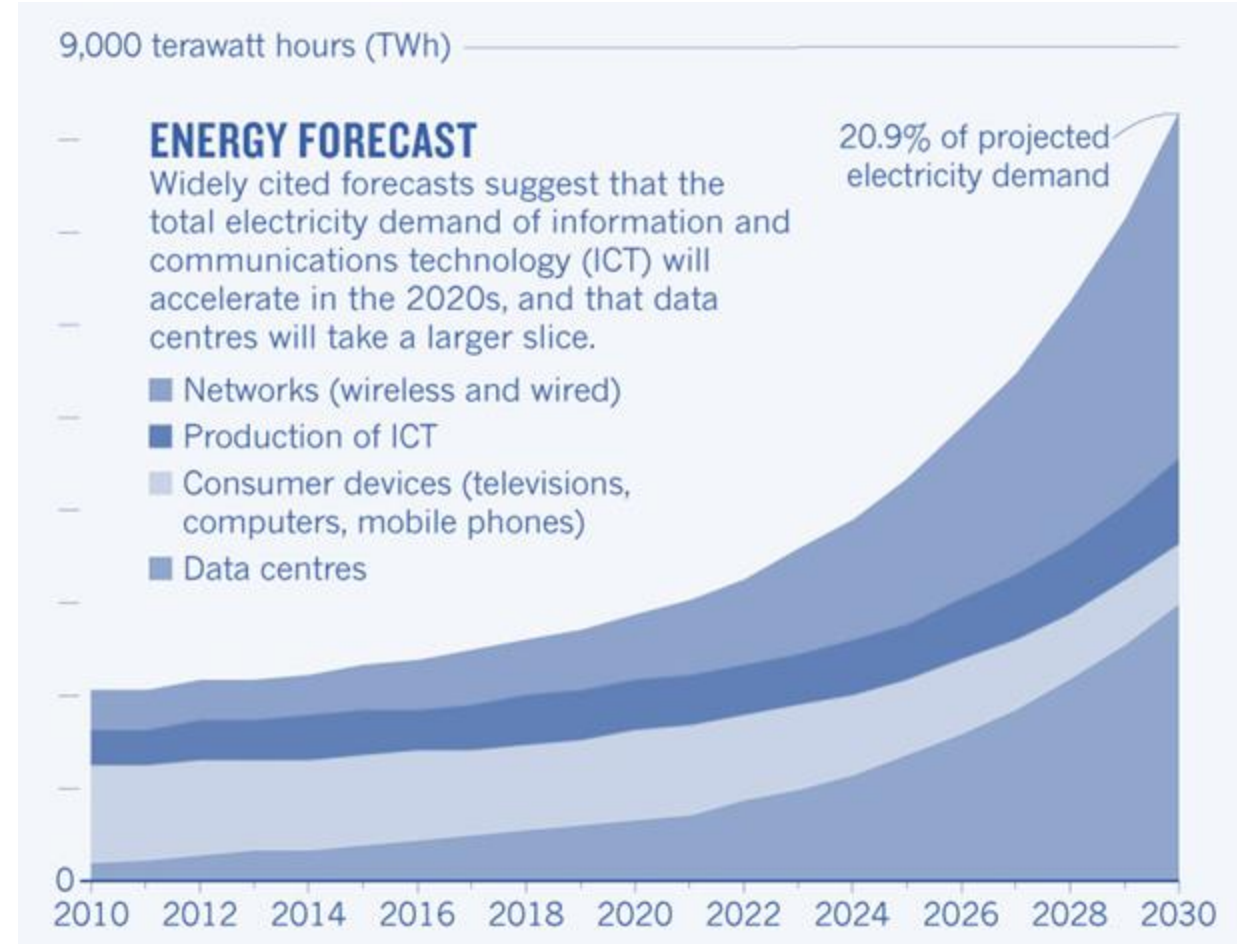
- ~ 5% today
- > 20% in 2030

ICT is responsible for around **2% of global CO2** emissions (comparable to the aviation sector)



Sustainable computing

- aims at **minimizing** the **carbon footprint** of computing,
- whilst keeping the **quality** of results **satisfactory** for end users



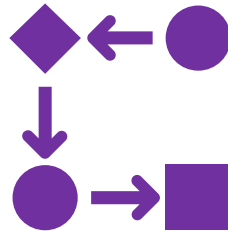
Three Pillars ⇒ One Research Objective

Enabling a **sustainable** and **failure-resilient** deployment of **microservices** over existing **Cloud-IoT** infrastructures

Cloud-IoT
continuum



Microservices



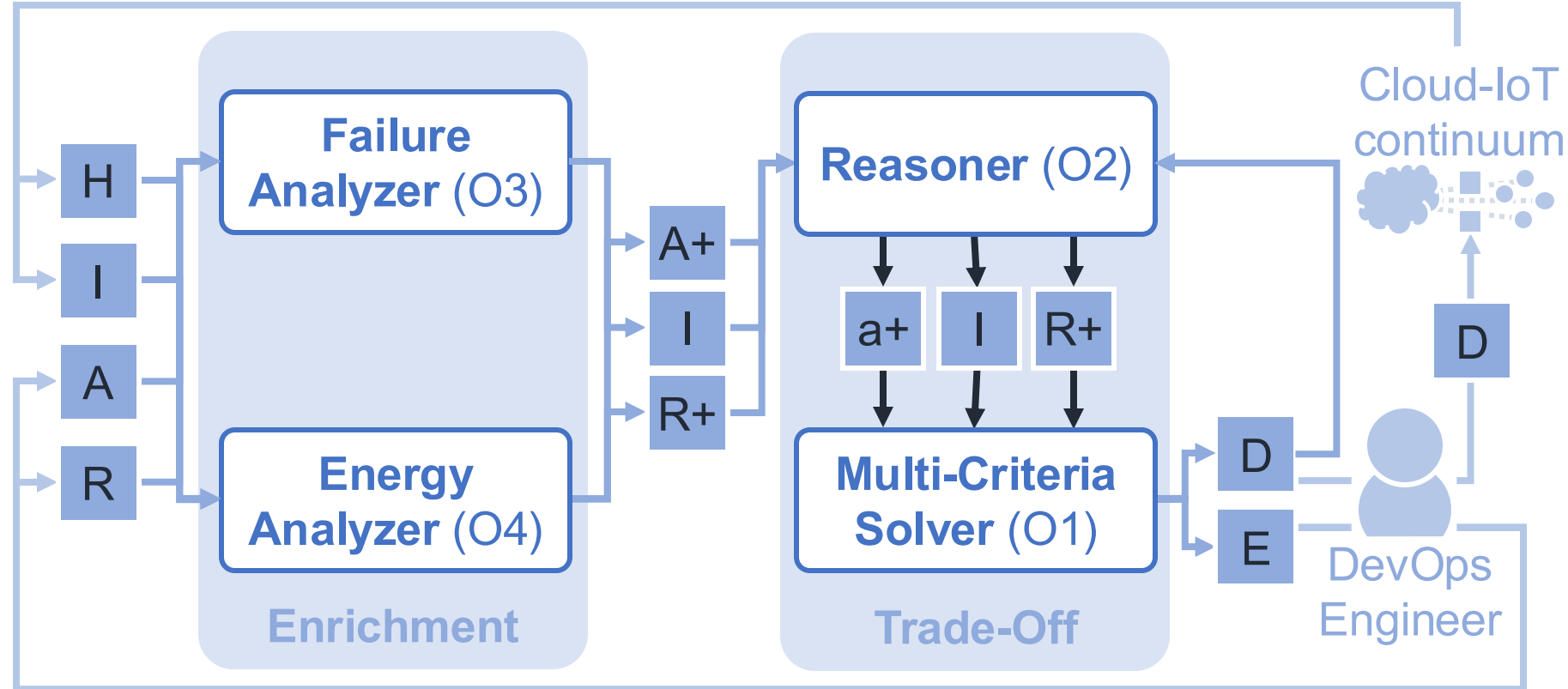
Sustainable
computing



FREEDA's Approach and Research Objectives

O3: Explainable enhancement of apps' failure resilience.

Cloud-IoT continuum, to adapt to **changes** in apps, infrastructure, or deployment requirements.



O4: Explainable reduction of environmental impact.

er the Cloud-IoT continuum, by identifying suitable **trade-offs** among apps' **requirements**.

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