



SPADE

Building agricultural drone digital twins with Eclipse Basyx



ABOUT ME

Received my bachelor's degree in Telecommunication Engineering from the University of Vigo in 2010.

Worked as a researcher for the University of Vigo for 5 years in the fields of mobile communications and embedded systems.

Joined **Gradiant** in 2016 as a research engineer working in SDN networks, IoT and Industry 4.0 technologies.



ABOUT US

We were founded in **2008** with a single goal: to make the companies around us better.

In **2024**, we work with clients from all over the world but always focusing on Galician industry.

Planta 0

Recepción
Sala 0.1: Ada Byron
Sala 0.2: Weber
Sala 0.3: Laboratorio
Sala 0.4: Hedy Lamar
Comedor

Planta 1

Áreas Técnicas
Sala 1.1: Dorothy Vaughan

Planta 2

Áreas Técnicas
Sala 2.1: Voyager
Sala 2.2: Ángela Ruiz Robles
Sala 2.3: Kathleen McNulty
Sala 2.4: Alan Turing

+250

people

14M€

year

*56% turnover with companies
26% competitive public funding*

+150

active
projects

18

active EU
projects

+800

developed
projects

+400

clients

*68% SMEs
32% large companies*



SPECIALIZATION, THE KEY TO 21ST CENTURY INDUSTRY



CONECTIVITY

communications systems and the internet of things for data transmission



INTELLIGENCE

infrastructure and algorithms for extracting value from data, turning it into useful and actionable information

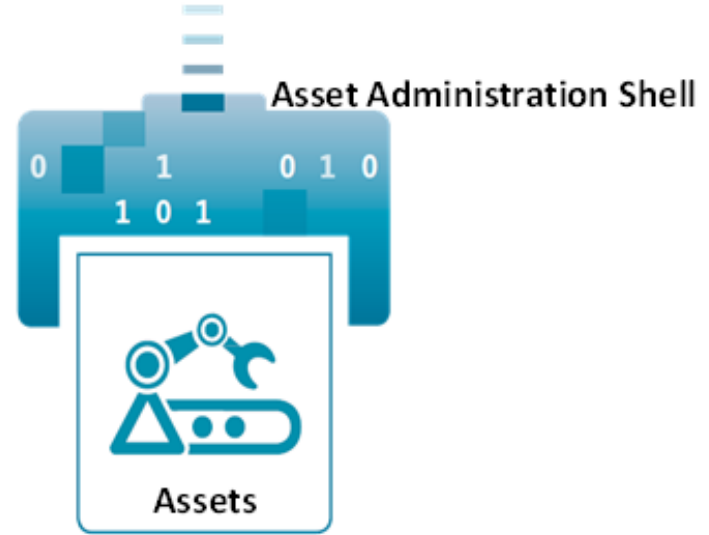


SECURITY

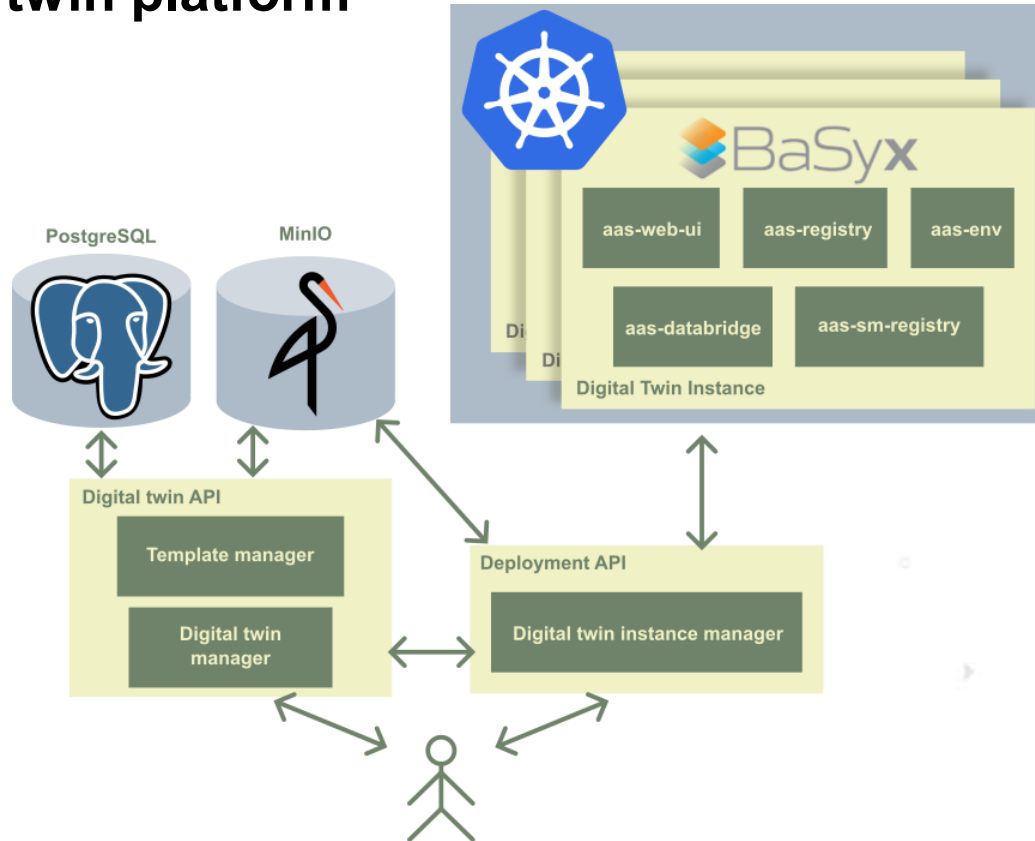
data protection and information systems, and protection of privacy

Can the AAS model be applied outside of a factory?

- AAS specification key features
 - Standardized data structures.
 - Standardized interfaces. Interoperability
 - Reusability.
- The base of the Industry 4.0 is the digitalization of processes, but processes are not exclusive to the manufacturing industry. Other sectors like Healthcare, Agriculture, Energy or Transport can also be modeled in the same way.



SPADE digital twin platform



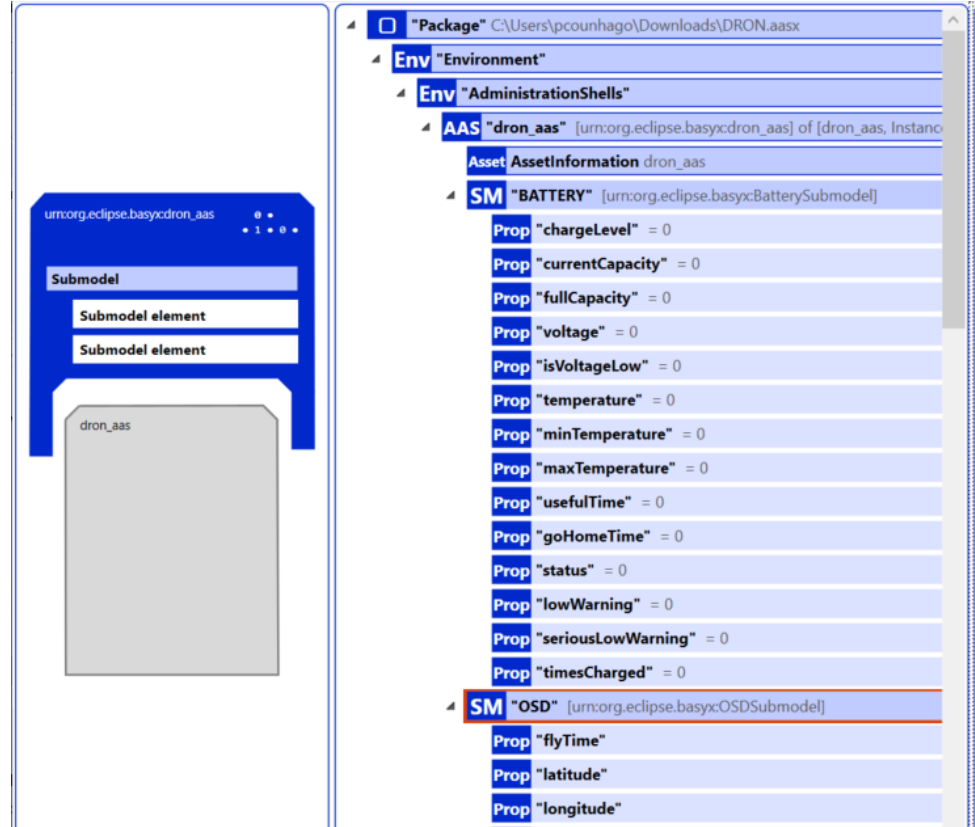
Data model

All the pilots in the SPADE Project have drones as a common factor.

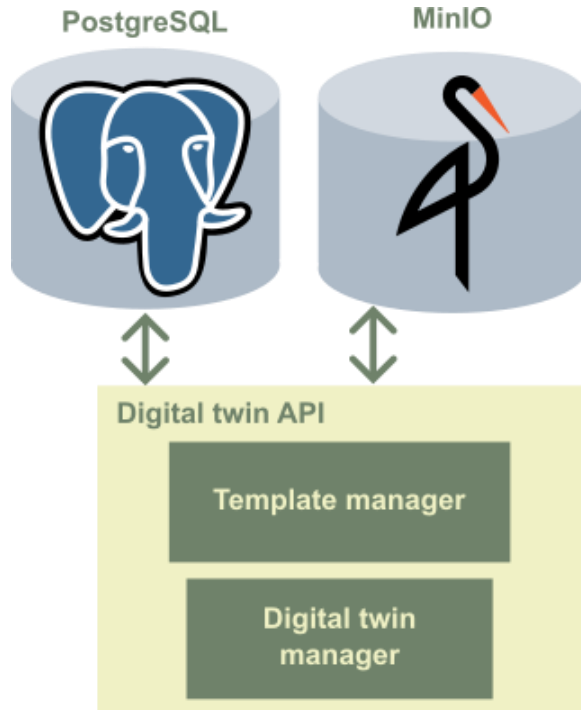
For now the only modelled entity is the drone itself

Platform thought and designed to be flexible and easy to expand with:

- New templates.
- New data structures.
- New data sources.



Digital twin templates



Templates manager

- Data structures modelling real world drone data.
- Stored as AASX files in MinIO.
- CRUD operations to manage template repository.

Digital twin manager

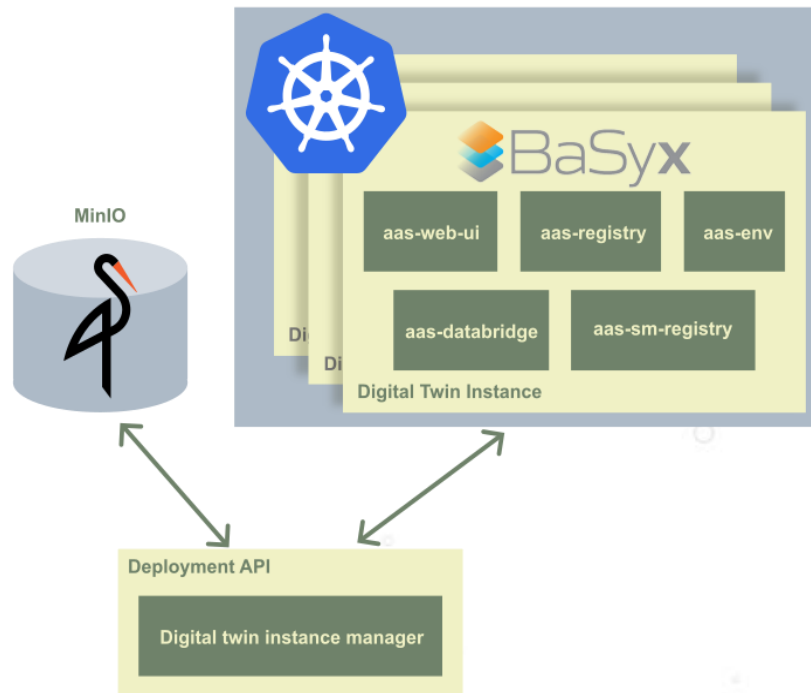
- Create customized digital twin from a template.
- Customized AASX file sent back to MinIO.
- Get inputs from Databroker (developed by Bavenir)
- CRUD operations to manage digital twins



Digital twin instances

Deployment API

- Generate configuration files for Basyx services
- Store configuration files in MinIO.
- Automatically deploy services to K8s namespace
- Monitor status of the instances.
- Separate namespaces for the instances.
- Subdomains to Access AAS web UI





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