

## **PIXEL - Port IoT for Environmental Leverage**

Webinar 3 : The PIXEL Platform

Marc Despland (Orange) – Architect

Andreu Belsa (UPV) – Researcher in DRTSL

Ismael Torres (ProDevelop) – R&D Project Manager


# Previous webinar

[https://pixel-ports.eu/?page\\_id=1692](https://pixel-ports.eu/?page_id=1692)



<https://www.youtube.com/channel/UCuV-XLjawh3CfsP3BYfITyg>





**WHERE  
WHEN  
WHAT  
WHY  
WHO**


**January 13th, 10:00 AM CET. PIXEL presentation**

Description: The Webinar is a general presentation of the PIXEL project: (i) What is the need, (ii) Who are the partners, (iii) How we plan to address the need, (iv) Description of the solution, and (v) What is the impact we plan to have.

Goal: We want to inform the industry about our new product, whereas at the same time get some feedback from the port needs

Target audience: Port executives, Port environmental managers, Regional government environmental managers, Specialized [journalists](#)

Watch it again! If you couldn't attend the webinar or you want to re-watch it, [here](#) you can access to via our Youtube channel.



**USER STORIES  
MODELS  
ALGORITHMS**

**February 10th, 10:00 AM CET. Technical presentation of user stories, models and algorithms**

Description: The Webinar will be a presentation of the science behind the PIXEL project: (i) Use Cases and User Stories, (ii) Models, (iii) Algorithms, (iv) Port Activities Scenario

Goal: Scientific dissemination and review of PIXEL technologies

Target audience: Logistics engineers and scientists, Port environmental managers, Regional government environmental managers

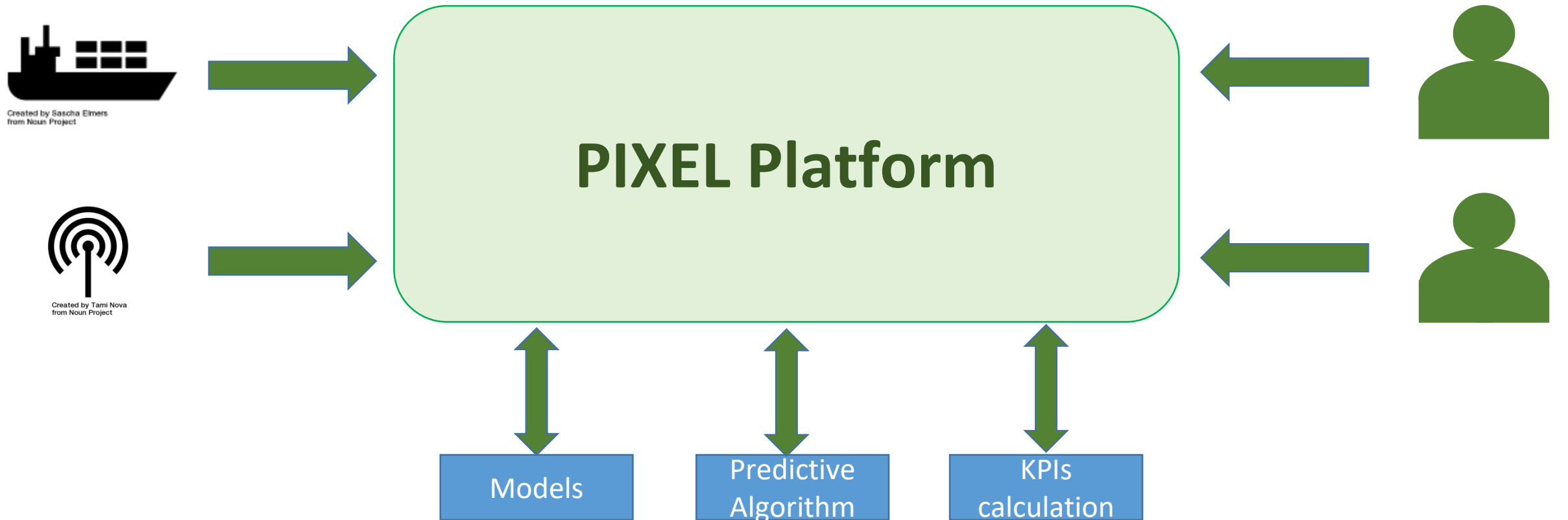
Watch it again! If you couldn't attend the webinar or you want to re-watch it, [here](#) you can access to via our Youtube channel.

# Content

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1. Introduction
2. Working with heterogeneous data sources
3. Cross-fertilisation between research projects
4. Functional scalability
5. Building a data hub
6. Managing custom visualization

# 1 – Introduction – Building a platform to support Scientifics works



# 2 – Working with heterogeneous data source –

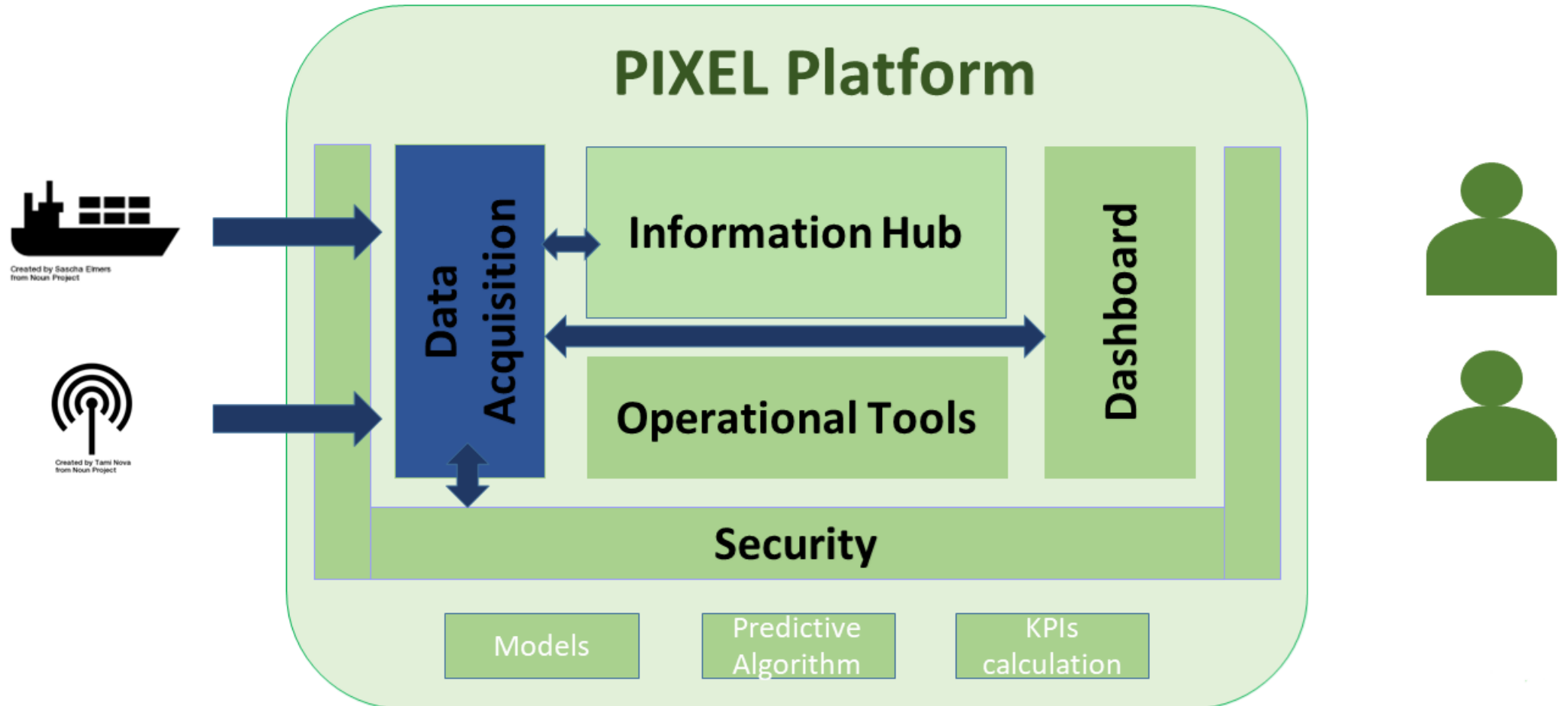
## The problem

- ☐ Different data type
- ☐ Different way of providing data
  - ☐ API
  - ☐ CSV
  - ☐ Form
- ☐ Two ports use different way to represent same data
- ☐ One data on PIXEL could request several source to be retrieve



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```

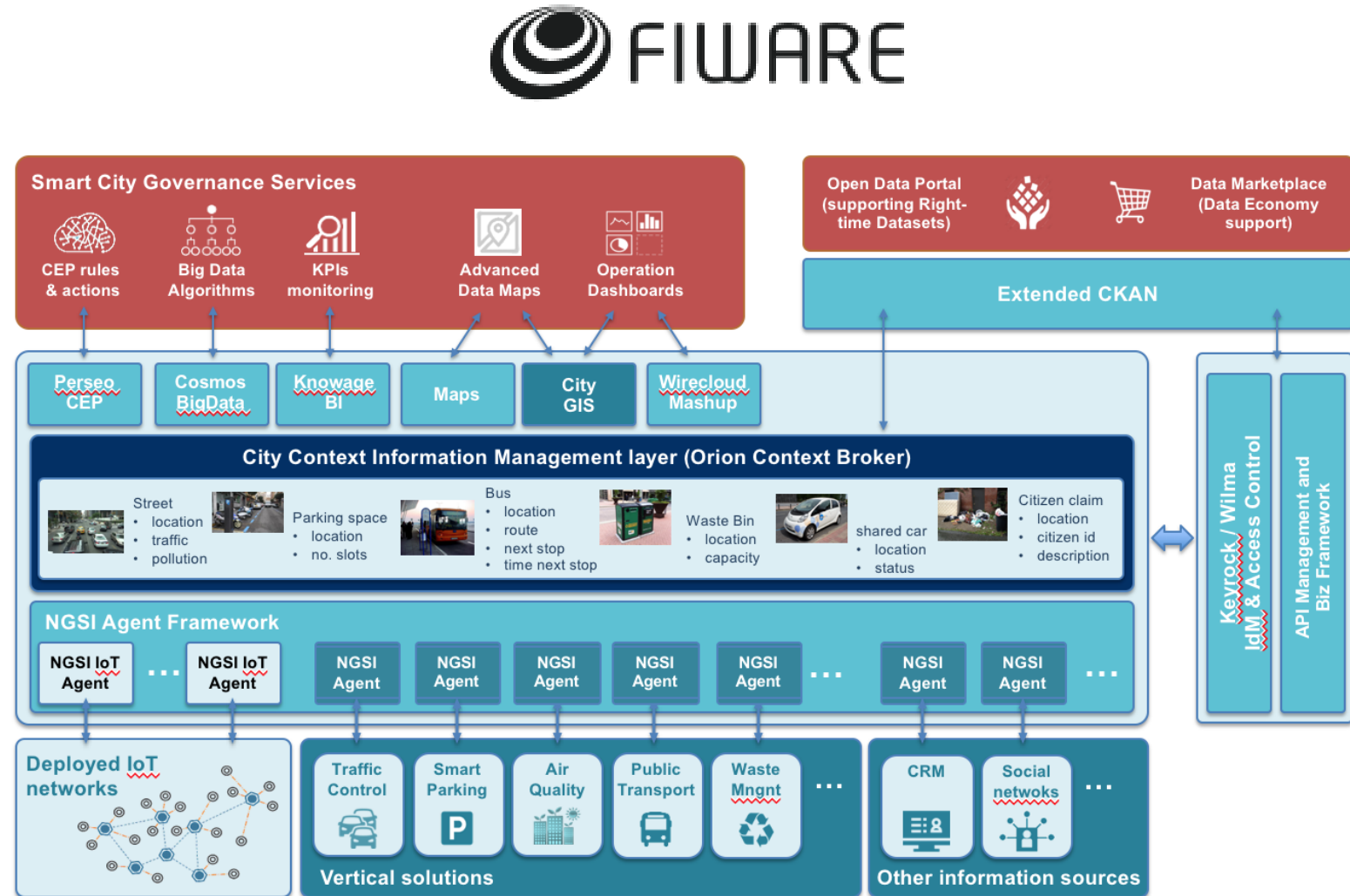
## 2 – Working with heterogeneous data source – DAL



## 2 – Working with heterogeneous data source – FIWARE

- Started in 2011 as Public/Private partnership with Europe
- FIWARE is now a foundation since 2016 with more than 200 members
- FIWARE Provide a toolbox to build SmartCities platform
  - Components catalog
  - Smart Data Models catalog

<https://www.fiware.org/>



## 2 – Working with heterogeneous data source – Smart Data Models

**FIWARE Smart Data Models** : <https://www.fiware.org/developers/smart-data-models/>

### **SMART CITIES DOMAIN**

Domain repository for topics related with Smart cities.  
Currently available [Building](#), [Parking](#), [Parks and Gardens](#), [PointOfInterest](#), [StreetLighting](#), [Transportation](#), [Urban Mobility](#), [Waste Management](#) and [Weather](#).

### **SMART ENVIRONMENT DOMAIN**

Domain repository for topics related with environment.  
Currently available [Environment](#), [Waster management](#) and [Weather](#).

### **CROSS SECTOR DOMAIN**

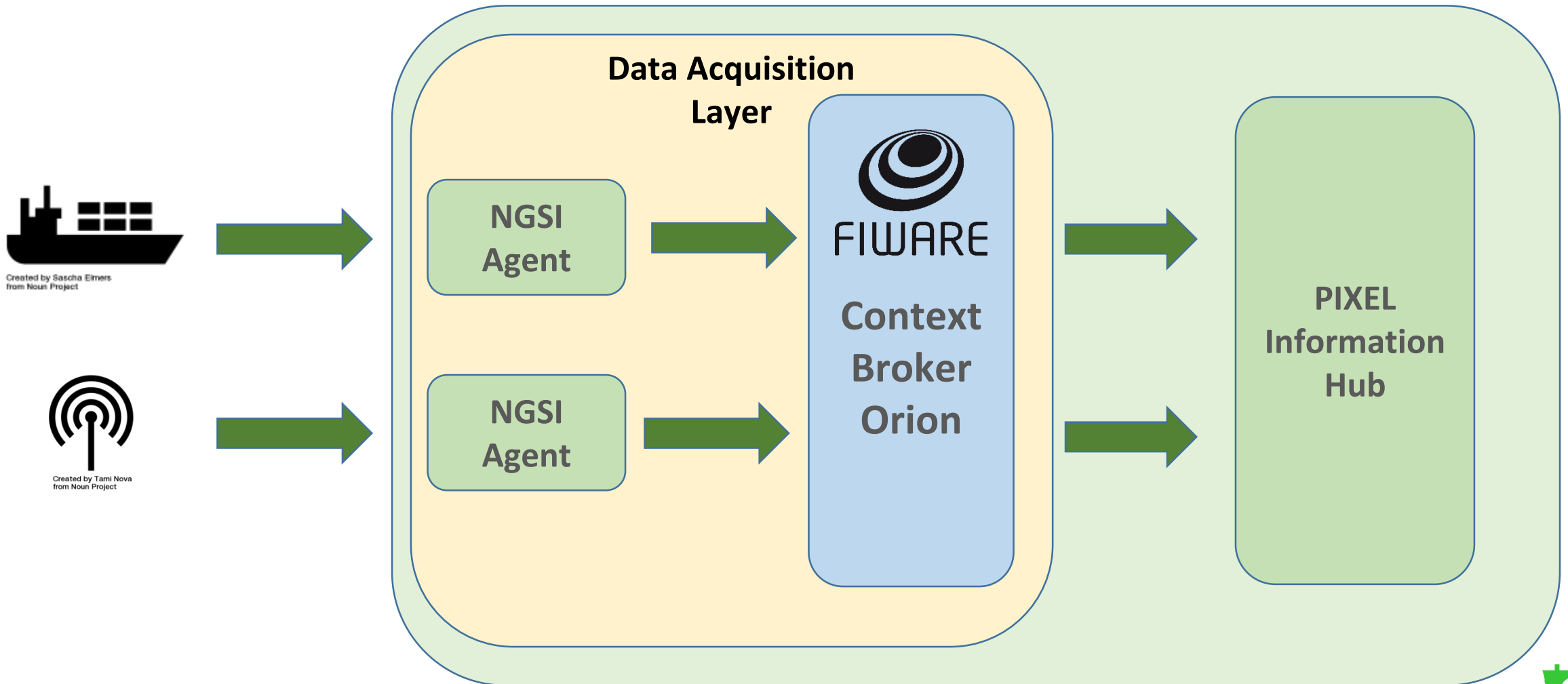
Domain repository for topics not directly related with a domain. Currently available [Alert](#), [Issue Tracking](#), [Key Performance Indicator](#), [Point of Interaction](#), [Point of Interest](#), User, [Weather](#).

### **PIXEL OWN DOMAIN**

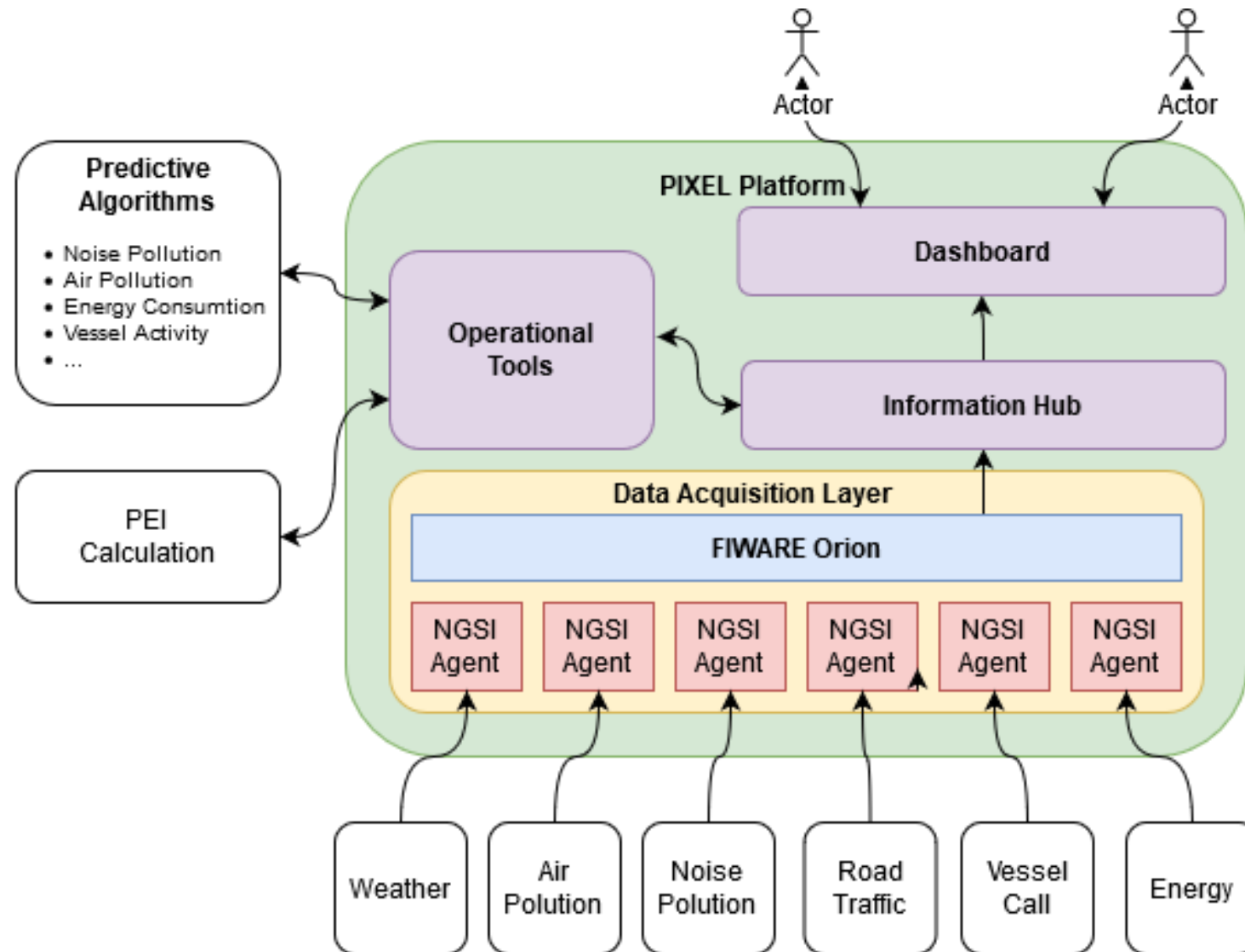
When FIWARE Smart Models are not available, we create our own models like VesselCall that will be proposed to the FIWARE Community



## 2 – Working with heterogeneous data source – NGSI Agents



## 2 – Working with heterogeneous data source – Architecture



### 3 – Cross-fertilization between research projects

**Cross-fertilisation between research projects: synergies with DataPorts and the use of FIWARE in maritime ports' innovation initiatives**

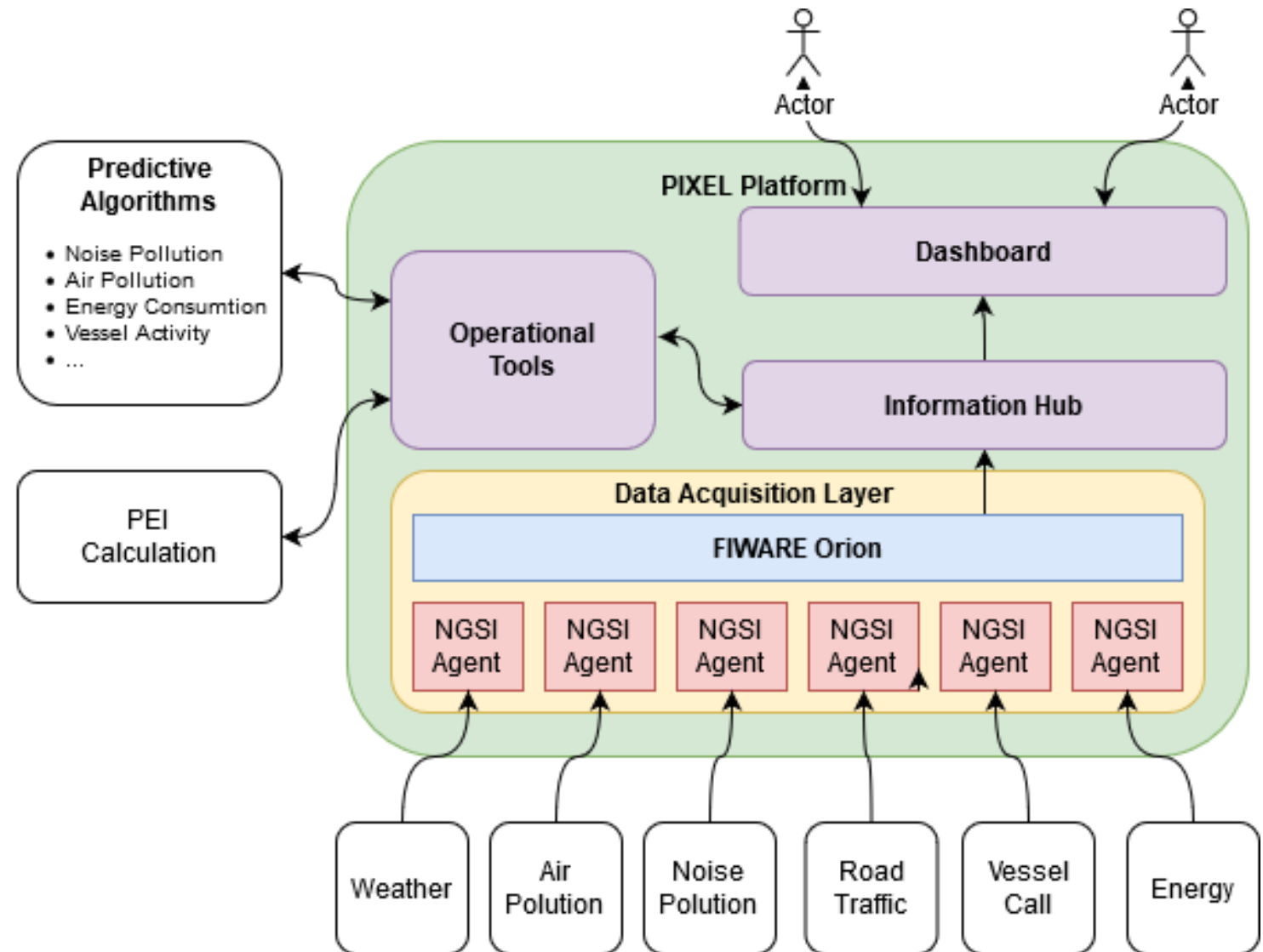
**Andreu Belsa Pellicer - UPV**



*17-06-2021*

# 4 – Functional Scalability – The problem

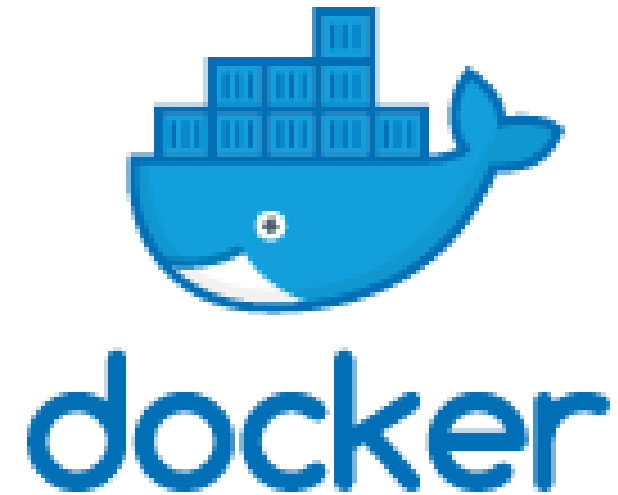
- ❑ Add and run new algorithm or models
- ❑ Connect new Data Source (NGSI Agents)
- ❑ Managing those features through API



# 4 – Functional Scalability – Docker

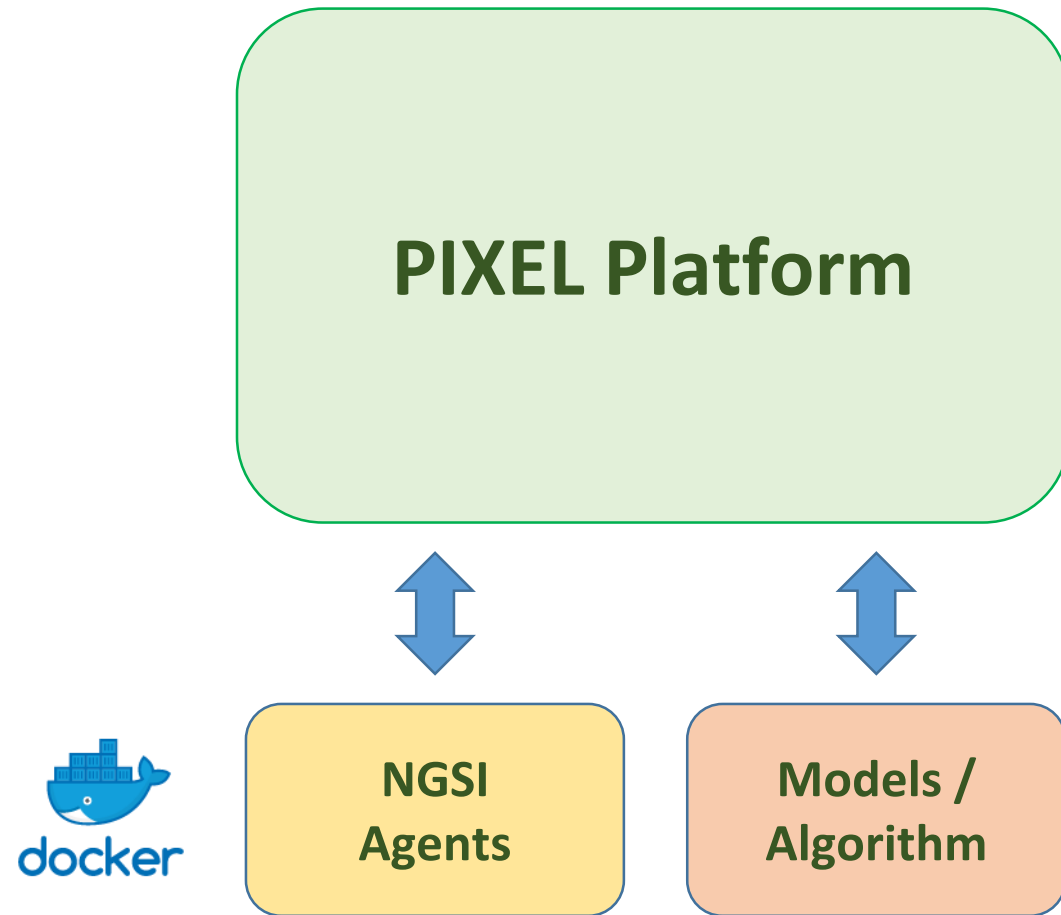
**Docker offer a solution to deliver packaged software, ready to deploy**

- ✓ State of the art for software delivering
- ✓ Manage runtime configuration
- ✓ Offer Registry to deliver the software
- ✓ Agnostic of the development language
- ✓ Provide an API



# 4 – Functional Scalability – Orchestration

- ✓ Interact with the PIXEL Platform
- ✓ Schedule the execution
- ✓ Monitor the run and manage logs



# 4 – Functional Scalability – PIXEL Solution

## DAL Orchestrator

- ✓ Manage Agent creation
- ✓ Manage Data Source with IH
- ✓ Schedule NGSI Agent
- ✓ Manage API Exposition
- ✓ Connect NGSI Agents to Orion
- ✓ Provide an API

## Operational tools

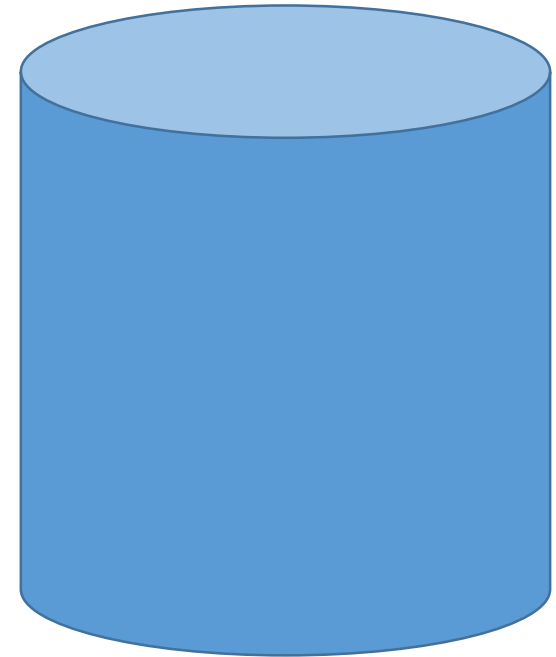
- ✓ Manage Model creation
- ✓ Manage configuration
- ✓ Manage connection with IH
- ✓ Schedule Model Creation
- ✓ Provide an API

# 5 – Building A Data Hub – The problem

- ☐ Storing heterogeneous data
- ☐ Managing long and short term history
- ☐ Scalable system to store huge amount of data
- ☐ Able to store burst of data
- ☐ Provide solution to execute complex query
- ☐ Provide an API

A data hub is more a system than a tools

**A Data Hub is a lot more  
than a database**





# 5 – Building A Data Hub – The FAIR Experience

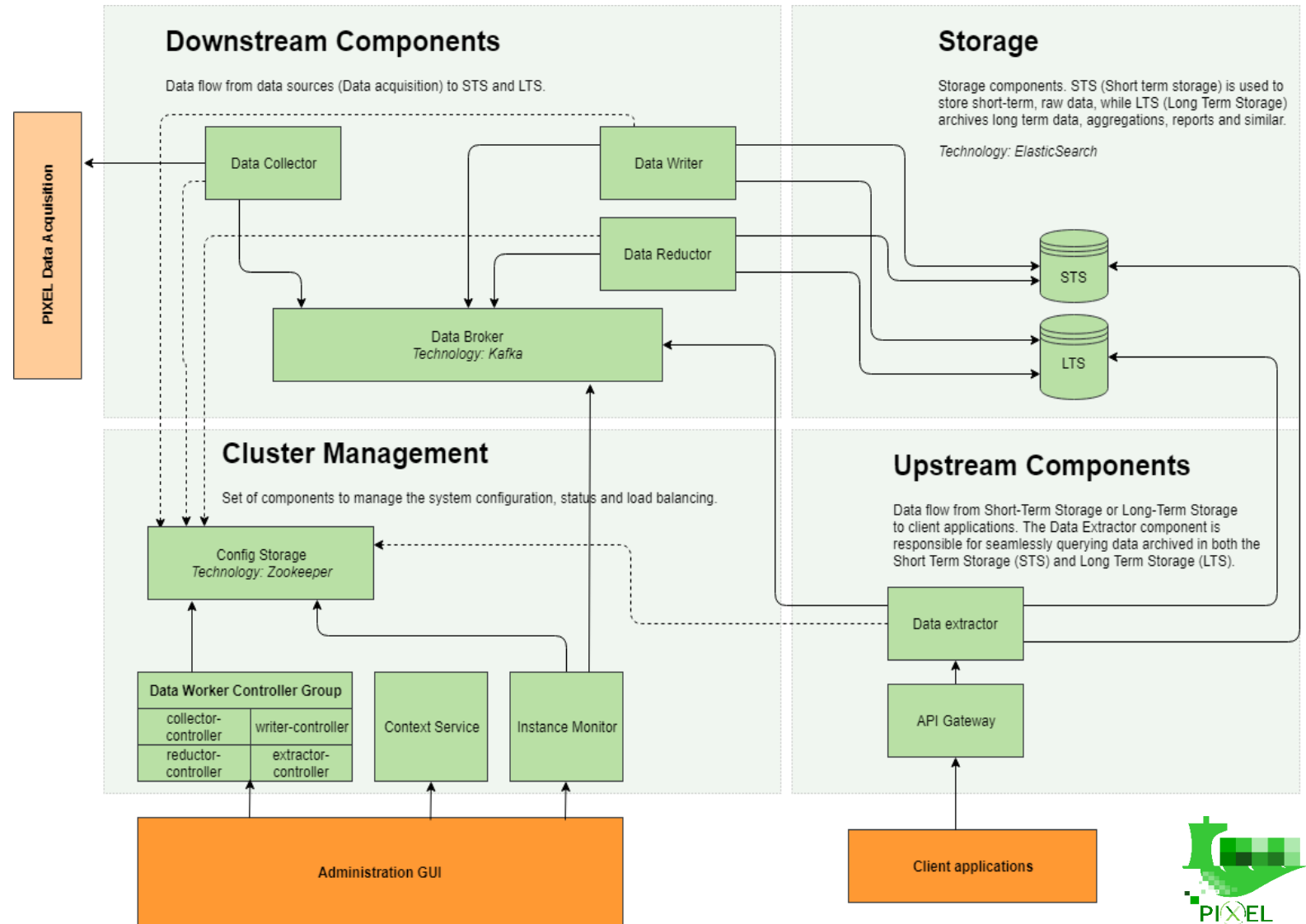
The main architectural approach for the PIXEL Information Hub is based on robust experience gained by XLAB during the design of a similar technical solution for the FAIR (Facility for Antiproton and Ion Research) particle accelerator based in Darmstadt, Germany <https://fair-center.eu/>

XLAB's role is to develop controlling system software solutions for storing historical measurements, diagnosing accelerator performance and acting upon collected real-time data that are considered operationally unacceptable.



# 5 – Building A Data Hub – The Solution

- ✓ A Orion Data Collector to subscribe of new Data Source and new data from this channel
- ✓ A solution to store and manage the data in a cluster
- ✓ Tools to manage the cluster activity
- ✓ Components to extract the data from the cluster through an API



# 6 – Visualising data in Pixel

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**Ismael Torres**



**R&D Project Manager**

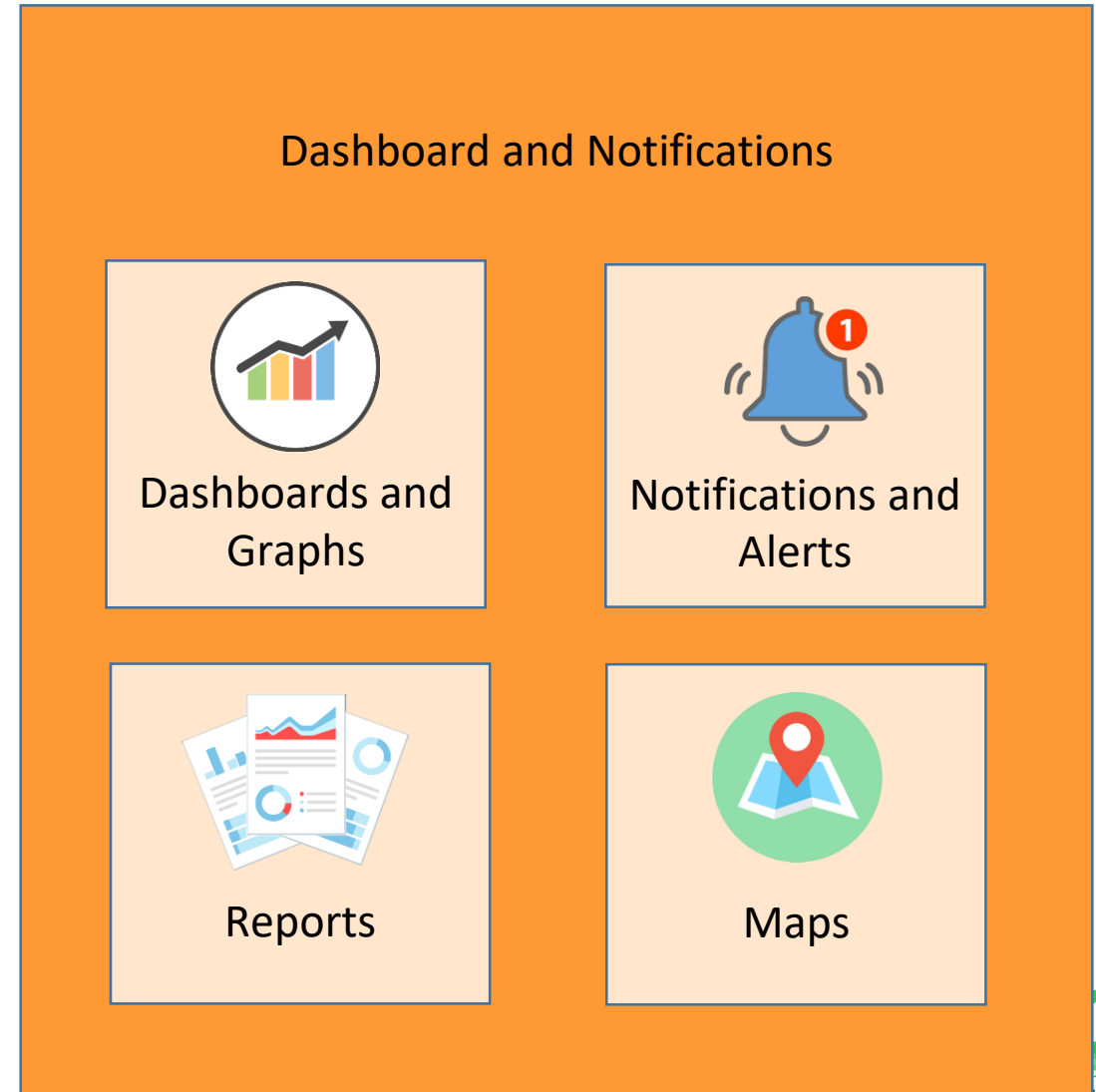
# 6 – Visualising data in Pixel - Questions

- How to represent data in Pixel?
- Who will be in charge of using and creating visualizations?
- Will it be needed to have Technological skills to create Visualization?
- Which Technology should we use?
- Should it be generic to support future needs (models)



# 6 – Visualising data in Pixel – How to represent Data?

- The data should be represented using intuitive visualizations based on graphs / Tables / Maps / Dashboards
- The type of the visualization depends on the data to be represented.
- The visualization should be prepared for future visualizations.
- Most of the data to be represented corresponds to Artificial Intelligence outputs (data)



## 6 – Visualising data in Pixel – Who will be in charge of using/creating visualizations?

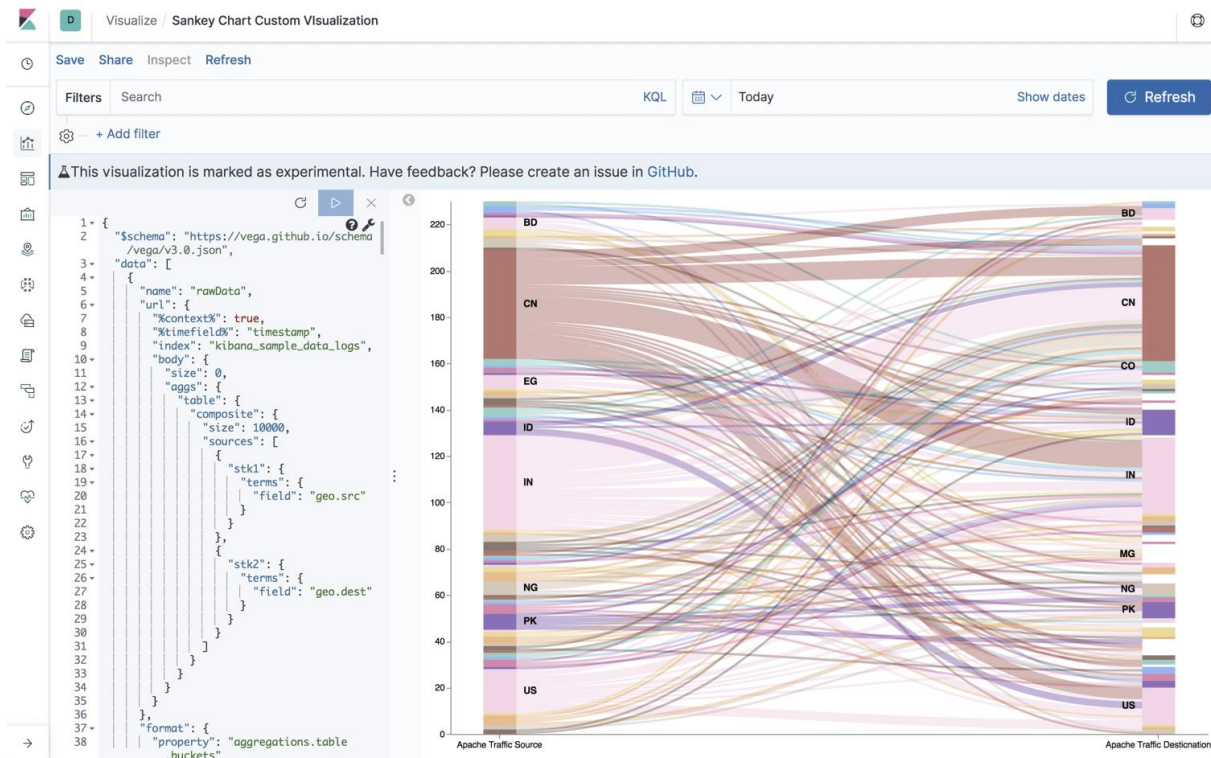


&

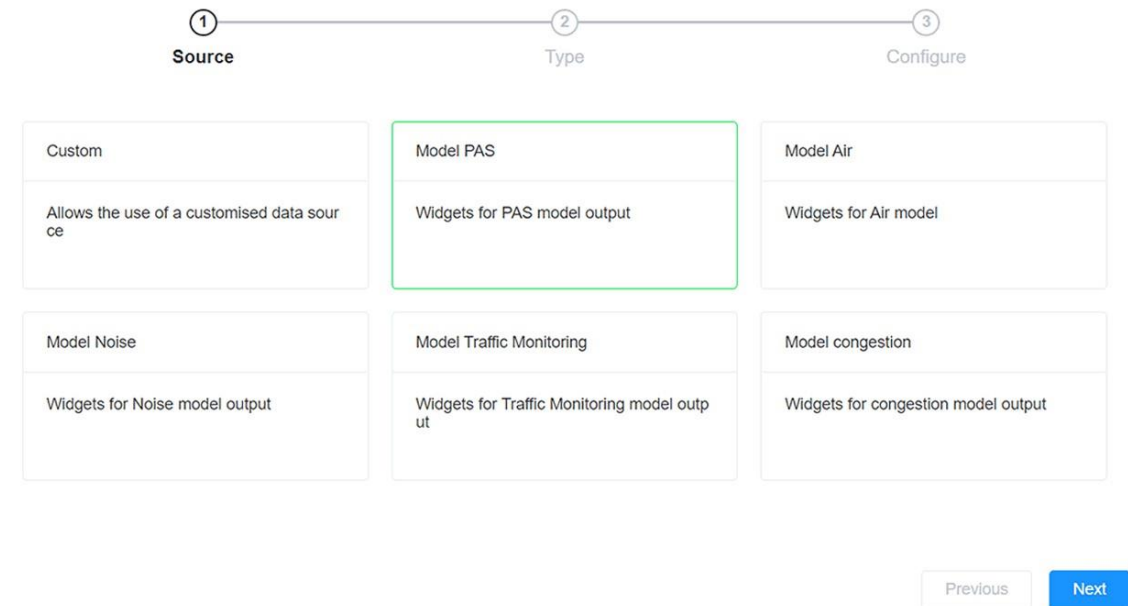




# 6 – Visualising data in Pixel – Are Technological Skills needed?



Create Visualization



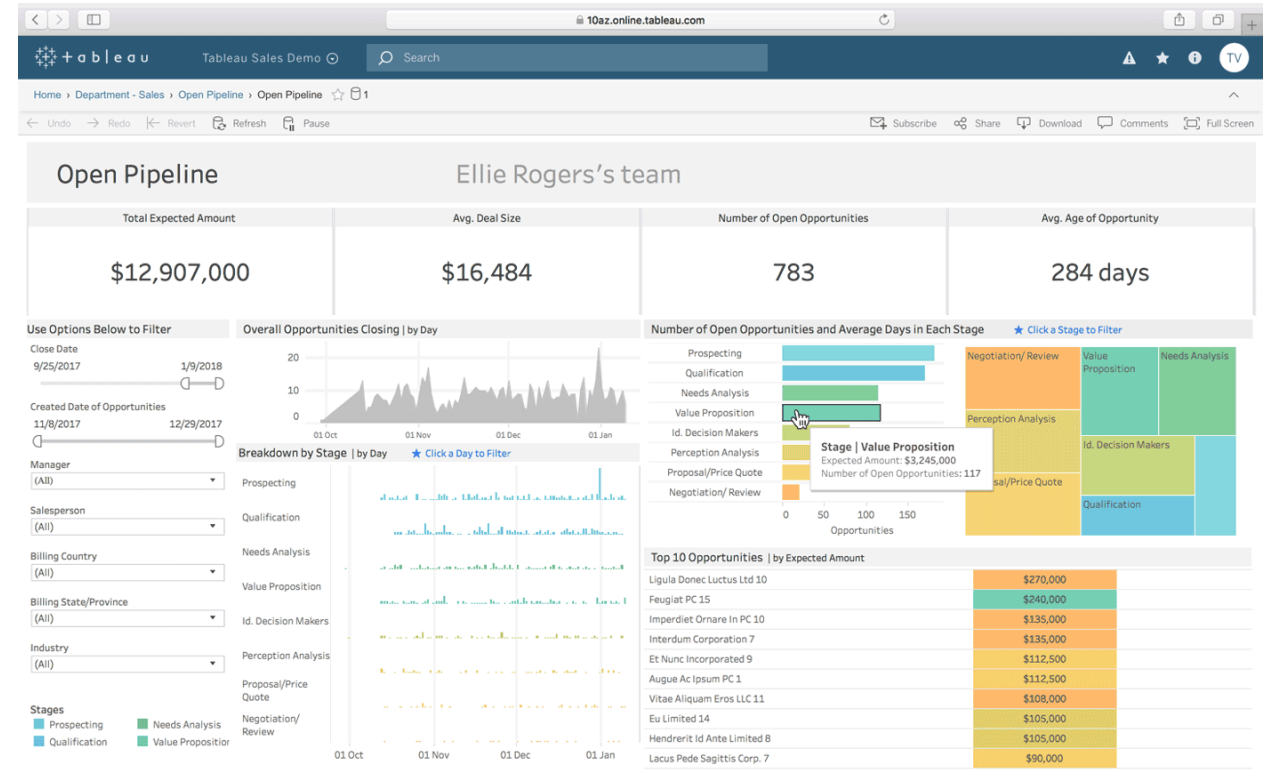
Based on json/XML and complex UI Wizards /assistants & Simple



# 6 – Visualising data in Pixel – Which Technology should we use? 1/3

## Business Intelligence tools

- Some technical skills needed
- Information about each model needed
- Price - Licence
- Integration in the pixel platform

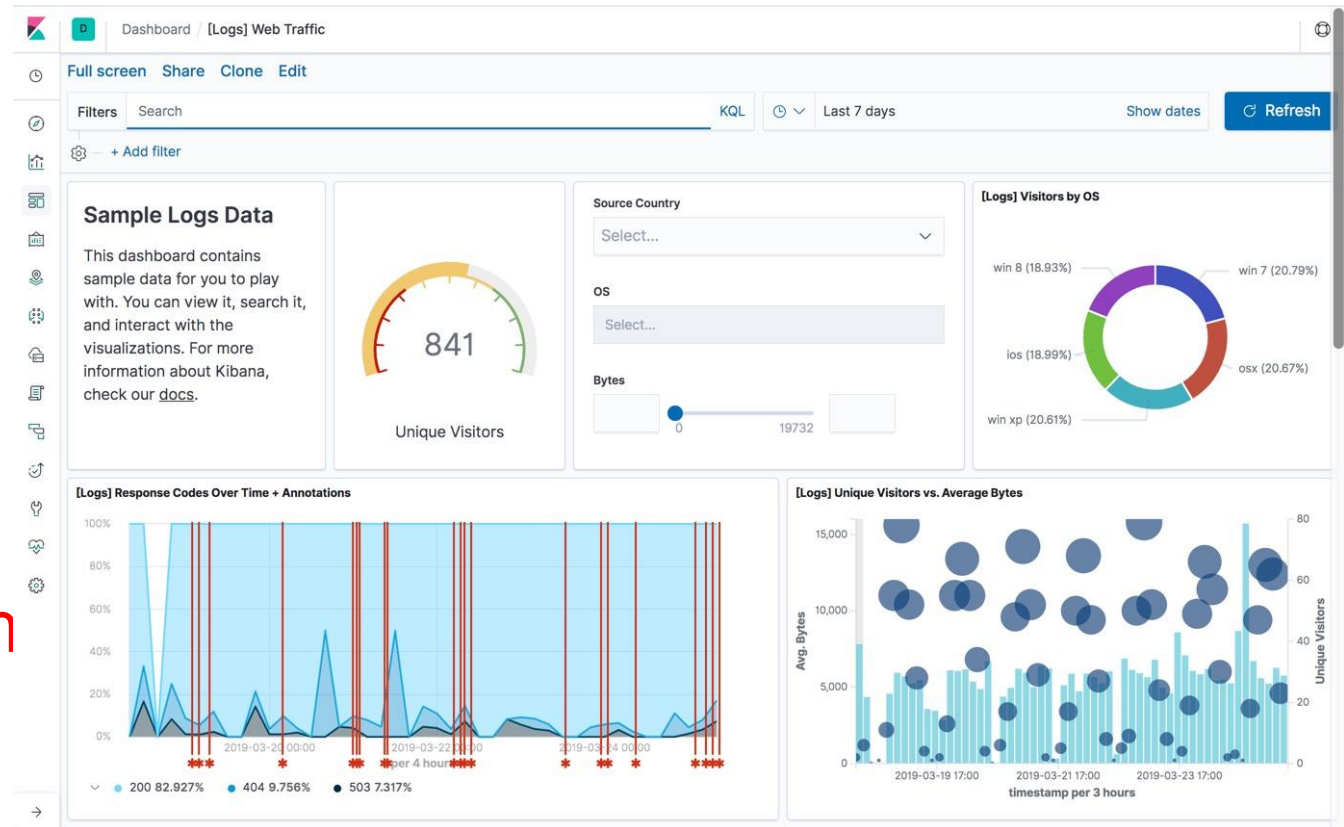




# 6 – Visualising data in Pixel – Which Technology should we use? 2/3

Dashboards bases on Kibana/ Grafana

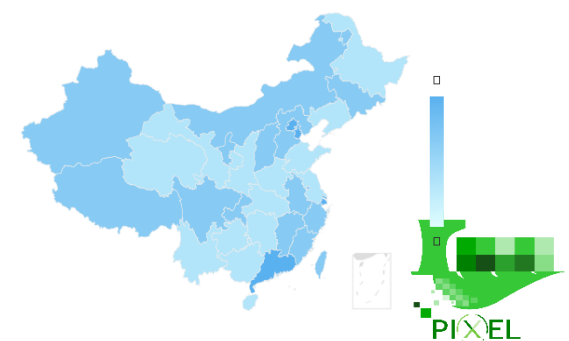
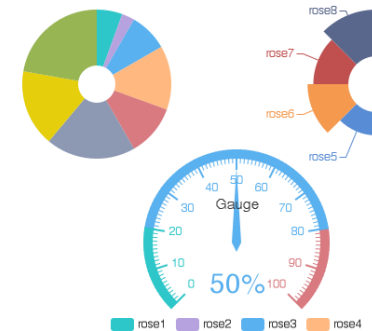
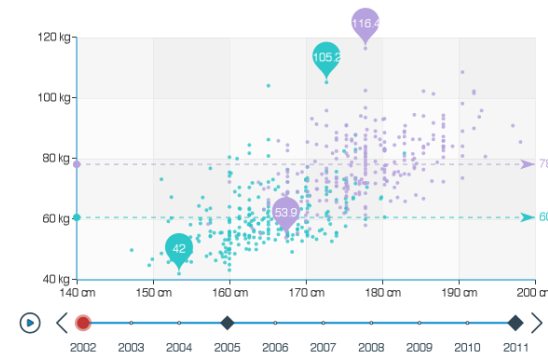
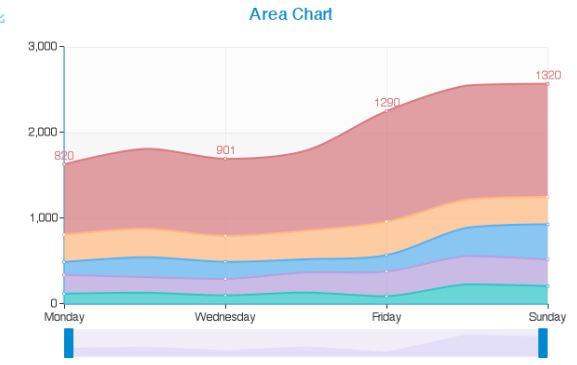
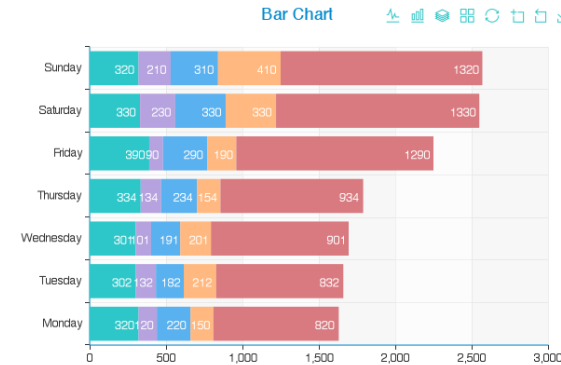
- High technical skills needed
- Information about each model needed
- Integration in the pixel platform



# 6 – Visualising data in Pixel – Which Technology should we use? 3/3

## Javascript libraries

- High technical skills needed
- Information about each model needed
- Easy integration and customization based on wizards



## 6 – Visualising data in Pixel – Should it be generic to support future needs (models) ?

- Pixel is an scalable platform.
- New AI models should be integrated.
- Dashboard provides a mechanism for defining Visualizations for models (Wizard configuration based on BD information)
- Each model should provide its wizard.
- A generic visualization can be use for visualising any data in a

The image displays three overlapping 'Create Visualization' wizard windows, illustrating a three-step configuration process:

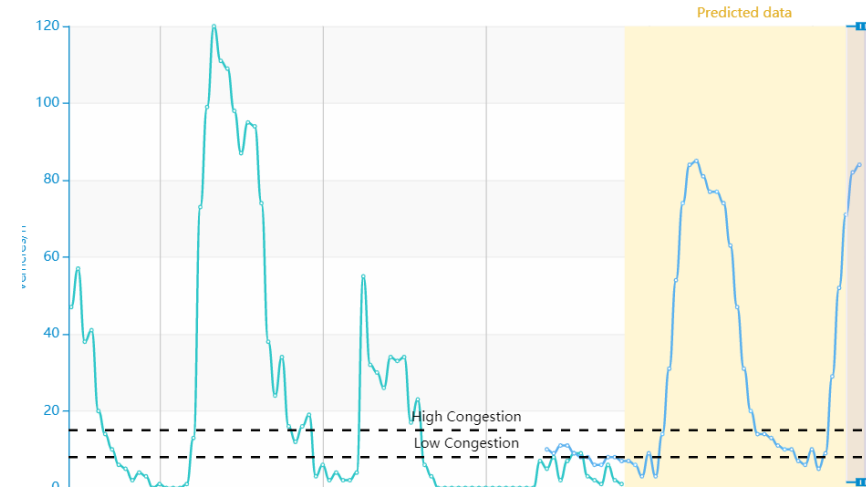
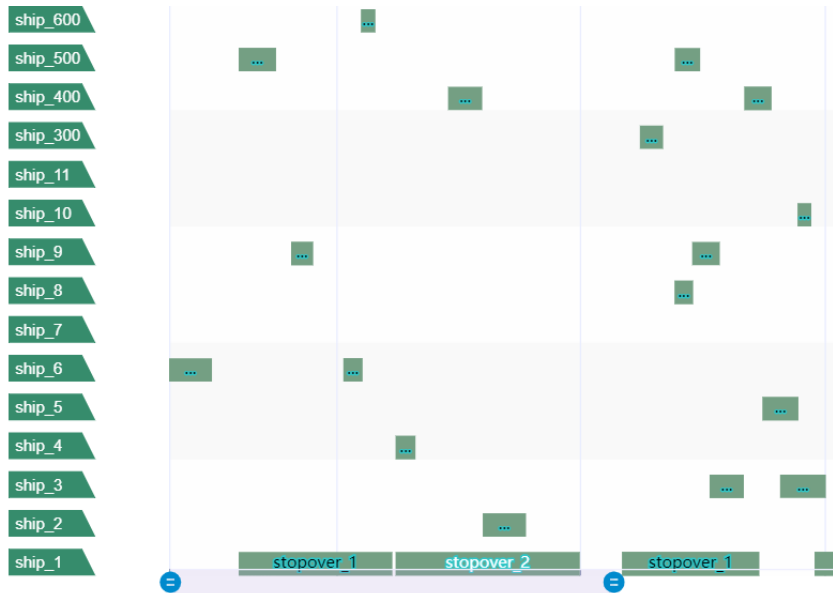
- Step 1: Source** (indicated by a circled 1)
- Step 2: Type** (indicated by a circled 2)
- Step 3: Configure** (indicated by a circled 3)

The bottom-most window is fully visible and shows the following configuration options:

- Title:** visualization
- Description:** Detail of the model
- Traffic Parameter:** ☒ Speed ☐ Intensity
- Lower Threshold:** 8
- Upper Threshold:** 1

Navigation buttons at the bottom right include 'Previous' and 'Add'.

# 6 – Visualising data in Pixel – Examples



PEI evolution



Current environmental performance



# PIXEL Partners



UNIVERSITAT  
POLITÈCNICA  
DE VALÈNCIA

**pro<sup>2</sup>DEVELOP**  
Integrating technologies



**CATIE**  
Solutions pour la société numérique



**creocean**  
Environnement & océanographie

**MEDRI**

**Sdag**  
Autoporto di Gorizia



THESSALONIKI  
PORT  
AUTHORITY S.A.



Porto di Monfalcone  
AZIENDA SPECIALE  
Camera di Commercio Venezia Giulia

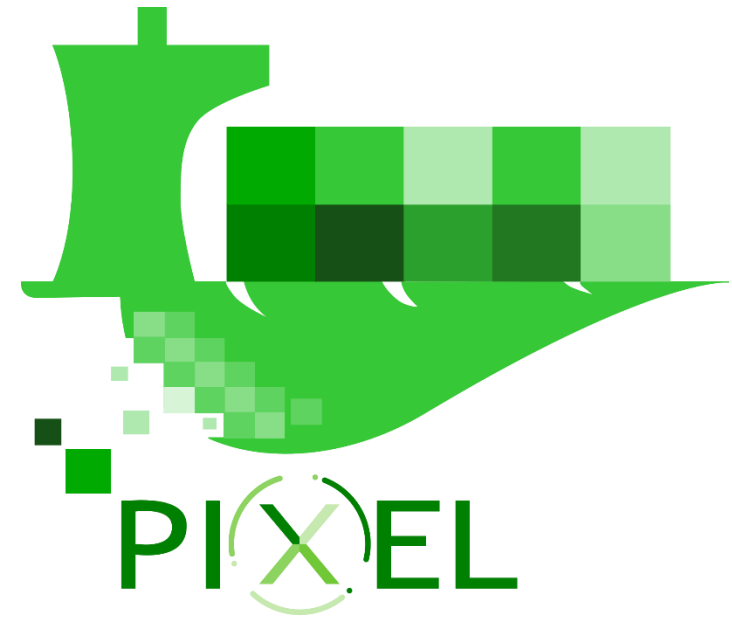


**PEOPLE**



**CERTH**  
CENTRE FOR  
RESEARCH & TECHNOLOGY  
HELLAS





# Thank You + Questions?



*This Communication is part of a project that has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°769355*

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17/06/2021

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