This project has received funding from the European's Union Horizon 2020 research innovation program under grant agreement No. 769355

PIXEL

Where IoT meets the Port of the Future

2nd NEWSLETTER

FEB 2020

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Summary

Welcome to the **second** PIXEL newsletter,

We are delighted to present our second **newsletter** aimed to provide an **update** on the activities carried out since the first release (May 2019). The PIXEL partners have been working hard to bring the initial specifications into **practical software implementations** to be soon tested in our four pilot ports.

During the last seven months the Consortium has been working in different tasks related to models, predictive algorithms, architecture specification and implementation, integration, evaluation and communication. We are proud of **having finalised** our four major models (**port city environmental model, energy, transportation and pollution**), some of which have been presented in **various conferences**. Committed with the community, PIXEL has made available video-tutorials of those technical tools (which can be found in our **YouTube channel**). The **Port Environmental Index** (PEI), the **leading model** within our project has already surpassed its **specification and methodology phase** and is currently under development. **Integration of heterogeneous data sources** from the different ports into common data formats also represents a challenging time-consuming task. However, we are conscientious and have already provided an **initial evaluation** from our **global evaluation plan**.

We are eager to start testing our PIXEL platform in the four pilot ports (Bordeaux, Monfalcone, Thessaloniki and Piraeus) with a special focus on the **PEI as a transversal use case**.

The PIXEL team

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Technical achievements and deliverables

During the first half of the project, following **achievements** have been performed:

- Development of a **PIXEL IoT architecture** with different layers, one of which directly links to port resources (Data Acquisition Layer).
- **PCS interoperability** for Port Vessel Calls. Common data format for vessel calls within the PIXEL architecture (as the format may vary from different PCSs)
- Initial set of **sensors** from pilot ports **connected** to the Data Acquisition Layer.
- **Methodology** for connecting heterogeneous systems through the use of **NGSI agents**.
- **Automatic aggregation** is performed at two different layers in PIXEL: (i) at DAL layer via NGSI agents and (ii) at IH layer via subscription and data fusion.
- **Homogenization** and **semantic annotation** derives from the use of common data models and data formats, starting from **FIWARE data models.**
- Development of an **initial dashboard** able to access to the different data sources and models. The dashboard is able to provide **authentication** and **authorization** based on profiles, and **multiple views** depending on the data to be processed
- Specification of a **common API** between dashboard and Operational Tools to handle existing and future models and predictive algorithms.
- **Models have been developed**: Port Activity Scenario, energy, transportation and environmental (air pollution, noise). **Results of some models** (PAS modelling and energy) have already been **disseminated/published.** All models have been described in deliverables and in **video tutorials** available in our **PIXEL YouTube channel**.
- Some **predictive algorithms** related to **ETD** (Expected Time of Departure) and use of **AIS** data are already developed.
- A **methodology for calculating the PEI** (Port Environmental Index) has been established. The PEI is **multi-sectorial** (ports, ships, terminals) and **multi-dimensional** (multiple environmental KPIs). The PEI model has already been **published in a high-impact** peer-reviewed journal, has been **validated** by our **Advisory Board** and initial contacts with **ESPO** and **Glomeep** are planned.
- More than **15 conferences** attended with active PIXEL participation (presentation, poster) and **6 research papers**.
- New **communication material** (**leaflet, poster**) available in our PIXEL website.

New **deliverables** have been released since May 2019 and are available in our PIXEL website:

- **D2.3**: Data Management Plan v2
- **D4.2**: PIXEL Models v2.
- **D5.2**: PEI Definition and Algorithms v1
- **D6.2**: PIXEL Information system architecture and design v2
- **D6.3**: PIXEL data acquisition, information hub and data representation v1
- **D7.1**: Integration Report v1
- **D8.1**: Evaluation Plan
- **D8**.2: Technical Evaluation v1
- **D9.4**: Report on Dissemination activities and Update of the Dissemination Plan v1

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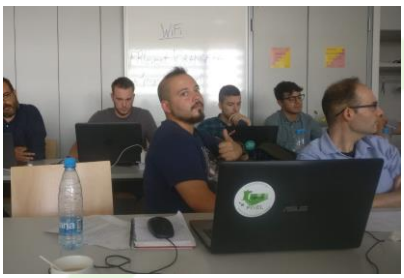
Meetings and PoF network

Several face-to-face **meetings** took place since May 2019 in order to coordinate and advance on the project, as well as prepare the **mid-term review** and sync with the **PoF network**.

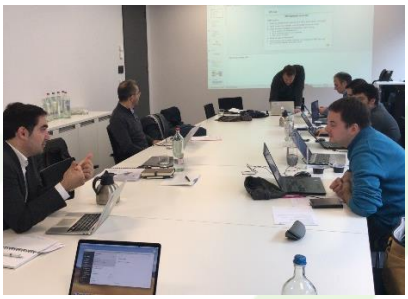


11/13 September-2019. Technical meeting. Ljubljana, Slovenia

A technical meeting took place in Ljubljana to finalize the **architecture details** and the **main interfaces** among components. Some **models** and **predictive algorithms** and their results were also presented and discussed.

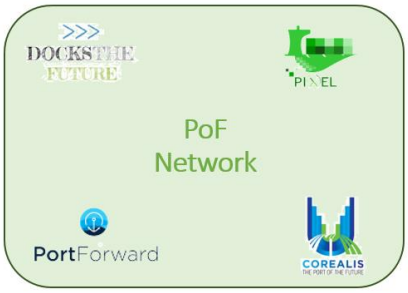
5/7 November-2019. Plenary meeting. Thessaloniki, Greece

A plenary meeting was held in Thessaloniki in order to officially close and **summarize the work** done until Nov 2019, to be then properly prepared and **documented** for the upcoming review. There was also time to plan **next actions** in PIXEL as well as a **visit** to the port to get a general overview.



22 January-2020. Review rehearsal. Brussels, Belgium

The PIXEL project **rehearsed** carefully the review one day in advance in order to highlight the **main achievements** in general, per each Work Package as well as the **timing constraints**. The same applied for the prepared **demos** intended to show our results so far. It was really difficult to summarize all the work done in a few hours.



Port of the Future network

PIXEL project has maintained during this period a **tight liaison activity** with the rest of the **PoF projects**. COREALIS, PortForward and PIXEL have celebrated bilateral teleconferences to discuss on technical matters, exploitation and the Port of the Future concept. We are also collaborating with the CSA DocksTheFuture in its final steps.

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Mid-term review

The last week of January (22nd and 23rd) the **PIXEL team** gathered together to prepare and face the official mid-term review (May 2018 to October 2019 execution) of the advances of the project by the agency INEA on behalf of the **European Commission**.

PIXEL's Project Officer, **Mr. Sergio Escriba**, altogether with an external expert reviewer and a delegate of the Directorate General **DG-MOVE** listened to the different presentations done by the PIXEL Coordinator, the different WP leaders and our Innovation Manager.

Globally, **the impressions were very good**. The PIXEL team found the time as well to show to the audience three different demonstrations of our already-working technological tools. More concretely, PIXEL exposed a global demonstration of the platform usability (conducted by **Michel Le-Van-Kiem**, Innovation Director at *Grand Port Maritime du Bordeaux* and assisted by our **Technical Coordinator**), an exhibition of a running hinterland-multimodal transport model and a user-friendly adaptation of the current work on the PEI: The Ship Environmental Index (SEI).

Additionally, we were given invaluable **recommendations and guidelines** on how to approach the rest of the project under a technical and operational perspective. Therefore, from now on PIXEL will double its efforts on the interaction with policy-oriented agents (e.g. ESPO, Glomeep), real impact of real actions in ports, cross-dissemination with other projects, scalability, flexibility and, technically, emphasis on the prediction features and the modularity of the solution.

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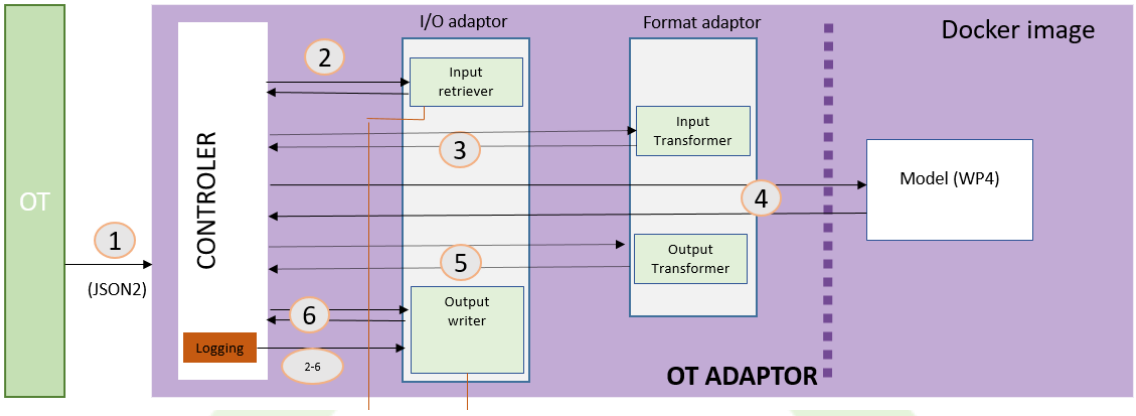
Code camp

Close after the mid-term review the technical partners in PIXEL organized an **internal code camp** in Valencia to move forward with the integration of developed components. The event was leaded by our Technical Coordinator (PRO).

Some **final implementation clarifications** took place but, most importantly, our integration choices and implementations needed to be **fully aligned** with the **architecture specification** we had already delivered in PIXEL (and released as deliverable). The face-to-face meeting seemed to be the best effective approach to cover successfully this relevant task. Needless to say that it was an intensive 4-day work with fruitful results.

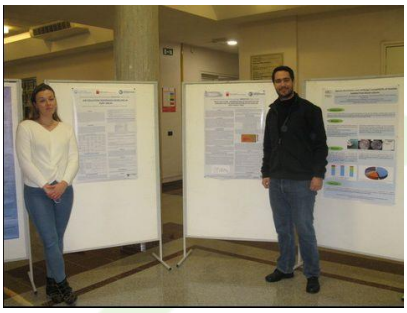
One of the most important topics discussed was the **integration** of the already developed **models** (WP4) **in the PIXEL platform**, with major link with the **Operational Tools**, but also impact on the Information Hub as well as the Dashboard (security considerations were also targeted). An Operational Tools adaptor was defined and the different needed interfaces were listed.

PIXEL technical partners and developers are already aware that development is an ongoing work and updates as well as unforeseen bugs are common. Therefore, all additional documentation not already released will be **properly documented in upcoming deliverables** (D6.4 and D6.5), so that interested followers will not miss anything. Moreover, the documentation will be provided **online** to allow updates even when the project ends.



Events

PIXEL partners have participated in different **events** and **conferences** since May 2019.



9/14 December-2019. Annual Faculty of Medicine Celebration Days. Rijeka, Croatia

On December 12th, 2019, a poster session was held in the Main Hall of the Faculty of Medicine, where Stjepan and Teodora (MEDRI) presented the H2020 European project PIXEL.

28 November-2019. 39 Scientific Symposium: Recent scientific achievements of the Teaching institute of public health. Rijeka, Croatia

Professor Luka Traven (MEDRI) was invited to this symposium to give a presentation titled: Assessment of the impact of port activities on human health and the environment using a composite index leveraged by IoT. Here the PEI concept was described.

15/16 November-2019. 8th Conference on Marine Technology. Rijeka, Croatia

The Conference was organised by Faculty of Engineering and Faculty of Maritime studies – University of Rijeka, Croatia, and Association for Research and Development of Maritime Industries. Teodora and Stjepan (MEDRI) participated with two posters related to air and noise pollution.

27-31 October-2019. OCEANS Conference and Exposition. Seattle, USA

Dejan (XLAB) presented a paper titled: Automated system for ship detection from medium resolution satellite imagery. The approach highlighted the potential use of satellite images for tracking vessels by combination of AIS data.

16/17 October-2019. BILOG- Logistics and Maritime Forum. La Spezia, Italy

The Forum analysed both the regional and European dimension highlighting the importance of the cohesion between all the players of the logistics chain. Leonidas (People) attended the event and gave a presentation about PIXEL.

10/12 October-2019. International Conference on Internet and Distributed Computing Systems (IDCS). Napoli, Italy

Nacho (UPV) presented a paper highlighting the PIXEL approach which targets the reduction of the environmental impact in ports through the intelligent use of IoT infrastructures and models.

1/2 October-2019. Blue Med Mediterranean Days. Toulon, France

PIXEL participated to the round tables event. Two round tables related to "Greenport" and "Greenship" were organized during the second day where Olivier (CREO) presented the PIXEL project and in particular the PEI methodology.

17/19-September-2019. ITS4C Congress 2019. Bordeaux, France

The congress tries to find solutions to the fact that until now ITS deployment remains well below levels needed to achieve European and global targets in terms of emissions. Charles (CATIE) presented PIXEL as a potential solution to target and reduce environmental impacts of ports.

10/12-September-2019. Maritime Transport 2019. Rome, Italy

The conference focuses on the topics such as navigation and ship operations, ports and their operation, port infrastructure, safety and security, pollution and the protection of the marine environment, and much more. Erwan (CATIE) presented PIXEL with a special focus on energy modelling.

4/6-September-2019. Baltic Port Conference. Stockholm, Sweden

BPC offered the participants an in-depth view into the current trends driving the global economy and its impact on the port market and helped answer the question behind the main factors defining a smart port. Aristos (CERTH) presented PIXEL as a solution enabler (through models and PEI) to a wide range of ports.

9/11-July-2019. 8th Black Sea Ports & Shipping. Constanta, Romania

Stefano (ASPM) and Gilda (INSIEL) shared some concepts of PIXEL and debated with some port operators about the importance to invest in smart solutions capable to make port operations more efficient and arise their competitiveness.

3-July-2019. GreenerSites Final Conference. Rijeka, Croatia

The conference gave us the opportunity to introduce the PIXEL project to the EU project partners, local and regional authorities and private companies interested in the development of brownfield sites. On this occasion Professor Traven (MEDRI) was in charge of this task.

25/27-June-2019. 7th Mediterranean Ports & Shipping. Casablanca, Morocco

Stefano (ASPM) and Gilda (INSIEL) attended the event giving a presentation about PIXEL. Among others, they promoted the Port of Monfalcone and PIXEL with the Minister of Transport.

13-June-2019. Export Summit VII. Thessaloniki, Greece

More than 3,200 persons attended the event physically and through live connection. Ms Aifadopoulou, Deputy Director of CERTH/HIT, presented PIXEL's work on 'IoT applications for environmental leverage in European ports & innovative technologies for efficient intermodal transport'.