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# D2.7 – Project Management Report v3

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Work Package	WP2		



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## Abstract

This deliverable has been created in the context of the Work Package 2 (*Work Plan, coordination and document management*) of the H2020-funded project PIXEL (Grant No. 769355).

This is the second PIXEL project management reporting. The present document provides the Project Management Report (PMR) for the second period of 6 months of the project. This report includes all the activities and advances performed from M7 to M12 of PIXEL. All WP have already started except WP7.

The document provides an overview of the work done and the actions performed to achieve the goals proposed and included in the GA. The document includes use of resources section in addition to the technical and impact aspects.

The document is structured in three blocks, providing the description of the work performed by the members of the consortium during the corresponding period (M7-M12). First block analyses the actions taken to accomplish the specific objectives listed in the DoA. Second block describes with more detail the main results and achievements per WP. The third block provides an overview of the impact achieved so far, including the different actions at industrial, scientific, academic and communication levels.

With this report the Consortium wraps the work performed during the first year of the project. A summary of this period can be seen as follows: (i) finished a detailed specification of the use-cases and scenarios to be demonstrated at a later stage, (ii) clear view and roadmap for development of the main functional enablers: a) models and simulation, b) PEI and its methodology, c) requirements to meet and d) baseline and strategy for impact evaluation, (iii) technological specification setting the ground for developments in forthcoming months and, finally (iv) clear advance on dissemination, both in virtual presence and in attendance to relevant events and fora, including naturally liaison with CSA DocksTheFuture and the MG-7-3 actions.

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# PIXEL

### List of acronyms

Acronym	Explanation
AB	Advisory Board
СА	Consortium Agreement
COVID-19	Coronavirus epidemic 2019-2020 caused by virus SaRs-COV 2
CSA	Coordination and Support Action
DPO	Data Protection Officer
DX.Y	Deliverable n° Y from work package X
EC	European Commission
EU	European Union
GA	Grant Agreement
GDPR	Global Data Protection Regulation
HMI	Human-Machine Interface
ICT	Information and Communication Technologies
IM	Innovation Manager
ІоТ	Internet of Things
IPR	Intellectual Property Rights
KPI / eKPI	Key Performance Indicator / (Environmental) KPI
PEI	Port Environmental Index
PIXEL	Port IoT for Environmental Leverage
PMS	Port Management System
PMIS	Port Management Information System
РО	Project Officer
ТоС	Table of Contents
DX.Y	Deliverable n° Y from work package X
WP	Work Package



### **1. About this document**

The idea behind this deliverable is to provide to the EC the report of the project status. After 24 months of execution, all work packages have started, two have finished and several meetings have taken place. The scope of this document is to summarise the advances and results of the project within the period M19-M24.

### **1.1.Deliverable context**

Table	I. Delive	erable co	ntext

Keywords	Description
Objectives	This deliverable does not serve particularly to any goal of the listed in the Grant Agreement. Nevertheless, this document plays a crucial role on the accomplishment of all the PIXEL objectives, indeed. Keeping track of current tasks, having an overview of the status of the project and planning the next steps for the forthcoming reporting period are the needed mechanisms to ensure to keep PIXEL remains towards its goals.
Exploitable results	This deliverable does not generate any exploitable result.
Work plan	The Project Management Report involves, actually, the activity from all the tasks in the project, as every one of them has been analysed and reported. However, this deliveable is framed in the WP2 structure and, particularly, it is assigned to T2.1, T2,2, T2.3 and T2.4.
Milestones	N/A
Deliverables	Similarly to the work plan, the Project Management Report involves all deliverables that have been submitted so far and some to still be completed. But, as it is mentioned several times throughout the document, this deliverable is especially tied to D4.2, D8.1, D4.4, D5.3 and of the results of the mid-term review meeting, as those have been the most relevant action points of M19-M24 period.
Risks	<b><u>Risk N°2</u></b> – This deliverable will allow all the Consortium, as well as the EC funder to ensure that the quality of work documentation and processes is being kept preventing any entity from misunderstand (or avoid) timing or responsibility due to lack of awareness.
	<b><u>Risk N°3</u></b> - Coordination mechanisms, keeping track of the advance of the project, identifying deviations and planning corrective actions will enhance the capacity and good execution pace of the project, and they are depicted in this document.

### **1.2. Methodology used for elaborating the report**

Drawing from the template established through D2.5, this report aims to mean an update of the latter. While D2.5 was the first report, D2.6 covered M7-M12, the Project Technical Report for mid-term review covered the period M13-M19 and this one (D2.7) corresponds to the M19-M24 execution of the project and it includes previous advances, the actual evolution of tasks and the results produced by all work packages.

The methodology followed has been to: (i) summarise previous advance, (ii) work package leaders, altogether with the coordination have elaborated "progress reports" that has been translated by deliverable leader to the actual format, (iii) review of the tasks description by corresponding partners, (iv) closure of the document by coordination. It is forecasted that this methodology will be followed by the rest of Project Management Reports to come.



### 2. Explanation of the work carried out by the beneficiaries and Overview of the progress

### 2.1. Objectives

The overarching goal of PIXEL is: "to enable a multilateral collaboration, multimodal transport agents and cities to allow an optimal use of internal and external resources, sustainable economic growth and environmental impact mitigation in all ports, regardless their size or volume of operations. Thus, **PIXEL** aims at bringing the **Port of the Future** paradigm to the complete spectrum of ports, with special focus in the small and medium sized. To do this, **PIXEL** will leverage an IoT based communication infrastructure to voluntarily exchange data among ports and stakeholders ensuring a measurable benefit in this process. The main outcome of this technology will be **an efficient use of resources in ports**, as well as the sustainable development and growth of ports and surrounding cities/regions. **PIXEL** is a use-case driven action that focuses on the needs of the stakeholders in order to improve their performance by means of specific technology enablers and improved environmental and operational procedures".

To ensure this, **PIXEL** provides (i) a set of models and predictive algorithms on the most prominent areas regarding the ports environmental impact: port and city environmental management, port energy demand, hinterland multimodal transport and port environmental pollution, including air, water and noise; (ii) a methodology and tools to calculate eKPIs and combine them in a Port Environmental Index, to enable proper quantification of the impact of Ports in cities and surrounding areas, correct assessment of mitigation measures, calculation of the return of investments in reduction of environmental impact and benchmarking with other similar ports; (iii) an open-source IoT-based technology enablers providing complete interoperability among existing port and city ICT systems and modern data-based systems to collect, aggregate and exploit data in a useful manner for port users, enabling more and better collaboration among the different stakeholders and unleashing the potential of Industry 4.0 management to ports and port-city relations and (iv) operational and visualization tools to observe, analyse and make decisions over the new available data.

All the efforts carried out during this reporting period (M19-M24) are in the line of accomplishing these global objectives. At this point, the consortium has delivered the planned deliverables, in few cases with short justified delays and with only two exceptions (D3.1 and D5.3) – which have been properly informed - , ensuring the maximum quality of work and clear alignment with agreed scope through GA. Technical activity is advancing and several developments are ongoing and dissemination and communication activities have been performed to maximize impact.

### **2.1.1. Research and innovation objectives**

To meet this goal, the **PIXEL** focuses on a set **of specific research and innovation objectives,** which compose the structure and leitmotiv of the project. These objectives are listed below. A review of the advances performed during this second report to achieve each of them is also depicted in this sub-section.

It is worth to mention that the list below does not reflect the total amount of tasks undertaken to meet the objectives. For simplicity and readability, we have compiled in the following pages those which refer only to the second period of project management reporting: M19 to M25. For a full understanding of activities executed towards PIXEL goals the reader should come back to previous deliverables of WP2, in which the Consortium made the same exercise for periods M1-M6, M7-M12 and M13-M18.

#### Obj.1: Enable the IoT-based connection of port resources, transport agents and city sensor networks

The project proposes a novel ICT based communication infrastructure to enable the integration of data produced by devices, sensors and systems into a full-fledged operational data hub operated by all actors (internal and external) involved in port operations. Every data generated by every of those components involved in port activities will be properly collected and stored in a unified information hub and it will be seen transparently as homogeneous string from the application and monitoring point of view. PMS/PCS of stakeholders must be connected and feeding the system. IoT and sensor networks from different stakeholders



# connected and interoperating. It provides methodology and tools for connecting isolated legacy systems such as SCADA/PLC based.

The results obtained related with this objective during the period M19-M24 of the project have been:

- Data Aaquisition Layer Agents orchestrator developed and integrated
- Development of several NGSI agents to connect real data sources with PIXEL infrastructure
- Information Hub connected and integrated in the "development environment"
- FIWARE security modules completely customised and integrated in the development environment
- Assignation of technical experts to different pilots in order to establish a parallel tracking and execution of the deployments (one port one pilot one technical partner assigned)
- Certain remote servers and on-premise infrastructure prepared for the integration.

## Obj.2: Achieve an automatic aggregation, homogenization and semantic annotation of multi-source heterogeneous data from different internal and external actors

As part of the IT solution, the project will provide a methodology and tools for unifying the data coming from heterogeneous, multi-tenant sources. PIXEL will offer a comprehensible acquisition, processing and interchange of heterogeneous data coming from different sources present in a port-operations environment: sensors, isolated IoT components, legacy systems and documentation. A methodology and supporting tool will be released to support the data fusion, based on semantic annotation and mediation. As a consequence of this objective, PIXEL will achieve semantic-level interoperability among different actors, with capability to choose the ontological domain of the reports view.

The results obtained after M19-M24 that put PIXEL one step closer to accomplish this objective have been:

- Clear planification by sprints following agile methodology has been set, put in place and is being followed by technical partners in charge of the integration.
- An NGSI Agent Python library and documentation to help other partners to developed NGSI Agent
- Preparation of the ground for the documentation of all code (to be done for D6.4 and D6.5).
- Northbound and southbound APIs completed and tested between all modules
- Northbound and southbound APIs completed and tested between all modules

# *Obj.3: Develop an operational management dashboard to enable a quicker, more accurate and in-depth knowledge of port operations*

It will support computing of indicators and multi-role views to enable better support to decision-making and optimisation of port/city specific needs. Platform will have an associated interface (HMI) with which responsible personnel of entities holding the pilots will be able to interact, measure and compare several operational data. As a result of achieving this objective, PIXEL will provide a dashboard validated by project members and independent stakeholders through a well-defined validation process.

The results obtained after M19-M24 that put PIXEL one step closer to accomplish this objective have been:

- Operational Tools v2 (OTv2) developed and integrated
- Dashboard and global UI v2 developed and integrated
- An integrated working demo functioning that was shown during the mid-term review

#### **Obj.4:** Model and simulate port-operations processes for automated optimisation

A structured, formalized, consistent and useful modelling will be undergone over port-operations processes to parameterize both the environmental impact caused by them and the process itself in pursuit of finding optimal resource consumption. PIXEL will leverage a set of standardized and inter-related specifications of port



processes regarding energy demand, port and city environmental management, hinterland multimodal transport in ports, and generic environmental pollution affecting ports and surrounding areas. Developed models will be tested by comparing its validity against real conditions in four different ports, with different businesses interests (freight, passengers, short sea shipping), different size (small, medium, large) and schedule diversity (second and third years of execution of the action).

The actions taken to accomplish this objective during the period M19-M24 of the project have been:

- Water and oil pollution modelling description of integration, use, data needed and technological requirements for a port wishing to implement them.
- Water pollution modelling utilisation for the THPA port case (using bathymetry data).
- This objective is considered met by M24, as all the models have been developed. The focus now in this regard is to test them under real scenarios and working conditions during the pilots (prone to be fine-tuned)

#### **Obj.5:** Develop predictive algorithms

In this project predictive algorithms will be developed devoted to selected port-operative process that will be modelled. Developed predictive algorithms that have the potential of significantly increase the efficiency in one or more of the following areas: energy demand, hinterland multimodal transport needs or anticipation of environmentally harmful actions. For verifying the achievement of this objective, the algorithms will be empirically tested and validated in the use-case scenarios. Additionally, it is planned an assessment of the increase in efficiency, confirming that is statistically significant.

The results obtained after M19-M24 that put PIXEL one step closer to accomplish this objective have been:

- Complete development (including training, validation and testing) and publication of predictive algorithms:
  - ETA using vessel calls (protected)
  - AIS data (protected)
  - Traffic prediction algorithms for PPA, THPA and ASPM
  - PV installation needs prediction

# *Obj.6:* Develop a methodology for quantifying, validating, interpreting and integrating all environmental impacts of port activities into a single metric called the Port Environmental Index (PEI).

The project will develop a Port Environmental Index (PEI) which will integrate all the relevant environmental aspects of port operations into a single metric framework. The index will enable ports to express their overall environmental impact as a single metric and use it for self-monitoring, appraisal of different mitigation measures as well as reporting issues (inter-port comparisons, benchmarking against best practices, etc.). The PEI will be validated through the use-cases and in a particular transversal trial where it be applied to each port to make proof of its scalability and portability, approved by the Stakeholders Policy Board and the method published in a relevant high-impact peer-reviewed journal.

The results obtained after M19-M24 that put PIXEL one step closer to accomplish this objective have been

- Creation of a waste inventory
- Final list of eKPIs
- Achievement of already-functioning code and usable program in Java for current PEI calculation

Obj.7: Develop guidelines for mitigating possible environmental and health effects of port activities and develop evidence-based, standardized and cost-effective procedures for environmental monitoring in port areas



Based on all of the identified environmental and health impacts of port operations, the project will develop appropriate mitigation strategies. In addition, the temporal and spatial resolution of monitoring/sampling/measuring points and the integration, statistical analysis and visualization of the obtained data in a GIS environment will be addressed. Both forecasting and alerting of environmentaldamaging situations will be enabled from a dashboard which will inform port (or any other body in charge) about environmental indicators and possible decisions to make. The PEI and the metrics that compose it will play a fundamental role in the achievement of this objective. As a consequence, there will be available mitigation suggestion in the operation tool of the PEI and there will exist geospatial representation of the environmental impact.

The results obtained after M19-M24 that put PIXEL one step closer to accomplish this objective have been

- A set of guidelines for the Business and Economic Assessment guidelines for each PIXEL port
- List of persons to contact of external ports and agents for T5.4 purposes
- PEI value proposition explanation and dissemination
- Initial RoI calculation and RoI calculation tool
- Formal contacts and certain commitments with IAPH, ESPO and IMO organizations.

### 2.2. Explanation of the carried work by WP

### **2.2.1. Work Package 1 – Ethics Requirements**

Universitat Politècnica de Valencia (UPV) as Project Coordinator (PC) was assigned as the partner leader (and in fact the only participant) for this mandatory Ethics Work Package. WP1 is focused on complying with the Ethical requirements detected by the EC in the evaluation phase and creating the documentation and structures needed for this aim.

#### **2.2.1.1.** Summary of progress in previous periods

During the first 6 months of the project, the activity on WP1 was intensive, as every procedure, template and strategy for future actions was defined, according to the proposed deliverable submission plan for the work package.

First of all, UPV addressed the definition, identification, cataloguing and ethics compliance analysis of the **participation of Humans** in PIXEL. Secondly, the PIXEL Consortium undertook the definition, identification, cataloguing and ethics compliance analysis of the **protection of personal data** in PIXEL. In third place, deliverable D1.3 included the information to Ethically comply with safe and healthy procedures.

Additionally, PIXEL Ethics Mentor was appointed and his tasks clearly defined.

Finally, D1.5 was completed containing a Data Management Plan for specific personal-protection subject data, differing from D2.2 through particularizing the plan for **specific Ethics-related raw data**.

During the next management reporting periods (M7-M12 and M13-M18), the activity on WP1 was diminished in terms of establishing procedures and documentation and was focused on continuous monitoring of ethical issues along the project execution. Having established the guidelines, the main tasks performed till M19-M24 were focused on

- Generic documentation of the project (day-to-day documents exchange, etc.)
- Forms and questionnaires needed to conduct our work
- Compliance with DMP and forwarding of new sources to register if applicable
- Ensure ethics compliance in the communication with external agents (other projects, CSA, IMO, AB, other entities) and in the dissemination
- PIXEL Ethics Mentor (see deliverable D1.4) supervised the main processes of information exchange and no remarkable issue has been detected by M18:



- All interviews to external people have been stored anonymously
- No specific ethics concerns were raised about communication with Advisory Board.
- Formal permissions were provided for proceeding in susceptible dissemination actions

With regards to topics covered by D1.2, the PIXEL Information Hub and PIXEL ICT infrastructure was under development and no data was integrated yet, so no personal data use/storage was analysed. Furthermore, WP7 had just recently started and no personal data from PIXEL stakeholders might have been processed.

After the AB was formed and formalised, all members were provided with the Participant Information Sheet and all of them completed and agreed with the Informed Consent for Protection of personal data issues.

#### **2.2.1.2.** Summary of results after previous periods

- Formalization of the procedure for ethics compliance about Humans participation in the project
- Creation of a template for Ethical issue identification by any partner
- Creation of a Participant Information Sheet for Humans that participate in the project, compiling their related information
- Creation of an Informed consent form for Humans that participate in the project. This sheet will be distributed to be signed by the external participants of PIXEL.
- Detailed strategy and procedure for personal data (subject to pass Ethics control) protection
- Creation of an Informed Consent procedure for personal data processing
- Creation of a Certificate of consent per personal data to be processed. This sheet will be distributed to be signed by the corresponding responsible
- Creation of a template specific for pilot trials to specify information about the data to be processed, framed into the context of Ethics compliance.
- Appointment of a Data Protection Officer from within the project Consortium
- Deliverables D1.1, D1.2, D1.3, D1.4 and D1.5.
- Confirmation of appropriateness of procedures established by D1.1, D1.2, D1.3, D1.4 and D1.5
- Finished execution of WP3 under holistic ethical observation and analysis of future actions

#### 2.2.1.3. Progress in M19-M24

During the management reporting period of interest (M19-M24), the activity on WP1 was diminished in terms of establishing procedures and documentation and was focused on continuous monitoring of ethical issues along the project execution. Besides, the preparation of the review that took place on M21 (January 2020) focalised the efforts of the team in order to analyse ethical concerns in the documentation to be prepared and exposed as well as on the outcomes obtained.

Meanwhile, the assets that received a continuous ethical analysis (always following the guidelines depicted through D1.1, D1.2, D1.3, D1.4 and D1.5) were:

- Generic documentation of the project (day-to-day documents exchange, etc.)
- E-mail exchange, communication via other channels as Slack chat, communication in teleconferences.
- Forms and questionnaires needed to conduct our work
- Data about sensors, data sources, internal aspects of ports, data needed to complete the predictive algorithms, data needed to execute the models, data needed for PEI computation
  - Extensive communication with WP2 and the DMPs (D2.3 and future versions).
- Communication with external agents (liaison with other projects, CSA, AB, IMO, ESPO, IAPH)
- Preparation for provision of ethics templates to external people to the project collaborating in diverse tasks: T5.4/T5.5, T8.4 and others.
- Dissemination of PIXEL through all channels: website, social media, newsletter, pieces of news, scientific articles, presentation in industrial events.



• Addition of ethical considerations to all material preparations (included in the plans for preparing, tracking and monitoring dissemination events).

Till this moment no ethical concern has been detected from the aforementioned list. All the exchanges of documentation have been done under optimal privacy conditions and the team does not consider any violation of privacy or personal data misuse have been produced.

PIXEL Ethics Mentor (see deliverable D1.4) supervised processes of information exchange and was also aware about the data set to be collected in further stages of the project. No personal data issues have been detected.

According to D1.1, any interview and communication that has been done to external people (in WP9 mainly) has been anonymised and only aggregated data has been used to create PIXEL documentation (e.g. D9.4 – social media interactions, events presented, etc.).

No official meetings were conducted with the Advisory Board during the period of interest (whereas particular communication and consultations were actually performed), so no special concern about ethics has raised. However, data exchange with the AB has occurred always under optimal ethical awareness.

Pilot trials are at an initial phase of execution. However, up to the moment no Human information might have been processed. Special attention has been put to the collection of passengers' vessels data in the port of PPA. The information that is being collected in PIXEL does not include any personal information, as the only relevant data for the purpose of the project is to track the total of passengers in the different cruises. This will be properly reflected as well in the deliverable D2.4 in the next reporting period.

With regards to topics covered by D1.2, the PIXEL Information Hub and PIXEL ICT infrastructure have been developed and are currently in fine-tuning (WP6) and integration (WP7) phase. Regarding the fine-tuning, currently all data is being managed under a multi-instance framework – meaning that all modules, handling information from different ports, are being run in a virtual server in the cloud (FiLabs provided by ORANGE) - therefore certain ethical constraints might apply. However, not previously or currently processed personal data from PIXEL stakeholders has taken place. This has been corroborated. With regards to the integration, all modules will be running within the port premises, following a single-instance approach – meaning that only (e.g.) PPA will be able to access/store/process data from PPA.

Regarding D1.3, till the moment no risk assessment has been needed related to health and safety procedures in the project. If this happens in the future, the mechanisms established in deliverable.

For future actions, several ethical concerns will be tracked and correspondent consent forms will be delivered for complying with PIXEL procedures:

- External experts to be contacted for "weighting and providing relevant inputs" about PEI's eKPIs. This will require a careful analysis from the ethical point of view and the proper forms and templates will be asked to be fulfilled. Eventual personal information will be anonymised and forgotten as well.
- Intervention of external agents (and people) to participate in PIXEL via the Proof of Concept (task T8.4) will also be analysed through the ethical perspective and the proper procedures will take place.
- Continuous work as in the points above.

#### 2.2.1.4. Results after M19-M24

- Confirmation of appropriateness of procedures established by D1.1, D1.2, D1.3, D1.4 and D1.5
- Positive outcome of the mid-term review with regards to technical issues
- Finished execution of WP4 under holistic ethical observation and analysis of future actions

#### 2.2.1.5. Deviations

So far no deviations have been detected.

#### **2.2.1.6.** Corrective actions

No corrective actions are required



# 2.2.2.Work Package 2 – Work plan, coordination and document management

Universitat Politècnica de Valencia (UPV) as Project Coordinator (PC) has been leading work package 2 (WP2), and the five tasks in which the WP is divided. As a project coordinator, UPV has carried out the majority of the activities within the task. The management work during the first year of the project has been one of the most time-consuming and effort-spending items in the day-to-day work.

The first thing to emphasize about this reporting period is that the plans were significantly affected by the current situation caused by COVID-19. The 3<sup>rd</sup> Technical Meeting was planned to be held in Rijeka from 31<sup>st</sup> of March until 2<sup>nd</sup> of April. However, it was cancelled, and a virtual meeting was held instead. It was held from 30<sup>th</sup> of March until 3<sup>rd</sup> of April, in the form of several teleconferences. The agenda was similar to the one planned for the Technical Meeting, with all the topics being covered as planned (at least, as much as it is possible without a face-to-face meeting).

Apart from that, most remarkable actions in period M19-M24 have been to organise and conduct the 4<sup>th</sup> Plenary Meeting in Thessaloniki, to attend and prepare the RP1 mid-term review of the project (with all previous works needed, especially the Project Technical Reporting), a code-camp held in Valencia at the beginning of February and a virtual (aforementioned) meeting that was supposed to be held in Rijeka during April 2020. The project consortium has generated three deliverables in this second period, associated with WP2 (1), WP4 (1) and WP8 (1), whose quality control has been performed following the project handbook procedures.

#### 2.2.2.1. Summary of progress in previous periods

#### Progress by task

#### Task2.1: Work plan, coordination and document management

The task has managed project planning and coordination. All WPs have started in the period under evaluation, all the activity has been executed as expected with minor delays and deviations that have been solved as they have been detected. Different management tools have been deployed: (i) Onlyoffice for calendar, information repository and management procedures; (ii) JIRA for VOLERE methodology support and risk management; (iii) mailing lists and reporting; and software repository tools (GIT). For internal communication and adequate interaction between the partners, the project has scheduled seven meetings (plenary and technical) during the period under review:

- Brussels (Belgium), 3-4 May, Kick-off meeting
- Bordeaux (France), 12-14 Nov 2018, Technical meeting
- Valencia (Spain), 11-12 Sept 2018, Plenary meeting
- Piraeus (Greece), 5-6 February 2019, Plenary meeting
- Valencia (Spain), 21-22 May 2019, Technical meeting collocated with Advisory Board meeting
- Ljubljana (Slovenia), 11-13 Sept 2019, Technical meeting
- Thessaloniki (Greece), 5-7 Nov 2019, Plenary meeting (not part of this reporting period)

The project has held biweekly telcos since the start of the project, using ISL tool provided by XLAB, additional telcos to handle specific issues have been also scheduled.

The PIXEL project has been interacting with the Port of the Future network and its associated projects (Corealis-RIA, PortForward-RIA, DocksTheFuture-CSA). Activity related with this network has been:

- Participation in monthly telcos.
- Participation in the DocksTheFuture Workshop in Porto, 29-30 October 2018
- Participation in the DocksTheFuture Mid-Term conference in Trieste, 3-4 Abril



• Participation with the PoF network in the European Maritime Days (Lisbon), 16-17 May 2019

Quality control is a task performed in the framework of this task, as indicated in the project handbook. All project deliverables are reviewed project-internally by two persons, who have not contributed to the deliverable itself (as far as possible) in order to ensure that project deliverables are of the best possible quality and that they are consistent in its content (an internal planning and schedule has been organised for such reviews). In turn, the deliverable editor performed the reviewer's suggestions and requested – if needed – extensions within 2 weeks after internal review submissions. In addition, all deliverables have been read and commented on in parallel to those experts' reviews above by the technical manager and coordinator, too.

#### Task 2.2.: Administrative and financial management

Administrative and financial management of the project has advanced as expected:

- Distribution of prefinancing was executed during the first month of the project
- The project has generated one amendment. The main reasons were:
  - To redefine the participation with ORANGE and its three linked third parties: ORANGE Consulting (OrangeC), ORANGE applications for Business (OrangeB) and Association images & research, as from 1 September 2018.
  - To change the PMs assigned to some partners (MEDRI, IPEOPLE), according to their current management situation to best accomplish PIXEL objectives. A proper justification was provided.
- Fluent communication with the PO of the project has been held: Mr. Sergio Escriba (M1-M18); No change of PO has been experienced during this period.
- In order to fix some mistakes in delivery dates and responsibilities of some deliverables (e.g. D8.3), work has been carried out to be prepared to an eventual final Amendment in the next period.

#### Task 2.3: Advisory Board Management

The PIXEL Advisory Board (AB) is intended to be a valuable group of experts related to various fields of knowledge that are willing to contribute to the success of the project. The main purpose of this venture is to gain feedback on several matters of the project from an external expert viewpoint.

The Advisory Board of the project was appointed during the first year of the project, and it includes 6 members in total, as presented in Table 2.

AB member	Organisation	Field of expertise	
David Bolduc	Alliance Verte (Green Marine)	Environmental aspects in ports	
Rafael Socorro	ACCIONA	Innovation, infrastructure, IoT	
Lucija Kolar	Complementarium	Marine environment	
Charalampos Platias	Greek Ministry of Maritime Affairs	EU policies, administration	
José Manuel García	Port of Valencia	Ports, infrastructure, innovation	
Francisco de los Santos	Autoridad Portuaria Bahía Algeciras	Ports, infrastructure, innovation	

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Agreed procedures were followed to establish this structure of members. Technical, industrial and academic criteria have been applied in order to contact particular people who could contribute significantly to PIXEL. Thus, specialists for the main application domains of PIXEL were included in the Advisory Board: environmental impact in ports, marine environment, small and medium ports, innovative technology and IoT, integration, smart cities, and other related services.

Generically, AB members are expected to provide technical, ethical and legal guidance, input and feedback on the PIXEL industrial and technological roadmap, advise on links with relevant interest groups outside PIXEL,



facilitate information about trends on technology and business models in the field and encourage interactions with other projects and initiatives.

The main format of collaboration among AB members and the PIXEL consortium has been set as by attending to meetings or workshops and interaction through e-mails with different bodies of the project. The initial planning for AB-PIXEL Consortium meetings was set as the following:

- **Virtual meetings**: Teleconference calls will be properly scheduled to keep track of advances and to get feedback and other contribution from AB members. Planned dates for these meetings were:
  - AB Welcome and Kick-Off collaboration February 2019 (done)
  - 4th PIXEL Plenary Meeting November 2019 (done)
  - 3rd PIXEL Technical Meeting March 2020 (not done by M18)
  - 3rd PIXEL Workshop November 2020 (not yet done)
  - 6th Plenary Meeting March 2021 (not yet done)
- Face-to-face meetings: PIXEL plans to have two physical meetings with the Advisory Board, coinciding with Plenary/Technical Meetings of the project. Planned dates for these meetings are:
  - 2nd PIXEL Technical Meeting May 2019 (done with attendance of 4 AB members)
  - 5th PIXEL Plenary Meeting September 2020 (not yet done)

Whenever an AB Meeting is envisioned, the agenda of the associated PIXEL Meeting will dedicate a single slot for this purpose. So applied for the face-to-face meeting in Valencia (May 2019). Every detail was announced and confirmed with enough advance (following article 6.2.2 of the Consortium Agreement). Travel expenses (except from non-EU countries) associated to attendance of these meetings are covered by the Project Coordinator (as it is indicated in the Grant Agreement).

#### Task 2.4: Risk management and Quality Assurance

The Risk management strategy is considered an important issue in PIXEL, even if there is no specific deliverable dedicated for that. It refers to an ongoing activity of monitoring and assessing the work that is being carried out during the project, detecting and anticipating risks, and select the best strategy to manage each of them

The criteria to classify and prioritize the risks follows the principles recommended by the Project Management Body Of Knowledge (PMBOK®) of the Project Management Institute (PMI). Frequent risk management telcos (twice a month, collocated with the plenary WP2 telcos) have been held in order to have tight control of the execution of the project. Additionally, WP leaders were encouraged to early detect the risks in their respective WPs and raise them in WP2 telcos. An informal work log has been maintained and the list of (foreseen and unforeseen) risks has been continuously updated in the EU Portal (SyGMa). Currently there were 22 foreseen risks and 10 unforeseen risks.

Risk management has been mainly led by PC and WP leaders, however the different members of the PMC have participated in risk management during the first 18 months of the project. During the different Advisory Board meetings (face-to-face, virtual) discussions about risks have been held.

#### Task 2.5: Data and ethical management, planning and assessment

PIXEL advance the following from M1 to M18 on T2.5:

- Identification of data subject to protection
- Elaboration of Data Management Plan (D2.2 and D1.5)
- Data Protection Officer appointed in PIXEL has been working with the participants of task T2.5 to supervise and create the needed documentation to enhance data protection strategies.
- Forwarded information about data management plan and data protection to WP3 (requirements) and WP6 (data processing).



- Establishment of a template to describe the data sources of all types to be included within the DMP observance.
- Elaboration of the second version of the Data Management Plan (D2.3), following the FAIR data management principles, describing (following the established template) the different data sources of interest and identifying next data sources.
- Identification of the next round of data to be included in DMP further versions. This is a continuous work that draws from the observation (by UPV, PRO and other relevant partners) of: (i) day-to-day advances of the project, (ii) technical scope and the different data sources that are being incorporated to the platform at each moment, (iv) the requirements, (v) the available data sets from the ports being integrated and used to generate and run the different technological tools of PIXEL, (vi) the market and state-of-the-art study and (vii) the global procedures on material generation in the project.
- Collection of details of the different (already known) data sets, advancing on its characterisation in order to fulfil the template for all identified data.

#### 2.2.2.2. Summary of results after previous periods

Main results associated with the execution of the WP is the adequate coordination of the activities organised in WP that required an intercommunication between them. Main achievements:

- Execution of the different administrative and financial activities as required by the project.
- Deployment of the different collaborative tools in order to manage the execution of the project.
- Submission of the deliverables in due date, delays have always been justified and agreed with the PO after analysing the corresponding rationale, e.g. delay of 15 days of D4.1
- Quality control of the deliverables and results of the project.
- Application of a risk management mechanism.
- Establishment of the AB and start of the interaction with it obtaining advice and guidance for the project.
- Deliverables submitted successfully:
  - Deliverable D2.1 Project management and quality handbook
  - o Deliverable D2.2 Data Management Plan v1
  - Deliverable *D2.3 Data Management Plan v2*
  - Deliverable D2.5 Project Management Report v1
  - Deliverable D2.6 Project Management Report v2

#### 2.2.2.3. Progress in M19-M24

#### Progress by task

#### Task2.1: Work plan, coordination and document management

The right functioning of a project often relies on a balanced coordination, taking into account the text of the proposal that has been funded and the daily activities that occur within it. In this regard, UPV is the Coordinator and UPV and, as WP2 leader, is the main executor of this task for PIXEL. Supported by other partners, if requested, UPV holds the responsibility of aligning the technical and social scope of PIXEL (according to the GA) with the day-to-day execution of the several tasks that take place simultaneously. At the same time, all the "logistic" of the project: enabling internal communication tools, being the interface for every request, etc. is covered within task T2.1

This task has been continuously performed during the whole reporting period. Regarding common tasks of coordination, a lot of activities have been undertaken, such as organising plenary telcos, creating specific mailing lists, supervising the whole work execution, uploading documentation (deliverables) to the EC, ensuring a good communication among the partners, communicating with the Project Officer after proper requests and keeping track of the work plan, ensuring the proper pace of work looking for the sake of the project and having 2 meetings in which all partners reunited, 1 development meeting and the mid-term review:



- 4<sup>th</sup> Plenary Meeting at Thessaloniki on 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> of November 2019. The main topics were to advance in technical issues and in the integration/pilots deployment and to prepare the mid-term review to be conducted in Brussels in January 2020.
- Mid-term review (RP1) on 23<sup>rd</sup> January 2020 in Brussels, with a rehearsal day (22<sup>nd</sup> January) at the same premises the day before. The review was chaired by the Project Coordinator and the advances of PIXEL in M1-M18 were analysed and commented/evaluated by the Project Officer, an external reviewer and one representative member of the DG-MOVE unit. The result was positive and different corrective actions have been put in place following the feedback received.
- Code-camp for software development and Agile Integration alignment, in Valencia, on 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> February 2020. Technical partners of PIXEL were gathered (with specialized developing staff) in order to jointly develop code needed for PIXEL and to solve questions and keep the alignment. This meeting was summoned by the Technical Coordinator (PRO) embedded within the Agile Integration and Development methodology and was specifically conducted for tackling the next round of developments of PIXEL (OTv2, Dashboardv2, IH put in place, models integration) and for preparing the software material to conduct all WP7 pilots.
- Rijeka (virtual) Technical Meeting, conducted via teleconference rooms on days 30<sup>th</sup> and 31<sup>st</sup> March and 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> April. This meeting was supposed to be held in Rijeka, hosted by partner MEDRI, but due to the COVID-19 confinement and mobility restriction rules, the Consortium was not able to travel. Nonetheless, the Consortium decided to keep the meeting alive in order to tackle different concerns, namely: data availability, pilots status, impact assessment and alignment with GA and, generically, PIXEL stance and results of the mid-term review.

With regards to the documentation, from M19 to M24 the common documentation repository was kept populated by all partners, while being created and maintained by UPV. Instructions for uploading, naming, placing and modifying the various document in the private server have also been followed by partners. Currently, more than 5 GB of original PIXEL documentation is already managed.

Periodic reports have been requested to all work package leaders. This method, that has been performed through several ways, is the approach selected to check the advance of the project. Altogether with bi-weekly telcos in which all partners participate. Biweekly management telcos are organised in alternative Thursdays, in order to solve any management issues, and every two telcos perform risk management activities.

Regarding the work plan, the period M19-M24 has been intensive both for the internal management and for the external point of view. On the one hand, various WP leaders translated to the Coordination diverse requests/concerns about the project plan at different points, specially about deliverable delays, tasks duration and risks to be faced with the current plan. On the other hand, the Coordination analysed all requests from a holistic perspective and forwarded upwards the proper consults (to the Project Officer) in order to understand how to proceed and/or obtain an acknowledgment/validation to formalise certain changes. In this aspect, remarkable changes are the extension of tasks and deliverables in WP7 and WP8 (see in sections below) and the communication/validation of delays (most of them, slight) on deliverables (being the most remarkable the 8-weeks announced delay of deliverable D5.3).

Coordination methods established and used by the Coordinator are also being followed by WP leaders partners to manage internally the advance of particular WPs. For instance, bi-weekly/monthly periodic telcos and a monitoring sheet with pending issues and most urgent tasks to be done.

Finally, another action tackled by the Coordination within the scope of T2.1 in M19-M24 was to create and appoint specific task forces to address issues of the project execution. Although some of these actions were delegated into the WP leaders (see, for instance, WP9 or WP6/7 task forces) other were important and global enough to be directly addressed by the Project Coordinators (UPV) and the Technical Coordinators (PRO). Thus, in this period, three relevant task forces have been created:

- 1. Agile methodology (by sprints) for development and integration.PRO leads this task force, that includes all technical partners with responsibilities in the development.
- 2. Assignation of technical experts to different pilots in order to establish a parallel tracking and execution of the deployments (one port one pilot one technical partner assigned).
- 3. Impact assessment and alignment with GA team, formed by CERTH and UPV.



#### Task 2.2.: Administrative and financial management

In task T2.2 the administrative issues generated and specially those related with the EC have been addressed. In the following paragraphs there are some details about the most demanding activities of task T2.2 in the period:

- Preparation of the **Project Technical Report for the mid-term review** (M21): this activity implied huge efforts both from WP2 leader (supervising, merging, analysing, aligning, keeping consistency, writing, submitting) and from all WP and task leaders of PIXEL, who had the duty to comply with reporting requests in order to reflect the best way as possible the advances of PIXEL in M1-M18:
- Preparation, correction and supervision of the **Financial Statements of the partners for the mid-term justification**: this action involved many people, including financial departments of all partners (and third parties of ORANGE), ensuring the alignment with the plans and supervision and cohesion from the Coordination. Although a continuous tracking takes place, this period was particularly intense on this regard.
- Preparation of the **mid-term review session** in Brussels: reservation of premises, negotiation with the Project Officer about the agenda to be established, preparation of the different presentations, alignment among WPs, supervision of all the procedure, celebration of a rehearsal session and, finally, presenting the M1-M18 summary of execution of PIXEL:
- Internal (allowed by GA rules) adjustments of budgets of various partners-
- Interim mid-term payment procedure execution (and solving of issues): As soon as the mid-term payment from the EC was received by the Project Coordinator (UPV) at the end of M23 the mechanisms were started in order to proceed with the payment to the partners. Several issues are being experienced as there were various internal agreements made during the period that need analysis of the amounts to be forwarded. Currently, the procedure is on-going and UPV is keeping a transparent communication to all the partners of the status.

Besides this, in the context of T2.2 several internal reporting actions have been conducted. Both technical and financial reporting was request to all partners to keep track of a proper use of resources since the very first stages of the project. As it is commented in the last section of this deliverable, no relevant deviations are to mention up to now.

#### Task 2.3: Advisory Board Management

The PIXEL Advisory Board (AB) is intended to be a valuable group of experts related to various fields of knowledge that are willing to contribute to the success of the project. The main purpose of this venture is to gain feedback on several matters of the project from an external expert viewpoint.

This period (M19-M24) has not been the most active one with regards to the Advisory Board Management and associated actions with the members. This is due to, mainly, two aspects: (1) WP2 partners focused their attention, especially in months M19, M20 and M21 on the mid-term review. Communication was kept but no specific intervention of the Advisory Board was conducted. (2) COVID-19 outbreak (M23, M24) made agile communication with the AB more difficult than before. The crisis is affecting all the companies in Europe and the AB members were not highly reachable. Besides, WP2 team decided not to put pressure on expected feedbacks from them during the epidemic.

However, a continuous monitoring has been kept from the Coordination team by maintaining a periodic communication with the members of the Advisory Board. Furthermore, several actions can be remarked. The following have been performed, mainly, by the leader of the task:

- Replace/maintaining two AB members because of change of company/position: Jose Manuel García left his position within the Port of Valencia to join one of the most important logistic companies in Europe: TIBA logistics. Due to the relevance of this company, and the willingness of Jose Manuel, this AB member was still considered relevant and was maintained in the AB of PIXEL. The same applies for Rafael Socorro, who changed his position (was promoted) within ACCIONA. He declared to have less time devoted to innovation and research but still enough to be useful and interested in PIXEL.
- Providing feedback of PIXEL by fulfilling the questionnaire that PIXEL members prepared in 2019.



- Plans for the next period:
  - The main format of collaboration among AB members and the PIXEL consortium will be by attending to meetings or workshops and interaction through e-mails.
  - Physical presence of the members of the AB as soon as vis-à-vis meetings will be able to be conducted in Europe
  - Ask for feedback to the AB members on the specific comments received by the reviewer and EC representatives in the RP1 review
  - Organisation of a workshop to show to the AB members the current status of PIXEL tools, models, visualization, etc. Huge advances have been done so the feedback to be received afterwards will be very useful to fine-tune PIXEL assets.

#### Task 2.4: Risk management and Quality Assurance

This task, same as the others in work package 2, will last for the whole period of the project. Thus, some actions have been undertaken during its first 6 months.

Particularly, as it can be observed in section 4 and in Appendix A and Appendix B, the period M19-M24 has been the most active one with regards to risk observation, assessment, mitigation and foreseeing for the future.

A lot of work was carried out in the risks' task (T2.4), but the most remarkable effects will be associated to the actions following COVID-19.

During months M19-M22 (before the epidemic), different risks for current and forthcoming activities were as well identified using the consolidated procedures agreed for PIXEL. It is especially remarkable the influence of the review in the risks identified. The various comments, suggestions and questions that were raised during the mid-term review in Brussels were carefully analysed by the WP leaders and task leaders and, finally, became formalised via risks.

Due to the current point of execution of the project, the most relevant risks to be thoroughly monitored for the next reporting period are those associated to WP7 and WP8, regarding the deployment of PIXEL in real ports and the impact that the different functionalities will have both for the ports and the society.

Additionally, the identification of risks has been slightly enhanced through the analysis of the first tasks of the project (documentation procedures, communication strategy, etc). Furthermore, some mitigation actions that were previously designed have been implemented. For instance, several efforts have been done to maintain the work plan without major deviations, both in duration and in number of partners involved.

All risks have been duly registered and formalised by their introduction on the "Continuous Reporting" tool in the online area of Sygma (Funding and Tenders' portal private space).

Regarding quality assurance, the process defined back in the first period for the quality review has been followed in all those deliverables that have been elaborated in M19-M24. Particularly, deliverables D3.1 (re-edition), D4.1, D4.2, D6.1, D6.2, D6.3 (re-submission after mid-term review requests) and, associated to this period D8.1, D4.4 have passed through the quality assurance process (Internal Review plus Innovation Review, meeting certain timing). Deliverable D2.7 of WP2 has followed the usual review circuit as well. These have been actions for both quality and risk mitigation.

#### Task 2.5: Data and ethical management, planning and assessment

The activities have been the following:

• Identification of the next round of data to be included in DMP further versions. This is a continuous work that draws from the observation (by UPV, PRO and other relevant partners) of: (i) day-to-day advances of the project, (ii) technical scope and the different data sources that are being incorporated to the platform at each moment, (iv) the requirements, (v) the available data sets from the ports being integrated and used to generate and run the different technological tools of PIXEL, (vi) the market and state-of-the-art study and (vii) the global procedures on material generation in the project.



- Collection of details of the different (already known) data sets, advancing on its characterisation in order to fulfil the template for all identified data. Specifically, details are being fulfilled of the next sets:
  - Raw data from own sensors
  - Observational data from own web services
  - Observational data from external services
  - Results generated from model and PEI calculation
  - $\circ$   $\;$  Guidelines and recommendations related with the PEI adoption
  - $\circ$   $\;$  Historical data collection and processing for model training
  - o Data predicted generated after execution of predictive algorithms
  - Pictures of PIXEL members presenting at events:
  - Pilot deployments in the four ports participating in PIXEL

Partner	Contribution			
P01 UPV	Coordination of the project.			
	Administrative tasks			
	• Leading management (WP2) and taking care of the coordination of the project, with definition of all procedures, setting up of the repository and other necessary day-to-day resources			
	• Writing of D2.7			
	Advisory Board management:			
	<ul> <li>Arrangement of meetings and other agreements</li> </ul>			
	Organisation and lead of PCC sessions regarding Interim Payment			
	• Act as the intermediary for all communications between the beneficiaries and the EC			
	• Implement quality procedures for the project			
	Administration of project resources including budget-related issues			
	• Financial management including distribution of payments to the beneficiaries			
	• Facilitate communication within the consortium on administrative matters			
	• Consolidate project's deliverables and reports and maintain Quality Assurance including submission to the EC			
	• Leading the Rijeka (virtual) meeting.			
	• Organisation of different sessions for technical advance in Thessaloniki and Rijeka (virtual).			
	• Create, update and maintain the control and official documents, thus keeping track of the WP activity			
	Organisation of bi-weekly Plenary Telcos			
	• Lead the risk identification and mitigation process			
P02 PRO	• Supporting Coordination in its majority of tasks from their position of Technical Coordinator			
	• Supporting Coordination specially in Risk detection, mitigation and taking actions			
	• Organisation of different sessions for technical advance in Thessaloniki and Rijeka (virtual).			
	• Assistance to PCC telcos.			
	• Usual actions corresponding to a WP leader (WP7)			

#### Table 3. WP2 Partner contribution summary table



	• Oversight of proper technical advance of the project, acting as a technical leader in several occasions in different work packages
P05 CATIE	Attendance to all Plenary Telcos.
	• Usual actions corresponding to a WP leader (WP4)
	• Attendance to the mid-term review as WP4 leader
	• Prepare and present the WP4 advancements in the mid-term review
	• As WP4 leader contributes to risk management and quality assurance.
	Attendance to PCC telcos.
P06 ORANGE	• Supporting Coordination specially in Risk detection, mitigation and taking actions
	• Usual actions corresponding to a WP leader (WP6)
	• Advisory board member and global follow-up (Task 2.3 and 2.4)
P08 MEDRI	• Supporting Coordination specially in Risk detection, mitigation and taking actions
	• Usual actions corresponding to a WP leader (WP5)
	<ul> <li>Administrative and financial management: contribution in administrative issues, preparation of Final Financial report for the first period (M1-M18), Internal Financial report and participation in Internal Technical report, follow up project tasks and implementation, organize MEDRI team meetings, lecture rooms, making travel arrangements, key controlling duties: tracking project progress, preparing project status</li> </ul>
	report, preparing final financial report. Set up the data base for the next project period.
	• Regarding T2.4, detailed financial reports were prepared towards the mid-term review and a request to the coordination for budget adjustment was done.
P10 THPA	• The 4th Plenary meeting in Thessaloniki took place, early in November, with ThPA team attending the meeting and making all relevant arrangements, as well as, a visit to the port premises. Also, meetings were held with both local stakeholders and ThPA administration on the progress and outcomes of the project
	• Physical meetings were held, with the project's subcontractor, who is assisting in WP5, WP7, WP8 and WP9 tasks
	• Meetings were held with both local stakeholders and ThPA administration on the progress and outcomes of the project, as well as public relations department
P11 PPA	• Communication with Project Coordinator on proposed budget reallocation already submitted in September 2019.
	• Held meeting with the sensors suppliers and discussed different options and specifications
	• Participated in the virtual plenary and technical meetings from March 30th to April 3rd 2020
P12 ASPM	• During this period, the video system for the monitoring of parking area and road congestion has been finalized and started to provide data to the INSIEL server. In order to do this, several meetings have been held with the external company committed to implement the system and evaluate the infrastructures capable to host the system.
	• ASPM organized a meeting along with SDAG, INSIEL and DPO in order to verify the respect of privacy in the usage of the data used in PIXEL.
P14 IPEOPLE	• Supporting Coordination specially in Risk detection, mitigation and taking actions
	Usual actions corresponding to a WP leader
P15 CERTH	• Supporting Coordination specially in Risk detection, mitigation and taking actions
	• Supporting Coordination in management of relation with ports specially



•	Usual actions corresponding to a WP leader
•	Contribution to the PPR submitted on time for preparing the mid-term review that took place on M21.

#### 2.2.2.4. Results after M19-M24

Main results associated with the execution of the WP is the adequate coordination of the activities organised in WP that required an intercommunication between them. Main achievements of the period M19-M24 have been:

- Elaboration of the Project Technical Report for the mid-term review about the advances of the project M1-M18
- Supervision, monitoring, correction, formalisation and presentation of all the Financial Statements by partners and third parties associated, and the corresponding documentation.
- Execution of the different administrative and financial activities as required by the project.
- Deployment of the different collaborative tools in order to manage the execution of the project.
- Submission of the report deliverable (D2.7) reflecting the reality of the project at this moment.
- Creation of various task forces in order to tackle specific issues of the project.
- Quality control of the deliverables and results of the project.
- Deliverables in this WP successfully submitted:
  - D2.7 Project Management Report v3

#### 2.2.2.5. Deviations

No significant deviations have been produced, apart from the extra work needed to undertake the creation and management of Project Technical Report and the gathering and correction of all Financial Statements while preparing for the mid-term review.

According to the observed in task T2.4 (see Appendix A as well), the Consortium is well-fond of different risks, deviations and delays that will take place in the following months due to the COVID-19 outbreak. Although mitigation measures are already being put in place, the Project Coordination will (most likely) request for an extension of between 3 and 6 months of the duration of the project. This very fact will be thoroughly monitored by this WP, and all partners, as well as the Project Officer, will be timely informed of the situation.

Even though not being exactly a deviation, the EC warned to PIXEL team (during the mid-term review) that a clear under-expenditure of resources is taking place in PIXEL (below than expected/planned). This must be observed and corrected in order to ensure a proper use of resources in the project (activity of task T2.2).

#### **2.2.2.6.** Corrective actions

- 1. Special work effort in the identification, assessment of risks (and introduction of measures) caused by the COVID-19 effects.
- 2. Creation of a task force: Agile methodology (by sprints) for development and integration.PRO leads this task force, that includes all technical partners with responsibilities in the development.
- 3. Creation of a task force: Assignation of technical experts to different pilots in order to establish a parallel tracking and execution of the deployments (one port one pilot one technical partner assigned).
- 4. Creation of a task force: Impact assessment and alignment with GA team, formed by CERTH and UPV.

Regarding the comment/observation by the Project Officer during the mid-term review, the Consortium has already put in place the next two measures:

- <u>All partners</u>: have clear the resources available and spend them respecting the rules trying to catch up to the 100% at the end of the project.
- <u>UPV</u>: make more thorough analysis (each 3 months) of the resources consumption reported by partners via IFRs.



### 2.2.3.Work Package 3 – Requirements and Use Cases

Having lasted from month M1 till M12 of the project, the project team considered the tasks duly conducted and the inputs needed for further work properly provided.

WP3 has been in charge of gathering and defining the set of technical requirements for the development of PIXEL solution and for each of its core components and use-cases scenarios. For this purpose, the specific objectives have been to analyse the market of current port, environment and operational data integration, related technological enablers and to describe thoroughly scenarios for the use cases that will take place via four pilots, involving all the relevant actors, goals and processes. The specific objectives of the WP were: (i) to provide a state of the art and market analysis in the areas targeted in the project, especially on environmental factors and impact in multi-modal transport models in present-day ports, (ii) to identify and analyse ports, agents, stakeholders and different actors involved in each use-case addressed in the project: Monfalcone, Bordeaux and Piraeus-Thessaloniki, (iii) to adequately formulate, gather and analyse requirements from targeted pilots, and other involved actors to characterise PIXEL, (iv) to track requirements through different stages of the process, representation, management, and potential to each tool and outcome, (vii) to analyse legal and regulatory requirements that will be relevant to PIXEL pilot deployments and (viii) to propose PIXEL architecture and accompanying specifications via requirements specification.

During the second management reporting period (M7-M12) the work package was finished according to the expectations and involving all needed partners and agents to meet the objectives. However, the execution has not been free of hindrances and barriers that have been overcome.

Initially, the deliverable D3.1 was catalogued as a shortcoming from the Consortium after its first internal draft delivery. Issues arose with regards to this deliverable were centred on the lack of coordination, alignment and managerial disagreements between the deliverable leader (IPEOPLE) and Project Coordination. For this reason, the consortium decided (via a binding PCC session celebrated according to procedures set in GA and CA) to revert the situation taking some measures that ended up, among other actions, on the partner IPEOPLE changing its assigned team to PIXEL. After this PCC session, a new ToC and first approach for D3.1 was proposed by the Consortium and partners such as PRO, XLAB and UPV assisted the newly appointed team of IPEOPLE in order to overcome the situation. This redounded on a delay on deliverable submission but with a clear consciousness of quality and with proper production of this important asset of the project. To sum up, the process of writing D3.1 was altered by certain internal reasons but the Consortium was able to revert the situation and to culminate the work without affecting further tasks nor diminishing the scope of objectives of the work package.

Regarding the analysis of use-cases and scenarios, the Consortium made an outstanding effort to create deliverable D3.4. After submission of deliverable D3.3, partners realised that several challenging tasks were to be done in order to meet the expectations and to provide a solid and useful manual of scenarios and use-cases. Particularly, following the workplan set from D3.3 to complete D3.4 guided partners to create the document, besides including other documentation for more clear input to WP4 and WP6: use-case diagrams, user stories, scenarios definition, available/needed data, environmental and modelling questionnaire and clear expected outcomes.

Finally, the main action of requirements gathering and wrapping was performed. Following the Volere methodology and the particularised procedure established at the beginning of the project (detailed in deliverable D3.2), different partners were assigned to conduct: (i) requirements creation, (ii) stakeholder validation, (iii) technical validation and (iv) final set of requirements definition. This process has been strongly enriched by the action of most of partners making an effort to align the requirements with their own responsibilities in other WPs. For instance, technical partners specialized on tasks from WP6 have reviewed the JIRA platform and provided view and contributions to align all current contents and mapping objectives to particular requirements. On the other hand, for accomplishing a full coherent delivery of D3.2, the task leader (INSIEL) decided to set specific sub-teams to be in charge of ensuring consistency of requirements related to use-cases, guaranteeing that the same essential information is covered by the main documents describing their purpose: D3.3, D3.4, D4.1 and D3.2.



With regards to the period M13-M24, the WP3 did not execute any task per se, with the exception of a continuous monitoring of legal issues (T3.2) and the surveillance of stakeholders market linked to the exploitation activity in T9.4.

However, the only remarkable action in WP3 during the M19-M24 period (under description in this report), was the modification request of the deliverable D3.1 by the EC after the results of the mid-term review in M21. The different inputs were worked by the partners and finally submitted on time.

The Consortium considers that **this WP has not suffered any negative impact** neither collateral effect because of the COVID-19 outbreak, as all the activities were finalised before the epidemic crisis.

#### **2.2.3.1.** Summary of progress in previous periods

WP3 activity started at the very beginning of the project. All ports were very soon encouraged to analyse their own scenarios, their goals and expectations (after the text submitted in the proposal) and to start gathering as most information as possible to enrich the input to be provided to the other technical work packages.

In the first 6 months of the project, all the tasks within WP3 started and provided tangible results to the project. Here below the main achievements of each one of them in the previous period (M1-M6) is described:

#### Progress by task

#### Task 3.1: Market study with stakeholders

In previous periods (M1-M18), this task consisted of:

- Analysis about the previous and current research Projects (FP7 & H2020) that have similar focus and objectives with PIXEL
- Analysis of 16 ports for the identification of the most important trends that affect the Port Operations, namely in the area of port efficiency and connected logistics
- Creation of a Market Analysis out of the two latter activities
- Struggles with finalizing D3.1 due to difficulties in obtaining the necessary data from the various sources that were decided to be used to elaborate the deliverable
- Desk research
- In-depth interviews with market experts
- Interviews with PIXEL stakeholders and use-case pilots host partners, users' surveys and Workshops
- Market studies & reports analysis

Despite of task T3.1 finalising on month M6 of the project, the Consortium felt necessary to continue some associated work. Analysing the market, PIXEL's position and the current status of the art with regards to ports' realm must be a continuum to achieve project aims. Market studies & reports analysis, Desk research and future Innovation potential of PIXEL on ports' market will be further assessed through task T9.4. Results on these activities will be delivered within its associated documents

#### Task 3.2: Regulation, Policies and Recommendations

This task has been executed since month M1 and concluded in M9. According to the team the activity has concluded by continuing the work expected from GA and D3.3.

In previous periods (M1-M18), this task consisted of:

- Elaboration of a questionnaire distributed among the partners to gather the proper
- Rough identification of regulations applying to the use-cases and provision of information for deliverable D3.3
- Set of a roadmap of actions to perform with regards to legal regulation on ports affecting PIXEL



- All partners made an extensive effort of identifying and reporting their corresponding regulations in the areas of: Environment (waste, pollution), transportation legislation, safety and security legislation, GDPR, ISO certification and Quality control policies relevant to the project activities in the port pilot areas
- Description of the main European directives, legislation framework in specific port operation relevant areas
- Elaboration of a a comprehensive and detailed list of related compliances each port needs to cope with (according to its specific use case) and a definition of international and national regulatory bodies to be following to.

#### Task 3.3: Use cases and scenarios definition for port environmental issues

This task was continuously performed during the period M1-M12, and it was finished in M12. The main activities undertaken in the past reporting period were:

- To define the structure of the first deliverable (D3.3 "use cases and scenarios manual v1").
- Work from ports within PIXEL to describe their use-case following the template and to explain their current situation
- Final version of the first deliverable (D3.3)
- After the submission of D3.3 in month M6, during the first part of this second period (M7-M9) the Consortium focused on build over it to create the next iterative version: D3.4 Use cases and scenarios manual v2.
- Continuous discussion between ports and technical partners of PIXEL to analyse the objectives and final achievements and how to be reached, always having the Description of Action as a reference.
- To provide a final detailed description of the use-cases that form part of the project, the data that will be used, the user-stories to be followed and the different actors intervening.
- All use-cases were divided in different user-stories that were listed (using unique identifiers) that will serve to track down each objective/function required by the port during the whole project.
- To provide a complete set of input parameters to WP4, WP5, WP6 and WP8 about what needs to be developed to meet use-cases objectives.
- To provide a baseline to generate final requirements in T3.4 for covering "functional requirements" set.

#### Task 3.4: Requirements specification

This task was continuously performed since M1 and finalised in M12. The main activities undertaken in the past reporting period were:

- Identification of the methodology to apply to collect and manage requirements (VOLERE)
- Customization of the methodology to PIXEL nature and creation of a template for inserting requirements
- Selection and customization of a prioritization methodology (MosCoW)
- Creation of a template (and introduction of the template in the JIRA flow) to introduce the requirements.
- Design of a workflow to manage and monitor the status of the requirements, with the possibility to create some macro categories of the requirements status.
- All requirements (functional and non-functional) were identified by pilot and technical partners, with the support of all project partners, that will guide the next technical stages of PIXEL
- Performance of an iterative process to improve both quality and soundness of collected requirements.
- Prioritization of all the requirements collected (more than 100) using the MosCoW methodology.
- Legal compliance and issues have been considered as part of T3.2 in order to identify and describe related non-functional requirements. In particular impact of GDPR on proposed use-cases has been evaluated
- Writing of deliverable T3.2.



#### 2.2.3.1. Summary of results after previous periods

The main results that we have obtained in the context of WP3 are the following:

- First approach to the use-cases manual
- Template for the creation of a requirement and design the process of creation, refinement and approval of a requirement. Selection of JIRA for creating and managing requirements
- Training video for PIXEL partners so that everybody is able to insert/correct/accept the requirements; depending on the stage of the requirements process that they must act.
- Market Analysis document created (part of D3.1)
- Full definition of set of functional and non-functional requirements of PIXEL.
- Full analysis of market and of environmental aspects for ports addressed by current initiatives, as well as existing business models and status of the port business.
- Final description of use-case and scenarios, providing a useful baseline and guidance for forthcoming technical development both for WP4, WP5 and WP6.
- Deliverables submitted successfully:
  - Deliverable D3.3 Use cases and scenarios manual v1
  - Deliverable D3.1 Stakeholders and market analysis
  - Deliverable D3.4 Use cases and scenarios manual v2
  - Deliverable D3.2 PIXEL Requirements Analysis

#### 2.2.3.2. Progress in M19-M24

This work package ended by M12 (April 2019).

The only activities carried out during M19-M24 have been:

- Preparation of the material for explaining WP3 execution, results and closure during the review meeting (January 2019).
- Addition to D3.1 and re-submission of the document after the particular request of the EC:
  - o Return of Investment calculation strategy
  - o Market and stakeholders careful review and inclusion of companies resulting of this study
  - Initial RoI calculation

Partner	Contribution
P01 UPV	• Significant contribution to the resubmission of D3.1
P02 PRO	• Significant contribution to the resubmission of D3.1
P03 XLAB	• Significant contribution to the resubmission of D3.1
P08 MEDRI	• Significant contribution to the resubmission of D3.1
P14 IPEOPLE	• Preparation of 1 <sup>st</sup> Periodic report presentation for the tasks T3.1, T3.2, T3.3 and T3.4
	• D3.1 was requested to be enhanced (in market study and RoI calculation) after the mid- term review meeting. IPEOPLE is deliverable responsible. The actions tackled were:
	<ul> <li>Commencement in M21 of D3.1 revision (RoI methodology inclusion)</li> </ul>
	<ul> <li>Authoring of the RoI, Value Proposition and business model sections requested by the PO during the mid-term review,</li> </ul>

Table 1	WP3	Partner	contribution	summan	table	M7_M12
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	• Organizing, delegating parts and reviews and integrating parts contributed by other Consortium partners.
	<ul> <li>Conclusion of D3.1 revision (RoI, Value Proposition and Business Models methodology and preliminary analysis inclusion)</li> </ul>
P15 CERTH	• Significant contribution to the resubmission of D3.1

#### 2.2.3.3. Results after M19-M24

The main results that we have obtained in this second period of the project (M19-M24) in the context of WP3 are the following:

- Deliverables submitted successfully:
  - $\circ$  Deliverable *D3.1 Stakeholders and market analysis* (added preliminar RoI and additional explanations for a continuous RoI calculation in the project).

#### 2.2.3.4. Deviations

Deviations on D3.1: it was requested to be modified/enhanced by the Project Officer during the review meeting in January 2019 (M21).

#### **2.2.3.5.** Corrective actions

Some partners were assigned to comply with the specific request about RoI and market study, being the main partners involved IPEOPLE and XLAB. A draft version was proposed and all the Consortium validated the content.

Additionally, one request/suggestion done during the mid-term review has been duly noted (and will be tackled by PIXEL partners) with regards to WP3: that cross-interaction and validation of the requirements could be automated using JIRA:

Regarding this, the Consortium has set that INSIEL and CATIE will use (and supervise the use of) JIRA for following track of validation/completion of requirements.



# 2.2.4.Work Package 4 – Modelling, process analysis and predictive algorithms

WP4 started on month M4 and has finished by the end of this management reporting period (M24). The first three tasks (T4.1, T4.2 and T4.3) were finished by M18 and all management and execution details were provided in the Periodic Technical Report submitted before the mid-term review that took place on January 2020 (M21).

The only active task in WP4 during this reporting period (M19-M24). In this period, the task has been finished successfully and the associated deliverable (D4.4) is being submitted to the EC at the same time of this report.

WP4 goal has been to provide several Modelling and Predicting Tools to PIXEL. Actually, WP4 has developed models, data analysis and algorithms in order to manage port efficiently and adapted to the environmental stakes. To do this WP4 has considered the environmental impacts identified in WP5 as necessary to the Port Environmental Index in order to provide metrics. Then in WP6 (especially in T6.4 Pixel Operational Tools) those models, data analysis and algorithms are being implemented to be used via the Operational Tools. Currently, all models and predictive algorithms developed are being integrated in real deployments in WP7.

Together those operational modelling (WP4) and operational (WP6) tools constitute a decision support tool providing a useful and transversal knowledge for cargo operational management. It will allow operators to evaluate the environmental impact of any activity scenario, and to compare them for an optimal choice regarding environment.

The Consortium considers that **this WP has not suffered any negative impact** neither collateral effect because of the COVID-19 outbreak, as all the activities were finalised before the epidemic crisis.

#### 2.2.4.1. Summary of progress in previous periods

#### Progress by task

#### **T4.1 – Port and City Environmental Management Models**

First objective of this task was to develop the interoperability between the models that would be developed in the other tasks of the work package, namely the energy demand and production models, pollution and transport demand models. The model that was developed in this task (PAS – Port Activity Scenario) acts as a central hub between the other tasks models that will allow the exchange of information between them.

This task had three distinct but interdependent goals:

- 1. Estimation of the data that other models will require in order to operate.
- 2. Development of the model (PAS) that will estimate / produce data needed by other models in the WP
- 3. Preliminary estimation of data availability for modelling the PAS.

The task started in month 4 and officially ended in month 18. The related deliverables of this task (Deliverable D4.1 - PIXEL models v1 and D4.2 - PIXEL models v2) were delivered on time.

Different relevant activities that were carried out as well in months M1-M18 were:

- Code has been developed that allow to build in an automatized way the list of all port activities that happen during a certain period of time
- PAS model was fully developed and settled as ready to be integrated in PIXEL Operational Tools.
- WP4 team considered that this task was fully achieved and completed by M18.

#### **T4.2 – Energy Demand Models**

This task focused on modelling the port's energy demand and production to provide information about the energy use. Three main axes have been investigated in this task: 1) quantify the energy consumption



corresponding to a specific port activities scenario, 2) how to predict the local photovoltaic electricity production for a given period and 3) how to estimate the resulting electricity net balance between electricity consumption and production in the port area. This task has closely interacted with a) task 4.1 in order to have a common definition and modelling approach for port activities and b) task 4.5 in order to development predictive algorithm for energy production with a photovoltaic (PV) system.

The following activities were conducted to achieve those objectives:

- To develop a model of the energy demand due to the port activities a deep investigation based on the GPMB use-case took place to understand the best approach to use.
- A first data analysis work based on 7 years of data (vessels calls) have was done to understand the structure of energy demand.
- The energy demand has been modelled according to a fixed scenario using the port activity scenario.
- Definition of all the input data models, designed and developed the algorithm to transform vessels calls, supply chain specification and the list of port activities in time series of energy consumption.
- Development of code to use the PAS outputs as an input of the energy demand model.
- Energy demand model was fully developed and settled as ready to be integrated in the PIXEL Operational Tools.

WP4 team considered that this task is fully achieved and completed.

#### <u>T4.3 – Hinterland multimodal transport Models</u>

The work in this task was focused on modelling the cargo traffic generated by a port and assessing its impact on the hinterland. The model developed in this task has been built based on the reality of the Port of Monfalcone and its hinterland of the Friuli Venezia Giulia Region. In particular, the objective was to implement a new tool enabling both forecast and management of congestions involving port and hinterland areas, supporting the cooperation and the interoperability between regional actors (in this case ASPM and SDAG) and boosting the use of the railway to reduce the environmental impact. To reach this goal, the context was analysed: the output of such work is represented by a model composed of 2 sub-models to meet the pilot needs:

- The multimodal transport has been modelled for the transportation of slabs to the hinterland, since Monfalcone port is the arriving point by ships of the slabs to be distributed to the industrial districts. So, the model creation considered all characteristic of the slabs transport, the infrastructures and the main destinations of the slabs in order to estimate the traffic generated by the slabs and the environmental impact of the different transport solutions.
- The second sub-model is focused on the congestion events of the Monfalcone port due to different reasons, such as port operational activities, type of cargo arriving, weather conditions, day of the week (trucks cannot circulate during the weekend), etc. A model was created to estimate when the congestion can happen within the port of Monfalcone in order to trigger the traffic incoming towards SDAG.

Code was developed for these two models. The provided results help to understand if a different traffic management has a positive impact on congestions and are useful for an effective decision support tool to optimize the re-routing of trucks. These models have been fully developed and were considered ready to be integrated in PIXEL Operational Tools.

WP4 team considered that this task was fully achieved and completed by M18.

#### <u>T4.4 – Environmental Pollution Models</u>

Main goals of the Task 4.4 were the creation of noise and air dispersion models that could be used by pilot ports to assess their contribution to the environmental pollution levels. In order to successfully finish those tasks, two different approaches were used. For noise modelling, a commercial software Predictor-LimA Software Suite,



developed by Brüel & Kjær, was used. As for air pollution, it was decided to use the American Meteorological Society (AMS) and the United States Environmental Protection Agency (EPA) Regulatory Model – AERMOD.

Both pollution models were developed using the Port of Thessaloniki as an example.

Regarding noise pollution, the following activities were carried out:

- Setting up the software environment for running the model
- Using data provided by THPA to be inserted in Predictor-LimA.
- Selection of adequate calculation method. Decision was to use different methods for railway (CNOSSOS-EU method) and road (ISO 9613.1/2 Road method) and import those results into a method used for the calculation of industrial noise.
- The final noise map was presented to other partners during the Technical Workshop in Ljubljana.

And for the air pollution modelling:

- Selection of procedure to be followed: result: to write scripts which essentially are "shells" for the open source pollution modelling software AERMOD.
- The port of Thessaloniki provided information about possible source locations, port activates and total energy consumption for some of the piers
- Missing data was provided form other models such as the Port Activity Scenario
- Preparation of the model to be Dockerized and converted to a service in WP7 to be integrated in the different pilots on the ports.

WP4 team considered that this task was fully achieved and completed by M18.

#### <u>T4.5 – Predictive Algorithms</u>

Task 4.5 aims at the identification and development of predictive algorithms in ports to support achievement of PIXEL objectives and will relate to all the tasks in WP4, where is the need for predictive algorithms.

First part of Task 4.5 (taking place in the period M7-M18) was thus dedicated to the identification of predictive tasks, according to the PIXEL Requirements analysis, Use cases and scenarios manual, as well as the needs of PIXEL Models and developments in bigger ports. The algorithms identified to be developed were:

**Predicting vessel calls data from FAL forms and other sources:** After a first round of data availability analysis, the team identified FAL forms data as the most general and standardized source of data to be used. In particular, as the GPMB's one was the most complete and available via API was thus used for the development and evaluation (to be continued in M19-24). During M7-M18, extensive exploratory data analysis took place.

**Use of AIS data:** During M7-M18, openly available historical AIS data sources were identified, as well as an effort was made to contribute to the open-source initiative AISHub, by providing our own AIS antenna receiver (partner XLAB) and as such obtaining access to the whole network of amateur AIS stations. During M7-M18, exploratory data analysis took place to analyse AIS data around GPMB, PPA, ASPM and beyond.

**Use of satellite imagery: During M7-M18,** satellite imagery from ESA Copernicus Sentinel-2 constellations and open-data program of Planet Labs were obtained. Satellite imagery was combined with AIS data in order to develop an automatic construction of large-scale ship detection dataset. A careful plan for M19-M24 was elaborated to develop state-of-the-art ship detection methods on medium resolution satellite imageryThe methods were presented at MTS/IEEE OCEANS 2019 conference.

**Analysis and prediction of road traffic conditions with connection to port operations:** This problem was analysed and needed to be tackled for ASPM, PPA and THPA. Data availability was studied and a detailed methodology was envisioned, choosing a common approach to be applied afterwards to each case. Exploratory data analysis for the 3 different scenarios was also conducted in the period by the T4.5 team.

**Prediction of renewable energy production:** For the prediction of the production of a PV system based on past data different approaches based on the GPMB use case and the data availability were studied. It was decided



to use the PV output database to have energy production, temperature and weather. Work was performed in M7-M18 for data analysis and transformation (resampling, seasonality, ...).

For all of them, methodologies were designed, data details were obtained and first works on the development of the algorithms were started before M18. All the technical details were provided via deliverable D4.3, which was also one of the main activities of the task in M7-M18.

#### 2.2.4.2. Summary of results after previous periods

The main results that we have obtained in this reporting period in the context of WP4 are the following:

- Models have been developed and were set ready for integration within the PIXEL platform (WP6) and use/test in real condition (WP7)
  - Port Activity Scenario Model: Modelling of the supply chain and port's activities and enable to build activity scenarios that are used to identify energy sources, emissions of pollutants and estimate the flow of cargoes entering or leaving the port.
    - Definition and development of the model of the Port Activities Scenario.
    - Definition of the data models to be used in the Port Activities Scenario.
    - Definition of the flexibility and transferability of the model: definition of the restrictions of the model of the Port Activities Scenario and of the restrictions' correlation with the data availability.
    - Definition of the system and training requirements of the model of the Port Activities Scenario.
  - Energy Demand Model: Enable quantification of energy consumption associated to cargo transition.
    - Definition and development of the energy demand model. Definition of data models to be used.
    - Test of the model with GPMB
    - Definition of the system and training requirements of the model
  - Hinterland multimodal model: Provide an effective decision support tool to optimize the rerouting of trucks.
    - Definition and development of the transport model: two sub models have been developed.
    - Definition of the system and training requirements of the model
  - Air and noise dispersion models: Simulate the air and noise pollutant dispersion caused by various activities and operations inside the port.
    - Adaptation of AERMOD interface to use the model in PIXEL
    - Use of a noise model based on Thessaloniki data
    - Definition of the system and training requirements of the model
- Predictive algorithms have been fully identified and described. Their developments are still an on-going work. The following results have been already obtained:
  - Identified and obtained FAL forms data for vessel call analysis and forecasting. Extensive exploratory data analysis and vessel traffic analysis with obtained vessel call data.
  - Identified and obtained AIS data sources (historical and live data). Extensive exploratory data analysis and large-scale visualizations of obtained AIS data. Method for port vessel traffic congestion analysis and efficiency monitoring based solely on AIS data.
  - Identified and obtained traffic data from internal sources (consortium) or external providers (e.g. TomTom). Extensive exploratory analysis and road traffic analysis for ASPM, PPA and



THPA. Initial forecasting methods developed for short-term traffic volume prediction for ASPM and PPA.

- GPMB vessel call duration (ETD) prediction module. GPMB ETA prediction module.
   Combination of GPMB ETA and ETD module for accurate and timely arrival and departure times.
- Identified and obtained openly available medium resolution satellite imagery from ESA Copernicus and Planet Labs.
- Developed of a novel procedure for automatic ship detection dataset building with AIS data and satellite imagery.
- Developed state-of-the-start ship detection method on Copernicus and Planet Labs satellite imagery.
- Identified and obtained real PV production data (via PV output). Extensive exploratory data analysis and PV production analysis. Start development of predictive algorithm based on LSTM method.
- The work done in WP4 has been presented in 4 research conferences (8th International Conference on Maritime Technology, Maritime Transport Conference, OCEANS 2019 conference)
- Three deliverables have been submitted successfully:
  - Deliverable D4.1 PIXEL Models v1
  - Deliverable D4.2 PIXEL Models v2
  - Deliverable D4.3 Predictive Algorithms v1

#### 2.2.4.3. Progress in M19-M24

As a summary, the advances done in M19-M24 with regards to WP4 have been the following:

- Finalising the development of predictive algorithms in task T4.5
- Writing of deliverable D4.4.
- Addition to D4.1 the election of the water and soil pollution modelling (including SotA) and resubmission of the deliverable.
- Addition to D4.2 the specification, development and example of use of the water and soil pollution modelling and re-submission of the deliverable.

#### **Interaction with other WPs**

WP4 is working closely with three others WP:

- WP5: a lot of discussion between WP4 and WP5 leader in order to establish link between what will be done in WP4 (emissions quantification and supply chain modelling) and the impact on the PEI.
- WP6: and WP7 works has been done to have a full set of model's requirements definition. The definition of data models was part of the discussions between WP4 and WP6 teams. Additionally, the development of agents was a matter of discussion here. Besides, the Operational Tools required to the different model owners to specify: (i) data model inputs, (ii) outputs of each model and (iii) the specification and/or development of the different adapters to allow integration of the models in PIXEL (to be deployed in WP7).

#### Progress per task in the period M19-M24

#### **T4.1 – Port and City Environmental Management Models**

Although the task was closed in M18, some work continued in order to fine tune the PAS model based on new inputs from other tasks models.



Additionally. during the Thessaloniki plenary meeting (in M19) it was decided that the interoperability provided by PAS can assist to the direct calculation of the Port Environmental Index (PEI – developed in WP5) both for real operating conditions of the ports as well as for the use of what-if scenarios.

Additionally, a video of the functioning of the PAS was created. It is available in the PIXEL Youtube channel.

#### **T4.2 – Energy Demand Models**

Although the task was closed in M18, some work continued in order to fine tune the Energy-demand model.

This fine-tuning was leveraged (and even intensified) for the preparation of a live demo to be shown in the midterm review. GPMB, CATIE, IPEOPLE, ORANGE and other partners made extra efforts in this task in order to develop Data Models, NGSI agents, visualization and backend services in order to show the UI, the functioning and the results in the Review. Besides, GPMB presented it to the reviewer and the Project Officer in Brussels from the perspective of what a port will obtain (impact, use) by using that PIXEL tool.

#### T4.3 – Hinterland multimodal transport Models

Although the task was closed in M18, some work continued in order to fine tune the two models that were developed in the task.

In particular, NGSI agents were developed and the adapters of the model to be able to be executed by the Operational Tools were works carried out during the M19-M24 period. This included the dockerization of the model.

#### **T4.4 – Environmental Pollution Models**

This task was considered closed in M18.

However, during the review it was noted by the EC that water and soil pollution models were not developed and included in the documentation. As described in deliverable D4.1, the interest of the ports, whose are part of PIXEL consortium, is low for the dispersion of pollutants in the marine environment and soil. There are currently no requirements in deliverable D3.4 or means to obtain all the necessary data. Moreover, this kind of modelling requires highly skilled staff to configure models and lots of computational power. This is why, in order to address water and soil pollution, a simple model has been built with some representative conditions. This simple model allows ports to have a better understanding on how they can rely on this kind of model to increase their knowledge on soil and water pollution. Besides, this model will allow a port (and technical partners) to deploy a soil and water pollution tool within the frame of PIXEL following certain instructions.

Then, after a formal request to proceed with a simplified model for water and soil pollution, during M19 to M24, partners of task T4.4 have worked in order to develop, 2D and steady-state models using classical methodology

In order to model water pollution, TELEMAC-2D has been selected. This open-source software allows us to simulate the 2D flow dynamic considering input data such as tide level, wind, waves, bathymetry, and many other physical processes. When the dynamic is known, we can add a pollution source as a neutral tracer and simulate its propagation in time and space. This is useful to anticipate potential water pollution and allow port environmental agent to test different solutions that can mitigate the impact.

Regarding the soil pollution in the port context, emissions of pollutants directly to the soil is generally considered not a significant aspect. Soil emissions have the potential to affect the environment during cargo handling procedures, cargo storage activities as well as stakeholder activities. However, this scenario is feasible only in case port operations are not carried out on watertight surfaces. In order to do so TELEMAC-2D can be coupled with the SISYPHE module. In this module, sediment transport rates, decomposed into bed-load and suspended load, are calculated at each grid point as a function of various flow (velocity, water depth, wave height, etc.) and sediment (grain diameter, relative density, settling velocity, etc.) parameters. This is useful to have a better understanding of how solid pollutants particles coming from port activities and discharged into water evolve in time and space.



What the WP4 team worked on, as it was documented via the re-submission of deliverable D4.2 was:

- Describe the models (TELEMAC2D and its couple with SISYPHE)
- Description on how to use the model, in case a port would wish to implement it to have a long-term evaluation of the water and soil pollution on their premises.
- Requirements for the integration of those models (data, system and training requirements).

The request made by the EC in order to fulfil with these modelling has been considered covered by the WP4 expert team.

#### <u>T4.5 – Predictive Algorithms</u>

During the period M19-M24, this task was the main focus of the WP4, as it is the only one remaining active.

This task advanced and finalised the different predictive algorithms that were identified and explored during the period M7-M18. Different sub-tasks were identified based on the existing documentation regarding requirements and use-cases as well as based on the review of the state-of-the-art in the literature, existing trends and examples from the maritime industry, our AI expertise and available internal and external data.

- **Prediction of vessel call data from FAL forms and other sources**. In the period M19-M24, ETD prediction module was upgraded with AIS data, integrated into PIXEL architecture and demo frontend prepared for showcasing results at midterm review. This demo was shown during the review in M21 (January 2020). This algorithm was considered concluded and the only pending task will be its integration as a "model" within the PIXEL architecture in WP7.
- Use of AIS: Methods developed for congestion analysis around the ports will be further developed for other ports. Automatic methods for anchorage area detection and delineation will be developed to provide out-of-the-box deployment of such methods in a completely automatic way. The developments and the associated code have been protected by XLAB (owner of the algorithms), but were part of the task done in this period in this regard.
- Use of satellite imagery: Developed ship detection methods have been analysed in this M19-M24 period and have been used for maritime traffic analysis, by monitoring certain areas of interest in the port. Regarding the integration, this will be included in the deployments in WP7.
- Analysis and prediction of road traffic conditions with connection to port operations: M19-M24 period was the more intense in the development of this algorithms. Diverse data pre-processing, processing and modelling was done for PPA, ASPM and THPA data but following a common methodology, data model and training conditions. Methods were developed for short-term traffic volume and/or speed that will be later tested during the deployment in WP7 (tasks T7.3 and T7.4 correspondingly). Remarkable features tackled during M19-M24 are indicated below:
  - Use of own (THPA, ASPM) traffic data
  - Use of vessel calls data
  - Use of open (DPO-validated) data of traffic in the city (port-city interaction use-case and interest)
  - Development of pre-processing, data processing and visualization of results via Python scripts and Jupyter Notebooks Provision of source code as open source with Apache 2.0 license.

The code of these algorithms has been uploaded to the GitHub account of the project (for the three instances of the traffic prediction task) and its access is already public.

- **Predict a PV installation future production**: Algorithms have been developed to predict the PV needed for the provision of energy knowing:
  - Previous data on production,
  - Previous weather condition

The code of these algorithms has been uploaded to the GitHub account of the project (for the three instances of the traffic prediction task) and its access is already public.



#### WP4 team considered that this task was fully achieved and completed by M24

Partner	Contribution			
P01 UPV	• Attendance to all WP4 monthly telcos			
	• Internal review of D4.2 (re-submission after mid-term review)			
	• Supervision of water and soil pollution modelling for D4.2, mediation and proposition of action plan			
	• Participation on PAS outputs fine-tuning and the conversion into an actionable UI for ports			
	Proposition of a Data Model for the traffic gates congestion in THPA			
	Development of traffic predictive algorithm for THPA (at the gates of the port) usi Facebook Prophet modelling following the guidelines and lead of XLAB (task T4.5			
	• Use of own (THPA) traffic data			
	• Use of vessel calls data			
	• Use of open (DPO-validation) data of traffic in the city			
	<ul> <li>Development of pre-processing, data processing and visualization of results via Python scripts and Jupyter Notebooks – Provision of source code as open source with Apache 2.0 license.</li> </ul>			
	• Writing contributions to deliverable D4.4.			
P02 PRO	Attendance to all WP4 monthly telcos			
	• Participation in the writing of the D4.2			
	• Definition of the microservices strategy "Dockerization of models" to easily integrate the model into the platform.			
	• Task 4.5:			
	• Study of the different services of road traffic and weather data providers.			
	• Development of the infrastructure for automatic data collection of the different services selected as a consequence of the previous study.			
	• Development of the prediction algorithm for PPA road traffic, which includes:			
	<ul> <li>Exploratory data analysis in search of patterns and temporal seasonality, such as work migrations, vacation periods, etc.</li> </ul>			
	<ul> <li>Development of scripts for transforming raw data collected to the standard format for use with the selected prediction algorithms.</li> </ul>			
	<ul> <li>Prediction with the use of the timeseries prediction algorithm, Prophet. Firstly, with the base traffic information and ended adding corresponding additional attributes of meteorological information and the activity of passenger ships.</li> </ul>			
	• AIS Data:			
	<ul> <li>Analysis of the events detected by the Posidonia Operations &amp; Management suite. Some of these are speeding, towing start and pilotage. This analysis includes heat maps, exploitation of the characteristics of said ships for each of the events, as well as the evolution over a year in the number of event detections.</li> </ul>			
	<ul> <li>Development of classification algorithms for the correct grouping of the events described above. Use of classification algorithms like Random Forest and KNN, as well as different feature extraction and</li> </ul>			

 Table 5. WP4 Partner contribution summary table M7-M12


	<ul> <li>Event prediction algorithms given a sequence of AIS messages with the use of recurrent neural networks with LSTM cells</li> </ul>			
	Writing contributions to D4.4			
P03 XLAB	• Task T4.5, both in periods M19-21 and M22-24:			
	• Task coordination and planning			
	• Predicting vessel calls data from FAL forms and other sources: ETD prediction			
	module will be further upgraded with AIS data, integrated into PIXEL			
	review.			
	• AIS data: Methods developed for congestion analysis around the ports will be			
	further developed for other ports. Automatic methods for anchorage area			
	detection and delineation will be developed to provide out-of-the-box			
	deployment of such methods in a completely automatic way.			
	• Use of satellite imagery: Developed ship detection methods will be analysed for the use of maritime traffic analysis by monitoring cartain areas of interact			
	in the port.			
	• Analysis and prediction of road traffic conditions with connection to port			
	operations: Initially developed methods for SILI short-term-traffic volume			
	prediction will be further upgraded and multi sensor use evaluated, for			
	increasing volume prediction accuracy.			
	<ul> <li>Attendance to OCEANS 2019</li> <li>Preparation of M18 review demonstrators</li> </ul>			
	<ul> <li>Writing deliverable D4.4</li> </ul>			
	• XLAB was the leader of the deliverable D4.4. Tasks conducted within were: leading			
	deliverable and task, contributing FAL, AS, Road traffic, Satellite imaging predictions.			
P04 INSIEL	• Attendance to all WP4 sessions.			
	• Finish of hinterland model and polish for creating the video in WP9.			
P05 CATIE	• Leadership of WP4. To-Do list monitoring. Tracking and checking advancement of each WP4 tasks.			
	Continuous management of WP4			
	• Organization of WP4 specialised telcos (every two weeks)			
	• Assure a continuous link with WP6/WP7 partners for the model integration.			
	• Fine-tuning of PAS model and energy model for their integration in the PIXEL platform			
	• T4.4:			
	• Start working on soil and water models to answer the PO request.			
	<ul> <li>CATIE has worked with CREOCEAN on soil and water models implementation</li> </ul>			
	• T4.5:			
	<ul> <li>First, the continuous work on energy prediction based on past data was still on place. By M19-21 different predictive algorithms have been tested</li> </ul>			
	<ul> <li>Finally, CATIE worked and delivered the predictive algorithms for energy production</li> </ul>			
	• Collaboration in the writing of D4.4.			
	• Deliverable D4.2: As lead editor and following the mid-term recommendation, CATIE has include new inputs related with water and soil pollution. CATIE has provided a huge contribution to this new version of the deliverable and format/edit the final version of this deliverable.			



	• Deliverable D4.2: CATIE contributes to the energy prediction section.		
	Upload of code to the official GitHub account of PIXEL with proper license notice.		
P07 CREO	Attendance to WPA taleos		
	<ul> <li>Attendance to wP4 teleos</li> <li>Definition of the water pollution modelling methodology (coffware, detects, etc)</li> </ul>		
	• Definition of the water politicion modeling methodology (software, datasets, etc).		
	• Inputs required (Identification of datasets, Description of modelling steps, existing numerical models) for the re-submission of deliverable D4.1 after mid-term review:		
	• Datasets for forcing and calibrating environmental pollution models for water		
	<ul> <li>Description of modelling steps for water pollution and sewer discharge dispersion tracking</li> </ul>		
	<ul> <li>Identification, description and comparison of the existing numerical models for water pollution (industry standards software)</li> </ul>		
	• Work in the deliverable D4.2 after the explicit request via the ESR of the mid-term review results:		
	<ul> <li>Description of the model including the following sections: Telemac model suite, how the model works, application to Thessaloniki Port</li> </ul>		
	• How to use the model: including the following: input data and parameters, mesh of studied domain, boundary conditions, computational parameters and hypotheses		
P08 MEDRI	Attendance to all WP4 monthly telcos		
	• In M19-M21, work from the previous reporting period was continued, with the main fields of study being ship emission factors and noise modelling. On noise modelling, there was a research of various scenarios covering different meteorological conditions. Additionally, noise power levels of simple sources were studied.		
	Also, a recap of the work done so far in the WP4 during the project was written and sent to the work package leader. Likewise, some corrections and contributions were made for the WP4 presentation for the review in Brussels (RP1 – mid-term – review).		
	• Noise modelling required to write a scientific paper was finalized during M22-M24 the paper was successfully completed and submitted.		
	• Experiences from the noise modelling done in previous periods were used to determine the optimal positions for the placement of noise sensors in the pilot ports.		
	• Future tests on the air pollution model have been performed.		
P10 THPA	• Collaboration with UPV with data provision and support for the development of predictive algorithm for traffic at the gates forecasting.		
P11 PPA	• Provided vessel data to PRO for OctNov. 2019 in order to use it for predicting traffic		
	• Provided the PPA seaport territory borders in order to be used for noise pollution monitoring		
	• Data provision to PRO on the port vehicles traffic from 1-10/2019 in order to use it for the traffic predictive algorithm in T4.5.		
P14 IPEOPLE	• Preparation of Video for T4.1 - Port-City Environmental Management Model.		
	• Participation in the WP4 presentation preparation for the 1st Periodic review		

# 2.2.4.4. Results after M19-M24

- Water and soil pollution modelling identification.
- Water and oil pollution modelling description of integration, use, data needed and technological requirements for a port wishing to implement them.



- Water pollution modelling utilisation for the THPA port case (using bathymetry data).
- Development and pubication of predictive algorithms:
  - ETA using vessel calls (protected)
  - AIS data (protected)
  - o Traffic prediction algorithms for PPA, THPA and ASPM
  - PV installation prediction
- Regarding deliverables produced during the period:
  - Re-submission of D4.1 PIXEL Models
  - $\circ$  Re-submission of D4.2 PIXEL Models v2
  - Deliverable D4.4 Predictive Algorithms v2

## 2.2.4.5. Deviations

As commented, during the mid-term review, it was asked by the EC to effectively keep the commitment on the water and soil pollution modelling even though not interesting for the ports in the Consortium. The particular request was formulated in the following way:

"Soil and water environmental pollution model have not been studied since PIXEL ports have not found this information useful and the monitoring infrastructure was not available. A mitigation plan aiming to build simple models has been agreed. The related deliverables should be submitted in the second period once this model is finalised"

"Soil and water environmental pollution models have not been included. A mitigation plan aiming to build simple models has been agreed. The deliverables should be updated to include this information. Deadline: 30/04/2020"

Soil and water pollution models are ongoing and will be finalised soon

## **2.2.4.6.** Corrective actions

A contingency plan was designed consisting of:

- D4.1 (end of February)
  - $\circ$   $\;$  Context: to modify in order to include soil and water  $\;$
  - List data available in ports for soil and water
  - State of the art: Provide a state of the art about soil and water pollution
  - Existing tools and software
- D4.2 (end of April): Addition of the same information as done for air and noise.
  - o Modelling of soil and water pollution
  - Description of the model
  - o Limitations and assumptions
  - How the model works (Inputs, Outputs, Parameters)
  - Example of results
  - o Requirements for integration of air pollution model in the PIXEL architecture
  - Data requirements
  - System Requirements
  - Visualization, triggers and KPIs
  - Training requirements
  - Transferability requirement

CATIE and CREO have tackled the action and this has been properly corrected. The deliverable D4.2 has been finished on time and delivered to the EC by 30<sup>th</sup> April 2020.



# **2.2.5.Work Package 5 – Port Environmental Index Development**

The Port Environmental Index (PEI) is a quantitative composite indicator of the overall environmental performance of a port. The main idea behind PEI is to devise a comprehensive, standardized and transparent methodology to be used as an integrator of all the significant environmental aspects of ports and the related impacts into a single metric.

WP5 is one of the most important work packages of the project, as it embeds the core of the environmental impact assessment action. At the end of this work package, a single metric for measuring the environmental impact of a port will be obtained as the outcome. The main result that the WP will bring to the project will be PEI itself, accompanied by a set of guidelines on how to use it. During the process milestones will be reached, that will guarantee the proper advancement of the activity.

At the very beginning of the period, there was a Technical Meeting in Thessaloniki, where plans and guidelines for the development of the project during the second half period were discussed. The results of the work on the WP were presented during the Technical Meeting in Thessaloniki and during the review in Brussels.

Apart from that, the period M19-M24 has been characterised, in WP5, to be focused on different aspects:

- Continuous intensive work on the concretion of the procedures for obtaining eKPIs from raw data from ports.
- Alternative data sources and data origins to be provided by ports.
- Choice of most suitable IoT sensors for obtaining data for PEI calculation.
- Developing functioning tools to compute the Ship Environmental Index SEI (first) and PEI (afterwards).
- Developing a demo of the SEI to be shown in the mid-term review in January 2020 (M21)
- Choice of suitable mathematical tools for normalization and weighting eKPIs and envision of a joint strategy with WP7 in order to conduct the validation of the tools and the sensitivity analysis.
- Specification of surveys and procedures to be followed with regards to PEI adoption by external ports

The contributions to the WP9 consisted of the participation on Eighth International Conference on Marine Technology in memoriam of the academician Zlatko Winkler with two poster presentations, as well as on Annual Faculty of Medicine celebration days 2019 on December 12 with the two poster presentations. Additionally, two scientific papers (one on noise pollution and one on air pollution) were finished in this period and are planned for submission early in the next three-month period.

Additionally, one paper was submitted to the "Noise Mapping" peer-reviewed journal in March, and its current status is "under review". Moreover, additional tests were performed on the air pollution model (WP4).

A relevant thing to remark about this reporting period is that the plans were significantly affected at the end of the period by the critical situation caused by COVID-19 (from M23 on).

The 3<sup>rd</sup> Technical meeting was supposed to be held in Rijeka and we had extensively prepared for it but due to the situation regarding COVID-19 it has been decided to postpone the meeting which will hopefully take place also in Rijeka in the next reporting period

Regarding WP5 activities, one of the current phases of PEI is to validate and weigh the eKPIs selected by having the inputs from external experts. This will be, at least, delayed (if not totally postponed) due to the COVID-19.

Finally, UPV and MEDRI (relevant partners in WP5) staff could have problems on devoting effort to the project. Forecast is to reduce usual rhythm of collaboration to 85%. Furthermore, being public Universities, contracting procedures have been stopped during the confinement, reducing the possibilities to complete associated teams.



# **2.2.5.1.** Summary of progress in previous periods

## Progress by task

## Task 5.1: Methodology definition

In previous periods (M1-M7), this task consisted of:

- a general description of the workflow to be used and methodological approach for obtaining the PEI;
- literature review of the current methodological approaches for the identification of environmental aspects of port operations;
- analysis of the existing approaches for addressing and defining the significant environmental aspects of port operations;
- conclusion on best approach for setting system boundaries: build three different indexes: an environmental index for the ships, a separate one for terminals and a third one for the port authorities;
- discussion on different methodological approaches related to different types of cargo;
- discussion on different methodological approaches to select the indicators (environmental key performance indicators eKPI) for PEI construction and weighing.
- Choice of the methodology and depiction of full explanation via deliverable D5.1 (M12).

This task was considered concluded in M7.

## Task 5.2: KPI Definition

This task had a timeframe of 8 months, starting in M5 and ending in M12. Under this task (and first of all) all the possible environmental Key Performance Indicators (eKPIs) have been identified. The methodology for defining and making a selection of the eKPIs was based on a literature review including a compilation of information and synthesis according to the factors needed for the PIXEL project's realization. The first step was a broad list of the eKPIs published in D5.1 "Environmental aspects and mapping to pilots".

The main criteria that have been used for selecting the eKPIs were the following:

- **Significant**: be significant according to the stakes defined by the impacts that they represent.
- **Representative:** differentiate the effects of port activities from any other "outside" effect: the aim is not to monitor the quality of the environment that is related to all the activities present (not only port).
- **Measurable**: be measured in real time, and treated thanks to IoT systems or to use data produced by the ports if they are already existing;
- **Quantitative:** respond to monitoring protocols leading to pertinent and exploitable data as part of the PEI calculation process.
- Be useful in PIXEL uses-case application: **usefulness.**

In the deliverable D5.2, no definitive conclusion on the exact eKPIs to be included for each port has been reached due the fact that the list has been further refined in T5.3.

This task was considered concluded in M12. However, different fine-tuning of the eKPIs are continuously tackled in order to align them with technological implementation of the PEI. Therefore, the final iteration of the definitive set of eKPIs that will be used for calculating the port environmental index will be delivered in D5.3 "PEI definition and algorithms v2" (being elaborated at the end of M24 – at the moment of the submission of this report).

## Task 5.3: PEI development

This task has a timeframe of 15 months, starting in M7 and ending in M24. This task included a further narrowing and analysis of the eKPIs to be used in the PEI calculation based on the different IoT data sources that have been identified in this task.



In addition, the PEI data requirements and ways of retrieving them were assessed in M7-M18 and the different statistical approaches for data imputation, normalization, weighing and aggregation were also analysed.

In D5.2 "PEI Definition and Algorithms v1" under broad categories a reduced set of eKPIs compared to the D5.1 Environmental aspects and mapping to pilots was considered. The set of eKPIs reported in the deliverable D5.2 is the second iteration of the eKPIs specified in D5.1 with the final iteration to be delivered in D5.3 "PEI definition and algorithms v2."

Due to time limits of the project and the fact that performing the sensitivity and uncertainty analyses is very time and data intensive so far no conclusion was reached in this period whether this exercise will be performed under the framework of WP5 or WP7 in the PIXEL project

Finally, the different ways of visualizing the PEI in the PIXEL platform were also assessed in M7-M18 period such as line –charts presentations, trend diagrams presentations and other types of representation (circumflex charts, etc.). In addition, some advanced PEI features for PEI visualizations were also described.

## 2.2.5.2. Summary of results after previous periods

The main results that we have obtained in the first 6 months of the project in the context of WP5 are the following:

- The general methodological framework for PEI development and computation has been devised.
- The significant environmental aspects of port operations have been identified and mapped to the PIXEL pilot ports.
- The eKPIs of environmental aspects of port operation have been assessed and proposed.
- The IoT data sources for eKPIs retrieval and computation have been analysed and solutions have been proposed.
- The statistical toolbox for PEI computation has been addressed and several statistical methods for data imputation, normalization, weighing and aggregation have been put forward.
- Different approaches for assessing uncertainty and sensitivity analyses related to the PEI algorithm have been proposed.
- Different ways of PEI visualization in the PIXEL dashboard has been proposed including advanced features for data analysis and visualization.
- The work done in WP5 was published in 2 papers (Environmental monitoring and assessment, TRA2020 respectively) and has been presented in 2 research conferences (Recent scientific achievements of the Teaching institute of public health, GreenerSites Final Conference)
- Deliverables submitted successfully
  - Deliverable D5.1 Environmental Aspects and Mapping to Pilots
  - Deliverable D5.2 PEI Definition and Algorithms v2.

# 2.2.5.3. Progress in M19-M24

#### Progress by task

## Task 5.1: Methodology definition

This task was considered concluded in M7.

#### Task 5.2: KPI Definition

As commented before, despite this task was considered closed in M12, different fine-tuning of the eKPIs is continuously tackled in order to align them with actual technological implementation of the PEI. Therefore, the



final iteration of the definitive set of eKPIs that will be used for calculating the port environmental index is being included in the deliverable D5.3, that will be submitted by (the latest) on 30<sup>th</sup> June 2020.

## Task 5.3: PEI development

The task T5.3, which was supposed to be finalised by M24 (end of this management reporting period) has been the more intensively tackled by the WP5 team during M19-M24 period. Diverse barriers have been encountered (deviations expected in section below) and huge efforts on communication with different groups (specially, ports) have taken place. Specific channels have been enabled for conducting this task (email thread, Slack channel, weekly teleconference session) as it demands strong cooperation among the partners: (i) environmental experts and methodological guiders, (ii) technical developers, (iii) integration experts, (iv) ports owning the data, (v) visualization responsible.

The results of this task in this period have been enormous, (pretty varied) and all of them are being properly introduced in the deliverable D5.3. This deliverable will be formally submitted by M26, due to the deviations indicated below.

The first action conducted was to explicit the table of contents of deliverable D5.3, which served as well to clearly differentiate, split and assign the work to be carried out along M19-M24:

- Data collection and data from ports for PEI calculation
- eKPI final list and explanation
- Procedures for converting data into eKPIs
- PEI mathematical toolbox
- PEI as a technological tool within PIXEL framework

Following the previous structure, the different activities that were conducted in this task in M19-M24 can be summarised as:

- Elaboration and agreement on the ToC of D5.3:
- Creation of a waste inventory
- Short summary and recommendations on the PEI calculation methods were provided and a pseudocode for the calculation
- Indicators were defined for all the sub-indices, together with relevant measurement units and calculation methods
- Work on how to link the PAS output with the estimation of the emissions in the atmosphere due do the port activity (link between PAS and PEI).
- Work on how to use AIS module within PIXEL to generate inputs for the PEI
- Exhaustive work with ports in order to retrieve (in different alternative ways) the minimum data needed to compute the PEI (towards its deployment in WP7)
- Determining methods for estimating eKPIs from directs measurements or proxy data
- Discovery of suitable IoT sensors for feeding certain data needed in PEI
- Communication with diverse sensor providers in order to have offers and budgets for suitable sensors.
- Data analysis for PEI within the mathematical toolbox choice.
- Development of a running version of PEI calculation in Java
- How to use statistical analysis for PEI
- Start of integration of PEI visualization into the global PIXEL dashboard
- Start of development of NGSI agents for the PEI calculation in THPA
- Writing of deliverable D5.3 will be completed before the end of M26.

The task is not completed yet. The WP5 teams considers that it will finalise whenever deliverable D5.3 will be submitted ( $30^{th}$  June 2020 at the latest).



#### Task 5.4: Best practices for PEI adoption

This task started in M19, which is the same as the beginning of this management reporting period.

The activities conducted during the first 6 months of the execution of the task have been listed below:

- Time plan for the task was agreed and distributed among partners.
- Provision of ToC for the deliverable D5.4, detailing the contributions and contents expected from T5.4 partners.
- Methodological approach for the task and the PEI adoption needs
- Analysis of the results of the TEN-T ports Environmental Sustainability reports' content
- TEN-T ports' questionnaire design
- Initial work on envisioning metrics for assessing port environmental performance by ports
- Tentative structure of the adoption and practices and implementation problems
- Initial identification of the benchmarking possibilities and strategies
- Questionnaire for online interviews
- Identification of contact persons with ports and related agents in order to gain information about PEI adoption and other planned feedbacks

#### Task 5.5: Guidelines for improvement of environment and society

This task started in month M23. Due to the COVID-19 outbreak (M23), no much advance has been able to take place in the first two months of the task execution. As the finalisation of deliverable D5.3 is the main concern of the WP at this moment, only the following activities were tackled:

- Analysis of the relation of T5.5 with other tasks within WP5 and interaction and dependencies on other tasks of the project.
- Plan of action.
- Discussions with the coordination about interpretation of the task, deliverable titles and potential timings and delays due to the epidemic and other factors.
- Inclusion of T5.5 contribution to the deliverable D5.4 in the ToC has been created. Specifically, the ToC of deliverable D5.4 has been split in two, in order to document advances from both tasks (T5.4 and T5.5) under separated spaces while keeping a common storytelling and line of thought.

Partner	Contribution
P01 UPV	• Development of a working demo of the SEI (backend and frontend)
	• Design of the technological implementation of the PEI and its spot within PIXEL architecture
	• Advances on the discussion of mathematical toolbox with CATIE and MEDRI (normalization, weighting)
	• Discovery of suitable IoT sensors for feeding certain data needed in PEI
	• Interaction with the device provider for designing a product meeting requirements
	• Development of the PEI calculation (composite index part)
	• Start of integration of PEI visualization into the global PIXEL dashboard
	• Start of development of NGSI agents for the PEI calculation in THPA
	• Discovery of alternative data sources for ports in order to provide the minimum data needed for the PEI calculation



	• UPV is contributing hugely to the deliverable D5.3:		
	• ToC reviewed and modifications proposed		
	• Completion of "data" section of the deliverable		
	<ul> <li>Currently finishing the "PEI within PIXEL" section</li> </ul>		
	• Telcos and different conversation with other contributors in order to complete different sections		
P02 PRO	• Working in the definition of different visualizations to represent the results of the PEI		
	• Collaboration in the data identification and classification		
	Review of data alternative sources		
	• Participation in meetings with ports to define the available data sources		
	Attendance to WP5 teleconferences		
	• Market analysis of sensor suppliers needed for the implementation of the PEI.		
P05 CATIE	• Work on how to link the PAS output with the estimation of the emissions in the atmosphere due do the port activity (link between PAS and PEI).		
	• During M19 to M21, CATIE worked on a proposition for PEI pseudocode (interaction with MEDRI and UPV).		
	• Work on how to use statistical analysis for PEI		
	• Deliverable D5.3: CATIE provides inputs on the statistical toolbox section		
	• CATIE works on data analysis for PEI		
P06 ORANGE	Analyse NOAA Data Source to import them into PIXEL		
P07 CREO	• Analysis of data required for PEI calculation.		
	• Making a point on all the different data sources that can be useful for the extraction eKPIs values.		
	• Determining methods for estimating eKPIs from directs measurements or proxy data.		
	• Writing of chapter 3 deliverable D5.3		
	• Help on redaction of D5.4 ToC		
P08 MEDRI	• MEDRI leads WP5. Under this scope, the following activities were carried out:		
	• Preparation for the Brussels review, including the outline of a working demo was created, hinting at a full potential and applicability of the PEI.		
	<ul> <li>Work on the WP was presented during the Technical Meeting in Thessaloniki and during the review in Brussels.</li> </ul>		
	During M19-M21, a work was done on emission factors and the waste inventory. In order to have a working demo for the review in January 2020, short summary and recommendations on the PEI calculation methods were provided and a pseudocode for the calculation was written. There was a significant level of cooperation with other partners on the development of the demo.		
	• MEDRI leads the deliverable D5.3., due to M24:		
	• Provision of D5.3 ToC		
	• As MEDRI is the lead beneficiary for this deliverable, very early preparation was done, mostly in the field of planning the future activities and task distribution.		
	• The deliverable 5.3 is being written with the emphasis on the final eKPIs for the PEI calculation.		



	• Most of the task on writing the MEDRI contribution for the deliverable has been completed, despite the fact that the submission deadline was postponed by two months.
	• During M22-M24, significant advances were achieved:
	• eKPI's have been finalized and a definitive list for the calculation of the PEI has been developed.
	• Indicators were defined for all the subindices, together with relevant measurement units and calculation methods.
	<ul> <li>Some exercises related to database integration have been performed</li> </ul>
	• Additionally, all the teleconferences linked with WP5 were attended by at least one member of the MEDRI team and the task was discussed during the (virtual) 3rd Technical Meeting
P10 THPA	• Data identification, gathering, aggregation, evaluation and exchange among technical partners for the data needed to compute the PEI.
	• Inclusion of 2019 data in an own-developed API available for PIXEL partners
	• Review of data section deliverable D5.3
	• Internal meetings with ThPA departments took place in order to retrieve data from different entities within the port.
	• Reconfiguration of data and exchange issues to be solved about needed PEI data.
P11 PPA	• MARPOL Annexes data collection and communication with UPV and technical partners for the PEI data collection
	• PEI data sources researching and communications for the sensors' technical specifications and tender procedure
	• Research on the air pollution and sound sensors technical specifications
	• Provide waste management data to MEDRI.
	• Provided the PPA seaport territory borders in order to be used for AIS data utilisation for calculating manoeuvring and berthing time
	• Review of "data" section of deliverable D5.3
	• Communication with marinetraffic.com for the vessel calls data collection with regards to the PEI data – in order to acquire AIS subscription
	• Established FTP server service for the provision of certain data for the PEI calculation.
P12 ASPM	• ASPM contributed to D5.3 development collecting data from port system/community and investigating in data sources availability.
	• ASPM continued in analysing data coming from ships due arrival forms, trying to find specific information useful for the PEI development such as wastes and emissions data.
	Review of "data" section of deliverable D5.3
P15 CERTH	• CERTH leads task T5.4:
	• Provision of a ToC for deliverable D5.4 (first part – corresponding to Task 5.4)
	$\circ$ Definition of the methodological approach to be used
	<ul> <li>Content analysis of the TEN-T ports Environmental Sustainability reports and definition of environmental indicators being used</li> </ul>
	• Design of TEN-T ports' questionnaire for the 2 <sup>nd</sup> phase of Task 5.4



# 2.2.5.4. Results after M19-M24

The main results that we have obtained in this second period of the project (M19-M24) in the context of WP5 are the following:

- Port waste inventories
- Final list of eKPIs
- Code and usable program in Java for current PEI calculation
- List of persons to contact of external ports and agents for T5.4 purposes
- Different dissemination results were created during this period:
  - o Two poster presentations in the Eighth International Conference on Marine Technology
  - Two scientific papers (one on noise pollution and one on air pollution) were finished in this period and are planned for submission early in the next reporting period

# 2.2.5.5. Deviations

During the first part of the period (M19-M21) several discussions were carried out on the availability of data for the Port Transversal Trial (T7.5), which is a work included within the scope of WP5 as well. The PIXEL pilot ports may not have all the necessary data to fully parameterise the PEI calculation algorithm (as it is detailed in deliverable D5.2). However, mechanisms have been provided in order to let a feasible implementation and deployment of task T7.5.

Effort has been provided in obtaining data from the PIXEL pilot ports as well as the Lloyds and AIS databases. In addition, an exercise in coupling the databases has provided for data coming from PPA. Huge efforts have been also done to find alternative data sources to cover the previous, as not always access to Lloyds and AIS will be available by ports in Europe. Besides, several problems have been encountered and appraised regarding existing IoT data sources and the implementation of sensors needed for conducting the transversal trial. Those problems were tackled by the IoT experts in the Consortium (mainly UPV and PRO) and solutions have been found.

The conclusion is that data availability may affect the PEI transversal trial (task T7.5). Also, since there was not a complete dataset obtained for any of the PIXEL pilot ports D5.3 could not test the different algorithms for obtaining the PEI. Based on the assessed situation it has been decided to move the testing and validation of the PEI algorithm including the establishment of the final algorithm to this WP instead of WP5. This in turns means that model testing and validation has been transferred to T7.5. Also, after the completion of this task, when the PEI has been tested and the efficacy of its deployment assessed will the PEI user manual be written

That very fact, altogether with the consequences of the COVID-19 for all partners' team working on the deliverable, has made the second deviation happen. It consists of the postponement of the submission of the Deliverable D5.3 by a maximum estimated of 8 weeks.

The previous deviations may affect the execution of the project (as was indicated via the Coordination Excel file about risks after COVID-19). This is being carefully jointly analysed by the WP5 leader and the Project Coordination of PIXEL.

Regarding the mid-term review, no deviation was remarked by the EC.

## **2.2.5.6.** Corrective actions

Discussions were done regarding the testing and validation of the PEI algorithm. It was decided to move the testing and validation of the PEI algorithm including the establishment of the final algorithm to task T7.5 instead of WP5. Additionally, several problems have been encountered and appraised regarding existing IoT data sources and the implementation of sensors needed for conducting the transversal trial.



# 2.2.6.Work Package 6 – Enabling ICT infrastructure framework

Work package 6 comprises the tasks that will provide as outcome the ICT enabling infrastructure for PIXEL solution. This means that every piece coming from previous activities will be put together under the umbrella of IoT technology. Because of that, the work in this work package has been intensive during this reporting period of the project.

Particularly, this WP was planned last a total of 22 months; having started on M4 and finishing on M26. In this regard, this work package has been executed during the whole second management reporting period (M19-M24) and it is currently in (its final) full intensive activity both in design, documentation and software development. In this period tasks T6.2, T6.3, T6.3, T6.4, T6.5 and T6.6 have been executed. Task T6.1 finished just before this reporting period (M18).

Currently, there are only two months left for the finalisation of this WP. According to the WP6 team, and analysing the current stand of coding and integration, it is the compromise to effectively finish all tasks by M26 (June 2020). The whole documentation and associated content done during M19-M24 will be depicted in the two conclusive deliverables: D6.4 and D6.5.

This period has been marked by the extensive development of software in all layers of the architecture: (i) new advances in the DAL have taken place, specially by developing Python framework for NGSI agents development and the inclusion of the procedure to insert new data sources in PIXEL, (ii) the Information Hub has been completed and extensive work has been focused on enabling northbound and southbound APIs for modules interconnection, (iii) the Operational Tools have been completed following all plans and incorporating all the needed changes to be compliant with the model execution (scheduled and per-request), with exhaustive work on the definition of inputs, outputs and models structure following open-source references (mainly FIWARE). New version of the (iv) dashboard is being finalised, using the most modern technologies and making space for all the different UIs that are being developed and that will be tested in WP7. Security has been included in the running environment, and all the needed setups for ports are being prepared. All modules are running in a "demo" environment in FILABS, provided by ORANGE. Up to this point, all integrations and tests have been done in the scope of that "development environment". Remarkable work was done to generate a "demonstrator" version to be shown during the mid-term review (M19-M21).

The two remaining months of the WP will be focused on: (i) fine-tuning and finalising all the modules, (ii) closing any pending issues on inter-module communication, (iii) making documentation efforts for the code of the different modules, (iii) depict all advances and content into deliverables D6.4 and D6.5

For WP6 management, bi-monthly follow-up calls are being held to check the work progress, organize the work between partners, handle issues, and to monitor development. Additionally, several channels have been open in our Slack platform in order to deal with day-to-day communication and assignments.

Additionally, at M20 (December 2020), and taking advantage of the needs of joint preparation of the working demo for the Review, it was decided to celebrate joint WP6/WP7 bi-weekly telcos (substituting the previous) under the name of "Agile development and integration". These have been being conducted till the end of the reporting period and it is planned that will keep going till the end of WP7 (deployment of the pilots).

A remarkable thing to mention is that the plans for the last part of this period and for the forthcoming months may be slightly affected by the current situation caused by COVID-19.

The productivity of the personnel of different key partners (UPV, CATIE, ORANGE mainly) may cause developments and integration to experience sensible delays in the forthcoming months.

Furthermore, due to the prioritisation of resources in most companies (XLAB, INSIEL mainly, with responsibilities towards the health system) is making that computing premises (servers) are not being available for PIXEL for the moment. Therefore, certain applications and core test systems for developments are (and will be) affected.

Additionally, ports are highly affected by the outbreak. Some activities have been stopped, which is currently hampering the development of NGSI agents associated to the four ports. This is pretty tied to the finalisation of



task T6.2. However, if certain NGSI agents are left pending to be developed, this work will be translated to WP7, which also involves the agents development and integration as one of the main enablers to run the pilots.

However and despite of the previous, the WP6 team strongly believes that the WP will be able to be finished normally at the end of M26 with the proper submission of deliverables D6.4 and D6.5. Any change on this prevision will be properly informed in advance to the Project Officer.

# 2.2.6.1. Summary of progress in previous periods

#### Progress by task

## Task 6.1: PIXEL information system design and architecture

The work in WP6 started in August 2018 (M4 of the project), and finished in M18, performing the following activities:

- Initialization of architecture definition plan, development tools and guidelines for conceiving the PIXEL ICT.
- Conduction of several meetings to initialize a working framework for the whole work package
- Definition of the WP execution plan, internal milestones and the methodology to be followed. Every sub-task has its corresponding plan and first approach to the technologies to be used.
- Establishment of the RA (Reference Architecture) for PIXEL, contemplating all technical constraints and needs of all the tasks comprised in WP6.
- Clarification of the technological choices for implementing each one of the modules after analysing the requirements set through deliverable D3.2 and D3.4.
  - A thorough definition of each one of the modules (including state of the art), architecture diagrams, explanation and examples of the architecture and different technological choices made can be consulted in D6.1 and D6.2.
- Clear establishment of the relation between modules and tasks in order to clearly delimitate the responsibilities within the work package and create a collaborative framework for development.
- Creation and writing of the deliverable D6.1
- Refinement of all modules explanation (and more detail provided) altogether with an architecture finetuning via deliverable D6.2.
- Creation and writing of D6.2.
- Specific check on requirements.

This task was considered finished and closed by month M18.

## Task 6.2: PIXEL Data Acquisition

This task oversees developing the "connection layer between raw data and PIXEL framework". It has been being executed since month M7, and the activities performed till M18 were the following:

- Definition of the main components that form part of the module and validation with the ports and all partners.
- Provision of a standard way to import data into the PIXEL Information Hub in order to allow an easy use of any kind of data source available on each port. It has been decomposed in various components: (i) context broker, (ii) persistent data hub, (iii) short term history, (iv) agent.
- The partners were involved on both integrating different DAL components and developing agents tackling diverse types of data sources. With this aim, one technical partner was assigned to select, for the first software milestone, various data sources from one pilot site and develop the agent.
- Work on the northbound connection: DAL with the Information Hub.



- A work on the input and output formats for energy model has also been made in collaboration with WP4
- A Docker-based development environment for FIWARE was created and a GIT repository in Orange GITLAB instance was initiated.
- A NIFI solution (Apache NIFI) was deployed in order to quickly implement NGSI agents for prototyping
- Several NGSI agents were developed and integrated, specially focused on the GPMB use-case in order to have a working demo ready for the mid-term review. More information about this can be found in the deliverable D6.3.
- Generation (development) of a generic python framework (library) for the development of NGSI agents. This also constituted a contribution to open-source initiatives by ORANGE.

## Task 6.3: PIXEL Information Hub

This task oversees developing the "data storage and persistence layer of PIXEL". It has been being executed since month M7, and the activities performed till M18 were the following

- Review of existing solutions and selection of suitable technologies, and started testing subcomponents.
- Proposition of the final system composition
- Analyse the relation with other modules in PIXEL ICT infrastructure and establishment of interaction diagrams (depicted in deliverable D6.1)
- Establishment of the internal architecture of the IH module.
- Development of the necessary custom models and integration of the already-existing solutions to have the framework of the IH as a whole:
  - OpenJDK
  - o Elasticsearch
  - PIXEL DataCollector (southbounds connection)
  - o PIXEL Archiving System Core
  - $\circ~$  API for the northbound collection (info to be retrieved by the models executed via the Operational Tools)

## Task 6.4: PIXEL Operational Tools

This task is in charge of developing the framework for executing models, retrieving data from the IH and preparing the results to be shown in the Dashboard. It has been being executed since month M9, and the activities performed till M18 were the following:

- Establishment of a work plan, including a timeline schedule to commit all requirements on time.
- Designing an overall schema of components that will compose the complete module: (i) Event Processing, (ii) Database, (iii) Model and PA Engine, (iv) API gateway, (v) publication submodule, and (vi) user interface.
- Definition of subcomponents clearly: with their relations with other components, interaction with other modules of PIXEL architecture, their technological function and flow of actions and use.
- Analysis and discussion about the interfacing with other parts of the PIXEL platform.
- Selection of technologies for implementing all sub-components
- Setting up of a test environment for developing the tools
- Development and integration of components. This activity is still ongoing as task T6.4 lasts for M26. In fact, it requires models (which were even released in M18) and predictive algorithms (not even



finished according to the project time plan) to be ready to start integrating them. Before that, work has been done with testing models.

• Design and implementation of a user interface. This is a work tightly related with the PIXEL Dashboard (task T6.5). Code has been implemented from scratch with similar technology as the dashboard to facilitate the integration (VUE, JavaScript).

## Task 6.5: PIXEL Integrated Dashboard and Notification

This task is in charge of developing the Visualization and Human-Machine interface of PIXEL. It has been being executed since month M9, and the activities performed till M18 were the following:

- Designing an overall schema of components that will compose the total module: (i) PIXEL Information Hub UI, (ii) PIXEL Operational Tools UI, (iii) Maps (GIS), (iv) Notifications and (v) Charts and Dashboard.
- Analysis and discussion about the interfacing with other parts of the PIXEL platform.
- Selection of technologies for implementing all six sub-components
- Setting of test environment for developing the tools
- Development and integration of components, mainly the following:
  - o Dynamic creation of visualizations
  - o Alerts module
  - Map engine to spot data sources
  - Overall navigation
  - $\circ$   $\;$  Integration of other PIXEL modules, specially the Operational Tools
- Creation of the visualizations needed for the working demo in the mid-term review

The set of components composing this task has been developed and allowed delivering the first version of the platform (D6.3 deliverable) and refining the architecture

## Task 6.6: PIXEL Security and Privacy

This task is in charge of developing the authentication and global security. It has been being executed since month M7, and the activities performed till M18 were the following:

- Definition of the main guidelines for IoT security and the mechanisms to be used.
- State of the art study and contribution to deliverable D6.1.
- Analysis and choice of security components for the PIXEL ICT infrastructure
- Installations FIWARE tools on the FILABS development environment to check size, usability and customisation needs
- Start of the customisation of the existing FIWARE enablers for PIXEL security
- To analyse the scope of security that is included in the different releases of the platform.
- Start of integration of the security with other PIXEL modules
- API Gateway solution was analysed

# 2.2.6.1. Summary of results after previous periods

During the first 18 months of the project (91% of the activity of the work package), the results obtained can be listed as the following:

• Definition of the WP execution plan, internal milestones and the methodology to be followed.



- Definition of every sub-task of the corresponding plan and first approach to the technologies to be used.
- State of the art and technology selection.
- Links with WP3, WP4, and WP5 regarding requirements.
- Influence in the market analysis.
- Finalized first and second (final) version of the architecture.
- Full list of components for each module closed.
- Development environment is setup and running
- PIXEL platform developed for an initial release
- The following deliverables were submitted successfully:
  - Deliverable D6.1 PIXEL Information system architecture and design v1
  - Deliverable D6.3 PIXEL data acquisition, information hub and data representation v1
  - Deliverable *D6.2 PIXEL Information system architecture and design v2*

# 2.2.6.2. Progress in M19-M24

#### Progress by task

## Task 6.1: PIXEL information system design and architecture

This task was considered as finalised and closed by M18. References are deliverables D6.1, D6.2 and D6.3

## Task 6.2: PIXEL Data Acquisition

The Data Acquisition Layer has been focused during this period in provide a useful framework for the development of all the connections real data – PIXEL platform. Furthermore, the work of the development of the software pieces to achieve that integration have been also considered part of the execution of this task. The good basis established during M7-M18 has allowed the team to tackle complex problems related to the integration in a development environment and the inclusion of a data sources management in the dashboard. More concretely, the activities overseen have been the following:

- Fine-tuning of the module architecture, specially focused on the models' execution part.
- Creation of a task force for the Data Models definition (lead by ORANGE). Three partners (ORANGE, PRO and UPV) constituted a new task force in order to interact with the ports, with the model owners and with the semantic experts in the Consortium in order to analyse and define the different data models to be used for the incorporation of data into the PIXEL platform. This task has been complex as it must consider the periodicity of the data, the values, the structure, the schema, etc. This is done, among other reasons, in order to avoid duplicity of data models, unify the work and align the different (future) pilots. Here, the rationale has been to, first, select a FIWARE data model for each piece of data (if existing). If not existing, to develop a new FIWARE-compatible one with the needed field extensions.
- Proposition of various Data Models
- Start of development of various NGSI agents, specially those related to GPMB, ASPM and THPA pilots.
- Provide an NGSI Agent Python library and documentation to help other partners to developed NGSI Agent
- Deploy DAL on the demo platform in order to put in place the mid-term review live demonstrator.
- Develop a first version of the DAL Orchestrator to propose an API to deploy new NGSI Agent
- Develop a first version of an NGSI agent to detect new data source and data model imported by NGSI Agent to notify the Information Hub



#### Task 6.3: PIXEL Information Hub

During the period M19-M24, the task T6.3 has been focused on keep the integration (both internal and external) going. The status is: almost finished. To achieve this, certain particular tasks have been tackled in the last 6 months of the project:

- Testing DAL integration with existing data sources
- OT integration first phase as agreed at the plenary in Greece.
- Preparation of M18 review demonstrators
- Alignment of data structures
- Review of OT integration patterns
- Development of methods for storage of complex data structures
- Fine-tuning and finishing the integration of the necessary custom models and integration of the already-existing solutions to have the framework of the IH as a whole:
  - OpenJDK
  - Elasticsearch
  - PIXEL DataCollector (southbounds connection)
  - PIXEL Archiving System Core
  - API for the northbound collection (info to be retrieved by the models executed via the Operational Tools)

#### Task 6.4: PIXEL Operational Tools

During the period M19-M24, the Operational Tools were exhaustively worked, being continuously presented and informed to the Consortium via specialized telcos and plenary and technical meetings. The task is almost finalised, for what the team has required to conduct the following activities:

- Development of the new version of the Operational Tools software (OTv2)
- Establishment of a fluid discussions about data availability from ports, data formats and data conversions
- Specification of the files to be used for (i) identification and creation of a model in the OT (GetInfo.json) and for (ii) the instantiation of a model (running the model).
- Structure of the developments needed to be made by model owners in order to adapt the inputs and outputs of the models to be managed by the Operational Tools (model adapters).
- Development of the connectors with models module in order to put in communication the model developed within WP4 and the OT.
- Specification and materialisation of the southbound interaction in order to let the models retrieve data from the IH.
- Specification and materialisation of the northbound interaction in order to let the Dashboard access to the results of the models so that can be visually represented.
- Support dockerization of WP4 results models.
- Running of the Operational Tools with all needed connectors in the "development environment" in FILABS.
- Integration of the component with the rest of modules of the platform

## Task 6.5: PIXEL Integrated Dashboard and Notification

The main focus of the T6.5 during the last 6 months has been to develop, integrate and continuously run in the "development environment" of the second (and definitive) version of the Dashboard/global UI wrapper and the inclusion over it of several requested features. In particular:



A configurable notification system to enable quick response of port operations staff

- The KPIs to be included were initially identified. This will be an on-going task as the rest of partners may wish to add new KPIs through the UI along the pilots. This option has been prepared. This will be able to be checked in the deliverable D6.4.
- Development of an automatic report generation tool to support the generation of valuable information in ports for official reports
- Development and integration of components, mainly the following:
  - Development and inclusion of new UIs needed for the whole human-machine interaction of PIXEL: PAS supply chain configurations, PEI visualization, different models visualization and representation. This will be an on-going task even after the finalisation of WP6, as new visualization needs may arise within WP7 (pilots) and changes over the current versions are likely to be requested by technical partners or ports during the deployment.
  - Integration of other PIXEL modules, specially the Operational Tools. The newest version of the Operational Tools have been integrated in the UI of the platform.

## Task 6.6: PIXEL Security and Privacy

The security in PIXEL has been reinforced during M19-M24 thanks to the work mainly promoted by ORANGE. The different activities overseen have been the following:

- Installations FIWARE tools on the FILABS development environment to check size, usability and customisation needs
- Customisation of the existing FIWARE enablers for PIXEL security. This is an on-going task that will be closed at the end of the WP6.
- To fine-tune the scope of security that is included in the different releases of the platform.
- Integration of the security with other PIXEL modules, including the corresponding login screens and UI associations. This is an on-going task that will need to be maintained even after the finalisation of the task. This will have a huge importance in the pilots (includes considerations of WP1 ethics).
- API Gateway solution was tested and included in the FILABS "development environment".

Partner	Contribution
P01 UPV	• Attendance to all WP6 bi-weekly conferences.
	• Attendance to joint WP6-WP7 control sessions under Agile Development management
	Management tracking as coordinator
	• Leading Task T6.4 Operational Tools (OT)
	<ul> <li>Development of components</li> </ul>
	• Integration of the component with the rest of modules of the platform
	• Participation and discussion in the code-camp of February 2020 with very
	positive outcomes
	• Anticipation of the start of technical work packages by starting to work on several
	points to align the scope and pace of the project between port needs and technical
	forthcoming development
	Collaboration in the global PIXEL Agile execution
	• Analysis on the integration between models and Operational Tools (links between
	WP4-WP6)
	• Research about potential software to be used or adapted for the Operational Tools
	• Following discussions about data availability from ports, data formats and data
	conversions

Table 7.	WP6	Partner	contribution	summary	table	M19-M24	
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	• Participation as member of the team of "Data Models" Task force.				
	Proposition of various Data Models				
	Start of development of various NGSI agents, specially those related to THPA pilot				
	Deployment of the implemented version of OT in FILABs				
	Discussions and work on user interfaces for the PIXEL models, specially for PEI and for Traffic predictive algorithm for THPA port				
	Leading initial tasks of documentation and port to open platforms (GitHub, DockerHub,				
DOO DD O	ReadTheDocs)				
P02 PRO	• Organize the code camp to evaluate the current status of the platform, take some integration decisions and plan the following months.				
	• Attendance to all WP6 bi-weekly conferences.				
	• Lead WP6-WP7 control sessions under Agile Development management				
	Enforce architectural fitting of the modules				
	• Develop adapters and guidelines to interconnect the components				
	<ul> <li>Lead the demo development platform of the project</li> </ul>				
	<ul> <li>Organize several working groups (Agile development session control, data models)</li> </ul>				
	team, new approach of the model Dockerization)				
	• Improve the main dashboard with new visualization for models				
	• Integration of the operational tools into the UI				
	• Improve the map UI with new sensors and visualizations				
DOO MI AD	Add a new report feature in the dashboard				
PU3 ALAB	• Attendance to all WP6 bi-weekly conferences.				
	• Attendance to joint WP6-WP7 control sessions under Agile Development management.				
	• T6.3.				
	<ul> <li>Testing DAL integration with existing data sources</li> </ul>				
	• OT integration first phase as agreed at the plenary in Greece.				
	<ul> <li>Preparation of M18 review demonstrators</li> </ul>				
	<ul> <li>Alignment of data structures</li> </ul>				
	<ul> <li>Review of OT integration patterns</li> </ul>				
	• Development of methods for storage of complex data structures				
	• Attendance to two technical workshops (one virtual, one physical)				
	• T6.4:				
	<ul> <li>Interface and data structure implementation for predictive algorithms and IH, as agreed at the plenary in Greece.</li> </ul>				
	<ul> <li>Support dockerization of WP4 results - models.</li> </ul>				
	<ul> <li>Dockerization of PA algorithms</li> </ul>				
	• Definition of APIs				
	• T6.5:				
	<ul> <li>Work on solutions for PIXEL information hub UI - how to provide data to different Dashboard components through the IH DataExtractor and ElasticSearch indexes.</li> </ul>				
	• T6.6: Analysis of authorisation mechanisms and consequences for IH components.				
	• Minor contributions on D6.2 based on the project review feedback.				
	• Minor contributions on D6.3 based on the project review feedback				
P04 INSIEL	Attendance to all WP6 bi-weekly conferences				
	<ul> <li>Attendance to joint WP6-WP7 control sessions under Agile Development management</li> </ul>				



	• In task T6.2, INSIEL contributed to the development of the architecture, specially				
	focused on the models' execution part.				
	INSIEL contributed to the development of component related to the DAL in order to integrate the different data sources of the pilot Monfalcone Port and SDAG.				
	INSIEL contributed to design the IH and the related infrastructure within INSIEL to host the PIXEL platform for the Port of Monfalcone and SDAG.				
	INSIEL developed the connectors with the Operational Tools module in order to put in communication the model developed within WP4 and the OT				
	<ul> <li>INSIEL contributed to define the logic behind the dashboard in order to identify the</li> </ul>				
	alert or messages to display related to the use of the models				
P05 CATIE	• Attendance to all WP6 bi-weekly conferences.				
	• Attendance to joint WP6-WP7 control sessions under Agile Development management				
	• Integration of PAS model and energy model through Operational Tools				
	• Interaction between ORANGE, GPMB about data and API for the energy use case				
	<ul> <li>Participation of discussion about WP6 demo and propose an end-to-end scenario to</li> </ul>				
	follow.				
P06 ORANGE	• Organisation and conduction of WP6 meetings.				
	• Assistance to the WP6/WP7 joint management under Agile framework.				
	• Leadership of tasks T6.1 and T6.6				
	Preparation of M18 review demonstrators				
	Preparation of WP6 presentation for Project Review				
	• Especially relevant has been ORANGE's participation in T6.2:				
	• Work on the integration between Data Acquisition layer and Information Hub				
	• Work on a generic python framework to easily create NGSI Agent				
	• Work with GPMB to integrate their Vessel Call through an NGSI Agent				
	• Deploy DAL on the demo platform				
	<ul> <li>Develop a first version of the DAL Orchestrator to propose an API to deploy new NGSI Agent</li> </ul>				
	<ul> <li>Develop a first version of an NGSI agent to detect new data source and data model imported by NGSI Agent to notify IH</li> </ul>				
	• In the period M19-M21, an intensive work was devoted to task T6.6:				
	<ul> <li>Analyse API Gateway solution</li> </ul>				
	• Deploy the security components on the demo platform				
	<ul> <li>In M22-M24, the efforts were focused on analysing the different connection between PIXEL components to provide the better security solution.</li> </ul>				
	• Work on integration with IH				
	• Work on integration with OT				
	Enhancement of FIWARE description and use in PIXEL in deliverable D6.1 after the mid-term review				
	• Explanation of the integration of new NGSI Agents in PIXEL deliverable D6.3 after				
	the mid-term review.				
	Provide an NGSI Agent Python library and documentation to help other partners to developed NGSI Agent				
P07 CREO	• Internal review of deliverable D6.2				
P11 PPA	• Data collection for the vessel calls arrangements				



# **2.2.6.3.** Results after M19-M24

The main results that we have obtained in this second period of the project (M19-M24) in the context of WP6 are the following:

- DAL agents orchestrator developed and integrated
- Operational Tools v2 (OTv2)
- Dashboard and global UI v2
- Information Hub connected and integrated in the "development environment"
- Northbound and southbound APIs completed and tested between all modules
- A series of NGSI agents for ports (specially for GPMB)
- An NGSI Agent Python library and documentation to help other partners to developed NGSI Agent
- FIWARE security modules completely customised and integrated in the development environment
- Preparation of the ground for the documentation of all code (to be done for D6.4 and D6.5).

## 2.2.6.4. Deviations

So far no deviations have been detected.

However, during the mid-term review, the following requests were made in order to rectify/enhance certain descriptions on the deliverables. In particular, the requests were the following:

- To enhance the reference of the use of FIWARE in the Data Acquisition Layer.
  - This clarification was made via a re-submission of deliverable D6.1 including more concrete references.
  - A manual of "how to create and introduce a new NGSI agent for a new data source to be incorporated in PIXEL" was provided via a re-submission of the deliverable D6.2, as it was agreed during the review.

## **2.2.6.5.** Corrective actions

Since there have not yet been any deviations, corrective actions have not been needed yet



# 2.2.7.Work Package 7 – Pilot trials integration, deployment and evaluation

This work package is in charge of integrating all the modules developed in WP6, applying properly the models described in WP4 and applying the methodology and techniques of WP5 to calculate the PEI in ports. The output will be the prototypes, adapted to the specific case studies in each port and with the PEI calculation implemented according to their requirements.

WP7 lasts (initially) from M14 to month M33, and constitutes one of the most important WPs for the project. As it has been indicated many times, PIXEL is use-case driven, so a good plan, execution and validation of the pilots will mark the future of the PIXEL tools and research lines. The current status is very positive from the side of the software integration and models interoperability but there is a lot to work (with additional effort, presumably) in order to convert those software advances into real-scenario on-premise instantiations. Equipment availability, ports bureaucratic and operative burdens, installation issues, data availability concerns and other difficult situations are putting in risk the completion (on-time) of the activities of the work package. All of these risks are being handled by the Consortium, and mitigation measures are being put in place within the reasonable manoeuvring margin of each partner.

At management level, WP7 is being a complicated work package as it includes the integration of developments made in other work packages and the realization of 4 pilots. The delay of other WPs may affect this one, for this reason a close and fluent communication between work packages is needed.

The first thing to emphasize about this reporting period is that the plans have been already significantly affected by the current situation caused by COVID-19.

Particularly, the most worrying situations are the following:

• **Paralysis of activity in ports due to the COVID-19 outbreak**: this will delay the installation of all kind of equipment, the availability of thepersonnel and the difficulty to access to certain agents within the port (other departments, other entities such as terminals).

• **Sensors provision and installation**: the sensor providers are stretching out the time of response and the material/stock availability, so more time will pass than expected to receive the sensors. With the same logic, installation companies/departments will be pretty limited, especially considering the distancing measures that are being applied all across Europe.

• **Data availability in general:** Especially for task T7.5, the ports have expressed that the data needed for computing PEI is very difficult (at some cases even impossible) to be collected under normal circumstances. This, added to the current extraordinary situation, will need to make the T7.5 time to envisage alternative solutions to keep the pilots executed without depending too much on the data availability. Otherwise, the conduction of the task is under clear risk of deadlock.

During the M19-M24 period, the work has been focused on: (i) software integration in the "development environment", (ii) models preparation for the installation (microservices) in remote servers, (iii) sensors collection, (iv) data conversion from raw sources to integration in PIXEL via (iv) development of NGSI agents, (v) acquisition of the needed equipment and (vi) preparation for the validation.

In order to conduct the work package in the best way as possible, during this period (M19-M24), the project team has designed and put in place certain managerial procedures that will last till the end of the project:

- Assignation of technical experts to different pilots in order to establish a parallel tracking and execution of the deployments (one port one pilot one technical partner assigned):
  - $\circ \quad GPMB \text{ -> } CATIE$
  - $\circ$  ASPM/SDAG -> INSIEL
  - THPA ->UPV
  - PPA -> PRO
- Clear planification by sprints following agile methodology has been set, put in place and is being followed by technical partners in charge of the integration. PRO is managing this.



# **2.2.7.1.** Summary of progress in previous periods

At the beginning of the execution of the work package and before the start of the tasks, time was devoted to define how the execution of the work package was to be managed (define the responsible for each organization in the different tasks, define how we will manage at the level of meetings, emails, deliverables, how to perform validations and test plans).

To validate the technical developments made in this project, including the pilots, it was decided to follow ISTQB guidelines based on the best practices and testing standards. The three main testing techniques are being used during the execution of the project:

- Individual test (unit test), focussed on the validation of specific functionalities
- Module test, focused on the validation of modules or components, and
- Integration test that allow us to validate the integration of different components and use cases.

To facilitate the management of tests, the web tool "TestLink" is being used, that is one of the most widely used tools to carry out the management of software tests.

## Progress by task

## Task 7.1: Integration of PIXEL components

This Task started in M13 and will end in M27. Till M18, the phase corresponding to the integration and testing of the software components developed in PIXEL was covered. The following activities took place:

- Definition of the integration strategy and its depiction via deliverable D7.1
- Creation (in TestLink) of the test cases for evaluating the integration.
- Definition of the models (out of WP4) that will be integrated; by when and by whom.
- Selection of a microservices strategy to be used for integrating all models as containers under a common mechanism.
- A proof of concept demo has been defined using the developed components and interfaces
- This demo was shown in the mid-term review in January 2020 (M21).

## Task 7.2: Energy Management trial: Port of Bordeaux

This task started in M16 and will end in M33. During the first half of the project (till M18), only three months of this task had taken place. In that short time, just some actions were performed:

- A first work of identification of software and hardware that have to be integrated for the GPMB pilot execution, resulting in a to-do list for the integration that was included in the deliverable D7.1
- A first set of integration tests were identified and defined in the TestLink web tools
- Identification of the end-points of the data sources to be integrated
- Identification of how to integrate weather station data and data coming from electrical sensors already installed inside the port but not already connected.
- Start of the work for integrating PAS model execution and outputs to feed the energy demand model with live data.

## Task 7.3: Intermodal Transport trial: Port of Monfalcone

Same as for T7.2, the task T7.3 had also executed three months before this reporting period (M16-M18). The works initiated (to be continued) in that time were:

• Establishment of the basis on how to manage the execution to achieve the scope of the task, including a work plan and assignment of duties to the different partners involved.



- A first work of identification of software and hardware that have to be integrated for the ASPM/SDAG pilot execution, resulting in a to-do list for the integration that was included in the deliverable D7.1
- A first set of integration tests were identified and defined in the TestLink web tools
- An initial analysis of the current data available, processes and port operation activities for the pilot was made, including the new video cameras that by the time were expected to be available in short time (already available by current reporting period M19-M24).

## Task 7.4: Port-city integration trial: Ports of Piraeus and Thessaloniki

Same as for T7.2 and T7.3, the task T7.4 had also executed three months before this reporting period (M16-M18). The works initiated (to be continued) in that time were:

- Planning of the separate tasks took place redounding in two Gantt charts that were included in the deliverable D7.1. One sub-task is the pilot to be deployed in THPA and the other sub-task is the pilot to be deployed in PPA.
- A first set of integration tests were identified and defined in the TestLink web tools

#### Task 7.5: Transversal trial: Port Environmental Index development

The Transversal Trial Port Environmental Index (PEI) development started in M14 and will end in M33, so five months were executed till the end of the last reporting period.

So far, the main points of discussion were on data availability and automated data retrieval for the PEI calculation in order to calculate and visualize the Port Environmental Index in real time. Data availability was identified as the main and critical point to be addressed during the transversal trial on which the success of the transversal trial will depend.

It was decided that the Port Activity Scenario (PAS) will be deployed in all ports and will be used as a way to bypass certain data inputs for the PEI deployment

#### Task 7.6: Inter-pilot integration and collaboration

Task T7.6 started on month M18. During the first month of execution, a time plan was established, different responsibilities were assigned and the initial works on recognising the different points (especially, models) that can be re-used and leveraged among the different pilots were done.

# **2.2.7.2.** Summary of results after previous periods

The main results that WP7 obtained in the first half of the project in the context of WP7 are the following:

- Definition of the validation approach to validate the platform integration and pilots.
- Definition of test plans, test cases and the initial execution plan.
- Deliverables submitted successfully:
  - Deliverable D7.1 Integration Report V1

# 2.2.7.3. Progress in M19-M24

#### Progress by task

#### Task 7.1: Integration of PIXEL components

Task T7.1 will last till the end of the WP7 (initially, M33) and the current work is mainly focused on controlling the executions of the task of integration.



In this period, for T7.1 the most important activity has been to thoroughly monitor the advances on WP6 in order to integrate different modules and data into the development environment in a way that the future integration to on-premises servers in port will be semiautomatic. The most important advances being tracked and fostered were: (i) data models selection, (ii) APIs and modules integration and (iii) models being ready to be executed by the Operational Tools. This has been also tightly related by the role as Technical Coordinator of the project of PRO, leader of task T7.1 and WP7 as well.

For conducting that monitoring and also for scheduling and planning the integrations within WP7, a clear planification by sprints following agile methodology has been set, put in place and is being followed by technical partners in charge of the integration.

Additionally, particular technical tasks have been performed in T7.1 during M19-M24:

- Integration of GPMB data, T7.2 model and WP4 outputs from a supervision point of view in order to present a working demo in the mid-term review in Brussels.
- PAS outputs fine-tuning and the conversion into an actionable UI for ports
- Revision and clarification of pilot scenarios and expected impacts (KPIs) in alignment with the technical implementations (interaction with WP8).

## Task 7.2: Energy Management trial: Port of Bordeaux

Task T7.2 has been being executed the whole 6-months period M19-M24. The main activities conducted during this period have been (in parallel, mutually feeding and interacting with both WP6 and WP4 partners):

- Data gathering, selection of data models, planification of NGSI agents development
- Development of NGSI agents
- Final clarification of the equipment needed to run PIXEL, collection of the equipment and start the phase of putting it in place
- Designing and starting software and hardware integration
- Collaboration with WP4 partners in order to prepare the software and operational mechanisms to achieve having the models running.

The following data sources have been tackled during the period M19-M24: (i) the data formats were defined and agreed with the Data Models task force team, (ii) the NGSI agents have been developed and (iii) they have been integrated in the "development environment" of PIXEL:

- Vessel calls (from VIGIEsip)
- PV output prediction
- Tide level sensor
- Data from supply chains of GPMB

#### Task 7.3: Intermodal Transport trial: Port of Monfalcone

Task T7.3 has been being executed the whole 6-months period M19-M24. The main activities conducted during this period have been (in parallel, mutually feeding and interacting with both WP6 and WP4 partners):

- Data gathering, selection of data models, planification of NGSI agents development
- Development of NGSI agents
- Final clarification of the equipment needed to run PIXEL, collection of the equipment and start the phase of putting it in place
- Designing and starting software and hardware integration
- Collaboration with WP4 partners in order to prepare the software and operational mechanisms to achieve having the models running.



The following data sources have been tackled during the period M19-M24: (i) the data formats were defined and agreed with the Data Models task force team, (ii) the NGSI agents have been developed and (iii) they have been integrated in the "development environment" of PIXEL:

- Vessel calls (from the website of ASPM)
- Certain SILI data needed for running models
- Data from the videocameras of (already installed in) Monfalcone

#### Task 7.4: Port-city integration trial: Ports of Piraeus and Thessaloniki

Task T7.2 has been being executed the whole 6-months period M19-M24. The main activities conducted during this period have been (in parallel, mutually feeding and interacting with both WP6 and WP4 partners):

- Data gathering, selection of data models, planification of NGSI agents development
- Development of NGSI agents
- Final clarification of the equipment needed to run PIXEL, collection of the equipment and start the phase of putting it in place (for example, creating the FTP infrastructure for PPA integration trial)
- Designing and starting software and hardware integration
- Collaboration with WP4 partners in order to prepare the software and operational mechanisms to achieve having the models running.

The next NGSI agents have been developed during this reporting period for the sub-task of THPA pilot:

- Wind data
- Weather data
- Traffic data at the gates
- Vessel calls

The next NGSI agents have been developed during this reporting period for the sub-task of PPA pilot:

- Weather data from open data sources
- Traffic data from open data sources

#### Task 7.5: Transversal trial: Port Environmental Index development

The task T7.5 in M19-M24 was marked by several discussions were carried out on the availability of data for the Port Transversal Trial. The PIXEL pilot ports will likely not have all the necessary data to fully parametrize the PEI calculation algorithm (as it is detailed in deliverable D5.3.). However, mechanisms have been provided in order to let a feasible implementation and deployment of task T7.5.

A very relevant activity realised by the partners of T7.5 at the beginning of the period was to develop a working version of the (partial) PEI in order to be shown during the mid-term review in Brussels. It required the collaboration of the environmental experts – providing the methodology, fundamentals and guidelines for the implementation -, the mathematical experts – providing formulae and other assumptions -, the ports – providing certain sample data and providing a clear vision on how the visualization should be – and, finally, software developers, who developed both backend and frontend code for having the demo running.

Additionally, other activities were tackled during the period:

- Experiences from the noise modelling done in previous periods were used to determine the optimal positions for the placement of noise sensors in the pilot ports
- During the Plenary meeting in Thessaloniki sensor purchasing by the ports has been addressed and recommendations have been provided.
- The next NGSI agents have been developed during this reporting period for the PEI execution:
  - Vessel calls of THPA



- Waste of ships berthing at THPA
- Terminals waste 2019 of THPA

## Task 7.6: Inter-pilot integration and collaboration

The task T7.6 has been executed during the period under report. However, as the developments are tightly depended on the results of the rest of the tasks in the WP, not many materialisations have been performed. The points that have been working on are:

- Analyse the data sources that will be available in the different pilots to define which possible new models can be applied to existing pilots that were not initially planned
- Identify new models/combination of existing models

Partner	Contribution
P01 UPV	• Attendance to all WP7 bi-weekly conferences.
	• Attendance to joint WP6-WP7 control sessions under Agile Development management.
	• Proposition of a Data Model for the traffic gates congestion in THPA
	• Participation on PAS outputs fine-tuning and the conversion into an actionable UI for ports
	<ul> <li>Start of development of various NGSI agents, especially those related to THPA pilot</li> <li>Discussions and work on user interfaces for the PIXEL models, especially for PEI and for Traffic predictive algorithm for THPA port</li> </ul>
	• Extensive work on realising alternative data provision from ports to comply with PEI needed data
	• UPV was in charge of data collection, and all the work has been reflected in D5.3. The work conducted by UPV with ports will redound in a feasible development of activites in task T7.5
P02 PRO	• Lead WP7 bi-weekly conferences and WP6-WP7 control sessions under Agile Development management.
	Validation of Data sources for PPA Pilot
	Proposition of Data Models for PPA Data sources
	• Work in the definition and execution of the Pixel Platform architecture
	• Developing a UI to define/configure the information needed to execute the PAS model
P03 XLAB	• Attendance to all WP7 bi-weekly conferences.
	• Attendance to joint WP6-WP7 control sessions under Agile Development management.
	• T7.1: Working on IH integration activities: integration of new data sources, analysis of sources data models. Support for overall integration
P04 INSIEL	• Attendance to all WP7 bi-weekly conferences.
	• Attendance to joint WP6-WP7 control sessions under Agile Development management.
	• INSIEL contributed to the task 7.1 and 7.3 to run the pilot phase for the ASPM use- case (INSIEL is the supporting technical partner assigned for the ASPM pilot).
	• INSIEL worked to connect the different source of data coming from Monfalcone Port and SDAG. In particular some data were already available, and the activities was the development of a web service to connect the data source to PIXEL platform. Other data are new data, for example data coming from smart camera, so INSIEL coordinated the

 Table 8. Summary contribution of partners WP7 M19-M24



	definition of the data format coming from new devices and designed the connector with PIXEL platform.		
P05 CATIE	Attendance to WP7 telcos		
	• Task 7.1: CATIE follows the integration plan in GPMB and test and validation of models as leader of WP4.		
	• Leading of task T7.2: CATIE has organized the work within partners. CATIE in collaboration with GPMB and ORANGE work on software and hardware integration for the energy management use-case. Many data sources have been integrated		
P06 ORANGE	• Attendance to all WP7 bi-weekly conferences.		
	• Attendance to joint WP6-WP7 control sessions under Agile Development management		
	• Following development progress with WP7		
	• Responsible of Data Models task force, with influence in WP7, for preparing the data to be integrated into the deployed on-site infrastructure		
P07 CREO	• Internal review of deliverable D7.1		
P08 MEDRI	• Attendance to all WP7 bi-weekly conferences.		
	• Attendance to joint WP6-WP7 control sessions under Agile Development management		
	• During the first part of the period (M19-M21) several discussions were carried out on the availability of data for the Port Transversal Trial. The PIXEL pilot ports will likely not have all the necessary data to fully parametrize the PEI calculation algorithm (as it is detailed in deliverable D5.3.). However, mechanisms have been provided in order to let a feasible implementation and deployment of task T7.5		
	• Experiences from the noise modelling done in previous periods were used to determine the optimal positions for the placement of noise sensors in the pilot ports		
	During M22-M24, a special session with key partners was held during the Virtual meeting.		
	• Discussions were done regarding the testing and validation of the PEI algorithm. It was decided to move the testing and validation of the PEI algorithm including the establishment of the final algorithm to task T7.5 instead of WP5. Additionally, several problems have been encountered and appraised regarding existing IoT data sources and the implementation of sensors needed for conducting the transversal trial		
P09 SDAG	• Attendance to some WP7 bi-weekly conferences.		
	• In T7.5, SDAG contributed for the implementation of the task by providing feedback on the related activities lead by PRO and MEDRI and helping the Port of Monfalcone with the implementation of the PEI.		
	• SDAG contributed in the deliverable D7.1		
	• SDAG contributed for the ppt presentation related to FVG Pilot during the Rijeka virtual meeting.		
	• Regarding T7.3:		
	• SDAG is implementing internal activities for the implementation of the trial related to T7.3.		
	<ul> <li>Some internal meetings were arranged also together with the contractor that manages SDAG parking data, so that by January 2020 SDAG was able to transfer its data to INSIEL.</li> </ul>		
	<ul> <li>SDAG also met INSIEL and the Port of Monfalcone in order to discuss about data availability and transfer also considering privacy issues for the integration of data in the PIXEL Information Hub.</li> </ul>		



	• Finally, some internal meetings were arranged also together with INSIEL regarding SDAG parking data and the integration in the PIXEL Information Hub
P10 THPA	Attendance to all WP7 telcos
	• Internal review of deliverable D7.1
	• Data aggregation, evaluation and exchange among technical partners for preparing the THPA pilot to be deployed (task T7.4)
P11 PPA	Attendance to some WP7 telcos
	• For the deliverable D7.1, PPA provided data on the Port City integration trial - PPA
	• PEI data sources researching and communications for the sensors' technical specifications and tender procedure
	• Research on the air pollution and sound sensors technical specifications
	• Held meeting with the sensors suppliers and discussed different specifications
	• Overviewed the deliverable D7.1. provided info on ship waste reporting procedures
	• Data servers' options availability examination and preparation of sensor equipment tender documentation.
	• T7.5: Established FTP server service for the provision of data for the PEI calculation
P12 ASPM	Attendance to all WP7 telcos
	• ASPM contributed to T7.3 and 7.5 providing feedback on the activities lead by PRO (T7.1) and MEDRI (T7.5), helping with the implementation of the intermodal trial for the port of Monfalcone and transversal trial for the PEI.
	• During this period, the video system for the monitoring of parking area and road congestion has been finalized and started to provide data to the INSIEL server. In order to do this, several meetings have been held with the external company committed to implement the system and evaluate the infrastructures capable to host the system.
	• ASPM organized a meeting along with SDAG, INSIEL and DPO in order to verify the respect of privacy in the usage of the data used in PIXEL.
P13 GPMB	Attendance to all WP7 telcos
	• Data gathering, selection of data models, planification of NGSI agents development
	• Development of NGSI agents
	• Prepare the demo for the Bordeaux mid term review. It includes the development of agents (Vessel calls, PV output prediction, Tide sensor and the integration of models (PAS and Energy Demand model) and algorithms (Predictive algorithm)
	Designing and starting software and hardware integration
P14 IPEOPLE	• Attendance to all WP7 telcos
	• Attendance to WP6/WP7 joint sessions of Agile development and integration.
	• With regards to T7.5, telcos were organised and conducted with PPA and THPA for preparing PEI pilot in both ports.
	• IPEOPLE leads task T7.4:
	• During the first months, (M19-M21) contribution in Deliverable D7.1 regarding the validation of the PIXEL solution in the test cases of PPA and ThPA (T7.4).
	• Then, a continuous communication with PPA and ThPA regarding sensors and data availability was established.
	• Organized and conducted Telcos with ThPA and PPA regarding Task 7.4
	• Evaluated Data sources for both THPA and PPA integration trial



	• Later, the equipment needed definition for ThPA and PPA was carried out.						
	<ul> <li>Created FTP infrastructure for PPA Integration Trial</li> </ul>						
	• Finally. the development of required agents for connection with sensors and data sources started in M23-M24.						
	<ul> <li>Identified suitable DataModels for ThPA</li> </ul>						
	<ul> <li>Studied Pyngsi framework for the development of NGSI</li> </ul>						
P15 CERTH	• Attendance to all WP7 telcos.						
	• Interaction between WP7 & WP8						
	• Revision and clarification of pilot scenarios and expected impacts (KPIs) in alignment with the technical implementations						

## 2.2.7.4. Results after M19-M24

- Clear planification by sprints following agile methodology has been set, put in place and is being followed by technical partners in charge of the integration.
- An integrated working demo functioning that was shown during the mid-term review
- Assignation of technical experts to different pilots in order to establish a parallel tracking and execution of the deployments (one port one pilot one technical partner assigned)
- Development of NGSI agents of the different pilots: T7.2, T7.3, T7.4 and T7.5 have developed several NGSI agents that are already integrated in a "development environment" that will be later translated to the on-premises servers.
- Certain remote servers and on-premise infrastructure prepared for the integration.

# 2.2.7.5. Deviations

For the moment, the only remarkable deviation is the most likely delay on the execution of the pilots. Due to the causes explained above (WP7 introduction), the WP7 will suffer certain effects that will lead the WP to be delayed in time. Current discussions with the Project Officer are taking place in order to understand how to channel this probable deviation.

Even though not being exactly a deviation, the EC and the external reviewer suggested to PIXEL team (during the mid-term review) to create a **careful integration plan** to ensure integration of all heterogeneous data.

# **2.2.7.6.** Corrective actions

With regards to WP5-T7.5: Discussions were done regarding the testing and validation of the PEI algorithm. It was decided to move the testing and validation of the PEI algorithm including the establishment of the final algorithm to task T7.5 instead of WP5.

Regarding the suggestion about the careful integration plan, the corrective action that is being put in place is that the WP7 leader (PRO) is ensuring to create a solid ToC for D7.2 (to be validated by all partners).

Although it was mentioned in the Periodic Technical Report, the following has decided to be included here as corrective action for WP7 during M19-M24. Task T7.1 (integration) will last until M33, similar to the remaining tasks, in order to be able to provide a final integration report (D7.2) when the pilots have finished (M33). This has been agreed with the Project Officer.

	M14	M 15	M16	M17	M 18	M19	M 20	M21	M22	M23	M24	M 25	M26	M27	M28	M29	M 30	M31	M 32	M33	M
WP7 Pilot trials integration, deployment and evaluation																					
T7.1 Integration of PIXEL components														Č,	≥						
T7.2 Energy management trial: Port of Bourdeaux					- 1																$\sum$
T7.3 Intermodal transport trial: Port of Monfalcone					7.															7.	7.
T7.4 Port-City integration trial: Ports of Piraeus and Thessaloniki																				$\square$	Ľ
T7.5 Transversal trial: Port Environmental Index development																					E
T7.6 Inter-pilot integration and collaboration																				$\left( \right)$	Γ



# 2.2.8.Work Package 8 – Assessment and expansion plan

The objectives of this work package are diverse: (i) to develop an evaluation plan for guiding the assessment activities of the project outputs, (ii) to define quantitative and qualitative KPIs for PIXEL involving partners and stakeholders, (iii) to assess the technical performance of the PIXEL 'enabling IT infrastructure' and of the ICT solutions implemented within each use case, (iv) to identify and provide guidance for improvement in regards to possible system gaps (e.g., flexibility, reliability, scalability, safety, etc.), (v) to define the business potential of PIXEL and the economic impact of its implementation, (vi) to specify scalable transferability of the results to other ports with independence of the size and (v) to provide evidence of PIXEL's proof of concept and R&D potential.

WP8 was initiated in month M10 of the project, hence it has been running for 14 months during the current reporting period. In terms of tasks, only T8.4 has not started yet.

The most worrying aspect of the WP8 execution is the dependency with the results of two previous work packages: WP6 (especially for the technical assessment in T8.2) and WP7 (especially for the business assessment in T8.3). These dependencies may spark a delay request. This will be properly informed to the Coordination and the Project Officer.

Regarding the objectives of the WP8, the most concerning aspect was the one commented during the mid-term review. Currently, the ports have not been able to fully tackle (or better, explain how to tackle) all the KPIs that were planned at the proposal stage.

For correcting this situation, the Consortium planned and conducted a special session on the (former) Rijeka meeting. This took place during the virtual meeting in M22-M23 (6 hours-long session) to discuss with the ports and relevant technical partners the different alternatives to come up with a more solid, enlarged and reliable list of KPIS.

A remarkable issue for the future of WP8 is the effect that the COVID-19 outbreak and its associated measures will have with regards to impact evaluation and business assessment of PIXEL pilots.

Besides the cascade effect of the most likely delays on WP7, the impacts (KPIs) that will be measured, especially from the point of view of T8.3, will be completely biased by the effects of the COVID-19. For most ports (data from PIXEL ports), the number of vessels and the numbers of operations in the port are being reduced by 40-60%. This will mean that the values of the KPIs will not be interpretable as if there were normal circumstances, which will for sure condition the results of the assessment.

This may mean a request of delay on the activities of the WP8 in order to obtain to "relatively normal" values.

# 2.2.8.1. Summary of progress in previous periods

## Progress by task

## Task 8.1: Evaluation Plan

The ultimate goal of the first task of WP8 was to formulate a concrete evaluation plan which will be implemented in the months to come so as to evaluate and validate the main results of the project. This task had been running from month M10 and finished on M16. The different activities that were carried out were:

- Design of the plan of the technical impact assessment. It was decided to use evaluation models based on the Square assessment framework.
- Identification of specific expected impacts, evaluation methodology and KPIs for evaluating the PIXEL technical framework and the use-cases from a functional point of view.
- Design of the plan of the business impact assessment. It was decided to use the classical CBA model for conducting the evaluation. One CBA will be conducted per pilot.
- Identification (for each use case/port) specific expected impacts (quantitative and qualitative), as well as KPIs along with the relevant units and methods of measurement
- Design of plan for conducting the proof of concept and the future research lines after PIXEL.



• For the implementation of some PIXEL tools to external ports, it was also foreseen the data collection methodologies, responsible parties, time plan and potential risks and mitigation plans.

This task was considered finished and closed by month M16.

## Task 8.2: Technical Impact Assessment

Task T8.2 started at month M15, therefore by the end of the past reporting period (M18), only four months of the task were executed. The activities conducted till that point were:

- Definition, discussion and agreement on the task time planning and the ToC (Table of Content) for the deliverable (D8.2).
- Creation of a first version of the questionnaires for TAM3 and AIMQ questions.
- Creation and sharing of a collaborative document for D8.2.
- Writing of a first draft for a majority of sections.
- Measurement of some technical impact assessment characteristics in order to derive KPIs for the different modules.

## 2.2.8.2. Summary of results after previous periods

The main results that were obtained in the context of WP8 are the following:

- Formulation of the Evaluation Methodology to be implemented for the:
  - $\circ$  Technical Impact Assessment of the PIXEL Platform and of the ICT solution implemented in each use case
  - o Business and economic impact assessment of the ICT solution implemented in each use case
  - Proof of concept and future R&D potential of PIXEL.
- First draft of main sections of D8.2.
- Progress in evaluating part of the module characteristics.
- Deliverables submitted successfully:
  - Deliverable D8.1 Evaluation Plan

# 2.2.8.3. Progress in M19-24

#### Progress by task

## Task 8.1: Evaluation Plan

This task was finished and closed by month M16.

#### Task 8.2: Technical Impact Assessment

Task T8.2 has set all the technical evaluations that must be done in order to consider full assessment of the PIXEL platform.

During this reporting period, T8.2 has been mainly waiting for the integration of work done in the framework of WPs 6 and 7. As soon as a functionality will be totally ready (OK message must be receive from WP6 and WP7 leaders), CATIE will be provided a link (URL) that will include a UI with the needed instructions for conducting the technical assessment. This will be done mainly for the real implementation in a pilot, but it is also planned to validate functionalities over the "development environment".

In the meantime, the four pilot sites have fine-tuned and finalised the description of their final pilot case and the measures that will be finally implemented with regards to technical impact assessment. This finalisation has included a review and update of the KPIs that will be included in the evaluation methodology.



Finally, one of the main actions in the task was the writing of the deliverable D8.2 with the most updated information about the business impact assessment.

#### Task 8.3: Business & economic impact assessment

Task 8.3 was the main target of the special session that was conducted during the Rijeka (virtual) meeting in M22-M23. Besides that action, task 8.3 has had intensive activity during the period M19-M24, that can be summarised in the following.

- Update and/or verification of the KPIs included in D8.1 after specific request of the task leader
- A set of guidelines has been prepared for each Port, as well as indicative questionnaires, in order to conduct the business and economic evaluation, that will lead to the formulation of a CBA per port. These guidelines were composed of the following:
  - o Brief description of each pilot case
  - Expected impacts per pilot case;gg
  - KPIs to be updated, enriched or deleted
  - Guidelines on how to conduct the measurements
  - Brief information on how to formulate and use the questionnaires. .
- In parallel, the four pilot sites have fine-tuned and finalised the description of their final pilot case and the measures that will be finally implemented with regards to business impact assessment. This finalisation has included a review and update of the KPIs that will be included in the evaluation methodology.
- Writing of the deliverable D8.5 with the most updated information about the business and economic impact assessment.

#### Task 8.4: PIXEL proof of concept and future R&D potential

This task has not officially started yet. It starts on M25, just after the end of this management reporting period.

However, the task leader (UPV), has already prepared a clear plan with the different actions to be performed (technically, temporally and with regards to assignation). This plan was made available to the partners and has been discussed and agreed in Plenary meetings.

Additionally, initial contacts have been made with external ports to check their willingness to be involved, in the evaluation – interest already expressed by the ports of Valencia, Rijeka and Trieste.

Partner	Contribution
P01 UPV	Participation in dedicated WP8 telcos.
	• Monitoring of draft plan for Task 8.4.
	• Provision of input for D8.2 in relation to Task 8.3 and per request from CATIE.
	• Answering of Task 8.2 questionnaire about indicators for Technical Evaluation.
	• Assistance to CERTH for the preparation and conduction of the "Impacts" session and "Impacts hands-on" session in the Rijeka (virtual) meeting.
P02 PRO	Participation in WP8 monthly telcos.
	• Contribution to D8.2. Section 3.1: "Port and City Environmental Management Model", Section 3.8: "PIXEL Integrated Dashboard and Notification" and Section 4: "technical impact assessment of the PIXEL platform"

 Table 9. WP8 Partner contribution summary table M7-M12



P03 XLAB	• XLAB participated in all WP8 monthly telcos.
	• T8.2: Developed and preformed a full set of PIXEL IH performance and KPI tests as input for D8.2.
	• Technical evaluation of the PIXEL Information Hub for deliverable D8.2
	• Working on definition of KPI tests for the M36 deliverable
P04 INSIEL	<ul> <li>INSIEL contributed (during M19-M21) to the execution of task T8.2, focusing on the technical evaluation of the components developed by the partner.</li> <li>Contribution to D8.2.</li> </ul>
	• Regarding task T8.2 and T8.3, INSIEL supported Monfalcone Port and SDAG in defining the indicators and parameters to carry out the technical impact assessment and the business economic assessment, analysis the state of the art in term of data and measurement available and what can be evaluate after the introduction of PIXEL platform.
P05 CATIE	Attendance to all WP8 telcos
	• Lead the task T8.2 about the technical impact assessment: organise work within partners and propose a methodology to follow.
	• Interaction with WP4, WP6 and WP7 to explain partners what will be evaluated in the technical impact assessment.
	• Deliverable 8.2: CATIE has provide huge inputs for this deliverable and as the lead editor spent time to coordinate the advancements. Deliverable has been submitted on time.
P06 ORANGE	Attendance to WP8 telcos
	• Participation in the evaluation plan (Task 8.1) and in the technical assessment (T8.2).
P08 MEDRI	• Attendance to all WP8 monthly telcos.
	• In deliverable D8.2, contributions were provided by MEDRI on the technical assessment of noise and air pollution models.
	• During the first part of the period (M19-M21), the Deliverable 8.2 was completed. MEDRI contributed with the technical assessment of noise and air pollution models. The data was provided on the relevant KPIs, as well as some other information, like the problems faced during the model development or during its implementation.
	• During the second part of the period (M22-M24), all the teleconferences linked with the task were attended and preparation has been done for future work, especially regarding eKPIs.
P09 SDAG	Attendance to WP8 telcos
	• Contributions (on ASPM-SDAG pilot assessment) for deliverable D8.2
	• Internal review of deliverable D8.2
	• SDAG contributed for the implementation of the task T8.2 by providing feedback on the related activities lead by CERTH, gave comments and contributions about documents/information asked by CERTH.
P10 THPA	Attendance to WP8 telcos
	• Contribution to deliverable D8.2 (section of impact assessment of THPA pilot)
P11 PPA	Attendance to some WP8 monthly telcos
	• PPA contributed to the deliverable D8.2 in the section of the technical impact assessment of the pilot in the port.



P12 ASPM	<ul> <li>ASPM attended all WP8 monthly telcos</li> <li>ASPM provided feedbacks and information to CERTH in order to fulfil the activities related to the implementation of T<sup>2</sup> 2</li> </ul>
	<ul> <li>For deliverable D8.2: Contributions in the identification of the KPIs for the business and economic assessment, pilot development.</li> </ul>
P14 IPEOPLE	Attendance to all WP8 monthly telcos
P15 CERTH	<ul> <li>Coordination of WP8</li> <li>Collaboration on the writing of T8.2.</li> <li>Continuous interaction with the ports regarding the pilot evaluation requirements <ul> <li>Formulation of pilot evaluation guidelines and questionnaires to be used for the pilots' business and economic assessment</li> </ul> </li> </ul>

## 2.2.8.4. Results after M19-M24

After the period M19-M24 activity of the work package, the results obtained can be listed as the following:

- A set of guidelines for the Business and Economic Assessment guidelines for each PIXEL port
- Deliverables generated:
  - o D8.2 "Technical Evaluation v1.0" has been submitted

## 2.2.8.5. Deviations

So far no deviations have been detected

Even though not being exactly a deviation, the EC and the external reviewer warned to PIXEL team (during the mid-term review) that the current KPIs (as exposed in D8.1) were not fully consistent with the foreseen in the GA.

# **2.2.8.6.** Corrective actions

Regarding the comment of the EC about the impacts (KPI list), the corrective actions have been put in place:

- Special session in the virtual meeting in M22-M23 (6 hours-long session) to discuss with the ports and relevant technical partners the different alternatives to come up with a list of KPIs that fully aligned to the actual pilot implementations and the final pilot scenarios.
- Proposition of alternative qualitative KPIs, added to the already identified quantitative ones.
- Ports have analysed and are providing newer definitions of the potential pilot impacts towards the port, the city, the citizens, the region, the environment and the economy.

Although it was mentioned in the Periodic Technical Report, the following has decided to be included here as corrective action for WP8 during M19-M24. Task T8.2 (technical assessment) will last till the end of the project (similar to tasks T8.3 and T8.4). Deliverable D8.3 was planned to be released in M28, but this cannot be properly done (overall assessment) until the pilots in WP7 have finished (M33). Thus, it makes more sense to release D8.3 in M36, aligned with D8.4 and D8.5, from a management perspective. There is no risk in that as the intermediate deliverable (D8.2) is released in M20, two months after D7.1, which is correct in the Gantt chart. Following this reasoning, it makes sense to release D8.3 after D7.4 (last deliverable in WP7)

		M14	M 15	M16	M17	M 18	M19	M 20	M21	M 22	M23	M24	M25	M26	M 27	M28	M29	M 30	M31	M 32	M33	M34	M35	M36
WP8	Assessment and expansion plan																							
T8.1	Evaluation plan			4	.2																			
T8.2	Technical impact assessment				1			- 4								- ¢.	<u>)                                    </u>							
T8.3	Business & economic impact assessment																							14
T8.4	PIXEL proof of concept and future R&D potential																							1.3



# 2.2.9.Work Package 9 – Exploitation, dissemination and communication

The general objective of this WP is to organize in a coherent way the activities leading to maximize impact for the overall project. The main objective for each partner is to have a structured, complete and achievable business model strategy and a proper communication of results.

This period has been one of the less active on dissemination actions. This is because the months M19 to M24 have been strongly marked by two effects:

• Effect "Review": The greatest amount of effort in M19, M20 and part of M21 was focused on the preparation and address of the mid-term review to take place in January 2020 in Brussels.

• **Effect "COVID-19":** The majority of events that PIXEL was tackling were cancelled, and it is foreseen that the team will not be able to attend to physical events for a certain time.

Especially remarkable was the cancellation of TRA2020, the biggest event planned to be attended by PIXEL partners in 2020 (if not in the whole project) and the IoTWeek 2020. In both of them, PIXEL was planning to have a booth with a working demo and also to have scientific publications associated and to be presented.

Regarding the WP9 actions during this period (those that have been able to be executed), the same pace as before regarding communication is being followed. However, regarding certain activities related to T9.2 and T9.3 that were marked as "to-address" in the second half of the project have been tackled. A proposal by the task leader was discussed in one of the monthly teleconferences and it was put in place. The proposal consisted of the creation of three specific Task Forces:

Policy-oriented actions	Scientific publications	Contribution to open-
CERTH	UPV	source initiatives - ORANGE

- Policy-oriented actions: ESPO<sup>1</sup>, IAPH/WPSP<sup>2</sup>, IMO/GloMEEP<sup>3</sup>, and others.
  - UPV to start the contacts
  - CERTH to lead the activity and to follow different actions.
- Scientific publications
- Contribution to open-source initiatives: FIWARE and others. Responsible: ORANGE

Additionally, a fourth element was added: the need of creating and conducting webinars to internal and external people. This was introduced in order to: (i) cover commitments made at the beginning of the projects and (ii) to take advantage of virtual dissemination possibilities to mitigate the effects of not being able to physically present PIXEL in events due to COVID-19 restrictions.

The idea is to conduct webinars-workshops-trainings: (i) internals, (ii) externals: PoF network projects, Advisory Board, interested ports for T8.4, etc. The responsible assigned was IPEOPLE, that will lead this initiative supported by UPV.

# **2.2.9.1.** Summary of progress in previous periods

## Progress by task:

## Task 9.1: Communication and impact creation

This task promotes PIXEL as a major driver for development and uptake of a genuine solution for ports and associated smart-city agents to achieve a new cleaner, more-sustainable and more-efficient model for

<sup>&</sup>lt;sup>1</sup> European Sea Ports Organisation

<sup>&</sup>lt;sup>2</sup> International Association of Ports and Harbors / World Port Sustainability Program

<sup>&</sup>lt;sup>3</sup> International Maritime Organization / Global Maritime Energy Efficiency Partnerships


interconnected multi-modal port activities. A coordinated Dissemination Plan was provided (via D9.3 and updated via D9.4) within this task so far in terms of releasing the following material/elements:

- PIXEL logo
- External communication and publication templates (e.g. PPT templates) to be used when presenting PIXEL features in communication events
- PIXEL website in two iterations. The second version is the currently active, implemented using WordPress CMS, within which all relevant content of PIXEL is disseminated following a timely plan.
- Presence in social networks, namely Twitter, LinkedIn, ResearchGate and our YouTube channel.
- PIXEL videos: a total of 10 videos of mixed content (mainly technical) were uploaded.
- PIXEL official poster: 2 versions were created (M1 and M18).
- PIXEL official leaflet: 2 versions were created (M1 and M18).
- PIXEL stickers were designed, printed and are part of the dissemination kit of PIXEL from M6.
- Newsletter: following a plan of one issue each 5 months, 2 newsletters have been generated and submitted to the mailing list of subscribers.

#### Task 9.2: Scientific dissemination

Through this task the consortium intends to develop a data access strategy to stablish the scientific dissemination of the project, including Open Access publication based on (i) presence with technical papers, demonstrations, or talks/panels; (ii) production of leading-edge research material suitable for publication in international Journals specialized in Maritime and Port technological trends, transportation and Smart-Cities, (iii) Cooperation with other projects, and (iv) other dissemination activities devised to promote the PIXEL concept and methodology.

The activity and planning has been conducted jointly to adjust the events to attend and the papers to be submitted to fairs and congresses. For tracking and planning scientific publications (equal than for other dissemination activities) an Excel sheet-based tool has been used during all the M1-M18 period (also for M19-M24 and it will be used as well till the end of the project). The publication results are summarised in the following table:

	Presented	Accepted	Success rate	Published	IoT/ICT (presented)	Environment (presented)	Logistics (presented)	Global (presented)
With congress	10	8	80%	1	6	3	1	3
No congress	1	1	100%	1	0	1	0	0

Table 10. Publication results/statistics by M18

- Additional actions were conducted in the period M1-M18 in this task:
  - A set of KPIs for Scientific dissemination were drafted and finally converted into a more specific table within the reporting period
  - Press releases: Several press releases have been made so far related to PIXEL objectives and advances
  - Lectures at the University.
  - PhDs started: for now, 4 PhD programs have started by people working directly in the project
  - o FIWARE Data Model request was made

#### Task 9.3: Industrial dissemination

The General objective of this task, extracted from the Grant Agreement is: "to organize in a coherent way the activities leading to maximize impact for the overall project. The main objective for each partner is to have a structured, complete and achievable business model strategy and a proper communication of results".



During the period M1-M18 the activities conducted in this regard were:

- Correlation of presence to the industrial events with the PIXEL' exploitable results or technologies, that have been produced (and that will be produced)
- Continuous surveillance of dissemination opportunities
- Definition (and following) of a 11-steps methodology in order to be more effective in managing the task. This is described in deliverable D9.4
- For tracking and planning events attendance, an Excel sheet-based tool has been used, in which all the information associated to each initiative tackled
- Same as for the scientific dissemination, the industrial dissemination also included a list of KPIs to be evaluated throughout the project

#### Task 9.4: Exploitation and Business Plan

The effectiveness of the exploitation of PIXEL's results is much dependent of a good and concise planning, including enough flexibility to adapt itself to the evolution of the technological development, and to enable the dynamics of the good practice of business development. In this effort, a healthy innovation management is essential for the appropriate selection of assets with commercial potential.

The tasks conducted during M1-M18 to be aligned with the previous were:

- To clarify what are exploitable results, how is the IPR protected in which they are based on, and how this information is being collected in parallel to the progress of the project.
- Logging of upcoming IP results, discussion of their protection with IP owners, and refinement of the product definition.
- To make available meaningful and useful tools that can promote the commercialisation of PIXEL.
- Establishing an early version of the business model canvas (BMC) and the SWOT analysis
- Two rounds of questionnaires to the partners about individual and joint exploitation plans.
- Refining the value proposition items, ranking those to assess their relevance in the PIXEL value message.
- Development of a market monitor where the main PIXEL competitors were listed, described and evaluated
- a feature comparison was performed between the PIXEL offering and the competitor products, to establish a market positioning confronting market coverage and feature coverage
- Exhaustive work with regards to PEI value proposition
- Development of the PIXEL equilibrium triangle, where the cost of environmental action is complemented by the cost-reduction inherent to the optimisation of port processes
- The innovation manager participated in four major networking events pitching the PIXEL message and creating space for an upcoming go-to-market strategy

#### **2.2.9.2.** Summary of results after previous periods

The main results that were obtained during the first half of the project in the context of WP9 are the following:

- Effective communication materials (2 leaflets, 2 posters and several videos). Access to all of them are available through our PIXEL website.
- PIXEL website active and continuously updated with all recent information, including events, publications, marketing material and deliverables as they are being released (public ones). The website is GDPR compliant. Metrics monitoring tools are available to evaluate the impact.
- PIXEL social network active with periodic updates on our PIXEL events. Twitter and website are linked to increase the impact. Metric monitoring tools are available to evaluate the impact



- Effective dissemination plan in terms of scientific and industrial dissemination. Methodology for identification and tracking of events (how, who, when, preparation and outcomes)
- Business and Exploitation Plan
- Deliverables submitted successfully:
  - Deliverable D9.1 Virtual Presence
  - Deliverable D9.2 Communication support
  - Deliverable D9.3 Dissemination Plan
  - Deliverable D9.4 Report on Dissemination and Update of the Dissemination Plan v1
  - Deliverable D9.6 Draft Exploitation Plan (CO)
  - Deliverable D9.7 Business and Exploitation Plan v1 (CO)

#### 2.2.9.3. Progress in M19-M24

#### Progress by task:

#### Task 9.1: Communication and impact creation

The following activities were performed within task T9.1 in the period M19-M24:

- Continuous update of the website each time a new deliverable was submitted, a new event was attended or any other dissemination and technical related activities have been going on in the project.
- Continuous update of social media channels following the same strategy and timely pace than for previous reporting periods.
- Creation and submission of the newsletter #2
- Generation of videos and upload to the YouTube channel:
  - Energy model
  - Transportation model
  - o Air Pollution model
  - Port-City Environmental model
  - Operational Tools

#### Task 9.2: Scientific dissemination

The following activities were performed within task T9.2 in the period M19-M24:

- Continuous monitoring of publication opportunities
- Design of a new methodology for scientific publications, accompanied by an Excel file available via the online repository to all the partners:
  - 1. Information to the T9.2 leader of a technical development of PIXEL worthy to be published
  - 2. Partners and T9.2 leader look for a suitable opportunity
  - 3. Joint writing of a draft
  - 4. Internal review by PIXEL partners
  - 5. Submission and tracking by T9.2 leader and the technical partner responsible
- Contribution to open-source initiatives:
  - Updated to GitHub the models and the algorithms (the non-privately protected) of the results of WP4
  - o Different use from external individuals/organisation of PIXEL code/projects made public
  - PyPl pyngsi framework library
- Scientific publications:



- MTC2019 Published WIT Transactions (as proceedings)
- IDCS2019 Published Springer (as proceedings)
- Invited lecture delivered by professor Luka Traven, two poster presentations by S. Piličić and T. Milošević at Winkler conference and Annual Faculty of Medicine Days
- STOTEN paper presented

#### Task 9.3: Industrial dissemination

The following activities were performed within task T9.2 in the period M19-M24:

- Participation OCEANS 2019 (started at end of M18, but finished in M19)
  - TRA2020 participation (initially planned and finally cancelled).
    - Papers to be presented (2 PRO and MEDRI)
      - These papers were not presented but will be published.
- Results of the "Relevant entities of the port sector" task force:
  - Written contact with entities ESPO, IMO and IAPH
  - Telcos organised and conducted with ESPO and IAPH
  - $\circ$  Working on follow-up documents to enhance relation with those organisations
- New plan for webinars conduction as a mitigation measure for not being able (probably, for a long time) to be present in events.

#### Task 9.4: Exploitation and Business Plan

The following activities were performed within task T9.4 in the period M19-M24:

- Preparing exploitation hands-on workshop for Rijeka (remote), 2 April
- Strategy for the validation of the value proposition by DocksTheFuture and COREALIS stakeholders
- Plan for ROI analysis, with analysis of specific challenges
- Strategy for the ROI at PIXEL
- Update IPR and exploitable results, and further product definition
- Exploitation collaboration with CORIALIS
- Identification and description of main innovations
- Virtual exploitation hands-on workshop for the plenary meeting Rijeka (remote)
- Preparing the closure of IPR management with several 1-to-1 communications before and after the hands-on session in Rijeka
- Further definition of assets of PIXEL, and complementary analysis with those of COREALIS and PortForward in the context of an exploitation-based liaison
- Preparation and discussion to approval and release of value proposition validation questionnaires for PIXEL ports but also for ports and stakeholders at DocksTheFuture, CORIALIS and PortForward
- Analysis of ROI and plan of ROI assessment at PIXEL

Partner	Contribution
P01 UPV	• Organization of all WP9 telcos and session in both physical and virtual meetings
	Attendance to all Innovation telcos

#### Table 11. WP9 Partner contribution summary table



	• Usual tasks of Community Manager, as responsible of all social channels:
	<ul> <li>Posting of various content</li> </ul>
	• Periodic update of profile
	• Re-share content of other projects and relevant news/events
	• Analysis of trends on communication by other projects/entities in the sector
	• Continuous update and hosting of the new website: <u>https://pixel-ports.eu/</u>
	• More prominence provided to the newsletter within the webpage
	• Update of the new Dissemination Plan via deliverable D9.4 and its continuation in the execution
	• Assistance to CREO in the Industrial dissemination tracking and monitoring
	• Participation in the creation of the second version of official poster and leaflet of the project
	<ul> <li>Conduction of all the relation and interaction with CSA DocksTheFuture and other EC funded projects:</li> </ul>
	• Attendance to periodic telcos
	• Creating common dissemination action
	• Creating common material
	• Update (periodic and asynchronous) of social media accounts and communication channels (Twitter, LinkedIn)
	Providing suggestions/requests/recommendations for the website
	• Supporting XLAB in the innovation and exploitation management tasks
	• Strong collaboration in T9.4, specially in the tasks related to communication with COREALIS and PortForward
	• Active participation within the task force of "Relation with relevant agencies/entities in the port sector" that is being lead by CERTH
	• Upload to YouTube channel the different videos developed by the partners
	Creation of the Newsletter #2
P02 PRO	Attendance to all WP0 telcos
	Attendance to all Innovation taleos
	Attendance to an innovation tecos
	<ul> <li>Post several tweets in Prodevelop's account</li> <li>Propagation of the second to be presented at the TPA 2020</li> </ul>
	• Preparation of the scenario to be presented at the TRA2020
	Collaboration in the definition of PIXEL ROI and IPR
DOO MI AD	Collaboration in the definition of the validation questionnaires for ports
P03 XLAB	<ul> <li>Attendance to all monthly WP9 telcos.</li> <li>Huge participation in all WP9 sessions (virtual and physical), especially with regards to task T9.4.</li> </ul>
	<ul> <li>XLAB contributed to T9.1 during M19-21 from an exploitation and innovation angle:</li> <li>Contributions to social media interactions, website improvements and newsletter #2.</li> </ul>
	<ul> <li>Contribution to improve marketing materials</li> </ul>
	• Content contributions
	• Validation of communicated message
	• Regarding the task T9.3, XLAB contributed in M19-21 with the following:
	• Participation OCEANS 2019 (started at end of M18, but finished in M19)
	• Contribution to marketing material improvement



	• Drafting the marketing campaign for TRA2020
	<ul> <li>Contribution to industrial dissemination campaigns</li> </ul>
	<ul> <li>Exploitation contribution for joint actions</li> </ul>
	• Examples of events of interest
	• XLAB leads task T9.4, for what regards the period M19-M21, the contribution as
	follows:
	• Preparing exploitation hands-on workshop for Rijeka (remote), 2 April
	<ul> <li>Strategy for the validation of the value proposition by DocksTheFuture and Corialis stakeholders</li> </ul>
	• Plan for ROI analysis, with analysis of specific challenges
	• Strategy for the ROI at PIXEL
	• Update IPR and exploitable results, and further product definition
	• Exploitation collaboration with CORIALIS
	• Identification and description of main innovations
	• Virtual exploitation hands-on workshop for the plenary meeting Rijeka (remote)
	• Preparing the closure of IPR management with several 1-to-1 communications before and after the hands-on session in Rijeka
	• Further definition of assets of PIXEL, and complementary analysis with those of COREALIS and PortForward in the context of an exploitation-based liaison
	<ul> <li>Preparation and discussion to approval and release of value proposition validation questionnaires for PIXEL ports but also for ports and stakeholders at DocksTheFuture, CORIALIS and PortForward</li> </ul>
	<ul> <li>Analysis of ROI and plan of ROI assessment at PIXEL</li> </ul>
P04 INSIEL	• Attendance to all monthly WP9 telcos.
	• With regards to communication, task T9.1, INSIEL contributed in M19-21 by preparing and submitting to T9.1 leader a video explaining the hinterland model developed by INSIEL. This video was uploaded afterwards to PIXEL's Youtube channel.
	• With regards to task T94, related to the exploitation and innovation management:
	• INSIEL contributed to the exploitation plan related to D9.7
	• INSIEL contributed to define the element to build the exploitation and business plan with regards to the new product and services developed within PIXEL and how to treat them in term of IPR and related business model
P05 CATIE	• Attendance to several WP9 specialised telcos: communication/dissemination and exploitation/innovation
	• Following and contributing to the outreach of all the social networks of the PIXEL project (Facebook, LinkedIn and Twitter) and participates in the creation of impact by relaying various information related to PIXEL on our own social medias.
	• Participation to the innovation team: definition expected IP and results.
P06 ORANGE	Attendance to several WP9 telcos
	• Active participation in task T9.3 after specific requests: provision of exploitation questionnaires, market positioning and exploitation.
	• Reference our DataModel in order to prepare communication to FIWARE
	• Prepare PIXEL documentation to be present to the "Salon de la recherche Orange" internal event (December)
	• Contribution to open source through the pyngsi upload to PyPl



	• Fostering diverse uses of already-available code from PIXEL by other initiatives (with success)
	• Taking the lead of the Task Force and executing certain actions with regards to "contributions from PIXEL to open-source initiatives"
P07 CREO	• Attendance to all WP9 telcos, with specially relevant participation in the organisation of T9.3 pitches.
	• Management of the industrial dissemination process (including tracking of the interesting industrial events).
	Implementation of the Industrial Development Strategy.
	• Questioning / accompanying the PIXEL partners related to their attendance to the selected events.
	• Tracking of events delayed / cancelled due to the COVID-19 pandemic.
	• The filing of the Excel file for the Industrial event strategy (the different steps) and each event attending by PIXEL' partner:
	• Step 1: Event detection.
	<ul> <li>Steps 2-3 - Confirmation of attendance and Event preparation (abstract and final paper);</li> </ul>
	• Step 5 - Groundwork Preparation.
	<ul> <li>Step 7 - Groundwork finalisation.</li> </ul>
	• Step 9 - Monitoring and wrap-up.
	• Creation of video technical modules for Air pollution Model (online in YouTube channel of PIXEL since February 2020).
P08 MEDRI	• Attendance to all WP9 telcos, with remarkable presence with regards to scientific dissemination. Several members of MEDRI team involved.
	Attendance to all Innovation telcos.
	• Promotion of the project actions through bilingual web site MEDRI PIXEL to spread the information about the PIXEL project in Croatian, which are updated on a daily basis - <u>https://pixelmedri.jimdofree.com/</u>
	• Regarding task T9.3– Industrial dissemination:
	• In the M19-M21 period:
	<ul> <li>Invited lecture delivered by professor Luka Traven, two poster presentations by S. Piličić and T. Milošević at Winkler conference and Annual Faculty of Medicine Days (more below and at web: https://pixelmedri.jimdofree.com/naslovnica-home/širenje-vidljivosti- projekta-project-dissemination/</li> </ul>
	Regarding task T9.2 – Scientific dissemination
	$\circ$ In the M19-M21 period:
	<ul> <li>Writing two scientific papers (one on noise pollution and one on air pollution). Both are planned to be submitted in the next reporting period.</li> </ul>
	• In the M22-M24 period:
	<ul> <li>Two scientific papers (one on noise pollution and one on air pollution) are prepared.</li> </ul>
	• MEDRI contributed actively to the deliverable D9.7: PEI exploitation vision, lean BMC and 5 forces model and answers to exploitation questionnaires and exploitation modelling.



P09 SDAG	Attendance to WP9 telcos
	• SDAG is continuing to update its social medias (Facebook, Twitter, Linkedin and Company Website) trying also to include PIXEL project news and relevant information to improve the project dissemination.
	• Contributions (on ASPM-SDAG exploitation and innovation matters) for deliverable D9.7
	• Internal review of deliverable D9.7
	• SDAG analysed the content of project communication/dissemination and exploitation tools trying to give useful comments in order to improve the result.
P10 THPA	Attendance to WP9 telcos
	• Internal review of deliverable D9.4
P11 PPA	Attendance to some WP9 telcos
	• PPA contributed to D9.6 by providing feedback on the 2nd Individual and Joint Exploitation Reports and Deliverable
	• PPA contributed to T9.4 by adding inputs to the Business and Exploitation Plan.
	• Provided list of events to be attended by PPA in 2020
P12 ASPM	Attendance to all WP9 telcos
	Attendance to all Innovation telcos
	• For D9.7: Contributions of port knowledge in the business and exploitation plan
	• Contributions of port knowledge in the business and exploitation plan
	• ASPM analysed the content of project communication/dissemination and exploitation tools trying to give useful comments from the Port point of view in order to define interesting events and publication for the specific sector.
	• ASPM continued updating personal Twitter pages, with specific interaction with Pixel profiles to spread project's contents.
P14 IPEOPLE	Attendance to all WP9 telcos
	Attendance to all innovation/exploitation telcos
	• T9.1: Preparation of Video for T4.1 - Port-City Environmental Management Model.
	• IPEOPLE participated in M19-M24 to task T9.4 as per the following:
	• Participation (filling in forms, feedback provision) in Innovation activities.
	o studying, providing reedback and changing the wording for the ports questionnaire.
	<ul> <li>Studying, providing feedback and making necessary changes in the RoI and value proposition validation.</li> </ul>
P15 CERTH	Attendance to all WP9 telcos
	Attendance to all Innovation telcos
	• Contribution to T9.3 (Industrial dissemination)
	• CERTH was nominated responsible of the Task Force: "Interaction with official entities/agencies relevant in the port Industry"
	$\circ$ Written contact with entities ESPO, IMO and IAPH
	• Telcos organised and conducted with ESPO and IAPH
	• Working on follow-up documents to enhance relation with those organisations



#### 2.2.9.4. Results after M19-M24

The main results that we have obtained in this second period of the project (M19-M24) in the context of WP9 are the following:

- New (updated) dissemination plan (same than M18 but little refined)
- Newsletter #2
- PEI value proposition
- Initial RoI calculation and RoI calculation tool
- Formal contacts and certain commitments with IAPH, ESPO and IMO organizations.
- 5 new videos uploaded to the YouTube channel.

#### 2.2.9.5. Deviations

No deviations in the execution have been occurred but the (out out PIXEL control) the cancellation of the following events that were planned to attend by PIXEL partners:

- Smart Ports Summit
- Ports 4.0
- IoT World
- 3rd Green Maritime Forum

Even though not being exactly a deviation, the EC and the external reviewer warned to PIXEL team (during the mid-term review) about three aspects to be monitoring and correcting till the end of the project:

- 1. Discuss and agree on IPR of project results early in the second period
- 2. All scientific publications in **peer-reviewed** journals must be available in **Open Access**.
- 3. All dissemination material must include EU funding acknowledgment.

#### 2.2.9.6. Corrective actions

Regarding the requests of the EC about the impacts (KPI list), the corrective actions have been put in place

- 1. Innovation Manager has elaborated templates and procedures. All partners have provided feedback on them. All partners have committed to actively collaborate and agree on the IPR of the project results diligently meeting the deadlines set by the Innovation Manager.
- 2. UPV as T9.2 leader will review all the publication candidate documents to ensure that all publications meet this point. All scientific partners have committed to carefully comply with this request whenever submitting camera-ready versions of the papers.
- 3. This has included a a formal re-writing of the reference to the EU funding in one of the scientific publications in journals. This also includes changing any digital (editable) material with these proper references. This will be done by WP9 partners properly. UPV has been named responsible of this action.



# 3. Impact

# **3.1.Update of the plan for exploitation, communication and dissemination of results**

The dissemination report will be sent through deliverable D9.5 (at the end of the project), with due date on month M36 (April 2021). Nevertheless, in the following pages there is a summary of the actions undertaken for enhancing PIXEL impact in the community.

### **3.1.1. Dissemination plan**

It is normal that throughout the execution of a project some changes and refinements are needed to be included in a plan. The new (updated) dissemination plan (that was introduced via D9.4) has been consolidated during the period M19-M24 and has considered a continuous activity since the start of the project, but with flexibility and possibility of evolving during the lifetime of the project, is considered as crucial by the PIXEL Consortium as it will help our final product to reach as more potential interested stakeholders as possible. This plan is accompanied by a monitoring tool created by the WP9 leader (UPV) which serves both for planning, tracking and brainstorming of communication/dissemination opportunities.

The following list summarises the different items included in this document that must be considered from this moment an intrinsic part of the PIXEL Dissemination/Communication Plan:

- Video publication strategy
- Newsletter planning
- Website analytics tracking tool
- Social network planning, tips and recommendations
- Twitter and LinkedIn Statistics
- Scientific and Industrial dissemination KPIs
- 11-step procedure for Industrial Events conduction in PIXEL

With regards to specific new entries in the Dissemination plan during the period M19-M24, a new procedure for monitoring/tackling scientific publications has been created:



Figure 1. New plan for scientific dissemination tracking



### **3.1.2. Industrial and scientific dissemination**

Regarding Industrial and Scientific Dissemination, the activities and impact achieved by PIXEL in the last semester can be summarised in the following:

Partners involved	Type of activity	Title of the event/meeting/article/social media	Date	Place	Type of audience
MEDRI	Poster presentation	8th Conference on Marine Technology	November 15 <sup>th</sup> – 16 <sup>th</sup> , 2019	Rijeka, Croatia	Academic comunity
MEDRI	Invited lecture/Power point presentation	39. Scientific Symposium: Recent scientific achievements of the Teaching institute of public health, Primorsko-goranska County. Organizer: Croatian Academy of Sciences and Arts, Department of Biomedical Sciences, University of Rijeka.	November 28 <sup>th</sup> , 2019	University Campus, Rijeka, Croatia	High education, employees of local and regional government, health professionals, researchers, regional, local, general population, Primorsko- goranska county, National- Croatia
MEDRI, ThPA	Publication	Influence of meteorological conditions on noise dispersion in the Port of Thessaloniki., Stjepan Piličić,	February, 2020	Rijeka	Scientific community
MEDRI, XLAB	Publication	Air pollution quantification from ships in seaports (preliminary title), Teodora Milošević	March, 2020	Rijeka	Scientific community
MEDRI	Publication	Short communication on the concept being PEI through IoT, Matija Široka- in preparation	March, 2020	Rijeka	Scientific community
UPV, PRO, XLAB	Publication	TRA2020 – The event was cancelled but a paper about PIXEL IoT framework is published.	30/04/2020 - announce ment	-	Scientific and industrial community specialised on transport in Europe
UPV, PRO, XLAB	Publication	TRA2020 – The event was cancelled but the paper about PEI methodology in PIXEL is published	30/04/2020 - announce ment	-	Scientific and industrial community specialised on transport in Europe
XLAB	Publication Presentation at	Paper about the use of AIS and satellite imagery for ETA prediction.	November 2019	OCEAN's conference, Seattle, USA	Scientific dissemination Industrial
	event			Source, ODA	dissemination
MEDRI	Poster presentation	Annual Faculty of Medicine Celebration days 2019	December 12 <sup>th</sup> , 2019	Rijeka, Croatia	Scientific dissemination
CREO	Pitch presentation	EUROMARITIME. The euromediterranean Blue Growth exhibition	February 4 <sup>th</sup> , 5 <sup>th</sup> , 6 <sup>th</sup> , 2020	Marseille, France	Industrial dissemination in the maritime sector

 Table 12. Industrial and scientific dissemination in period M19-M24
 Image: Control of the scientific dissemination in period M19-M24



### **3.1.3.Liaison with other projects**

One of PIXEL priorities is networking with other H2020 projects with relevant objectives. An official request of collaboration was made to the leading partners of the relevant projects, at the start of the PIXEL project.

D9.3 considered in the communication action the liaison with different project, and a preliminary plan was drafted. D9.4 updated the different actions carried out on that regards, covering up to month M18. However, during the period M19-M24 the relationship with CSA DocksTheFuture and the rest of the projects of the Port of the Future Network is ongoing, the consortium has already taken some liaison actions. These actions have not been arbitrary but responding to a specific strategy in order to take maximum profit of the actions and to focus on answering the question with whom the PIXEL project needs to engage, when, where, and on which basis. Driven by this underlying plan, this section draws current status of the projects external liaisons:

#### Liaison with the Ports of the Future (PoF) network:

- With CSA **DocksTheFuture**: The CSA action lifetime is coming to an end on July 2020. This has made that certain actions indicated as objectives for DocksTheFuture had to be tackled during the M19-M24 period of PIXEL. In particular, apart from the respective periodic telcos held and organized by the CSA, PIXEL contributed actively to two particular requests:
  - Indication of PIXEL assets, value proposition and different technical elements developed till M24 and the purpose and status of development of each of them.
  - Contribution to the KPIs set by DocksTheFuture: provision of feedback on the selection of KPIs and fulfilment of a surver in order to indicate where PIXEL stands in each of them.

As usual, a continuous monitoring of joint events to be attended by CSA and the PoF projects took place, identifying events such as OR62 and ALICE-ETP 2020 meeting to be attended. This is an on-going work.

As a final remark, it was planned to celebrate in TRA2020 a physical round table session with presentations of all the projects. Finally, this did not take place due to the COVID-19 outbreak. A virtual alternative on the same dates was envisaged but finally it was unanimously discarder.

• With **COREALIS and PortForward**: Peer-to-peer teleconferences have been held involving corresponding exploitation and innovation teams in order to share the list of assets and value propositions among the projects. Additionally, PIXEL has been gathering surveys from the PortForward and COREALIS's stakeholders in order to enhance the views on the usefulness and appropriateness of PIXEL products and outcomes. More actions are planned for the future.

Consequently, during the period M19-M24, PIXEL has been involved in several actions according to the plan. In order to report the main work performed in this regard, there will be a table in the deliverable D9.5 including information about how PIXEL has collaborated with the CSA and how PIXEL has participated in several initiatives both with DocksTheFuture and individually with other projects of the Ports of the Future Network.

#### Liaison with other projects:

- With the project **ADRION-InterReg**: A presentation of the ADRION project was made in a session during the last day of the meeting of Thessaloniki (November 2019). Future synergies were established, especially with regards to the environmental data gathering in Adriatic ports.
- With the project **INTERMODEL**: Following the recommendation of the Project Officer, a stronger relationship was built between INTERMODEL project and PIXEL, mainly conducted by the Technical Coordination of PIXEL (PRO), which redounded in a presentation of PIXEL project in the closing event of INTERMODEL in La Spezia, February 2020. This relationship is expected to last in time due to the multiple similarities between the two actions.
- With the project **DataPorts**: Two PIXEL partners are involved as well in this recently-started Innovation Action (January 2020 M21 of PIXEL). First, a presentation of PIXEL was conducted physically by Professor Palau (PIXEL Coordinator) in the kick-off meeting of DataPorts in Valencia. Second, it is expected that DataPorts will benefit (by incorporating) of certain outcomes of PIXEL, especially the PAS and the PEI.



### 4. Risk Management

As commented at the beginning of this report, the last part of the period M19-M24 has been strongly marked by the COVID-19 epidemic outbreak. Project partners have been motley affected (diminish of effort amount able to be provided, non-physical accessibility, etc.) and, therefore, certain tasks have suffered consequences such as delays or postponement of actions.

A lot of work was carried out in the risks' task (T2.4), but the most remarkable effects will be associated to the actions following COVID-19.

The first action was tackled by the Coordination. Realising the potential impact that the COVID-19 will have (and already has) in the project, the PIXEL Coordinator elaborated a template (Excel file) composed of the following columns:

- Partner

- Foreseen effects of the COVID-19 in their organisation

- Impact in PIXEL
- Mitigation measure planned
- Unavoidable facts and effects caused

Afterwards, all partners completed the Excel file, clearly indicating the effects of the outbreak to their work in PIXEL, specifying % of intensity estimated, the expected delays and the future implications on the different tasks and deliverables.

UPV monitored and coordinated the fulfilment of the file and, after a review and consistency-making, the file was sent to the Project Officer in order to inform the EC on the potential deviations of the project caused by this extraordinarily unexpected situation.

Some conclusions were extracted analysing the file (which were also shared with the PO), mainly related to the potential delays to be suffered by D4.4, D5.3, D6.4, D6.5 and D7.2. Additionally, one important conclusion was the need to request for an extension of the project of between 3 and 6 months.

The file sent to the PO is attached to this report in the **Appendix A**.

Additionally, during months M19-M22 (before the epidemic), different risks for current and forthcoming activities were as well identified using the consolidated procedures agreed for PIXEL. It is especially remarkable the influence of the review in the risks identified. The various comments, suggestions and questions that were raised during the mid-term review in Brussels were carefully analysed by the WP leaders and task leaders and, finally, became formalised via risks.

Due to the current point of execution of the project, the most relevant risks to be thoroughly monitored for the next reporting period are those associated to WP7 and WP8, regarding the deployment of PIXEL in real ports and the impact that the different functionalities will have both for the ports and the society.

All risks have been duly registered and formalised by their introduction on the "Continuous Reporting" tool in the online area of Sygma (Funding and Tenders' portal private space).

### 4.1. New risks identified in the period M19-M24

A summary of the risks that were identified, described, analysed and provided with mitigation measures is done below. The reference is per WP. A complete description of all those risks is attached at the end of the report in the Appendix B. There, the template agreed for formalising risks is fulfilled for every of them.

#### **WP2**

• With the COVID-19 pandemic all partners are in an area with confinement. Partners have to organize their team in order to work at home with their family. All of this imply they are not fully available for PIXEL execution



• External entities with influence in the project (AB, Financial Departments of UPV and other partners) may experience delays (or stop of activity) after COVID-19 effects.

#### WP4

• There is a risk that models and predictive algorithms will not be correctly integrated in the PIXEL platform due to a lack of data to parametrize them correctly. This risk is not directly linked with WP4 but more with WP7

#### WP5

• Data for testing the PEI statistical toolbox could be lacking. Especially if PEI is deployed to all ports. This could limit the PEI transversal trial in WP7.

#### WP6

- The reference architecture of the PIXEL platform has been defined before all the models and data source have been fully identified and developed.
- The reference architecture of the PIXEL platform has been define in D6.1 could be too big to be deployed on port premises

#### **WP7**

- A substantial delay in the completion of the technical developments of the platform and models.
- Technical documentation of the platform and manuals of delayed or incomplete developments.
- The ports do not have the infrastructure ready in time to be able to start the technical part of the pilots.
- The data required to develop the scenarios for the different ports are not on time or the quality of the data is not sufficient
- The PIXEL platform, its models and algorithms do not work as expected or do not provide the assumed value
- The pilot may be delayed because access to the port infrastructure is restricted until the situation of the COVID-19 improves

#### **WP8**

- The deployment of the PIXEL platform is not done in time and ports do not have enough time to use and test the platform.
- Due to COVID-19, integration of the PIXEL platform will expect delays, with the associated delay in the impacts assessment (WP8)
- As the pilot scenarios are being finalized taking into account the evolving operational needs of the ports and the actual technological implementation of the PIXEL components, the initially foreseen impacts will have to be revised and aligned to them. Also, the delays due to the restrictions imposed because of the COVID-19 pandemic, are further jeopardizing the achievement of impacts.
- The software developed in PIXEL is not properly tested in pilots to go to external ports
- Not enough external ports willing to participate and share knowledge in the external proof of concept actions
- External ports do not provide enough assistance, resources, data or cannot even handle with the infrastructure cost

#### WP9

- Events throughout all Europe cancelling vis-à-vis dissemination opportunities
- Unavailability of external subscribers/followers/target audiences of PIXEL products or turning focus to COVID-19-related actions instead of maintaining same level of support to PIXEL.



## **5. Deliverables and milestones**

### **5.1. Deliverables**

Del	Del.#	Del. Name	W P.	Lead Beneficia ry	Natur e	Disse minat ion Level	Delivery Date from Annex-I	Delive red Yes/N o	Actual Delivery Date	Comments
D1.1	D1	H – Requirement No.1	1	UPV	Ethics	СО	31/05/2018	Yes	31/05/2018	None
D1.2	D2	POPD – Requirement No.2	1	UPV	Ethics	СО	31/05/2018	Yes	31/05/2018	This deliverable was requested to be corrected due to minor things. Re- sent on 26/07/2018
D1.3	D3	POPD – Requirement No.3	1	UPV	Ethics	СО	31/10/2018	Yes	31/10/2018	None
D1.4	D4	EPQ - Requirement No. 4	1	UPV	Ethics	СО	31/05/2018	Yes	31/05/2018	None
D1.5	D5	POPD – Requirement No.5	1	UPV	Ethics	СО	31/10/2018	Yes	30/10/2018	None
D2.1	D6	Project management and quality handbook	2	UPV	Report	СО	31/05/2018	Yes	31/05/2018	None
D2.2	D7	Data Management Plan	2	UPV	Report	PU	31/10/2018	Yes	31/10/2018	This deliverable was requested to be corrected to comply with FAIR template. Re-sent on 24/04/2019
D2.3	D8	Data Management Plan v2	2	UPV	Report	PU	31/10/2019	Yes	30/10/2019	None
D2.5	D10	Project Management Report v1	2	UPV	Report	PU	31/10/2018	Yes	31/10/2018	None
D2.6	D11	Project Management Report v2	2	UPV	Report	PU	30/04/2019	Yes	30/04/2019	None
D2.7	D12	Project Management Report v3	2	UPV	Report	PU	30/04/2020	Yes	04/05/2020	None
D3.1	D14	Stakeholders and market analysis report	3	IPEOPLE	Report	PU	31/10/2018	Yes	10/02/2020	This deliverable was requested to be corrected to include details about interviews and workshops carried out to gather stakeholders' input. 10/04/2019. Minor changes 23/04/2019. This deliverable was re-submitted after the Review.

Table 13. Sent deliverables list



D3.2	D15	PIXEL Requirement Analysis	3	INSIEL	Report	PU	30/04/2019	Yes	30/04/2019	None
D3.3	D16	Use cases and scenarios manual v1	3	GPMB	Report	PU	31/08/2018	Yes	31/08/2018	None
D3.4	D17	Use cases and scenarios manual v2	3	GPMB	Report	PU	31/01/2019	Yes	15/3/2019	This deliverable was requested to be corrected to add 'Modelling and data analysis questionnaires'. Re-sent on 23/04/2019
D4.1	D18	PIXEL Models v1	4	CATIE	Other	PU	31/01/2019	Yes	30/04/2020	Official submission on time. Request of change after mid-term review: 30/04/20
D4.2	D19	PIXEL Models v2	4	CATIE	Other	PU	31/10/2019	Yes	30/04/2020	Official submission on time. Request of change after mid-term review: 30/04/20
D4.3	D20	Predictive Algorithms v1	4	XLAB	Other	PU	30/04/2019	Yes	30/04/2019	None
D4.4	D21	Predictive Algorithms v2	4	XLAB	Other	PU	30/04/2020	No, soon.	11/05/2020	Slight delay accepted by the PO.
D5.1	D22	Environmental factors and mapping to pilots	5	MEDRI	Report	PU	30/04/2019	Yes	30/04/2019	None
D5.2	D23	PEI Definition and Algorithms v1	5	MEDRI	Report	PU	31/10/2019	Yes	31/10/2019	None
D6.1	D26	PIXEL Information system architecture and design v1	6	PRO	Report	PU	30/04/2019	Yes	30/04/2019	None
D6.2	D27	PIXEL Information system architecture and design v1	6	PRO	Report	PU	31/10/2019	Yes	10/02/2020	Official version submission 24/11/2019 – 1 month delay accepted by PO. Modification request after mid- term review. Submission: 10/2/2020
D6.3	D28	PIXEL data acquisition, information hub and data representation v1	6	XLAB	Other	PU	31/08/2019	Yes	6/02/2020	Official version submission 1/10/2019 – 1 month delay accepted by PO. Modification request after mid- term review. Submission: 6/2/2020
D7.1	D31	Integration Report v1	7	PRO	Report	PU	31/10/2019	Yes	6/02/2020	Official version submission 24/11/2019 – 1



										month delay accepted by PO. Modification request after mid- term review. Submission: 6/2/2020
D8.1	D34	Evaluation Plan	8	CERTH	Report	PU	31/08/2019	Yes	6/2/2020	Submission slight delay: 9/9/2019 – 9 days, accepted by PO. Modification
										request after mid- term review. Submission: 6/2/2020
D8.2	D35	Technical Evaluation v1	8	CATIE	Report	PU	31/12/2019	Yes	20/12/2019	None
D9.1	D39	Virtual Presence	9	IPEOPLE	Other	PU	30/06/2018	Yes	30/06/2018	None
D9.2	D40	Communication support material (poster, leaflet and video)	9	UPV	Other	СО	31/07/2018	Yes	31/07/2018	This deliverable was requested to be corrected due to minor things. Re- sent on 04/09/2018
D9.3	D41	Dissemination Plan	9	UPV	Report	PU	31/10/2018	Yes	31/10/2018	This deliverable was requested to be corrected due to format things. Re- sent on 11/04/2019
D9.4	D42	Dissemination Plan v2	9	UPV	Report	PU	31/10/2019	Yes	30/10/2018	None
D9.6	D44	Draft Exploitation Plan	9	XLAB	Report	СО	31/10/2018	Yes	31/10/2018	None
D9.7	D45	Business and Exploitation Plan v1	9	XLAB	Report	СО	31/10/2019	Yes	20/11/2019	Slight delay accepted by the PO.

\* Deliverables submitted at the same time than D2.7

### **5.2. Milestones**

MS No	MS Name	WP.	Lead Beneficiary	Delivery date	Achieved Yes/No	Actual/Forecast Achievement date	Comments
MS1	Kick-off Meeting	2	UPV	31/05/2018	Yes	04/05/2018	The kick off meeting took place in Brussels from 3rd May to 4th May 2018. Every partner attended the meeting.
MS2	State of the art and use-cases defined	3	IPEOPLE	28/2/2019	Yes	15/03/2019	Final version of D3.4 Use-cases manual and scenarios, was delivered. D3.1 and D3.3, inputs of the former, were also completed.
MS3	Requirements gathered	3	INSIEL	30/04/2019	Yes	30/04/2019	Requirements are gathered and available in our JIRA platform. D3.2 is finished and delivered.
MS4	Environmental Analysis completed	5	MEDRI	30/04/2019	Yes	30/04/2019	Deliverable D5.1 has been completed and released.
MS5	Predictive models/algorithms established	4	CATIE	30/04/2020	Yes	30/04/2020	D4.2 and D4.4 have been completed. Code has been uploaded to GitHub. Algorithms and models are finished.



MS6	PEI developed	5	MEDRI	30/04/2020	Not yet	30/06/2020	PEI development (technological) is done, but mathematical analysis and data integration is pending to consider PEI totally implemented. Forecasted date of delivery of D5.3 is 30/06/2020. The Project Officer has been informed.



# **6. Explanation on the Use of Resources**

### 6.1. Use of resources

The following graph provides an overview vision of the evolution of resources consumption by PIXEL partners in the period M1-M24. It aims at reflecting the overall status of project financial execution.



Figure 2. PIXEL resources consumption (evolution graph) M1-M24

Here below, a report summary table on precise figures justified is exposed: globally, underconsumption has been experienced but the situation remains under control.

	UPV	PRO	XLAB	INSIEL	CATIE	ORANGE	CREO	MEDRI	SDAG	THPA	PPA	ASPM	GPMB	IPEOPLE	CERTH
Planned	77,0	66,8	56,9	34,4	44,8	30,7	23,1	61,3	24,8	20,3	27,9	22,8	19,1	31,1	36,4
Actual	61,6	65,5	60,4	29,8	45,5	28,2	8,5	49,4	24,7	21,2	29,2	20,4	14,3	27,5	17,5
delta pms	-15,41	-1,34	3,42	-4,63	0,73	-2,43	-14,59	-11,88	-0,08	0,86	1,24	-2,35	-4,89	-3,58	-18,87
delta %	-20,01%	-2,00%	6,01%	-13,44%	1,63%	-7,94%	-63,13%	-19,38%	-0,34%	4,24%	4,45%	-10,33%	-25,54%	-11,51%	-51,87%

 Table 14. PIXEL resources consumption (summary report)

As it can be seen, most partners are pretty aligned with the planned consumption, remaining between the  $\pm 25\%$  margin. This is good from a Financial Management point of view, as there are still 12 months to have all partners adjusted to their plan.

However, three partners show bigger deviations than 25%: MEDRI, CREO and CERTH. The reasons that drove these partners to under-consume resources were thoroughly explained in the Project Technical Report for the mid-term review and during the consequential communications with the project officer. The problems have been tackled, but other conditions associated to the COVID-19 outbreak have prevented the partner to recover yet from the deviations. The main problems behind those are the difficulties in hiring adequate people in companies and in the universities, that have been increased due to Administrative and Financial departments deadlocks due to the epidemic crisis. The plan is to be aligned with the initial expectations by the end of PIXEL.

Remarkably, tables included in this section have taken as baseline for estimation a "linear approach" for work package. That is: assuming all tasks in the WP are linear in its execution, and no peak moments or unbalance dedication takes place. This goes in contrast of the internal planning. PIXEL action is following the course established by the Gantt included in section 3 of Part B on the Grant Agreement. This fact may distort the interpretation of the figures, as no "linear approach" is being followed when tackling the needed activities.

A remark must be done in this sense with regards to the COVID-19 impact on the resources' consumption in PIXEL:

Although the epidemic crisis has started on M23, two months of this report have been affected on the resources consumption. The main effects are: (i) some partners have experienced reduced working hours per day, therefore the PMs consumption is lower, (ii) prioritization of personnel allocation, especially for partners involved in the health sector, (iii) financial and administrative departments' activity stopped/not reachable and (iv) staff that was about to enter has been stuck without being able to finish the hiring procedure.

For the short future, these problems are expected to remain. For the long term, the partners are already applying updated plans and mitigation measures in order to keep the plan of resources consumption.

# Appendix A – Risks and forecasts of COVID-19 effects

Part ner	Issues due to COVID-19 affecting PIXEL	Associated impact	Tasks directly affected	WP	Mitigation actions	Unavoidabl e effects
P01 UPV	The whole UPV-PIXEL-team is working remotely, so there is more time spent on coordination of activities.	Global efficiency of the team will decrease to 90-95%.	ALL current tasks UPV is involved in.	2, 4 , 5, 6, 7, 8, 9	Team will make the most effort to catch-up with tasks as soon as normal situation is restablished.	Delays on software developmen t and integration. <b>Potential</b> <b>delay</b> of D4.4.
	Physical meetings need to be re-scheduled, including 3rd Technical Meeting (initially in Rijeka), which has meant double effort.	Efficiency of the Coordination team due to the over-efforts to deal with the situation on regards of project supervision, planning, risk mitigation, etc. Will be reduced to 85%.	T2.1, T2.2, T2.3, T2.4, T2.5	2	Coordination team is teleworking reinforcing the effort in WP2 at the expense of certain dissemination tasks that are pointless at this moment.	No remarkable effects on this regard. Only more difficult cooperation with no physical meetings at all with partners.
	All administrative procedures for contracting and extending current contracts of staff are paralysed. No administrative work in the University.	New incorporation was planned for month of April-May to tackle effort-consuming tasks in WP6 and WP7. This will not take place in the short term. Therefore, the productivity of UPV for technical developments and integration may experience sensible delays.	T6.2, T6.3, T6.4, T6.5, T7.1, T7.2, T7.3, T7.4, T7.5, T7.6, T8.2	6, 7, 8	Current team has been re-structured to be able to meet contributions and requests.	Delays on software developmen t and integration. <b>Possible</b> <b>delay</b> of D6.4 and D6.5.
	UPV servers running the most part of PIXEL managerial activity need more maintenance actions because of the partial activity (and only remote) by the University personnel.	Shutdowns of document repositories may take place. Website, Git, or internal services for the execution of day-to-day activities may experience difficulties and temporary unavailability. This will affect indirectly most tasks of the project.	T2.1, T2.2, T2.3, T2.4, T2.5, T9.1	2,9	Backup servers exist. Local downloads to prevent access unavailability have been performed.	There should not be remarkable effects on this regard.
	Despite already proven teleworking in PRO, impossibility to reach the offices implies difficulties.	Presential (internal) meetings for coordinating technical agile development and integration are conducted online. This implies a 75% of efficiency, maximum.	T2.2, T6.2, T6.5, T7.1	2, 6, 7	Microsoft Teams, Slack and other tools (in professional mode) are being used every day.	Sync. Issues and misundersta ndings will lead to a <b>potential</b> <b>delay</b> on T7.1.
P02 PRO	Unavailability of providers and physical space for developing and testing prototypes. Certain resources (such as devices and material) are divided among the team that cannot (forbidden)	In the procedure for deciding the sensors to be bought by the ports, equipment providers answer (if any) with delay.	T5.3, T7.5	5,7	Pre-selected sensors are the preferred ones. If there is no response in a reasonable time, ports will proceed purchasing (not ideal situation).	If we decide to wait, the integration of the PEI pilot (T7.5) will be <b>surely</b> <b>delayed.</b>
	meet physically.	PRO is leading the creation of a physical mock of a terminal for dissemination purposes.	T7.1, T7.5, T9.4	5, 7, 9	Keep working on it remotely.	Prototype for booths and stands will not be

Table 15. Risks and forecasts of COVID-19 effects on PIXEL





		Collaboration, testing and prototyping delayed.				ready for months.
	Unavailability to travel to port destinations.	Apart from the pure deployment, certain technical actions strongly depend on the installation and cooperation in- situ with ports, such as the agents development, the Dashboard tailoring and other integration actions.	T6.2, T6.5, T7.1, T8.2	6, 7, 8	Focus the integration on development environments (already planned) to have all the modules ready for just "plug&play" deployment after installation of all infrastructure in pilots.	Delays on integration. <b>Sure delay</b> on D7.2
P03 - XLA B	The XLAB-PIXEL-team is working remotely, so there is more time spent on coordination of activities.	Global efficiency of the team will decrease to 80-85%	ALL current tasks XLAB is involved in	2, 4, 5, 6, 7, 8, 9	Teams will make the most effort to catch-up with tasks as soon as normal situation is restablished.	Delays on software developmen t and integration. <b>Potential</b> <b>delay</b> of D4.4 (leaders)
	Access to some server (computing) resources used for PIXEL is limited at the moment, however we aim at solving the issue in the coming weeks (while COVID-19 would last).	The Information Hub, certain applications and the core test system for XLAB associated developments are limited. In that regard, the developing environment both for XLAB an the whole project will be temporarily affected.	T4.4, T6.3, T6.5, T6.6, T7.1, T7.3, T8.2	4, 6, 7, 8	Some effort of people to developments or other tasks has been put to solve these issues.	Delays on software developmen t and integration. <b>Possible</b> delay of D6.4 and D6.5.
	The whole project execution, and especially the integration workshop will be organised remotely	This will affect the productivity in the technological (HW and SW) deployment of the pilots and therefore the technical validation.	T7.1, T7.3, T8.2	7,8	Focus the integration on development environments (already planned) to have all the modules ready for just "plug&play" deployment after installation of all infrastructure in pilots.	Delays on integration. <b>Sure delay</b> on D7.2
P04 INSI EL	Insiel Network and security department are working to guarantee the remote-work for all regional and local administrations including the healthcare sector.	Insiel staff has difficulties to prepare PIXEL infrastructure for the FVG region pilot as the health sector is top priority in this situation. Servers from INSIEL to be used in the pilot FVG region are no longer available (for now).	T7.1, T7.3	6	PIXEL will not be set at the bottom of priorities. As soon as health servers will liberate capacity, PIXEL will re-take.	Sure delay on task T7.3. Possible delay on deliverable D7.2 because of this issue.
	Implementation of Interoperability with PMIS depends on Trieste Port and Maritime National Authority, both are facing COVID-19 impacts, both have other urgent issues, priorities changed.	NGSI agents for the ASPM- SDAG use-case are hampered. Pilot of FVG region is stopped in any physical action needed. Hinterland transport model will delay in its integration on the PIXEL platform and therefore the associated technical validation.	T6.2, T7.3, T8.2	6,7 ,8	Data Models for the data sources for the pilot are tried to be figured out knowing the final installation objectives (not accurate). NGSI agents to be developed with the available info (to be modified later	Delays on software developmen t and integration. <b>Possible</b> <b>delay</b> of D6.4 and D6.5. <b>Sure</b> <b>delay</b> on task T7.3.



					but not from the scratch).	
	All members of the CATIE- PIXEL-team have to take care of children and to face communication and remote inconvenients effects.	CATIE members' productivity is expected to decrease to 70%.	ALL current tasks CATIE is involved in	2, 4, 5, 6, 7, 8, 9	Teams will make the most effort to catch-up with tasks as soon as normal situation is restablished.	Water and soil pollution models completion in risk of a <b>possible</b> delay - D4.4.
P05 CAT IE	CATIE, as an entity, has properly informed to the Coordination that the project must expect delays on CATIE's duties due to COVID-19.	The current works of CATIE are of paramount importance for the short- and mid-term advance of the project: conclusion of pending WP4 activities, technically leading the Energy pilot, carrying out the technical validation and assessment in WP8, defining and testing the mathematical toolbox for the PEI and being the main holders of the knowledge of one of the most crucial model: the PAS. This will affect indirectly all the works in integration and validation and in the proof of concept.	T4.4, T5.3, T6.2, T6.4, T7.1, T7.2, T8.2	4, 5, 6, 7, 8	Team will make the most effort to catch-up with tasks as soon as normal situation is restablished.	Potential delay on T5.3 and D5.3. Potential delay on T7.2. According to the team, T8.2 is not at risk at this moment if the COVID-19 situation does not prolongs excessively.
P06 - ORA NGE	ORANGE, as telecom operator, is needing in this outbreak time to double the efforts to ensure reliability and capacity of communications in all the network in Europe. This has meant devotion of time from staff of all departments. Half-time work-hours scheduled are also established for members of the team with children in their care.	The ORANGE-PIXEL-team dedication to PIXEL is forecasted to be 70-80% during the COVID-19 crisis due to this issue. Technical developments on the DAL components (agents), security and privacy for PIXEL as well as (mainly) in the pilot of GPMB will be impacted.	T2.2, T6.2, T6.6, T7.2	6, 7, 8, 9	Team will make the most effort to catch-up with tasks as soon as normal situation is restablished.	Delays on software developmen t and integration. <b>Potential</b> delay of D6.4 and D6.5.
P07 - CRE O	Telephone lines of the PIXEL- CREO- team are slowed down. Members of the PIXEL-CREO- team would be in a temporary technical unemployment mode	CREOCEAN general activity will be slightly slowed down. Forecast is 70% of usual performance.	ALL current tasks CREO is involved in	4, 5, 9	Teams will make the most effort to catch-up with tasks as soon as normal situation is restablished.	D4.2 can be possibly delayed as major CREO duty now is to achieve water pollution model.
P08 - ME DRI	Face to face meetings of the MEDRI PIXEL time that were held once per week and where issues were discussed and analysed. Now, there will be a lost of efficiency, not being able to have at their disposal the infrastructures of the University.	All tasks involving the active participation (both leading or strongly contributing) by MEDRI team might be affected and suffer delays. Additionally, access to research papers by the team is already limited.	T5.3, T7.5, T8.2	5, 7, 8	Meetings are kept virtually.	Potential delay on T5.3 and D5.3. Potential delay on T7.5.



	Administrative staff at the University has reduced considerably its activity. Internal procedures about purchases, licensing, contracts, etc. are unlikely to be carried out for the moment. There is several people of the Faculty of MEDRI infected by COVID-19.	There is possible that MEDRI staff could have problems on devoting effort to the project. Forecast is to reduce usual rhythm of collaboration to 85%. Additionally, interaction with the Coordination is centralised by administration staff and this can have clear impact on the MEDRI accessibility to operative info. In case of infection of one of the team members the capacity of the partner to carry out their tasks.	All current tasks MEDRI is involved in	2, 5, 7, 8, 9	Teams will make the most effort to catch-up with tasks as soon as normal situation is restablished. If this materialises, with the contractual proceedings stopped, there is little margin of reaction in the	
					shor-term.	
<i>P09</i>	SDAG is trying to find the better solution to combine the working needs to the workers health. Still on-going. People involved in PIXEL project are working at home with reduced working hours and with reduced access to the needed materials.	SDAG members' productivity is expected to decrease to 75%.	ALL current tasks SDAG is involved in	7, 8, 9	Teams will make the most effort to catch-up with tasks as soon as normal situation is restablished.	Sure delay on T7.3. According to the team, T8.2 is not at risk at this moment
SDA G P10 - THP A	Movements from home are severely restricted, so also face- to-face meetings needed to solve some issues with the other italian partners involved can not be made, and the work is slowed down.	m home are ted, so also face- s needed to es with the thers involved e, and the work		7, 8	Virtual meetings will take place whenever all team members will be available.	if the COVID-19 situation does not prolongs excessively.
	Most people involved in the project work from home and access to resources used for the project is limited	THPA members' productivity for the whole PIXEL project expected to decrease to 65%.	ALL current tasks THPA is involved in	4, 5, 6. 7, 8, 9	Team will make the most effort to catch-up with tasks as soon as normal situation is restablished.	Sure delay on T7.4. Potential delay on D4.4. as one
	New conditions of work added extra tasks to THPA-PIXEL- team members from ICT department and this has affected work priorities	THPA members' of ICT department (crucial in this moment of the project) are expected to reduce their dedication to 25% due to urgences by COVID-19.	T5.3, T6.2, T6.5, T7.1, T7.4, T8.2	6, 7, 8	PIXEL will not be set at the bottom of priorities. As soon as ICT basic services for THPA are granted, PIXEL will be attended.	Algorithms relies on integrating data from THPA (ICT team
	Procedures for the procurement and installation of sensors will be delayed	Inevitable delays associated to the pilot. Sensors not able to be installed (configured and tested).	T7.4, T8.2	7, 8	API already available with real data will keep running.	<b>Potential</b> delay of D7.2
P11 - PPA	Disruption of access to the port resources and port locations.	PPA members' productivity is expected to decrease to 75%.	ALL tasks PPA is involved in.	5, 7, 8, 9	Team will make the most effort to catch-up with tasks as soon as normal situation is restablished.	Sure delay on T7.4. Potential delay on D4.4. as one of the
PPA		Sensors will not be able to be installed. This will affect the pilot normal pace of execution	T7.1, T7.4, T8.2, T8.3	7, 8	Virtual sensors will be used for now.	Predictive Algorithms relies on



		as well as the assessment and validation.				integrating data from PPA (ICT
	No admittance of non- employee persons also allowed to the port facilities	PPA's activity in PIXEL relies heavily on subcontractors that work usually within the premises. Currently they are prevented from working in the port.	ALL tasks PPA is inolved in.	5, 7, 8, 9	Teleworking is not easy to achieve but efforts are being made to have this staff active for PIXEL.	and subcontracte d staff involved). <b>Potential</b> <b>delay</b> of D7 2
	Reduced maritime traffic,	Predictive algorithms working with this data will be affected.	T4.5, T7.4	4, 7	Already advanced algorithms are being tested and validated with past data.	D1.2
	especially cruise traffic which is actually stopped. Limited operations of container/cargo vessels.	Normal pace of work in PPA is stopped. Administrative procedures such as the purchase of sensors is given lower priority by the Admin Department of the entity due to COVID-19 circumstances.	T5.3, T7.4, T8.2	5, 7, 8	PIXEL will not be set at the bottom of priorities. As soon as the current emergencies are solved PIXEL will be paid attention to.	
	Personnel participating in PIXEL has limited connection to office material, without option of being totally connected and without the capacity of ensuring teleworking.	Staff of ASPM for PIXEL will only be 50% available.	ALL tasks ASPM is involved in.	5, 7, 8, 9	Team will make the most effort to catch-up with tasks as soon as normal situation is restablished.	Sure delay on T7.3.
P12 - ASP	Most of the offices are closed, only port entry services are kept working.	PIXEL related activities have been stopped, delaying the project pilots carried on by ASPM at the Port of Monfalcone	T7.1, T7.3	7	Virtual sensors will be used for now on a "development and testing	to the team, T8.2 is not at risk at this moment if the COVID-19 situation does not prolongs excessively.
ASP M	ASPM will not be able to install new sensors (configuration and test) due to unavailability to access certain port premises.	Pilot will not keep its normal pace. Furthermore, NGSI agents' development will be hampered. Of course, validation and assessment will not be able to be conducted.	T5.3, T6.2, T7.1, T7.3, T8.2	5, 6, 7, 8	environment" integration, aiming at putting everything on place to be ready to connect to sensors and in-situ measurements as soon as they will be available.	
	GPMB will not be able to install new sensors (configuration and test) due to unavailability to access certain port premises.	The deployment and running of the pilot will not keep its normal pace and the final results will be delayed in time.	T7.3, T8.2	7, 8	Virtual sensors replicating the characteristics will be used (not valid for real integration).	Sure delay on T7.2.
P13 GP MB	GPMB will not be able to fix current issues with the weather station.	The predictive algorithms and models incorporating real-time measurements on air quality, temperature and wind cannot be used integrated in the pilots. NGSI agents development affected.	T4.5, T7.1, T8.2, T8.3	4, 7, 8	Past data will be used (simulated) as most updated for running the algorithms.	Potential delay of D4.4 as one predictive algorithm is directly needing data and collaboratio n in-situ of GPMB.
	GPMB will not be able to fix technical issues to collect electrical consumption.	Energy demand model integration stopped. NGSI agents, DAL, IH and OT running in real time hampered. Technical validation affected.	T6.2, T6.3, T6.4, T7.1, T7.2, T8.2	6,7, 8		Sure delay on T7.2. Potential delay on



						D6.4 and D6.5	
P14 PEO PLE	Our PIXEL ICT team is currently supporting the VPN and working from home solutions	PEOPLE team is not able to work on WP7 with the pace we had anticipated.			Team will make the most effort to catch-up with tasks as soon as normal situation is restablished.		
	As long as the social distancing measures are in effect, the PIXEL-PEOPLE-team will not be visiting the ports.		T7.4, T6.4,	6, 7	Virtual sensors will be used for now on a "development and	<b>Potential delay</b> of T7.4.	
	Procurement delays and ICT personnel scope rescheduling for ports in all ports.	PEOPLE will not be able to assist on the installation of infrastructures and correctly supervising the pilot they are leading	T6.5		testing environment" integration, aiming at putting everything on place to be ready to connect to sensors and in-situ measurements as soon as they will be available.		
P15 CER TH	Difficulties in accessing necessary research	CERTH team is forecasting a 90% of the usual dedication.	ALL tasks CERTH is involved in	5, 8, 9	Team will make the most effort to catch-up with tasks as soon as normal situation is restablished.	<b>Possible</b> <b>delays</b> on WP8 tasks in general.	
	infrastructure resources	All tasks involving researching papers, utilising software infrastructure associated to the assessment and validation are hampered.	T8.3, T8.4	8	Open resources will be used for now.	Possible delays on task T8.3 and T8.4	
	Unavailability of respondents (European ports) to planned project surveys	One of the current phases of PEI is to validate and weigh the eKPIs selected by having the inputs from external experts. This will be, at least, delayed (if not totally postponed) due to the COVID-19.	T5.4, T5.5	5	Use only internal experts' view on weights for eKPIs for the moment.	<b>Sure delay</b> on D5.4.	

	Caption of unavoidable effects:
	100% of likelihood to ask for
Sure delay:	extension
	75% of likelihood to ask for
Potential delay:	extension
	50% of likelihood to ask for
Probable delay:	extension
	25% of likelihood to ask for
Possible delay:	extension

# PIXEL

# **Appendix B – Template fulfilled for all risks detected**

Risk subcategory							
Organisation	!						
Risk N°	Risk Nam	e	Risk Description		Cons	Consequences	
U11 COVID-19 to partners' teams		With the COVID-19 pandemic all partners are in an area with confinement.		Delays in tasks and deliverables and reduction of the work able to be exerted by each partner during a certain period of time.			
Likelihood		Severity		Impact		Criticality	
Very high		Serious	s 3.6			This risk is considered critical, with potential direct impact in the project plan.	
Contingency	Contingency plan						
Avoid/Minin	nize Likelih	ood Strategy		Mitigate Severity Strategy			
This risk is v the PIXEL C confinement having entitie	very likely to onsortium h situation or es closed/wit	happen, consid as no option to r the different dela th reduced activit	ering that nodify the ays due to ty.	Partners have to organize their team in order to work at home with their family. All of this imply they are not fully available for PIXEL execution			
Handler		Current Status	s	Creation Date		Transfer Strategy	
UPV		On-going		10th March 2020		Continuous status report to the PO and the partners.	
Work Log							
10th March 2 and how the	10th March 2020 – UPV asked to the partners to fulfil an Excel sheet with information to evaluate the risks and how the COVID-19 will affect each team in PIXEL						
20 <sup>th</sup> March 2	0202 - UPV	' informed the Pr	oject Office	er using the Excel file	compl	leted by all partners	

Risk subcategory							
Organisation, dissemination							
Risk N°	Risk Name	Risk Description	Consequences				
U12	COVID-19 to external entities involved in PIXEL	External entities with influence in the project (AB, Financial Departments of UPV and other partners) may experience delays (or stop of activity) after COVID-19 effects	Delay of certain activities such as T8.4 and the continuous innovation work. Decrease on the dissemination impact.				



Likelihood	Severity	Impact	Criticality				
High	Tolerable	1.4	Moderate				
Contingency plan							
Avoid/Minimize Likelih	ood Strategy	Mitigate Severity Strategy					
This risk is very likely to the PIXEL Consortium h confinement situation or having external entities/p	b happen, considering that as no option to modify the the different delays due to people not totally available.	To act in advance (asking for long deadlines) To monitor the activity and fostering a continuous communications To ask for bare minimum feedback/participation.					
Handler	Current Status	Creation Date	Transfer Strategy				
UPV	On-going	10th March 2020None planned.					
Work Log							
-							

Risk subcategory								
Technology, usability								
Risk N° Risk Name		Risk Description		Consequences				
R4.1 (U13)	Model Integration		There is a risk that models and predictive algorithms will not be correctly integrated in the PIXEL platform due to a lack of data to parametrize them correctly. This risk is not directly linked with WP4 but more with WP7		If we do not have the data to run models and predictive algorithms this implies that results will not be directly applicable to ports.			
Likelihood		Severity		Impact		Criticality		
Moderate		Moderate		3		Moderate		
Contingency	v plan							
Avoid/Minir	nize Likelih	ood Strategy		Mitigate Severity Strategy				
There is an on-going work in order to have a clear access on data. There is also a strong collaboration between models owners and WP6/WP6 tasks leaders.			-					
Handler C		Current Status	S	Creation Date		Transfer Strategy		
WP7 leader v owners	vith models	Managed		07/04/2020		-		



#### Work Log

-

Risk subcate	gory					
Usability						
Risk N°	Risk Name	e	Risk De	scription	Cor	nsequences
U14 Data availability		Data for testing the PEI statistical toolbox could be lacking. Especially if PEI is deployed to all ports. This could limit the PEI transversal trial in WP7.		The opti inte to j tria	The algorithms will not be optimized nor tested. Lack of interport comparison. Failure to fulfil the PEI transversal trial.	
	Delay in P in WP7	EI related tasks	Function of Risk 1.		Fai	lure to deploy PEI on time.
Likelihood		Severity		Impact	<u> </u>	Criticality
Very High		Serious		<likelihood sever<br="" x="">3.6</likelihood>	ity>	<following 2="" figure=""> Risk Level 4</following>
Contingency	plan					
Avoid/Minim	nize Likeliho	ood Strategy		Mitigate Severity St	rateg	3y
Provide a clea ports should done by UP ports and solv iterative fashi	ar-cut instru be providin V. Intensify ve the data c ion	ctions on the data g. This has alrea the communicat availability probl	i that the idy been ion with em in an	Reduce the number og trial (two instead of a	f port all 4 p	ts involved in the transverse pilot ports).
Handler		Current Status		Creation Date		Transfer Strategy
WP5 team considers this Identified and b to be a cross WP issue, mitigated project related so the handler should be the coordination (UPV).			being	<risk creation="" da<br="">September 2019</risk>	ate>	<description of="" the<br="">transfer strategy&gt; WP5 team informed and transferred this risk to the Project Coordination, in time.</description>
Work Log						
Identification associated wi the descriptio	and date of th the risk, e n and handl	of associated eve 2.g. risk changes s er of the risk char	nts, which status from 1ges.	h the handler of the n identified to managed	risk d or j	tracks the relevant events from managed to closed, or



September 2019 – Plenary session summoned to tackle the issue.

October 2019 – Assignment of task force with responsible (UPV) to conduct the mitigation measures

November 2019 – Establishment of monitoring tools and timely contacts with the ports to advance and solve this issue

December 2019 – Advances on the APIs of THPA and GPMB including data of PEI

January 2020 – Alignment of the status with Agile integration procedure

*February* 2020 – Agreement on alternative data sources to alleviate the need of sensors/automated connections of small/medium ports

*April 2020 – Specific sessions planned and conducted in the Virtual technical meeting having all ports explaining clearly the data sources for the PEI, status and date for provision* 

April 2020 – Huge advance in this issue taking advantage of the elaboration of section 2 ("Data") of the deliverable D5.3

#### • WP6

Risk subcategory						
organisation						
Risk N°	Risk Name Risk De		Risk Des	cription	Cons	equences
U15	Teams availability		Key partners in WP6 not fully available for the PIXEL project during the COVID-19 outbreak.		As we finalize WP6 delivery in conjunction with WP7 pilot deployment, some delay could occurs to finalize the WP6 components integration.	
Likelihood		Severity		Impact		Criticality
Very High		Moderate		High		Estimate
Contingency	y plan					
Avoid/Minin	nize Likelih	ood Strategy		Mitigate Severity Strategy		
The problem cannot avoid	is external the problem	of the project. to occur	Partners	The follow of the p adapt the work of th	pendin ne team	g task each week allow to a to reduce the impact
Handler		Current Status	8	Creation Date		Transfer Strategy
WP6, WP7 Leaders Managed			15/03/2020			
Work Log						
_						

#### **Risk subcategory**

Technology



Risk N°	Risk Nam	e	Risk Description		Consequences	
U16	Platform functional architecture issues		The reference architecture of the PIXEL platform has been defined before all the models and data source have been fully identified and developed.		It is possible it not reflecting all the features needed to implement real PIXEL use-cases	
Likelihood		Severity		Impact		Criticality
Moderate		Moderate		Moderate		Monitor
Contingency	y plan					
Avoid/Minin	nize Likelih	ood Strategy		Mitigate Severity S	Strateg	3 <b>y</b>
Regular meeting is organize between WP4, WP5, WP6 and WP7 partner to identified integration issues in order to adapt the functional scope of the generic platform to the real needs.			P4, WP5, ntegration ope of the	The regular integration of the WP4 and WP5 development allow to detect a problem as soon as possible		
Handler		Current Statu	S	Creation Date		Transfer Strategy
WP6 Leader		Managed		03/05/2019		
Work Log						
Participation	ı of WP6 par	rtner to WP4 and	l WP5 meet	ings		
11/2019 : De	ployment of	an integration/d	emo platfoi	rm to start continuou	s integ	ration of models
01/2020: Sta	rt weekly me	eeting with WP7	to follow pi	lots integration and a	levelop	oment needs
Risk subcat	egory					
Technology						
Risk N <sup>o</sup>	Risk Nam	e	Risk Des	cription	Cons	equences
U17	Platform a for port pr	lesign to heavy emises	The reference the PIXE	ence architecture of L platform has been	The creat	port will not be able to e the infrastructure needed

NISK IV	NISK I VAIII	C	NISK DES	cription	Cons	sequences
U17 Platform design to heavy for port premises		The reference architecture of the PIXEL platform has been define in D6.1 could be too big to be deployed on port premises		The port will not be able to create the infrastructure needed to deploy the PIXEL platform.		
Likelihood		Severity		Impact		Criticality
Moderate		Moderate		Moderate		Monitor
Contingency	y plan					
Avoid/Minir	nize Likelih	ood Strategy		Mitigate Severity Strategy		
A minimal validated wit	infrastructur h port	re requirement	has been	All the software of deployed using Doc the possibility to a different size of infr	compor ker tec deploy astruci	nents are designed to be hnology. This solution offer the PIXEL platform with ture.



Handler	Current Status	Creation Date	Transfer Strategy			
WP6 Leader	Managed	03/05/2019				
Work Log						
Participation of WP6 par	rtner to WP7 meetings					
05/05/2019 : All software components have to be dockerized						
02/2020: Proposition of t	the minimal infrastructure r	equirement				

#### • WP7

Risk subcate	gory						
Technology d	and organisa	ution					
Risk N°	Risk Nam	e	Risk De	scription	Cor	Consequences	
U18	Delay in technical developments (pixel platform and models)		A substantial delay in the completion of the technical developments of the platform and models		A da teck imp vali and diff requ	elay of several months in the mical developments, lies a delay in the dation of the developments in the development of the erent pilots, since it is a uirement to start the pilots.	
Likelihood		Severity	<u> </u>	Impact		Criticality	
Moderate		Serius		2- Moderate		<following 2="" figure=""></following>	
Contingency	plan						
Avoid/Minim	nize Likeliho	ood Strategy		Mitigate Severity Strategy			
By conductin control of t minimize time	eg weekly m he state oj e deviations.	eetings to have <sup>f</sup> the developme	a better ents and	Making incremental that allow pilots to a latest version	deliv advar	veries of software artifacts ace without waiting for the	
Handler		Current Status	5	Creation Date		Transfer Strategy	
Technical of with the colla the leaders wy wp6	coordinator boration of p4,wp5 and	Managed		10/01/2020			
Work Log	Work Log						
Since Februa objectives set	Since February, weekly meetings are being held at the technical level to monitor progress and achieve the objectives set in time.						

Risk subcategory



Technology a	nd organisa	tion					
Risk N°	Risk Name	e	Risk De	escription		nsequences	
U19 Technical documentation Ta delayed th de de de de de de de de de de de de de		Technical documentation of the platform and manuals of delayed or incomplete developments		A delay in documentation or poor quality documentation will force both technical partners and ports to devote more effort to the development of pilots.			
Likelihood		Severity		Impact		Criticality	
Moderate		Tolerable		1		Low	
Contingency	plan						
Avoid/Minim	nize Likeliho	ood Strategy		Mitigate Severity Strategy			
Carrying out and not waitin	documentat 1g for the plo	ion and revisions utform to be comp	s in time oleted	Involve the technica technical follow-up n hand the state of the o	l lea neetir devel	nders of the pilots in the ngs so that they know first- opments	
Handler		Current Status		Creation Date		Transfer Strategy	
Leaders of the WP6 and Identified WP7 and technical leaders of the pilots			01/02/2020				
Work Log							
When the pilo be necessary	ts have to sta	art installing the	platform a	and testing the different	t moc	lels, the documentation will	

Risk subcate	gory						
Technology, a	organisation						
Risk N°	Risk Name		Risk Description		Co	nsequences	
U20	Delay in the availability of the infrastructure in the pilots		The por infrastru be able part of th	The ports do not have the infrastructure ready in time to be able to start the technical part of the pilots		if the infrastructure is not on time, the start of the technical part of the pilot will be delayed and the data and models cannot start to be integrated	
Likelihood		Severity		Impact		Criticality	
Moderate Moderate			1.5 - Moderate		<following 2="" figure=""></following>		
Contingency	plan						
Avoid/Minin	nize Likeliho	ood Strategy		Mitigate Severity St	rateg	3 <b>y</b>	



be flexible in the minimum have no problems in infrastructure	requirements so that they providing the minimum	Do not wait to have the platform ready at the port to start the developments of data acquisition and validate the developments in the development platform			
Handler	Current Status	Creation Date	Transfer Strategy		
Leader of the WP7,	Managed	01/12/2019			

#### Work Log

pilots and ports

technical leaders of the

The initial requirements could not be assumed by all ports and so the infrastructure requirements were reduced.

In addition, the ports have been helped in obtaining budgets to be able to deploy the pilot in the cloud.

Risk subcate	gory						
Usability, org	anisation						
Risk N°	Risk Name		Risk Description		Сог	Consequences	
U21	Hardware infrastructure insufficient		The hardware infrastructure deployed in ports is insufficient		The prop hav disk	The platform will not work properly because it does not have enough resources (CPU, disk space, memory)	
Likelihood		Severity		Impact		Criticality	
Moderate		Moderate	1.5 - Moderate			<following 2="" figure=""></following>	
Contingency	plan						
Avoid/Minin	nize Likeliho	ood Strategy		Mitigate Severity Strategy			
define approp	priate minimi	um resources		Define policy to man occur	age t	he possible issues that may	
Handler Current Status			Creation Date		Transfer Strategy		
Ports Identified			01/12/2019				
Work Log							
Because the	initial requi	rements of the p	latform c	ould not be assumed	by th	e ports easily. A smaller	

Because the initial requirements of the platform could not be assumed by the ports easily. A smaller infrastructure was proposed that could run the pixel platform, but this could collapse if it is used intensively or the volume of data increases considerably.

#### Risk subcategory

Organisation, Bussines



Risk N°	Risk Nam	e	Risk Description		Cor	Consequences	
U22 Insufficient or untimely pilot data available.		the data required to develop the scenarios for the different ports are not on time or the quality of the data is not sufficient		The will of com	The development of the pilot will be delayed and the results of the pilot will not be completely reliable		
Likelihood		Severity		Impact		Criticality	
High		Serius		2.8 High		<following 2="" figure=""></following>	
Contingency	plan						
Avoid/Minimize Likelihood Strategy				Mitigate Severity Strategy			
Work with the ports in the definition of data and in the acquisition of the sensors, month the beginning of the implementation of the p		i sources hs before pilots.	Possibility to test the look for alternative d	scenc ata so	arios with simulated data or ources		
Handler		Current Status	;	Creation Date		Transfer Strategy	
Partners invo development	olved in the of pilots	Managed		01/06/2019			
Work Log							
The availability of data from some pilots is delayed, mainly because sensors have not been purchased or services have not been contracted to provide such information.							
The consortiu	m has assist	ed the pilots in th	e search f	or sensors and data pr	ovide	ers.	
In order not t sources have	o accumulat been used.	te delays in the de	evelopmer	nts, simulated data and	l data	available from alternative	

As soon as the final data are available, the scenarios will be re-tested with these data

Risk subcate	gory						
Usability							
Risk N°	Risk Name	e	Risk De	Risk Description		sequences	
U23	The PIXEL platform does not work as expected or does not provide the assumed value		the Pixel Platform, its models and algorithms do not work as expected or do not provide the assumed value		Port scenarios cannot be properly validated		
Likelihood	·	Severity		Impact		Criticality	
Low		Serius	1.2 Moderate			<following 2="" figure=""></following>	
Contingency	Contingency plan						
Avoid/Minin	nize Likeliho	ood Strategy		Mitigate Severity St	rateg	y	



Conducting intensive platform validation tests and frequently showing progress to ports for feedback		Frequently present the progress to the ports to obtain their feedback and make the appropriate changes to maximize their satisfaction		
Handler	Current Status	Creation Date	Transfer Strategy	
Technical leader	Identified	01/01/2019		
Work Log				

Since the beginning of the project, this risk has been considered and it is important that the platform meets the expectations of the users.

On the one hand, intensive tests are carried out to ensure that the product has a minimum level of quality, despite being an R&D project.

On the other hand, frequent presentations are made with the ports to show the progress and get their opinion

Risk subcategory						
, organisation						
Risk N°	Risk Name		Risk Description		Consequences	
U24	delays in the pilots due to covid-19		the pilot may be delayed because access to the port infrastructure is restricted until the situation of the covid improves		the pilot will be delayed until the situation gets better	
Likelihood		Severity		Impact		Criticality
Very High	h High			3.6 Critivcal		<following 2="" figure=""></following>
Contingency plan						
Avoid/Minimize Likelihood Strategy			Mitigate Severity Strategy			
-		work temporarily with the platform installed in the development environment while the situation improves and use simulated data. In addition, a postponement of several months of the project execution might be requested in order to achieve the project objectives				
Handler		Current Status	5	Creation Date		Transfer Strategy
All parners Managed			15/02/2020			
Work Log						
The situation of the covid is worsening in Europe since march and it is affecting several of the countries						

involved in the project, such as Spain and Italy.



At a technical level the project can continue to progress, because most of the partners can telework.

At the level of the development of the pilot project, it can be affected due to the physical restrictions to access to the port facilities.

Risk subcategory							
Technology							
Risk N°	Risk Nam	e Risk Des		scription C		Consequences	
U25	Integration and deployment of PIXEL platform not ready		The deployment of the PIXEL platform is not done in time and ports do not have enough time to use and test the platform		Lack of data to do the technical impact assessment. Difficulty to obtain feedbacks of users and to have clear technical KPIs to evaluate the platform		
Likelihood		Severity		Impact		Criticality	
Moderate	rate Moderate			1.5		Moderate	
Contingency plan							
Avoid/Minimize Likelihood StrategyMitigate Severity Strategy							
Deployment of the PIXEL platform in ports even if the integration is not fully done. Do not wait for a full integration to start gathering KPIs			<i>Reduce the test period in each parts</i>				
Handler		Current Status	;	Creation Date		Transfer Strategy	
T8.2 Leader(	CATIE)	Identified		2020-04-07		None is envisioned;	
WP7 leader							
Work Log							
Initial schedule drafted in deliverable D8.1. However, due to Covid-19 crisis project extensions will take place generally in the EU with an impact on the planning. Currently the task has not yet started and it seems wise to wait before producing/proposing a new time plan							

Risk subcategory					
Organisation (External risks (mostly dependent on external ports))					
Risk N°	Risk Name	Risk Description	Consequences		


R8.2 (U26)	26) Technical impact assessment delay due to COVID-19		Due to Covid-19, integration of the PIXEL platform will expect delays.		Delays of the technical impact assessment too		
Likelihood Severity			Impact		Criticality		
moderate	oderate moderate			moderate			
Contingency	plan			•			
Avoid/Minimize Likelihood Strategy				Mitigate Severity Strategy			
Extension of the integration period				-			
Handler		Current Status		Creation Date		Transfer Strategy	
T8.2 Leader(	CATIE)	Identified		2020-04-07		None is envisioned;	
WP7 leader							
Work Log							

Risk subcategory								
Business								
Risk N°	Risk Nam	e	Risk Description		Con	nsequences		
R8.3 (U27)	Need for revising the impacts initially foreseen in the G.A		As the pilot scenarios are being finalized taking into account the evolving operational needs of the ports and the actual technological implementation of the PIXEL components, the initially foreseen impacts will have to be revised and aligned to them. Also, the delays due to the restrictions imposed because of the COVID-19 pandemic, are further jeopardizing the achievement of impacts		Assessment of fewer KPIs. Achievement of less impacts than the ones mentioned in the G.A.			
Likelihood		Severity		Impact		Criticality		
High Serious		Serious				High		
Contingency plan								
Avoid/Minimize Likelihood Strategy			Mitigate Severity Strategy					
Extension of extension will	the integra be granted	ation period (gi to the project).	ven that	Where implementatio models will be used.	n can	not be achieved, simulation		



Special session took place during the last plenary<br/>and solutions have been foreseen to assess as many<br/>KPIs as possible in each pilot site.Summary<br/>Creation DateTransfer StrategyHandlerCurrent StatusCreation DateTransfer StrategyT8.3 Leader (CERTH)Identified2020-04-07None is envisioned;Work LogGuidelines are in progress for each pilot site to speed up the process and facilitate the assessment of the

Guidelines are in progress for each pilot site to speed up the process and facilitate the assessment of the KPIs. Local partners will be supported by technical partners in order to efficiently implement the evaluation plan and the decisions made during the last Plenary meeting (online –  $1^{st}$  of April, 2020).

Risk subcategory									
Technology									
Risk N°	Risk Name	e	Risk Des	scription	Cor	nsequences			
R8.41 (U28)	Developed Products n	eloped PIXEL The sof ducts not ready PIXEL i in pilot. ports		ne software developed in XEL is not properly tested pilots to go to external prts		Unwillingness of external ports to test non mature technology.Additional potential problems and delays while setting up the system and testing it			
Likelihood		Severity		Impact		Criticality			
Very Low		Tolerable		0.2		Very Low			
Contingency	plan								
Avoid/Minim	nize Likeliho	ood Strategy		Mitigate Severity St	rateg	3Y			
Test only those products that have been tested and validated before in any of the PIXEL pilots				Delay/Reduce the start of trials in external ports until all PIXEL products are ready					
Handler		Current Status		Creation Date		Transfer Strategy			
T8.4 Leader Identified				2020-04-07		None is envisioned; however, PIXEL products will be open source and target IT department (external port) could potentially adapt it			
Work Log									
Initial schedu place general wise to wait b	le drafted ir ly in the EU pefore produc	<i>i deliverable D8.</i> <i>with an impact o</i> <i>cing/proposing a</i>	1. Howeve n the plan new time	er, due to Covid-19 cr ning.Currently the task plan	risis <sub>I</sub> k has	project extensions will take not yet started and it seems			



Risk subcategory								
Organisation (External risks (mostly dependent on external ports))								
Risk N°	Risk Nam	e	Risk De	scription		Consequences		
R8.42 (U29)	External ports not willing Not en to participate willing share k		Not end willing share kn	enough external ports ing to participate and re knowledge		Limited transferability of the results and feedback		
Likelihood		Severity		Impact Criticality				
Very Low		Tolerable		0.2		Very Low		
Contingency	plan							
Avoid/Minim	nize Likeliho	ood Strategy		Mitigate Severity St	rateg	39		
Divide involvement in various levels so that ports can decide up to which extent they will like to participate. Provide some simulation tool that can be easily used by ports and could provide some basic feedback								
Handler		Current Status		Creation Date		Transfer Strategy		
T8.4 Leader Identified			2020-04-07		None is envisioned;			
Work Log								
Initial schedule drafted in deliverable D8.1. However, due to Covid-19 crisis project extensions will take place generally in the EU with an impact on the planning.								

Currently the task has not yet started and it seems wise to wait before producing/proposing a new time plan

Risk subcategory							
Organisation							
Risk N°	Risk Name		Risk Description		Cor	Consequences	
R8.43 (U30)	No real (enough) Extern involvement of external enoug ports data with t		External enough a data or with the	External ports do not provide enough assistance, resources, data or cannot even handle with the infrastructure cost		Limited transferability of the results and feedback, unavailability of testing PIXEL product in its full potential	
Likelihood		Severity		Impact	•	Criticality	
Very Low Tolerable		0.2		Very Low			
Contingency	plan						
Avoid/Minimize Likelihood Strategy			Mitigate Severity St	rateg	39		
Reduce the scope of the pilot in the external port and focus on one or two important aspects easy to integrate and test.			Temporal use of FILABS if no (enough) infrastructure resources available. Integrate only some data (E.g. sensors) or part of the PEI (modularized definition)		f no (enough) infrastructure (E.g. sensors) or part of the on)		
Handler		Current Status	;	Creation Date		Transfer Strategy	



T8.4 Leader	Identified	2020-04-07	None is envisioned; however, PIXEL products will be open source and target IT department (external port) could potentially adapt it
Work Log			

Initial schedule drafted in deliverable D8.1. However, due to Covid-19 crisis project extensions will take place generally in the EU with an impact on the planning.

Currently the task has not yet started and it seems wise to wait before producing/proposing a new time plan

## • WP9

Risk subcategory								
Dissemination								
Risk N°	Risk Nam	e	Risk Des	cription	Cons	sequences		
U31	Events cancelled		Events throughout all Europe cancelling vis-à-vis dissemination opportunities		Dissemination impact diminished. Decrease of the possibilities to show technical advances to different target audiences via booths / demonstrators.			
Likelihood		Severity		Impact		Criticality		
Very High		Moderate		2.1		High		
Contingency	v plan							
Avoid/Minir	nize Likelih	ood Strategy		Mitigate Severity Strategy				
This risk is already being materialised. PIXEL Consortium has no option to modify the confinement situation or the different congresses / fairs being cancelled/ postponed.			To enhance and fos as the restriction To reinforce the su present To organise virtual target audiences a dissemination To create more vide reinforce communic	ter phy is of urveilla l work in ord eos in i cation	vsical dissemination as soon mobility will allow it. ance of potential events to PIXEL on. shops and inviting selected ler to "cover" the empty periods. the YouTube channel and to via social media channels.			
Handler		Current Statu	S	Creation Date		Transfer Strategy		
UPV		On-going		10th March 2020		None planned.		
Work Log								
-								



Risk subcategory								
Dissemination								
Risk N°	Risk Name	e	Risk Dese	cription	Cons	equences		
U32	PIXEL followers turning to COVID-19-related initiatives		Unavailability of external subscribers/followers/target audiences of PIXEL products or turning focus to COVID- 19-related actions instead of maintaining same level of support to PIXEL		Dissemination impact diminished. Communication KPIs to be measured in the next reporting period seriously affected, showing a bad image not attributable to PIXEL work.			
Likelihood		Severity		Impact		Criticality		
Moderate		Tolerable		1		Low		
Contingency	y plan							
Avoid/Minin	nize Likelih	ood Strategy		Mitigate Severity Strategy				
This risk is already being materialised. PIXEL Consortium has no option to modify the confinement situation and limited power to deviate the attention that the followers will turn to projects like PIXEL instead of COVID-19-related actions.			To organise virtual target audiences i dissemination To create more vide reinforce communio To create specific widening the sco publications/disser	works in ord cos in t cation camp camp pe an minatio	shops and inviting selected er to "cover" the empty periods. he YouTube channel and to via social media channels. paigns during this period of the public of PIXEL on actions.			
Handler		Current Status	s	Creation Date		Transfer Strategy		
UPV On-going			10th March 2020		None expected			
Work Log	Work Log							
-								