Marseilles-Fos : The SMART Port 2.0

Implementing IT systems inside the port community does not only mean adopting a new shared IT system in a logistics community. It requires a completely shift in mind to work towards more collaboration and communication in order to improve the port's competitiveness and productivity. Implementing successfully a CCS and PCS requires some organizational innovation, the port community needs to acquire a "Port Spirit" attitude.

CCS's core benefits for users are improved efficiency through the key cargo statuses (manifesting, vessel discharge and loading, Customs clearance, port health formalities, delivery in and out of the terminal). Improved efficiency brings cost reduction. At the port level, the main benefits are stronger competitiveness thanks to cargo transit through the port being speed up, better visibility on cargo allowing players to better manage and optimize their supply chain.

In a nutshell, CCS and PCS manage this complex environment through common and shared procedures to enhance the port supply chain performance.

Smart Cargo, smart logistics, smart ports

Today, we are entering a new era for vessels and goods tracking right across the supply chain. Thanks to new technologies vessels and cargo becomes *smart* or *intelligent* and can be tracked wherever it is located in the world. The challenge is *how do we integrate and make the best use of these technologies for the maritime transportation?*

Our vision is guiding the development of the new generation of Port Community System/ Cargo Community System with Neptune and Ci5 (Cargo intelligence, 5 for the five modes of transport: air, rail, road, ocean and waterways). Ci5 is to replace AP+, the CCS that has been implemented in the main French ports and was in operation over the last 10 years.

Smart Port ecosystem

Our Smart Port ecosystem encompasses various IT systems and solutions thanks to its high interoperability such as:

- Port information systems (dangerous goods management, vessel management),
- Customs systems (for Customs statuses: inspection, release, bonded warehouse, …),
- Trade information systems (suppliers for Customs declarations, suppliers for shipping agent's booking services, terminal operators, basically any private IT system that can provide relevant information to a PCS in order to smooth the flow of data and goods).
- Port and Cargo Community Systems' providers (information exchange with other national or foreign ports)
- Port to port and airport to airport data exchange
- Global positioning or Geofencing
- Vessel tracking

- New applications linked to smart container and smart cargo

The building blocks are the backbone of the modules available that include the main logistics processes at import and export that are shared in any port in the world.

We have defined the following modules that are interlinked with each other: Vessel/ Transport announcement; Cargo announcement and movement; Customs/ Port Authority and other administration's operations; Terminal/ Warehouse operations; Activity monitoring. Procedures and processes are paperless and optimized in the system without unveiling any confidential information.

Measuring performance with innovative IT systems
Measuring performance or providing KPI (Key Performance Indicators) is one of the benefit provided by advanced IT systems in ports.

KPIs can be defined based on the different goods status involving the intervention of several stakeholders and not only one in an isolated way.

Terminal operators provide KPI measured on cargo based on the time spent on quay from the moment they have been unloaded to the moment they leave the port.

The Port Authority of Marseilles and Marseille Gyptis International (MGI) has built jointly the first brick and the new generation of Smart Port Systems.

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Competition Entry for 2017 IAPH IT Award:

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Project Summary:

Supply chain players need efficient IT systems that goes beyond existing ones have been offering so far.

What do port community 's users want? Visibility, predictability, reliability and an efficient supply chain. With these needs in mind, we have designed the new generation of PCS.

The aim of the project was to modernize at the same time and on a 2 years' period (2015/2017) the PCS (ships management), developed by Marseilles Port Authority, and the CCS[1] AP+ (cargo management), which has been implemented in French ports by MGI 10 years ago and used since by all the actors of the port and logistics chain.

The first phase of the project is already completed with Neptune PCS. The second phase is in pilot phase and will be completed in 2017 with the implementation of Ci5, the new CCS.

Neptune PCS system is implementing real innovative concepts such as an **onboard transmission system** complying with the EU2010/65 directive relative to single window. This is a real revolution as Neptune is the only onboard system in the world.

Ci5, Cargo Community System offers additional new modules, eg: bookings for the trucking companies, the use of KPI and BI technology, the link to Intelligent Container Devices, the "Fast Lane" process easing the global logistics of port for operators.

The tremendous challenge the **whole port community** has to face is the implementation at a regional level of IT systems inside the community. This change inside the community impacts, in term of change management, 500 private companies and public bodies and 1,500 end users of the solutions.
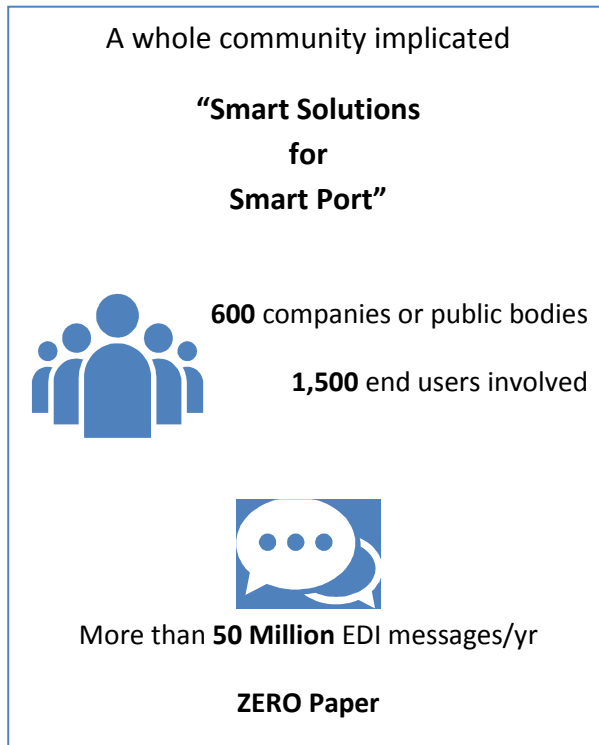
MGI and the Port Authority put one of the first bricks of the **Regional Smart-Port** in Marseilles-Fos. The results of the project aim to build new innovative solutions for public and private bodies by creating a new generation of information tools linking Ships systems, Cargo systems and Customs Systems.

The main domains addressed in that paper can be described in the following main concepts:
- **Operational excellence** in Ships and Goods management,
- **Information real time access** and better traceability,
- **Logistics Process optimization** and full port community collaboration,
- **Port efficiency** and improvement of productivity measurement.

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[1]"A CCS is an electronic, single window which optimizes, aggregates, automates, orchestrates and secures public and private business supply chain processes for cargo stakeholders of the port and airport communities." *CCS definition by MGI & SOGET, 2010.*

Results Achieved :

A whole community implicated

**"Smart Solutions
for
Smart Port"**

600 companies or public bodies

1,500 end users involved

More than **50 Million** EDI messages/yr

ZERO Paper

As mentioned before, this global project was declined into 2 phases.

Neptune Phase 1 is already completed and show very interesting output such as the fact that the number of users of the Neptune system has drastically increased.

From now on, 600 actors have access to on-time information relatives to the ships location as well as their administrative and logistical situations.

The PCS is fully integrated and is smoothly managing all the port activities (cruises, ferries, RORO, containers and bulk) taking into account the specificities of traffics.

Ci5 Phase 2 already shows great advantages compared to former system:

- The monitoring of the activity is user centric,
- The alert system is personalized (helping the user in gaining crucial time),
- The Vessel Tracking System added to Ci5 enables the system to provide better estimation of call dates.
- With the "Fast Lane" principle, Ci5 enables the EAO actors to shorten and smooth even more the port logistics of their goods and to anticipate all actions that need to be done (such as a transfer for sanitary inspection for example).

Thanks to our system, we can measure that:

- ✓ 80% of cargo at import is leaving the port in 48 hours.
- ✓ less than 5 minutes for a container to be Customs cleared.
- ✓ Longer container dwell time set off a domino effect of reduced productivity through the supply chain.

➔ From those KPI, the port community is able to spot at what stage in the cargo or ship management inefficiencies are occurring and take measures to act on them in order to improve the performance.

Based on proofs and since the implementation, we have registered a decrease in the manipulations that needed to be done:

Total of232calls, **number of input information divided by 6**for the user =**automation of inputs up to 84%.**

December 2016	*Before Neptune*	*With Neptune*
Calls	*232*	*232*
Calls creation in AP+	*232*	*0 (Auto)*
Service creation in AP+	*1 003*	*0 (Auto)*
Total	***1 467***	***232***

December 2016	*Before Ci5*	*With Ci5*
Calls	*232*	*232*
Calls creation in AP+	*232*	***232 (auto)***
Service creation in AP+	*1 003*	***1 003 (auto)***
Total	*1467*	*1467*
Total Automation	***0***	***1 235***

Neptune, the Port Community System for the XXIst century

The **Neptune Global port system** covers many business and logistics oriented processes dedicated to the accommodation of ships in the port. The software allows **federating and synchronizing all of the actors** involved in the nautical, freight and transport areas.

Neptune Global is an integrated system covering many aspects of the **Supply Chain** from the sea to the land allowing a **ceaseless real time management.**
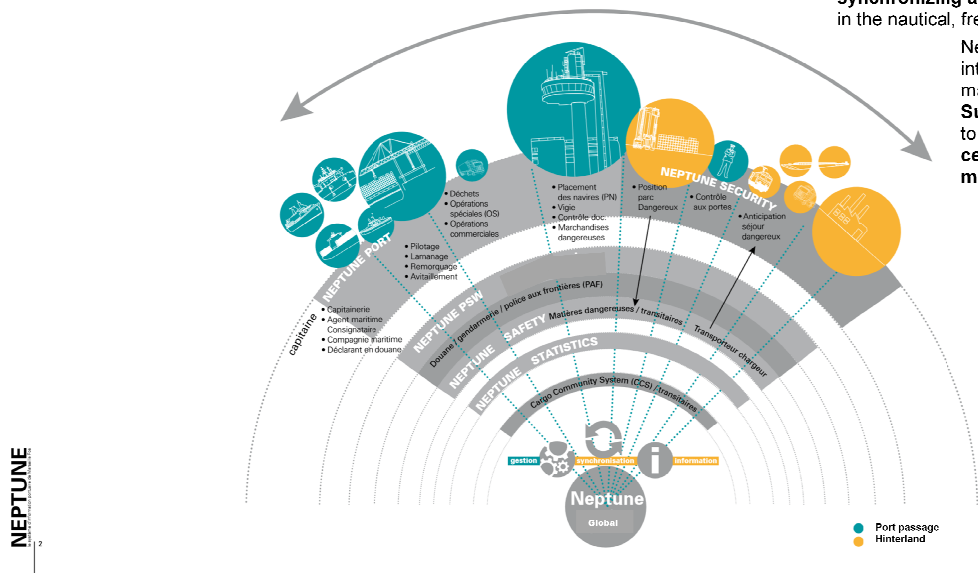
Coverage of the Neptune System:

Obstacles overcome:

Different obstacles have been overcome for implementing the SMART Port project and it's IT revolutions:

* Human aspects: **User centric approach and change management**
An important part of the SMART Port project and the IT transition is concentrated on efforts to gather the users in adopting both systems as smoothly as feasible. A study was completed to concentrate on the ergonomic aspects of both applications in order to integrate at the early stage he future users in the decision making.
For phase 1, an important training campaign was also completed with success.
For phase 2, on line training will be added to the training session in order to make sure that Ci5 is well received by all the community. Demonstrations are being hold after every delivery to facilitate the acceptation of such important changes.

* Technical aspects: **Scalability, Flexibility and Cyber-Security**

Smart Port IT systems needs to run 24/7.It was thus necessary to implement it on a high availability cluster with an important capacity so the system will never be slowed down by batches including back-up procedures. Therefore, the architecture of the systems needed to be well define before any development started.

Regarding phase 2, the software delivery method has to move from a physical delivery to the cloud technology as the cloud is now offering more flexibility and security.

Moreover, **Cyber-security workshops** have been made in order to test the robustness of the infrastructure

* Methodological aspects: **BE AGILE**!

As deadline for phase 2 was really short considering the scope and size of the project, MGI decided to use the Agile methodology which is the most suitable method for implementing the new CCS. Agile methodology is described as "iterative" and "incremental". Concretely, it means shorter development period with review of the results of each sprint and corrective measures to be taken after each session of tests.
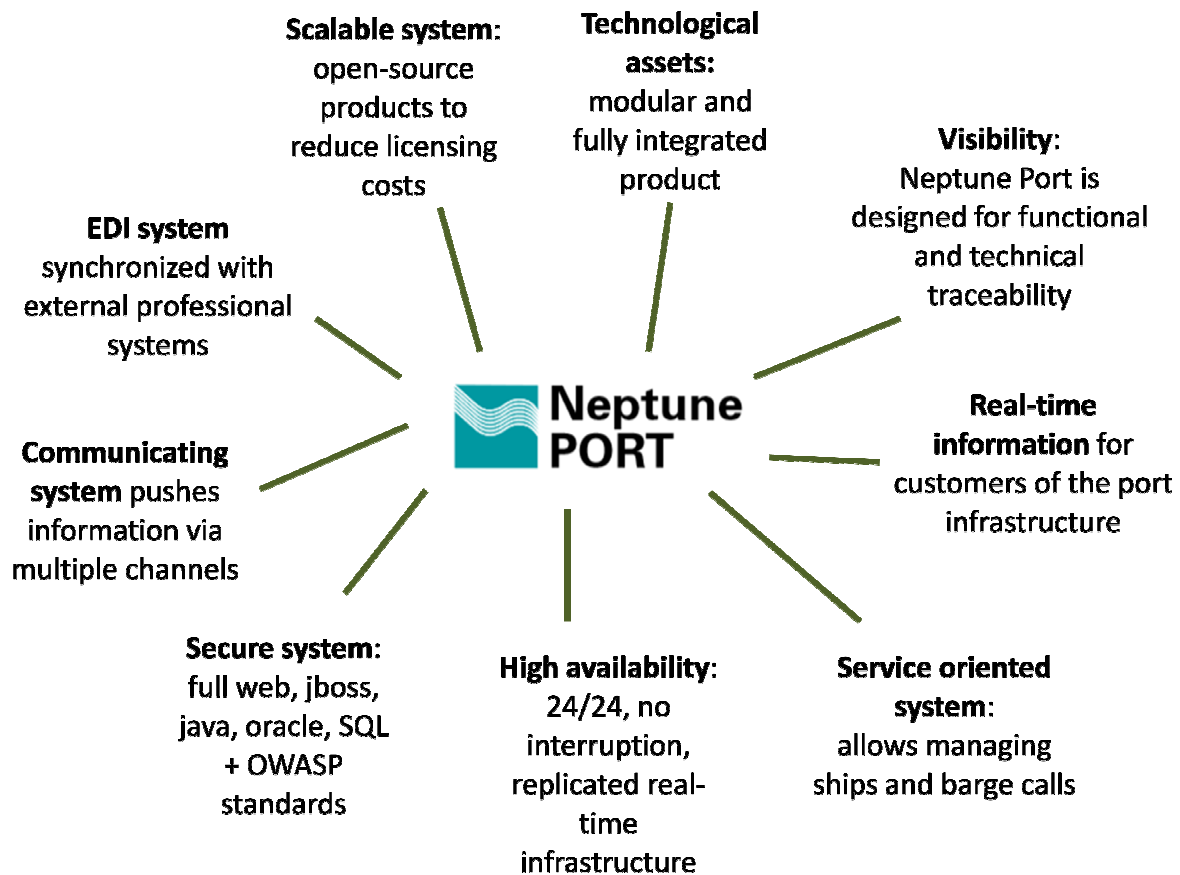

Technology Base:

As both PCS and CCS systems were modernized, a lot has evolved in terms of technologies and functionalities.

First both systems are fully interoperable helping the user by reducing the number of inputs as both systems can transfer to the other relevant information.

Neptune brings some great add-ons in terms of technology as the application is **more open** but also **more secured**. It provides **real time information** for customers and allow strong technical **traceability**. It is a modular system that is **fully integrated**.

Scalable system: open-source products to reduce licensing costs

Technological assets: modular and fully integrated product

Visibility: Neptune Port is designed for functional and technical traceability

EDI system synchronized with external professional systems

Real-time information for customers of the port infrastructure

Communicating system pushes information via multiple channels

Neptune PORT

Secure system: full web, jboss, java, oracle, SQL + OWASP standards

High availability: 24/24, no interruption, replicated real-time infrastructure

Service oriented system: allows managing ships and barge calls

Ci5 main technological drivers focused on different layers:

- Strong interoperability between logistics systems [Web Services]
- Multi-support access [responsive design application]
- Non-proprietary and scalable architecture [Open sources]
- Productivity gains in development
- Cyber Secured
- Decrease of Total Cost of Ownership (TCO)

Thus, the choice of Open Sources and the use of Agile methodology were cleared for us and meet the state of the art of IT developments.

Additional technologies such as **data analysis and Big Data** are implemented to enable user anticipation.

**Business Intelligence module** aims to pilot the activity.

P**ersonalized dashboard** offers a clear view on the coming shipments or calls.

KPI and statistics can be extracted from Ci5 thanks to **predictive algorithms**.

Ci5 technology also enables **multiport** activity (management data from several ports in one environment).

For Ci5, software delivery is based on **Cloud technology**.

The system is compatible with **all supports** (tablet, Smartphone...) as a responsive application.
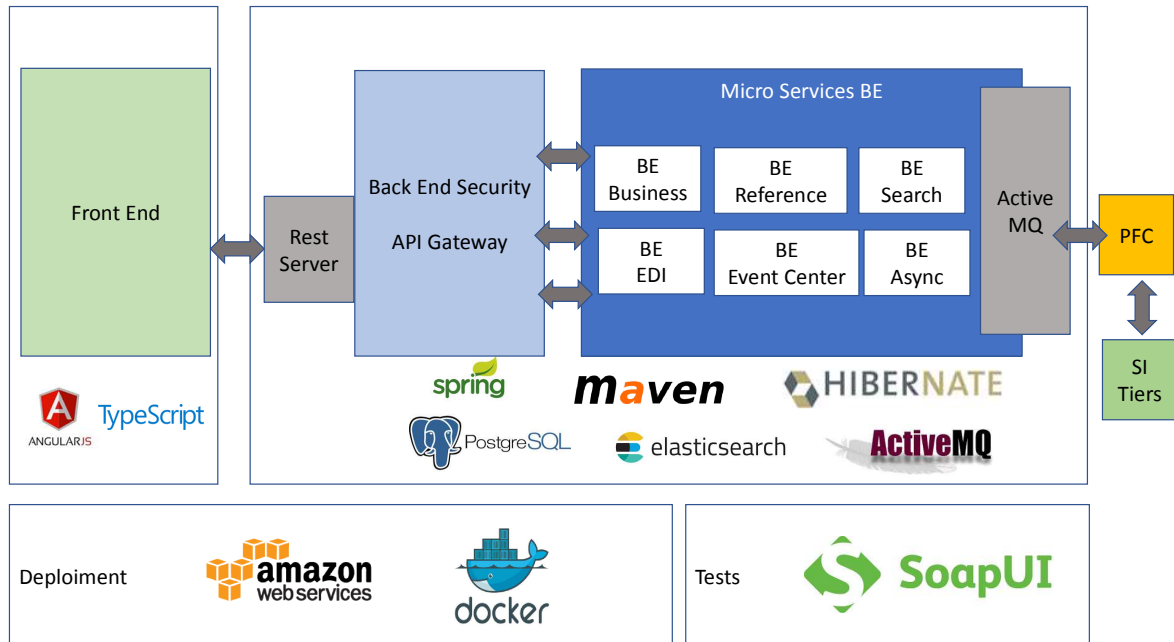
Scheme of the architecture of Ci5 system

For users, technology is always in the backstage, but they could see that users' experience is in the heart of the development thanks to the deployment of users friendly applications.

For MGI, technological and methodological choices allowed us to reduce by 40% the time to market and reduce the maintenance costs of 50%.