IoT in Port of the Future

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Internet of Things

Definition – “Three As”

- “Being connected” to the Internet has become the norm in large parts of the world

- The Internet of Things (IoT) refers to machine-to-machine (M2M) technology enabled by secure network connectivity and cloud infrastructure, to reliably transform data into useful information for people, businesses, and institutions.
IoT – 2016 Landscape

Source: http://mattturck.com/2016/03/28/2016-iot-landscape/
Infrastructure congestion costs 1% of GDP in EU

At global level, $400bn a year could be saved by making more of existing infrastructure through improved demand management and maintenance.

The global marine ports and services market will grow at a compounded annual rate of 4.7% until 2020\(^1\).

Digitalisation is one way of creating value for private and public stakeholders involved in the logistic port sector and can be achieved through various initiatives:

- eGovernment (single windows)
- Smart Ports: PCS, C-ITS and data generated from the IoT infrastructure

Source: Lucintel July 2006
IoT in Port Operations

What’s Involved

► Main Port Activity → Constant movement of containerized goods between sea and land

► Opportunity → Increase the use and easy-deployment of IoT technology in Ports to acquire data from the movements of goods/use of the infrastructure

- Exploiting the connectivity and IoT technology at port level and beyond
  ▪ Data is gathered and passes through networks to the IT backend/cloud

- Cloud – Analytics
  ▪ Information from across IoT network is gathered and stored (often) in cloud. Through manual analysis and automated processing, insights are extracted and presented / alerted the correspondent people, enterprises, IT Backend or IoT sensors to take action

- Services
  ▪ IoT isn’t just about gathering data; it’s about using it to make better decisions. Innovation appears here to address business needs and create the value of the IoT technology
Ports and container terminals have started to deploy sensors in cranes, container handling equipment, containers, trucks, and at gates to enable:

- **Better management of existing infrastructure**
  - Smart port with data to better understand our port activity
- **Reduce traffic-related emissions** - synchronise the arrival of ships and cargo in terminals, schedule and accredit vehicles and consequently use the full capacity of port access
- **Optimized multi-modal operations**
- Establish an intelligent infrastructure to **optimise the flow of information** to manage trade flows efficiently
  - In the way to automate port processes using data from the IoT (complex event processing, advanced analytics...)
  - Support port stakeholders in developing, deploying and validating new business models in the information economy

Some examples are: Port of Hamburg (Germany) and Port of Santos (Brazil)
Ports needs to expand the use of IT to support port user requirements

**IoT helps drive data visibility** across the ports ecosystem, and **data analytics-enabled timely business decision-making**

**Real-time analytics to run smarter operations, and automates decisions:** IoT technology provides port users with real time data on the status of cargo, paperwork, and availability of port facilities, and enables ships and terminals to be part of an integrated infrastructure

**Ports are already investing in IoT** sensors/devices and solutions in the port equipment

But there are some remaining challenges / barriers
- Investment of the IoT– not all actors are doing it
- Interoperability – lot of platform, IoT providers, protocols...
- Privacy and Security:
  - High dependence on infrastructure for data and communications to do absolutely everything → Target for attacks
Thanks!!!

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Every IoT solution involves many moving parts.

- **Sense**: Data is gathered, processed, filtered, and transmitted by a "terminal" or connected device.
- **Transport**: Data passes over networks, which may be Wi-Fi, cellular, mesh radio, satellite, or fixed line.
- **Store**: Information from across the IoT network is gathered and stored, often in the cloud.
- **Analyze**: Through manual analysis or automated processing, insights are extracted and presented.
- **Control**: Based on these insights, alerts are sent to people, enterprise systems, or IoT devices to take action.
- **Share**: IoT data is exchanged with other systems, monetizing it and enriching it with third-party data.