Industry Views: Trends and Prospects in the Port Sector
Transformation of a port’s role

Advantageous position
- Port authority
  - Planning
  - Investment
  - Operations
  - Rapid volume increase in cargo
  - Efficiency “bottleneck” of port operations
  - Lack of specialized port operations
  - 1990-1999

Advantageous operation management
- Port terminal operators
  - Assets
  - Operation
  - Efficient facilities
  - Slowdown in cargo growth, with terminal owners raising more requirements
  - Opportunities for integration of global supply chains
  - Homogenized infrastructures and port operations
  - 2000-to-date

Advantageous ecosystem
- Trade service providers
  - Trade facilitation
  - Differentiated value propositions
    - Integrated value chain
    - Open innovation
    - Timeliness and efficiency
    - Safety and reliability
  - Future
Industry Changes...

Mega Vessels

Mega Alliances

Demand for more mega berths & terminal consolidation

Increasing customer size and complexity
What we are innovating now ... for ports of the future
Port of the Future Initiative – ITS WC Melbourne

• ITS WC Melbourne workshop, 8 October 2016
• Port of Hamburg, Port of Montreal, Port of Fremantle, Port Singapore, Dutch Ministry of Transport and IT providers
• Identify common challenges for the Port Industry (low-carbon ICT technologies, hinterland transport network, Sustainable Smart Port Cities)
Automation in Port Operations

[Source: Self driving vehicles in logistics, DHL Report, 2014]
Australian Ports - Automated Port

• Australia likely has the highest percentage of automated terminals for a multiple, major container port country in the world (five major, three of which semi-automated container terminal ports).
• Port of Brisbane was an early world leader in automation and the Patrick auto-strad operating system is still an efficient and world-unique terminal operating method, which is now shared in other terminals in Australia.
• The three terminal operators in Brisbane and Patrick and Hutchison in Sydney have automated stacking areas.
• Victoria International Container Terminal (VICT) = new levels of automation
• Weigh in Motion devices at eastern states terminals provide CoR weighs for vehicles exiting
• One of the few countries in the world with booking systems to regulate arrivals at both terminals and empty parks (cannot enter without booking and, in most cases, at time of booking)
• 1-stop VBS and e-Gate makes paperless flows at both terminals and empty parks
Adoption of AGVs by Terminals

- ECT Delta in Rotterdam, Netherlands (1996)
- HHLA CTA in Hamburg, Germany (2002)
- ECT Euromax in Rotterdam, Netherlands (2008)
- Tobishima Container Terminal in Nagoya, Japan (2008)
- Middle Harbour in Long Beach, United States (2014)
- APMT & RWG in Maasvlakte II, Netherlands (2015)
- XOCT in Xiamen, China (2015)
- Qing Dao & Yang Shan (2016-17)

More automated terminals are adopting AGVs as horizontal transport.
Port Singapore - AGV

- AGV will replace man-driven truck for container transfers within the port
  - Improve labour productivity
  - Greater Predictability and Consistency in Operations
  - Longer “working hours”
  - Improve safety
  - Potentially greener & environmental friendly

AGV Ops at Wharf

AGV Ops at Yard
Port Singapore – Truck Platooning

PSA-MOT will be using innovative automation technologies to enhance operational productivity

**SMOOTHEN TRAFFIC FLOW**
More haulage activities can be shifted to off-peak hours

**ALLEVIATE MANPOWER DEMAND**
Only one driver is required to lead each platoon of four trucks

**INCREASE PRODUCTIVITY**
Each driver can command more trucks and ferry more containers in a platoon

**How it Works**

- **Driver in first container truck leading 3 driverless trucks**
- **Incorporates vehicle detection, anti-collision and lateral control technologies for safety**
- **Lead vehicle linked to the platoon via wireless communications**
- **Coupling and decoupling to allow other road users to cross between platoon vehicles**
Port Singapore - Truck Platooning

- Collaboration between Singapore MOT & PSA
- Test bedding of Platooning concept on Public Roads
- Inter Terminal Movements: currently ~ 3000 trips daily
- Approx 10 & 35 km of public highway
Relationship Smart City, Smart Region and Smart Port
Traffic Management: Vision Port Traffic Center
Connected road & logistics hubs

**Benefit**: 13% reduction of fuel consumption and CO2 equivalent emissions for heavy goods vehicles

**Scenario**: Use of C-ITS at intersections to indicate the speed to reduce number of stops and accelerations

**Eco-driving Support**

**Benefit**: 5–12% reduction on fuel consumption and CO2 equivalent emissions

**Scenario**: Use of C-ITS to provide time to red/green light at intersections

**CO2 Footprint and Monitoring**

**Benefit**: Measuring the CO2 emissions of vehicles operating in the pilots

**Scenario**: Use of GPS data or CANBUS related data to measure the fuel consumption

**Cargo Transport Optimisation**

**Benefit**: Optimise and increase the efficiency of cargo transport operations

**Scenario**: Monitoring of cargo activities for real-time information on status of the delivery process and possible exemptions

**Intelligent Truck Parking and Delivery Areas Management**

**Benefit**: Optimisation of traffic activities on the route and reduction of stops

**Scenario**: Provide real-time information on parking spaces to avoid waiting time and not needed stops on the route
Greenhouse gas emissions
Current emissions: Low.

GES emission concentration
Calculated per truck crossing

- High: more than 160g CO2/KM
- Medium: from 120g to 160g CO2/KM
- Low: less than 120g CO2/KM

Calculating greenhouse gas (GHG) emissions per truck trip is based on how much time elapses between the various checkpoints on Port territory and how far a truck travels.

With these figures, we can measure the amount of fuel used by road transport at the Port of Montreal and, in turn, the greenhouse gas emissions.

We calculate greenhouse gas emissions when a truck is being driven and also when it’s idling.

https://portmtltrucks.com/
EU Connected road infrastructure
InterCor corridor

- Pilot C-ITS services on freight and logistics by building on a common hybrid communication architecture and taking into account commonly agreed specifications from existing C-ITS corridors first results.

- Traffic management
  - In Vehicle Signage
  - Probe Data
  - Road Work Warning
  - GLOSA

- Freight and Logistics
  - Truck parking
  - Multi-modal cargo
  - Tunnel logistics
Openness and innovation to achieve interconnection in the value chain

- **Connected ports**
  - Digitally-enabled port synchronization, import planning, resource and work flow optimization

- **Connected ships**
  - Real-time monitoring, operations and availability optimization integrated with key stakeholders

- **Connected container trucks**
  - Monitor in real time & analyze to support better vehicle, driver, operations & regulations management.

- **Connected workers**
  - Mobile, safety, tracking analytics and technology to increase worker efficiency

- **E-Commerce Platforms**
  - Real-time bookings, visibility, price transparency, customs and supplier integration with predictive analytics

- **Digital supply chains**
  - End to end monitoring, analytics, automation and integration across channels and supply chain stakeholders
AEOLIX - H2020

• An architecture for a distributed open system for exchange of information among key logistics actors enabling increased use and impact of such information in the value chain.
• This logistics collaboration centre software package will run on any existing local logistics information system, independent of its size, complexity and sophistication.
• The AEOLIX specifications for the system to be built will be agreed at EU level among the interested stakeholders but the system will be implemented at local levels and under all applicable local governance schemes.
AEOLIX Living Labs

**Multi/syncromodal Transport**
- Thessaloniki-Balkans & central Europe via rail/road
- Gothenburg-Hamburg, Bratislava load control centre, Trieste to three TEN-T corridors (Scandinavian-Mediterranean, Mediterranean, Baltic-Adriatic)
- Urban Bordeaux & Atlantic Corridor
- UK - Continental EU - China logistics
- Bucharest-Vienna: Inland waterway

**Intelligent Hubs**
- Sea ports: Hamburg, Gothenburg, Bordeaux, Trieste
- Railway hubs: Hamburg, Trieste Northamptonshire
- Inland waterway (barge) terminals: Bucharest Vienna
- Cities: Bordeaux, Gothenburg
- Virtual freight centres: Thessaloniki Industrial Area

**Network Optimisation**
- The whole logistics network, incl. ports, inland transport (road, train, barge) in The Netherlands, Germany and Spain
- All sites that will cover multi/synchromodal transport
## AEOLIX innovation

<table>
<thead>
<tr>
<th>Interoperability</th>
<th>Technical</th>
<th>Legal</th>
<th>Business</th>
<th>Communities</th>
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<tbody>
<tr>
<td>Interfaces with any logistics information systems</td>
<td>Distributed open system through configurable plugin APIs.</td>
<td>Data access, privacy, identification, authentication</td>
<td>Enable low-complexity and low-cost connectivity</td>
<td>Open to all stakeholders across modes, within and across related supply chains.</td>
</tr>
<tr>
<td>Support continued development of standardized formats</td>
<td>Demand driven from users rather than supply driven</td>
<td>Secure, Resilient and Trusted environment procedures</td>
<td>Business models and public-private governance</td>
<td>Towards an EU Single European Transport Area</td>
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The ERTICO - ITS Europe Partnership
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