Automation in Transport: Digitalization and e-documents as enablers of growth and development

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AEOLIX pan-European logistics information exchange platform

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Content

• Background & needs
• AEOLIX project
• European Logistics Information exchange Platform
• Towards future federative platform for logistics services?
• Conclusions & next steps
Background

• Many digital platforms on freight transport and logistics:
  – EC FP & H2020 Projects solutions
  – Port Community systems & Cargo Community System (CCS)
  – e-Customs platforms
  – Single Window platforms
  – Proprietary ICT /ITS Solutions

• Open standards and EU initiatives
  – UBL/XML, EDIFACT, GS1, Open Data Standards, DATEX II
  – ITS Directive, RIS, eMaritime
  – (ETPs), such as ALICE, ERTRAC, ERRAC, Waterborne
## Business Needs

### Needs at Hubs
**Ports, Terminal**
- **Management Needs**
  - Process control, customs clearance
  - Capacity planning, scheduling
- **Data needs**
  - Vessel Load
  - Berthing schedule. Load plan, ETA, container location, customs clearance status
- **Interface level needed**
  - Data availability, visibility
  - Document transfer

### Visibility Needs
**at Supply chain**
- **Management Needs**
  - End to end visibility and exception management
  - Vertical cooperation and mode conversion
- **Data needs**
  - Load size, and format, origin, destination, asset availability, capacity availability, schedule, voyage reports, travel authorisation, shipment location, shipment status
- **Interface level needed**
  - Data availability, visibility
  - Document transfer
  - Online-booking links, confirmation
  - Intelligent agent, exception alerts

### Network Optimisation
**needs**
- **Management Needs**
  - Load factor, capacity optimisation
  - Horizontal collaborations
- **Data needs**
  - Combined demand
  - Combined loads, combined locations, combined destinations
  - Corridors
  - Combined lanes, schedules
- **Interface level needed**
  - Lane analysis
  - Optimisation algorithms
  - Cost analysis
But new challenges appear...

<table>
<thead>
<tr>
<th>Lack of interconnected systems</th>
<th>Process digitalisation and re-engineering</th>
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<tbody>
<tr>
<td>Data challenges:</td>
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<tr>
<td>i. Data ownership, sharing, access to data, re-use of data</td>
<td>Non-interoperable standards</td>
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<tr>
<td>ii. Lack of trust/data confidentiality</td>
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<td>iii. Data protection, cybersecurity</td>
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<td>iv. Big data, added value creation</td>
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<tr>
<td>Non-recognition of e-Transport documents</td>
<td>New business models</td>
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<tr>
<td>Governance</td>
<td>Low cost solutions, accessibility for SMEs</td>
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The AEOLIX Platform represents a critical way forward of supply chain interoperability through decentralised information sharing. AEOLIX is established via cloud services where data, application, on-premises and cloud-based processes and services from multiple actors can be connected - enhancing collaboration and interoperability, potentially across the entire freight transportation system.
AEOLIX Objectives

Lessons learned, needs and requirements

Lessons learned from existing ICT platforms and systems (success, failure)

Technical and non-technical requirements and needs for the collaborative logistics ecosystem

ICT development

AEOLIX IT architecture

Software components and toolkit

Data access management model

AEOLIX

Testing, validation & implementation

LIVING LAB 1
LIVING LAB 3
LIVING LAB 5
LIVING LAB 7
LIVING LAB 9
LIVING LAB 2
LIVING LAB 4
LIVING LAB 6
LIVING LAB 8
LIVING LAB 10

Feedback

Impacts monitoring, dynamic assessment & evaluation

Dissemination & exploitation
High-level architecture view

**Intelligent Dashboard**
End-User interface, configuration manager

**Stakeholder Systems**
Data feed / consumption

**3rd Party New Apps**

**Logistics Services**
Process & Services interplay
Services: eCMR, ETA, Planning, CO₂ footprint, Port services...

**Governance**
Business collaboration, data sharing management, rules, visibility

**Interoperability**
Data transformation, type repository, data integration, events, workflow

**Connectivity**
Communication platform – cloud messaging

Platform Support Services
- Identity Management
- Authentication
- Authorization
- Accounting & Billing
- Housekeeping
- SDK API

Platform Added-Value services & Apps
✓ Main Features

• **Ensure systems’ connectivity**: a shared cloud-based connectivity layer message queueing framework, enabling messaging between various entities that wish to communicate with each other seamlessly and reliably.

• **Interoperability services** to develop the data transformation before data pass to the connectivity layer.

• **Governance services** in charge of the management of the data sharing rules between partners. Services that enables the visibility of information between stakeholders and/or services.

• **SDK/API**: develop/integrate SW solutions or services.

• **Identity management**: management of digital entities of the actors/systems and access to the services.
AEOLIX IT Architecture

Disparate Systems, Cloud apps & data sources

AEOLIX Connectivity Engine

Interoperability Services

Security Services

Developers Services

Interoperability

Reuse of Assets

Decentralization

Scalability

Real-Time / Responsiveness

Service Toolkit

Simplicity

Security

AEOLIX Dashboard

AEOLIX SaaS ETA

AEOLIX SaaS eCMR

AEOLIX Cloud Stora

AEOLIX Planning Sa

Client Apps/Systems

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AEOLIX IT Architecture – How It works?

AEOLIX platform

- Ensure connectivity of systems >> AEOLIX Connectivity Engine: a shared cloud-based connectivity layer message queuing framework, enabling messaging between various entities that wish to communicate with each other seamlessly and reliably
- Interoperability >> repository of types
- SDK/API >> develop/integrate SW solutions or services
AEOLIX Toolkit

- AEOLIX toolkit is comprised of 3rd party services that will provide solutions that manage or improve specific logistics processes.
- Toolkit is available to all users in the platform aiming to use it.
- Some services identified in proposal + LLs
  - AEOLIX secure cloud storage
  - AEOLIX eDocumentation e-CMR
  - AEOLIX geographical toolkit, map and data
  - AEOLIX routing toolkit,
  - AEOLIX planning toolkit, planning services for road and intermodal service
  - AEOLIX ETA toolkit
AEOLIX IT Architecture – How It works?

AEOLIX Dashboard

- Front of the AEOLIX Platform, SW tool to actors enriching their supply chain visibility
  - In case actors has no system/tool, entry tool to the digital ecosystem
- Allow logistics stakeholders to share/collect data from the platform based on defined permissions
- Dashboard can be enriched with AEOLIX Toolkit / 3rd party services
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

Customers (example)
- Automotive OEMS & tiered suppliers
- Consumer Goods and Retail
- Restaurant and Foodservice
- Infrastructure providers
- Parcel Carriers
- Electronics and High Tech Solutions
- Chemical Industry
- Logistics Service Providers
AEOLIX e-CMR data flows and supply chain end-to-end visibility in multimodal case

Dashboard provides a structured database for each user organization with linked data fields, enabling data from various operators to be combined into customized views for each role.

Data Flow and transformation

- Data from port terminal operator
  - Data transformation
- Data from rail operator
  - Data transformation
- Data from truck operator
  - Data transformation

Connectivity engine

Dashboard database application

- Data Capture and Value Added Enhancement

Information Sharing

<table>
<thead>
<tr>
<th>Container ID</th>
<th>Terminal ID</th>
<th>Available Data/Time</th>
<th>Available update</th>
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- Report

Dashboard view for rail operator at port

<table>
<thead>
<tr>
<th>Container ID</th>
<th>Train ID</th>
<th>Scheduled ETA</th>
<th>ETA update</th>
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<tbody>
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</table>

- Report

Dashboard view for truck and inland terminal operator

<table>
<thead>
<tr>
<th>Container ID</th>
<th>Destination ID</th>
<th>Truck ID</th>
<th>Scheduled ETA</th>
<th>ETA update</th>
</tr>
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<tbody>
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</table>

- Report

Dashboard view for consignee

<table>
<thead>
<tr>
<th>Container ID</th>
<th>Destination ID</th>
<th>Truck ID</th>
<th>Scheduled ETA</th>
<th>ETA update</th>
</tr>
</thead>
<tbody>
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</table>
Inland phase without/with AEOLIX

**INLAND PHASE**

**AS IS**

- **Train Departs**
  - Train depart when all containers ready for shipping, and missing containers replaced in controlled manner with other standby loads.

- **Railway Schedule Update**
  - Train operations influenced by multiple external factors from other rail traffic incidents, and infra management; updated by email to all parties.

- **Reschedule Terminal**
  - Terminal and truck operators review emails and adjust schedules accordingly.

- **Reschedule Trucks**
  - Trucks are underway when rescheduling is completed, resulting in truck waiting time at inland terminal.

- **Truck Depart**
  - Consignee experiences unexpected delays and uncertainty regarding any customs and logistics operation.

- **Truck arrival at consignee**

**TO BE**

- **Train Departs**
  - Train depart when all containers ready for shipping, and missing containers replaced in controlled manner with other standby loads.

- **Railway Schedule Update**
  - Train operations influenced by multiple external factors from other rail traffic incidents, and infra management; updated into AEOLIX Dashboard.

- **Reschedule Terminal**
  - Terminal and truck operators receive alerts to adjust schedules accordingly.

- **Reschedule Trucks**
  - Trucks rescheduled in time and changed ETA for consignee updated.

- **Truck Depart**
  - Changed e-CMR for consignee updated and visible in time for workflow adjustment.

- **Truck arrival at consignee**
Example – AEOLIX scenarios

Port – Scenario 1: reduce lost business and waiting time for the train due delays of ocean carrier.
Example – AEOLIX scenarios

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Example – AEOLIX scenarios

Port – Scenario 1: reduce lost business and waiting time for the train due delays of ocean carrier.
AEOLIX → Future

Logistic Service Provider asks ...

Container #?
Vessel #?
Geo Position?
Schedule?
Origin?
Destination?

AEOLIX provides realtime information for all participants

AEOLIX Logistics Data Hub

LL12 e-CMR

Vessel
Port Terminal HH
Train Terminal HH
Train Terminal FFM/Hinterland/Last Mile
Warehouse

Targets: solve any uncertainty regarding any custom and logistics operation

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AEOLIX Total counter (18.02.2019 21:00)

AEOLIX Total counter: 4,742,890
Last 24h Counter: 568,690
AEOLIX Dashboard counter: 1,642,365

Last 24h Histogram

LL1 Total Operation: 2,852,159
LL2 Total Operations: 46,108
LL3 Total Operations: 291

LL1 operation distribution
LL2 operations
LL3 Operation distribution
AEOLIX benefits

- Enhanced supply chain visibility
- More efficiency and better resilience
- Fewer costs, less administrative burden
- New business opportunities
- Optimised choice of transport services
- Better transport and event management
- Increased load factors
- Fewer CO2 emissions
## Conclusions

### Challenges: technical, security, new use cases, new business models

### Innovate:

<table>
<thead>
<tr>
<th>Interoperability</th>
<th>Technical</th>
<th>Legal</th>
<th>Business</th>
<th>Communities</th>
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<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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Next AEOLIX events

Brussels: 4\textsuperscript{th} April 2019
Port de France: 2\textsuperscript{nd} May 2019
Eindhoven: 5\textsuperscript{th} June 2019
Hamburg: 26\textsuperscript{th} June 2019
Thank you for your attention!
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