Transforming Transport
Big Data Value in Mobility and Logistics

ICT-15 Large Scale Pilot Action
(aka. Big Data Value Lighthouse)

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Transport and Logistics Domain

- **One of the most-used industries in the world and in EU...**
  - 15% of GDP (source: KLU), employment of 11.2 million persons in EU-28 (source: DG MOVE)
  - 3,768 billion tonne-kilometres and 6,391 billion person-kilometres in EU-28
  - Key contributor to emissions: 4,824 megatonnes CO2 (source: DG MOVE)

- **...and growing**
  - Business and tourism travel expected to grow significantly over next decades
  - Freight transport slated to **increase by 40% in 2030** and by 80% in 2050 (source: ALICE ETP)

- **Need for paradigm shift!**
  - A 10% efficiency improvement = EU cost savings of 100 B€ (source: ALICE ETP)
  - Big Data expected to lead to 500 billion USD in value worldwide in the form of time and fuel savings, and savings of 380 megatons CO2 in transport and logistics (source: OECD)

- **But: Current Situation**
  - Only 19% of EU transport and logistics companies employ Big Data solutions as part of value creation and business processes, and 70% do not plan to do so in the future (source: Price Waterhouse Coopers)
TT in a Nutshell

TT will demonstrate, in a **realistic, measurable, and replicable way** the transformations that big data will bring to the mobility and logistics sector.

TT will bring about a demonstrated increase of productivity and demonstrable impact in **seven pilot areas**, covering areas of major importance for the transport and logistics sector in Europe.

- Highways
- Airports
- Ports
- Rail
- Vehicles
- Urban Mobility
- Supply Networks

**Starting Date:** January, 1st

**Duration:** 30 months

**Estimated Budget:** 18,7M€

**EC Contribution:** 14,6M€

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Project Objectives and Impact

1. “Piloting” of transformative nature that existing and very-near-to market big data technologies can bring about in the mobility and logistics sector: **13 Pilots in 7 Pilot Domains**

2. “Value” → *Demonstrated increase of productivity in target sector of the Large Scale Pilot Action by at least 15%*

3. “Reusability” of TT solutions (including with adaptation) and replication across use cases

4. “Scalability” of TT solutions for anticipated mobility and logistics processes and data characteristics at end of TT project (20 different data sources, > 55.000 GB, > 25 GB/day)

5. “Engagement” → *At least 120 organizations participating actively in demonstrations*

6. “Transfer” → *Doubling the use of Big Data technology in the mobility and logistics sector from the currently 19% to at least 38%*

7. “Market Impact” → *Increase of market share of Big Data technology providers of 72% on average (absolute market share of up to 12%) if implemented commercially*

8. “Sustainability” of TT outcomes through *post-project replication*

9. “Mobilisation” → *Leveraging add’l target sector investments of > 6 times EC investment*
„Piloting“ & „Sustainability“

Vertical Data Integration
- Smart Highways
  - Load Balancing in Malaga
  - Sensing Passenger Cars
  - Proactive Rail Infrastructures
    - Predictive Rail Asset Management
    - Predictive High Speed Network Maintenance
- Sustainable Connected Vehicles
- Proactive Rail Infrastructures

Horizontal Data Integration
- Ports as Intelligent Logistics Hubs
  - Valencia Sea Port
- Smart Airport Turnaround
  - Smart Passenger Flows
- Integrated Urban Mobility
  - Integrated Urban Mobility & Logistics in Tampere
- Dynamic Supply Networks

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Three key value dimensions for Big Data in Transport and Logistics (Source DHL/DETECON) ➔ TT covers them all!

**Operational Efficiency**
- Delivery mileage reduction of 5%-15%
- Rail maintenance cost reductions by up to 12%
- ...

**Customer Experience**
- Less missed connections
- Decreased passenger waiting times
- Delivery cost and time reductions
- ...

**New Business Models**
- Oriented retailing (knowing expected preferences of passengers before arrival)
- Trip patterns for advertising, tourism, ...

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**TT 3-Stage Validation and Scale-up Methodology**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Embedding</th>
<th>Infrastructure</th>
<th>Scale of Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S1: Technology Validation</strong></td>
<td>Problem understanding and validation of key solution ideas</td>
<td>Local, existing small-scale infrastructure used for exploratory experiments</td>
<td>Selected (historic) data pinpointing problems and opportunities</td>
</tr>
<tr>
<td><strong>S2: Large-scale Experiments</strong></td>
<td>Controlled environments, decoupled from productive environm.</td>
<td>Dedicated large-scale data processing infrastructure for experimental purposes</td>
<td>Large historic and live data, possibly anonymized or simulated</td>
</tr>
<tr>
<td><strong>S3: In-situ trials</strong></td>
<td>Trials in the field, involving actual end-users</td>
<td>Actual data processing infrastructure of pilot partners</td>
<td>Real, live production data complemented by large scale historic data</td>
</tr>
</tbody>
</table>
Data Assets (per pilot by the year 2020)

<table>
<thead>
<tr>
<th>Domain</th>
<th>Vol. GB</th>
<th>Veloc. GB/day</th>
<th>Data Variety (Data Sources)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highways</td>
<td>~1.000</td>
<td>~1</td>
<td>&gt; 20, live traffic information, historical traffic data, meteorology information, OCR data, spatial infrastructure, car sensor data, social network streams, ...</td>
</tr>
<tr>
<td>Vehicles</td>
<td>~2.500</td>
<td>~7</td>
<td>&gt; 20, vehicle, position, speed, brake, black ice sensor, ABS, ESP, fuel level, emergency button, engine status, engine revolutions, tyre pressure, temperature, ...</td>
</tr>
<tr>
<td>Rail</td>
<td>~1.500</td>
<td>~2</td>
<td>&gt; 40, environmental, geospatial, Network Model, track circuits, axle counters, points heaters, rail temperature monitoring, overhead line tension, rail signalling power, scheduled planning and control data, track usage, ...</td>
</tr>
<tr>
<td>Ports</td>
<td>~400.000</td>
<td>~110</td>
<td>&gt; 25, information about import and export of containerised, general and bulk cargo, tracking and tracing through the whole logistics chain, machines equipped with, AIS (vessel tracking), video streams of trucks and trains (from video gates), traffic management data, ...</td>
</tr>
<tr>
<td>Airports</td>
<td>~3.000</td>
<td>~30</td>
<td>&gt; 35, flights scheduling, flights updates, passenger tracking information across the airport, queuing times for check-in/security/lifts, hand luggage scanning information, shops level of occupation, aircraft sensor data, ...</td>
</tr>
<tr>
<td>Urban Mobility</td>
<td>~500</td>
<td>~10.5</td>
<td>&gt; 10, real time probe data from personal, freight and public transport vehicles; traffic light data and sensors, roadside camera images, usage data from public transport, ...</td>
</tr>
<tr>
<td>Supply Chains</td>
<td>~1.500</td>
<td>~11</td>
<td>&gt; 10, inventories, orders acquired of online retailers, deliveries, distribution information collected by 3PL/courier companies, customer delivery preferences, geographical position of customers, cost of deliveries, vehicle fill rates, ...</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>~410.000</td>
<td>~172</td>
<td>&gt; 160 data sources</td>
</tr>
</tbody>
</table>
"Engagement"

**TT consortium** brings together knowledge, solutions and impact potential of major European players

- 46 project partners (20 BDVA members)
- > 50 persons from core business operations
- Post project replication (15 expressions of interest)
- High-level Advisory Board (9 members) acting as multipliers (e.g., OpenGroup, ALICE, ERTICO)

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"Engagement"

BDV Collaboration

Data Protection

Engineering

Standards

Data Visualisation and User Interaction
1D, 2D, 3D, 4D, VR/AR

Data Analytics

Descriptive

Diagnostic

Predictive

Prescriptive

Data Processing Architectures
Batch, Interactive, Streaming/Real-time

Data Management
Collection, Preparation, Curation, Linking, Access

Required technology

Provided technology

Dedicated stakeholder events and outreach activities (e.g., BDVA SG “Transport & Logistics”)

Member of BDV Technical Committee (TC): BDVA Reference Model of TT results

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TT covers **all transport modes and sectors** → TT results relevant for the whole mobility and logistics sector and market, covering **EU market size of 1 305 BEUR**

<table>
<thead>
<tr>
<th>TT Pilot Domain</th>
<th>Related Transport Sector / Market</th>
<th>Market Size 2011 (source: DG MOVE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highways</td>
<td>Road freight &amp; passenger transport</td>
<td>419 326 MEUR</td>
</tr>
<tr>
<td>Vehicles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rail</td>
<td>Railways</td>
<td>78 354 MEUR</td>
</tr>
<tr>
<td>Ports</td>
<td>Inland water &amp; sea transport</td>
<td>112 803 MEUR</td>
</tr>
<tr>
<td>Airports</td>
<td>Air transport</td>
<td>127 394 MEUR</td>
</tr>
<tr>
<td>Urban Mobility</td>
<td>(cross-cutting)</td>
<td>(included in above)</td>
</tr>
<tr>
<td>Dynamic Supply Networks</td>
<td>Warehousing, postal and courier activities</td>
<td>567 200 MEUR</td>
</tr>
</tbody>
</table>

Estimated increase of market share and size of TransformingTransport industry members: **up to 600% individually (72% on average) by 2020**
Mobilisation

Investment plans of beneficiary companies of TT estimated at 94.970 MEUR* = mobilisation of at least six times the EC investment

- All TT industrial partners perceive Big Data as strategic area for their future business core
- Reflected by industrial strategy, exploitation and development plans (provided in the DoA)

Measuring and reporting additional investments

- Dedicated task in TT devoted to KPI Achievement (led by Atos)
  1. Definition of Assessment Framework in Mo 6
  2. Periodic KPIs Achievement Reports in Mo 18 and Mo 30
- Confidential annex of Reports will provide
  - Actual additional investment to date of the partners
  - Partner-specific business plans on using TT results

* not considering confidential investment plans, and only counting direct investments resulting from TT
Thank You!

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement no. 731932.

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