oneTRANSPORT
A Transport Data Marketplace: oneM2M’S Role

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Trial covers a large footprint, including cities and rural areas
oneTRANSPORT intelligent transport trial and partner eco-system

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<thead>
<tr>
<th>Platform provider</th>
<th>Transport Sector Expert</th>
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<tr>
<td>INTERDigital.EUROPE</td>
<td>ARUP</td>
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<th>Use case owners</th>
<th>IoT &amp; Intelligent Transport Analytics</th>
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<td>Oxfordshire County Council</td>
<td>Imperial College London</td>
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<td>Buckinghamshire County Council</td>
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<td>Hertfordshire</td>
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<th>Sensor-network Service Providers</th>
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<td>WORLDSENSING</td>
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<td>Clearview Intelligence</td>
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11 Multi-sector Partners
2 year project
+200 Different data assets

$ 5.2m Total cost
70% Funded by Innovate UK

Started 1st Nov 2015

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oneTRANSPORT employs a common IoT platform and data marketplace, enabled by the oneM2M™ standard.

Citizen and transport service applications cut across geographic and operational boundaries.

oneM2M™ Standards-based Horizontal IoT Platform & Data Marketplace

Diverse Sources of Data
- Connected assets
- Enterprise data bases
- Paper records
- Remote sensors
- Third-party suppliers of data

Local-government agencies

Independent IoT-application developers

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Stages in the data integration challenge

**Data**
- Identify data assets
- Catalog data resources

**Data in Platform**
- Integrate existing OT/IT systems with platform (reliability, dependability and usability of data sources)
- Visualization aids understanding of assets and their operating dynamics

**Better Data in Platform**
- Assess quality of data e.g. link and cross-reference multiple sources to detect errors
- Perform data transformations
- Add other data sources e.g. partners, ‘open data’ etc.

**Enable Business Decisions**
- Use data to make business decisions
- How will addition of new sensors help?
Event day travel management use-case

- Event – Watford FC Premier League soccer matches
- Rate of vehicles leaving car-park causes congestion on the ring-road
- How can the city improve traffic management?
- Data Life-cycle
  - Use data feeds to detect and measure congestion
  - Modify traffic signs to car park
  - Measure results (steadier car-park exit rate, less Ring-road congestion)
  - New data sources for enhanced use case (Bluetooth sensing of mobile phones, user survey of travel intentions in matchday program etc.)
  - Maintain and measure effectiveness of existing deployments
Evolution trend for data sourcing

1. Data Retrieval From Existing Sources
   - Use web services to capture data based on existing, vertical standards e.g. Datex2
   - Data packaged as ‘documents’: large files, based on vertical-specific model, are not suitable as streams of sensor data

2. Sensor Providers Push Data into Platform
   - Co-operative eco-system encourages sensor owners to publish data directly into oneM2M™-based platform (bypass current proprietary or vertical-specific platforms)

3. Sensors Function in Native oneM2M™ Form
   - Sensor vendors and sensor-network operators embrace the oneM2M™ standard. This allows sensors to:
     - be discoverable
     - contribute data natively
     - support cross-silo applications

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Smart city projects are attracted to the oneM2M™ standard

InterDigital Horizontal IoT Platform Using oneM2M™

21 Multi-sector Partners

$8.6M Investment

Pan-European Scale

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A closer look at oneM2M’s **current** role

- oneM2M satisfies oneTransport’s requirement for a standards-based & data type agnostic mechanism for sharing data.
  - Standardized oneM2M services and APIs
    - Standardized oneM2M resources, attributes, messaging protocol that are data agnostic
    - oneM2M standards based information model enables publishing and discovery of data from a diverse set of data providers and consumers
  - Standards-based ensures no vendor lock-in
    - Allows sensor/data providers to interface directly without doing any system integration
- oneM2M services and APIs currently being leveraged:
  - AE Registration
  - Access Controls
  - Data Management (<container> & <contentInstance>)
  - Resource Discovery
  - Subscriptions & Notifications
  - HTTP Protocol Binding

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A closer look at oneM2M’s **future** role

- Work is underway on the following
  - Increased visibility into data
    - Use of `<flexContainer>` (e.g. for describing geospatial assets such as street lights)
  - Charging & Accounting
    - Use of events and statistics collection
    - Generation of charging records
  - Mcc’
    - IN-CSE to IN-CSE communication
  - Interworking
    - Between oneM2M and Hypercat
    - Between oneM2M and W3C
      - E.g. W3C Data Quality Vocabulary

- Under consideration
  - Use of oneM2M semantics
  - Use of oneM2M group
  - Use of oneM2M timeSeries

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oneM2M “pain points” encountered

- **Security**
  - ACPs – Can be heavy and burdensome to manage and no notion of a user (all based on AE) or how ACPs can be provisioned.
  - Security Association – oneM2M defined certificate formats (rather than standard certificates) can be a deterrent to use oneM2M based security

- **Discovery**
  - Current filter criteria are somewhat limited (e.g. lack advanced operators such as <, >, <=, >=, !=, …)

- **Subscription / Notification**
  - Overall, the subscription/notification feature is quite complex and not easy to quickly ramp up and use
    - What is the format of notification and how do I parse it?
    - Do I need to send a response to a notification?
    - Which notificationURI format do I use?,
    - What is oneM2M subscription validation?

- **Charging & Accounting**
  - Lack of a standardized interface for access or export of charging records

- **Identifiers**
  - There are a lot of them and some oneM2M IDs can be formatted in several different ways which causes confusion and interop issues
    - E.g. ResourceIDs can be formatted 6 different ways

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