oneTRANSPORT
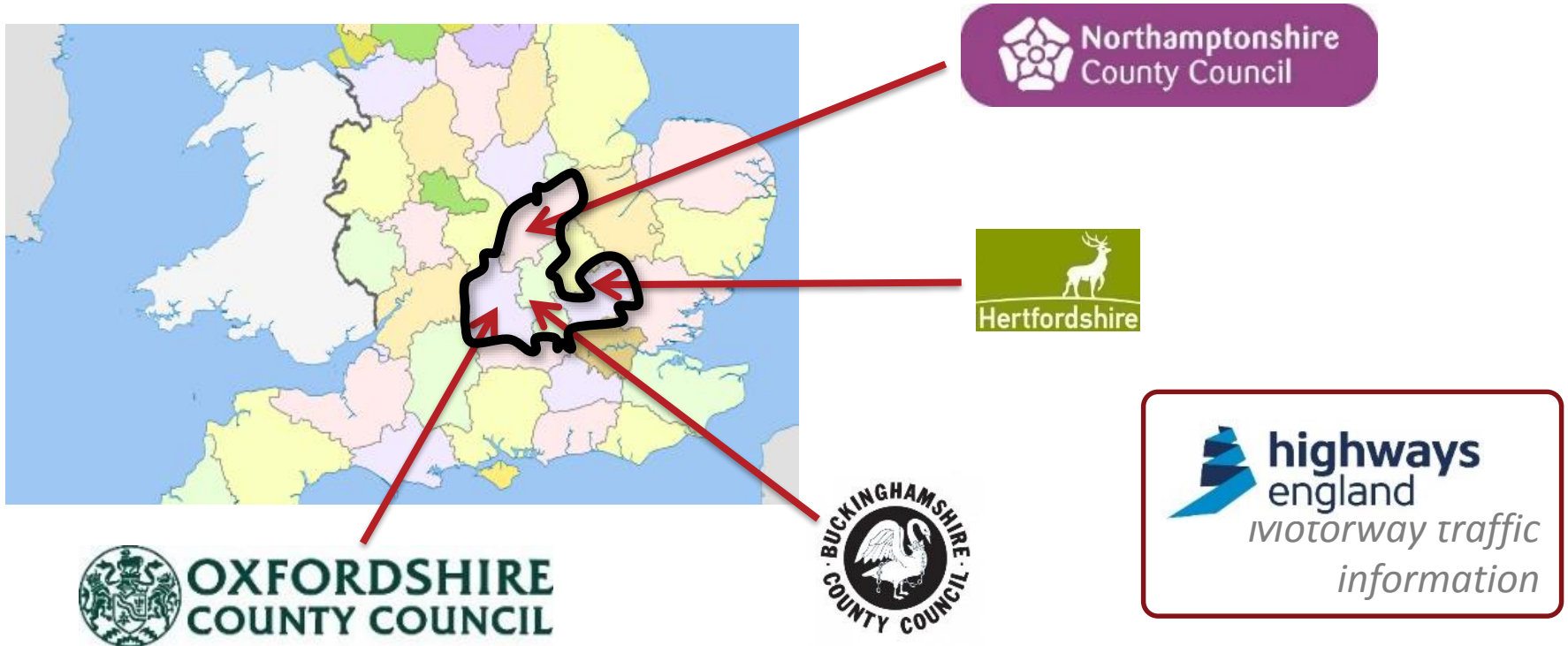## A Transport Data Marketplace: oneM2M'S Role

Presented by Mike Jeronis, VP InterDigital IoT Solutions
Mike.Jeronis@InterDigital.com

Trial covers a large footprint, including cities and rural areas

Northamptonshire County Council

Hertfordshire

highways england
Motorway traffic information

OXFORDSHIRE COUNTY COUNCIL

BUCKINGHAMSHIRE COUNTY COUNCIL

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oneTRANSPORT intelligent transport trial and partner eco-system

Platform provider
INTERDIGITAL. EUROPE

Transport Sector Expert
ARUP

Use case owners
OXFORDSHIRE COUNTY COUNCIL
Northamptonshire County Council
Hertfordshire
BUCKINGHAMSHIRE COUNTY COUNCIL
highways england

IoT & Intelligent Transport Analytics
Imperial College London
traak

Sensor-network Service Providers
WORLD SENSING
Clearview Intelligence

11 Multi-sector Partners

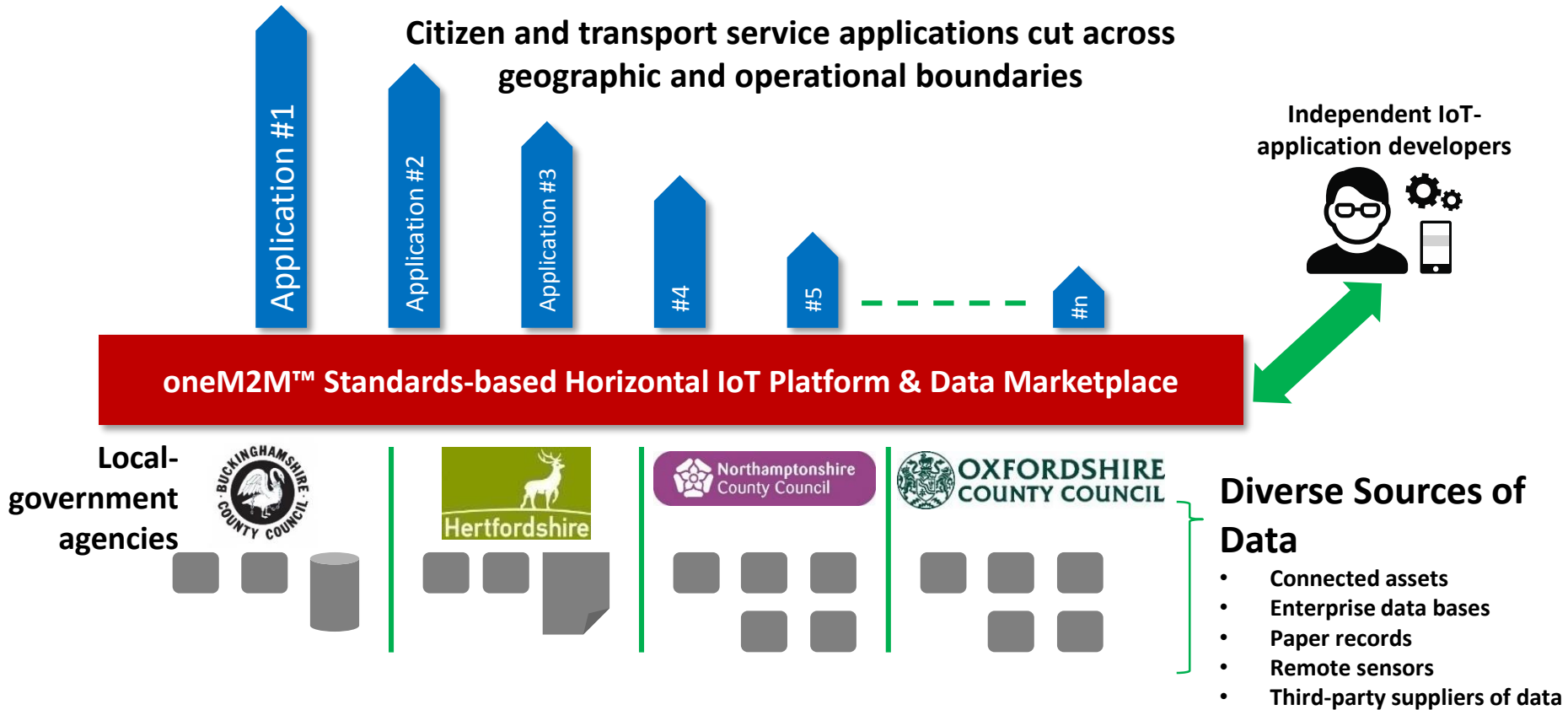**2** year project

+200 Different data assets

$ 5.2m Total cost

Started 1st Nov 2015

70% Funded by Innovate UK

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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

Application #1

Application #2

Application #3

#4

#5

#n

Independent IoT-application developers

oneM2M™ Standards-based Horizontal IoT Platform & Data Marketplace

Local-government agencies

Buckinghamshire County Council

Hertfordshire

Northamptonshire County Council

Oxfordshire County Council

Diverse Sources of Data

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

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4

Stages in the data integration challenge

Data	**Data in Platform**	**Better Data in Platform**	**Enable Business Decisions**

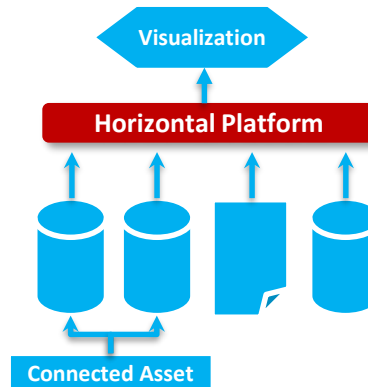- Identify data assets
- Catalog data resources
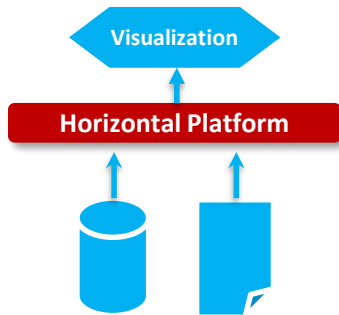
- Integrate existing OT/IT systems with platform (reliability, dependability and usability of data sources)
- Visualization aids understanding of assets and their operating dynamics

- Assess quality of data e.g. link and cross-reference multiple sources to detect errors
- Perform data transformations
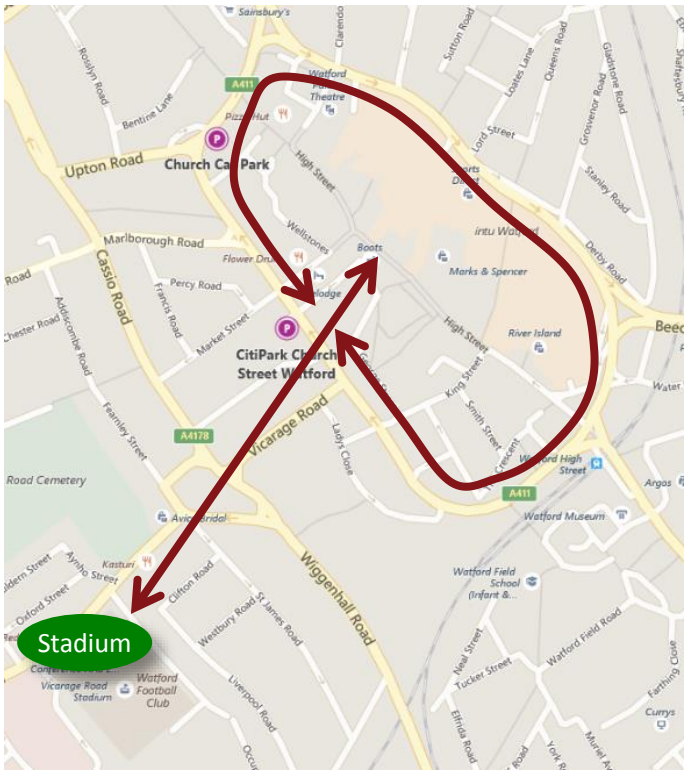- Add other data sources e.g. partners, 'open data' etc.
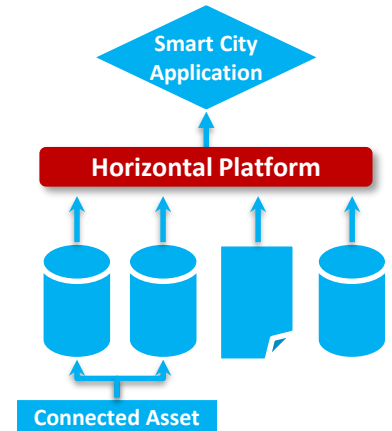
- Use data to make business decisions
- How will addition of new sensors help?

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Event day travel management use-case

**Watford Town Center & Football Ground**

- 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

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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

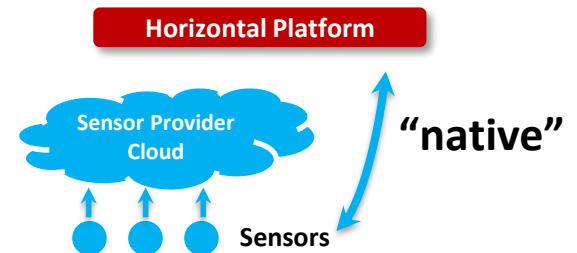**Horizontal Platform**

"pull"
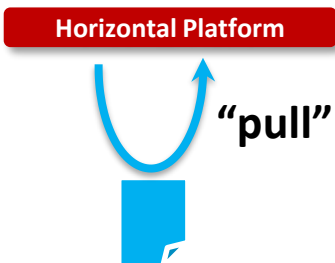
2. Sensor Providers Push Data into Platform

- Co-operative eco-system encourages sensor owners to publish data directly into oneM2M™-based platform (bypass current proprietary or vertical-specific platforms)

Horizontal Platform

Sensor Provider Cloud

Sensors

"push"
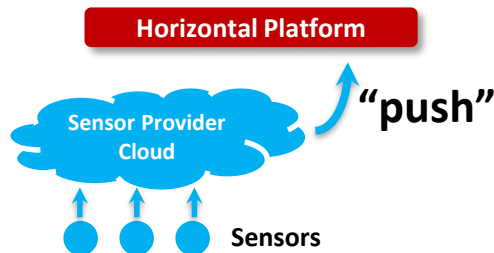
3. Sensors Function in Native oneM2M™ Form

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

Horizontal Platform

Sensor Provider Cloud

Sensors

"native"

Smart city projects are attracted to the oneM2M™ standard

oneTRANSPORT
- InterDigital Europe
- ARUP
- Hertfordshire
- Imperial College London
- Oxfordshire County Council
- Buckinghamshire County Council
- Clearview Intelligence
- highways england
- Northamptonshire County Council
- traak
- World Sensing

Smart Routing
- Birmingham City Council
- CAUTION YOUR BLAST
- University of Aberdeen
- InterDigital Europe
- Ayoupa

Crowd4Roads
- Buckinghamshire Advantage
- Regione Abruzzo
- Regione Marche
- Coventry University
- Bla Bla Car — Condividi un posto in auto
- Università Degli Studi di Urbino Carlo Bo, 1506
- SATEAN

InterDigital Horizontal IoT Platform Using oneM2M™

21 Multi-sector Partners

$8.6M Investment

Pan-European **Scale**

A closer look at oneM2M's **<u>current</u>** 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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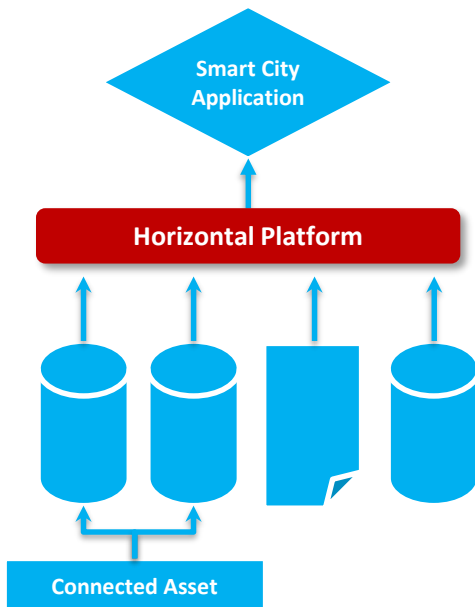
A closer look at oneM2M's **future** role

- 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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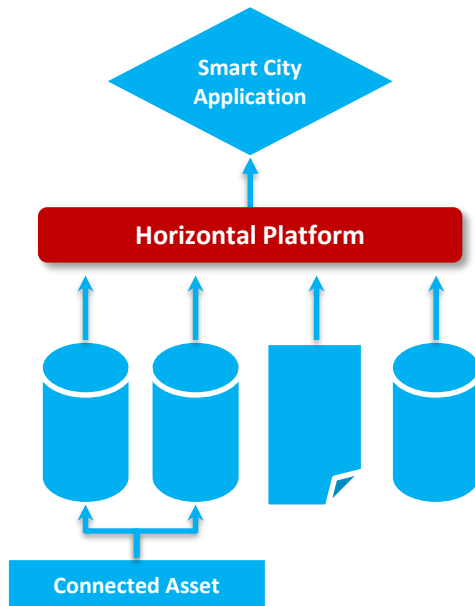
oneM2M "pain points" encountered
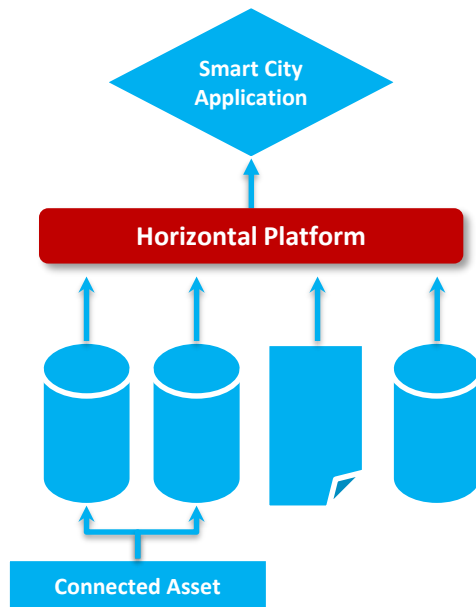
- Security
  - ACPs – Can be heavy and burdensome to manage and no notion of a user (all based on AE) or how ACPs can be provisioned.
  - Security Association – oneM2M defined certificate formats (rather than standard certificates) can be a deterrent to use oneM2M based security
- Discovery
  - Current 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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Smart City Application

Horizontal Platform

Connected Asset

Contacts for more information

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http://transportdatainitiative.com/

http://onem2m.org/

http://www.interdigital.com/iot/