CityVerve: Manchester’s Smart City Initiative
Platforms for Supporting IoT Smart City Ecosystems

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£15M collaborative R&D project

Smart Cities: doing more with less in a time of financial constraints

CityVerve will provide Smart City demonstrators, networks, platforms and infrastructure to enable open innovation

Central to this will be **BT’s IoT data hub**, interoperating via **Hypercat** with a range of other platforms

*Replicable, sustainable and scalable*
CityVerve’s Use Cases: What is being built?

- Transport and Travel
- Energy and the environment
- Health and Social Care
IoT Technology layers

Sensor/Data Providers

SENSORS
- Light Sensor
- Bin Usage
- Parking Sensor
- Soil Moisture
- Vehicle Telemetry
- RFID Trace

BT

CONNECTIVITY
- LoRa
- Wi-Fi
- MESH
- UNB

BT

DATA HUB
- Analytics
- Dev Environment
- IT Services
- Information Spine

SME / Ecosystem

APPLICATIONS
- Smart Street Lighting
- Waste Management
- Smart Parking
- Driver Assist
- Tracing Assets: BT Trace

Enabling the IoT Ecosystem
SECURITY / RESILIENCE / SCALE
The IoT Data Hub
- Information Aggregation
- Economies of scale
- Uniform Access
- Maximise Value of Data
- Lower barrier to participation

BT IoT Data Hub
(On-boarding of Information)
Developers
(Data Hub)
Applications
- City Motion Map
- Supply Chain
- Smart Energy Usage
- Smart Water Usage
- Connected Buildings
- Air Quality
- Assisted Living
- Smart Street Lighting
- Connected Home
- Smart Waste Management
- Smart Parking
- Connected Vehicles

City Infrastructure
Satellite
Home Sensors
Water Levels
Wearables
Traffic/Car Logistics
Strategic Roads
Temperature
Smart Water Usage
Smart Energy Usage
Supply Chain
Connected Buildings
Air Quality
Connected Home
Smart Waste Management
Smart Parking
Connected Vehicles
Current BT Manchester data

~200 data feeds

Parking Data
Automatic Traffic Counts
Air Quality data
River Levels
Smart Buildings data
Live and scheduled train
Live and scheduled bus
Cycling usage patterns
NAPTAN (bus stop locations)
Met Office Weather Observations
Highways England – trunk route traffic speed and density

Other partners also have hubs for other application themes

⇒ Data hub interoperability
IoT & Interoperability

“Interoperability is essential to unlock 40% of the $11 trillion potential value of the IoT” (McKinsey)

Risk:
without Interoperability
Data Hubs will become Data Silos
IOT Hubs & interoperability

Data hubs lower the barrier to participation:
• Data published on clear terms to a wide audience
• Access to data from multiple heterogeneous sources
• What data does this hub have and how do I access it?
• Interoperation between hubs
CityVerve’s *platform of platforms*

Driving data hub interoperability

- **Hypercat specification (BSI)**
- A machine-readable (JSON) data catalogue + API
- Breaking down silos
- Fostering innovation
- Maximising the value of data

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**HUB INTEROPERABILITY**

Hypercat enables uniform access to multiple Data Hubs

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**Data Hub**

- Developer Portal
- Catalogues
- Service Orchestration
- Policy
- Information models
- Analytics
- Information Routing
- Data Ingress
- Security
- Data Egress

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Programmable City API
Supporting multiple data hubs with a Unified API

PORTAL
developer
document api
write content
portal
monitoring
webmaster

admin
user management
api monitoring
api analytics

CONSORTIUM

CITYVERVE

distro
master entity type store
master entity to connector mapping

central activity log
activity conflicts

DISTRO

session based load balanced
entity namespace management
entity to connector management

DATA HUB

northbound interface specified
internal technology not specified

SENSOR/LEGACY

no changes required or desired

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Thanks for listening
BT/See.Sense CityVerve smart light trial

200 See.Sense sensor-enabled cycle lights to Manchester cyclists
– ICON gathers broad range of anonymised sensor data
– flashes brighter and faster in high risk situations
– feed back location and speed data

Data aggregated on BT’s IoT Data Hub, combine with other data
Rich picture on how Manchester’s cyclists use their city
Optimise cycle infrastructure investment
Insight
Infrastructure use
Future investment
Road quality
Smart Parking
Milton Keynes example
£1.1m new multi-storey car park put on hold
Re-focus on driving up usage of existing capacity
Air Quality

Understanding correlations between traffic and AQ
Addressing health challenges
Sensors used to control dimming of lights based on real time traffic volumes
30% energy savings delivered