

OPEN DATA AND IOT

Can open practices lead to a smarter cities?

January 2018

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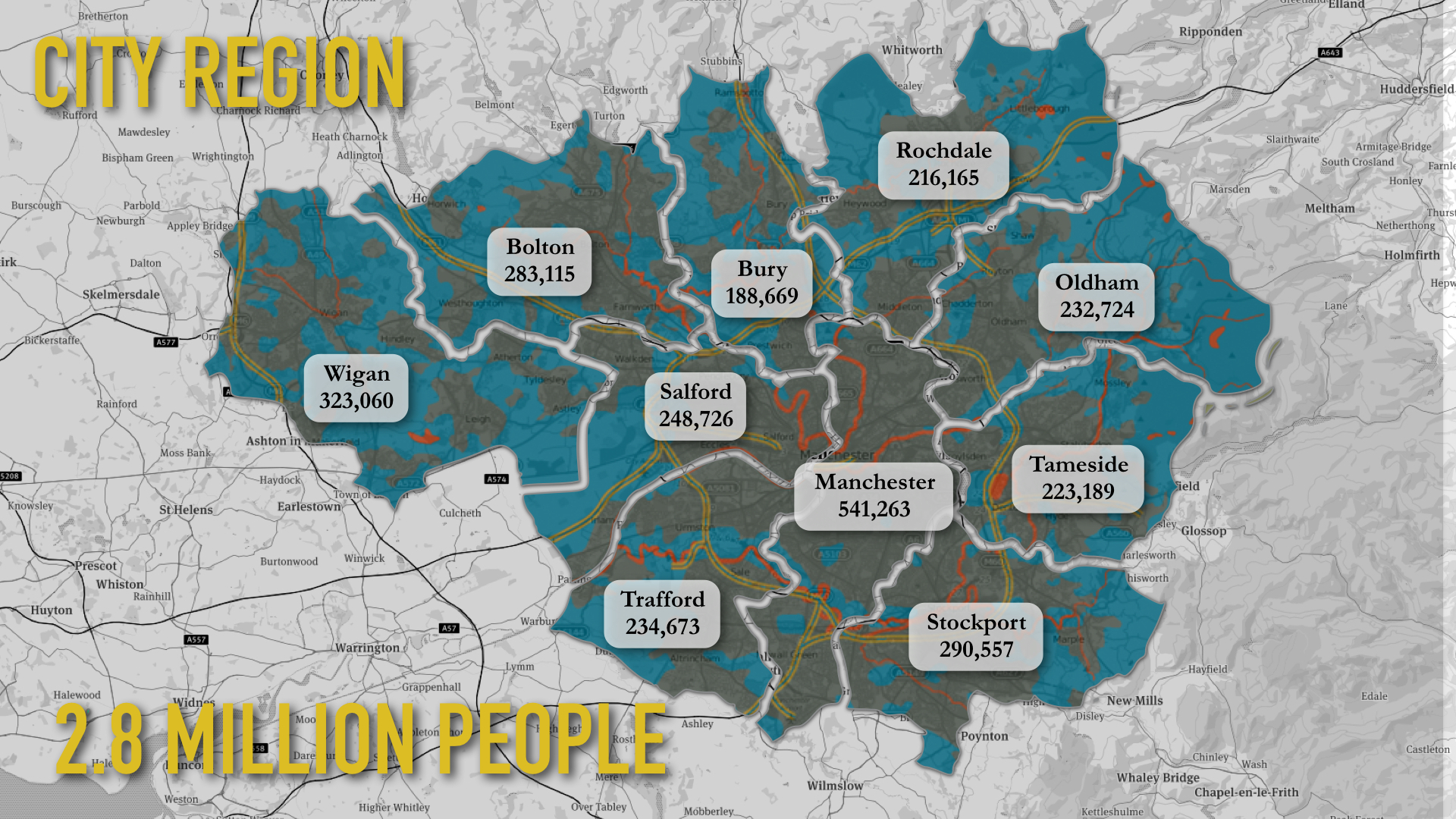


MANCHESTER

- Post industrial economy that is still feeling the effects of decline in manufacturing
- Inequality of income and opportunity across the city
- There is a need to increase skills in digital technology
- A lot of infrastructure is old - from utilities, to transportation to built environment
- Need for better access to healthcare, social care and education
- Not enough money to pay for what needs to be done

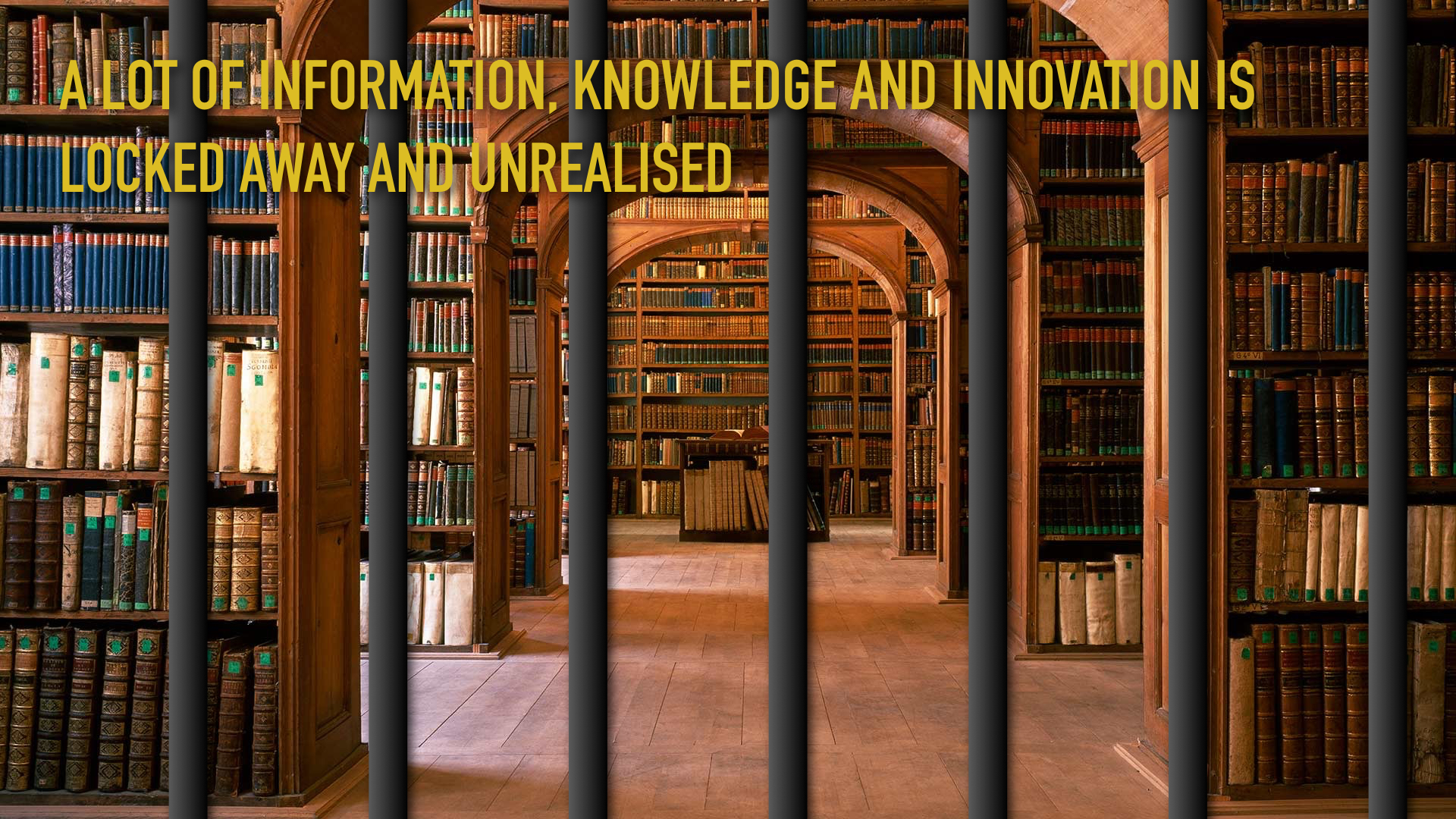
COULD BEING OPEN HELP OUR CITIES?

CITY REGION



2.8 MILLION PEOPLE

**A LOT OF INFORMATION, KNOWLEDGE AND INNOVATION IS
LOCKED AWAY AND UNREALISED**



FOUR AREAS OF OPEN

- Open Data - enable access to, sharing and reuse of data
- Open Standards - making data comparable, interoperable and shareable
- Open Infrastructure - access to data connectivity
- Open Innovation - connecting people, skills and ideas

There is also open source, open hardware, etc.

COULD BEING OPEN HELP?

WHAT IS OPEN DATA MANCHESTER?



- Established in 2010 we are an independent community of civic minded technologists
- Advocate for local and national government data release
- Run workshops, training and events
- Events highlighting state of the art practice
- Develop initiatives looking at new ways of working with data
- Promote organisations doing good work with data

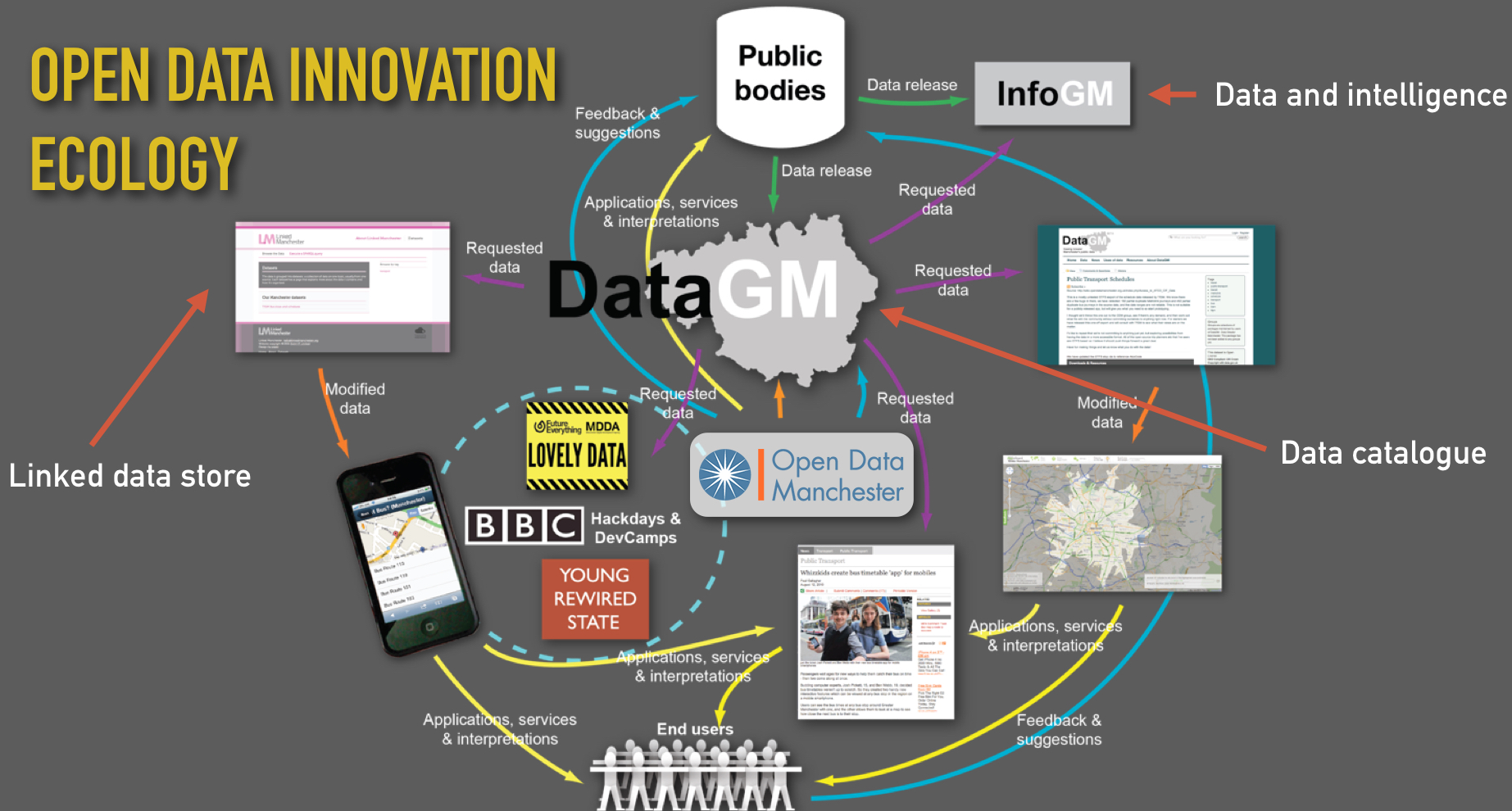
WHAT IS OPEN DATA MANCHESTER?



We also do

- Data standards
- Data governance
- Internet of Things
- Innovation projects

OPEN DATA INNOVATION ECOLOGY



OPEN DATA INFRASTRUCTURE MAP

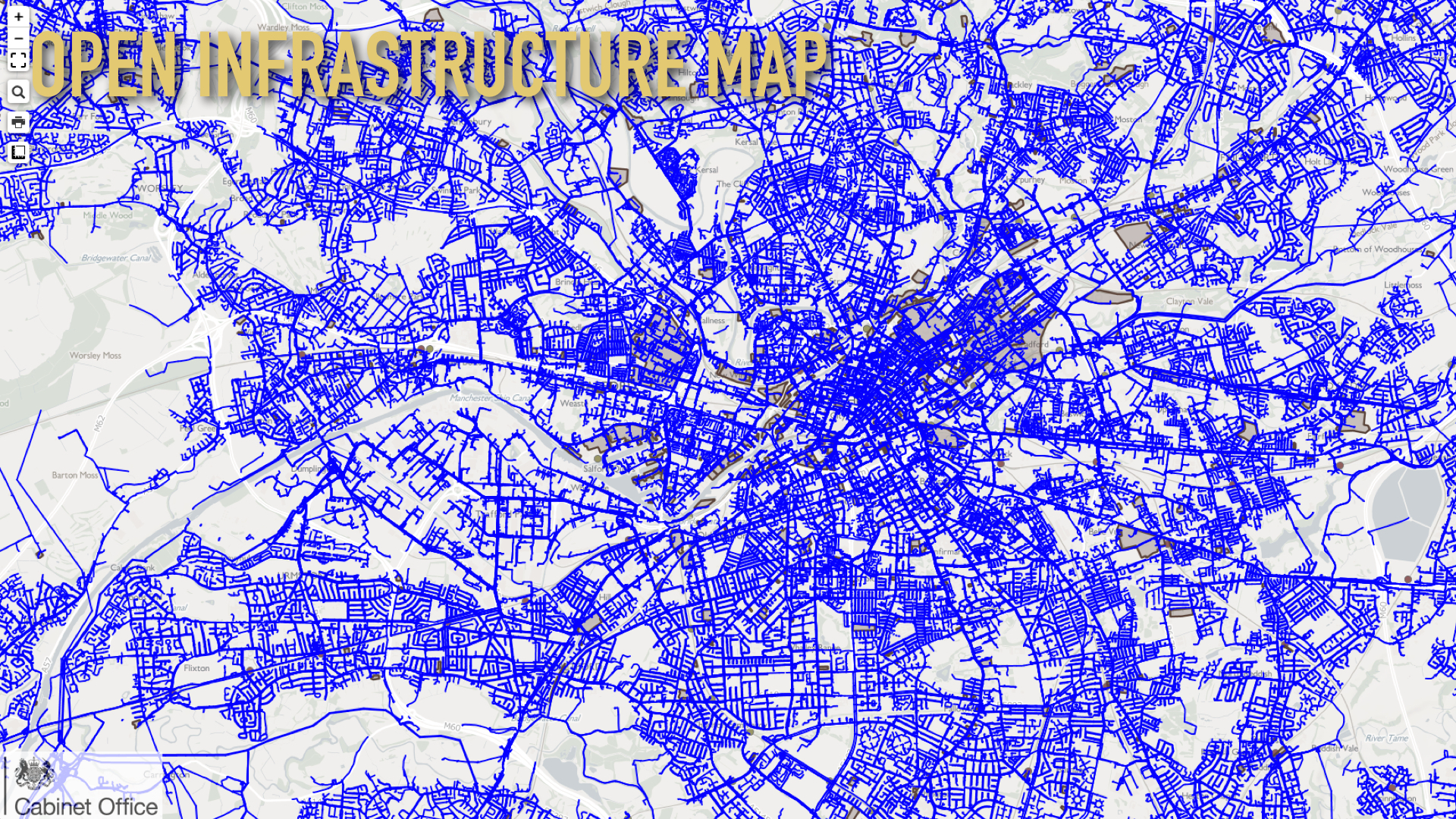
- Boundaries [1]
- Communications [0]
- Culture and heritage [0]
- Environment and ecology [0]
- Flooding [0]
- Geography and geology [0]
- Housing and housing market
- Land and property assets [0]
- People and places [0]
- Planning and development [0]
- Social and public amenities [0]
- Transport [0]
- Utilities [0]
- Waste and recycling [0]
- Water network and water bodies [0]

Problem

- Manchester is a growing city
- Space for development is constrained
- Development is not uniform across region
- Capacity issues with existing infrastructure
- Finding the right information is difficult
- Lack of information creates inefficiency and risk



OPEN INFRASTRUCTURE MAP



OPEN DATA AND TRANSPORT

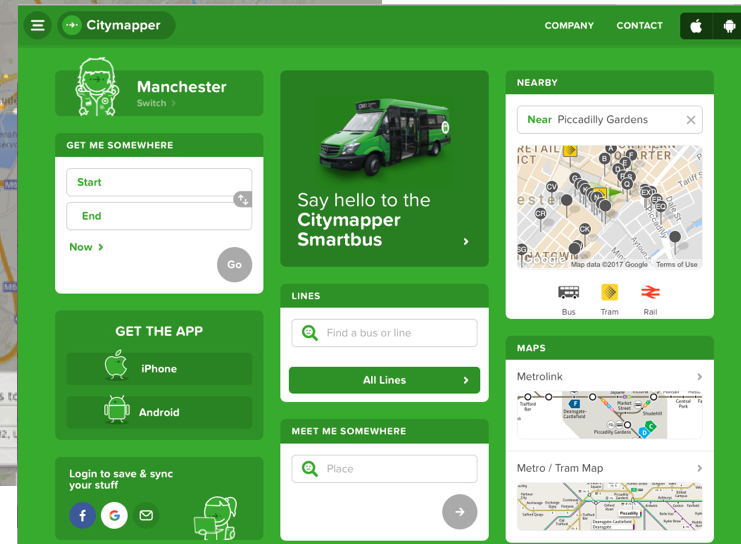
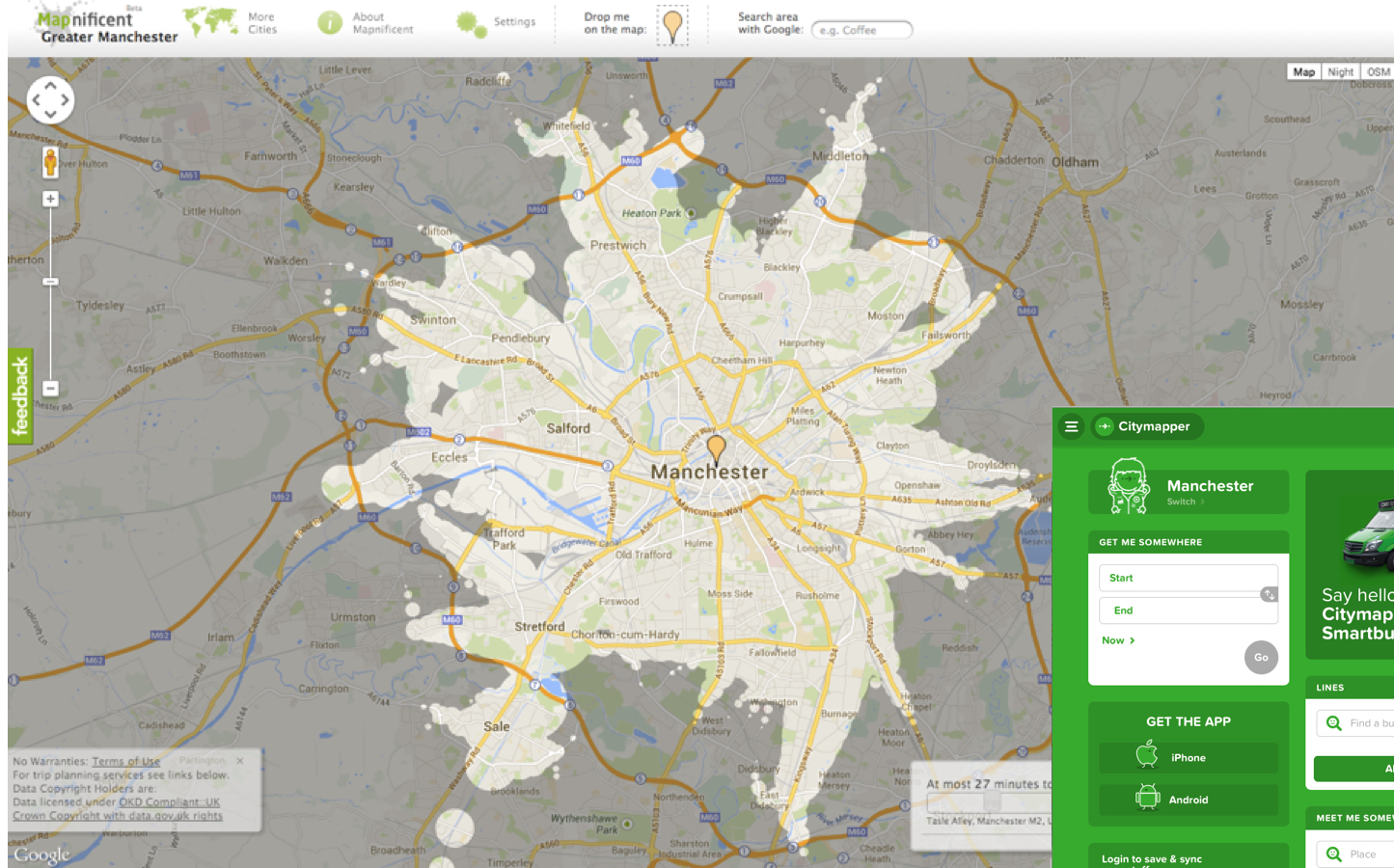
Problem

- 14,000+ Bus stops
- 15 Bus Stations
- 98 Tram stops
- 200+ Rail stations
- 2000+ Bus routes
- 300,000,000 passenger journeys
- 40+ Bus operators
- As well as highways infrastructure
- How do you keep the public informed?

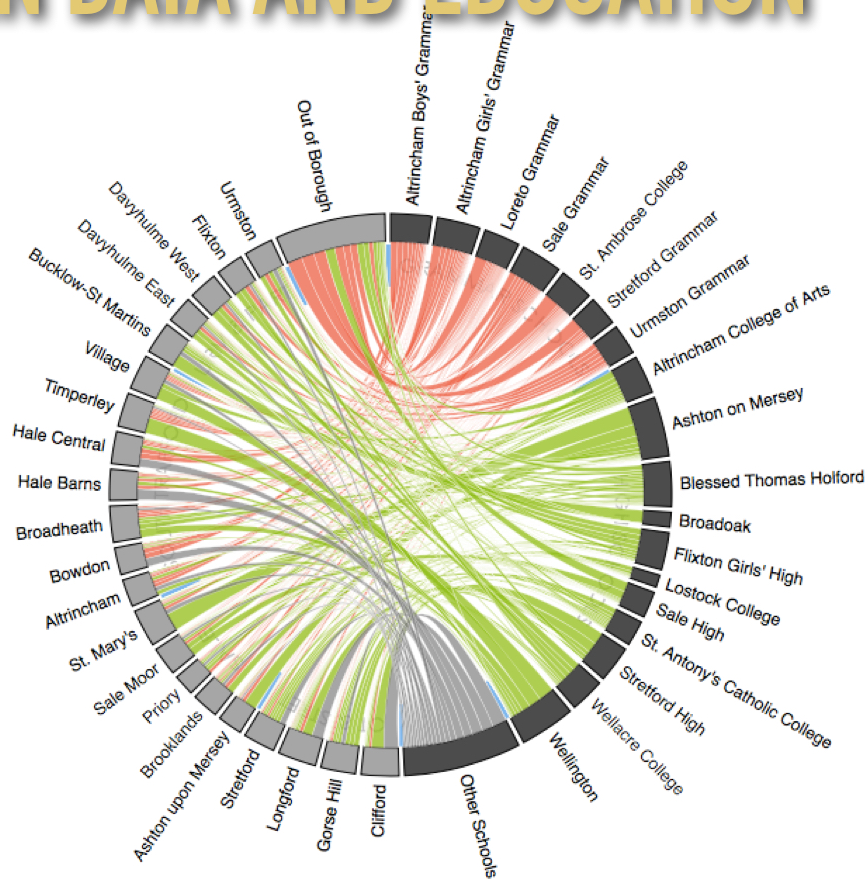
Traditional solution



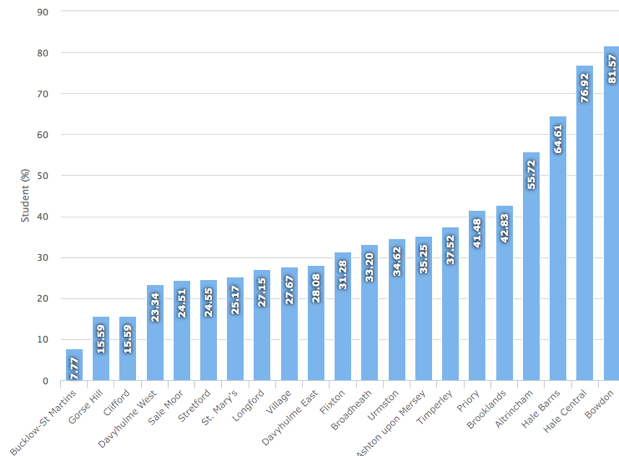
These applications exist because Manchester's transit agency releases open data



OPEN DATA AND EDUCATION



Trafford Students Attending Grammar Schools (% Students)



Highcharts.com



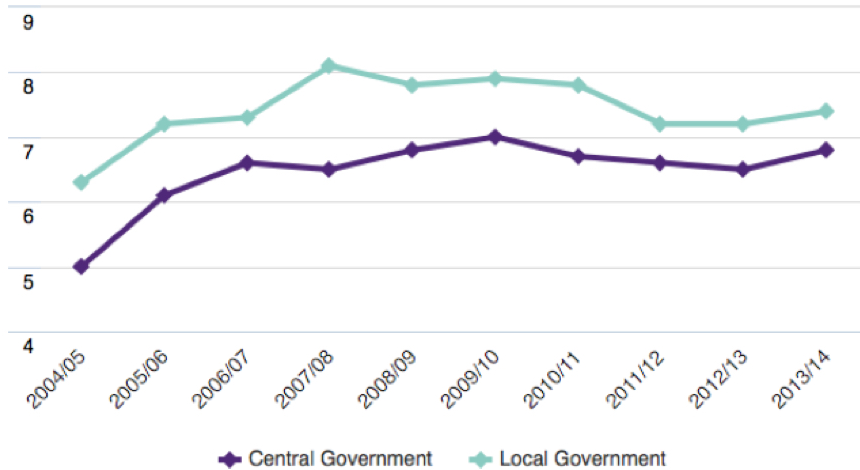
Open Data
Manchester

OPEN STANDARDS



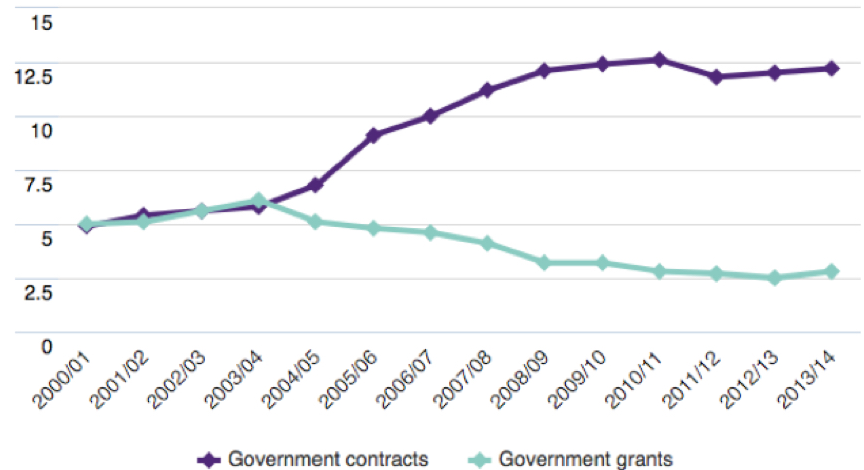
Local authority income into the VCSE sector £7.4bn 2013/14 81% of funding of funding is contracted services

Income from central and local government, 2004/05 to 2013/14 (£bn, 2013/14 prices)



NCVO UK Civil Society Almanac | Built with Highcharts

Income from government contracts and grants, 2000/01 to 2013/14 (£bn, 2013/14 prices)

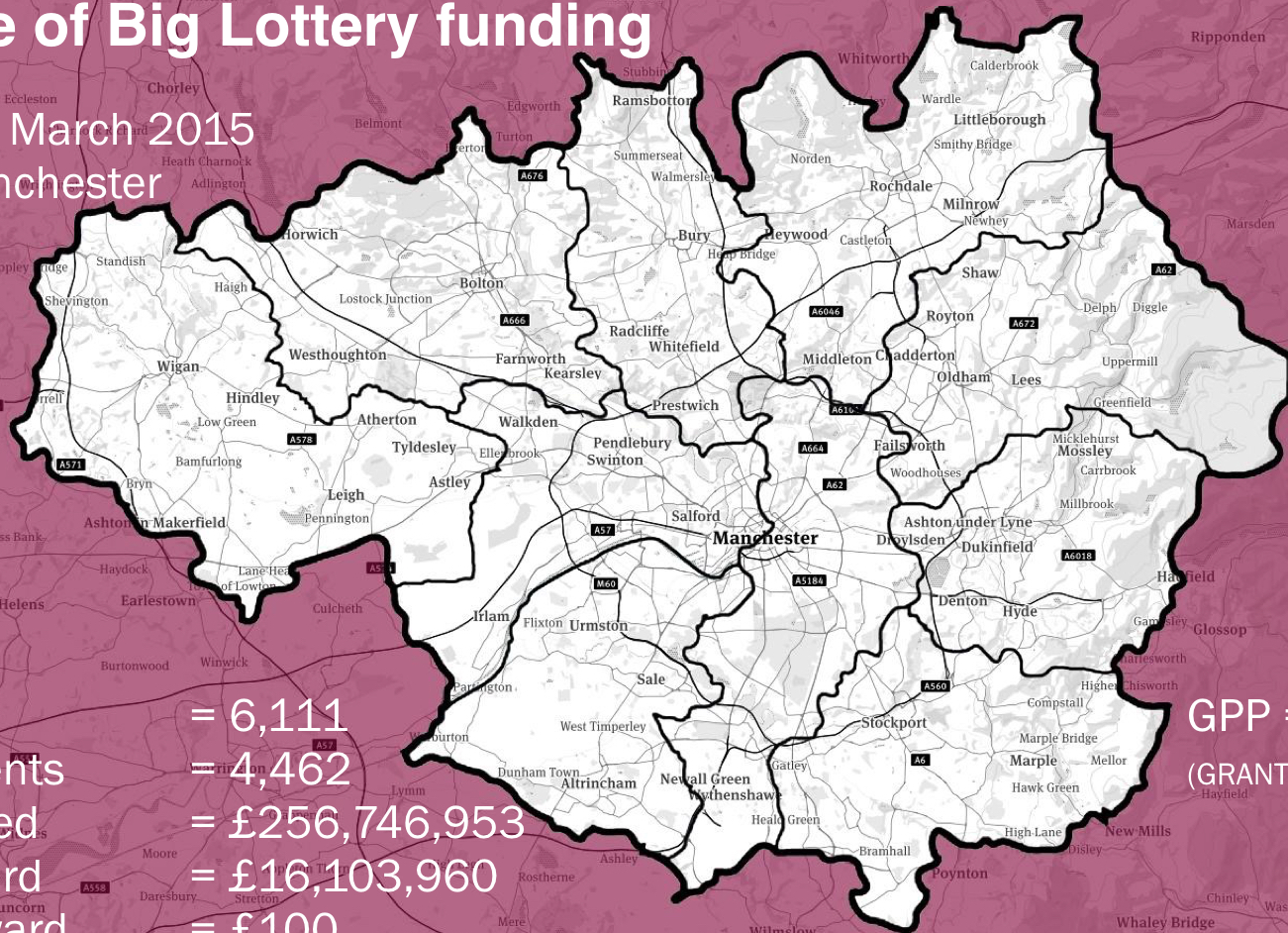


NCVO UK Civil Society Almanac | Built with Highcharts

VCSE - Voluntary, community and social enterprise sector

A picture of Big Lottery funding

April 2004 - March 2015
Greater Manchester



Total grants = 6,111
Total recipients = 4,462
Total awarded = £256,746,953
Largest award = £16,103,960
Smallest award = £100

GPP = £95.61
(GRANT PER PERSON)

OPEN INFRASTRUCTURE

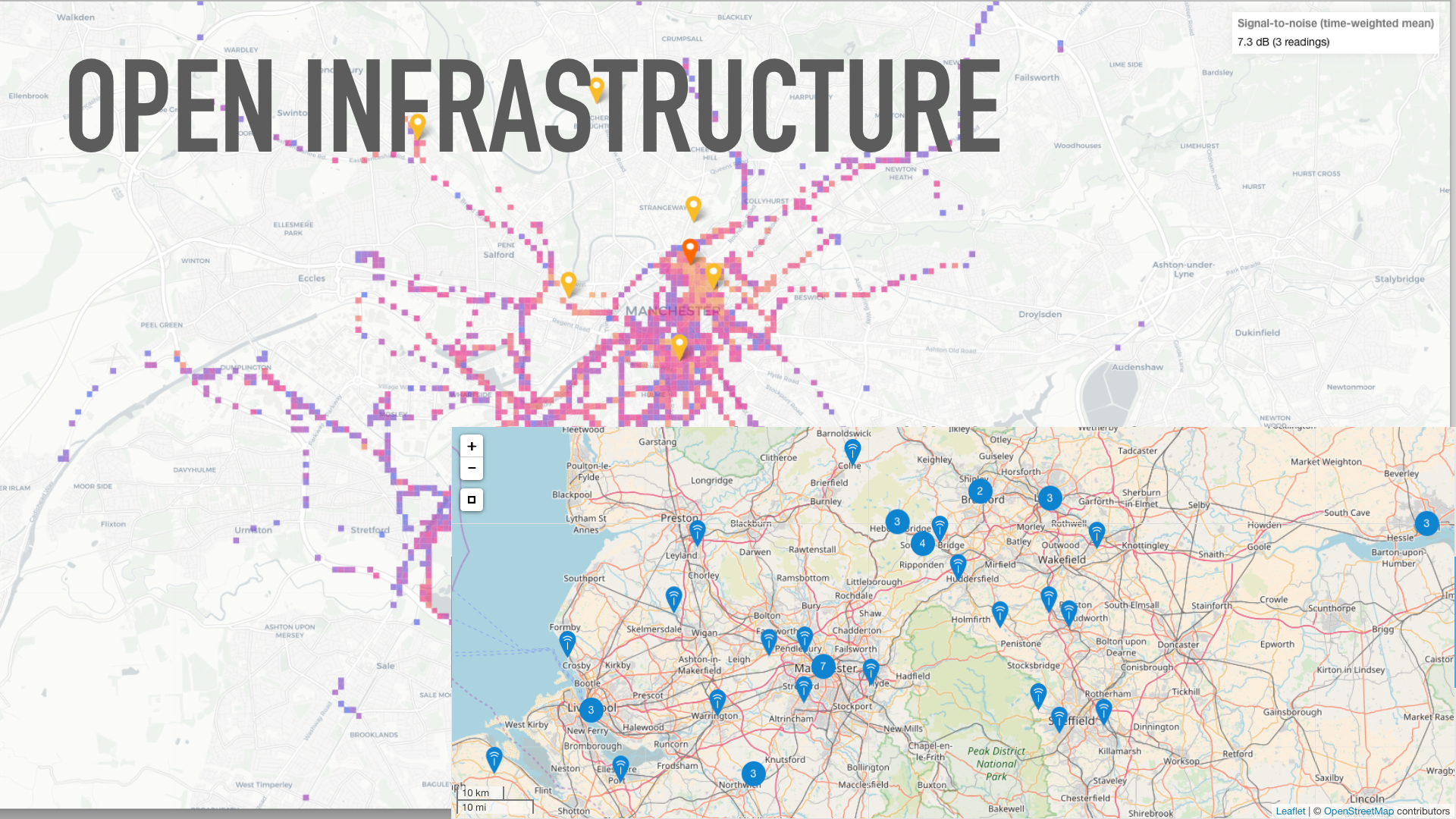


Building internet of things infrastructure for cities and communities

OPEN INFRASTRUCTURE

Signal-to-noise (time-weighted mean)

7.3 dB (3 readings)



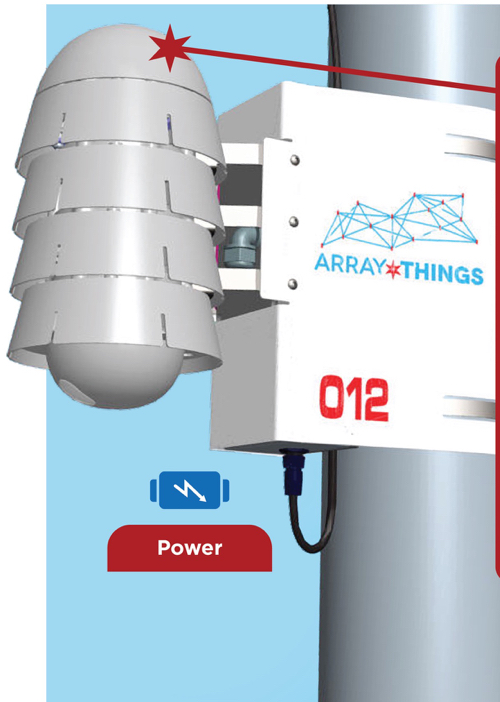
BUILDING OPEN INFRASTRUCTURE

- ▶ Building Greater Manchester's open LoRaWAN network
- ▶ Encouraging and supporting IoT communities across the North and beyond
- ▶ Helping government and communities understand and mitigate against problems
- ▶ Sharing practice



SMART GOVERNANCE

ARRAY*THINGS
THINGS



Node Components



Environmental Sensors

Air temperature, Humidity, Barometric Pressure, Vibration, Sound Intensity, Magnetometer



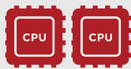
Air Quality Sensors

Nitrogen Dioxide, Ozone, Carbon Monoxide, Hydrogen Sulfide, Sulfur Dioxide



Light & Infrared Sensors

Light intensity, infrared (CLOUD COVER; SURFACE TEMPERATURE), camera, vehicle and pedestrian traffic. Images processed in-situ and discarded.



Linux Node Controllers

Image Processing Computer & System Health Manager and Control/Communications Computer



Node Power Manager

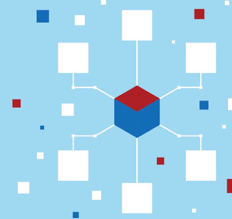
Node health monitoring and resilience functions



Power



Argonne Server

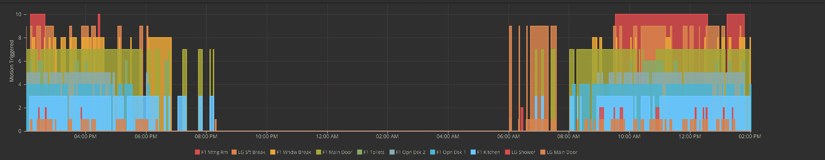
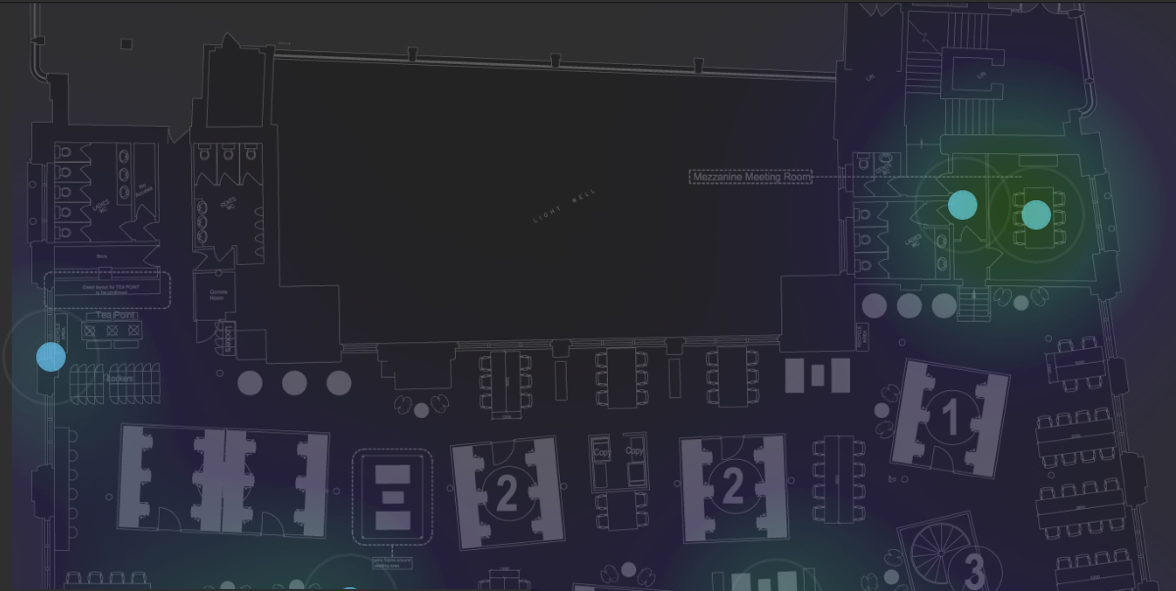


Plenario, Open Data Portals, Dashboards, and Apps

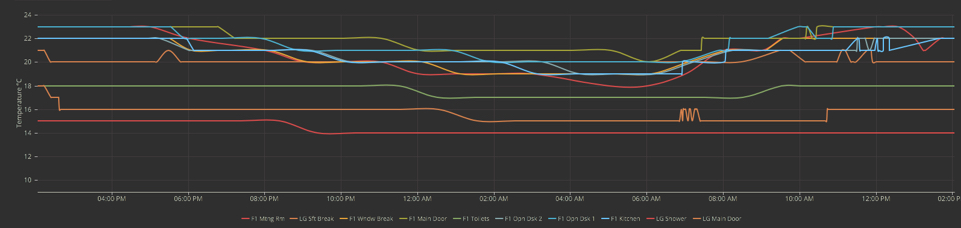


KNOWABLE BUILDING FRAMEWORK

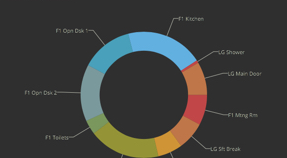




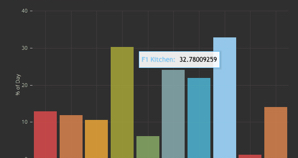
Temperature Analysis



Motion by Location



Percentage of Last 24hrs



THANK YOU

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