

**Introduction to:**

# **The Cambridge Cluster Smart and Intelligent Cities**

Cambridge

Royal Borough of Greenwich

Scotland - Circular Economy

John K Davies - International Partnerships

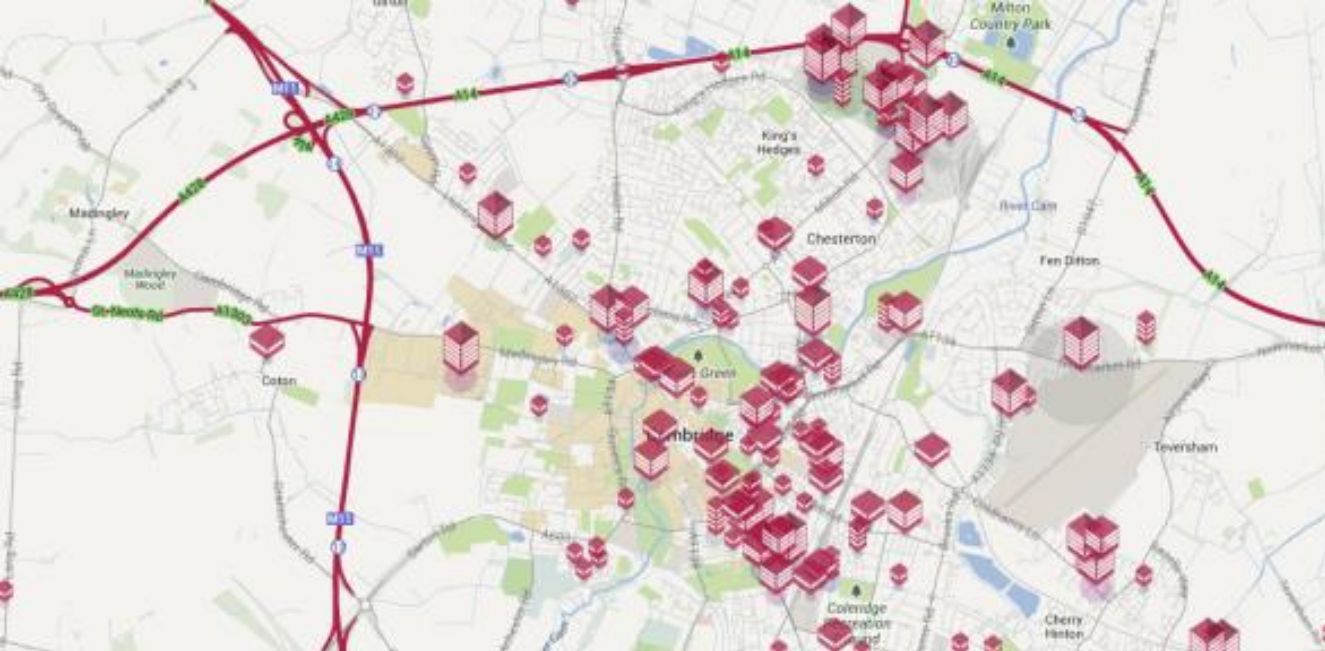
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CW (Cambridge Wireless)

- Introduce the Cambridge experience of technology clustering in the context of evolving and new ecosystems
- University, large multinationals, Start up and Scale up, Angel and venture funding
- Moores Law and Faster – within our generation
- Smart Cities, IoT, Data, AI, VR/AR/MR Blockchain CAV, Industry4.0, 5G  
..... and all that stuff...!!!

## The Past and the Future





## Concentration in Technology

ICT, Pharma, Biotech, Cleantech .....

### The Cambridge Cluster

There are currently...

**4,700+**

knowledge intensive firms



**60,000+**

people employed by knowledge intensive firms



**£12bn+**

in total turnover of knowledge intensive firms



## Cambridge Innovation in numbers

- **4723** technology based firms in the Cambridge cluster
- **£13bn** in total revenue from the Cambridge cluster
- **15 x \$1bn** companies come from the Cambridge cluster
- **2 x \$10bn** companies come from the Cambridge cluster



## Astonishing aggregation of technology companies into the Cambridge Cluster.

**Alcatel Lucent**

Amgen

**Amazon**

**Apple**

AstraZeneca

Bayer

Beko/Arcelik

**Broadcom**

**Brother**

Carl Zeiss

Cancer Research

**Citrix**

Dr Reddy's

GlaxoSmithKline

**Hitachi**

**HP**

**Huawei**

Illumina

**Intel**

Johnson &

Johnson

Medical Research

Council

**Microsoft**

**Research**

Mundipharma

Pfizer

**Philips**

**Qualcomm**

**Samsung**

Sanofi

Takeda

**Toshiba**

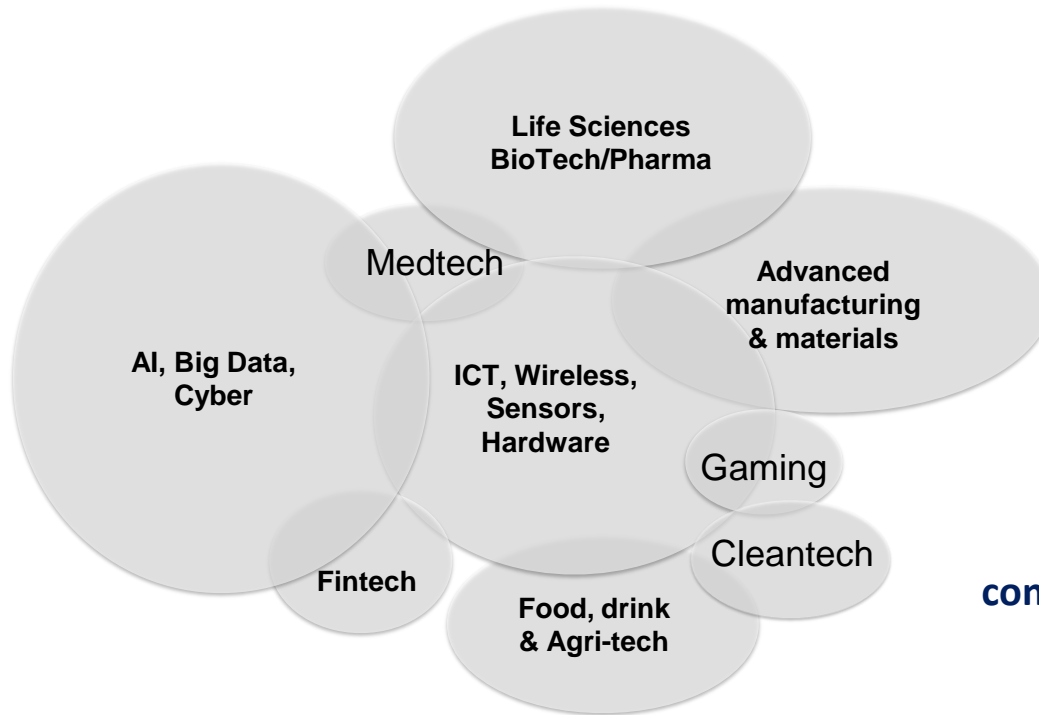
Unilever

Wellcome Trust

## and 15 \$1bn 'home-grown scale-ups'

ARM, Autonomy, Aveva, CSR, Virata

# Organisations collaborate across sectors



**Universities, research institutes,  
consultancies, CROs, finance, training,  
angels**

# Life-stage support eco-system

Research Institutes

Business networks

Contracted Research Centres (CROs)

Angels

Finance

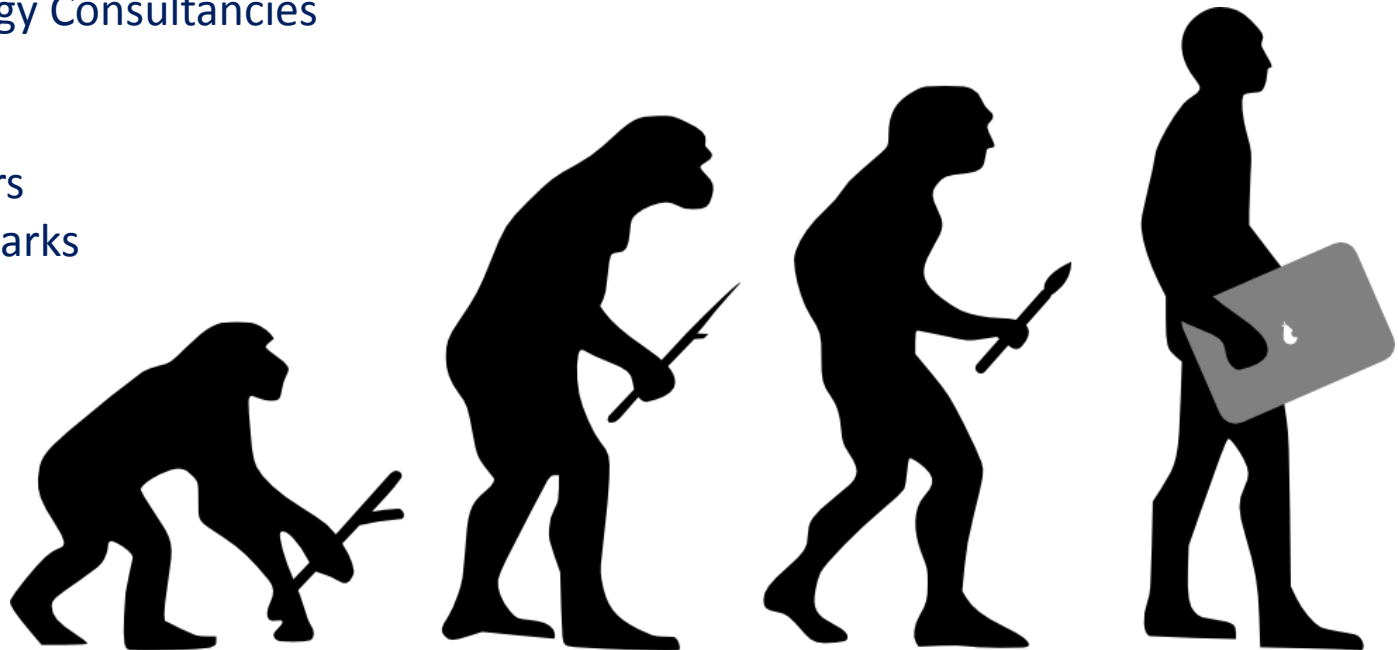
Technology Consultancies

Training

Lawyers

Incubators

Science Parks





# CW's mission is to help its members Network, Learn and Grow:

- **Network** Meet & collaborate with companies across all industry sectors for shared success
- **Learn** Learn about and debate the latest developments in Wireless Technology and its applications
- **Grow** Strengthen business capability and reach

**CW is a not-for-profit organisation that is owned by its members, with a governing board that is elected by the membership.**

**Members are drawn from all parts of the wireless enabled world, from securely connected devices, networks, smart phones, software and applications, through to data analytics, content delivery, telecommunications and satellites.**

# Special Interest Groups (SIGs)

*Our SIG events enable like-minded companies to network, debate the latest developments in the industry and find commercial opportunities for mutual collaboration*

## Our Aim:

- Keep members up to date with developments
- Explore new business opportunities
- Create opportunities for influencing developments
- Focus on specific technology and market sectors
- Encourage networking



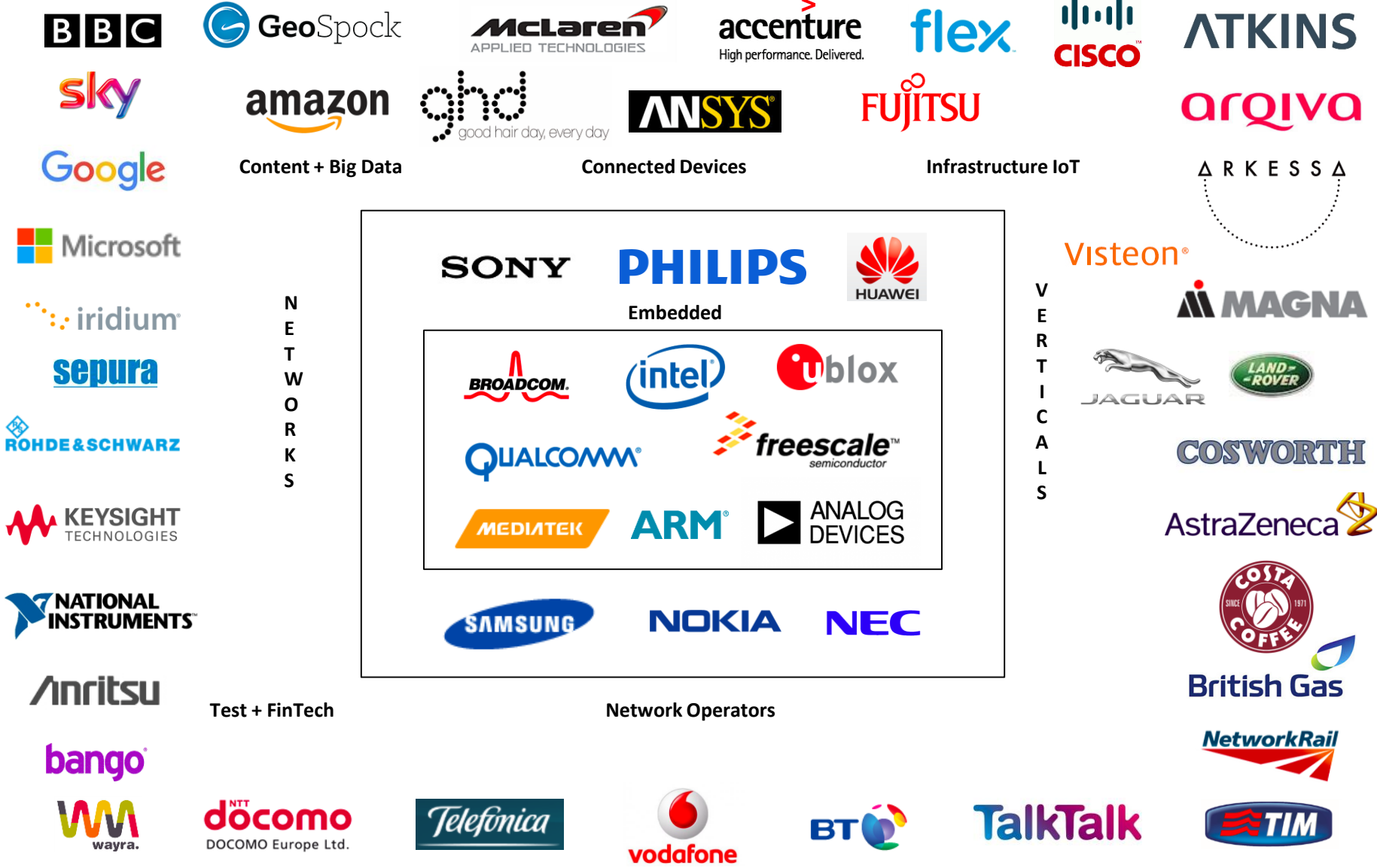
## 17 SIGs:

Academic & Industry  
Automotive & Transport  
Business  
Connected Devices  
Digital Delivery & Content  
Future Devices  
Healthcare

Legal  
Location  
Radio Technology  
Security  
Software / Open Source  
Small Cell  
User Experience

Virtual Networks  
Wireless Heritage  
Artificial Intelligence  
Industrial IoT  
Smart Cities

# CW Members: 400 + wide coverage of the technology eco-system



# CW Members: Service Providers & Thought Leaders



# Cambridge Intelligent City- On the Ground, In the Air

## Example programme: IoTUK Boost

- A programme to support  $\geq 10$  x **SMES** to deliver Internet of Things (IoT) enabled services and applications on an installed LP-WAN network.
- Makes use of a new Cambridge city wide LoRaWAN network.
- Utilises the new Cambridge University Intelligent City Management Platform & Iotic Space
- Testing LP-WAN technology solutions, that focus on a genuine need or problem area: Air quality monitoring, Transport, Primary prevention of ill health in older people







BROOKGATE

# Collaboration

ARM



UNIVERSITY OF CAMBRIDGE



CW CAMBRIDGE WIRELESS



GREATER CAMBRIDGE  
GREATER PETERBOROUGH

ENTERPRISE PARTNERSHIP



abellio redgate



ttp | The Technology Partnership

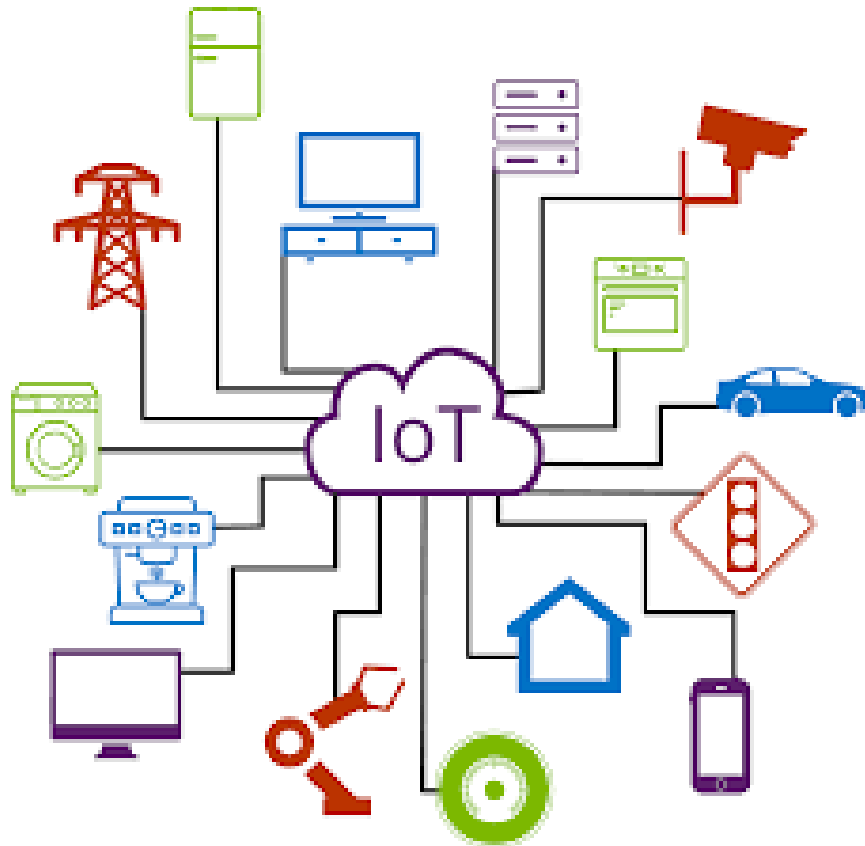


# THE ADAPTIVE CITY/COMMUNITY

- Adaptation of Infrastructure in real-time
- Adaption of hard infrastructure
- Adaptation of behaviour

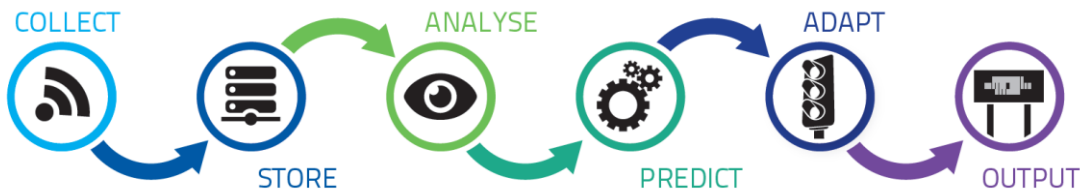






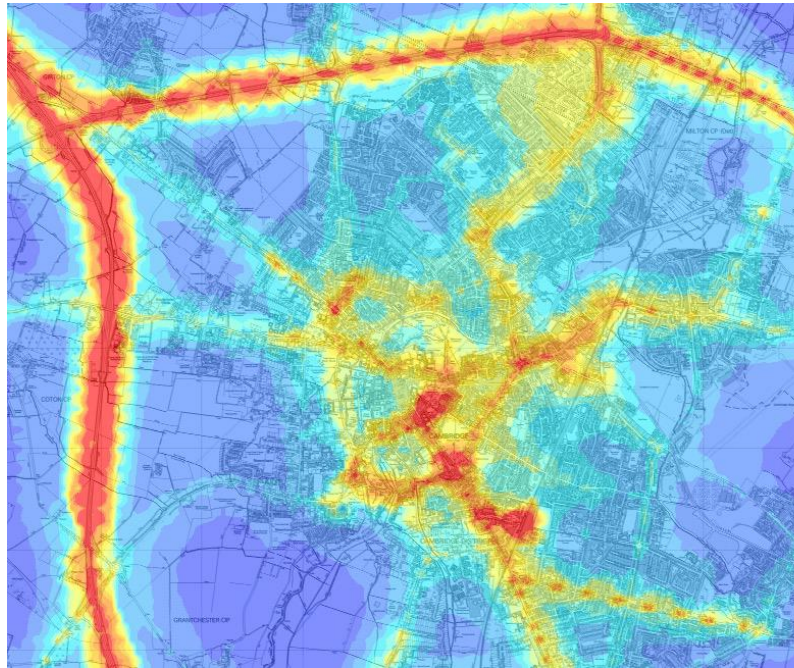
## Cambridge 'Internet of Things' infrastructure

- Real time data hub
- Static open data platform
- LoRa Low power wide area network
- Sigfox – LPWAN
- Network of sensors



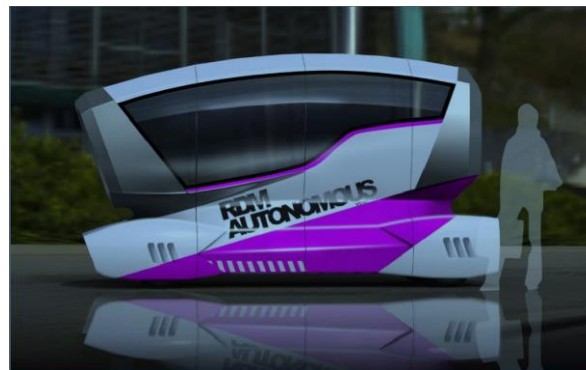
# Air Quality

- 13<sup>th</sup> worst level of congestion of UK cities and in the top 30 for serious air pollution including from diesels, particularly particulates and nitrous oxides.
- Collaboration with University of Cambridge Chemistry Dept
- Used a network of AQ sensors and a model to look at local source attribution

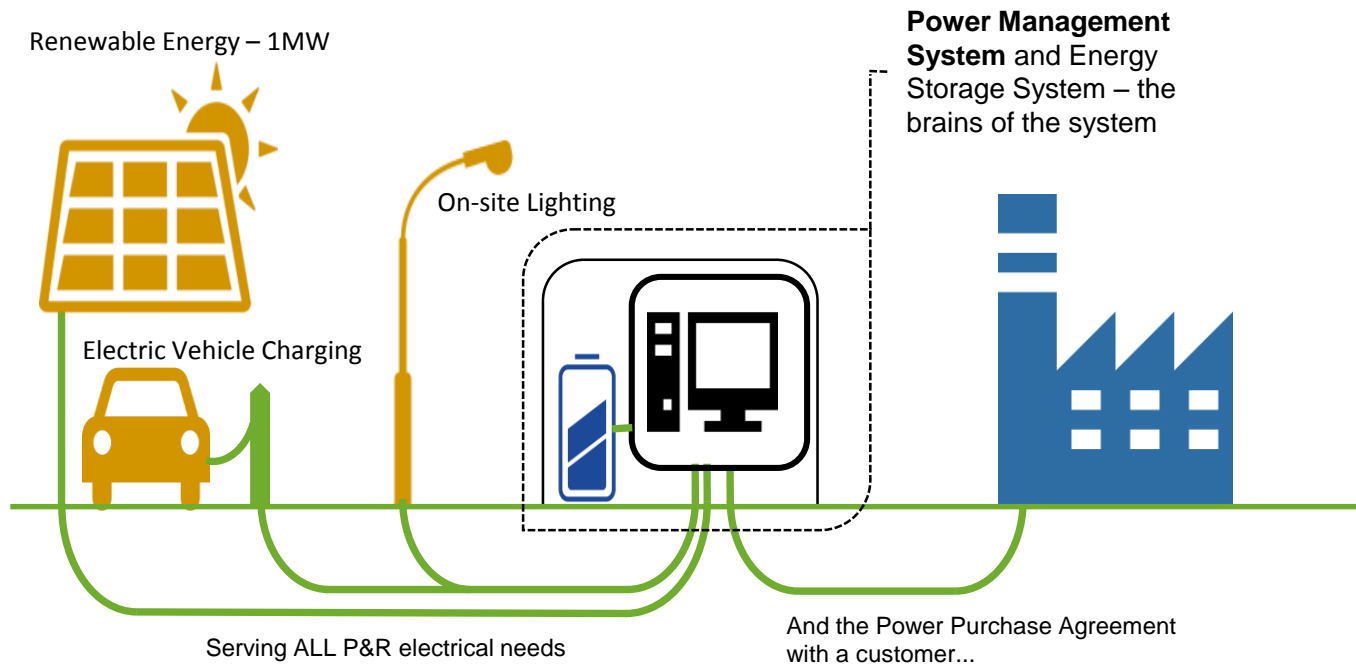


# Future Mobility and Emerging Technologies

- Autonomous Vehicles – CCAV 2 – feasibility study/Guided busway study
- Future Transport System – Affordable Very Rapid Transit
- Mobility as a Service
- On-demand services
- Smart Logistics
- Smart Parking



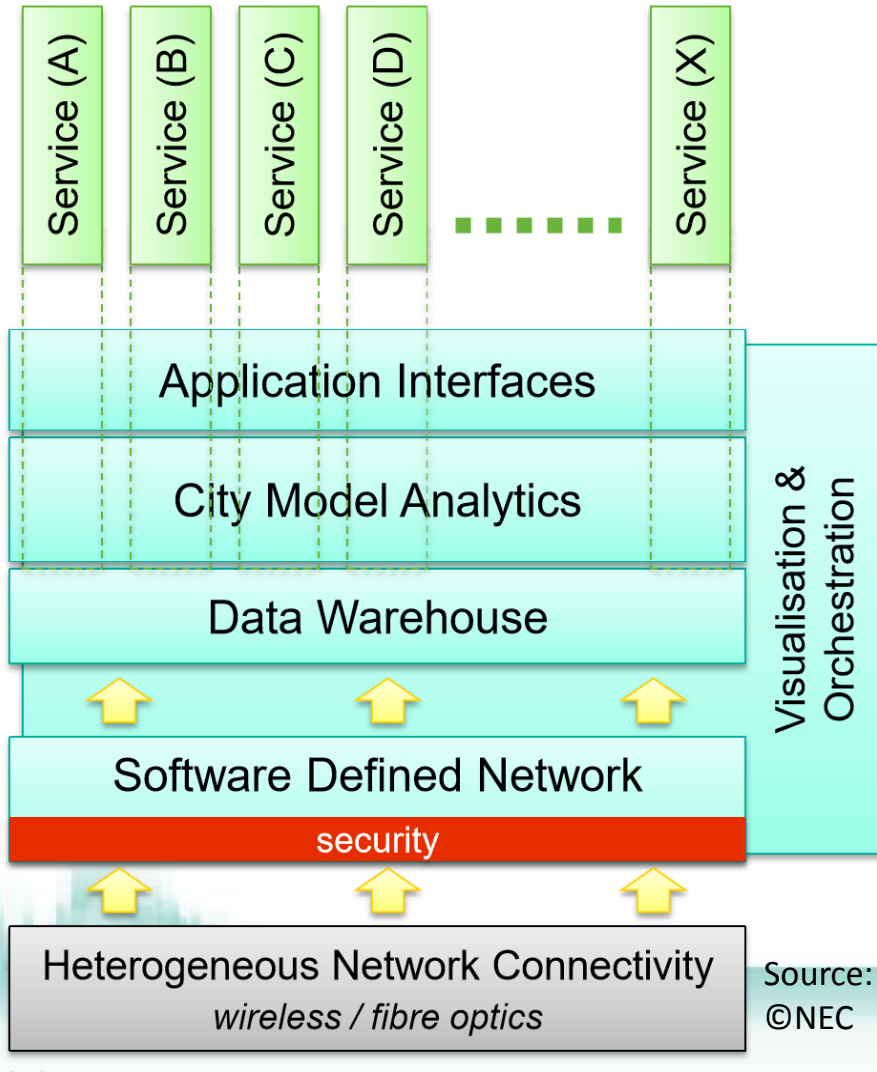
# Electric Vehicles as part of a Smart Grid





• DIGITAL  
• GREENWICH

Royal Borough of Greenwich, London  
Smart City test bed, 275,000 population  
H2020 Sharing Cities demo district  
Smart Mobility Living Lab  
5gcitizen Test Bed and Trials  
ETSI City Digital Profile for standards  
City Protocol Society for scale up



## Replicable smart city platform

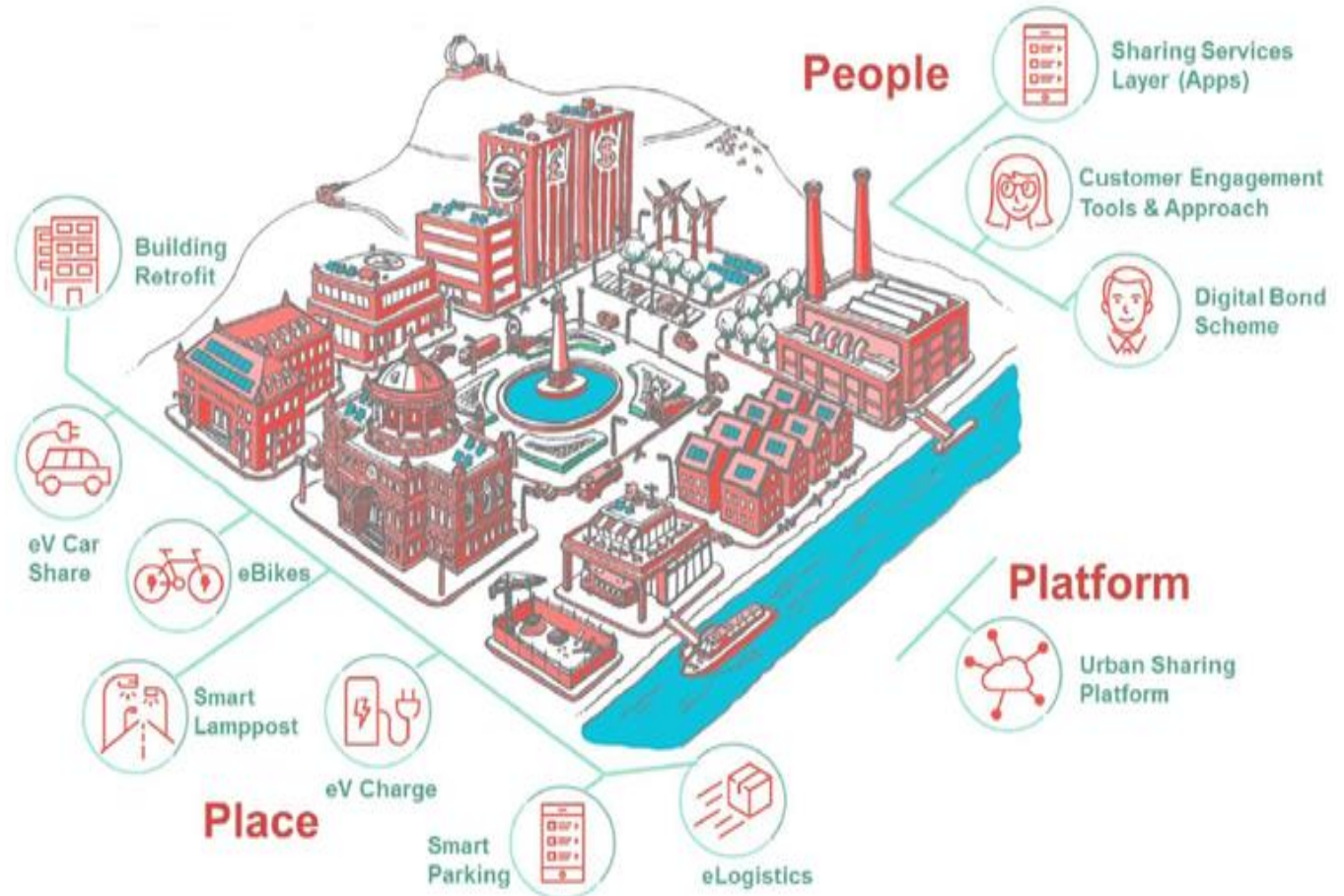
- Horizontal focus
- Avoid next gen silos
- Risk share development
- SDN interface
- Pervasive IoT services
- DLT wallet authentication
- Aiming for Mobility as a Service
- 6 CAV research projects
- Bidding for 5gcitizen test bed



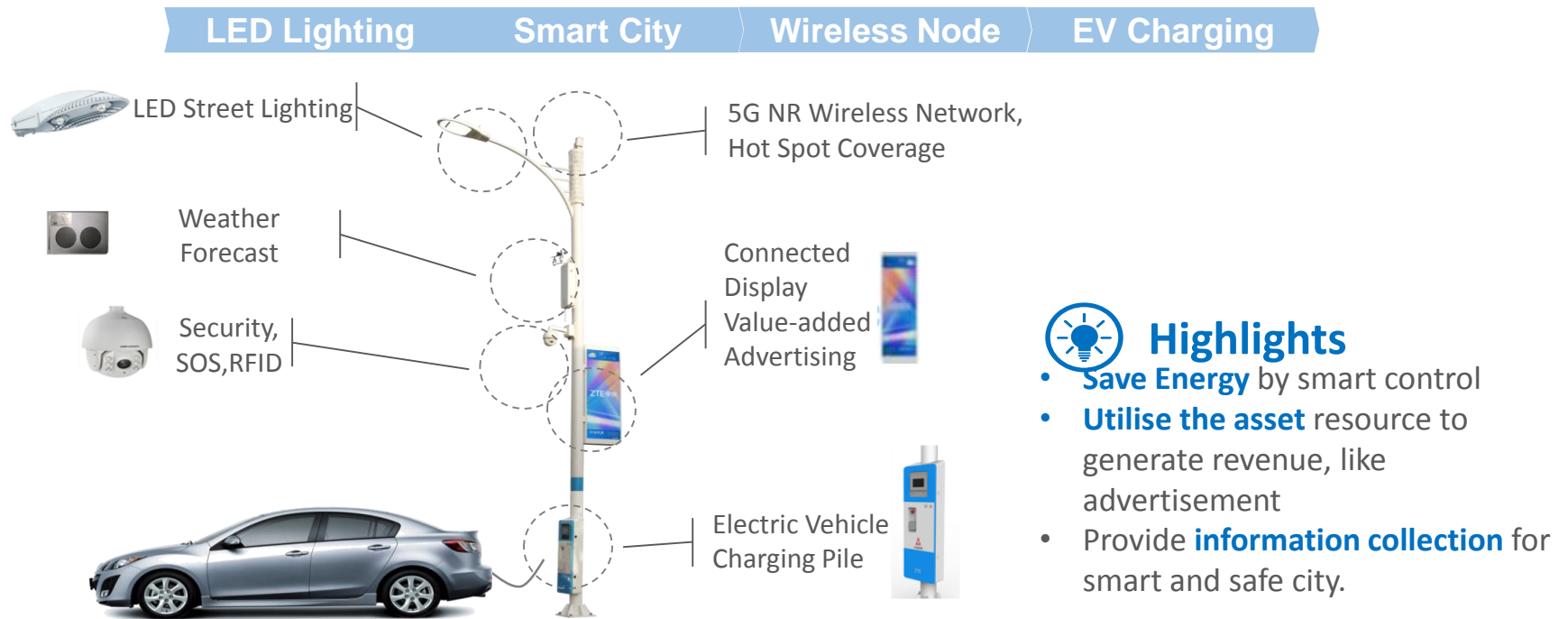
DIGITAL  
GREENWICH

## Sharing Cities Horizon 2020 Lighthouse

London  
Milan  
Lisbon



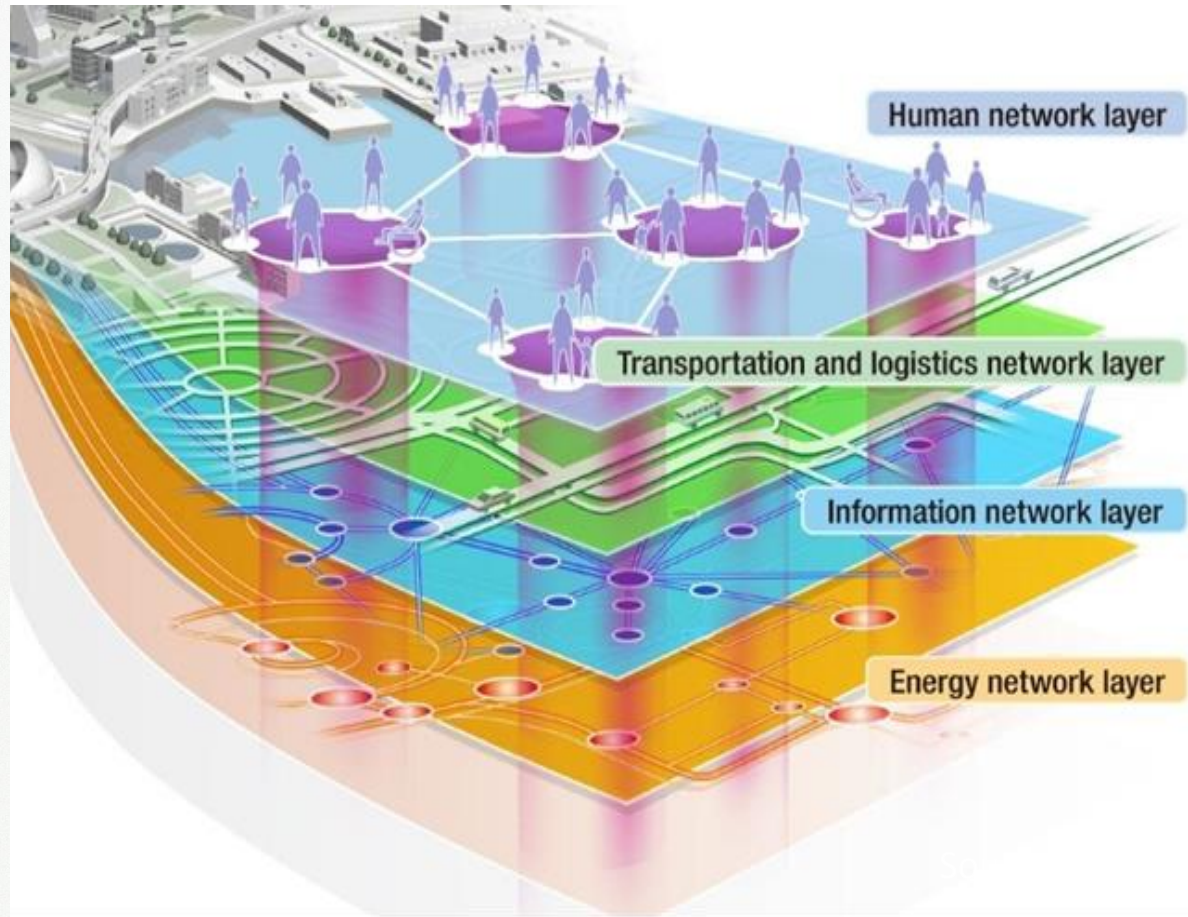
# 5gcitizen - ZTE Smart City – BluePillar Solution



## Highlights

- **Save Energy** by smart control
- **Utilise the asset** resource to generate revenue, like advertisement
- Provide **information collection** for smart and safe city.





Connected homes/vehicles  
Payments / monetized IoT  
Hardware encryption  
Voting and polling  
Social care & benefits  
Leisure and public media  
Mobility as a service

**Citizen authentication is key**

# 5G enhanced mobile broadband

is required for XR mass adoption

Extreme throughput – multi Gbps

Ultra-low latency – down to 1 ms

Uniform experience – even at cell edge

XR video will be the killer use case for 5G

~10 to 50 Mbps

Current-generation  
360° 4K/30fps video

~200 to 5000 Mbps, very low latency

Next-decade  
Interactive, real-time 3D “Free-Viewpoint”  
6-DoF 8K/90-120fps HDR-next video

Sustained network performance



~50 to 200 Mbps, lower latency

Next-generation (2019)

3D 360° 8K/30fps viewport-aware HDR10 video



© Qualcomm Technologies Inc



<https://www.qualcomm.com/documents/mobile-future-extended-reality-xr>



Your text here



Live service autonomous pods  
Digital Greenwich 2017 highlight



 · DIGITAL  
· GREENWICH

# Circular Economy Development in Scotland

The City of Edinburgh Council is currently working in partnership with Zero Waste Scotland via the Circular Economy Cities and Regions Programme which will be delivered over two phases.



**Phase 1:** To identify a wide range of circular economy opportunities at the Edinburgh city region level, the local economy, and local priorities. The outputs from this work will build an evidence-base to demonstrate opportunities for local business growth and regional collaboration between SMEs.

**Phase 2:** To organise stakeholder engagement workshops and 'road test' projects identified in Phase 1.

The success of this work provides an opportunity to consider delivery of similar projects in other cities and regions, and to raise awareness of the benefits of a circular economy approach at a regional or local level.



International collaboration and Partnership is sought

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