



Department for  
International Trade

# **UK Opportunities and Capability in Communications and Electronics**

**7 December 2017**

**Phillip White, Sector Specialist**



# DIT – Introduction to our services

As a fully integrated advisory service we will support any aspect of plans to expand in the UK

- Dedicated, **professional assistance** on locating and expanding your business in the UK
- We are a **FREE & CONFIDENTIAL** service to support your UK expansion and growth to be as efficient as possible, helping you with:
  - Links with centres of excellence (e.g. universities);
  - Information on tax, regulatory and business planning issues;
  - Information on financial incentives;
  - Information on staff recruitment, retention and training programmes;
  - Assistance with immigration issues



# Industrial Digitalization

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UK Government Industrial Digitalization Review,  
November 2017

Focussed on five Industrial Digitalization Technologies:

- Artificial intelligence, machine learning and data analytics,
- Additive manufacturing,
- Robotics and automation,
- Virtual reality and augmented reality,
- The **Industrial Internet of Things** (IIoT) and connectivity (5G, LPWAN, etc.)





- Sensors
- IoT Wireless Network Technologies
  - LoRa, NB-IoT, Telensa, Wireless technology clusters
- Data Analytics and Artificial Intelligence
- Applications
  - Smart Cities, Industrial Digitalization, Automotive
- IoT Security
- Innovating in the UK



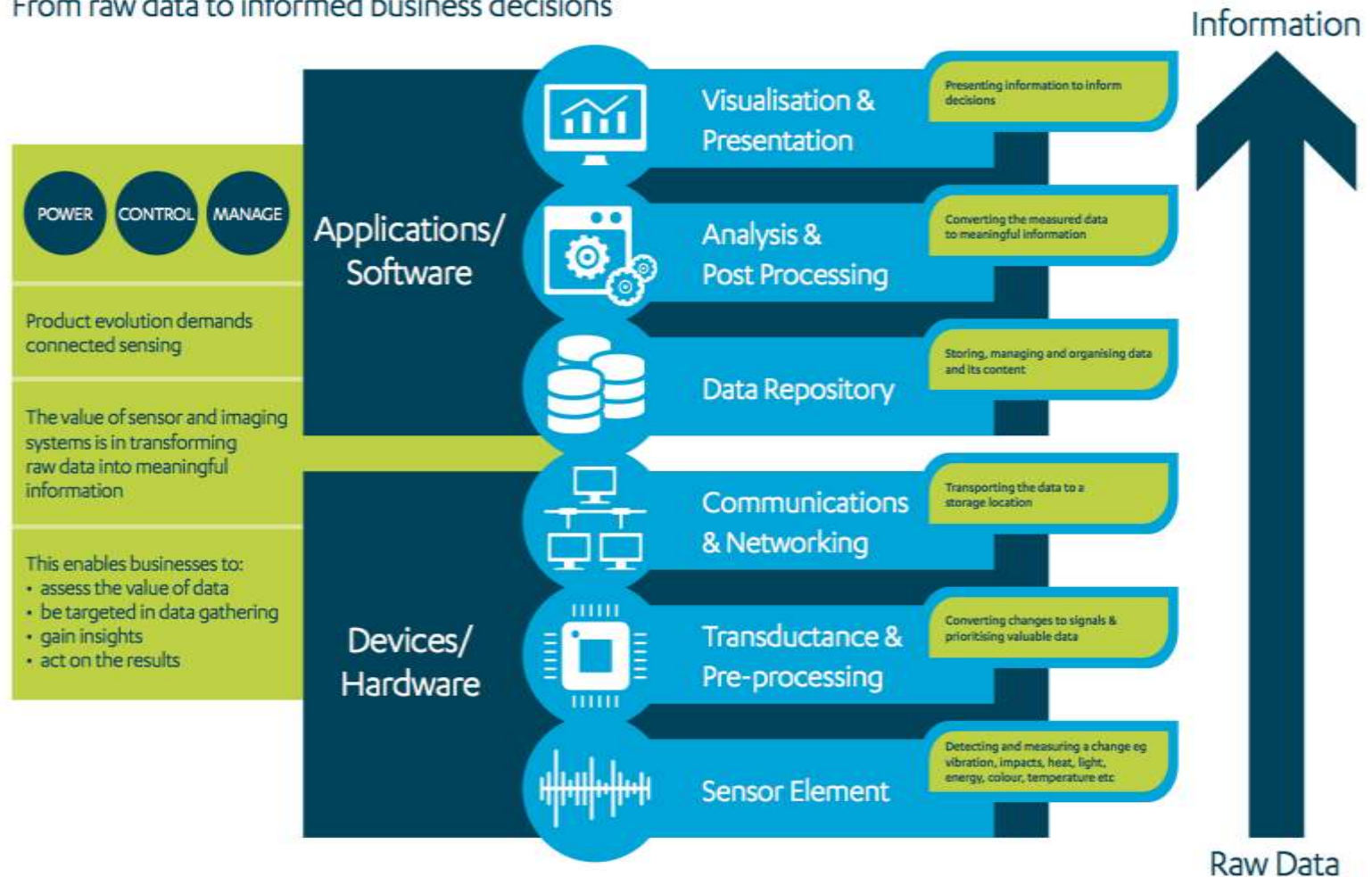
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# The Sensor Systems Stack

## The Sensor Systems Stack

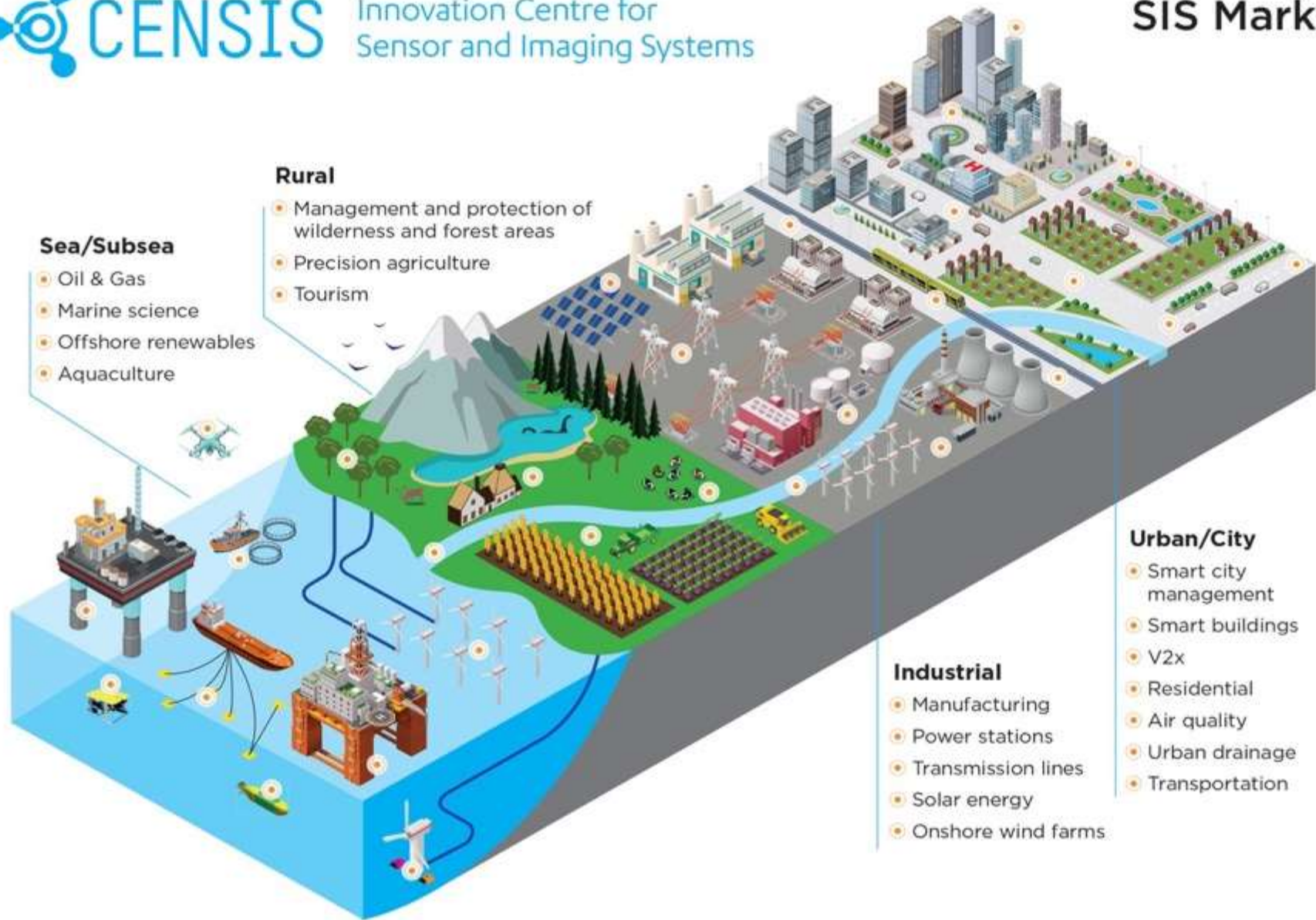
From raw data to informed business decisions





Innovation Centre for  
Sensor and Imaging Systems

 Building Scotland's IoT network



### Sea/Subsea

- Oil & Gas
- Marine science
- Offshore renewables
- Aquaculture

### Rural

- Management and protection of wilderness and forest areas
- Precision agriculture
- Tourism

### Industrial

- Manufacturing
- Power stations
- Transmission lines
- Solar energy
- Onshore wind farms

### Urban/City

- Smart city management
- Smart buildings
- V2x
- Residential
- Air quality
- Urban drainage
- Transportation





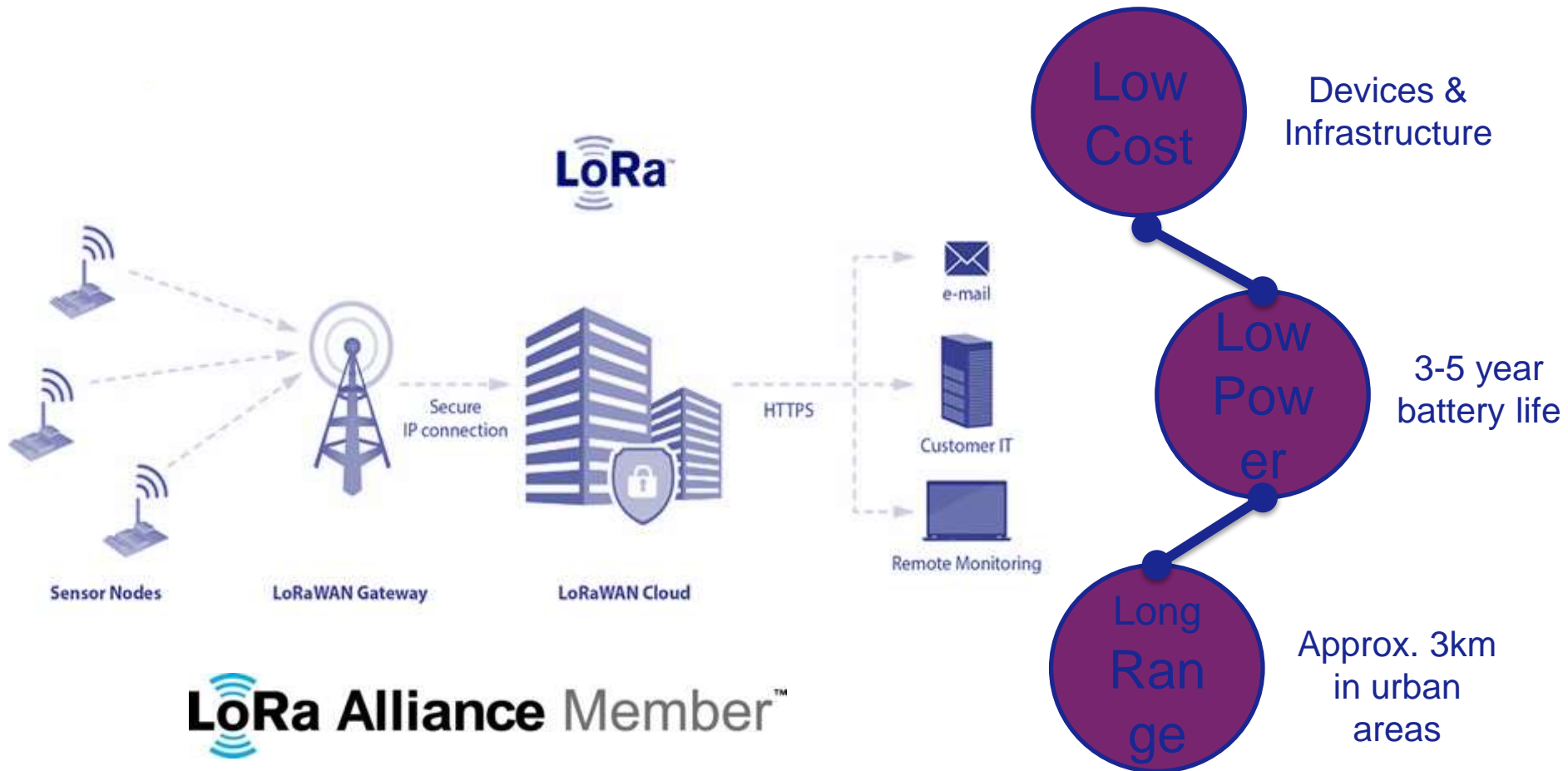
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# IoT Network Technologies

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- **LoRaWAN** – new users, companies, private, public open, free access
- Narrowband IoT – cellular mobile network operators
- Telensa – mesh network for connected street lighting
- Sigfox – new network operators, wireless mast owners, cities



# CENSIS Where does LPWAN fit?

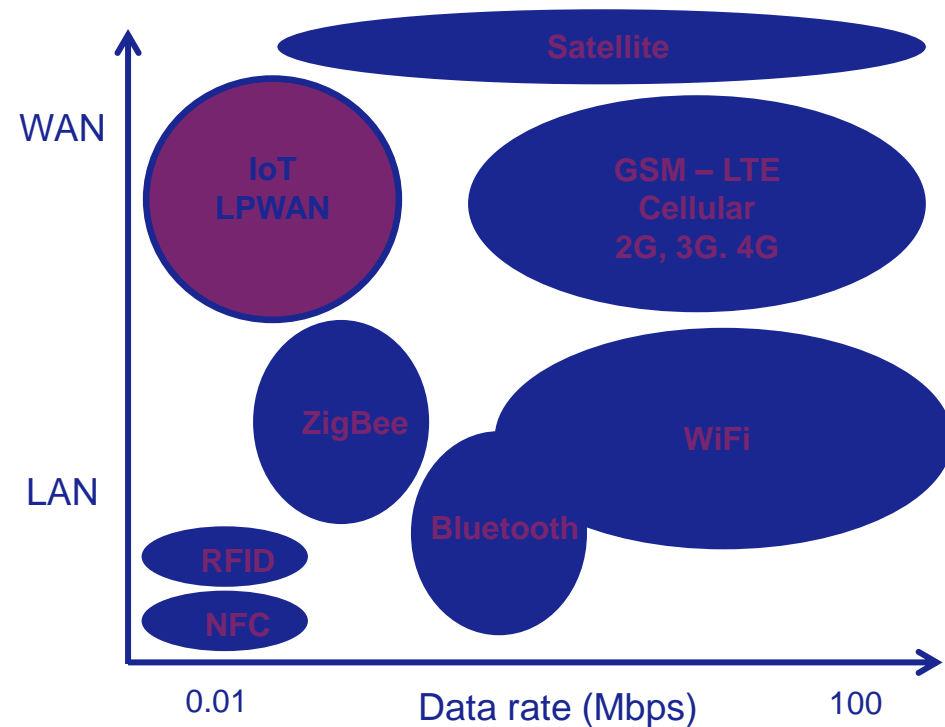
Licence-exempt ISM  
bands globally

Sub 1GHz - exceptional  
RF characteristics

Designed for small IoT  
data packets

Simple network  
infrastructure

Low cost (capex/opex)



# CENSIS Low Power Wide Area Network (LPWAN)

## What LoRa **does** deliver :

Transformative technology with positioning capability

- Cost effective enabling of IoT connectivity to new types of devices
- Infrastructure needed for development and scaling of new IoT offerings

## What LoRa does **NOT** deliver :

Internet connectivity to the disconnected

- MAXIMUM data rate is <1% of an 8Meg link!

A means for transferring video, audio, etc.

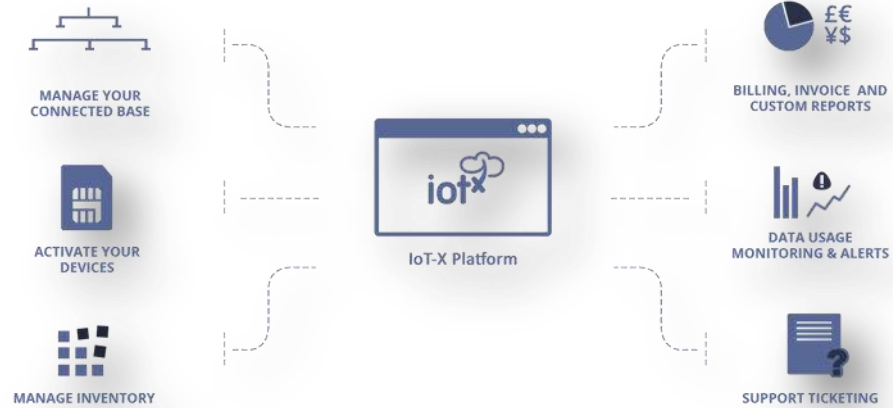
A head-to-head competitor with cellular M2M



# Network management



## Stream Technologies Cloud Platform

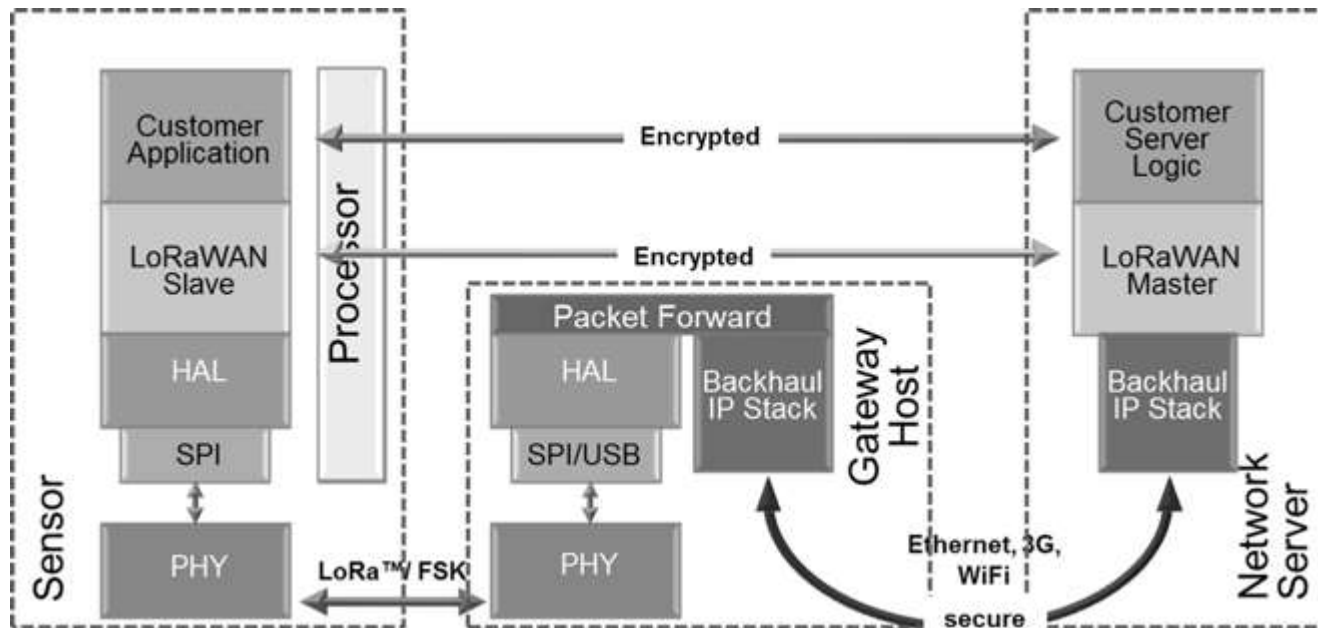


## Three level encryption

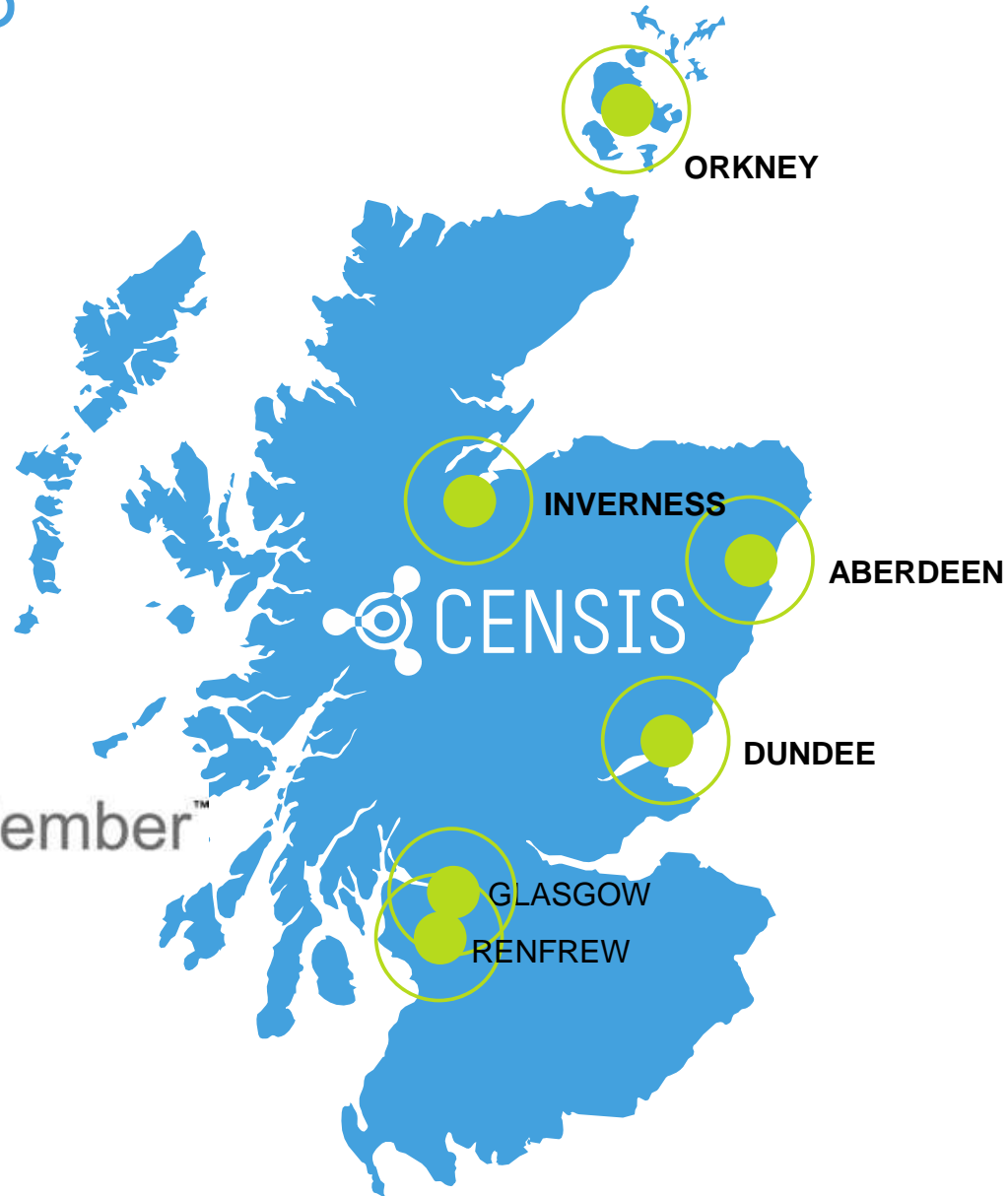
Device specific key (EUI128)

Unique Application key (EUI64)

Unique Network level key (EUI64)



# CENSIS LoRa Network Partnerships



 **LoRa Alliance** Member™



# Geolocation Solution in Glasgow



# CENSIS LoRa network offering

## Lowest possible barriers to entry

First concept to finished product

## Seamless growth with need

Scale cost and resource as you grow

- Open architecture
  - Your data
- Collaborative ecosystem partnering
  - Local delivery and shared benefit
- Global replication
  - From S/W to full deployment





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# Wireless Networks – NB-IoT

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# Narrowband IoT

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Weightless Open Standard



Neul



MK:Smart



Neul acquired by Huawei



Huawei and Vodafone NB-IoT demo lab, May 2016



## What is NarrowBand IoT?

# NB-IoT

Is a Low Power Wide Area wireless network technology specifically for connecting devices with low bandwidth requirements, using low power whilst providing increased penetration. Many millions of devices will be connected via LPWA.



**10+ Years  
Battery Life**



**Deep  
Penetration**



**Mass  
Deployment**



**Low  
Bandwidth**



**Device  
Cost**





## What applications are suited to NB-IoT?



### Gas metering

Large homogenous market measured in millions

Battery life and propagation is critical

Large number of potential meter manufacturers



### Water metering

Large homogenous market measured in millions

Battery life and propagation is critical

Large number of potential meter manufacturers



### Liquid and pressurised fuels

Large homogenous market measured in millions

Asset is currently un monitored & losses are high

Battery life is critical



### Smart Bins

Growing market with good business case

Battery life and network coverage is critical

Complements our hi end connected bins



### Environmental Monitoring

Latent market waiting for a low power solution

Battery life and network coverage is critical

Fragmented channel to market in low volumes



### Smoke and fire alarms

Massive market measured in hundreds of millions

Battery life and ability to test device is critical

High volume B2C play



### Parking monitoring

Market measured in hundreds of thousands

Battery life and low install cost are critical

Low data throughput



### Alarms and event detectors

Market measured in hundreds of thousands

Battery life is ultra critical

Very low data throughput on check and trigger





## Different technologies for specific purposes

### 2G-4G

- ✓ Sophisticated devices
- ✓ High performance
- ✓ Fast data rate
- ✓ High power

### NB-IoT

- ✓ Low bandwidth
- ✓ Deep coverage
- ✓ Long battery life
- ✓ Low cost devices







# Narrowband IoT

## Narrowband-IoT Support is global



NB IoT is supported by over 42 of the worlds largest operators who provide communications for over 3.4bn customers and geographically serve over 90% of the M2M market






## We are running NB-IoT pilots around the world


**Open Labs – UK, DE, IT, ES**

- Vodafone's Open Lab created for live network tests, demos and pilots.




**Turkey**

- NB-IoT smart parking demoed in Istanbul




**Italy**

- Gas Meter trials to be delivered in H2 2017




**Spain**

- Tested in real water meter locations with Aguas de Valencia
- Live pilots in delivery with 6 Utilities companies
- Working with 20+ utility hardware companies



**Australia**

- Testing with South East Water across their sewer pressure monitoring system





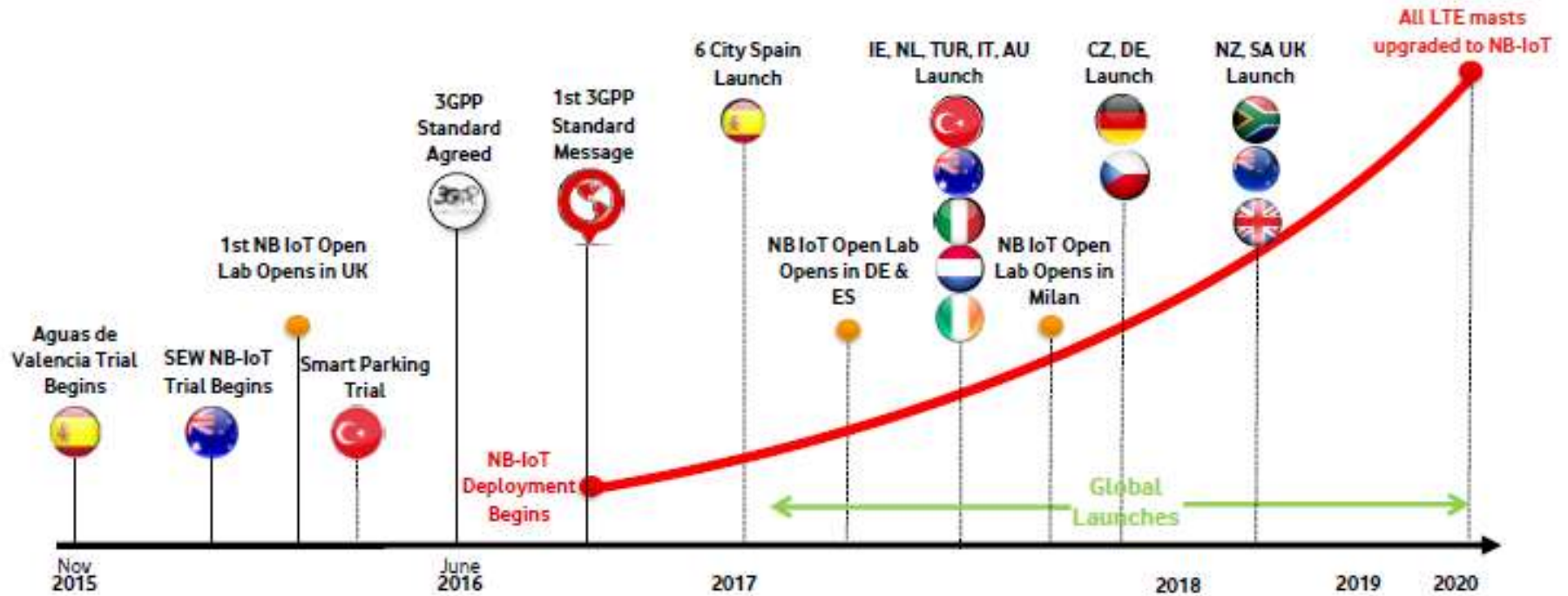
More Information Available on Request





# Narrowband IoT

## When will NB-IoT be available?

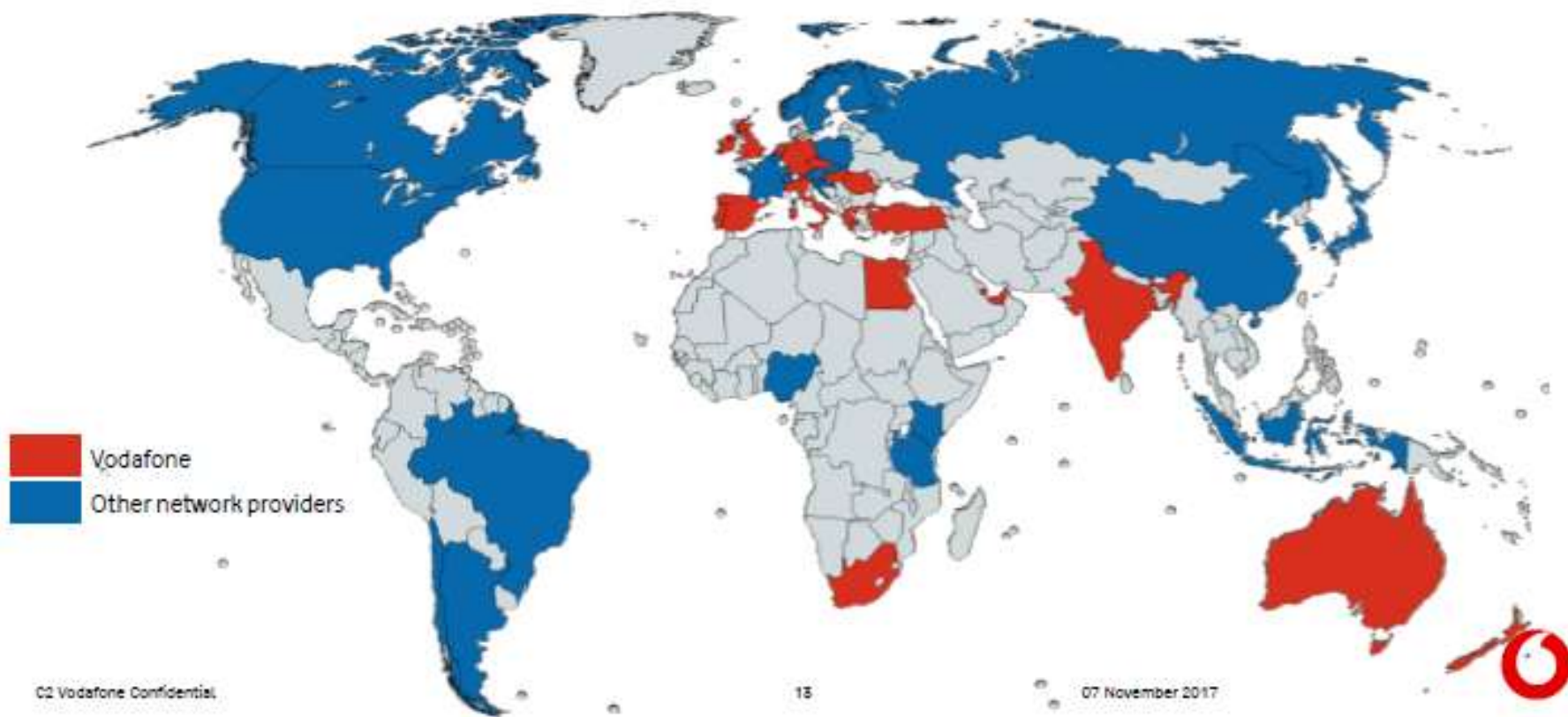


...More market launches to be confirmed!





## NB-IoT expected roll-out





# Narrowband IoT

## Narrowband-IoT Support is global

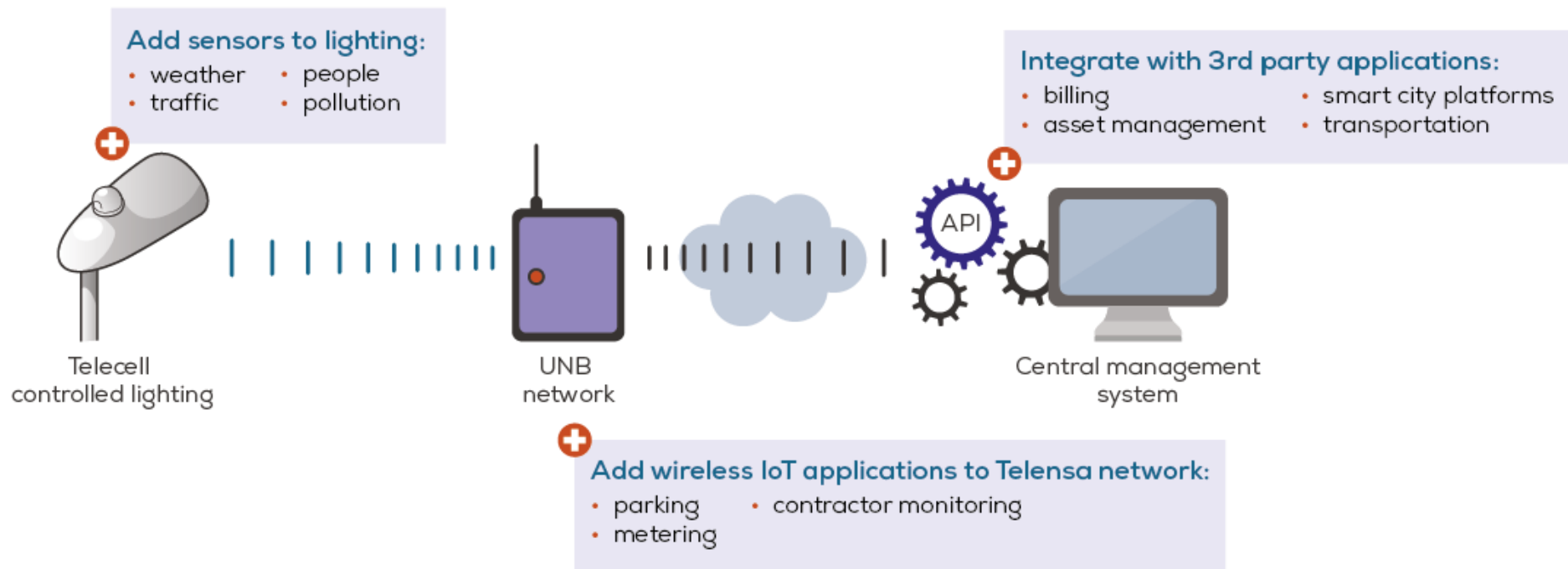


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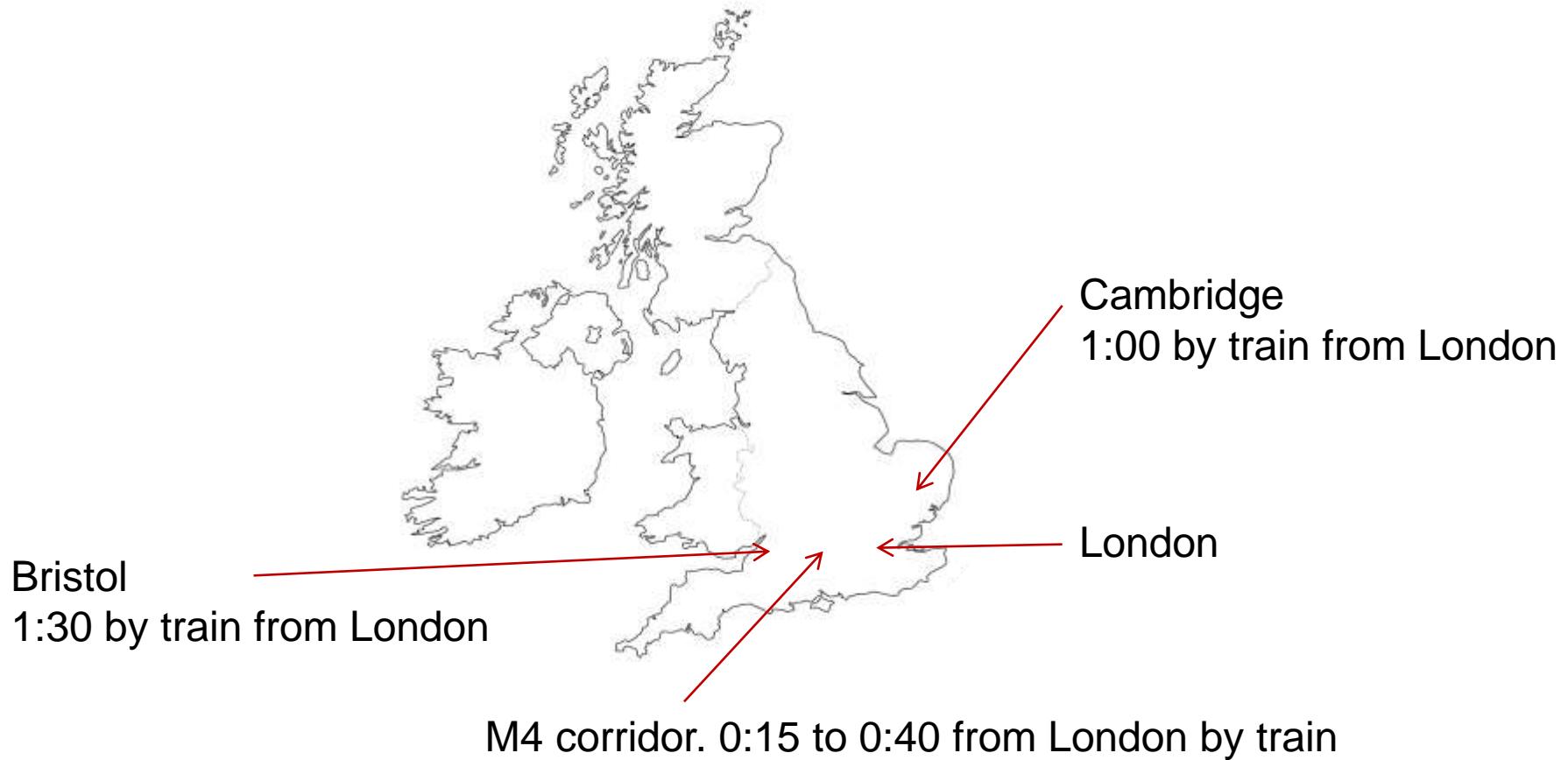




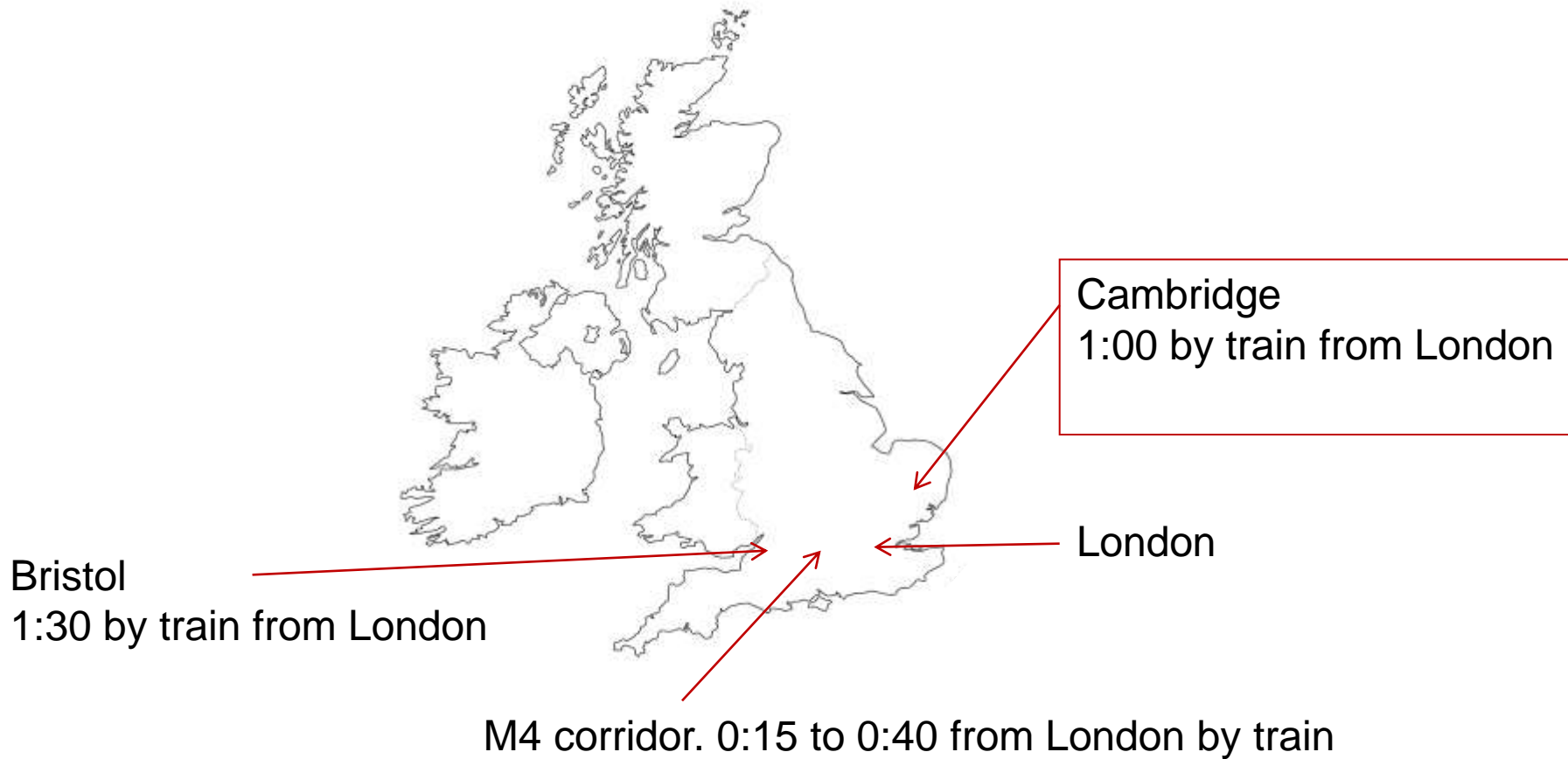
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## Map of some of the UK wireless technology clusters



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## Cambridge cluster companies

**ARM + Softbank:** world's most widely-used microprocessor cores

SoftBank

**Imagination Technologies** : multimedia processor cores



**Huawei:**

Neul, now **Huawei** – Low-Power, Wide-Area wireless network for Internet of Things

**Qualcomm:** wireless and broadband ICs.

CSR, now **Samsung:** Bluetooth, WiFi and GPS. Low-power RF CMOS

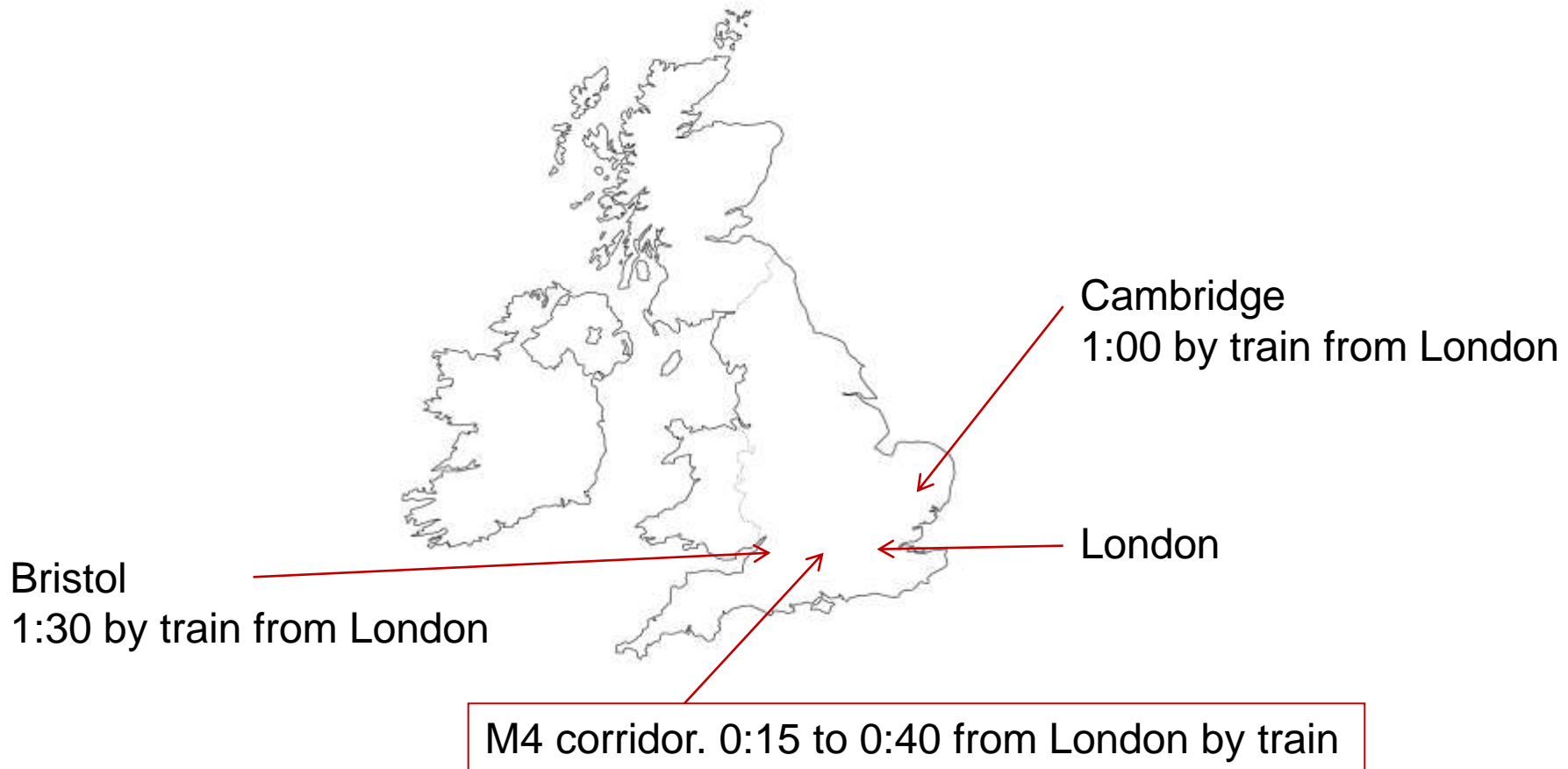
**Mediatek**( TTPcom, now **Mediatek:** mobile phone protocol stack

**u-Blox**

Cognovo, now **u-Blox:** software defined radio for 4G and other standards



## Map of some of the UK wireless technology clusters





# M4 Corridor (between London and Bristol)

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Vodafone: mobile network  
operator



Telefonica O2: mobile  
network operator

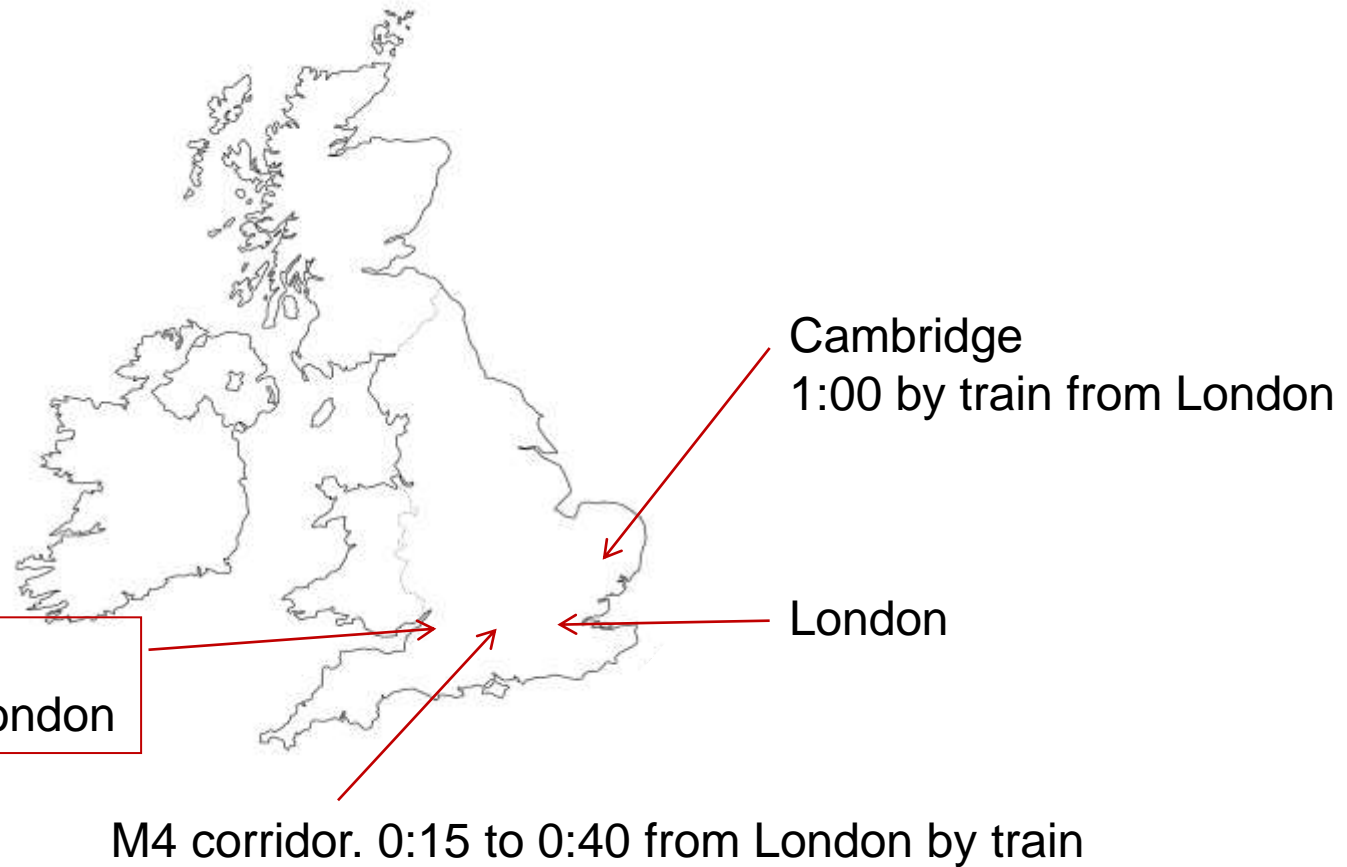


htc





## Map of some of the UK wireless technology clusters





## Bristol cluster companies

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**ST Micro:**



**Huawei:** Processor development centre



Icera, now **Nvidia:** multi-standard baseband modem for mobile phones



Picochip, now **Intel:** processor for femto-cell base station



## Bristol cluster companies

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**XMOS:** Recent investment by **Huawei** and **Bosch**.

Reconfigurable microcontroller for time critical input/output.  
Used in ethernet audio/video and many other applications.



**Blu Wireless Technology:** Silicon IP for 60GHz and other mm wave applications



**FiveAI:** Developing computer vision, artificial intelligence and machine learning for autonomous vehicles without the need for highly detailed prior 3D maps



**Zeetta Networks:** NetOS an open platform for software defined networks





## Map of some of the Universities for wireless technology

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University of Cambridge

London

University of Surrey,  
Guildford

University of Bristol



## University of Cambridge

Computer Science Lab and Engineering Department have many spin-off companies and provide talent for companies

## University of Bristol

Processor design, GPUs (Graphical Processing Units), Multicore programming

## University of Surrey, Guildford

5G Research Centre Supported by: Samsung, Telefonica O2, Vodafone, Huawei, Fujitsu and others

Centre for Vision Speech and Signal Processing



Department for  
International Trade

## Guildford companies

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**Lime Microsystems:** Field programmable RF transceivers  
(Software Defined Radio)



**Quortus:** Virtualized core for mobile networks



## Map of some of the Universities for wireless technology

University of  
Strathclyde,  
Glasgow



University of Cambridge

Imperial College London

University of Bristol

University of Surrey,  
Guildford

University of Southampton



### **Imperial College, University of London**

Biomedical Engineering, Body Area Networks, Wearable healthcare devices, spin-off company Toumaz Technology

### **University of Strathclyde, Glasgow**

Future Cities Institute, £24 M demonstrator integrating multiple systems across the city of Glasgow

### **University of Southampton**

Semantic Web, Web Science Institute, The Open Data Institute, Prof Sir Tim Berners-Lee (inventor of http and html)

# 5G Testbed & Trials Programme

Competition open to organizations registered in the UK

## Testbeds for:

Manufacturing

Robotics

5G Equipment

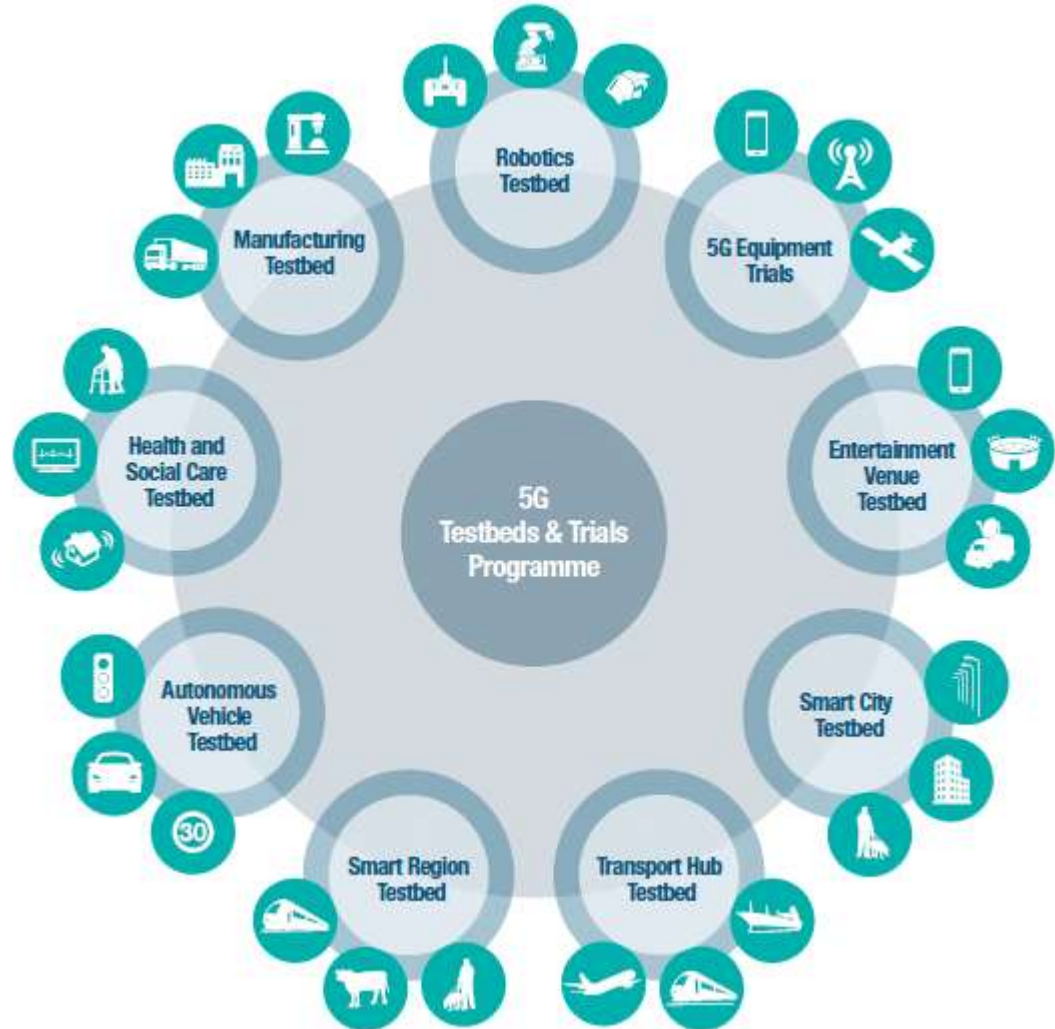
Entertainment Venue

Smart City

Transport

Autonomous vehicles

Health and Social Care

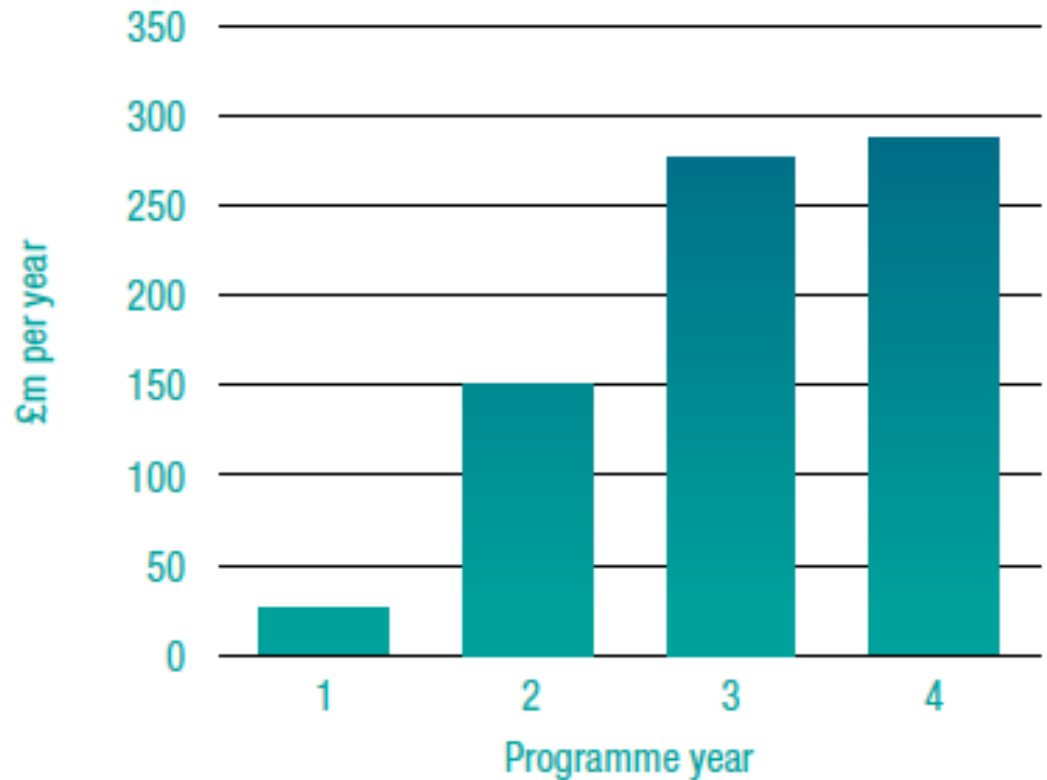




# 5G Testbed & Trials and Full-Fibre Networks

Phase 1 funding £ 25 million

## FUNDING FOR 5G TESTBEDS & TRIALS AND LOCAL FULL FIBRE NETWORKS PROGRAMMES





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THE ALAN  
TURING  
INSTITUTE



New ways of collecting, organising and analysing large sets of data

Working with UK universities:  
Cambridge, Edinburgh, UCL  
Oxford, Warwick

Strategic partnerships: Intel, Lloyd's Register, GCHQ, HSBC & other corporates.

*New £42m Institute for Data Science:  
dedicated to British computer pioneer  
and code-breaker Alan Turing*

# Examples of UK Artificial Intelligence companies that have been acquired 1

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**Deepmind:** deep neural networks and reinforcement learning. builds general-purpose algorithms for use in simulations, e-commerce applications, and games. Acquired by **Google** in 2014



Won in five match game of Go against the current world champion.



**Dark Blue Labs:** Deep learning and language translation, dialogue, summarization, sentiment analysis, semantic parsing, question answering and, and mapping language to action. Spun-out of **Oxford University**. Acquired by **Google** in 2015



**Vision Factory:** Deep convolutional neural networks for image recognition. Spun-out of **Oxford University**. Acquired by **Google** in 2015

# Examples of UK Artificial Intelligence companies that have been acquired 2

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**Evi**, natural language understanding, knowledge base and semantic search for digital personal assistant. Acquired by **Amazon** in 2013



**VocalIQ**, voice recognition for devices and apps. Acquired by **Apple** in 2015.



**Swiftkey**, predictive text recognition for mobile phones. Acquired by **Microsoft** in 2016



**Magic Pony**, video upscaling, compression and enhancement. Acquired by **Twitter** in 2016.



# Artificial Intelligence companies - 1

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**Oxbotica:** spun-out of **Oxford University**. Autonomous vehicle imaging processing and software.



**FiveAI:** Bristol and Cambridge (team from Icera and Neul). Autonomous vehicle imaging processing and software.



**Cortexica:** visual search and image recognition technology for the retail fashion industry



**Blippar:** consumer-brand interaction on mobile by image recognition and augmented reality (AR).



**Speechmatics:** spun-out of **Cambridge University**. Deep recurrent neural networks for automatic speech recognition. Converts audio to text.



## Artificial Intelligence companies - 2

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AR: Zappar



On-line/virtual shopping: Metal



Robotics in Agriculture: Dogtooth Technologies



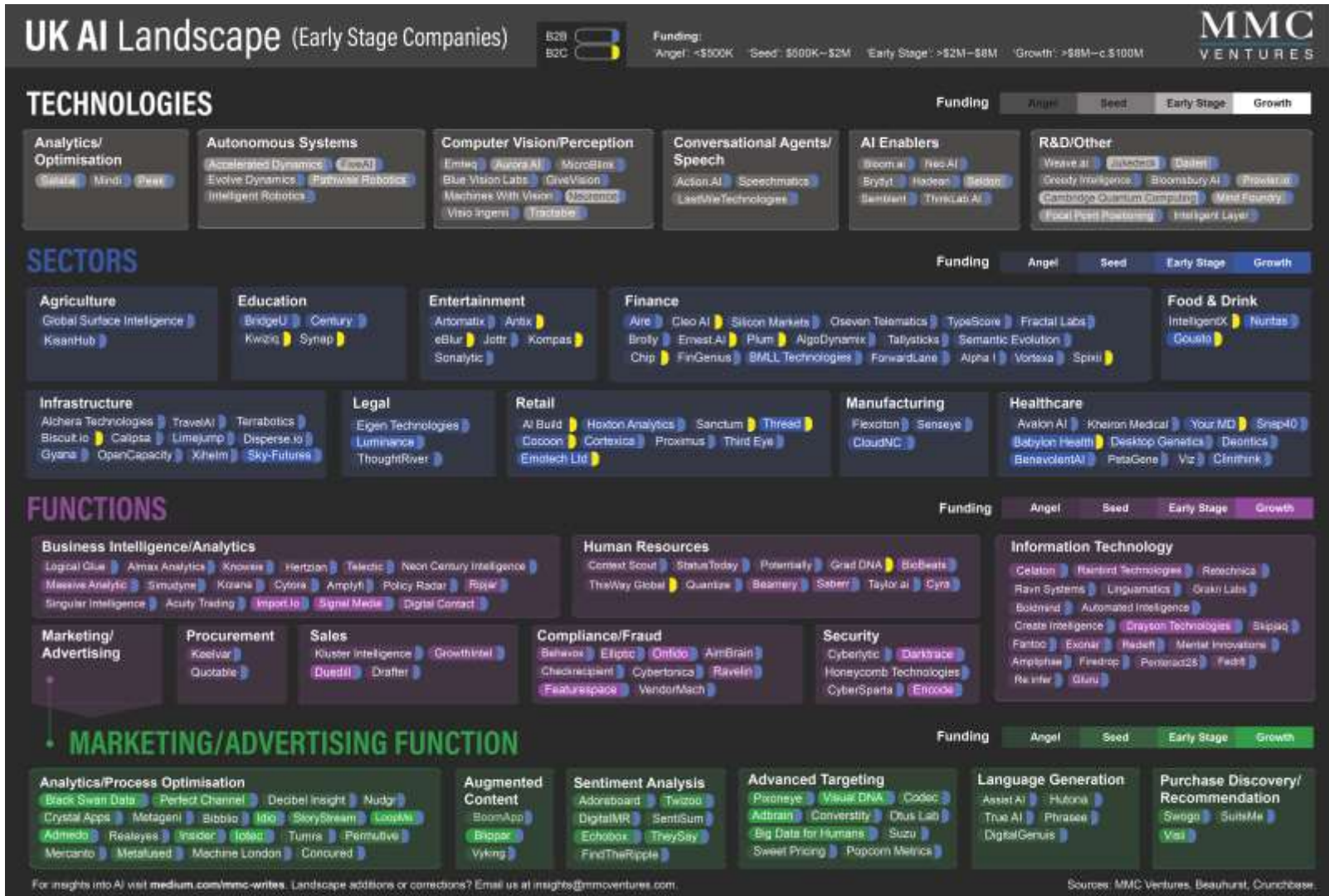
Invrea: Decision Support



Light Blue Labs: AI Safety for Self Driving Cars



# Survey of the UK AI Landscape (early stage companies)





# Fresh Start Ups, Clear Growth Routes



**Ravelin, London**  
Fraud detection  
systems for payment  
apps  
[www.ravelin.com](http://www.ravelin.com)



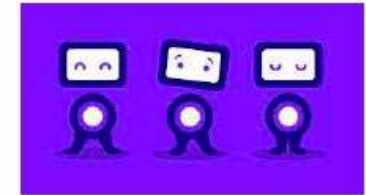
**Digital Genius, London**  
Intelligent chatbot (human  
+ AI) for customer  
services  
[www.digitalgenius.com](http://www.digitalgenius.com)

**DigitalGenius**  
Human+AI Customer Service



**Status Today, London**  
Employee insights  
technology  
[www.statustoday.com](http://www.statustoday.com)

**Status Today**  
humanizing security



**Prowler, Cambridge**  
Self learning, autonomous  
bots  
[www.prowler.io](http://www.prowler.io)

PROWLER.io

**BenevolentAI**

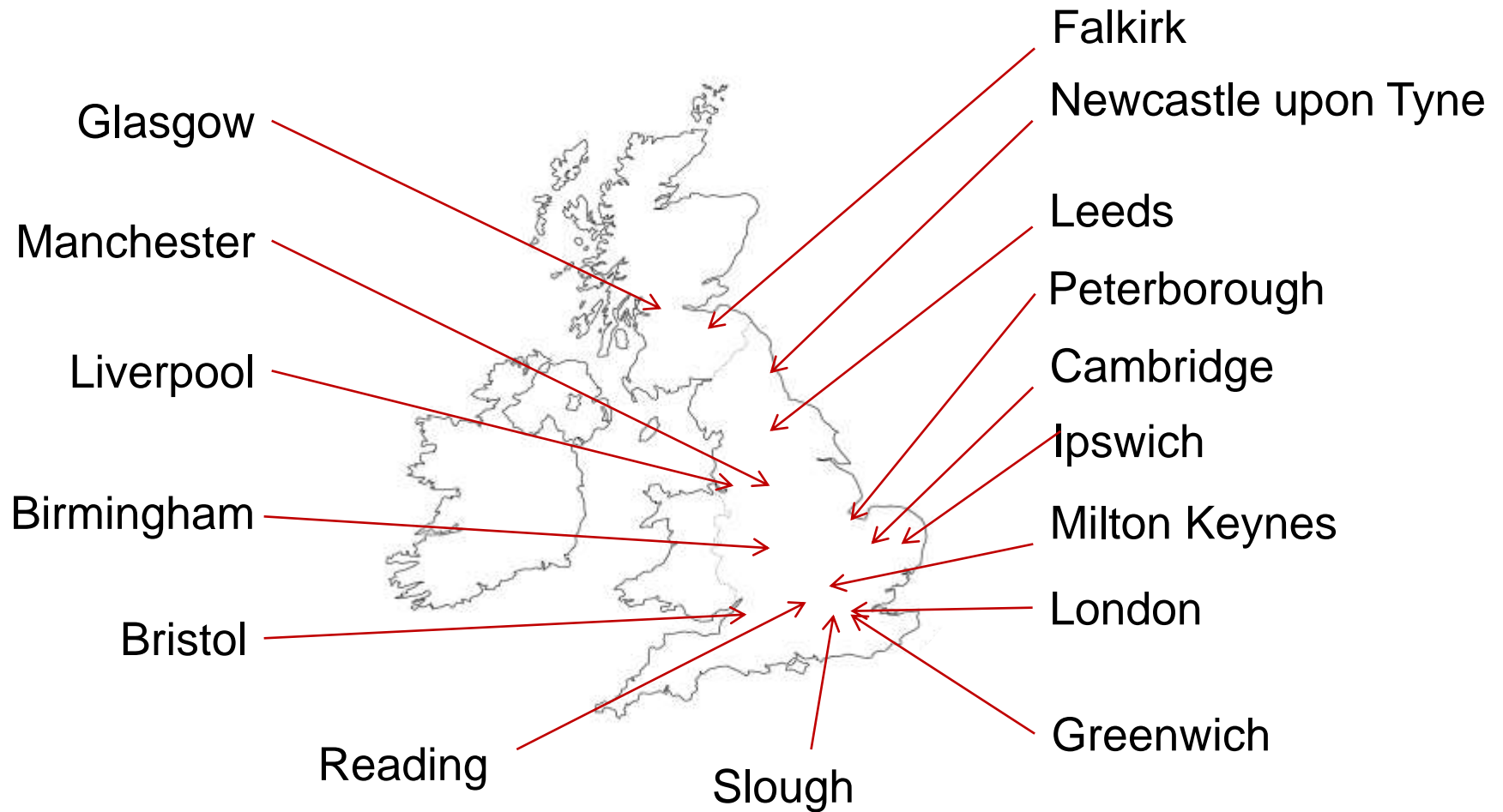




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# Smart City Projects



## Smart City spending plans, March 2016

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Falkirk	£1.5 billion	IoT, environment sensing, energy, logistics
Milton Keynes	£10 million	Data hub for transport
Peterborough	£9.5 million	Virtual modelling, sensors
Slough	£5 million	Monitor diabetes patients
Liverpool	£7 million	Sensing of transport and environment
Liverpool	£1 million	Support patients with dementia
Ipswich	£5.2 million	Sensing of transport by mobile phone
Birmingham	£30 million	Business campus, IoT, healthcare, transport
Silvertown, East London	£10 million	Smart homes/buildings: transport, energy, waste management

## Smart City spending plans, March 2016

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Manchester	£10 million	IoT sensor network
West London	£700 million	Smart homes, transport, energy, waste
Bristol	£15 million	VR/AR models: traffic, air quality, energy
Newcastle	£200 million	Smart building/homes
Cambridge	£8.15 million	Sensor network, transport, environment
Reading	£14 million	IoT, transport, assisted living, energy
Mobility Fund (across the UK)	£13 million	Venture Capital fund investing in smart transport projects across the UK
Community Action Platform for Energy	£ 100 million	Community energy projects. Developed in Milton Keynes then spread across the UK.



# Smart City Projects

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Birmingham



London

Bristol

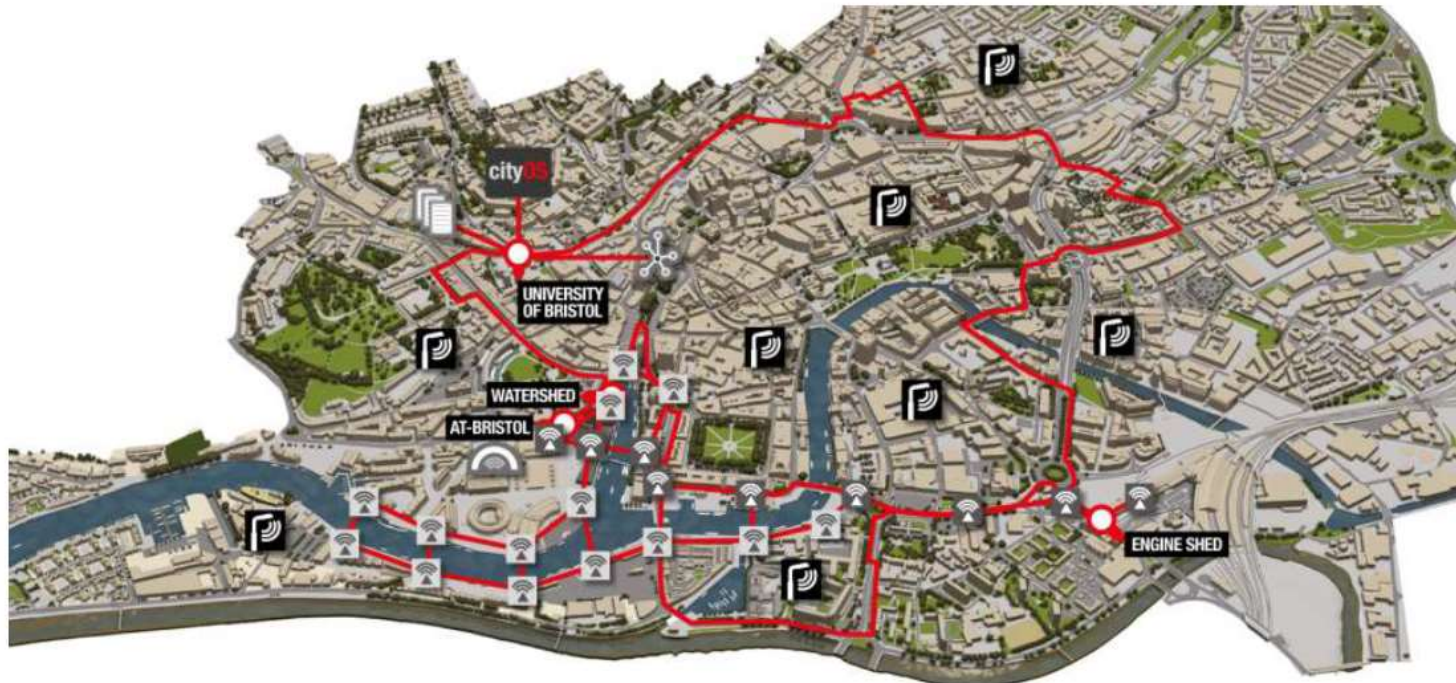
1:30 by train from London



# Bristol Is Open

- 1,500 lamppost IoT mesh

A mesh network IoT 'canopy of connectivity' across the city



### ACTIVE NETWORK

- Fibre network
- Core network nodes with accessible rack space



Network emulator



High performance computer



Software



Data Dome

### WIRELESS NETWORK

- Main hubs
- 'Sub-hubs'
- 3G, 4G, LTE & 5G Technologies
- 60GHz & Experimental wireless

### RF MESH NETWORK

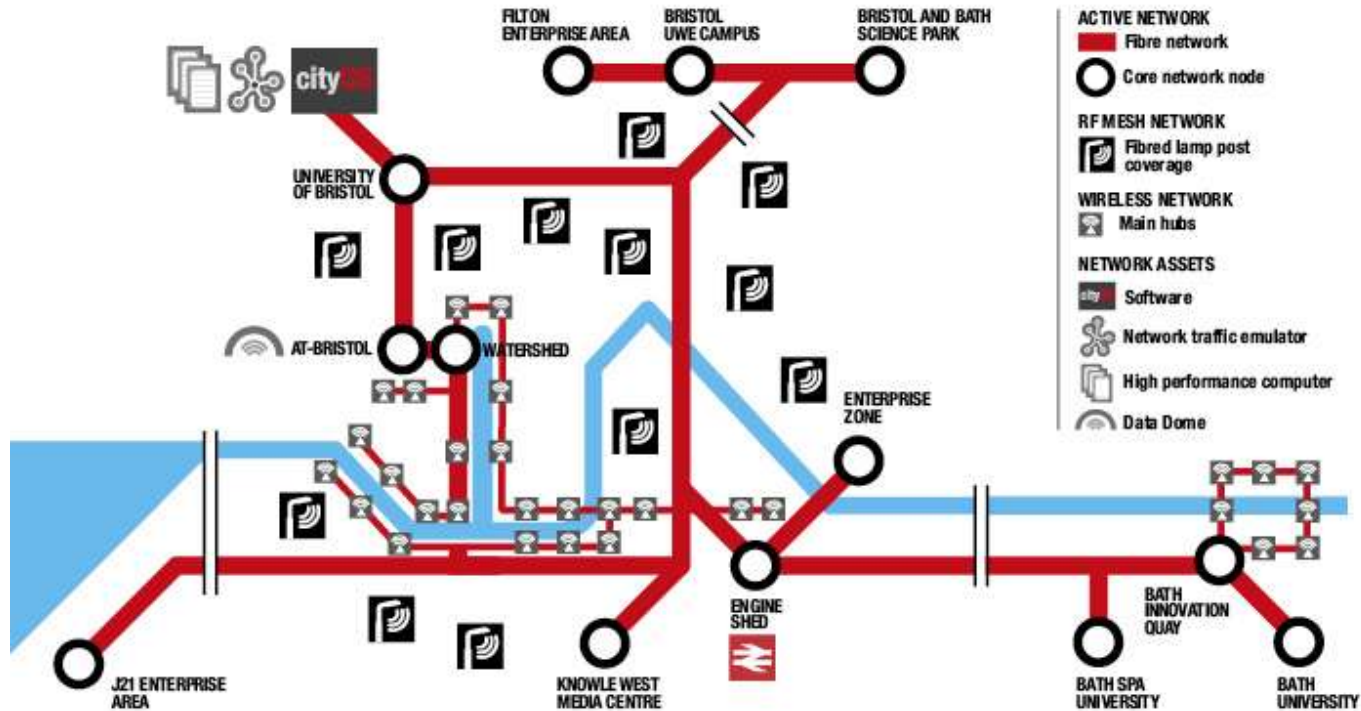
- 1,500 lamp posts



# Bristol Is Open

- 1,500 lamppost IoT mesh
- 1,000 Gigabytes per second core network

Phase II, wider City-Region, live in stages 2016-18



Open data platform

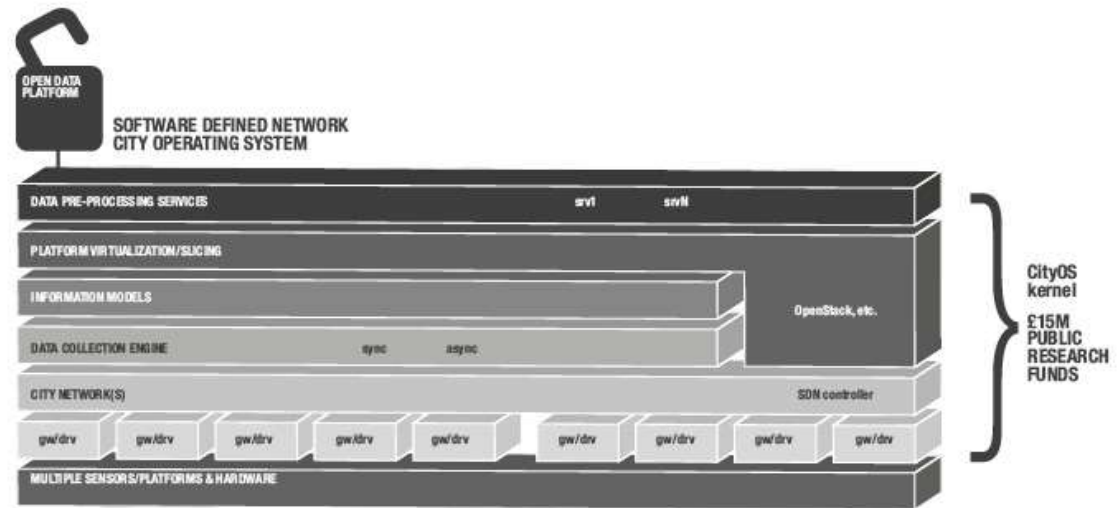
Software defined network

City operating system

City networks

Multiple sensors, platforms  
and hardware

CityOS: OpenFlow Software Defined Network using NFV



# Bristol Is Open

Driverless cars

Road traffic management

Assisted living

Emergency healthcare

Creative & cultural content

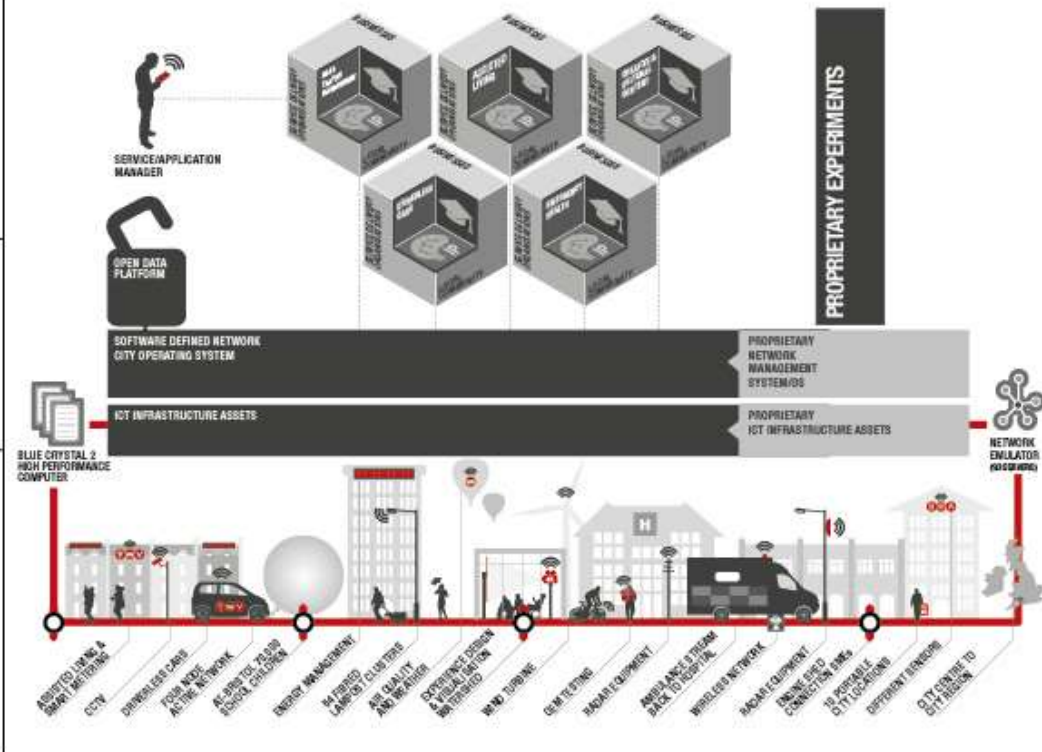
We provide: City-Experimentation-as-a-Service



Algorithmic Decision Making

Innovative Data Transport

Data Harvesting & Programmable Infrastructure







# Bristol Is Open

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£ 15 million public research funds from central and local government

Companies:

**NEC**

**NOKIA**

INTERDIGITAL

**zeetta**  
NETWORKS

Universities:

 University of  
BRISTOL

 UNIVERSITY OF  
BATH

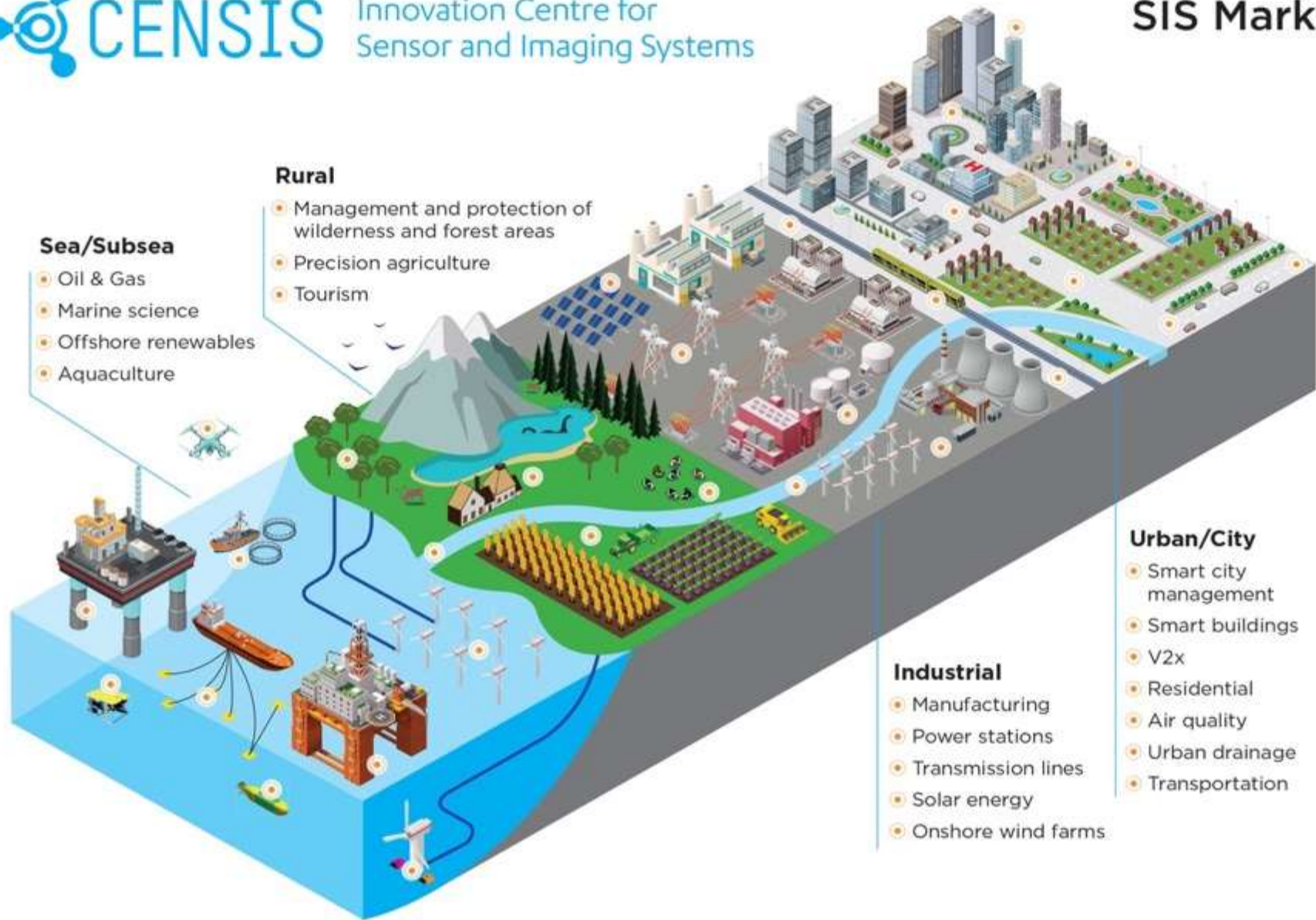
Innovation Centres:

**CATAPULT**  
Digital

**CATAPULT**  
Future Cities

 open  
data  
institute

Open Data Institute



### Sea/Subsea

- Oil & Gas
- Marine science
- Offshore renewables
- Aquaculture

### Rural

- Management and protection of wilderness and forest areas
- Precision agriculture
- Tourism

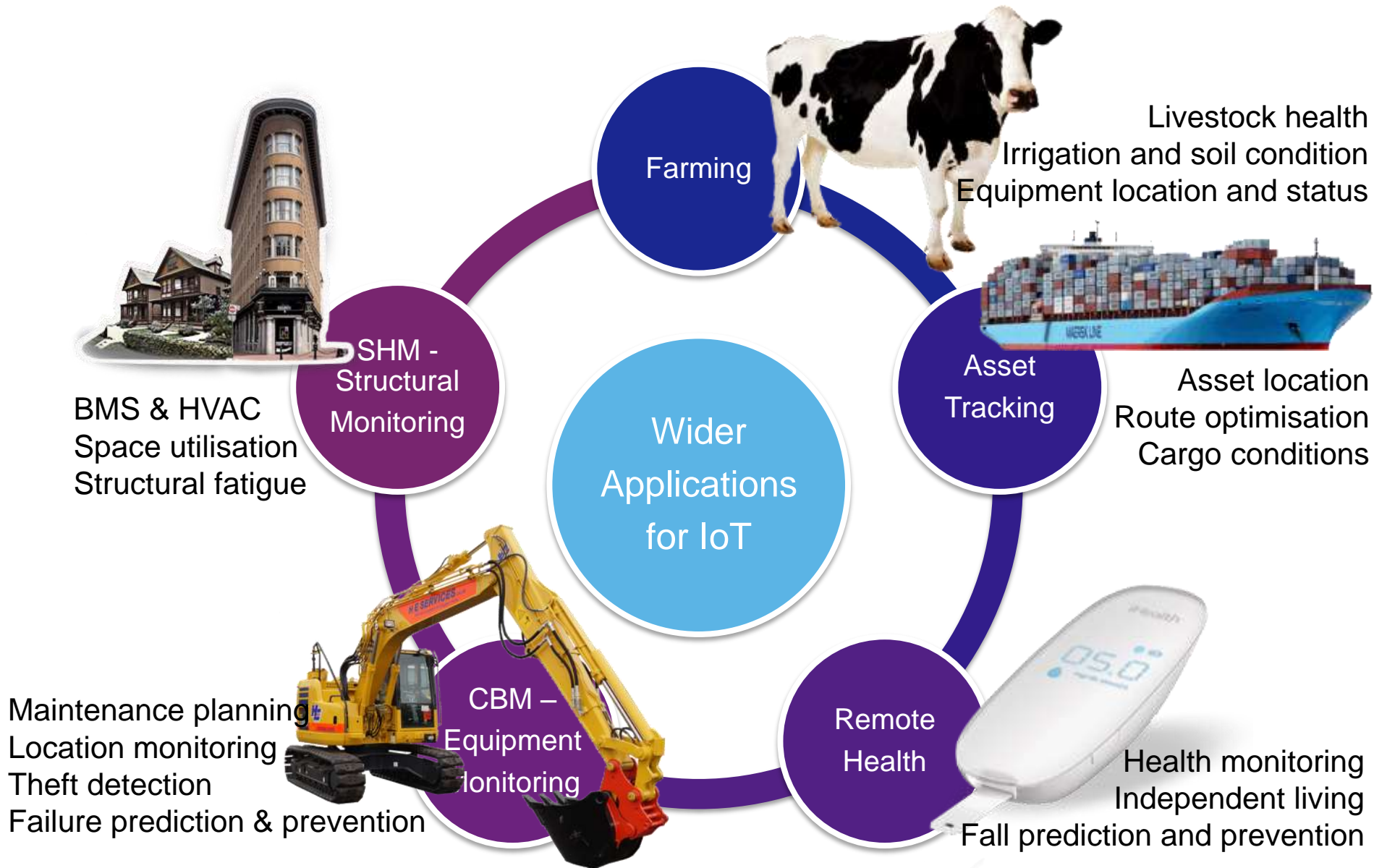
### Industrial

- Manufacturing
- Power stations
- Transmission lines
- Solar energy
- Onshore wind farms

### Urban/City

- Smart city management
- Smart buildings
- V2x
- Residential
- Air quality
- Urban drainage
- Transportation

# Emerging IoT/LPWAN Applications



£2 per month per property

iOpt.

Technology identifies:

- Damp and humidity issues
- Air quality issues
- Failing heating systems



Remote Building Monitoring

Can be applied to:

- Cannabis farm detection
- Fuel poverty identification
- Vulnerable person problems
- Energy reduction



# Example: Commercial building monitoring



Highlands and Islands Enterprise  
Iomairt na Gàidhealtachd 's nan Eilean





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# Applications – Industrial Digitalization

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- Additive manufacturing,
- Robotics and automation,
- Virtual reality and augmented reality,
- The **Industrial Internet of Things** (IIoT) and connectivity (5G, LPWAN, etc.)



The image shows a dark, blue-tinted photograph of a factory floor. In the center, the word "senseeye" is written in a stylized font. The "sense" part is in a light purple color, and the "eye" part is in a light blue color. The background shows industrial machinery, including a yellow overhead crane system and a car chassis on a lift. The floor is polished and reflects the overhead lights.

senseeye



# problem: downtime

300%

The amount by which  
Total Downtime Cost  
is usually  
underestimated

\$2.5m

The cost per **hour** of  
downtime in automotive  
manufacturing

24%

Percent of total  
manufacturing cost  
attributed to  
downtime

90%

Amount of maintenance work  
categorised as 'crisis work'  
to fix breakdowns

Downtime is expensive

The background of the slide is a dark, blue-tinted photograph of a factory floor. In the foreground, there is a blue metal cart. In the background, there are yellow overhead cranes and various industrial equipment. The Senseye logo is overlaid on the left side of the image.

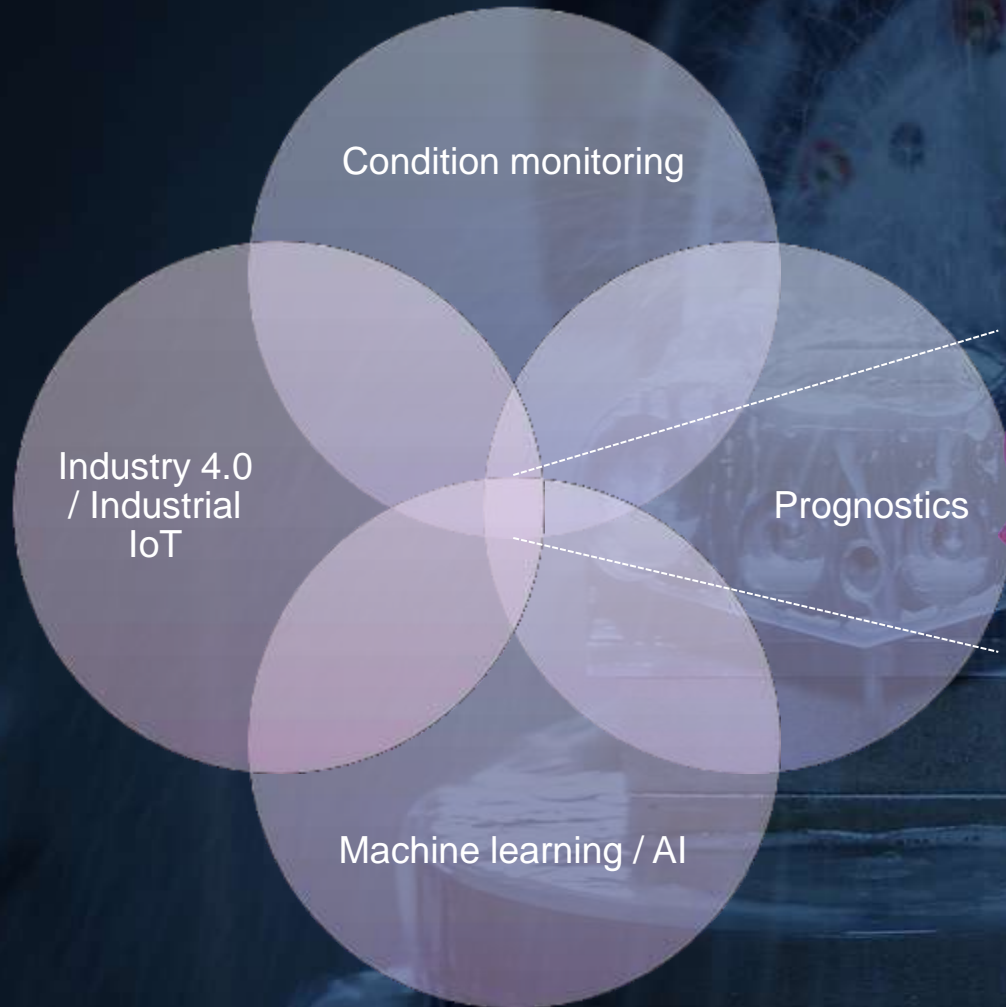
senseye

# Scalable Predictive Maintenance

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Reduce unplanned downtime and maximize OEE with Senseye, the ultimate cloud-based predictive maintenance application

# technology: convergence



**senseye**

## Any & many

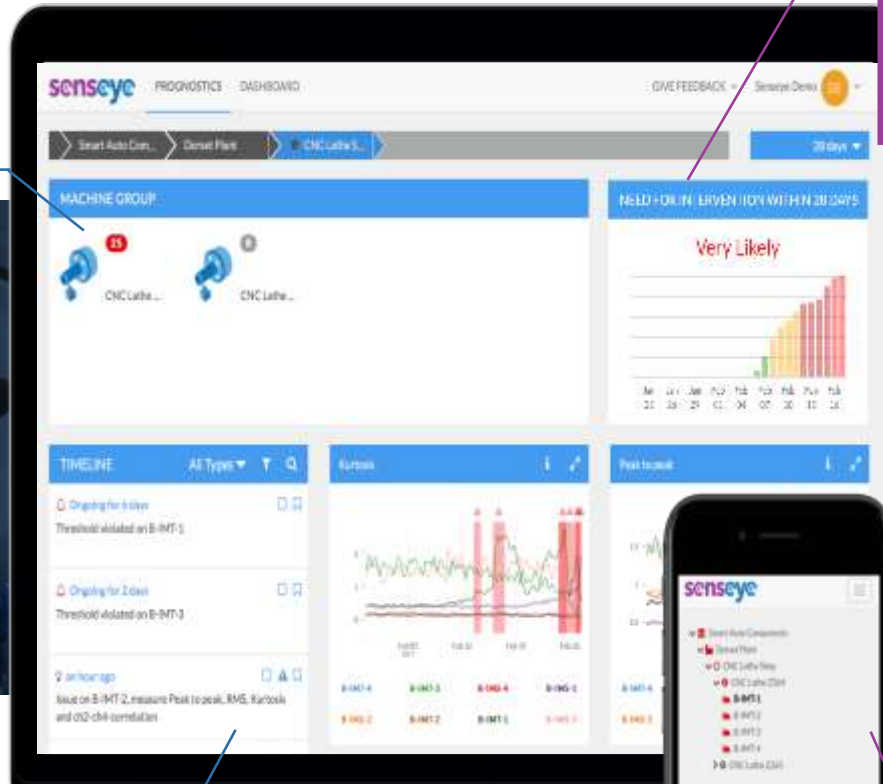
Any connected machine is supported, big or small, from 10 to 10,000

Scale effortlessly

## Condition Monitoring

Automated condition monitoring insights, only relevant information is highlighted.

Takes the pain out of asset management



## Remaining Useful Life

Understand for how long your machinery is likely to perform

Improved predictive maintenance

“Motor has a 70% risk of failing within two weeks”

## Web based

Nothing to install or maintain, powered by the cloud and accessible on all devices.

No infrastructure to support



# it's: automated



## DIAGNOSTICS & CONDITION MONITORING

ANOMALY DETECTION

AUTO OPTIMISATION

AUTO CONDITION EXTRACTION

AUTO TRAINING

STATE AND USAGE DETECTION

AUTOMATED THRESHOLDING



## PROGNOSTICS

PROBABILITY OF RISK FORECASTING

DEGRADATION FORECASTING

REMAINING USEFUL LIFE



## Asset Health

HEALTH ASSESSMENT

CRITICALITY ANALYSIS

PRIORITISATION

“How is my machinery behaving right now?”

“When will my machine fail?”

“Which machines should be prioritised for maintenance?”

# key: differentiators

Cloud based product

Get started right away!

Scalable

From tens to thousands of machines

Know-how

Embedded mechanical knowledge

Prognostics

The only product to give Remaining Useful Life

Easy to use

No technical knowledge necessary

Zero-touch

No configuration needed!

Senseye helps you to avoid downtime and s

# Automotive OEM CASE STUDY

## CHALLENGE



A major automotive OEM was embarking on a Condition Based Maintenance programme to help to avoid downtime on the production line, *reducing it by up to 50%*. They were attracted to Senseye by their strong prognostics offering underpinned by machine learning.

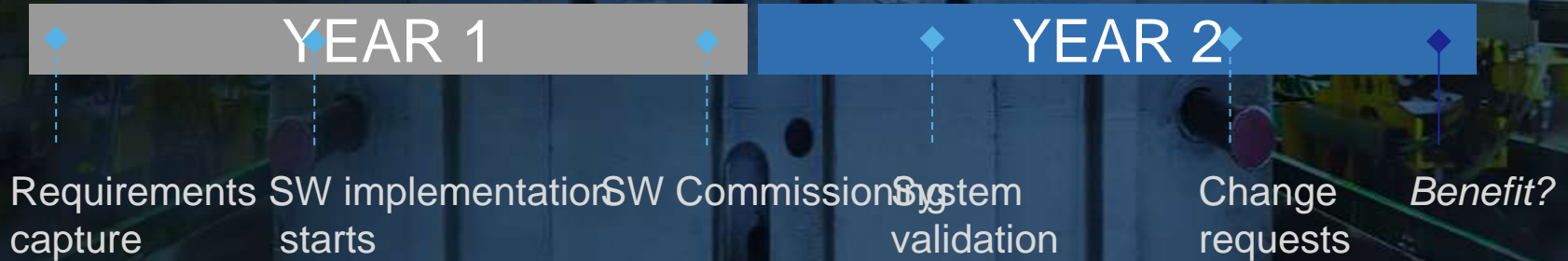
## RESULTS

Senseye works with the OEM by integrating data taken from the factory floor. Identifying anomalies and trends used to forecast machine failure and predict Remaining Useful Life, *automatically*.

- Increased value proposition of their condition

# why: Senseye

Traditional predictive maintenance project:



SW costs alone > £500k + dedicated experts to use it

**senseye**







- Sensors
- IoT Wireless Network Technologies
  - LoRa, NB-IoT, Telensa, Wireless technology clusters
- Data Analytics and Artificial Intelligence
- **Applications**
  - Smart Cities, Industrial Digitalization, **Automotive**
- IoT Security
- Innovating in the UK



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# IoT Security - PETRAS

A consortium of nine universities researching issues around

- Privacy,
- Ethics
- Trust
- Reliability,
- Acceptance and
- Security



**Living in the Internet of Things:  
Cybersecurity of the IoT**  
**A PETRAS, IoTUK & IET Event**  
**28 - 29 March 2018. London**

**Build Secure** Ensure security capabilities are provisioned at the design stage

**Buy Secure** Specify/ask for security requirements before purchase

**Be Secure** Stay secure, maintain security hygiene

IoT Security Foundation delivers through a programme of awareness, education and best practice

## Working Groups:

- Self-Certification/Requirements,
- Best Practice Guidance,
- Compliance and Test
- Vulnerability Disclosure,
- IoT Landscape,
- Smart Buildings
- Trustmark



## Internet of Things

Rob Aitken

Distributed  
Systems  
Architecture

Optimization  
Against  
Power,  
Latency &  
Bandwidth  
Constraints

Scalable,  
Standardized  
Solutions

End-to-End  
Security

Data-  
Oriented  
Services



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- **Innovating in the UK**



# DIT – Introduction to our services

As a fully integrated advisory service we will support any aspect of plans to expand in the UK

- Dedicated, **professional assistance** on locating and expanding your business in the UK
- We are a **FREE & CONFIDENTIAL** service to support your UK expansion and growth to be as efficient as possible, helping you with:
  - Links with centres of excellence (e.g. universities);
  - Information on tax, regulatory and business planning issues;
  - Information on financial incentives;
  - Information on staff recruitment, retention and training programmes;
  - Assistance with immigration issues





# There are many reasons for which UK is the top investment destination

## Vast market opportunity

- 6th largest economy in the world
- Excellent international accessibility
- Robust infrastructure

## Favourable business environment

- Enterprise zones
- Ease of set-up and operation
  - Language
  - Stable business environment & efficient legal system

## High quality of life

- High standard of living, appreciated by relocating international executives
- Rich cultural heritage easily accessible language-wise

## Easy access to talent

- 4 of the world's top ten universities
- Strong research base
- Educated & flexible workforce

## Attractive tax regime

- Reduction of corporation tax to 17% by 2020
- Most competitive tax regime in G20
- R&D tax credits, Patent Box





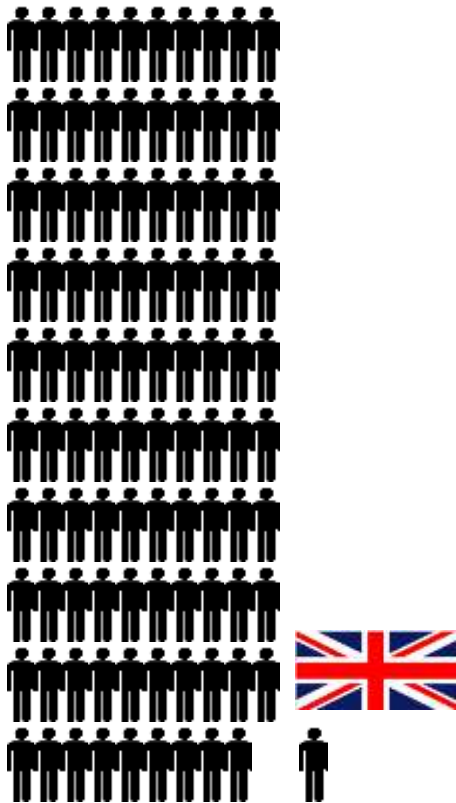
## Access to Talent from Top Universities

The UK is home to 6 of the top 8 universities in Europe

Shanghai Global Ranking 2017	University	Country
3	University of Cambridge	UK
7	University of Oxford	UK
16	University College London	UK
19	ETH-Zurich	Switzerland
27	Imperial College London	UK
30	University of Copenhagen	Denmark
32	University of Edinburgh	UK
38	University of Manchester	UK

# The UK has an outstanding and highly productive research base

## Less than 1% of global population:



### Excellence

4 of top 10 universities

16 % most cited articles

12 % citations

6 % of research papers

4 % researchers

3 % R&D spending

### Innovation

Top G20 country in the  
Global Innovation Index  
(WIPO 2013)

11% patents cite UK  
research

2.4% global patents



# Innovate UK

- Responsible for investing over £560m pa in innovation
- Helps businesses develop new ideas and technologies
- Supports all types of business – pre-starts, start-ups, small and medium enterprises up to major corporations
- Awards c70% of its funding to support SMEs
- Encourages and supports networking and knowledge exchange
- Manages and oversees the network of **Catapults**



**CATAPULT**  
Digital

Data, metadata & data value chain

**Pit-stop events** - test new tech ideas

**Data Catalyser** - Secure environment for companies & data innovators to work together

Located in London and also in Brighton, Bradford & Sunderland

*National Centre to rapidly advance UK's best digital ideas to market*

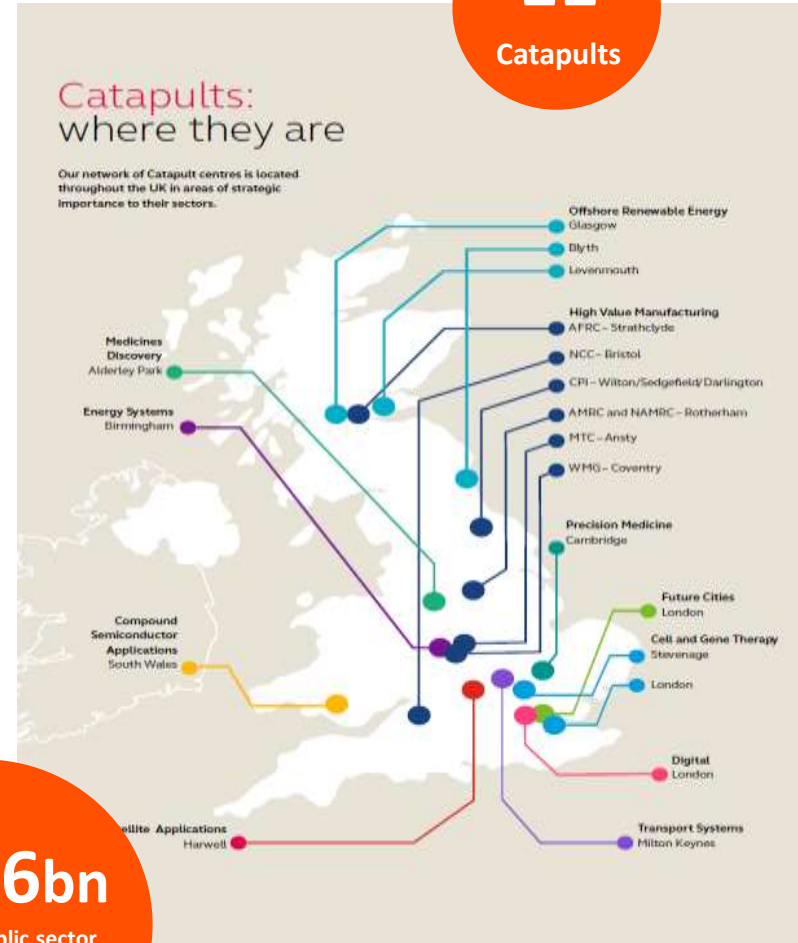


# Catapult Centres

11

Catapults

- Part of a world-leading network of technology and innovation centres
- Bridge the gap between businesses, academia, research and government
- A long-term investment to transform the UK's ability to create new products and services
- Open up global opportunities for the UK and generate sustained economic growth for the future
- Established and overseen by Innovate UK



>£1.6bn

Private & public sector  
investment

## Intelligent Mobility

Test bed for the transportation industry

Automated transport systems, modelling & visualisation, customer experience and information exchange



*Using new and emerging technologies to transport people and goods more smartly and efficiently*



Milton Keynes



**CATAPULT**  
Future Cities

Businesses + universities + cities  
solve city problems, now & future

Urban Innovation Centre (London)

Good relationship with city councils to  
evaluate IoT & data analytics projects

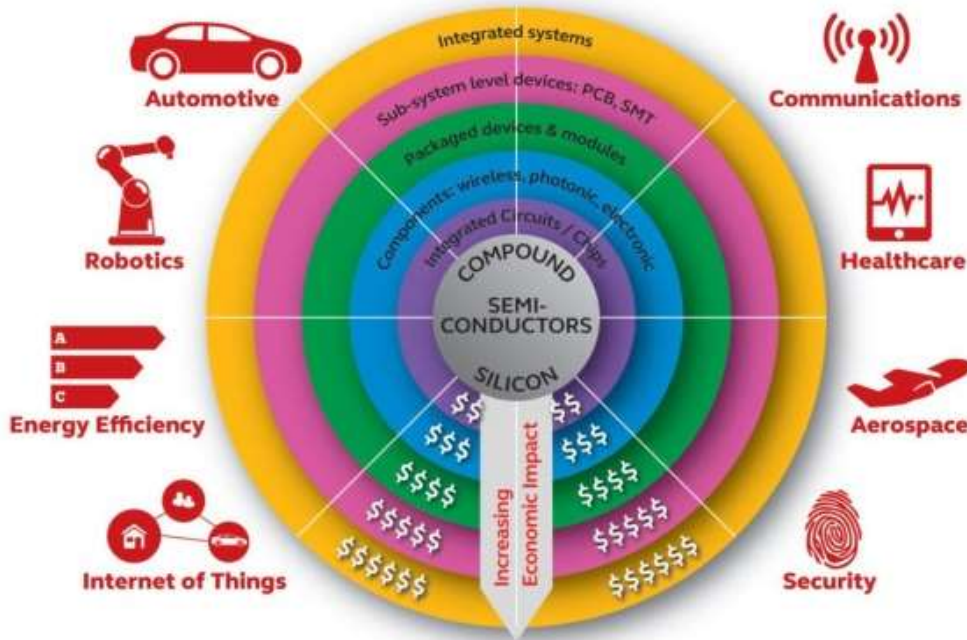
MK:Smart (Milton Keynes)

**MK:SMART**

*Accelerate urban ideas to market, to  
grow the economy and make cities better*

# CATAPULT

Compound Semiconductor Applications



Focus on programmes relating to  
Power Electronics;  
RF & Microwave;  
and Photonics

*The CSA Catapult aims to bridge the gap between companies developing novel semiconductor materials, topologies and devices, and those developing systems for end-user applications*



# TECH NATION 2017



AT THE FOREFRONT  
OF GLOBAL DIGITAL  
INNOVATION

From  
**TECH CITY**

FOREWORD

# TECH NATION 2017

@TechCityUK  
#TechNation  
[techcityuk.com/technation](http://techcityuk.com/technation)



THE RT HON THERESA MAY, MP  
THE PRIME MINISTER

Today more than 1.5 million people are already working within the digital sector, or in digital tech roles across other sectors, while the number of digital tech jobs across the UK has grown at more than twice the rate of non-digital tech sectors. From analysts to web developers to software architects, these pioneers of our digital economy are at the forefront of a great British success story.

Britain already leads the world when it comes to new technology. We make more contactless payments than anywhere else and we help to lead the way in everything from FinTech to Artificial Intelligence. We are natural innovators, eager to incorporate the latest innovations into our lives.

As Prime Minister I am determined that we will build on this success as we seize the opportunities that arise from leaving the EU and seek to build a bold new future for our country. That is why support for the digital tech sector is an important element of the government's modern industrial strategy, helping to deliver a high-skilled, high paid Britain where opportunity is spread across every community, not just the traditional areas of London and the South East.

Through close co-operation between government and our tech industry we will help to ensure that Britain remains one of the most competitive places in the world to start and grow a tech business. We will expand the scope of our digital tech industries, funding Artificial Intelligence, robotics, 5G, smart energy and more. We will broaden their reach across the UK, create new Institutes of Technology, and reinvigorate STEM and digital education to equip young people for the workplaces of the future.

In doing so, we will also take an important step in helping to build a future in which everyone - from every background and every part of the country - has the skills and support to reach their full potential. Every entrepreneur, every innovator and every employer in the tech sector and beyond can play a huge part in this, helping to build a country that truly does work for everyone.

# TECH NATION 2017



## Profiling the UK Digital Landscape

- 1 BELFAST
- 2 BIRMINGHAM
- 3 BOURNEMOUTH & POOLE
- 4 BRIGHTON
- 5 BRISTOL & BATH
- 6 CAMBRIDGE
- 7 CARDIFF & SWANSEA
- 8 DUNDEE
- 9 EDINBURGH
- 10 EXETER
- 11 GLASGOW
- 12 HULL
- 13 IPSWICH
- 14 LEEDS
- 15 LEICESTER
- 16 LIVERPOOL
- 17 LONDON
- 18 MANCHESTER
- 19 MIDDLESBROUGH
- 20 NEWCASTLE
- 21 NORWICH
- 22 NOTTINGHAM
- 23 OXFORD
- 24 PLYMOUTH
- 25 READING
- 26 SHEFFIELD
- 27 SOUTHAMPTON
- 28 SUNDERLAND
- 29 TRURO & REDRUTH
- 30 WORCESTER & MALVERN



Thank you for your time

Please ask your questions later



## For more information

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Department for  
International Trade