



# 5G Retail Business Case

Surrey Heath Borough Council

# The Square 5G Retail Business Case

Prepared for Surrey Heath Borough  
Council

BY

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## 1.0 Executive Summary

This business case was commissioned to examine the opportunity for turning The Square shopping centre located in Camberley into Europe's first 5G retail test bed. Research has been drawn from a number of sources and industry experts, as well as looking at regional and national interests in 5G and retail. The projected cost for the project will be in the region of £8-10m over a three year period which can potentially be offset by local enterprise partnership grants, contributions (in-kind or direct cash) from technology partners and larger government grants.

### What is the proposition?

The creation of Europe's first 5G retail test bed. Working with a consortium of partners to provide a ground-breaking open data shopping centre, transforming the way bricks and mortar retail operates.

### Why do this?

The power of 5G and IOT is set to transform the retail industry, the ownership of the shopping centre by Surrey Heath Borough Council provides a unique opportunity to create this test bed in partnership with a number of key technology partners and put Camberley on the world map and gain international recognition. The opportunity has arisen to create revenue models based on the ownership and commercialisation of data and lead the council towards real time data driven decision making. The council made a significant investment in purchasing the shopping centre and the surrounding areas, by investing in to this project and making it the first 5G enabled shopping centre in Europe, will mean that they are future proofing the shopping centre and allowing retailers to innovate and trial new technologies which they currently cannot do on legacy networks and systems. This is important because the customer experience is becoming significantly important for driving consumers in to bricks and mortar retail shops, and retailers will need a test bed to trial and test new technologies before rolling them out nationally.

## How will it be done?

Collaborating with a number of different partners and retailers to install a 5G fibre network that will allow the use of sensors and technologies. Bringing a whole new level of innovation to retailers and shoppers, as well as providing open data to SMEs and technology companies to help innovate and personalise solutions. There is also the possibility of doing hackathons where industry can find solutions to problems they are having, by utilising SMEs and University students to come up with ideas and testing them in the shopping centre in a real world environment.

## Risks

With any large scale project there are a number of risks to doing this project, especially with the significant up front capital investment required. These costs can potentially be offset by grants and with the right partners on the project. Investing in the expertise of the 5G Innovation Centre and consultants who can advise on the correct technology systems and partners to make this project a success long term.

## Conclusion

There is significant rewards and benefits for being the first shopping centre in Europe to be a 5G retail test bed as it would be classed as a turnkey opportunity for the Department for International Trade giving the shopping centre international appeal. It should also be attractive for new retailers who are looking at trialling innovation in their stores, which should lead to increased footfall and higher conversion rates. Moving forward the data could be commercialised, and the learnings turned in to an economic blueprint for retail, with Surrey Heath Borough Council becoming thought leaders in technological innovation in retail and owners of significant data sources.

## 2.0 Introduction

The fourth industrial revolution is upon us, with the blurring of boundaries between the physical world and the digital world beginning to occur. Providing an exciting opportunity for government, academia and industry to capitalise and innovate in ways that have not been previously possible due to the limitations of terrestrial networks. This business case outlines the proposal to build a 5G retail test bed in Camberley. Utilising the significant advancements gained from the 5G technologies beginning to roll out across the country, it would be applied to a large-scale retail asset owned by Surrey Heath Borough Council called The Square. This is a very important step for retail and could be the catalyst for change for bricks and mortar retail and the high street which is under a lot of pressure, a PWC report has found that on average 16 shops a day are shutting on the high street, with 2870 high street shops closing between January 2019 to June 2019 which is the highest figure since records began. But there was also a total of 1634 shops which opened, which is a 4% year on year increase showing that bricks and mortar retail is still important and needed. PWC Consumer markets leader Lisa Hooker was quoted saying “The decline in store numbers in the first half of 2019 shows that there’s been no let-up in the changing ways that people shop and the cost pressures affecting High Street operators” (Gazette, 2019).

Camberley is located 35 miles away from London and is close to the M3 motorway, a number of large-scale international airports in Heathrow and Gatwick and private passenger airport Farnborough. Meaning it is in an ideal location to be a flag ship UK project that will drive innovation in retail and be a “turnkey” opportunity for the department of International Trade (DIT). The concept behind the test bed would be to allow retailers to trial and implement new innovations and technologies using the 5G fibre network and then be able to scale solutions across the country. The key benefits this would provide is multifaceted, firstly retailers will have a real-life test bed to trial technologies and innovation which could work and are implemented in other shops or fail quickly before making a large initial investment in a number of shops. It would allow the retailers to implement new technologies such as

point of sale units, augmented and virtual reality and other innovations which currently are not able to be done due to the restrictions in current digital networks. Consumers will benefit from enhanced new experiences and innovation that will make the shopping experience unique from other shopping centres, giving The Square shopping centre a technological and connectivity USP. The UK government will benefit from this as the productivity gains from 5G are estimated to be in the region of £15bn by 2025 (Barclays, 2018) and it also provides a soft landing zone for foreign direct investment. Leading to an opportunity for exporters to demonstrate new technologies to foreign investors in a real-life environment or getting their products to market quicker by testing them in the shopping centre.

This business case will outline the following:

- The Vision of the project and how it should be looked at initially
- The Scale of the opportunity- Benefits and Risks
- The Global rise of IoT and 5G and how it links to retailers
- The Changing demographics and how Surrey Heath Borough Council need to be aware of the changes locally
- The recommendations and next steps needed to make the project a reality

### 3.0 The Vision- 5G Retail Test Bed

## The creation of Europe's first 5G enabled Shopping Centre

This business case is outlining the initial proposal for the creation of Europe's first 5G enabled shopping centre, building on the investment that Surrey Heath Borough Council made in 2016 by purchasing The Square shopping centre.

#### 3.1 What is the project trying to achieve?

The creation of Europe's first 5G retail test bed. Working with a consortium of retail and technology partners to provide a ground breaking open data shopping centre, creating the blue prints for future models on how the bricks and mortar retail sector operates. This is an important project not only regionally but nationally/internationally as solutions can be scaled and the knowledge that is derived from data can be interpreted, learned from and commercialised making Surrey Heath Borough Council thought leaders in the retail sector.

The project will have clear outcomes:

- A unique shopping experience that will be focussed around innovation by pushing the boundaries of IoT and 5G leading to a paradigm shift in the customer experience and becoming a retail centre of excellence which international appeal.
- Future proofing of a significant asset owned by the council by the installation of 5G infrastructure (Fibre, Base Stations, IoT sensors).
- Increased footfall to the shopping centre.
- Creation of a flexible working space/incubator which will allow innovative SMEs and start ups a place to work close to the shopping centre. This will lead to hackathons and industry events to help drive new businesses/individuals to the region.

- An enabler for future innovation in the retail industry, by utilising open data sources obtained by IoT sensors and making these available to tenants and the incubator.
- Becoming a “Turn Key” opportunity for the Department of International Trade (DIT) which essentially means that they can advertise this opportunity all over the world as a ready to invest in project to foreign investors.

The Project will deliver ROI by:

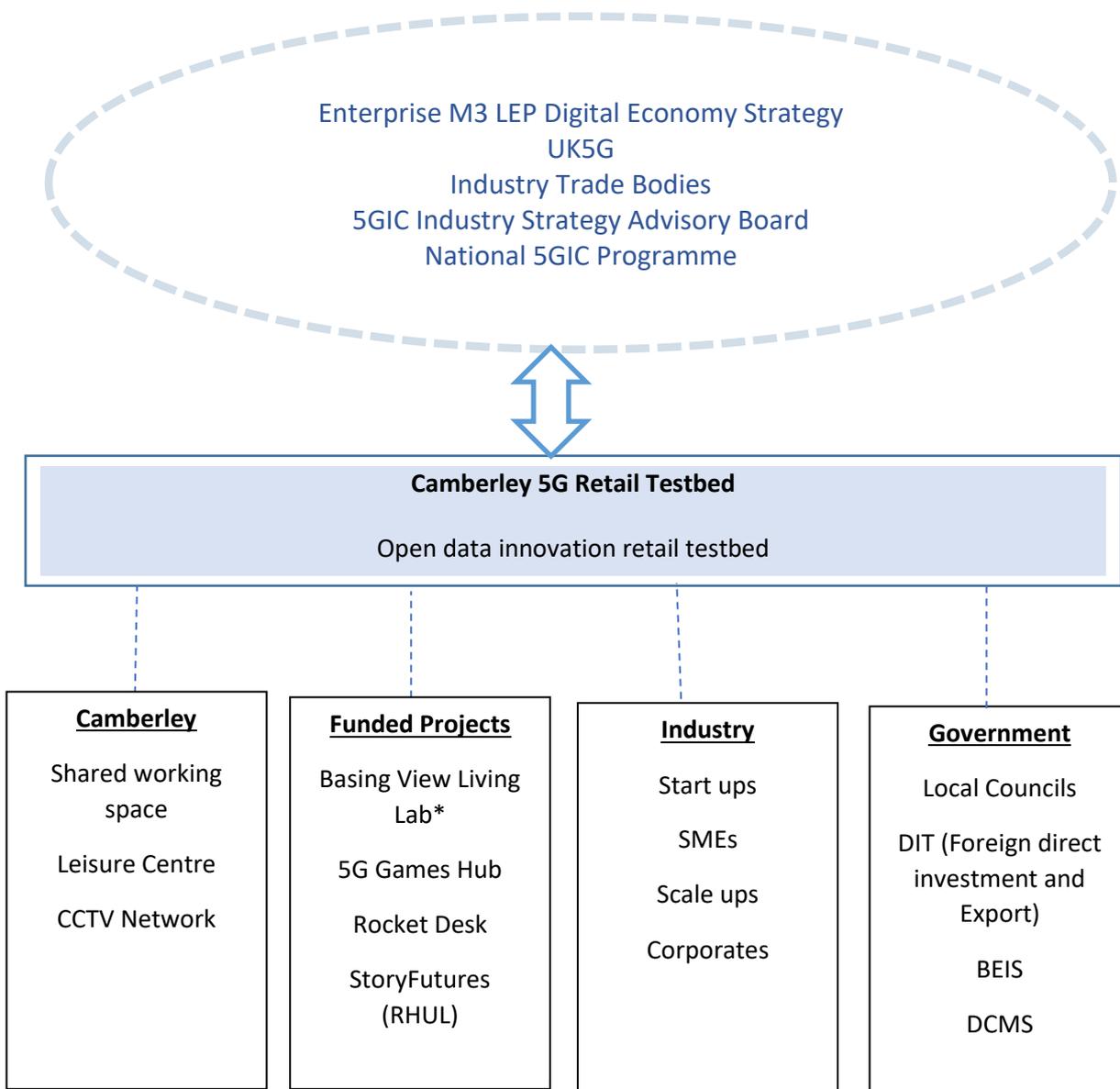
- The commercialisation of data obtained by IoT sensors.
- Future proofing a significant asset owned by the council.
- Increased satisfaction by the current tenants as they will be able to innovate in a number of different ways by exploiting new technologies and connectivity (Explored further in section 7.2).
- Attracting new tenants nationally and internationally by working closer with the Department for International Trade (DIT) and create a soft-landing zone for foreign direct investment.
- Driving footfall to the shopping centre to experience an improved way of doing bricks and mortar retail, which should lead to increased occupancy, higher conversion rates and increased fees received from parking.

### 3.2 How could Surrey Heath Borough Council do this?

Collaborating with a selection of technology partners, universities and retailers to install a 5G fibre network that will allow the use of sensors and the right technology applied that will bring a whole new level of innovation to retailers and shoppers. Providing open data to SMEs, tech companies and hackathons to equip the innovators of tomorrow with the right data to provide more levels of innovation than we have seen to date.

It is also important that the test bed works with key retailers from large scale all the way down to the independent shops, it is important that this project is seen as a project for retailers with them heavily

involved at the start, and not a project which they have very little influence in and has been forced upon them. The project will be working with retail trade bodies to ensure that the retailers voice is heard, this is important because a key outcome for the project is driving new organisations in to the region and this can be done if they are being represented by the trade body. The schematic below shows a vision of how it could operate:



\*Awaiting sign off

### 3.3 Why do this?

The power of 5G and IOT is set to transform a number of industries and the latest DCMS test bed programme has demonstrated this in a number of verticals (IoT, Autonomous Vehicles, Health) one of the key parts missing in the retail industry, likely due to the fact of asset ownership. The ownership of the shopping centre by Surrey Heath Borough Council provides a unique opportunity to create this test bed in partnership with several key technology partners and put Camberley and Surrey Heath on the world map and gain international recognition. There is a significant opportunity to create revenue models to provide a ROI model based on ownership of data. The impacts and learnings of data driven decision making will mean that Surrey Heath Borough Council could become thought leaders in this field, and sell intelligence to shopping centres and retail partners around the world who want to implement technologies, but do not have the resource available to them or the time to be able to do it properly.

There is also an economical argument for this project, the UK retail industry is a big employer and contributor to GVA. Retail Economics (Retail Economics, 2018) found that there were 2.9 Million people employed in UK retail in 2018 and the amount retail generates of total GDP (GVA) is 5% with one third of consumer spending going through retail which makes it a big contributor economically through employment and spend.

### 3.4 The Square Shopping Centre

The Square is a 460,000 sq. ft shopping centre, with over 100 different retailers and attracts 180,000 shoppers a week (Camberley, 2019) from its affluent catchment area. It has a number of anchor tenants with household names such as Sainsburys, Poundland, Primark, Boots and TK Maxx. Within a short radius of Camberley there is significant competition in close proximity, with shopping centres of prominent highstreets highlighted in the map below.



(Google Maps, 2019)

A report by CACI (CACI, 2018) looked at The Square shopping centre and found the following:

- The Square has a strong local pull, with 89% drawn from the local primary and secondary catchments. There is an underrepresentation of shoppers from the secondary catchment areas and this is due to the increased competition from other shopping centres such as Bracknell. A recommendation was to increase its appeal for shoppers from further away through improving its destination led offering such as restaurants and cafes or refurbished department store/fashion offer which was requested by 19% of shoppers.

- The Square is performing well in comparison to other shopping centres and retail spend is above the average for other in town shopping centres. The Conversion rate of shoppers is also increasing year on year. One of the catalysts for the increase was the new caterers at the Square which has helped increase conversion rates from 7% in 2014 to 21% in 2018.
- The customer experience is key and CACI rated The Square as a 4.2 with shoppers experiencing a more positive perception of The Square in comparison to 2014. There was a strong uptake of services such as free Wi-Fi and the information desk.

### 3.5 Flexible Working Space

The creation of a 2500sq foot flexible working space that could back haul in to the 5GIC core to allow SMEs and start ups the opportunity to work on a 5G network from their office space. There are a number of groups that could benefit from this type of work space, and considerations should be given to the following:

- **Skills Retraining**

The workspace could offer development courses or training to get people back in to work, there should be considerations to look at the national retraining scheme launched by the government. This could benefit a number of individuals such as adults who lose jobs to automation, mothers returning to work after maternity leave and military leavers.

- **Women in technology**

Working with large corporates and public sector to help get more women in to technology and STEM careers, this could be a flagship project where there is significant investment and

time in to giving opportunities to women to work in the flexible working space and receive mentorship and support from organisations around the UK.

### 3.6 Benefits of the Project

There are a number of significant benefits that can be obtained by investing into this project, especially as this is the first of its kind in Europe to date, which will gain media interest nationally as well as generating a significant USP for Camberley as a retail centre of excellence. The key benefits that could be seen are:

#### **Department for International Trade (DIT) Landing Zone**

To drive inward investment and foreign direct investment, the project should be classed as a landing zone for the DIT. By becoming Europe's first 5G enabled shopping centre, it should be seen as a centre of excellence for retail innovation, and be a showcase for the UK. The DIT should also be utilised for exporting opportunities, with SMEs and Scale ups being able to demonstrate their technologies/products in a real life environment to attract new exporting opportunities or investment.

#### **Incubation and academia links**

As Surrey Heath has no higher education or further education institutions, this project would help deliver stronger links to academia with Universities such as The University of Surrey and Royal Holloway a short distance away. By linking the project with the Universities, Surrey Heath Borough Council can explore opportunities such as a Knowledge Transfer Partnerships (KTP). A KTP is a part funded programme that enables the public sector or industry to access knowledge and skills from a university graduate.

#### **Strong Partner Network**

Attracting large organisations to partner on the project has many benefits, firstly the recognition and marketing that can be obtained from the larger organisations will give significant coverage for Surrey Heath which it would not have got without the project. There is also the opportunity to work longer

term with these partners on other projects, as outlined in the appendices there are a number of other technologies and applications that would benefit from 5G that Surrey Heath Borough Council could be a part of.

### **Data Collection**

One of the biggest benefits of doing the project is the collection of real time open data, that can be analysed and interpreted. This gives Surrey Heath Borough Council the opportunity to move towards real time data driven decision making, making it easier to justify decisions to the public as they will be based on real data. The data could also be commercialised and sold which would create a new revenue stream for the council. The data could also be provided for hackathons to allow innovative smaller organisations or start ups to work on real life problems and come up with solutions.

### **Continuously Developing Ecosystem**

The project has the opportunity to continuously develop, it is key for an innovation test bed that it is constantly keeping up to date with changes in technologies. This means that for future funding bids, the testbed could be used or commercialised to allow partners not just involved in retail to use the test bed for new technologies or trials and adding to the shopping experience for consumers.

### **Centre of excellence for future bids**

By becoming a centre of excellence for retail, there is a good opportunity to partner on emerging technology or other 5G large scale bids. This will give even more exposure to the project as well as potentially unlocking future grants and new partners.

### 3.7 Return on Investment

Surrey Heath Borough Council has already made a significant investment with the purchase of the shopping centre and will be able to demonstrate the investment in the shopping centre, and the potential to generate new revenue streams as seen below:



### 3.8 First Mover Advantage or Fast Followers?

There are a number of benefits to being the first to move in this sector, as you have the opportunity to become the thought leaders in this field and shape the future of retail to how you want it to be. This will also demonstrate a commitment to the current retailers that you are investing in your asset and future proofing it to allow for them to innovate. The publicity and press that will be obtained from the project will also potentially help attracting new tenants to the region.

The other option is to become fast followers and let another shopping centre assume the initial risk, but there are a number of dangers of following this strategy. Regardless of being a first mover or fast follower the infrastructure costs will still need to be paid for to future proof and equip the shopping centre with the right infrastructure. Surrey Heath Borough Council will not have the publicity or USP that another shopping centre would obtain, if they did this first. By becoming a first mover it makes it far more of an attractive proposition to retailers and technology partners and far more likely to attract investment in the project.

### 3.9 The Timing is right

With the release of phase two of 5G due to being rolled out in 2020, this is the perfect time to start putting the infrastructure and partners in place to roll out this type of transformational project. Brexit is posing a significant number of challenges for government from an economical perspective, and they will need to have a number of flagship projects to demonstrate innovation and prosperity in the UK as well as trying to driving foreign direct investment to create new high value jobs in the UK. This gives the opportunity for Surrey Heath Borough Council to get on the map politically as well as securing a number of key technology partners who want to be part of flagship projects such as this. The other consideration is that other shopping centres in the UK will do this eventually, it is important to note that most shopping centres will already be considering becoming 5G ready, as it will naturally become the standard mobile network that consumers and retailers operate on. The need to move now is vital if the test bed is to become a reality.

## 4.0 Risks

With all new projects there is a series of risks that arise and it is important to consider these before making any major decisions or investments in to new projects.

### 4.1 Cyber Security and Data Protection

Whilst 5G networks are designed with security at the core, it is essential that data protection and security is maintained, and essential cyber security measures are put in place to ensure the integrity and security of the project and the data. The challenges that can be faced by open sourced ecosystems is that it becomes easier for people to hack into the system and take control, which could be devastating and have huge reputational risk associated with it. It is critical that partners with a proven track record in security are involved and that all sensors and data capture points are fully secured and stored securely with robust security measures put in place.

### 4.2 Health

Implementing new technologies or change can cause disruption and fear amongst citizens, especially when 5G is spoken of as there is a number of movements trying to promote the dangers of 5G and the health implications surrounding increased levels of electromagnetic radiation. A common complaint is the dangers of increased exposure to electromagnetic radiation and is one of the most common objections raised when 5G is discussed. It is important to understand the way 5G operates to clearly be able to articulate to citizens and eradicate any cause for concern. Mobile networks transmit radiofrequency electromagnetic fields, similar to Wi-Fi, Radio and TV transmitters. These are low energy forms of radiation which has raised fears over the safety of 5G, especially as 5G will be accessing a very high frequency spectrum that has been unexploited in the past by mobile networks.

The radio waves transmitted by base stations are a form of non-ionising radiation and have frequencies in the microwave region of the electromagnetic spectrum. Advice is taken from key institutions around the world:

**World Health Organisation (WHO)** (WHO, n.d.)

“Despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health”

“Considering the very low exposure levels and research results collected to date, there is no convincing scientific evidence that the weak RF signals from base stations and wireless networks cause adverse health effects.”

**Public Health England (PHE)** (PHE, 2019)

Public Health England advised that radio waves from base stations is in line with the guideline set out by The International Commission on Non-Ionizing Radiation Protection (ICNIRP) who are formally recognised as an official collaborating non-governmental organisation by the World Health Organisation (WHO) and the International Labour Organization.

**National Health Service (NHS)**

The NHS discusses mobile technologies and prolonged/frequent exposure to radio waves:

“Concerns have been expressed that prolonged or frequent exposure to radio waves might increase a person's risk of health problems such as cancer. But most current research suggests it's unlikely that radio waves from mobile phones or base stations increase the risk of any health problems. Since the 1990s, there's been a huge amount of scientific research into the potential health effects of mobile phone use”.

“Large reviews of published research have concluded that overall the evidence does not suggest that radio waves from mobile phones cause health problems. But further research is still needed to check that there are no health impacts from long-term exposures (using a mobile phone for more than 20 years)”.

*“when it comes to other risk factors for cancer, such as smoking, poor diet, drinking too much alcohol and lack of exercise, mobile phone ownership is probably not a significant risk to your health”. (NHS, n.d.)*

In 2012 an independent report by the Health Protection Agency found “no convincing evidence that RF exposure below agreed international guideline levels (which the UK adheres to) causes health effects in adults or children”. (NHS, 2012)

#### 4.3 Not doing anything

Standing still and not doing anything can also be considered a risk, there is nothing to say that other shopping centres across the country and even regionally will not be considering similar projects. If they have a clear USP that attracts retailers and consumers to go to their locations instead of the Square then there could be significant drops in footfall and conversion rates. Meaning that retailers may not want to stay at The Square, this is also to be considered if a new retailer is looking at the region and has to decide on where they want to relocate.

#### 4.4 GDPR

The introduction of GDPR has meant that individuals have enhanced rights in relation to their personal data being stored and utilised. GDPR also means that there are increased obligations on the entity storing the data and ensuring the safety and proper use of the data and deletion after a certain period.

It is advised that all partners in the project are fully aware of GDPR regulations and further advice is sought from experts in this field.

## 4.5 Risk Register

<b>Risk</b>	<b>Level (L/M/H)</b>	<b>Solution</b>
Huawei being blacklisted by UK Government	<b>H</b>	Explore alternative options with other providers such as Cisco and Ericsson.
Reputational risk of using Huawei with the public	<b>H</b>	Working with government to find out the latest on the telecoms infrastructure review and take guidance from government officials. Advice can also be obtained from the 5GIC.
Security of networks and sensors	<b>H</b>	It is imperative that partners with a proven track record in cyber security and have security included in their solutions/products.
Not being given spectrum to use	<b>H</b>	Working with the 5GIC and Ofcom to utilise its partners to get access to spectrum. This can be done by looking at trial and development licences, which can be used if they do not interfere with a mobile networks signal.
GDPR and storage of data	<b>H</b>	It is important that all data is stored in conjunction with GDPR legislation. It is advised to seek expert advice on this in relation to the project.
Freedom of information requests on health risks	<b>M</b>	A number of partners outlined in section 4.2 have looked in to the health implications of 5G. Nothing has been medically proven but SHBC need to be clear around this and refer to research. There is also the risk of citizens citing false research to try and scare people online.
ICNIRP guidelines not being adopted by the UK government after leaving the EU	<b>M</b>	It is expected that the UK government will continue to incorporate the ICNIRP guidelines which were incorporated in to the 1999 EU Council recommendation (1999/519/EC). It is recommended to take advise from the UK government if anything changes.
Retailers not using testbed	<b>M</b>	Engaging with the retailers early in the project, understanding what they need and want out of it. Making sure they are part of the journey.
Road Ownership	<b>M</b>	Ensure that the council is aware of who owns the road and who would have ownership of any ducting/fibre put in to the ground.
Increase in electricity consumption	<b>M</b>	Important to factor in the future costs of electricity due to the increase in demand.
5G not being adopted by the general public	<b>L</b>	Whilst 4G will still be prevalent until the UK reaches Stand Alone network status, the roll out and investment of 5G by the mobile networks will mean that the adoption is encouraged with the release of new 5G handsets and incentives.

## 5.0 Place Making

Locations all over the country are branded for the kind of industry which thrives in that region, with historical links and thriving industries now all becoming part of local industrial strategies and creating a place-based strategy. Place making is vitally important economically and is helping drive inward investment with businesses in the UK looking at relocating or driving foreign direct investment. The vision for Camberley is clear, utilising assets owned by the council and investing in them to breed innovation, with the overall goal of creating a 5G retail test bed which attracts new consumers and retailers and leads to increase in footfall and conversion rates.

Place Making is a very key part to attracting new citizens to the region and this is something that is highlighted in the Enterprise M3 LEP Strategic Economic Plan with the aim of attracting new Young Urban Residents to the region, the 5G retail test bed will be the defining USB for Camberley and Surrey Heath and a step forward to making it recognised as a “Retail Centre of Excellence” by achieving this status, it would make the region significantly more attractive to young urban residents.

Numbeo is the world’s largest database of user contributed data about cities and countries worldwide, they show the following differences between London and Camberley, which will be considerations for young urban residents looking to relocate:

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You would need around £3,215.78 in Camberley to maintain the same standard of life that you can have with £4,600.00 in London (assuming you rent in both cities). This calculation uses our Cost of Living Plus Rent Index to compare cost of living. This assumes net earnings (after income tax).

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### Indices Difference



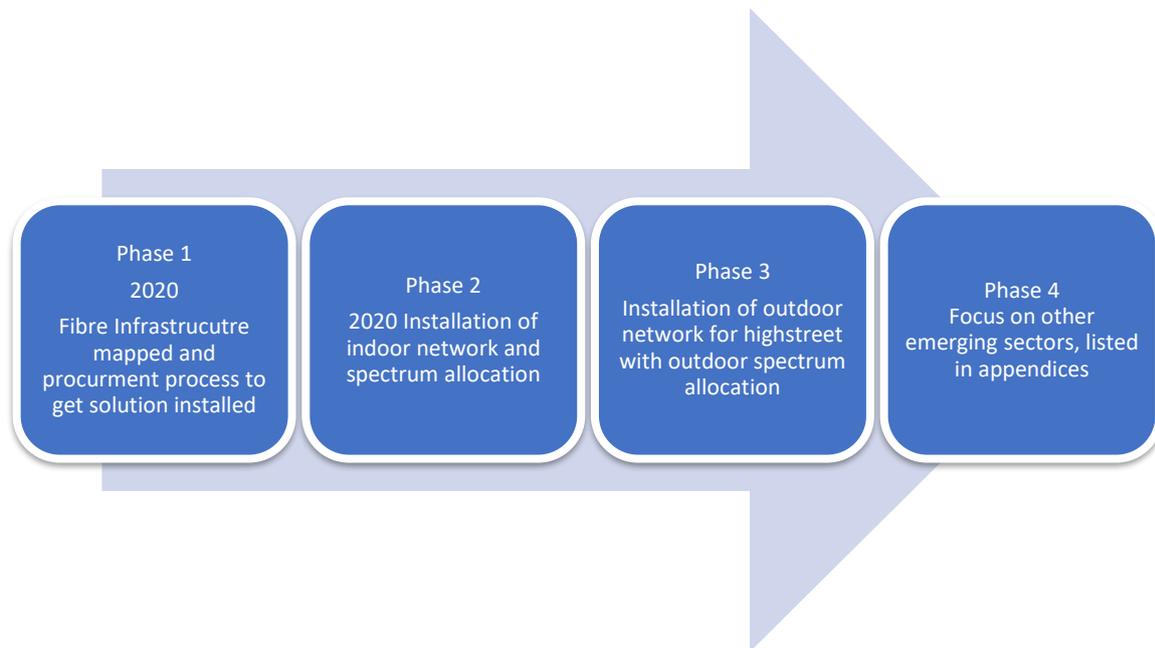
Consumer Prices in **Camberley** are 13.43% **lower** than in London  
Consumer Prices Including Rent in **Camberley** are 30.09% **lower** than in London  
Rent Prices in **Camberley** are 51.37% **lower** than in London  
Restaurant Prices in **Camberley** are 10.62% **lower** than in London  
Groceries Prices in **Camberley** are 2.75% **lower** than in London  
Local Purchasing Power in **Camberley** is 26.78% **higher** than in London

(Numbeo, 2019)

Numbeo has demonstrated that there is significant high level benefits for people looking to relocate from London to other regions. The stats showed significant benefits to relocating but there are also some challenges with this, as people may not be willing to compromise on things that they receive as standard in London or larger cities. These could include things such as Uber, Contactless Payments, restaurants and nightlife that are open until late as well as delivery services such as Deliveroo/Uber eats. These are the kind of things that need to be reviewed by Surrey Heath Borough Council and included in regeneration projects moving forward.

## 6.0 Phased Approach

When looking at the implementation approach to the project, it is advised that the project is broken down into different phases. This is important for a number of different reasons such as spectrum licences, land/road ownership and procurement. This element is key when costing out the project fully.



### Phase 1

It is important to first find out what fibre is in the ground and have this mapped out, this is vital to ensuring that a 5G network can be installed. Fibre is the backbone to 5G and at present Surrey Heath Borough Council are unaware of what is currently in place. Once this is known then a procurement process should be taken place to get competitive quotes and pick a key partner to undertake the work required.

### Phase 2

Working with Ofcom and other industry partners, phase 2 should be the installation of the indoor network and obtaining a spectrum licence for indoor capabilities.

### **Phase 3**

The high street and surrounding areas should be the focus of phase 3, with exploration needed to understand what is currently there and what the requirements will be for outside use. There will also need to be conversations with Ofcom to understand what licence/spectrum is required for outside use and how it would interact with the indoor network.

### **Phase 4**

Once the retail proposition is in place, there can then be focus on other areas which would benefit from 5G connectivity. These potential sectors are listed in the appendices.

## [6.1 Potential partners](#)

The key to success in this project is working with a number of key partners who can add value and solutions in to the project. Following discussions with SHBC, 5GUK and the 5G Innovation Centre (5GIC) the following partners have been identified:

### [6.1.1 Infrastructure and fibre mapping](#)

#### **AWTG**

AWTG are a member of the 5GIC and an end-to-end engineering services and technology solutions provider for companies in Telecommunications, Smart Cities, Industry 4.0, Connected Health, Smart Fashion, New Media, Internet and other markets that employ digital technologies.

#### **Natta**

Natta are an experienced contractor who specialises in civil engineering projects.

### **Wireless Infrastructure Group (WIG) (Part of the 3i group)**

WIG are an independent communications infrastructure provider, who builds and operates communication towers in rural, suburban and shopping centres. They work with fibre based network to improve mobile coverage in large buildings and highstreets.

#### 6.1.2 Network Spectrum

##### **Ofcom**

The Office of Communications, commonly known as Ofcom, is the UK government-approved regulatory and competition authority for the broadcasting, telecommunications and postal industries of the United Kingdom.

##### **Vodafone**

One of the largest mobile communication companies in the world, and a founding member of the 5GIC. Surrey Heath Borough Council have already had initial talks with Vodafone.

#### 6.1.3 Experience

##### **StoryFutures at Royal Holloway University London**

Funded by the Arts and Humanities Research Council (AHRC) creative industries clusters programme this project brings together world class creative and technology companies, Universities and SMEs to take next generation storytelling. Located at Royal Holloway University London (RHUL) in Egham the project looks at how the creative sector utilises emerging technologies such as AR/VR/MR/XR, smart devices and AI to engage audiences in new experiences.

##### **Rocket Desk**

Rocket Desk is a flexible co-working space for the start-up, indie and freelance creative technology professionals which has a dark fibre 5G link backhauled to the 5GIC. Rocket Desk is home to around

25 small companies who are developing digital games, VR/AR applications and creative experiences.

### **The Centre for Vision, Speech, and Signal Processing (CVSSP) at the University of Surrey**

Located at the University of Surrey CVSSP is one of the largest audio and vision research groups in the UK, with a track record of creating award winning spin out companies, experiences in VR and a number of innovative projects. The centre has over 150 researchers and relationships with key innovation partners all over the world.

#### 6.1.4 Expertise

##### **5GIC**

The 5G Innovation Centre (5GIC) is located on the University of Surrey campus and officially opened in 2015. It is the largest industry and academic research partnership and test facility for development of future 5G communications in the world. The 5GIC works on a membership basis with large scale companies and SMEs paying a membership each year to get access to the testbed and research. Founding members (platinum) of the 5GIC include the likes of Vodafone, EE/BT, Huawei and O2 (Telefonica). There is also a number of other interesting partners in the gold and silver membership such as BBC, Samsung and Fujitsu, a full list of up to date partners are found on the 5GIC website. In 2016 the 5GIC was recognised by the G7 nations as a global leader driving the growth and promotion of a digitally connected world. (G7)

##### **Rahim Tafazolli**

A Regius Professor , Director of Institute for Communication Systems (ICS), and the founder and Director of 5G Innovation Centre (5GIC) at the University of Surrey, UK. He has over 30 years of experience in digital communications research and teaching. He is one of the leading authorities in 5G in the world and comes with a wealth of experience in mobile communications.

### **Barter For Things (Alex Barter)**

Alex Barter is an IoT specialist and runs a company called Barter for Things, his company works with a number of public sector organisations and looks at the implementation of data sensors.

### **Martin Brindley PR Ltd**

A local technology PR specialist with a track record in PR and emerging technologies.

## 6.1.5 Government and trade bodies

### **The Department for Digital, Culture, Media and Sport (DCMS)**

DCMS is a ministerial department, they have been heavily involved in 5G and ran the testbed and trials programme.

### **Department of International Trade (DIT)**

The DIT is responsible for promoting the UK on a world stage and attracting foreign direct investment, as well as identifying exporting opportunities.

### **Department for Business, Energy and Industrial Strategy (BEIS)**

With the importance of business and the Industrial Strategy at the heart of this project, BEIS would be an important partner to be involved in the project.

## 6.1.6 Retailers

### **British Independent Retail Association (BIRA)**

The British Independent Retail Association one of the associations responsible for the independent retailers.

### **The Square retailers and high street retailers**

It is also recommended to work with the current retailers in The Square shopping centre to build dialogue and gain a better understanding of what their pain points and digital aspirations are.

## 7.0 The Scale of the Opportunity

“5G has the potential to provide a much-needed boost to the UK retail sector. Not only can the technology improve the instore customer experience, it is also set to transform warehouse management through the use of the internet of things, artificial intelligence and robots. In order for the UK retail sector to realise its full potential, the Government, mobile providers and partners such as financial institutions need to support businesses to make smart investments that enable 5G.”

Ian Gilmartin, Head of Retail at Barclays Corporate Bank

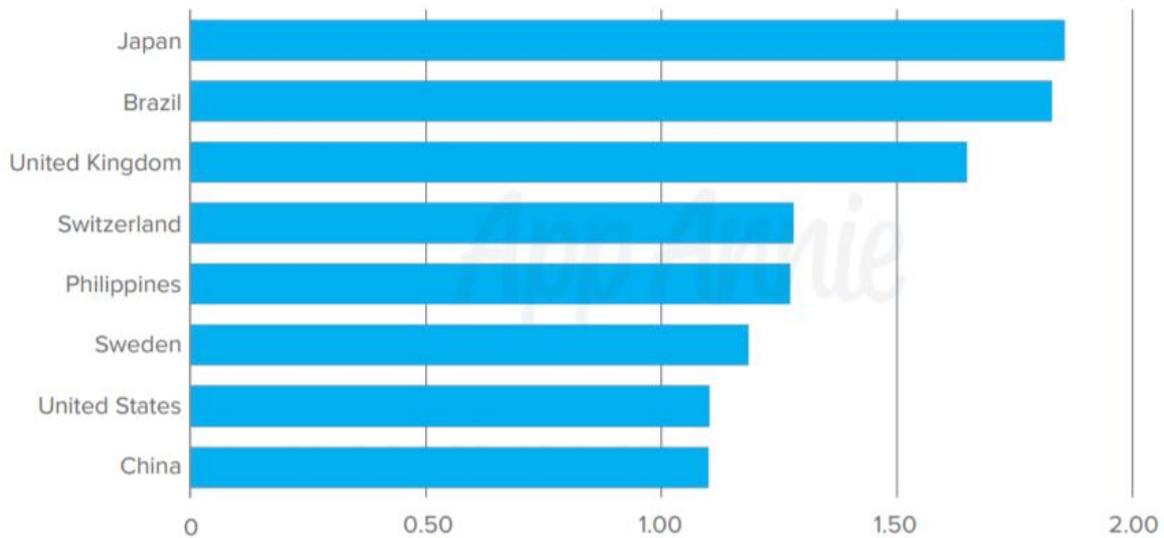
(Barclays, 2018)

5G could have significant macroeconomic impacts but at present this remains a theoretical prediction which can only be validated as the technology develops and commercial roll out has begun. 5G is the enabler to allow innovation to take place, much like petrol is the key to making a car run. One of the biggest growth areas that 5G will enable is the rapid rise and integration of the Internet of Things and the roll out of 5G enabled handsets. One of the key reasons that this project should be a success is due to the fact that most consumers will already have a mobile handset which they carry with them.

Some key stats that have been obtained show that:

- Up to £15.7bn added to the UK economy by 5G rollout by 2025 (Barclays, 2018)
- Mobile Data traffic showing 82% year on year growth (Annie, 2019)
- 3 Hours per day spent in mobile by the average user in 2018 (Annie, 2019)
- \$101Billion worldwide app store consumer spend in 2018 (Annie, 2019)
- Globally mobile is set to comprise nearly 75% of total e-commerce transactions by 2021 (Annie, 2019)
- Currently 1 Billion cellular IoT connections globally, that is expected to rise to 4.2 Billion by 2025 (Barclays, 2018)

**Top Countries Where Mobile Is Growing Faster  
Than Countries' Economies  
2016 vs. 2018**



**Mobile Consumer Spend Growth Multiplier Relative to GDP Growth**  
*Calculated by Country's App Store Consumer Spend 2 Year Growth Relative  
to Worldwide Consumer Spend Growth Compared to Country's GDP Growth  
Relative to Worldwide GDP Growth*

*Note: GDP data from IMF; Ranking Based on 75th Percentile  
of Countries by App Store Consumer Spend (iOS, Google Play and Third-Party  
Android in China)*

(Annie, 2019)

A report by App Annie the state of mobility showed a number of interesting statistics when mobile is looked at from a national perspective. Firstly the UK, Japan and Brazil are three countries where mobile consumer spend actually grew faster than overall gross domestic product (GDP). It is estimated by App Annie that global spend on technologies and services that enable digital transformation will hit nearly \$2 Trillion by the year 2022, with the conclusion that “mobile is at the heart of the digital economy”.

### 7.1 5G

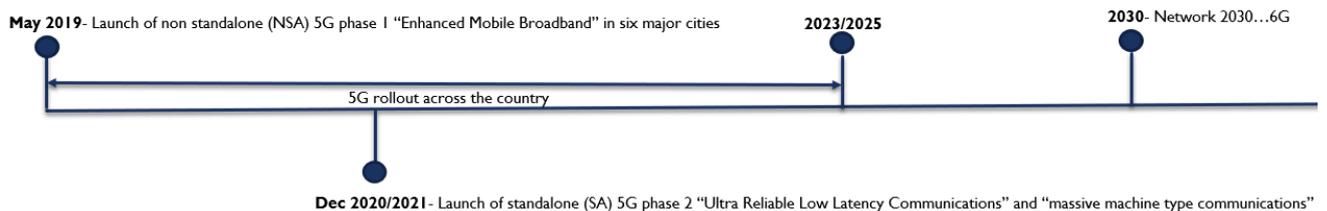
It is estimated by Barclays in their 5G report “5G A transformative technology” that the introduction of 5G in the UK could increase aggregate UK business revenues by between £8.3Billion and £15.7 Billion. Barclays analysts took a pessimistic and optimistic outlook depending on the speed on the

rollout and came to a central scenario of a £13 Billion increase. A speech by Dr Hui Cao the Head of Strategy for Huawei in July 2019 said that Huawei forecasts that data usage for an average user is set to increase to 1 Gigabyte per day of mobile data by 2025, meaning an average consumer will use 30 Gigabytes per month, which is a huge increase in terms of current data usage. (Huawei, 2019)

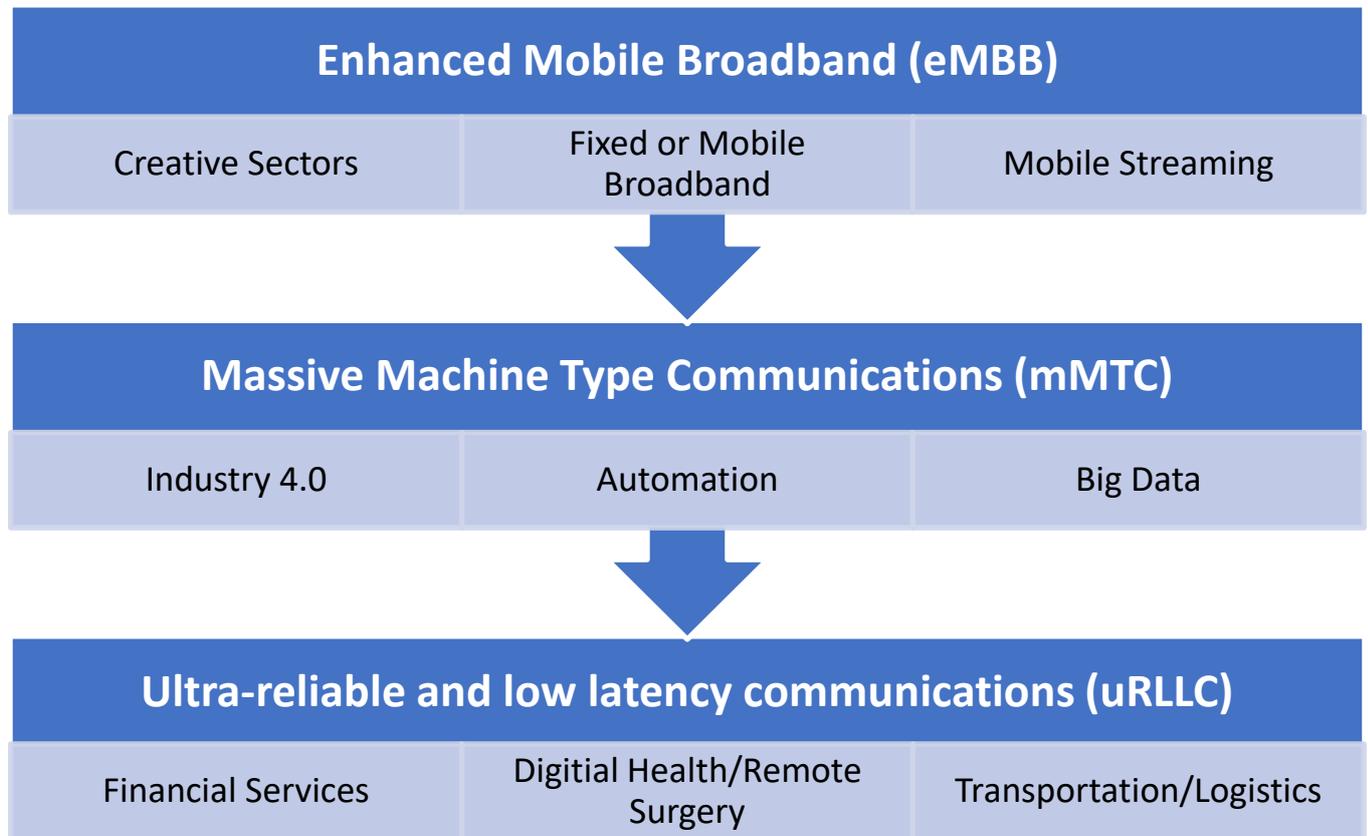
### 7.1.1 What is 5G

5G is the evolution in mobile communications, building on previous generations such as 1G, 2G, 3G and most recently 4G.

It is important to understand that similar to how 3G/4G work in harmony, 4G and 5G will work in harmony together for a significant period of time this is known as a non standalone network (NSA). The overall aim is to get to a standalone network (SA) but analysts do not see this happening for several years, with realistic ambitions being the end of 2020 and beginning of 2021.



5G can be broken down into three different categories, depending on the latency and speed requirements of the technology.



### 7.1.2 Why do we need it?

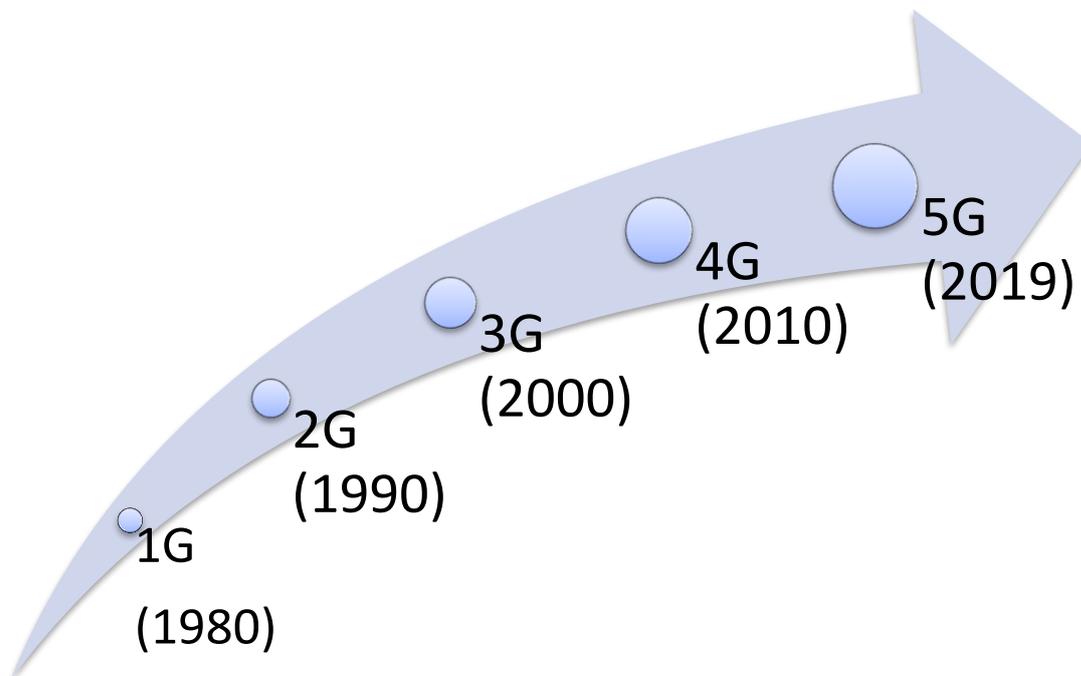
Growth in data demands is putting pressure on 4G networks and the need for the next generation of mobile communications is upon us. 5G networks will revolutionise the way we live, work and play. With mobile users experiencing network speeds ten times faster than we experience today, with instant responsiveness. 5G networks will transform the way businesses operate and break down barriers set by restrictive legacy download speeds and network response times. This opens up a world of opportunities for all business verticals, who will be able to provide cutting edge innovation without any network restrictions. With high resolution 4k video on demand, and next generation content through Virtual Reality (VR) and Augmented reality (AR), 5G will enhance the user experience and

open a plethora of possibilities for the creative sectors to develop truly innovative products and services that can be implemented into the retail environment.

With the introduction of instant responsiveness (down to sub one millisecond), the network will be able to handle the data heavy demands of the smart city. Smart cities will see the likes of driverless cars, Internet of things (IOT) enabled sensors allowing any device to be connected to the internet and advancements in health, autonomous vehicles and automation within manufacturing just scratches the surface at the incredible technological advancements 5G will enable. 5G will be the true enabler of innovation improving citizen's ways of living for years to come.

### 7.1.3 The differences from previous generations

There has been a new generation of mobile communications nearly every decade since 1980, with the evolution of 1G,2G,3G,4G and the recent release of 5G.

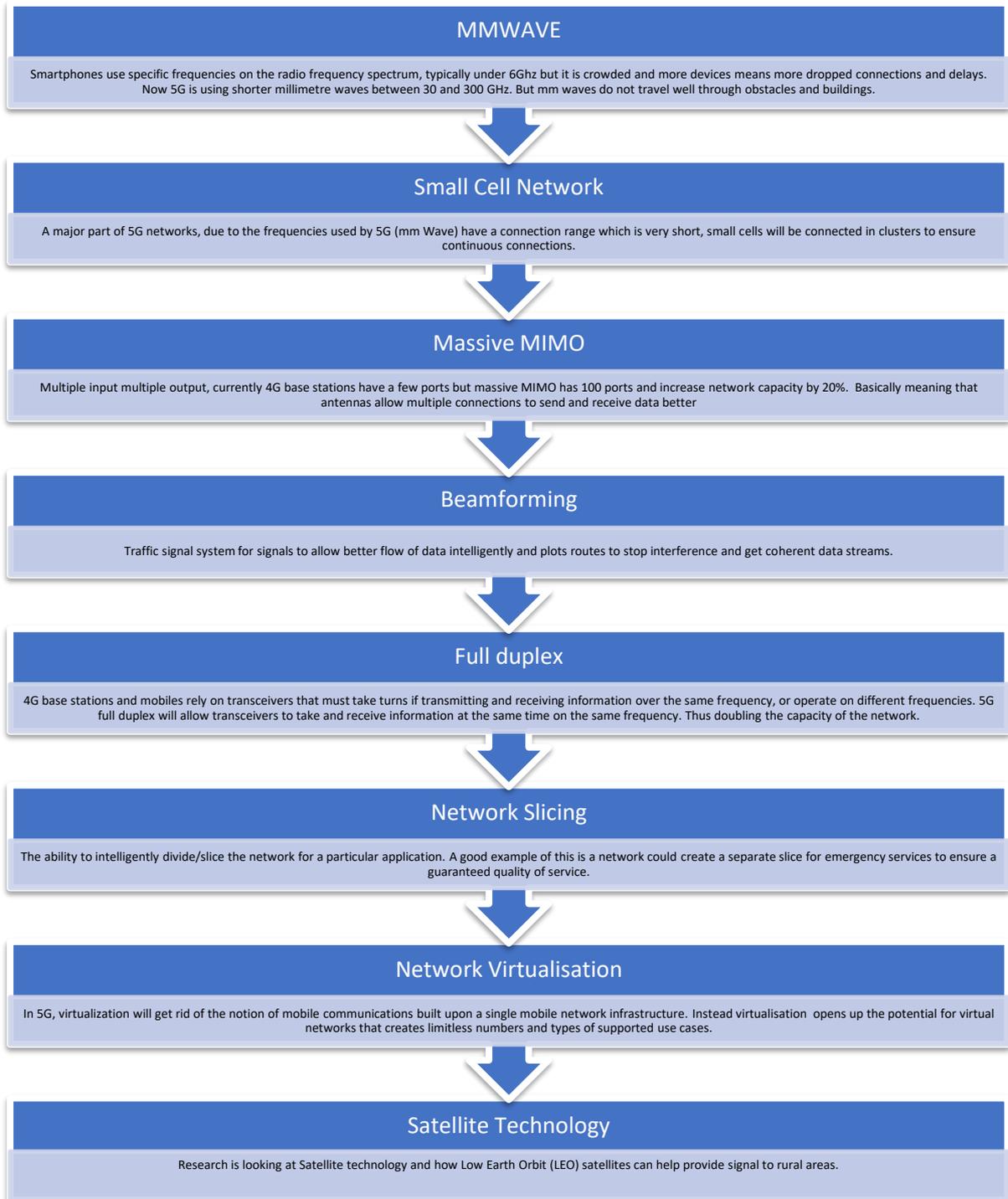


Date	1997	1998	2001	2009	2019
<b>Speed</b>	80 Kbps	250 Kbps	384 Kbps	150 Mbps	10 Gbps
<b>Technology</b>	GPRS 2G	EDGE 2G	3G	4G	5G
<b>Time to download a 1 GB HD Video</b>	36 Hours 24 Minutes	7 Hours 16 minutes	4 Hours 44 Minutes	43 seconds	0.8 seconds
<b>Latency</b>	300-1000 milliseconds	300-1000 milliseconds	100-500 milliseconds	30-100 milliseconds	1 millisecond

Data Sources: Huawei and Hbpn

The table above demonstrates the capabilities of the different generations of mobile communications, with 1G being the launch of mobile communications in 1980, leading to the next wave of mobile communications with 2G, 3G and 4G. The table highlights the differences in speed, showing the time taken to download a 1GB HD video.

There are a number of key differences between 4G and 5G and these can depend on what part of the spectrum you purchase. The integration of new technologies, efficiencies and years of research have meant the following technology changes:



Certain technologies list above are dependant on spectrum licence, so guidance will be needed from Ofcom on what is permitted and what is not on each licence.

## 7.2 The Future of Retail

The Future of retail will be even more data empowered than it is now, with retailers dependant on obtaining as much data as possible. To gain actionable insight through real data sets and to provide a more personalised experience for their customers. A report by Charged quoted that “A vast majority of consumers prefer shopping online on their mobiles or tablets from the comfort of their homes, offices or on-the-go rather than going to a physical store and facing long queues, limited stock of items and pushy sales assistants. To combat this, many brick-and-mortar retailers have embraced technology to provide consumers unique experiences which will entertain, inform and encourage interaction rather than just focusing on shopping. In particular, technologies like IoT, sensors, AI, wearable tech, VR and AR have become popular and are leading retailers in a new direction”. (Charged, 2019) The report also looked at key technology enablers and these were identified as:

- Internet of Things (IoT)
- Artificial Intelligence (AI)
- Virtual and Augmented Reality (VR/AR)

### 7.2.1 The Customer Experience

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“Anybody who works in retail knows that there’s a shift in the industry; people who visit brick-and-mortar locations are looking for an experience, not just a place where they can buy shoes.

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(Forbes, 2018)

A number of retailers are now focussing on the customer experience as a way of attracting consumers into their shops, and by giving them a good experience hoping that they will return again to make future purchases. The Charged report focused on creating a “Customer-centric world” with retailers looking to stand out in a more connected and personalised world. Retailers are now using Artificial Intelligence (AI) to form a connection between the customers and retailers, which should lead higher

sale conversion rates and return visits. Brands are now focussing not just on products that they sell but the environment in which shoppers buy them (Charged, 2019).

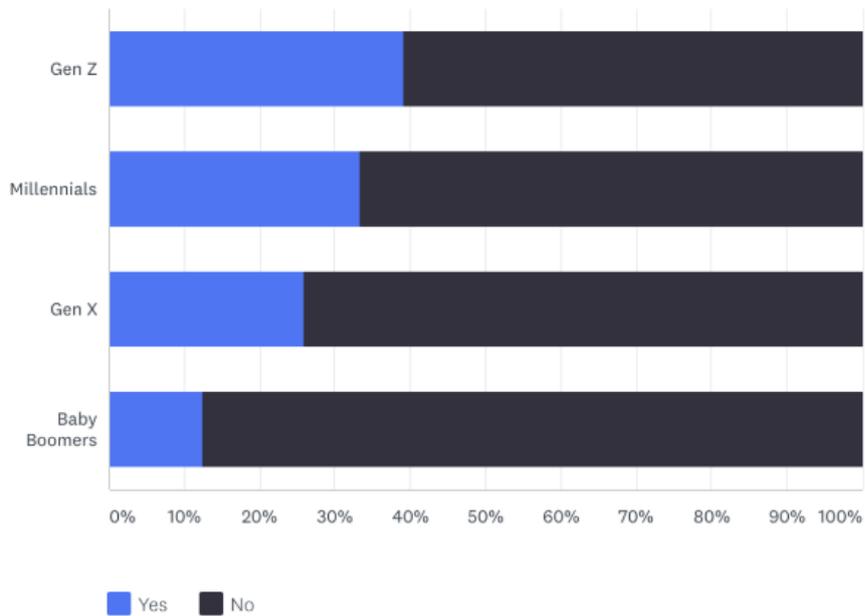
A report by Big Commerce (Big Commerce, 2018) surveyed nearly 3000 consumers for an omni-channel retail study and found a number of interesting outcomes.



(Big Commerce, 2018)

Privacy is a key issue and something that is becoming more of an issue for retailers, big commerce found that Generation Z, Millennials and Generation X are more likely to believe that retailers are respecting the right to privacy and that “risk averse” isn’t just an issue faced by the baby boomers and older generations. Bryan Bowman founder of eCom Underground was quoted saying “The most interesting observation we’ve made recently is that the youngest generation of buyers are more risk averse than average. In turn, we highlight our Unique Safety Proposition more than usual when marketing to them.” (Big Commerce, 2018).

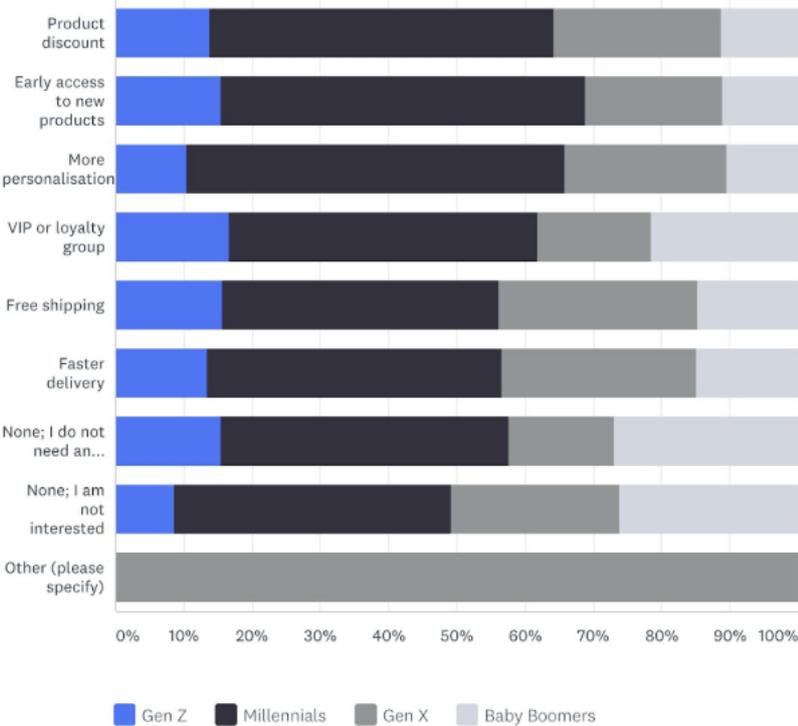
Since GDPR went into effect, have you requested that a retailer delete your data?



(Big Commerce, 2018)

GDPR has become a significant priority for a number of brands and is highlighted in section 4.4. The Big Commerce report found that more than 75% of all the generations are aware of the new GDPR regulations but less than 40% of individuals in each generations have asked for their data to be deleted but the younger generations such as Gen Z and millennials are more likely to ask for their data to be deleted.

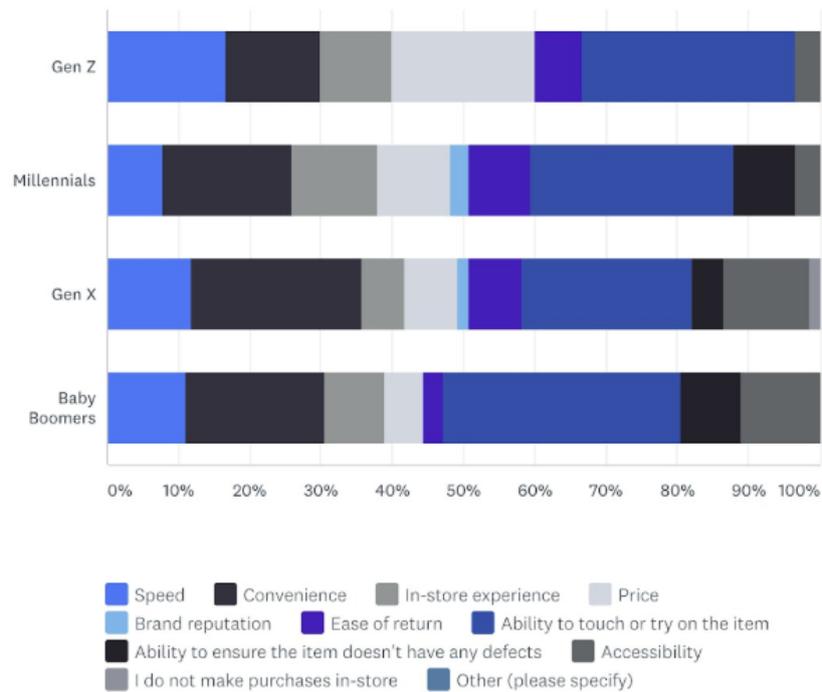
Would any of the following incentivize you to share your personal data with a retailer? [Select all that apply]



(Big Commerce, 2018)

The data found that 47% of baby boomers said that there was absolutely nothing that could be exchanged in return for their data, but younger generations were more open to exchange discount for their data.

What is the primary reason you would decide to buy from a physical store rather than an online store?



(Big Commerce, 2018)

The Big Commerce report looked at why consumers visit physical retail stores and found that the number one reason that UK consumers shop in store is the ability to touch or try on an item. Another key reason for shopping in store is speed and convenience which was a key for a number of different generations. One of the growing trends though is the customer experience which is becoming key for retailers and driving the movement towards a more personalised experience through retailers understanding the data of their consumers and how to leverage it and learn from it.

## Omni Channel Strategy

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*The more timely, relevant, and targeted your strategy is the better. Retailers who are harnessing the power of all of their data to make informed decisions on which messages and products to market are winning the race to the top. By understanding segments of your audience based on historical data you have a higher likelihood of breaking through all the noise and actually converting a browser into a buyer.*

*Alicia Thomas*

*Senior Marketing Manager at Klaviyo*

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Big Commerce have identified the key to omni-channel retail implementation strategy as:

- 1- Capture Data, track conversions and target messaging
- 2- User experience and customer experience are priority #1
- 3- Automate to save your sanity
- 4- Different channels means different devices (Including your feet)
- 5- Allocate the resources and use helpful technology
- 6- Conversion is only the first step, now you must deliver. (Big Commerce, 2018)

Building on this there are a number of ways that retailers can use technology to improve automation and the customer experience, these include:

<b>e-Wallets</b>	Currently being rolled out on the 4G network but will become even more prominent moving forward. These are digital versions of debit and credit cards that allow consumers to pay with their phones.
<b>Virtual Reality</b>	Very much built around the customer experience and using VR to sell experiences such as holidays, new cars or immersive experiences/games. It gives a sense of immersion that could not be experienced with other hardware.
<b>Augmented Reality</b>	Being trialled by a number of retailers that can show products in the home using a mobile phone. Ikea have started using this to show products in the home and allowing users to purchase straight away. Other retailers are using AR to guide people to products and promotions in the store. A big trend in Asia is smart mirrors which show different outfits and what others have bought with it to increase conversion and the value of a sale.
<b>Artificial Intelligence</b>	AI is not a new concept and has been used for generations but the way it has evolved makes it a powerful tool for retailers. Facial recognition, customer flows and personalisation is scratching the surface in regards to the power of AI and what it can do.
<b>Internet of Things</b>	By understanding consumer behaviour and trends it will allow retailers to get a better understanding of consumer behaviour and move towards more personalised approaches to consumers and increase conversion rates.
<b>Customer Flow Monitoring</b>	By monitoring the flow of consumers, the shopping centre can get a better understanding of footfall and how it moves through the centre. It can then decide on rents based on footfall and use tools like AR to move people about differently.
<b>Payments</b>	Point of sale units are becoming more and more mobile, as consumers can be put off by queuing or change their minds. Mobile devices can now handle payment and this has been seen by the likes of Apple who do not have tills and create a more personalised customer experience.
<b>Theft Management</b>	The introduction of RFID tags and sensors can help with theft management and link up with CCTV/Facial recognition software to help reduce theft and create a more linked up secure shopping centre and saving retailers significant amount of money from stolen stock.
<b>Logistics and Last Mile Delivery</b>	Smart ordering systems that can speed up delivery of items out of stock directly to the consumer's home means increased conversion rates and increased customer satisfaction rates.
<b>CCTV</b>	Object recognition is a key security measure moving forward and a step towards creating a safer shopping experience. There is also 4K CCTV which could gain analytics and information that can be commercialised.
<b>Loyalty Reward Programmes</b>	A number of bricks and mortar retailers are using loyalty reward programmes on mobile apps to drive consumers to their stores. Supermarkets such as Tesco and Waitrose use these very effectively. Nike one of the test cases listed has been known to run in-store promotions on the loyalty app to drive footfall.
<b>Mobile Apps</b>	With the number of users with smart phones increasing and the roll out of the number of apps, mobile applications are becoming critical for shopping centres and retailers to create loyalty programmes and understand their consumer behaviours better to create a more personalised experience.

### 7.3 Test Cases

#### Amazon Go

Amazon Go is one of the newest innovations in retail and has been trialled in the US in 15 cities, a combination of owning a smartphone and a user linking an Amazon account with the Amazon Go app. By utilising machine learning (ML) computer vision, Artificial Intelligence (AI) and deep learning

algorithms has meant that shoppers can walk in to a store and scan in with their smartphone, pick up anything they want on the shelf and then walk out without needing to queue and their amazon go account gets charged. This means that no purchases are lost due to large queues and there is limited dwell time. Amazon has named this technique just walk out technology.

## Nike

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“What we wanted to do is respond to the idea that all retail is moving from transactional to experiential,”

Andy Thaemert, Nike Senior Creative Director, Global Store Design

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Nike has been one of the most recognised brands to adopt a mobile app to drive people into their retail stores. They have recently created the Nike House of Innovation 000 which is in New York City. This was built on the success of another innovation store they opened in Shanghai, the six-floor shop boasts a number of retail innovations showing that the experience is now key to a number of leading retailers.

Nike has used a number of ways to innovate and personalise the customer experience such as:

- Personalisation/Customisation

Nike created a customisation bar which meant that customers could personalise their Nike products the way they wanted, with lacing plates, different colours or selecting the Nike swoosh logo they wanted.

- QR Codes

Mobile app users could walk past a mannequin and if they liked what they were wearing, a customer could scan a QR code and be shown every piece of clothing being worn, where it was located in the store and the option to order it to a virtual bag.

- Virtual Bags

Customers could add a number of items to a virtual bag, which would then be delivered to them personally in a dressing room, so they did not need to walk around the store trying to find all the different items or clothes in their size.

## Sainsburys

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“We know our customers value their time and many want to shop as quickly as possible - technology is key to that. This is an experiment rather than a new format for us - it hasn't been done in the UK before and we're really excited to understand how our customers respond to the app experience. We'll be with our customers and colleagues all the way over the coming months, iterating continuously based on their feedback before we decide if, how and where we make this experience more widely available.”

**Sainsbury's Group Chief Digital Officer, Clodagh Moriarty**

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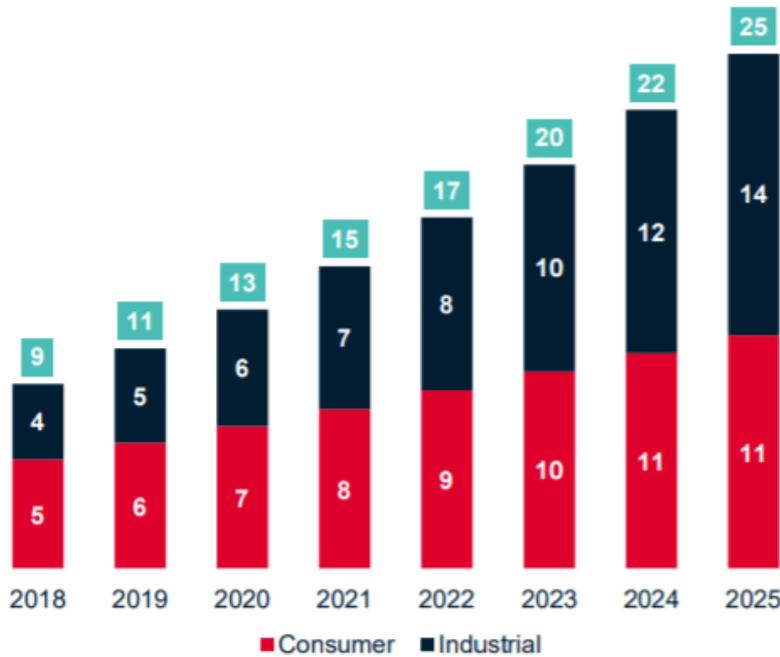
UK Supermarket and one of the key retailers in the Square Sainsburys conducted a three-month trial in their Holborn Circus shop with a mobile first check out free shop by utilising SmartShop scan and Pay & Go technology. (Sainsburys, 2019). The trial was conducted to see how shoppers would react and understand if this is something that should be rolled out across the country, as well as using customer feedback from the trial to help develop the SmartShop Scan and pay & go app further. Sainsburys quoted that 82% of transactions in this store were cashless, but still provided opportunities for people to pay with cash if needed.

## 7.4 The Global Rise of IoT

The Internet of Things (IoT) is the intelligent connectivity of physical devices through the internet. With sensors being embedded in devices and utilities used on a daily basis, it can provide real time data that can be used in a number of different ways benefiting real life decision making, health, retail and being the enabler for smart cities. According to GSMA Intelligence the world economy benefited

by \$175 Billion in 2018 from the productivity benefits to businesses from the use of IoT which is equivalent to 0.2% of GDP (GSMA Intelligence, 2019).

Global number of IoT connections (Billions)



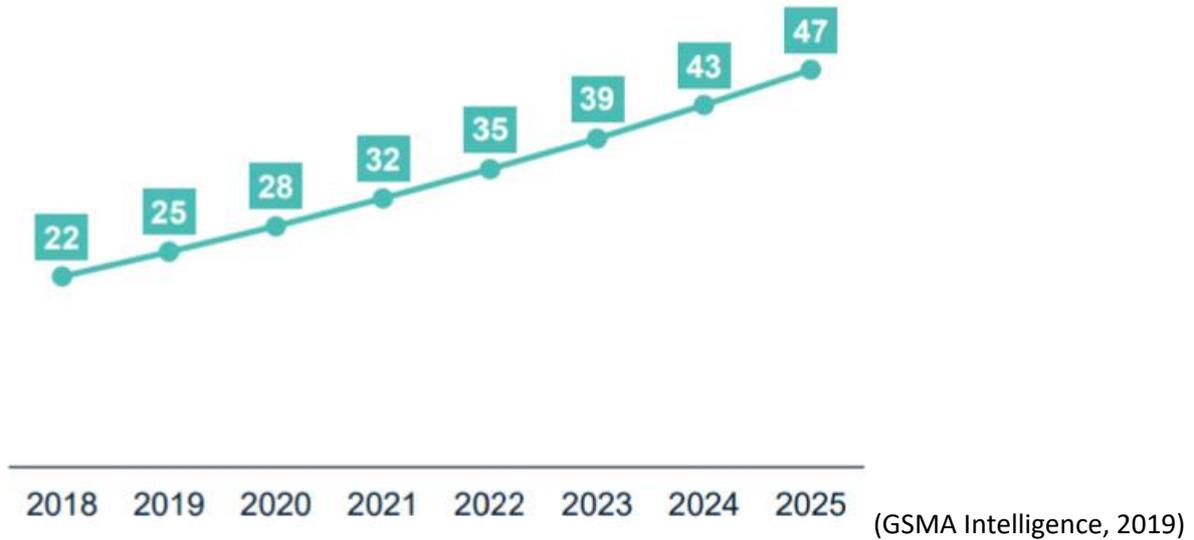
Source: (GSMA Intelligence, 2019)

Research undertaken by GSMA Intelligence has shown an upward trajectory for the global number of IoT connections for both consumer and industrial users. Industrial users will lead in the number of connections by an average growth rate of 21% per year, which will ultimately be benefited by the global 5G rollout. This means that industry will be responsible for over half of the IoT connections worldwide with 14 billion IoT connections, transforming the amount of data required and also the amount of information available.

The economic contribution of IoT is vast with the global productivity impact of IoT already at \$175 Billion and 0.2% of global GDP, GSMA Intelligence predict this to increase to \$370 Billion per annum in 2025 which would equate to 0.34% of global GDP. It is estimated that IoT companies will generate over \$1 Trillion in revenues by 2025 and governments are set to gain financially due to increases in taxes gained from corporate income and sales. It was estimated by GSMA Intelligence that \$22 billion

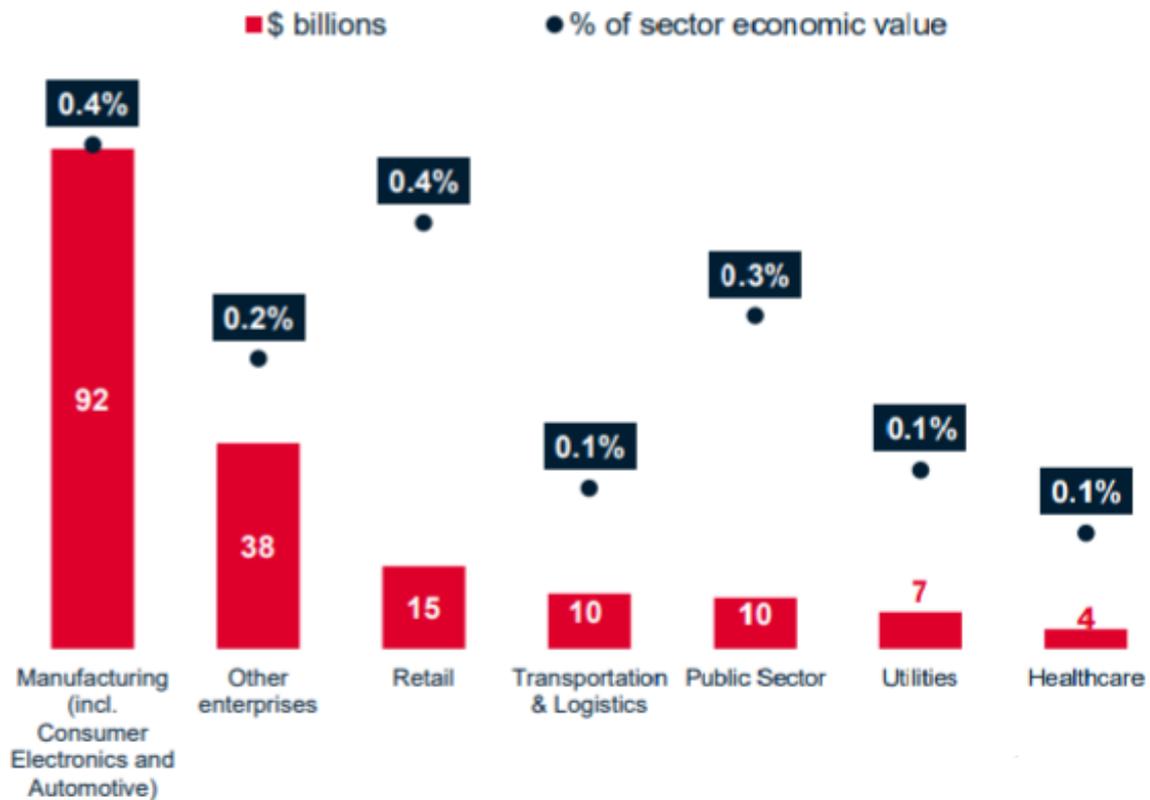
was contributed to government revenue worldwide and predicted to reach \$47 Billion by 2025 as seen in the graph next (this figure does not include direct/indirect tax contributions from IoT ecosystem).

**IoT contributions to government revenue worldwide (Billions)**



There are several industrial sectors that have benefited from IoT, mainly manufacturing (including consumer electronics and automotive) which globally is 50% of the total global productivity impact. Other key sectors included retail, transportation and logistics and the public sector.

## Economic impact of IoT on productivity globally (2018)

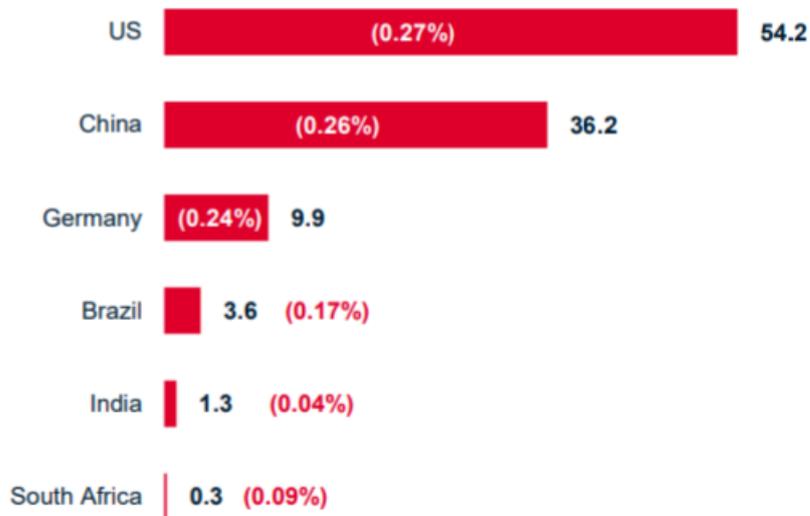


(GSMA Intelligence, 2019)

Globally IoT is contributing to economic growth and the chart below highlights the top six countries who are seeing the largest economic impact. The USA and China are leading the way in IoT productivity gains mainly due to the size of their economies as well as the higher rates of adoption in IoT technologies. Germany has seen productivity gains of around 0.2% due to the significant manufacturing sector.

Economic Impact of IoT on business productivity (2018)

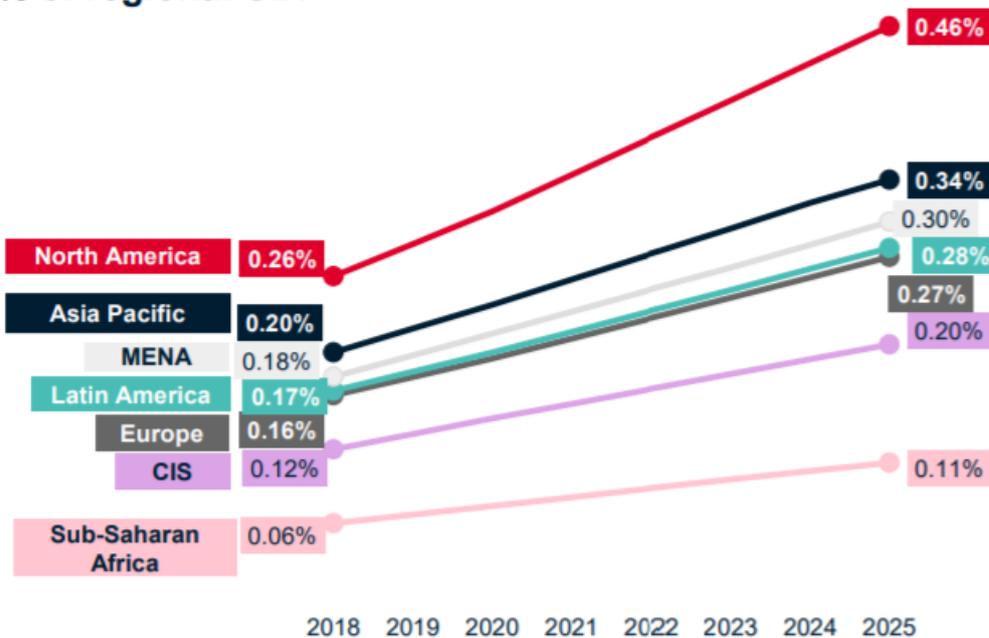
**\$ billion (% of national GDP)**



(GSMA Intelligence, 2019)

Economic impact of IoT on business productivity

**% of regional GDP**



(GSMA Intelligence, 2019)

Major growth areas have been identified for future growth with North America in line to gain the most benefits moving forward, with Asia Pacific in second place. Europe is predicted to see a rise from 0.16% to 0.27% in 2025. This is important metric to understand as it will help set the needs when looking at inward investment and exporting opportunities.

## 7.5 Shift in Generations

There is a shift in generations that is important for Surrey Heath Borough Council to understand, as it will impact how future generations work, live and play. This forms an important part of the project and making sure that The Square shopping centre is future proofed to meet the growing needs of a new generation known as Generation Alpha (born between 2010-2025). Generation Alpha are the children of the millennials, meaning that they are the most technology infused generation to date, with some being born into a world where 5G will be standard rather than a leap in innovation. Using a study by Mccrindle in Australia in 2017 (mccrindle, 2017) we can categorise the different age groups into the following:

Generation		Age Range
Builders	< 1946	73+
Baby Boomers	1946-1964	54-72
Generation X	1965-1979	39-53
Generation Y	1980- 1994	24-38
Generation Z	1995-2009	9-23
Alpha	2010-2025	0-8

The generation ages are slightly subjective and vary depending on who is researching and what metrics they are using, but there is usually a 1-5-year gap roughly which shows a level of consistency when benchmarking against other studies.

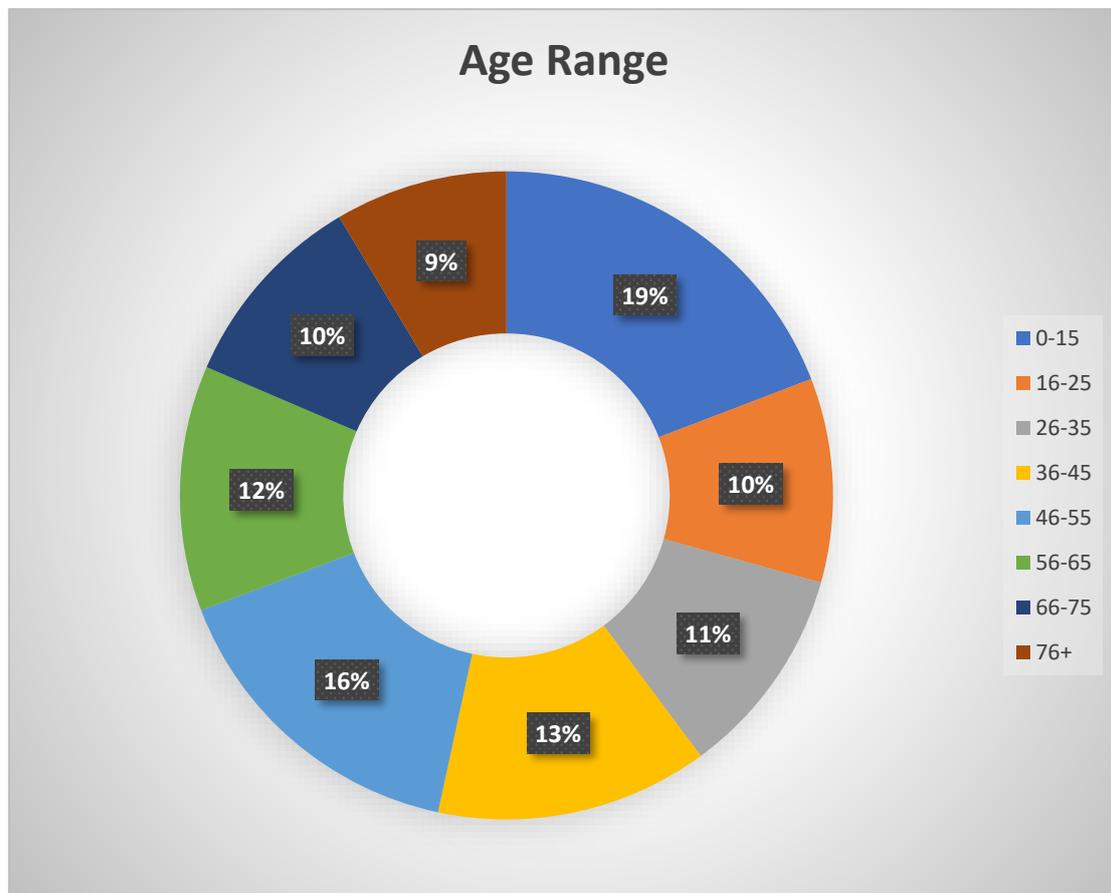
CATEGORY	BUILDERS	BABY BOOMERS	GENERATION X	GENERATION Y	GENERATION Z	GEN ALPHA
<b>Slang terms</b>	 We prefer proper English if you please. Born: < 1946 Age: 74+	 Be cool Peace Groovy Way out Born: 1946-1964 Age: 55-73	 Dude Ace Rad As if Wicked Born: 1965-1979 Age: 40-54	 Bling Funky Dah Fashizz Whassup? Born: 1980-1994 Age: 25-39	 Fam GOAT Slay Yass queen Born: 1995-2009 Age: 10-24	 lit yeet hundo oaf rn idrc Born: 2010-2024 Age: under 10
<b>Social markers</b>	World War II 1939-1945	Moon landing 1969	Stock market crash 1987	September 11 2001	GFC 2008	Trump / Brexit 2016
<b>Iconic cars</b>	 Model T Ford Final, 1927	 Ford Mustang 1964	 Holden Commodore 1978	 Toyota Prius 1997	 Tesla Model S 2012	 Autonomous vehicles 2020s
<b>Iconic toys</b>	 Roller skates	 Frisbee	 Rubix cube	 BMX bike	 Folding scooter	 Fidget spinner
<b>Music devices</b>	 Record player LP, 1948	 Audio cassette 1962	 Walkman 1979	 iPod 2001	 Spotify 2008	 Smart speakers Now
<b>Leadership style</b> L - Leader I - New leaders	 Controlling	 Directing	 Coordinating	 Guiding	 Empowering	 Inspiring
<b>Ideal leader</b>	Commander	Thinker	Doer	Supporter	Collaborator	Co-creator
<b>Learning style</b>	Formal	Structured	Participative	Interactive	Multi-modal	Virtual
<b>Influence/advice</b>	Officials	Experts	Practitioners	Peers	Forums	Chatbots
<b>Marketing</b>	Print (traditional)	Broadcast (mass)	Direct (targeted)	Online (linked)	Digital (social)	In situ (real-time)

(mccrindle, 2017)

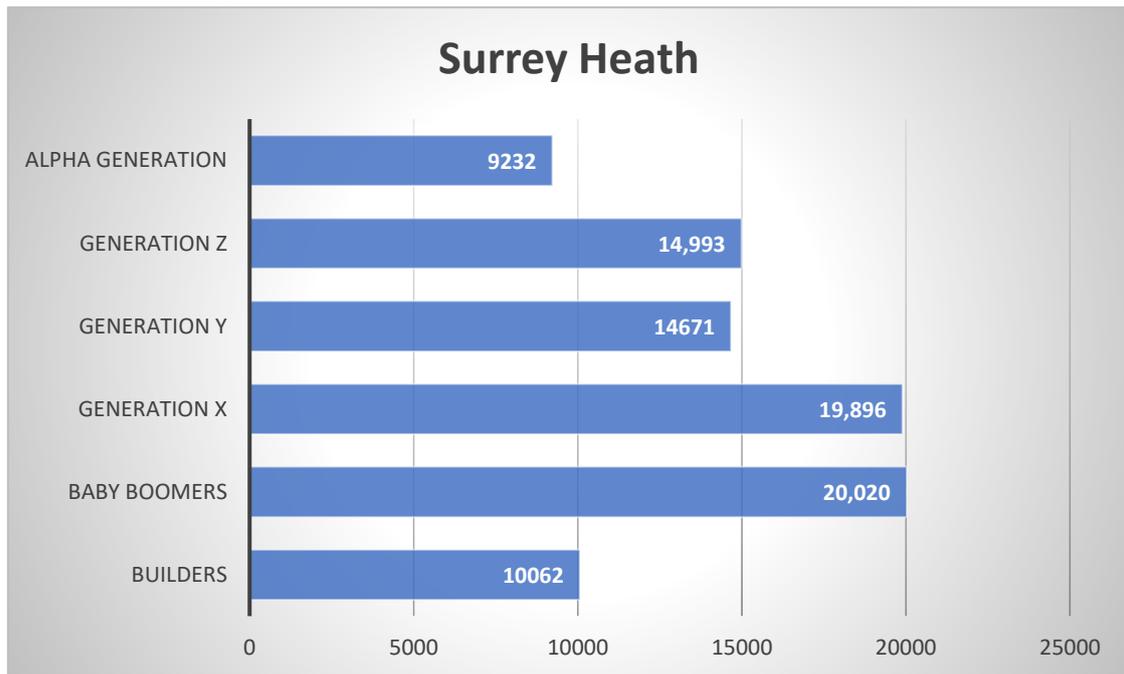
It is important to understand the demographics of the citizens of Surrey Heath to get an understanding on what the demands will be of citizens moving forward and allow to think strategically from a planning and digital perspective.

Surrey Heath Demographics (ONS)

	0-15	16-25	26-35	36-45	46-55	56-65	66-75	76+
Surrey Heath	17,020	9,053	9,346	12,012	14,100	10,883	8854	7606
%	19.15%	10.19%	10.52%	13.52%	15.86%	12.25%	9.96%	8.55%

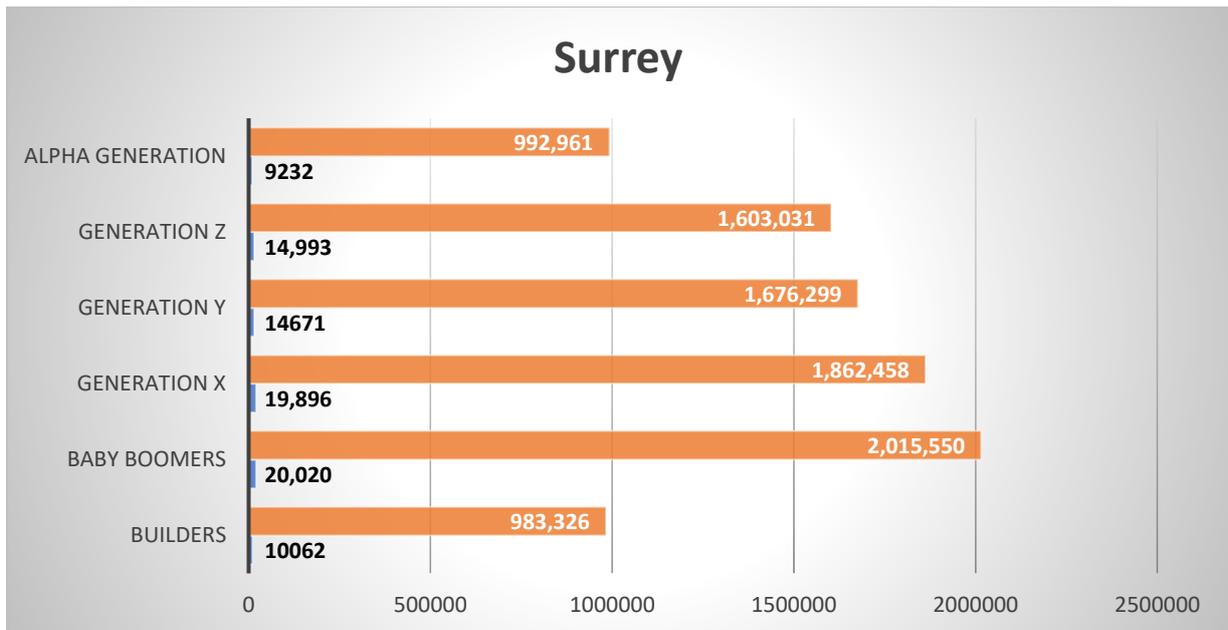


The data shows that the largest percentage of citizens for Surrey Heath fall between the ages of 0-15 years old at 19% meaning they fall into the generation Alpha and Generation Z. We can then extrapolate that information into a more granular view and break down into the different generations across Surrey Heath and Surrey in general to show the demographics of the Surrey region and potential users of the shopping centre.



The data shows that in Surrey Heath the following key bits of information:

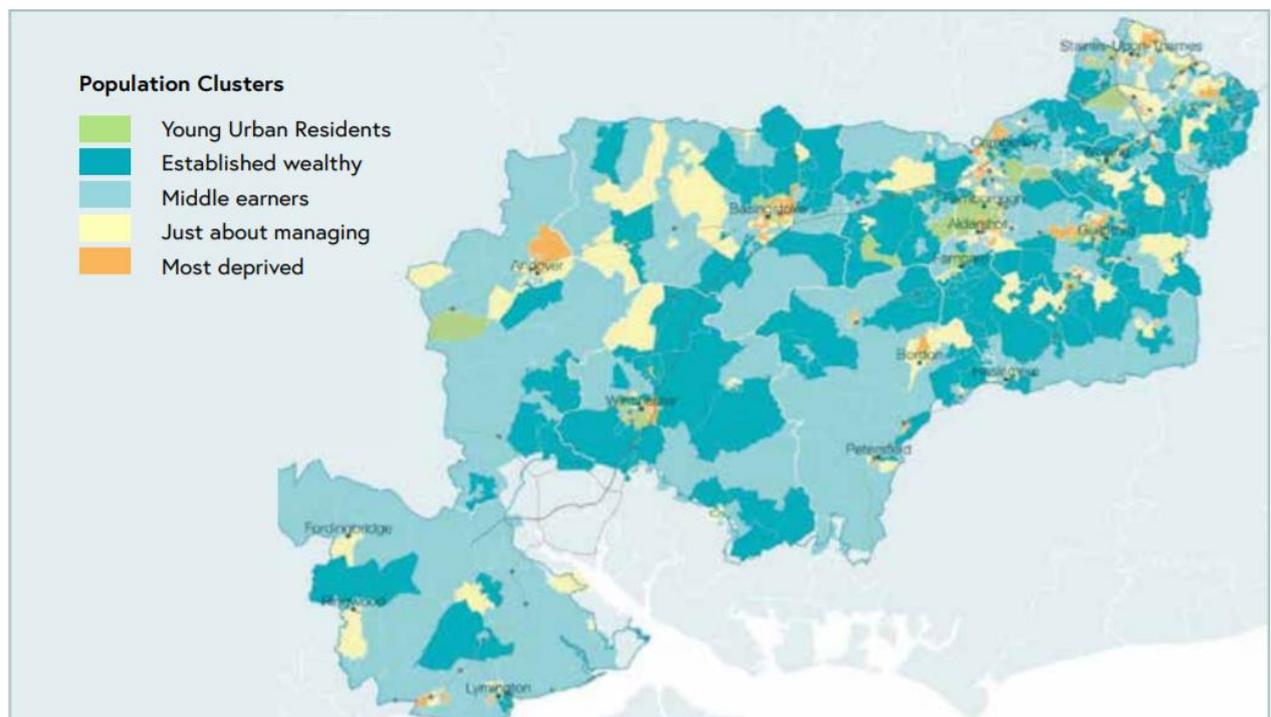
- The largest generation in the Surrey Heath region is **Baby Boomers** so it is important to understand their needs and requirements. They are followed closely by **Generation Z**. But Alpha and Generation Z classed in the 0-15 years old classification form the youngest and highest number of citizens combined.
- This shows the need for a number of areas of 5G especially around digital health, as there will be a large amount of **baby boomers** in the region needing increased health care the older they get.
- **Generation Alpha** will be growing from now until 2025 showing that there is a large generation of consumers with growing expectations on public services and the shopping centre.



When we look at Surrey in a wider context, we can pull out some interesting bits of information such as:

- Currently there are 992,961 **Generation Alphas** which will grow up to 2025 meaning a significant proportion of the Surrey region will be in this generation and consumers of the future.
- Similar to Surrey Heath there is a significant amount of baby boomers which demonstrates the future need for digital health projects.

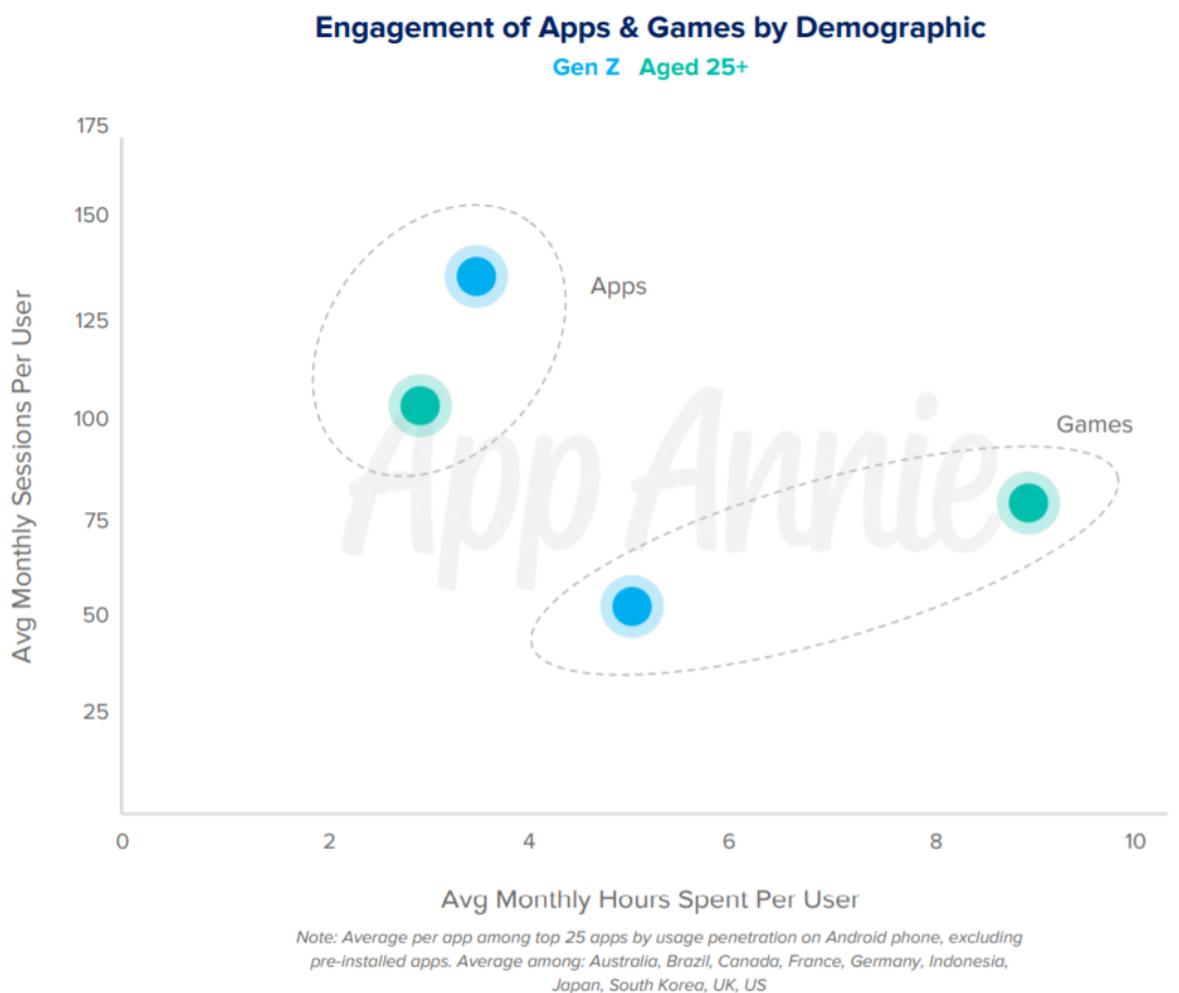
The Enterprise M3 strategic economic plan identifies Camberley as one of the towns that has a smaller group of Young Urban Residents, who are key to economic growth and prosperity. The Enterprise M3 LEP has aspirations to attract more young urban residents to the region as they are classified as “typically highly mobile and qualified 25-34 year olds with potential to create the jobs of tomorrow and enable future wealth” (Enterprise M3 LEP, 2018).



(Enterprise M3 LEP, 2018)

## 7.6 Mobile and Retail

The 2019 state of mobility report by App Annie found interesting links with Generation Z, which they classed as 16-24 year olds. They found that Generation Z users engage on average with non-gaming apps than those in generation Y.

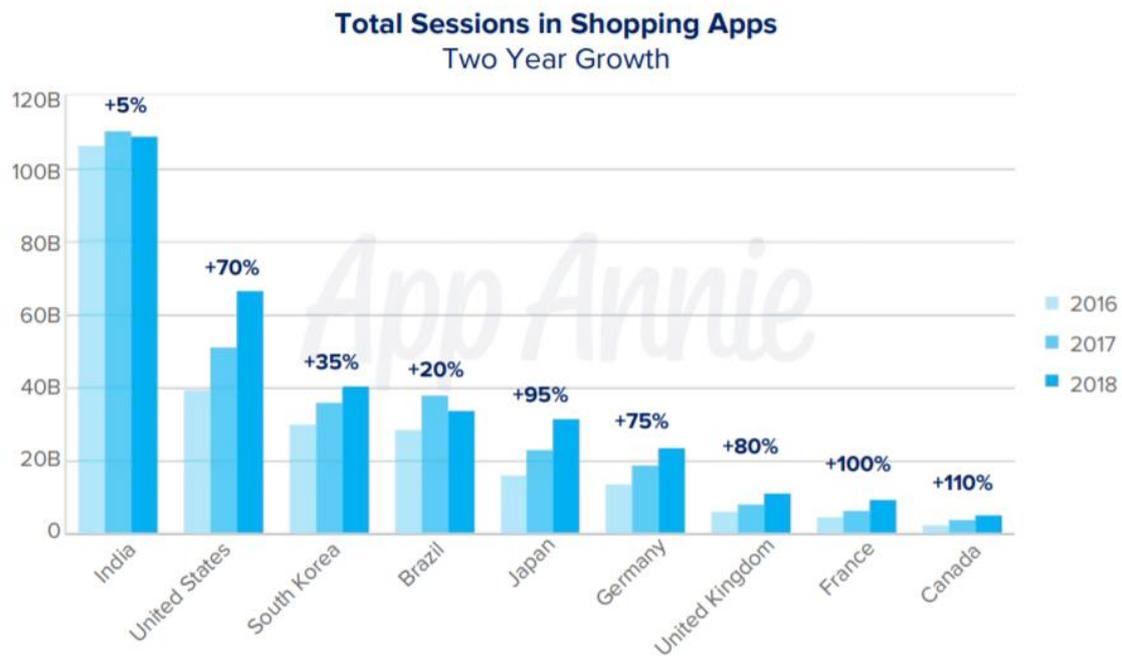


(Annie, 2019)

Generation Z user spent 20% more time and engages with their favourite apps 30% more often than any other generation, essentially highlighting that mobile applications are becoming second nature and used in a number of different ways. The report concluded that the types of apps used were

Communications, Social, Shopping and Banking and that any business hoping to attract a generation Z user will need to understand that mobile is non-negotiable.

The App Annie report has focussed significantly on key sectors which is embracing mobile technologies and retail was one of the key verticals chosen. It showed some extremely interesting findings which is showing the trends moving towards increased usage of mobile applications and the importance of mobile moving forward. Globally the amount of time spent in retail/shopping mobile apps grew to 18 billion hours in 2018, which was a 45% increase in just two years from 2016. The graph below has plotted this out and shows that the UK has seen an 80% increase from 2016.

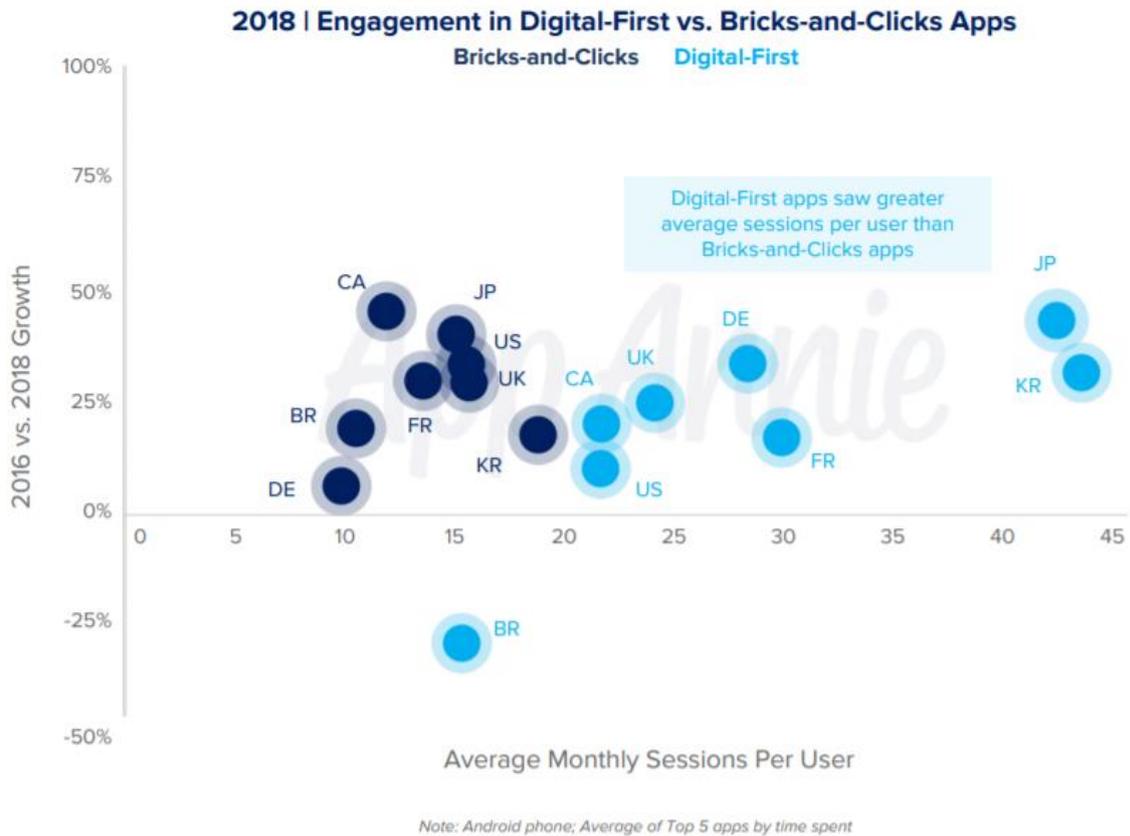


Note: Android phone

(Annie, 2019)

A key finding has been that bricks and mortar retail is making strides to increase engagement with mobile apps being rolled out. The UK saw a 25% increase in engagement with mobile applications in comparison to 2016. Digital first retailers still have done much better in terms of time/spend within

the applications but mobile commerce and in store experiences have meant that mobile applications do play a significant role in bricks and mortar retail.



Part of the report focussed on the US market and found that 2018 was a significant point in history as the consumer behaviour and corporate priorities seemed to shift. They found that traditional bricks and mortar retailers such as Walmart and Target were leveraging mobile applications to allow customers to access loyalty programs, point of sale payments, product information, and in store mapping.

## Correlation of Quarterly Digital Sales and Time Spent in Shopping Apps

Q1 2014 — Q3 2018 | United States



Source: US Census and App Annie;  
Time Spent on Android phone

The final part of the report looked at the time spent in mobile shopping apps and the correlation in sales. It found that the longer time spent in mobile shopping apps, the increased amount of digital sales.

## 7.7 Regionally

The Enterprise M3 region is one of the leading regions for 5G activity and investment, with the Enterprise M3 LEP investing in a number of key projects which aligns with their strategic economic priorities and the grand challenges set out by government in the industrial strategy. The Enterprise M3 has a vision to become a globally competitive region known for its knowledge, digital and design based economy and has developed a strategic economic plan for 2018-2030. The plan identified two stimulants to generate economic expansion:

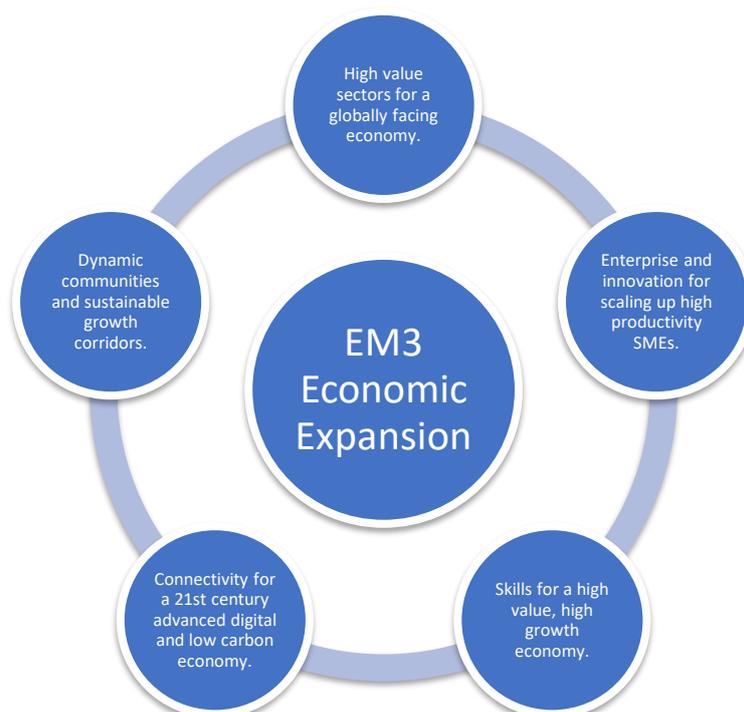
### **Digital and Data Technologies**

Incorporating the ground-breaking 5G Innovation Centre based at the University of Surrey which includes Vodafone, Huawei, O<sub>2</sub> and EE as corporate members, and also the National Cyber Security Centre at Royal Holloway University.

### **The Clean Growth Economy**

Siemens is working on an Energy Strategy for our region and there are plans to create an energy hub.

These support the EM3 LEPs five key priorities for economic expansion:



## Key Sectors for the EM3 LEP:

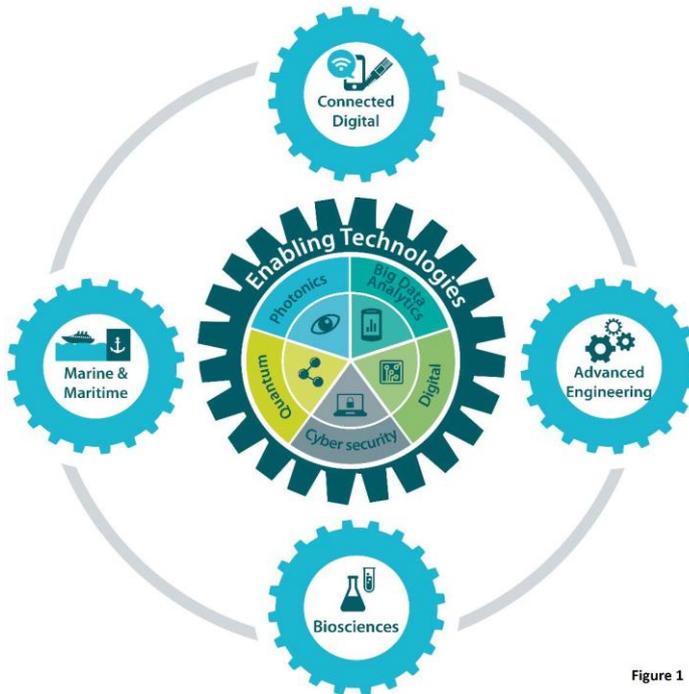


Figure 1 (Enterprise M3 LEP, 2018)

The diagram above shows that connected digital is a key sector for the EM3 LEP which means that this project falls directly under this. When you drill further there is also a number of enabling technologies that this project would support and become a part of such as digital and big data analytics. Due to the nature of the project and the importance of data security cyber security would play a big part in this project as well, meaning that 3 of the 5 key enabling technologies will be supported by this project.

### 7.7.1 Regional Ecosystem

There are a number of previously funded or soon to be funded projects in the EM3 region that the 5G retail test bed can connect and collaborate with.

#### The 5G Innovation Centre (5GIC)

The 5G Innovation Centre is located on the University of Surrey campus and officially opened in 2015. It is the largest industry and academic research partnership and test facility for development of future

5G communications in the world. The 5GIC works on a membership basis with large scale companies and SMEs paying a membership each year to get access to the testbed and research. Founding members (platinum) of the 5GIC include the likes of Vodafone, EE/BT, Huawei and O2 (Telefonica). There is also a number of other interesting partners in the gold and silver membership such as BBC, Samsung and Fujitsu, a full list of up to date partners are found on the 5GIC website. In 2016 the 5GIC was recognised by the G7 nations as a global leader driving the growth and promotion of a digitally connected world. (G7)

### [Rocket Desk](#)

The EM3 LEP invested £1.75m in to enabling a 5G games hub at Rocket Desk on the research park at Guildford. Rocket Desk is a flexible co-working space for the start-up, indie and freelance creative technology professionals which has a dark fibre 5G link backhauled to the 5GIC. Rocket Desk is home to around 25 small companies who are developing digital games, VR/AR applications and creative experiences.

### [Basing View Living Lab](#)

Whilst not funded yet, Basing View living lab will be a 5G enabled test bed located on an enterprise zone in Basingstoke.

### [StoryFutures](#)

Funded by the Arts and Humanities Research Council (AHRC) creative industries clusters programme this project brings together world class creative and technology companies, Universities and SMEs to take next generation storytelling. Located at Royal Holloway University London (RHUL) in Egham the project looks at how the creative sector utilises emerging technologies such as AR/VR/MR/XR, smart devices and AI to engage audiences in new experiences.

## 7.8 Nationally

The industrial strategy and grand challenges have outlined a number of exciting and ambitious targets to ensure that the UK is at the forefront of technology and innovation. A key part of this was to roll out the national 5G test bed and trials programme through the Department of Digital, Culture, Media and Sport (DCMS). The purpose of the testbeds was exploring the benefits of 5G but also the challenges of 5G deployment with clear objectives:

- Accelerate the deployment of 5G networks and ensure the UK can take early advantage of the applications those networks can enable.
- Maximise the productivity and efficiency benefits to the UK from 5G.
- Create new opportunities for UK businesses at home and abroad, and encourage inward investment

## 7.8.1 UK Government funded projects

The UK Government funded six projects with each project receiving between £2M and £5M grants as well as match funding from industry partners.

	<p><b>5G RuralFirst</b></p> <ul style="list-style-type: none"><li>• Lead Organisation: Cisco</li><li>• Partners: The University of Strathclyde and 32 other partners</li><li>• Grant: £4.3M</li><li>• This project is looking to create a complete end-to-end rural 5G testbed system for trials of new wireless and networking technologies, spectrum sharing, and new applications &amp; services.</li></ul>
	<p><b>5G Smart Tourism</b></p> <ul style="list-style-type: none"><li>• Lead Organisation: West of England Combined Authority</li><li>• Partners: BBC, Aardman, The University of Bristol Smart Internet Lab, Bristol City Council, Bath and North East Somerset Council, Bristol Futures Global, Mo-Sys and Zeetta Networks</li><li>• Grant: £5M</li><li>• Using technology to offer tourists new experiences using VR/AR in major attractions in Bath and Bristol</li></ul>
	<p><b>Worcestershire 5G Consortium</b></p> <ul style="list-style-type: none"><li>• Lead Organisation: Worcestershire LEP</li><li>• Partners: 5GIC, AWTG, Huawei, o2, BT, Worcester Bosch, Yamazaki Mazak, QinetiQ</li><li>• Grant: £4.8M</li><li>• This project is exploring ways to increase productivity by using robotics, big data analytics and augmented reality with 5G in a manufacturing setting.</li></ul>
	<p><b>Liverpool 5G Testbed</b></p> <ul style="list-style-type: none"><li>• Lead Organisation: Sensor City</li><li>• Partners: Liverpool University, NHS and social care organisations and Blu Wireless</li><li>• Grant: £3.5M</li><li>• This project will see high value technologies including low-cost open source 5G networks, artificial intelligence, virtual reality and IoT deployed across deprived communities in the Liverpool city region testbed.</li></ul>
	<p><b>AutoAir</b></p> <ul style="list-style-type: none"><li>• Lead Organisation: Airspan Communications Ltd</li><li>• Partners: 5GIC, McLaren Applied Technologies, ARM, Real Wireless, Quartus Limited, Blu Wireless, Dense Air Limited</li><li>• Grant: £4.1M</li><li>• This project will investigate and validate the development of Connected Autonomous Vehicles (CAVs) and look at handover speeds at fast speeds and whether this can be applied to both road and rail transportation.</li></ul>
	<p><b>5G Rural Integrated Testbed (5GRIT)</b></p> <ul style="list-style-type: none"><li>• Lead Organisation: Quickline Communications</li><li>• Partners: Cybermoor, Broadway Partners, Precision Decision, Bluebear, Kingston University, Kings College London, Lancaster University, North Pennines AONB, World Around Me</li><li>• Grant: £2.1M</li><li>• This project is looking at trialling innovative use of 5G technology across a range of rural applications, such as smart agriculture, tourism and connecting poorly-served communities, using shared spectrum in the TV bands and a mix of local ISPs and self-provision.</li></ul>

(DCMS, 2019)

## Urban Connected Communities Project

In September 2018 the UK government announced that the West Midlands Combined Authority were the preferred partner for the Urban Connected Communities Project. This will see the development of a large scale 5G pilot across the midlands region with hubs being located in Birmingham, Coventry, and Wolverhampton with £50M approved for the project.

## Cyber Security

With the increase in cyber security threats, the government has allocated £10M to work with the National Cyber Security Centre to create capabilities to test 5G networks.

## Transportation Projects

The government is very keen on transportation of the future and has funded a number of different projects in different transportation modes.

### Rail

The Government announced £35M from The Northern Powerhouse Investment Fund (NPIF) to look at different ways to improve communications for train passengers. The fund is being used to upgrade the Network Rail test track in Melton Mowbray, installation of trackside infrastructure along parts of the trans Pennine route and rollout of full fibre to allow 5G connectivity. With the recently announced South Korea/UK trade bridge a £2.4M grant (50% funded by UK government and 50% funded by South Korean Government) will fund 5G RailNext. This project is looking to provide uninterrupted “infotainment” across the Seoul Metro System. This project will aim to deliver next generation experiences whilst on the move, they will include Augmented Reality (AR) Mixed Reality (MR) to display travel information to customers, video streaming and gaming through headsets.

## Roads

There has been £5M of funding put together for initial trials to test 5G application and deployments on roads. One of the key parts of this project is to look at the future productivity benefits from autonomous vehicles

## 7.9 Industrial strategy

In 2017 the UK government launched the modern industrial strategy, an ambitious long-term strategy for planning and investing in key areas that strengthen the UK economy and futureproof the country for future economic growth.

### The Worlds Most Innovative Economy

- Raise total R&D to 2.4% of GDP by 2027; Increase tax credit to 12%; Further £725M for Industrial Strategy Challenge Fund

### Good Jobs and greater earning power for all

- Technical Education System; Invest an additional £406m in maths, digital and technical education; Create a new National Retraining Scheme that supports people to re-skill, beginning with a £64m investment for digital and construction training.

### A major upgrade to the UK's Infrastructure

- Increase the National Productivity Investment Fund to £31bn; Support electric vehicles through £400m charging infrastructure investment and an extra £100m to extend the plug-in car grant; Boost our digital infrastructure with over £1bn of public investment, including £176m for 5G and £200m for local areas to encourage roll out of full fibre networks.

### The best place to start and grow a business

- Sector Deals partnerships between government and industry to increase sector productivity. The first Sector Deals are in life sciences, construction, artificial intelligence and the automotive sector; Establish a new £2.5bn Investment Fund, incubated in the British Business Bank; Actions for SME productivity, including the 'long tail' of lower productivity firms.

### Prosperous communities across the UK

- Agree Local Industrial Strategies; Create a new Transforming Cities fund that will provide £1.7bn for intercity transport; Provide £42m to pilot a Teacher Development Premium for high quality professional development for teachers working in areas that have fallen behind

## 7.9.1 Grand Challenges

As part of the governments industrial strategy, four grand challenges were identified to put the UK at the forefront of the industries of the future. The aim of the challenges are to ensure that the UK takes advantage of global changes in innovation and make a real impact in peoples lives. The four challenges that were identified were:

### Artificial Intelligence

- Artificial Intelligence Sector Deal
- Make the UK a global centre for artificial intelligence and data-driven innovation
- Support sectors to boost their productivity through artificial intelligence and data analytic technologies
- Lead the world in safe and ethical use of data and artificial intelligence giving confidence and clarity to citizens and business
- Help people develop the skills needed for jobs of the future

### Clean Growth

- Develop smart systems for cheap and clean energy across power, heating and transport
- Transform construction techniques to dramatically improve efficiency
- Make our energy-intensive industries competitive in the clean economy
- Put the UK at the forefront of the global move to high-efficiency agriculture
- Make the UK the global standard-setter for finance that supports clean growth

### Future of Mobility

- Establish a flexible regulatory framework to encourage new modes of transport and new business models
- Seize the opportunities and address the challenges of moving from hydrocarbon to zero emission vehicles
- Prepare for a future of new mobility services, increased autonomy, journey sharing and a blurring of the distinctions between private and public transport
- Explore ways to use data to accelerate development of new mobility services and enable the more effective operation of our transport system

### Ageing Society

- Support new products and services for the growing global population of older people, meeting important social needs and realising the business opportunity for the UK
- Support sectors to adapt to a changing and ageing workforce
- Leverage our health data to improve health outcomes and UK leadership in life sciences
- Support care providers to adapt their business models to changing demands, encouraging new models of care to develop and flourish

## 8.0 International

There is a global race to launching 5G with governments all around the world keen to ensure that their country is at the forefront of innovation, with 5G and artificial intelligence being hailed as key enablers to economic growth and prosperity.

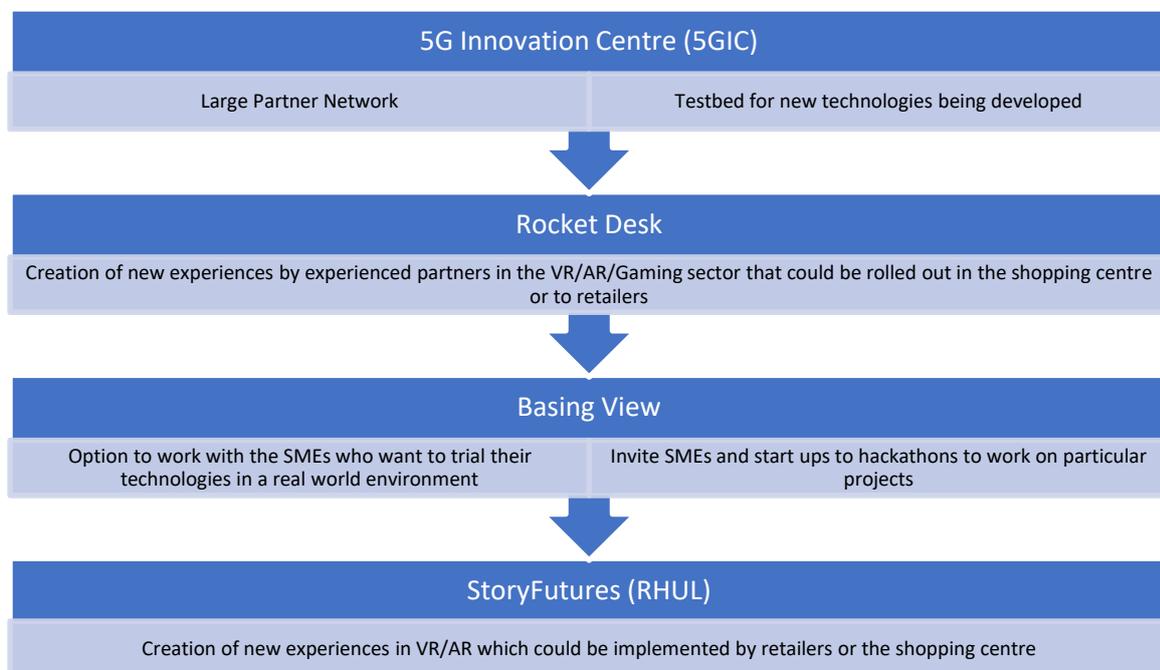
### 8.1 Inward Investment and Exporting

Driving inward investment either nationally or internationally and creating new streams of foreign direct investment are important for the creation of jobs and productivity. Section 12.0 of the document outlines the engagement plan with the department for international trade (DIT) and how to work closer on making this project a turnkey opportunity.

## 9.0 Fitting in to the regional and national ecosystem

There are a number of ways to ensure that this project collaborates and works with partners and projects which are already underway in the UK. This is important as there could be significant partner networks which can assist with the project, and when bidding for funding it is always important to leverage previous investments made by LEPs and government.

From a regional perspective the following partners/actions can be taken:



From a National Perspective there could be collaboration with the partners on the previous DCMS trials and test bed programme. The cyber security centre could also play a key part in this project, as well as discussions with two GCHQ accredited cyber security universities in The University of Surrey and Royal Holloway. There is also the opportunity of working closer with UK5G and similar projects where 5G is the common theme for all parties.

## 10.0 Initial Costings and Funding Calls

It is projected that this project could cost circa £8m-£10m as the following will need to occur:

Fibre Mapping- Initial costings are £100,000
Fibre Roll Out- Initial costings are £1,339,348 (ex-vat)
Data Centre- Initial costings are £250,000
IoT sensors- Scoping exercise to be done first
Base stations and indoor networks- Initial costing £250,000 and £30k annual costing
Spectrum Licences-Ofcom TBC with Ofcom and 5GIC at scoping meeting
Marketing and PR- Ongoing Revenue Cost but for an initial project outlined in section 11 £4000 (ex-VAT)
Smart Cities Team- Ongoing Revenue Cost
Consultancy Partners- Rahim Tafazolli (£50K)

\*Prices subject to change and full quotes would need to be obtained and public sector procurement rules followed. These prices are rough estimates or guideline prices\*

### 10.1 What is needed for 5G

In order for 5G to be rolled out across Camberley and into the shopping centre there is a number of things that are needed.

#### 10.1.1 Fibre

The backbone of the 5G network is fibre and is critical to allow 5G connectivity. It is advised that a full mapping exercise is conducted to work out what fibre is in the ground and what is required moving forward to future proof for 5G.

#### 10.1.2 Base stations/small cells

In order to give the ability for devices to connect to the network a series of base stations and small cells need to be deployed within the shopping centre. These small cells are the hardware which allows end devices or sensors to receive a network signal.

### 10.1.3 Spectrum

Discussions with Ofcom have identified that spectrum is available and there are two directions that can be taken. Firstly, Surrey Heath Borough Council can apply for a trial and development licence to get things underway, which is usually offered on a yearly basis. There are limitations with this though, and it is advised that this can only be used for a year. To ensure long term sustainability the advice of Ofcom is to apply for a shared access licence (24.25- 26.5 GHz) this is for indoor connectivity and should be seen as phase 1 of the project, with the outdoors/high street being seen as phase 2 which would require a different spectrum licence. Advice should be taken from the 5GIC on the best way of doing things with Ofcom in terms of spectrum and licences.

### 10.1.4 Business Layer

The 5GIC has been working on a business layer application with Vodafone, that allows for SMEs and scale up organisations to be able to have a plug and play in to the 5G network. This application would be crucial for the shared working space.

### 10.1.5 Data Centre

A data centre is key for the storage of data with a physical location used to store IT equipment which stores and manages the data obtained from the shopping centre.

### 10.1.6 Digital Twin

A digital twin is a digital version of an asset which can then be manipulated and tested on, this is a good way of seeing how the shopping centre operates and what would happen if any technological solution was put in to place.

## 10.2 Enterprise M3 LEP Funding

The EM3 LEP has funded significant projects in the past which have revolved around 5G, from the initial funding of the 5GIC, the investment in Rocket Desk of the research park in Guildford and the investment made in to Basing View. So they have a track record of investment in 5G and their strategic economic priorities strategy outlines the need for 5G. It was advised to enter an initial EOI to the EM3

LEP to gain exposure to the project and then build a full proposal which will be requesting a grant to the value of £5 Million.

### 10.3 European Regional Development Funding (ERDF)

There are significant ERDF funding calls currently open, but they are quite restrictive in terms of revenue generation and working with large scale organisations. The funding is primarily designed for SMEs and that means the larger organisations will have trouble benefiting from the project and it will become restrictive. It is advised that this funding route is not the right call for this project.

### 10.4 DCMS Funding

The Industrial 5G Testbeds and Trials grant funding competition is open for applications. DCMS is seeking projects to trial new 5G services and applications in the vertical industry sectors of manufacturing and logistics. The Programme is seeking 4-6 projects from the manufacturing sector with £3-4 million of DCMS funding available per project and 2-3 projects in the Logistics sector with £5-10 million available for each project. It is important to keep DCMS a vested partner in the project as it will mean that Surrey Heath Borough Council have an opportunity to lobby to government for increased investment into retail, and try and get a future call around 5G and retail.

### 10.5 Industry Funding

Part of the project can be funded directly and indirectly by industry partners who will join the project team. It is important that the relationships with industry are seen as two-way relationships rather than just transactional. The simplest form of investment can be seen as direct cash investment into the project otherwise industry can provide in kind benefits such as time/expertise/equipment to help offset the costs of the project.

## 10.6 Superfast Broadband Roll Out

There was a project funded by Surrey County Council which would look at funding broadband roll out; it is advised to speak directly with Surrey County Council to understand if the fibre installation costs could be covered by this project.

## 11.0 Marketing and PR Recommendations

The Marketing and publicity of the project is key to get national and international attention on the project, it is advised that a PR consultant is contracted to develop a strategy for informing technology news agents and retail press. After talks with PR agencies and PR experts the following has been advised by a technology PR consultant:

### **Project scope statement**

The project will run over a two-month period and comprises of undertaking media relations outreach to a variety of retail, technology, telecommunications and local press in the UK for five days per month. Specifically, it will include the development and distribution of press releases (maximum of 2), organising of press interviews, storyline development and placement, writing and issuing byline articles (maximum or 2), undertaking news jacking activities, managing incoming media opportunities and providing ongoing counsel.

### **Deliverables**

Provide monthly activity reports and send coverage as soon as it is seen.

### **Constraints**

It is assumed that guidance will be provided regarding the specifics of the project. It is also assumed that content and imagery developed for the wider promotion of the project will be shared and useable. It is suggested that there is a monthly face-to-face meeting at the start of each month with all relevant stakeholders.

## 11.1 UK5G Publicity

The head of UK5G has offered publicity to the project through the 5GUK website, this should be considered as a good way of gaining publicity for the project and become linked with the UK5G brand.

## 11.2 Industry Publicity

When working with partners it is key to ensure that they give this project publicity through their marketing channels. This can be done by creating case studies, marketing videos, blogs or thought leadership pieces which associate the project with key industry players who will have significant followers on social media and access to news platforms.

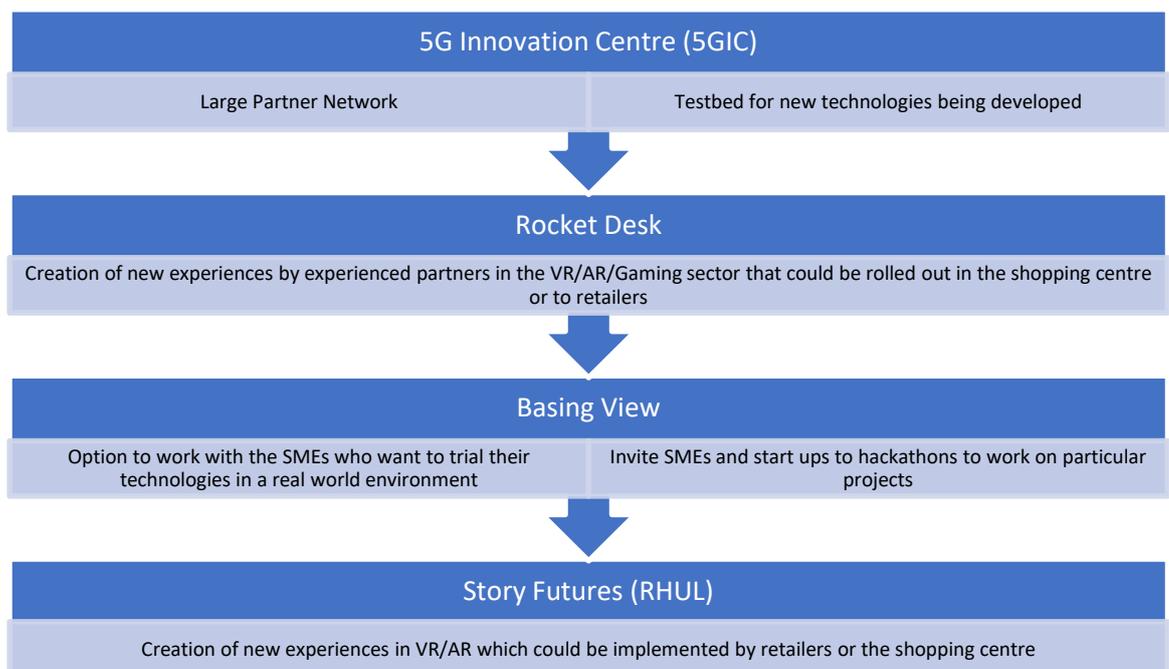
## 12.0 Engagement Plan

Engagement with key stakeholders and parties with associated interests in the project is key to the long-term success of the project. A number of key stakeholders have been identified and this section will explore the different stakeholders, what value they can add and how they should be engaged.

### 12.1 EM3 LEP

The Enterprise M3 (EM3 LEP) is an important partner to keep on board and part of the project, there is significant government money that can be obtained through grants and loans from the LEP which can help support the project initially. It is also important to have their support on the project because when you are bidding for larger scale grants from government it is important to have the LEPs support and show the wider impact regionally.

As highlighted in section 7.7.1 the regional picture has a number of 5G and creative projects that can add value to the project, and these can be all linked as seen below:



## 12.2 5GIC

The 5G Innovation Centre (5GIC) is a combination of Industry and government investment to get a physical building and test bed which has housed the 5G core network. The 5GIC has a number of core partners which can add value and expertise to the project. There is the opportunity for Surrey Heath Borough Council to join the 5GIC as a member and get access to the partners and research that is developed. It would also be good for the 5GIC as they will be able to test new technologies that they have been working on and use it as an innovation playground for their partners who want to test new technologies in a real-world environment.

## 12.3 UK5G

UK5G is a group of businesses that have a common interest in 5G technologies, by engaging UK5G early it puts Surrey Heath at the forefront of discussions and has the opportunity to give publicity to the project. It is also a good way of attracting 5G related partners to the project and getting notifications if new partners join UK5G.

## 12.4 DIT

A key outcome of this project is to make this a turnkey opportunity for the Department of International Trade. Inward investment and exporting are the two major components of the Department of International Trade (DIT). It is important to engage with key members of DIT as one of the key outcomes for the project will be attracting new businesses to the region. This can come in two different ways either direct investment where an organisation who has already invested in the UK look to relocate or open new premises and foreign direct investment (FDI) which is where a new organisation looks to open offices/premises in a different country. It is important that there is a soft-landing proposition put in place to ensure that the DIT have the best possible opportunity to market this "Turn Key" opportunity to all their posts across the world. A turnkey opportunity means that they can advertise this opportunity all over the world as a ready to invest in project to foreign investors.

## 12.5 Citizen engagement

Citizens are at the heart of any local economy; they will be the ones using the shopping centre and spending their money. Importantly it is their taxes that help fund the council and in turn they will be keen to see how their money is invested and used by Surrey Heath Borough Council, so it is important that citizens are made aware of the project and how it will impact them and how it will benefit them moving forward. It is recommended that citizens are kept up to date with the project and have a voice to make sure that they can help input into the project and advise what would make their lives better.

## 12.6 Retailers

The heartbeat of this project is the retailers and it is important to ensure that they are involved early on in the project, because essentially, they will be the end users of the project. It is important to understand that there are different classifications of retailers as you will have large scale organisations such as Game, Sainsburys, TK Maxx and smaller independent companies whose needs and understanding of 5G and IoT will be very different. Understanding the pain points of these organisations will be key as these will create use cases and encourage adoption of the technologies if the problems are being solved. It is recommended that there should be two round table events for independents and then for the larger organisations to understand the pain points and make them feel involved in the project.

## 12.7 Trade Bodies

It is important that the trade bodies associated with retail are included in the project, they are able to be a voice for a number of retailers who are not in the region but could be potential targets moving forward. By working with the trade bodies it will give national exposure to the project and have the interests of the retailers at the heart of the project, which should make it easier when approaching a retailer to relocate to the region. There is also the opportunity to do national/international events with the trade bodies which will give even more exposure and publicity to the project.

## 13.0 Recommendations and Next Steps

Based on this business case the following recommendations are made:

- 1-** Surrey Heath Borough Council have a short window to become first movers in this field, and appeal to a number of technology and innovation partners. The business case shows there is significant benefits to this project from an economical perspective as well as potential ROI models that could generate revenue in the future. But the window is small, the closer the UK gets to the full roll out of 5G and phase 2 of the 5G roll out, other shopping centres will do this meaning that Surrey Heath would not have a USP and lose appeal to larger towns and cities.
- 2-** Engage with retailers and citizens early through roundtable events and briefing sessions to truly understand their needs and requirements and make them a key part of the project.
- 3-** Consider becoming members of the 5GIC to obtain significant benefits in terms of 5G core access for the shared work space and networking with large scale partners and innovative SMEs
- 4-** Engage the EM3 LEP to use this project as a catalyst to attract young urban residents to the region and be one of their flag ship projects.
- 5-** Linking in with Regional and National Projects as outlined in section 9.0
- 6-** It is important to become part of the regional 5G ecosystem and benefit from the research and work that has been done by previously funded projects. The 5G retail test bed could incorporate a number of the existing projects and work collaboratively in a number of areas.
- 7-** Structure a phased approach to implementation with the focus on the inside network in the shopping centre then the outdoor network coming at a later stage.
- 8-** Ensure that revenue is put in place to have a designated smart cities team within Economic Development to manage the project correctly. There will be the need for data analysts/data scientists to correctly analyse and visualise the data to make the correct decisions. There should be

discussions with academia (The University of Surrey) computer science department and business school to discuss KTPs around the use of data, operating models and cyber security.

**9-**Work closely with the Department for International Trade to make this project a “turn key” project. With international focussed events being held at The Square or the shared work space.

**10-**Choose the right technology partners with cyber security and data security at the heart of the solutions.

**11-**Ensure that the marketing and promotion of this project is done professionally to ensure that the project gets the exposure it needs on a national and international basis. The creation of a soft landing website could significantly drive attention to the project and make it easier to sell for the DIT.

**12-**Ensure that this project is in line with GDPR regulations and legislation, it would be recommended to speak to GDPR professionals about this project. It would also be recommended all partners in the project are GDPR compliant and have measures in place to follow GDPR compliance regulations.

**13-**Find partners that have strong corporate social responsibility programmes who could potentially sponsor or invest in the flexible working space.

**14-** Be open and transparent with the public in terms of data collection and look at ways that users could opt out of providing data if they do not feel comfortable with it or incentive people to provide more data to help create a more personalised approach.

**15-** Ensure that Surrey Heath Borough Council fully own the data.

## 14.0 Conclusion

The purchase of the shopping centre and owning a large scale asset gives this project the opportunity to become a flagship project nationally. The retail stats show that there is 2.8m people employed nationally in retail, and in Surrey Heath 13.7% of the residents are employed in retail/wholesale which shows that it is a significant sector regionally. By future proofing the shopping centre, Surrey Heath Borough Council will be a position to utilise the paradigm shift in mobile technology to enable retailers to implement new technologies and innovations into their stores and the shopping centre. From a retailer perspective it is a unique opportunity to trial new technologies in a real world environment, which could be cheaper for them to trial them in one store and then roll out nationally if successful. From a shopping centre perspective the 5G connectivity combined with IoT sensors will mean that real time data could be collected, this is important as historically brands have not relocated to the Shopping Centre due to insufficient data sets on footfall or visiting on days where footfall is light. By understanding the shopping centre footfall, interventions could be put in place to drive footfall to certain areas or create dynamic pricing that could be adjusted for rental agreements to try and attract and incentivise new retailers in to quieter parts of the shopping centre. The flexible working space will also encourage new start ups and SMEs to locate to the region, and will create a stronger link with academia, which could be a significant step forward for Surrey Heath as it has no HE/FE establishments in the borough.

Regionally this project has a number of upsides, from an economic perspective the LEP should see this project as a significant turn key project for the region and one of the driving catalysts for attracting young urban residents to the EM3 region. There is also the opportunity to add a new digital specialism to the EM3 strategic economic plan, by investing in this project they would then be linked with Europe's first 5G enabled shopping centre and centre of excellence for retail innovation. This project has the capability to give international recognition to the region for its ground breaking work in 5G, and drive inward investment in to the region which could be foreign direct investment or national

inward investment creating more jobs regionally. From a national perspective with Brexit dominating most headlines and causing economic instability, the UK government will need flagship projects and turn key opportunities such as this. There is also the need for interventions to be made to the bricks and mortar retail industry, as there is 2.9 Million people employed nationally in retail.

There is a generational shift occurring with millennials, generation Z and generation Alphas becoming prominent which will see a transformational shift in how they use shopping centres and what they expect from them. The global rise of IoT is triggering a number of innovations in a number of sectors with retail being a key sector which will benefit from the growth of IoT. Retailers are now looking at innovative ways of attracting consumers in to physical bricks and mortar stores, and will be dependant on consistent, high speed connectivity so their consumers can interact with them digitally in store.

There a significant number of benefits and upside to doing this project, being Europe's first 5G enabled shopping centre will give national and international appeal and publicity to Camberley/Surrey Heath as well as putting the region on the map. It futureproofs a significant asset purchased by Surrey Heath Council and creates an economic blueprint for bricks and mortar retail which could be commercialised and sold to other shopping centres. There are other revenue streams that could be recognised such as the commercialisation of data sets created by the shopping centre and IoT sensors throughout the borough. It will also equip the council with data to make more informed decision making, this is incredibly important as different generations are now expecting decisions made by the public sector to be supported by facts and data. This will shift Surrey Heath Borough Council towards a data driven decision making council, and be able to justify large investments to the public by using real time data. With large scale projects there are always a number of risks to doing a project of this scale. An obvious risk is the significant up front investment to ensure there is the correct infrastructure in place to enable 5G connectivity in the shopping centre, this can be potentially offset by a number of different elements such as EM3 LEP funding, in kind or direct contribution support by technology companies looking to partner on the project. There is also GDPR and security issues that will need to be addressed by key

technology partners with a track record in delivering project, securely and safely and making sure that the storage and use of data is in line with GDPR legislation.

To conclude Surrey Heath Borough Council have a unique opportunity to leverage a significant asset they own and become synonymous with retail innovation and working with key technology partners, to become Europe's first 5G retail shopping centre. Due to the short window that Surrey Heath Borough Council have with 5G, estimated at roughly 18 months. It is recommended that Surrey Heath Borough Council act quickly in developing the solution and work with industry partners and experts within academia such as the 5G Innovation Centre to develop the proposition and solution to create the 5G retail test bed and be a cause for change for the high street and bricks and mortar retail.

## 15.0 FAQ

### **Do we need 5G?**

Yes, the 4G network was never designed to handle the amount of data that will be required to power 5G networks. There are significant improvements in the 5G network over the 4G network such as: Better latency rates, Download Speeds and the ability to intelligently divide the network through network slicing.

### **Can't we just wait until 5G is rolled out in this region?**

This is an option, but is dependant on networks rolling out 5G to the region sooner rather than later with larger cities and towns getting preferred over Camberley. Surrey Heath have a short window of opportunity to gain an international USP by becoming an innovation playground for retailers and a centre of excellence for retail innovation. If they decide to wait until normal roll out, then the shopping centre will have no distinct USP other over shopping centres and regions. They will also run the risk of another shopping centre doing this project before them, and potentially lose retailers and consumers.

### **Is there Health risks of 5G?**

Advice is taken from key institutions around the world:

- **World Health Organisation (WHO)**

“Despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health”

“Considering the very low exposure levels and research results collected to date, there is no convincing scientific evidence that the weak RF signals from base stations and wireless networks cause adverse health effects.”

- **Public Health England (PHE)**

Public Health England advised that radio waves from base stations is in line with the guideline set out by The International Commission on Non-Ionizing Radiation Protection (ICNIRP) who are formally recognised as an official collaborating non-governmental organisation by the World Health Organisation (WHO) and the International Labour Organization.

- **National Health Service (NHS)**

“Concerns have been expressed that prolonged or frequent exposure to radio waves might increase a person's risk of health problems such as cancer. But most current research suggests it's unlikely that radio waves from mobile phones or base stations increase the risk of any health problems. Since the 1990s, there's been a huge amount of scientific research into the potential health effects of mobile phone use”.

“Large reviews of published research have concluded that overall the evidence does not suggest that radio waves from mobile phones cause health problems. But further research is still needed to check that there are no health impacts from long-term exposures (using a mobile phone for more than 20 years)”.

*“When it comes to other risk factors for cancer, such as smoking, poor diet, drinking too much alcohol and lack of exercise, mobile phone ownership is probably not a significant risk to your health”.* (NHS, n.d.)

In 2012 an independent report by the Health Protection Agency found “no convincing evidence that RF exposure below agreed international guideline levels (which the UK adheres to) causes health effects in adults or children”. (NHS, 2012)

### **What is next after 5G?**

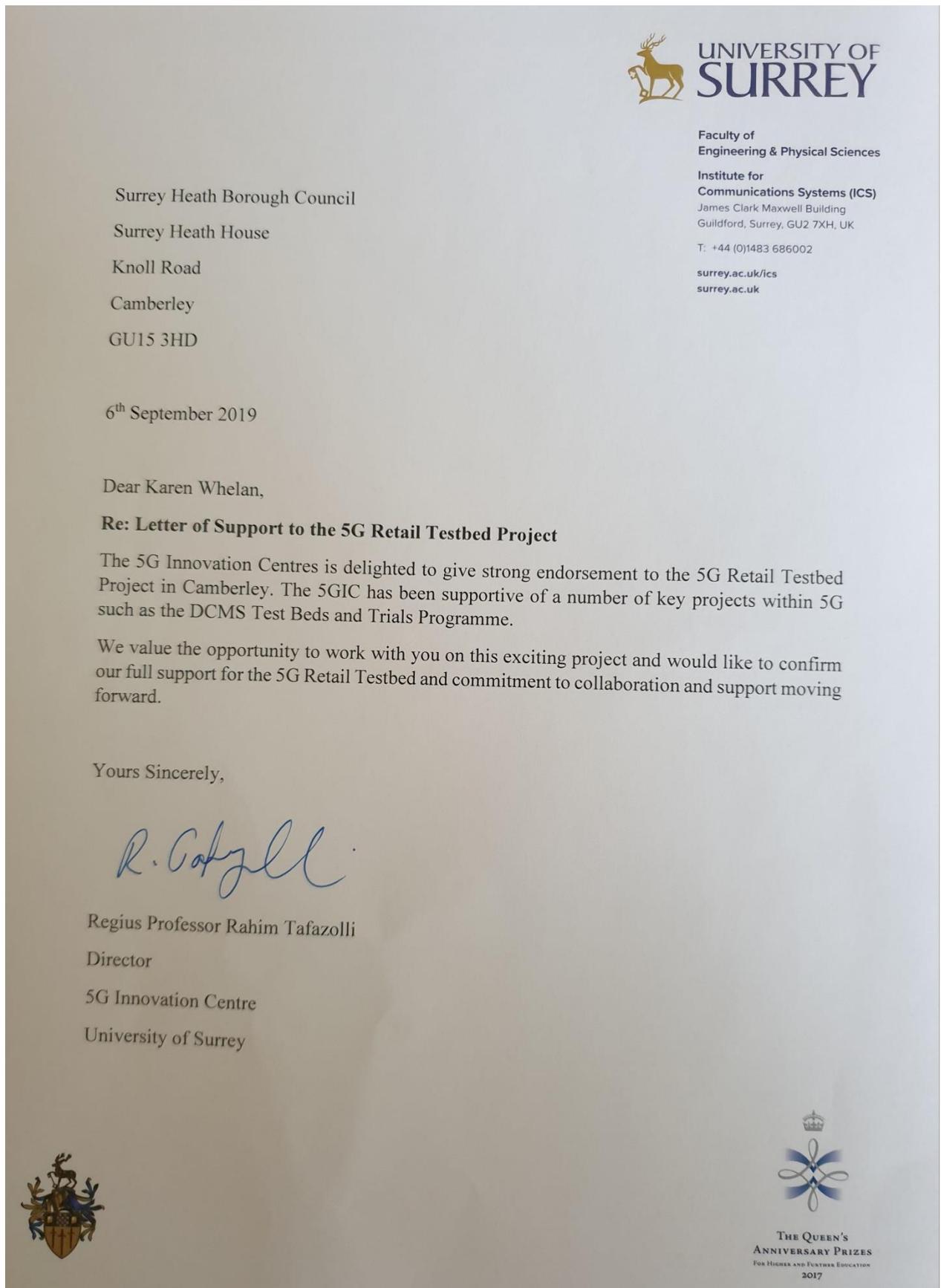
Networks and research institutions are already looking at the next phase of communications after 5G, but this is predicted to not roll out until at least the year 2030.

## 16.0 Appendices

Other applications of 5G:

- **Autonomous Vehicles-** 5G will power the network that allows driverless cars to communicate (V2V and V2X) IoT also used for tracking and diagnostics
- **IoT/Smart Cities-** Smart CCTV, Lighting, Sensors on rubbish bins, environmental monitoring
- **Digital Health-** Sensors in the home to remotely monitor patients (Vitals, movements, lack of mobility)
- **Retail-** Smart mirrors utilising AR, AI, smart payments such as Amazon Go, Improved logistics
- **Tourism-** Smart tourism using VR and AR to boost tourism sites and track people movement
- **Creative Sectors-** Digital Gaming, Competitive Gaming, VR/AR/XR
- **Manufacturing-** Industry 4.0 and automation of supply chains, logistics, and production lines. Use of robotics and remote monitoring

Letter of recommendation from the 5GIC and Regius Professor Rahim Tafazolli who is the 5GIC director:



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