

**BCS, The Chartered Institute for IT**

**Consultation Response:**

**Department for Culture, Media & Sport**

**Digital Communications Infrastructure Strategy**

**Dated: 1 October 2014**

**BCS**

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BCS is governed by a Royal Charter which defines our purpose: to promote the study and practice of Computing and to advance knowledge and education for the benefit of the public. We bring together industry, academics, practitioners and government to share knowledge, promote new thinking, inform the design of new curricula, shape public policy and inform the public.

The Royal Charter enables the Institute to admit qualified members; without our 70,000 members we would be unable to undertake many of our charitable activities to promote IT at all levels. Under the Charter, BCS is required to establish and maintain standards of professional competence, conduct and ethical practice for information systems practitioners.

As a professional body, BCS represents its members and the IT Profession as a whole on issues of importance, and liaises with other professional bodies, the government, industry and academics to initiate and inform debate on IT strategic issues. We also deliver a range of professional development tools for practitioners and employees and as a leading IT qualification body; we offer a range of widely recognised professional and end-user qualifications.

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## Consultation Document:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/346054/DCIS\\_consultation\\_final.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/346054/DCIS_consultation_final.pdf)

## Consultation Questions:

### 1. Views are sought on:

#### a) Is this an appropriate role for Government?

BCS believes that this is an appropriate and essential role for Government. The information economy, to be competitive internationally, requires world-leading infrastructure. Telecommunications has become more important, in this respect, than other aspects of infrastructure, such as transport, which receive vastly more Government support. It is interesting to note that Broadband and IT will become part of the UN sustainability development goals with effect from 1 January 2016.

#### b) What other high level principles might the Government adopt?

The UK Government should try to be ahead of the curve internationally in terms of telecommunications infrastructure, not play catch up with the leading nations. It should be possible to state where we want to be in ten to fifteen years in broad terms and then ensure that policies are directed towards that goal without being too prescriptive or restrict competition.

#### c) What resources do you consider the Government should aim to deploy to effectively manage its role?

In our opinion, the market for telecommunications infrastructure in the UK is far from perfect while its economic and social impacts are extremely high. The Government needs to ensure that there is sufficient competition in critical areas. It also needs to encourage investment in areas which the market economy will not serve adequately. Major Government projects should mandate the use of the latest IT technologies to maximise the benefit of its investment and support of UK innovators.

### 2. What potential opportunities are there for Government to leverage its combined buying power to support policy objectives?

We consider the Public Service Network to be a good example of where aggregation of public sector demand can lead to better adherence to standards and greater economies of scale. The Government should seriously consider whether it should take a more direct role in areas which are dominated by a few suppliers, such as backhaul networks. Investment in national networks of comparable importance, such as highways and railways, is controlled much more directly by Government. Central Government spends an estimated £45 billion on goods and services. Smart procurement through the changing Government procurement network is supposed to be a pillar in deficit reduction and delivery of better public services. The current goal is that 25% of this spend should go to SMEs. Our work with entrepreneurs in start-up communities e.g. IDEALondon has shown us how difficult it is for them to get on the Government Digital Marketplace. Some have products which central and local Government departments wish to purchase, but because SMEs are unable to get into the G-cloud or

the new digital marketplace are unable to. What is the point of Government encouraging entrepreneurship if it is not prepared to consume the resulting innovative products.

**3. If migration to IPV6 is required, are there any barriers to that migration and if so how might these be addressed?**

There can be no doubt that the UK Government needs to take a lead in ensuring a full transition to IPV6 without further delay. This is essential to demonstrate that we are serious about achieving a world-class infrastructure but also, more practically, to allow the expansion in addresses that the Internet of Things (IoT) will require to achieve its potential. It is a good example of where light-touch Government intervention could be very effective. If IPV6 was mandated in all Government procurements then the market would respond with investment which will benefit the private sector as well. We believe that without such a statement of intent, companies may choose to invest in other countries which have taken a more pro-active stance. The UK technology company ARM has developed products based on the international 6LoWPAN for efficient IPV6 support on low power IoT devices and is now distributing IoT hubs using this protocol.

**4. Is an ongoing disparity of broadband services inevitable? If so, should this be addressed and how might this be done most effectively?**

We would argue that it is inevitable that provision will vary according to the density of demand; otherwise there is a risk of wasteful over-investment. However, the Government can state what level of broadband service it expects to be provided to different types of premises and over what timescale. A reasonable two year target could be at least 30MB broadband to all homes and 100MB-plus to all groups of non domestic premises (villages, industrial estates, etc). Where the providers can demonstrate that there is no economic case for such provision then Government support would be appropriate. However, suppliers should not be allowed to avoid replacing expensive leased lines by universal broadband provision in order to protect their revenues.

We note that, Ireland has already made such a commitment to rollout a minimum of 50Mbps to 50% of premises by 2015 and 30Mbps to every premises. We refer here to the European standard, rather than the 24Mbps the BT Version, in order to avoid upgrade of the roadside 'Green Cabinets'. Significant new fibre installations in the rural community is being funded as a necessity<sup>1</sup>.

**5. How symmetrical will digital communications networks have to be in the future? Will this differ across user types? What implications does this have for fixed and wireless broadband provision?**

The Government should investigate issues related to future demand such as symmetry, low latency and reliability. The ratio between upstream and downstream capacity is likely to get nearer to 1, even if it doesn't quite reach it. Such work should look at future classes of usage and examine their needs and whether it's 'fit for purpose'. Not every data type has the same value and some classification of content and data usage together with QoE and QoS services used to maximise efficiency. Infrastructure will have to handle high traffic in office and domestic situations, high density in public spaces and stadia and high mobility on trains and motorways. Some IoT applications may have very

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<sup>1</sup> <http://www.dcenr.gov.ie/Press+Releases/2014/Major+fibre+build-out+to+rural+Ireland+will+be+cornerstone+of+Government+strategy.htm>

Consultation response: Digital Communications Infrastructure Strategy

low bandwidth demands but very high resilience and time-to-repair demands. Such applications may have very large economic and social benefits, for example by reducing health and social care demands on public expenditure, enabling better energy usage etc. They would thereby become of greater importance in the overall infrastructure strategy, with Government standards and support addressing their particular demands.

At a recent conference in Cambridge EE said that 69% of traffic would be domestic video and Google announced its plans to use the VP9 Codec to support “an explosion of 4K Video streaming”<sup>2</sup>.

BT’s 5G director correctly pointed out that 95% of data will still traverse the fixed infrastructure (primarily as backhaul). That fibre capacity will however need to be upgraded by 1000% to cope with predicted growth by 2020. China Telecom predict that by 2030, the number of global IoT connections will reach 100 billion, of which China will make up over 20 billion.

IoT connections on cellular infrastructure typically poll their status a few times a minute and transmit very little data. In dense deployments this will load the switching infrastructure (which is not revenue generating) without the compensating chargeable data traffic. A new model needs to be found to cover this scenario.

## **6. Which countries should be our benchmarks on communications infrastructure to ensure that businesses remain in the UK and continue to invest?**

We should not be following other countries as this implies we will always be behind the best. Whilst wasteful over-investment in a network infrastructure that is underused is in no one’s interest significant under investment for many years leaves the UK well behind the competitors. The UK is a leader in research and innovation and many countries are following us. They then imitate us or invest to compete e.g. the German copy of 5GIC launched in Dresden 25 September 2014 with 500 researchers. So benchmarking should always be looking forward (by the number of years such investments are planned over) and should examine what, say, the top five world-leading countries are planning over that period. We should set our own long-term (and short term) goals and direct policies towards meeting them. Other countries will have different priorities but the UK will succeed only if we have a world-leading information economy and for that we must have a fit-for-purpose, telecommunications infrastructure that anticipates rather than follows user demand.

Whilst the GSM phone is the most used technology in the world there are still 3Billion people who don’t have any sort of phone. These countries present an opportunity for investment more appealing than saturated northern hemisphere markets and they don’t have a legacy infrastructure to upgrade. The countries we should benchmark against are the south Asian ones where for example China has 300+ wireless cities partnered with local authorities ensuring that the services for 200 million citizens make the internet part of their daily lives. They are very keen to work with the UK in development and standardisation. In Korea the average data rate per user is 3GB for 60% of the population.

ITU and National growth predictions for China compared with the rest of the world are

- Global data: will grow by more than 200 times from 2010 to 2020, and by nearly 20,000 times from 2010 to 2030.
- In China: the growth factors are even higher, with mobile data traffic expected to grow by more than 300 times from 2010 to 2020 and by more than 40,000 times from 2010 to 2030.

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<sup>2</sup> <http://www.hdtvtest.co.uk/news/youtube-4k-201311203451.htm>

- For large cities and hotspots in China: the growth of mobile data traffic will exceed the projected average growth for all of China: with growth by 600 times from 2010 to 2020 in Shanghai, and 1,000 times in a hotspot area of Beijing

US attitudes are different and they are concentrating on deploying 4G well with little concept of what 5G will be.

**7. What metrics do you think should or will become relevant in comparing network performance in different countries? Which metrics should most appropriately be used as the basis to set objectives for government policy?**

Much of the consultation paper is about network speeds but while this has been an important issue for the last ten years as the suppliers have tried to keep up with consumer demand, it is likely to be of less importance once high speed services (see our response to question 4) are available to all homes and mobile devices. Of growing importance will be the other metrics which are critical for businesses, such as low latency, coverage, reliability and rapid provisioning (SDN). The UK should adopt the OECD agreed metrics. This is an area where the Government might commission studies drawing in relevant organisations that can represent the demands of, for example, small businesses, rural communities etc. However, a better means of consultation might be to use modern methods (social media, real time data analytics etc.) to establish trends, although without adequate infrastructure and technology it is unlikely that those suffering the most would be able to respond. Happier more efficient communities are possible with smart city thinking based on all the community economics. Resourced and paid for by local businesses, many successful implementations such as Malmo and Bilbao are using telecommunications IoT technologies to manage the city and are making a profit from subsequent inwards investment.

**8. Do you agree with this scenario or elements within it? Where do you agree/disagree? If you disagree what alternative scenario do you envisage?**

The value of predicting future demand by describing scenarios of this type is questionable. Some elements of each of the scenarios can already be seen in current service provision and existing plans for the next few years, but predicting demand in any level of detail over the ten to fifteen year time horizon is fraught with difficulty. Nobody predicted the 'selfie' and the rise in personal media. Rather it would be better to set out broad principles and let the market respond. Those broad principles should include the provision of high speed broadband services (see our response to question 4) to all premises with higher speeds (100MB +) and other enhanced service standards delivered to community facilities such as schools and business premises. Mobile coverage should be increased to 100% geographical coverage of the UK, with 'not-spots' rigorously addressed, as a condition of the mobile operators' licences. There should be automatic transfer from fixed to mobile services as users travel within and between buildings and transport facilities (as delivered by BT with its fusion phone in the mid 1990s). WiFi offload is now the standard practise in areas where the mobile data charges are high or when roaming internationally. A few simple principles such as these, with appropriate target dates, should be set by Government and the suppliers challenged to say how they will meet them. The FTTP opportunity missed in the 1980s should be encouraged and legislation should assist this.

**9. What are your views on the technology commentary underpinning this scenario? To what extent might the infrastructure/technology discussed evolve irrespective of demand and how far will it be a direct consequence of the level of demand?**

Please see our response to question 8. Much of the commentary from Government highlights activity in the innovative and entrepreneurial world. Little is said about successes of established businesses and although it is planned, little done to encourage their continued success.

**10. Are there technologies not identified here that you think will have a major impact on the performance of existing infrastructure or the deployment of additional infrastructure in the next 10-15 years?**

Please see our response to question 8. The availability of 4G/LTE/5G mobile and pervasive access to WiFi hotspots, whilst not a substitute for fixed broadband, will affect demand, usage and traffic patterns for the fixed infrastructure. It is likely that the 4G services will deliver better wireless broadband coverage than the fixed equivalent but this should not be a reason to hold back on fibre installation as this will still be required for backhaul. Massive investment in mmWave will be required and should be anticipated with early site planning, regulation etc.

**11. Are there wider environmental issues not reflected in the scenario e.g. the price or availability of energy that will affect this scenario and in what way?**

Please see our response to question 8. One of the arguments for improving the telecommunications infrastructure is that it has a potential to reduce other pressures on the environment. For example, if it reduces energy demand through smart metering or reduces physical travel by allowing more home working, then it will help to meet other Government targets and international obligations, at a much lower cost than alternatives such as building more power stations or railway lines.

**12. How likely is any unforeseen disruption to this scenario and what area might it occur?**

Please see our response to question 8.

**13. Do you agree with this scenario or elements within it? Where do you agree/disagree? If you disagree, what alternative scenario do you envisage?**

Please see our response to question 8.

**14. What are your views on the technology commentary underpinning this scenario? To what extent might the infrastructure/technology discussed evolve irrespective of demand and how far will it be a direct consequence of the level of demand?**

Please see our response to question 8.

**15. Are there technologies not identified here that you think will have a major impact on the performance of existing infrastructure or the deployment of additional infrastructure in the next 10-15 years?**

Please see our responses to questions 8 and 10

**16. Are there wider environmental issues not reflected in the scenario e.g. the price or availability of energy that will affect this scenario and in what way?**

Please see our response to question 8.

**17. How likely is any unforeseen disruption to this scenario and what area might it occur?**

Please see our response to question 8.

**18. Do you agree with this scenario or elements within it? Where do you agree/disagree? If you disagree, what alternative scenario do you envisage?**

Please see our response to question 8.

**19. What are your views on the technology commentary underpinning this scenario? To what extent might the infrastructure/technology discussed evolve irrespective of demand and how far it be a direct consequence of the level of demand?**

Please see our response to question 8.

**20. Are there technologies not identified here that you think will have a major impact on the performance of existing infrastructure or the deployment of additional infrastructure in the next 10-15 years?**

Please see our response to question 8.

**21. Are there wider environmental issues not reflected in the scenario e.g. the price or availability of energy that will affect this scenario and in what way?**

Please see our response to question 8.

**22. How likely is any unforeseen disruption to this scenario and what area might it occur?**

Please see our response to question 8.

**23. Are there factors, for example technical or unrelated to the regulatory framework, that could create bottlenecks and delay future infrastructure deployment in the UK in this timeframe, that would result in demand not being met or the UK not being seen as a leading digital nation?**

The Government should ensure that the regulatory environment includes provisions to achieve a level playing field where there are one (or a few) dominant players in the market. It should be ruthless in addressing anti-competitive behaviour. It should ensure that open access to passive infrastructure is compulsory for all civil engineering works. Planning guidelines and allocation of contracts for communications in new greenfield/brownfield sites can create unnecessary hurdles. Among the other issues that may have an impact are: a tightening of finance that makes investment more difficult;

trade restrictions or wars with major suppliers of telecommunications equipment and component providers, and access to rare minerals needed for telecommunications equipment.

**24. Do you expect commercial providers to deliver future infrastructure and meet demand on a purely commercial basis, or is some form of public intervention likely? If public intervention is likely how might that work with the commercial provision of infrastructure? What form might that intervention take?**

Public intervention will be needed to achieve universal fixed and mobile provision to minimum standards in areas with low population density. The level of subsidy should be competitively determined within the tendering process, for example by reverse auction to meet the universal service obligation. Public intervention can have a positive effect in various ways; see for example our response to question 2 (PSN as an example of setting standards and aggregating demand) and question 3 (setting an IPv6 standard). The 'digital by default' policy of the Government is another example of how the Government can save money while stimulating the market, but it must be accompanied by measures to ensure that all citizens can use the services in the preferred way, in terms of technology availability, awareness, training and personal support.

**25. Which current or draft legislation might prevent or facilitate the emergence of any of the scenarios?**

The privacy backlash from the impending data protection regulation will undoubtedly disrupt revenue models funded by advertising and re-sale of personal data. Rigorous enforcement will however regain user trust and the Government should resource accordingly.

**26. Do you have views on which scenario (or combination of scenarios) is most likely and should influence the development of future strategy?**

Please see our response to question 8.

**27. How might efficient investment in communications infrastructure be supported, for example by changes in the regulatory framework?**

Please see our responses to questions 23 and 24.

**28. Are any further regulatory measures necessary to incentivise the rollout of future mobile infrastructure in currently underserved areas?**

Where it is hard to justify investment in difficult to reach areas for one operator and cannot be justified for multiple operators, access infrastructure sharing should be required, and operators should allow customers of other networks access. Re-purposing of 2G networks to support IoT wireless connectivity might present an opportunity for Government to focus and incentivise remote deployment. (LTE-M, SigFOX, Weightless etc.)

**29. Is there a role for a revised USO or USC to ensure that minimum consumer demand requirements are met and to reduce the potential for a new digital divide? What might this look like?**

The USC should be actively upgraded to meet the superfast broadband and other targets, such as service quality metrics, in the strategy.

**30. In terms of supporting future innovation and long-term investment in infrastructure, what areas of broadcasting regulation may have served its purpose by 2025 -2030 (or indeed earlier)? What future technical developments may also have longer term implications for regulation and wider public policy?**

As explained previously, the migration of broadcast services to the internet and aggressive deployment of internet video is dwarfing other usage. Faster migration away from broadcast services will free the spectrum for more modern usage which could use the coverage. The IoTs with connected objects and more widespread use of high speed unregulated spectrum including global WiFi hotspot networks, will need to be considered as part of public policy.

**31. Are there changes to the EU Regulatory Framework that the UK might seek to encourage more competition in UK markets?**

European Commission's connected continent proposals should be fully supported and Government should not resist heavily promoting UK technology and research. The UK needs to take its share of Horizon 2020 funding and encouragement of SMEs and researchers to get involved could stimulate European competition.

**32. Should Government seek changes to the European regulatory framework which put more reliance on competition law and how might this be done?**

Ex-ante sector specific regulation is essential for the foreseeable future. Competition law is inadequate as by definition it is ex post and, frequently by the time the appeals are done the offended party has gone bankrupt.

**33. In what ways can you see competition driving technological change in the UK in the future?**

The Government's view that competition and user demand will drive technological change is supported, however, regulation and competition needs to be done in such a way that all market stakeholders have a fair chance. A shift from infrastructure based competition to service based competition over shared infrastructure would stimulate greater innovation in devices, applications and content. This would be facilitated by structural separation of fixed and mobile access networks.

**34. How can the regulatory framework keep up to date with new business models and changes in technology?**

Government should ensure availability of equivalence of input access. Also, it must beware the effects of sub national geographic deregulation which has eliminated competition for multi site urban/rural fixed line access networks, as competitors to the incumbent have no protection in urban

areas which are deemed competitive for the mass market. Flexibility and speed of response are vital as new business models will develop with increasing speed. For example, the emergence of the 'selfie', as an example of user generated content, television viewing is increasingly on personal mobile devices and the 'privacy backlash' may devastate business models based on targeted advertising. The latter will be of major benefit to the consumer but in a surveillance society about to succumb to the new EU privacy regulation, it is essential that rigorous enforcement is also fundamental to government policy.

The UK leads the world in open data through the ODI and predictive analytics based on these real time registered data could give Government an edge in the sensitive regulation of changing services.

#### Technology:

The regulatory framework is currently independent of short term changes in technology except perhaps in the area of spectrum allocation and assignment. Spectrum allocation should continue to be consistent with ITU specs and the Government should aim to get the best deal it can at the Global Spectrum meeting in 2015. Where the regulatory framework is concerned with a specific service, for example, PTSN, the framework should be updated as new methods of delivering the service are developed.

Market domination by a few of the major software and device manufacturers means that massive swings can happen overnight. The Government is heavily funding innovation and development through new and revised agencies e.g. the catapults, and the 5GIC in Surrey. It needs to capitalise on this investment and be reactive in enabling these new technologies (and businesses) with a way of entering the market fairly. We are aware of many new start-up businesses moving to USA because after their accelerated growth funded by Angels and VC's has come to a point of consolidation they find the regulatory and financial communities more welcoming.

Whilst Government regulators can maintain stability and fairness in traditional infrastructure it is unclear what they are doing in emerging technologies. For example, BLE Beacons in public spaces and DLNA in domestic and mobile devices. Leadership and awareness should be part of the regulatory processes in all sectors of Government.

#### Business models:

The business models used in the provision of telecommunications infrastructure and services are changing. One change that has occurred is in pricing, with the introduction of bundles of minutes and data volumes with line rental. This change is a result of competition arising from an effective regulation of the market. Bigger changes may also be occurring including the move from a telco model to a telco and media provider model. The competition framework approach should still work, only the telco will be participating in media markets as well as telecommunications markets. Remedies associated with SMP such as accounting separation may therefore be used. A model based on 'Creative Commons' and zero revenue is inevitable in the new ICT world. As stakeholders jostle for new revenue streams (e.g. through IoT, smart cities etc.) it is unclear how Government will respond positively.

#### Infrastructure sharing:

This gives rise to the possibility of cartels and such sharing agreements should be monitored carefully. As previously mentioned, BCS on behalf of users has been calling for national roaming for mobile to allow users to get the best signal wherever they are and the operator to concentrate on providing the best coverage in regions where they are strong. As we roll through the LTE 4G deployment to a 5G one encapsulating terrestrial wireless which is not cellular in nature challenges

will emerge. It is likely that SDN and cognitive radio will require much infrastructure sharing and regulatory awareness will facilitate best use of this development.

**35. Are there any changes to legislation other than the Communications Act 2003 that would incentivise the provision of communications infrastructure?**

Mandatory provisioning of existing trunking etc. plus enforced sharing of passive infrastructure and dark fibre in other sectors e.g. railways, transport, military, energy and local Government will be necessary to accommodate new broadband and wireless deployment. Similarly powers to acquire new capacity should be strengthened and spectrum harvesting, refarming, sharing and trading, encouraged.

**36. Would there be benefits to investment from a focus on broadband only services? Are there any barriers to the emergence and adoption of broadband only services, whilst still providing necessary access to emergency services?**

There is a strong case for investment in broadband infrastructure which is focussed on business use. The boundaries between broadcast and data services no longer exists in the consumer market and consumerisation of business broadband is inevitable if it's the only broadband a business can get.

There would be great benefit from a focus on broadband backhaul for the developing 4G services which are already faster than many fixed broadband services. Additionally mandated broadband proximity to business parks for broadband access points is essential. Businesses should only have to pay reasonable charges for broadband connection and should not be disadvantaged by their location. They stimulate rural economies and disperse pressure on urban infrastructure.

**37. How might copper access networks evolve over time alongside other access technologies? Is there a role for policymakers in helping manage any transition from copper to other access networks?**

This is a technical question for suppliers and there is no need for policy makers to intervene. It is unlikely that further beneficial upgrade to the copper infrastructure will eclipse what is happening in the fibre or wireless world. There is certainly a role for regulators to facilitate access to the supporting infrastructure and routes to enable competitive services to be deployed.

We are reminded that the Government intervened in the Thatcher years when Mercury wished to install a free fibre to every premise in the country through the water pipe. The technology was proven and the then singular water company was in agreement. Government intervention then opened the market for a large number of cable operators (mostly from USA) to roll out obsolescent coaxial networks rather than fibre. These have over many years consolidated back to one (Virgin) who are in the process of taking us to where we could have been in the 80's.

**38. Views are sought on whether there are any additional actions the Government should consider to ensure:**

**a) That the provision of all areas of the UK's digital communications infrastructure remains competitive in order to ensure that the UK can take full advantage of growth opportunities in the Digital Age;**

**b) Aside from legislation and adapting the regulatory framework in the broad sense which other actions should the Government take to encourage investment in communications infrastructure?**

**c) That potential investment in the provision of digital communications infrastructure offers a suitable risk and reward profile to ensure that they can be financed by the private sector.**

Please see our response to questions 1 and 35-37.

It is to be hoped that most of the required investment can be provided by the private sector with Government intervention to meet social objectives (e.g. complete geographical coverage) or to address market failure or anti-competitive behaviour by dominant suppliers. However, if the UK sets targets that exceed the risk and reward profiles of the private sector then the Government should be prepared to invest to maintain and improve our position as an information economy.

For many years the domination of the infrastructure by a single incumbent has stifled competition. There are now signs of new investors who need long term Government plans framed and presented in ways that give them confidence. Re-nationalisation of Openreach or the appointment of at least one other equivalent player might seem extreme but just the serious consideration of doing so should stimulate competitive investment.

**39. Views are sought on:**

**a) The case for the UK to invest to gain 'early mover advantage';**

**b) In what areas in particular the UK should aim to see investment;**

**c) Are there any actions not covered elsewhere in this report that the government should consider to ensure digital communications infrastructure is in place before it is needed and such that it helps generate need.**

The Government should set very ambitious but simple long term objectives and encourage the market to respond. This is not so much to gain 'early mover advantage' but to give confidence to those investing in our information industries in the Government's long term commitment to providing both a technology infrastructure and regulatory environment which will allow them to prosper.

**40. How can we maximise the current R&D and innovation UK landscape to help take advantage of the opportunities provided by future technologies? What needs to be done by Government and its agencies, and industry to tackle any gaps?**

The current levels of investment through Government agencies and initiatives is impressive however there are over 70,000 technology job vacancies. Massive support of engineering and software apprenticeship and technical internships as happens in Germany should be given through Government schemes.

Better socialisation of R&D successes would bring more of the innovation to market.

Encouragement of the innovative 'digital natives' to take internships in suitable SMEs so that each learns from the other.

Many of the 'silicon roundabout' successes are forced to move abroad to grow by the cautious attitude to risk of the UK high street banks. Once the grant/angel/seed funding cycles are complete many find it difficult to get normal trading accounts and have to leave.

**41. In which future communications technologies do you consider the UK has, or could achieve, an international leadership position?**

This is very difficult to predict, so our view is that Government should not pursue any particular technology as an objective. The current areas of focus as defined by the catapults should keep the UK at the forefront in these fields and stimulate the relevant industries. It is clear that the UK leads in design and research in many technologies but lags in manufacture of communications technologies having lost our equipment industry. What we can lead in is low power chip design (ARM etc). Such technology is absolutely essential to data centres and communications networks. Another is Satellite communications where British satellites are able to deliver 2-5Gbps downloads per DVB channel. We may however build a leadership position in the provision of services. Technologies in which we lead should be protected to prevent them being lost overseas by acquisition.

**42. What more could Government and industry do to exploit future technologies, associated new applications and emerging business models?**

As in the previous question 40 encouragement of a "buy British" mentality and promotion of British technology and companies. It could gain a better understanding of these technologies and open regulatory blockages. New business models are developing fast, advanced use of predictive analytics and the open data resources Government and local authorities hold could help in exploiting them to their fullest.

**43. What role might local bodies in have facilitating the future delivery of digital communications infrastructure?**

Local bodies have a vital role in identifying shortcomings in the provision of infrastructure at the local level and ensuring they are addressed by suppliers. Local bodies may also consolidate demand and coordinate supply of telecoms services, as for example with the PSN. In some countries, local authorities have been the principal driver in establishing excellent broadband infrastructure in community networks, e.g. Sweden and Finland.

This smart city development is about the community not the technology. The role of local authorities in co-ordinating all aspects of the community to develop a plan and make sure it is delivered to the needs of the citizens and local businesses is fundamental. In Malmo for example, once a failing city, the authority raised money from local investment bonds. Infrastructure improvements based on ICT Technologies funded by these bonds transformed energy, waste and water services to be energy positive. Housing and transport were optimised and overall the city has now attracted inward investment and is profitable and growing. The transforming technologies sit on an IoT and open data platform that can adjust the operation of the city in real time. This open mindedness has transformed many cities to the benefit of their citizens and their local economy.

#### **44. How can councils maximise the digital communications infrastructure in their local area to support their work on economic regeneration?**

Councils should include in their planning and investment analysis the benefits from improved connection to schools, hospitals, libraries, leisure facilities, road controls, street lighting and their own functions such as town planning, transport, waste disposal, power generation and water. Each aspect of a community influences another. Big Data analysis based on collection from IoT sensors, used without restriction (to silos) and presented in visionary ways will encourage innovative new approaches<sup>3</sup>.

BCS believes that councils can do much through the planning system to promote infrastructure development across their area and in individual developments. Clearer advice to local authorities from the LGA and relevant professional bodies in this regard would be welcome.

**End**

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<sup>3</sup> [www.vizicities.com](http://www.vizicities.com)