The Converged World of the Internet in a Connected Digital Economy

Position Papers

Anon

- Innovation in the creative and digital media sectors is pervasive and iterative, highly collaborative, project-based and informal.
- The innovation process tends to be non-linear and multi-disciplinary, with new projects and services are developed out of rapid iteration, open to inputs from unexpected sources.
- Innovation culture is strongly human-centred, with an emphasis on user-experience.

The development of a range of new applications and services in the Connected digital economy will be stimulated and influenced by the development of a highly collaborative eco-system, which reflects the observations made above.

It will be important to ensure that this is reflected in the make-up of the CDEC, with an emphasis on a whole 'eco-system' rather than just a technology-oriented intervention.

BBC R&D Submission: The Converged World of the Internet in a Connected Digital Economy
Dr. Andy Bower, Head of External Relations, BBC Research & Development.
Said Business School, Oxford, 21st May

The Catapult Centre needs to the set a clear vision and roadmap for the development and future evolution of the Connected Digital Economy. This will allow the CDE to grow through the application of technology and enables new service-led business models that will provide the pervasive and immersive digital services and content to enrich citizens' lives, drive further societal change and stimulate economic growth.

- The CDEC should:

  - *Identify a small number of transformational but achievable target areas that represent major use-cases* for the CDE to focus on, to rapidly demonstrate ability to deliver and impact the UK CDE and economy.

  - *Identify and build upon clear synergies across different industry sectors through meeting shared challenges* with common underlying solutions that may be applied across sectors of the digital economy. For example, many sectors (media, healthcare, finance) need secure and trusted relationships with their 'client' consumers, so digital identity, rights and security are common challenges. The exact parameters may vary between industry applications, but ideally the CDEC can develop common underlying systems and infrastructure, to meet these.

  - Build *capabilities and a balanced project portfolio* from shorter term closer-to-market development and innovation – to provide more immediate market impact and economic stimulus – to longer term research (providing the seed corn for tomorrow's market impact).

  - Bring *clearly identifiable return-on-investment benefits for individual organisations* – this is not necessarily immediate financial return. But Participation has to be attractive – especially in today's economic climate.

- Digital media content and services are fundamental to the BBC and the wider Creative Industries, and form a major use case of the Connected Digital Economy. The BBC is reliant on connected digital networks to produce and deliver its content and services to its audiences. 'Guaranteeing Access' is a BBC objective and should be for the CDE by making a digital public space a reality, across multiple platforms. Providing consumers with a richer, pervasive, immersive experience that is robust and reliable, in a trusted environment, across interconnected networks and platforms. So three key areas for the focus of CDEC activities:

  - *Audience experience and end-user requirements* for digital content and services in the CDE. In order for the digital content and services of the future to be of value and interest to our digital citizens, and those not yet fully conversant with the digital world, this digital information needs to be easily accessible, usable on a variety of platforms and devices, pervasive, personalised, and where relevant immersive. It should work reliably and seamlessly, end-to-end across networks, from origination / production through to consumption by the end-user. Whether these services are media content, healthcare applications, financial services etc., there will be common issues of usability, digital identity, privacy, digital rights and trust that need to be addressed.

  - *Optimising the management of 'Big Data' across industry sectors*, including the development of strategies and technologies for sustainable storage, search and access, security, resilience and digital preservation & restoration. Developing technologies to extract maximum value from content and data as digital assets, to drive economic growth. Development of scaleable demonstrators that will connect massive datasets (from across different sectors) to trial the systems and methodologies required to manipulate these datasets such that they can be: re-purposed for different platforms and use-cases; personalised and accessed according to individual users' requirements; made secure, robust and resilient; with protected privacy and validated provenance and identity.

  - *Developing and piloting infrastructure to form a pervasive interconnected IP 'network-of-networks'* that will constitute the 'Future Internet' in order to deliver digital services and content to users seamlessly via a plurality of networks and platforms in the home, at work, and on the move - on a range of target user devices. The 'Future Internet' must meet the needs of a wide variety of use cases e.g. remote medicine (very high availability), commerce (very high security), media (very high traffic, low latency). Developing, testing and piloting the infrastructures to support these different requirements should be a major challenge undertaken by the CDEC.

Breaking Down the Problem, Bill Dutton, OII

Four general points to put on the table:

1. The Importance of Connecting Creative and Internet Industries.

The creative industries offer the UK an opportunity to play a more significant role in shaping the future of the Internet. Other nations occupy more strategic positions in the development of underlying technologies, and others have a far larger base of users, who will drive Internet developments. However, the creative industries are strong in the UK, and present one of the best opportunities to provide the UK with a strategic advantage in developing new platforms, products and services.

2. The Value of Breaking Down the Problem.

Attending various discussions of the proposed CDEC, I was struck by the difficulty of discussing its role and the role of academic partners, such as universities, unless I thought of more concrete and discrete examples. Here is a first quick attempt at starting a table that suggests the kinds of opportunities that are likely to come to a CDEC, with a real or fictitious example, and some guesses at what the role of the CDEC and a research unit might be. If this is useful, I'd be happy to work with someone to refine it.

Type	Example(s)	Role of CDEC?	Role of Research?
Individuals with New Ideas	Two researchers with an idea for a new search engine; SME with a new way to encrypt files; …	Interview, incubate and develop demonstrator, or put in touch with others; support licensing, protection of IP; help start-up	Relevant training for start-ups; potential to draw from academic expertise
SME with new digital technique or product	Fillmotography Studio; …	Help scale to next stage; push to think globally; share technical advances to their product	Provide sense of alternative business models; …
Hyper-local Digital production team	3VTV; digital wiki heritage project; Voices from Oxford; …	Demonstrate leading-edge digital production; sharing of best practices, such as on copyright; create a type of YouTube Academy	Workshops to connect various projects; develop proposals; …
Major production company seeking to develop new online platforms	BBC iPlayer goes to multiple devices; Pinewood Studio to create a new VR	Link with entrepreneurs at the CDEC; …	Possible sites for case studies, …

	Studio		
Non-ICT or media business seeking to move into an area	Utility company seeking to provide information services to consumers	Bring their team up to date on relevant developments in the UK; avoid reinventing, …	
Traditional Artisans wanting to go digital	Potters, who would like to show their work to others; …	Connecting with trusted Web design teams; training; provision of platform for commercial offerings	University libraries and archives working on 3-dimensional visualization
New SME w/o marketing ability	Technical advance that is not well developed for potential users, markets	Translation of technical development into an attractive product	Expertise in marketing; case studies of marketing challenges
Creative industry losing revenue	Music company seeing profits decline	Experiment and expose to new business models	Seminars, research opportunities, …
Information service with a new big data set they believe to be valuable	Water companies to provide alerts to families with seniors, based on smart metering; …	Help with ownership, licensing, issues over privacy, data protection	Opportunities for research on the impact of new services, consumer behaviour; …

3. The Political, Social, and Policy Contexts Cannot be Ignored.

Policy initiatives are in train that might derail efforts to grow our connected digital economy. For example, the new communications bill, copyright policy, initiatives around surveillance of Internet users, and more, could dramatically affect the vitality of the Internet in Britain. Maybe debate and research on these issues is beyond the remit of a CDEC, but is it a clear role for academic partners and universities?

4. Problem Focused, rather than Innovation Focused.

Whether or not Edison invented the light bulb, the old story goes that it might not have been invented if inventors had focused on inventing a better candle. Trying to push innovation of the Internet and related digital technologies might be furthered best by focusing on solving problems, such as getting signals into the London underground, better serving rural areas, creating new business models for music, etc. Perhaps a CDEC can do both, but I wonder of a more problem-focused centre would be more likely to succeed in the current economic and social context.

This is not in conflict with connecting creative and Internet industries as we need creative industries working with Internet folks to solve these problems, and creative industries need sophistication in the digital technology to solve many problems of the creative industries.

John Farrington, University of Aberdeen

·   Limited Broadband availability and speed are basic issues in rural Britain. Indications are that the present 'divide' between digitally fast and slow Britain – most of the latter in rural areas – will increase as new technologies are deployed.

·   Can the market provide faster-than-present (and next generation) rural broadband through a range of infrastructure technologies (including e.g. wireless, satellite as well as fibre) based on revised business models, or must/should this provision be enabled through community enterprise?

·   The often higher costs of rural digital connection tend to neutralise or override the benefits of connection, at least for individuals.

·   Remote rural areas in Britain, Western Europe and areas of North America are at the forefront of demographic ageing, and show higher proportions of older people than do urban and 'accessible rural' areas ; this is also associated with lower incomes. As Oxford Internet Surveys (OxIS) show, Internet use/non-use is strongly related to age and income: thus, issues of digital connection availability are compounded by the demographic of rural Britain and elsewhere.
.   Should/can more resource be made available for the training of rural (and other) SMEs in order to maximise digital benefit?

Tony Henderson

1. Digital Inclusion

It strikes me that it is very hard to fully embrace the benefits of the new technological and social world while we cling on to the old world and maintain so many legacies.

I am not suggestion that culture, tradition, government or social practices are abandoned wholesale but there is enormous economic value in driving day to day communications and activities online.

Attached is a speech from Paddy Barwise, professor of Marketing at LBS that puts a staggering £22.5bn cost of not connecting the remaining 8.2m of the population online.

2. Community Engagement

To help the UK move forward significantly, new initiatives will need to gather widespread and rapid adoption to make them truly successful and above all meaningful.

Attached is a research paper authored by Steve Smith, head of Thought Leadership at Starcom Mediavest in London on how brands should think about, value and engage with communities.

3. Cloud Services

The scalability, cost and widespread availability of cloud services today provide an overwhelming economic case for adoption.

Attached is a paper from Microsoft on the Economics of the cloud.

4. Wireless Broadband Technology

Cloud technology only works if people have good consistent connectivity.

While broadband in the UK is reasonably widespread, high bandwidth fixed line or fibre broadband is limited in location and wireless broadband is also very patchy.

A number of organisations have been trialling a new wireless technology that uses the Whitespace between TV transmissions to provide a kind od "Super Wi-Fi"

This technology has just finished a major trial in Cambridge – see attached report.

<u>It is anticipated that it Ofcom will make it available for use in 2013 on a license exempt basis.</u>

5. Shifting Industry Paradigms

There are a number of key industries that are encountering seismic shifts in business models and are struggling to adapt.

In particular the TV, Publishing and retail industries are worthy of note.

First mover businesses in these industries have taught consumers that at any time and in any place they should be able to watch, read or buy whatever they want.

As industry players struggle to adapt, I believe test and prove new business models, markets and customers

Attached is a recent paper I wrote about the impact of Cloud in the broadcast TV industry.

6. The Intellectual Horsepower of Oxford

There is no question that within the boundaries of Oxford and Oxfordshire lie some of the greatest intellects on the planet.

The challenge is to engage those intellects from across the spectrum and inspire them to collectively focus on solving specific problems.

Despite these intellectual riches at our disposal, we also have a number of very poor and deprived housing estates within the same boundaries.

Surely we possess the intellectual curiosity, ability and perception to better balance social, learning and economic opportunities within our community?

And now more than even the financial barriers to doing this have been removed by the recent fantastic leaps in technology.

And if we in Oxford could achieve something notable, surely the learning from our efforts can be communicated and applied to other communities across the UK to deliver the similar benefits?

Preamble
This discussion paper is intended to help broadcasters and content owners better understand the rapidly growing possibilities of using cloud computing to help them evolve their businesses. Rather than provide a detailed technology briefing or an industry overview, the aim of this document is to provide a starting point to help business leaders and technology folk come together in to fully discuss the opportunity now presented by "The Cloud".

"Marvin K. Mooney I don't care how. Marvin K. Mooney will you please GO NOW!"
 - Marvin K. Mooney by Dr Seuss

The need for change
In an age where even a mobile phone can record and play back HD Video and every man and his dog has a twitter feed, it seems remarkable to see broadcasters still filming, editing, scheduling and transmitting their programmes - and running their business from traditional, proprietary infrastructure.
Sure if you wonder round a broadcast centre, the Digibeta tape machines are thinner on the ground, and the array of computer screens is ever thickening, but fundamentally the business of broadcasting hasn't really changed in the last 10 years.
One might be tempted to ask incumbents why this is so, and receive a range of varied opinions in return. The truth is pretty simple.
Over the last 10 years, Google has successfully pinched huge chunks of advertising revenue from the TV business causing a huge slump in revenues for most commercial broadcasters. For all its sophistication, Google essentially does one thing that commercial TV currently cannot do – it directly connects advertisers with customers in a measureable and easily understood fashion.
In 2009, UK online advertising revenues surpassed TV revenues. Ouch.
TV Broadcasters are nothing if not creative and so far have managed to successfully respond to the challenge from online advertising. Despite all the lures of the internet, live TV remains a very dominant form of entertainment mainly because it is a predominately social activity.
A good example is ITV who have created a number of blockbuster TV formats that leverage the social aspect, such as XFactor, which have driven huge live audiences and returned significant advertising revenues to its coffers. ITV could also applaud itself for the impact of these shows have also had on social media networks such as Twitter and Facebook, but the fact remains that it isn't making much making much noise about its online revenue. At a recent industry event, a senior figure commented:

"If I was CEO of a TV company, I would ignore all the new technology for the next 5 years and concentrate on doing what we have always done. For 5 years we would make lots of money and I would be a big success. After 5 years we would go bankrupt and I would be slated as a total disaster."

In the UK and beyond, broadcaster's envious eyes are distracted by the BBC and the iPlayer. With a slick user interface, depth of content and availability on multiple consumer devices, the iPlayer has set the benchmark for next generation TV viewing. It is however easily forgotten that the BBC has invested tens of millions of pounds in iPlayer, has armies of resources to do all the encoding and metadata and make it a polished and elegant experience.

It is also <u>fundamental </u>to remember that the BBC does not need to make a commercial return through advertising or protecting premium content - which makes the iPlayer a great benchmark but not a business model.

Key drivers for change
A combination of lowering advertising revenues, increasing competition from online media and inability to get their brand to stand out in an online world are three compelling reasons why broadcasters need to wake up and get their business moving forward. The live TV marketplace is also very fragmented with hundreds of channels available on Sky and dozens channels available on

Freeview. Despite wide availability of Freeview the majority of free-to-air TV viewing is still focused around the five main channels from their original analogue services.

Where to start?
Despite the uncertainties around business models, income, streams, devices and platforms to target, it is possible to start framing the challenge for broadcasters over the next five years. Broadcast TV has always been about providing an excellent and consistent viewer experience. Therefore it is likely that any new services will need to follow the same mantra.
But hang on a minute I hear you cry – where do we start? What should we do? What devices should we target? What's our business model?
And herein lies the dilemma – to rise to the challenge of online, interactive and social media broadcasters desperately need flexible, low cost reconfigurable infrastructure.
At the same time it is incredibly hard to articulate a traditional business case for such investment. Coupled with the business case issue are the poor economics of streamed video versus video when compared to those of traditional broadcast antennae. Building a TV station end to end is expensive but once you have connected to your transmitters, you can transmit to as many devices that receive. For all the advantages of online media (interactivity, return path, targeted advertising), additional server delivery capacity is needed for every online user and device). This means that your costs rise in linear fashion to your viewers… but surely internet technology is supposed to make things cheaper?

How could "The Cloud" be the answer?
The concept of could computing is not new – much as the internet is a "connectionless network", the Cloud can be thought of as "connectionless computers".
Everyone is actually very familiar with could computing – every app on every smartphone effectively uses Cloud computing. Smartphone users know what the app is doing but don't really care where or how. It's "in the cloud."

<u>What is different now is that finally "The Cloud" can finally provide answers to economic and business questions, not just the technical ones.</u>

At a basic level, broadcasters need to think of The Cloud as cheap and plentiful supply servers. They don't have to be purchased, set up, depreciated in the books, maintained or even housed. They can be accessed when needed and switched off when not.
The more servers you need, the **cheaper** they get - which means that as you build out Cloud infrastructure <u>everything </u>you are doing in the cloud gets progressively cheaper. They are also very easy platforms for which to write programs and applications.
Because Cloud servers are not physical devices that have to be acquired, they don't have a **Lifecycle** in the traditional sense. Yes you read that correctly, once you get your stuff up in the cloud it's there. Sure you can move it around between different providers but the thorny issues of legacy, migration and poor ROI are set to leave us once and for all.
Scalability is another massive win for cloud computing. Coders can design new applications in very short timescales, but if the whole world logs on to use it then suddenly the issue of server capacity to deliver it becomes front and centre. A crash from traditional infrastructure is still not unusual (the UK's University Admissions website recently crashed the day after exam results were released), but an application or website outage is a customer experience that broadcasters can never afford.
A first class cloud infrastructure provider will allow customers to ratchet up their capacity on as little as an hourly basis to cope with spikes in demand.
"What about **Security**?" I hear the cynics cry. Like any mission critical technology platform, it is all about how you design it. Clearly broadcasters will need local cloud services on their premises and secure, high bandwidth network connections to link everything together.

But most of all it's the business **Agility** that stands out as the most compelling reason for moving broadcasting infrastructure to the cloud. Mobile applications have a cycle time measured weeks

between concept and delivery, surely a broadcasting or media business needs to think in this kind of timescale?

Case Study 1– Creating a single user interface within the broadcasting chain.
Back in late1992 an experienced BBC engineer was tasked with rebuilding a Master Control Room in BBC Manchester. The challenge was that the room simply could not accommodate all the hardware control panels for all the equipment needed. The engineer came to the conclusion that even if he could fit all the panels in, the control room would almost certainly have to be rebuilt again when the next new piece of equipment was added.

He therefore sat down and wrote some software that would enable the entire control room to be managed from a PC. Rather than use a mouse, which is ill suited to live broadcast control, he put a touchscreen onto the PC so that broadcast engineers could use their fingers to control things – much as they always had.

This approach solved the immediate problem – the addition of a few touchscreens meant that the control room would not have to be rebuilt. But it didn't solve the longer term problem, as engineers would have to first learn how to code and rewrite the software for each time an update was needed.

So the engineer then decided to turn the software into a programming language. A programming language that would be so easy to use that broadcast (i.e. non-software) engineers could use it.

He finished the first version and then set up a low cost training programme for other BBC engineers to learn how to use it.

Unsurprisingly there was a huge take up and a community was born around it to develop device drivers, user interfaces and a range of utilities.

The software is now used extensively throughout the BBC, including new facilities in Salford and London's Broadcasting House. It is also used by a number of external broadcasters (DirecTV, LWT and Sky). Its applications include post-production, routing of radio feeds across the UK, on-screen graphics and control of all routing and signalling within BBC TV News. The simplicity of the user interface means that journalists can use a terminal to set up a satellite link for an interview.

Case Study 1- Observations
- There was never a management decision at BBC to implement the control software; it was driven from grass roots level by a visionary engineer with willing helpers.
- One of the key aspects of this software is that it established how a computer OS (Windows 3.2 in the very early days) could be used as a completely reliable platform to control a mission critical broadcast chain. The Manchester Control Room has been continuously live for 17 years using the same software despite the amount of equipment controlled doubling.
- It allowed BBC News centre to scale from managing six channel feeds to deliver 32 using the same basic infrastructure and staff levels.
- The operational performance of the people using the control system actually improved as the systems logging capability-tracked when people pressed the wrong button.
- Users without engineering skills such as journalists could be presented with a simple, reliable user interface screens that would enable them to do their job without needing specialist technical knowledge.

Case Study 1- Interesting Takeaways
- If it is possible for one of the world's largest broadcaster to use IT technology to provide a seamless user interface for their broadcast infrastructure then surely this remains true for all broadcasters?
- If by doing this, the user interface is effectively "abstracted" from the infrastructure it is controlling, surely large chunks of the infrastructure can already be replaced by cloud computing or on-premises cloud servers?

- If it is possible to replace existing infrastructure without changing the "User Interface" then surely it is then possible to add new screens to the "User Interface" to manage and deliver metadata, social media feeds?

Case Study 2 – Building a winning Ecosystem in the Music Production Industry

In 1995 the music production industry was at a turning point. A run of lean creative years had been broken by a new generation of indie rock bands headed by Oasis and the Britpop scene.

For years rock and roll records had been made in "proper" recording studios with computer controlled analogue consoles and open reel 24-track tape machines.

Developing from this industry background was the increasing trend for recording artists to build their own home studio, with facilities that were smaller in scale but no less impressive. A key part of all studios is the equipment known as "outboard" – these are range of standalone effect devices such as reverberation simulators, delay units, exotic compressors and equalisers – all designed to shape and smoothen audio signals during the recording or mixing process, and provide the unique flavour of sound for which that the artist and producer is looking.

Set against these market trends was the inexorable rise in computer based recording. Despite widespread hostility to computer based audio workstations due to their perceived lack of sonic "warmth", there was no question that they offered fantastic efficiency, the capacity to capture a huge number of tracks and the ability to go back into a recording and edit at the finest details – all with the ability to undo things if you made a mistake – features that were just was not possible on tape.

The leading proponent of this technology was a firm called Digidesign with a product called ProTools which replicated an entire recording studio. The ProTools product was used by a lot of musicians however it still was still not regarded as a replacement system for a traditional studio. Digidesign management decided that they had to crack this perception if they were going to and become the leading player (which they have now been for over 10 years).

Digidesign's market strategy was to create a plug in programme that allowed other manufacturers to create software version of their product. The plug-in programme had been well received but only a few partner companies had the resources and expertise to actually design and build a software plug-in.

Digidesign then took a straw poll to see which outboard products were most in demand and approached one leading manufacturer to see if they could gain the momentum they needed.

In the end Digidesign worked collaboratively with the manufacturer and did the software plug-in development themselves under license, the result of which was a superb product that finally established a digital benchmark for analogue audio product. The momentum this created brought a number of other key outboard companies to the table and within two years they had most of the leading brands they needed – credibility at last.

Case Study 2- Observations

- Despite taking what was ultimately the correct approach (to create a partner ecosystem) Digidesign didn't have immediate success.
- Digidesign surmised that they would have to take a leading role in order to make the ecosystem work.
- They ultimately succeeded by both reversing their normal business and building s superb product to get them across the hurdle.

Case Study 2- Interesting Takeaways
- An inclusive, well-managed partner ecosystem has generated significant market success on a large scale in a parallel creative industry.
- In order for a platform provider to make a partner ecosystem work properly, it's necessary to seed the ecosystem with key products, taking whatever steps necessary to create relevant and well-engineered products.

Back to The Cloud - Two Big Elephants In The Room

There are two big elephants in the room which do also need to be called out.
The first is that any cloud infrastructure will need high bandwidth connectivity to and from a broadcaster as well as the availability of some on-premises cloud infrastructure. This isn't such a huge issue for most broadcasters are fibred into nearby Teleports and internet Points of Presence, but it is a significant requirement that needs consideration.

The second is that the reason most broadcasters still use proprietary equipment is that they have each established their own unique working practices together with an ecosystem of unique suppliers who will generally design and customise very specific pieces of equipment in order to keep their customer happy. There is an understandable reluctance for many of these suppliers to give up selling a profitable, tangible box and support what looks like an uncertain support intensive venture into building cloud applications. It is clear that the broadcast industry must work together to create an App Store style opportunity for broadcaster suppliers that will drive the industry forward.

Three thoughts going forward

Rather than leave things to chance, the first thing that all forward looking broadcasting organisations should be looking to find a handful of visionary business and technical people who can think like the BBC engineer above. This should not be another addendum to their day job but should be a dedicated full time effort to understand, agree and translate the cloud opportunity for the individual organisation. Remember that a Cloud initiative is about creating the capacity to tackle strategic business opportunities for the next ten years. If organisations do nothing, as alluded to by the executive above, they will of course do fine for the short term but face being destroyed in the longer term.

The second thing that all broadcasting organisations should be doing is referring all business cases for new media to their cloud team in order to see what can be effectively delivered using cloud resources. Nothing will spur the transition to cloud computing faster than live projects with deadlines, deliverables and end users. This process shouldn't block projects completely but should provide a reality check to see what's possible.

The third thing is to ensure and open and constructive dialogue between broadcasters, the equipment suppliers and service providers. Everyone in the ecosystem needs to make a living somehow and the sooner there is transparent and honest engagement, the sooner capable and resourceful vendor organisations can contribute significant value to broadcasters to make the transition. Otherwise broadcasters will find that vendors they have relied upon to get things done have gone elsewhere and costly and unnecessary projects will have to be created to re-design something that was previously working fine (see Case study above!).

Sheep TV vs CloudTV

If the thinking in this discussion paper is not stirring you, the broadcaster, into action then you should consider this final thought:
Today two organisations want to get into the TV business in the UK. Let's call the first one SheepTV. SheepTV decides to follow longstanding business conventions for broadcasters. They sign some agreements to acquire traditional TV content, buy Freeview and Sky Channels, hire executives and

build out a broadcast centre. While this is approach well understood, it's still very expensive and there's no guarantee of any kind of audience for their channel – no matter how big their budget or how good their content. . And without and audience, they will struggle to sell their advertising inventory.

The second organisation called CloudTV thinks radically differently.

CloudTV is a small, agile organisation that is very targeted in its approach. It would begin by identifying a few small potential TV audiences and then acquire a range of broadcast rights to create original content and that will appeal to these audiences

Cloud TV would also make agreements with game console manufacturers, Set Top Box manufacturers, and connected TV manufacturers. It would then stream live and on demand video via the internet directly into a significant number of consumer's homes. It needs to leverage these in home devices because although people watch video on their PC they watch TV on a big screen.

CloudTV will find their audiences using social networks such as Facebook, apps on smartphones and web players. All of CloudTV's capability could be built, managed and delivered using cloud technology in a fraction of the time (months or even weeks) and at a fraction of the cost of the traditional TV broadcaster.

By targeting their viewers through online and mobile channels, CloudTV will build up significant following who are very "engaged" – i.e. loyal to Cloud TV's offering. They are perhaps thinking more like a retailer than a broadcaster….?

Should CloudTV choose to put up a live channel on Freeview (it could then easily use its cloud capability to do so) suddenly they have a significant TV audience out of nowhere.

So how does it make money?

Cloud TV initially makes some money from targeted advertising on live and on demand TV services, remember unlike today's TV services it does have a return path. Cloud TV will then add subscription services and payment gateways so that it can sell related content, services and merchandise. Sounding even more like a retailer…..

The longer term goal of the Cloud TV is to provide really low cost and efficient infrastructure to prove the business case and platform capability for a whole next generation targeted television services.

When Cloud TV becomes successful; it will offer its expertise, infrastructure and services to other TV content partners, production companies and broadcasters to builds a scale business.

The longer term revenue would derive from doing a transparent revenue share arrangement with these organisations so that they could operate, control and profit from the vast array of current and past TV productions in the UK.

Here endeth the lesson

CloudTV doesn't exist today but very soon something very like it will appear. If you are a broadcaster with existing online rights – it could even be you. On the other hand it could be ruthless online retailing giant with global ambitions.

You - the broadcaster - have now been warned!

"I said Go and Go I meant….The time had come to Marvin went."
- Marvin K. Mooney by Dr Seuss

Tony Henderson, 18th November 2011

Industry comments
"New entrants into the TV broadcast business need to think outside the box to prosper and grab the attention of the end user, wherever they are. For targeted broadcasters, cloud TV offers a very viable route to building a multi-territory brand that can deliver audiences in large numbers and, in the near future, charge a premium for delivering targeted and measurable advertising."
- Mark Cullen, CEO, etv

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Thank you.

Quite rightly, the Green Paper is likely to exclude some important parts of what UK communications will look like in 2020.

One is newspaper regulation and media ownership. The debate on that will have to wait until after Leveson.

Another is the future scope and funding of the BBC. The main debate on that will be after the next election.

Today, I want to focus on a third issue I expect to be barely mentioned in the Green Paper – getting people online. I'd like to propose that **getting people online faster than in other countries should be a key part of our vision for 2020**.

This would build on our competitive strengths. We have some great technology companies but if we ask, *"Who will provide and control the main internet platforms and standards in 2020?"*, the most likely answer is a combination of Apple, Google, Facebook, Amazon and maybe Microsoft - all US companies.

There *will* be non-US players, but none likely to dominate the main platforms and standards.

But when it comes to *using* the internet, we're the ones to beat. BCG's 2010 report for Google, The Connected Kingdom, showed that - despite having only mid-ranking infrastructure – **we're the world leader in internet usage by consumers and businesses.**

Specifically: among the major economies, we had the highest online percentage of both *shopping* and *advertising*. We were also the world's leading *internet gateway* with 36% of global traffic.

BCG described us as *the world's leading e-commerce economy*, exporting 2.8 pounds for every pound of imports.

The *first* part of my proposed vision for Digital Britain in 2020 is obvious: we should aim still to be the world leader in the *private use of the internet by consumers and businesses.*

The rollout of superfast broadband will help that, as will other government measures to encourage innovation, entrepreneurship, and competitive markets.

The *second* part of the vision for 2020 is less obvious. It is that we should build on our competitive strength in *commercial and consumer* internet usage

by also aiming to be the world leader in *online adoption* and *online public services.*

ICT investment across the public sector is about *18 billion pounds a year*. Much of that is now about *shifting public services online*. The aim is to go "digital by default" as soon as possible, increasing service quality while reducing costs.

But **digital by default will work only if users are already using the internet**. We still have *over 8 million* adult fellow citizens who have never done so. They vary greatly, but many are heavy users of public services – typically: old, poor, female, and living alone and/or disabled. Others are part of a younger, mostly unemployed, digital underclass, increasingly left behind by the modern economy.

A strategy for Digital Britain 2020 should aim to bring these people online faster than in other countries, for both moral and financial reasons.

The moral case is that a few basic online applications like email, the web, and online shopping – at which we're the world leader, remember – would transform many of these 8 million lives: saving them time and money, reducing their isolation, re-engaging them in wider society and the economy – *and* enabling them to use online public services. Getting people online is a powerful and cost-effective way of reducing inequality.

The financial case is just as strong. PwC, commissioned by the Digital Champion Martha Lane Fox, estimated the total potential economic benefit of getting everyone online at *22 billion pounds*.

Of course that depends on the assumptions. But whatever the exact numbers, accelerating online take-up would bring huge economic benefits by reducing the cost of public service delivery, helping people get jobs, supporting the development of 21st century skills, and enabling British businesses to become world leaders in public *and* commercial online services for poorer people.

A small extra investment in getting people online would significantly increase the return on the *£680m* of public money already committed to subsidising the rollout of superfast and mobile broadband and the *many billions* we're investing in online public services.

So, how can we accelerate online adoption?

Superfast broadband won't help much. It will be great for those of us already online but do little to bring in those who are not. The BCG report found **virtually no correlation between the availability of fast broadband and the adoption and usage of the internet.**

To achieve the *second* part of the vision, all we need is cabinet-level leadership and marginally more resources, to scale up existing initiatives and support them with some top-down marketing.

Through the work of Ofcom, the Oxford Internet Institute, the LSE's Media Policy Project, the BBC, Race Online 2012, the UK Online Centres, and others, we already know what's needed to bring people online. We just aren't resourcing it enough and supporting it with top-level political leadership and top-down communications.

At grass roots level, Race Online and partners such as Age UK are doing a terrific, very cost-effective, job bringing people online. But with minimal resources, the current take-up rate won't deliver world leadership in online adoption and, therefore, in the usage of online public services.

The main *government-funded* effort in getting people online is through the 3,800 UK Online Centres. They know how to help people see the benefits and relevance of the internet, overcome their fears, and get online. But their budget is just *7.2 million pounds for the 16 months ending next March* with no guarantee beyond that.

There's also some great work in the most disadvantaged areas by the charity Citizens Online, but its annual budget is even less - 800 thousand pounds.

Meanwhile, **there's no top-down marketing of internet adoption**. Here we have a resource not available to other countries – the BBC. No other country has such a successful and well-trusted public broadcaster.

We also have Digital UK, in which the BBC is a main partner and which has almost completed digital TV switchover. The programme is on time and 230 million pounds below budget, all of which will now go to support superfast broadband.

Digital UK has developed the appealing character Digit Al and expertise in communicating an emotionally challenging digital technology message to vulnerable consumers.

Under current plans, Digit Al will retire this October and Digital UK will be scaled back and probably wound up at the end of next year. Surely, we should be using the BBC, Digit Al and some of Digital UK's proven expertise to help drive online adoption among the 8 million?

Getting people online is a *marketing* task. We should be scaling up the bottom-up activities *and* supporting them with top-down communications. This, too, is something we're good at, and in this case we already have the marketing collateral.

To sum up, my proposed vision for Digital Britain in 2020 has two mutually supportive aims.

The first is to ensure that we'll still be a world leader in the private sector use of the internet by consumers and businesses. I think the policies in the Green Paper will do a lot to help us achieve that.

The second aim is that we will *also* be a world leader in **online adoption** and **online public services**. I don't think current policies *will* achieve that but most of the required building blocks already exist.

Achieving this second aim won't involve huge extra resources. **A *0.5 percent levy on public sector ICT investment* would generate an additional *90 million pounds a year.* That's still only about half the subsidy to superfast and mobile broadband but enough to transform the rate of online take-up.**

This would help reduce inequality *and* pay for itself many times over, mainly by accelerating the usage of the broadband networks and online public services in which we're rightly investing so heavily, but also by helping to ensure that these are genuinely user-focused and therefore more likely to be used by those who are online.

I don't know the right balance between the *supply* side and the *demand* side. But investing *many billions* a year on the former and *less than ten million* a year on the latter has to be the wrong balance.

Putting online adoption at the heart of Digital Britain is an easy win at a time when there aren't many. We already have a great Digital Champion, a great network based around Race Online, and a lot of relevant expertise and experience. All it needs to make this happen is cabinet-level leadership and some minimal extra resources.

This, to me, is such a no-brainer that I hope it will attract cross-party support.

Thank you.

Patrick Barwise is emeritus professor of management and marketing at London Business School, chairman of Which? and a visiting fellow at the Reuters Institute for the Study of Journalism, Oxford University.
www.beyond-the-familiar.com.

Lynne Murray, Holition Augmented Retail

Areas I would like to highlight as being important would include;

1. How to support innovation for business using knowledge of Uni.

2. How to better educate 'thinkers' and 'academics' to the benefits of business thinking.

3. Ways to facilitate more 'hacker' style intro days and events for a holistic team including business, developers, creatives

4. To become a global leader, the UK must look to foster disruptive innovation by encouraging entrepreneurial thinking throughout all design schools.

5. Tax relief is critical

6. Identity should include satellites to London- too London focused currently.

7. Need more collaboration between design and tech- this is fundamental and the main asset we have as a country. Design should not be an after-thought.

Eddie Townsend, ICT KTN

Our FI report concluded that four "Instruments" are required to effect real change and bring about growth, along with commercial and social advantage. The CDEC will have significant funding from government and industry, but however large this funding is, it will be but a small percentage of the total investment required to bring about a national shift and place the UK in a leadership position.

Technology requires investors and in turn investors require business models based on a policy context that encourages innovation.

The CDEC can be an incubator for innovative business models that can be linked to innovation in technology to create new industrial sectors and create a game changing shift in the UK economy. Just to focus on the technology and not on the other "instruments" will limit its potential.

Value case

There are different value cases, depending on a **commercial** or **governmental** perspective. For example, the **city** environment requires a value case in terms of reduced service delivery cost to the city, **reductions in CO_2** emissions and new services to businesses that will make the city a **more attractive place in which to invest** – the so-called 'smart city'. From a governmental viewpoint, these factors scale up to a UK value case, but there will also need to be a commercial value case to incentivise businesses to work together in a Future Internet style way. **Service revenue will need to flow to infrastructure providers so that real quality-on-demand services can be supported.** Similarly, owners of data will need a business case to persuade them to share data with service providers.

Policy

At a **city and national level**, there will need to be a change in policy at a most senior level to **change the way departments operate**, moving from the traditional stand-alone mode of operation to cross-departmental operation. The policy will need to be supported by **a jointly developed value case and the implementation of new structures** that are design to align service delivery to the Future Internet style. The change will **impact on traditional spans of control, demolishing 'walled gardens'** and bringing about the advent of cross-departmental shared responsibilities.

On a commercial level, businesses will need to **re-examine their corporate structure and cost structures** by embracing new ways of delivering output from R&D to operations and support services.

Technology

Integration of technology and platforms with a capable infrastructure forms the basis of any delivery mechanism. There will be many implementations and it will be necessary to develop architectures to suit each application and service environment.

The technology will encompass the sharing of data clouds, **integration of**

applications with the chosen platforms and all aspects of secure access and payment modalities.

Leadership

Without a new organisational structure that can implement the required changes, the full value of the Future Internet will not be realised. It will require a cross-departmental **leader position to align the 'levers' and to ensure full implementation** of the policy. At a national level, the leadership would need to be at Cabinet level and would encompass not only political leadership but also technology leadership. At a city level, it would mean the **creation of a CIO+ role** to drive through the required changes and realise the massive opportunities.

John Varney
Maximum Clarity Ltd

- Understanding of the pressure points and potential bottlenecks if infrastructure roll out stalls or falls far behind development of services
  - Development of a realistic roadmap of network roll-out is essential

- Creation of appropriate collaboration environments to allow co-creation and crowd-sourcing

- The UK has a poor record of investing in Internet technology start-ups (e.g. compared with US). How will the Catapult help this?

- Establishment of support environments for digital economy entrepreneurs (along the lines of the US Plug and play centres) http://www.plugandplaytechcenter.com/

- How to create a patient funding community. Too many UK VCs are looking for exits that are too early. By contrast Silicon Valley VCs are prepared to nurture technology start-ups, concentrating on refining the technology offering and looking for successful partnerships.

- Production of a guide to using Platform As A Service offerings to avoid up-front spending on hardware would allow many entrepreneurs an opportunity to test ideas without large start up costs (and thus avoid the need to waste valuable time looking for funding) I have an example of this from the US I can talk about if there is interest

- The rise of the second screen is an incredibly important development in TV - tying together the linear with the non-linear, broadcast with synchronised web delivery and narrow family viewing with broad social TV. This is one of the most exciting developments in the space in almost 2 decades and a fertile ground for new initiatives

CDEC Workshop in ICT May 2012

In February 2011 HP submitted input to the TSB on the need for a technology and innovation centre in information and communications technologies. While the name has changed since then, what was called a TIC is now a 'Catapult Centre', and the innovation centre in ICT has been scoped as addressing the 'Connected Digital Economy', our position is unchanged: HP, the UK ICT sector, and the industries that use ICT can benefit much from the presence of a strong centre of innovation in ICT, provided that a number of conditions are met. Our input to TSB in response to the initial consultation in February 2011 is included below, and we believe that much of it is still a valid now as the new centre is being established.

Much has been discussed on the industry funding model for the catapult centres. The formula is for central government, competitive national and international programmes, and industry to each make up a third of the centres resources. We think that this is entirely viable funding model for a successful innovation centre which is delivering value to UK business and industry large and small. The question is not whether it's the right model, but how to get there. One view, which seems to have been articulated both from the academic sector and from some parts of central government, expects the ICT industry to allocate funds in advance to allow the centre to build up capacity and fund research projects. We don't think this is the right, or even a viable, model. The key resource of the proposed CDEC is its innovative people who must be technology leaders in themselves – until the centre is running, how can the ICT industry make a rational decision to spend money with it - unless of course the primary purpose of providing funding is marketing and visibility. And why should the only source of industry funding be the ICT sector? In all likelihood, the biggest benefit to the UK economy of the next round of the Internet will be to the sectors that use ICT in the most innovative ways and a CDEC should seek as much funding from the users of ICT as from the supply side.

More importantly, the real issue is the one of 'chicken and egg'.   What comes first – industry or central government funding? I met recently with a professor from one of the Fraunhoffer centres in Germany and over dinner we discussed where the money came from. Central government (and in his case, regional) funding enabled the establishement of the centre around a fairly focussed topic and enables the centre to develop its people and technological capacity. Competitive funding from National and particularly European schemes enabled collaborative programmes with partners and consortia in important growth areas. Industry funding followed on specific targeted applied or advanced technology efforts on a bilateral basis between the centre and it's 'customers'.   This is the model that we should apply to the CDEC. Central government funding to get started, a focussed and deliberate attitude towards the use of Framework Funding from the EC (now Horizon 2020) to fund collaborative programmes in key areas and to build the industrial partnerships out of which the bilateral research contracts can will develop. The shape of the new H2020 programme is very aligned with the CDEC and we would welcome the opportunity to collaborate in some of the areas outlined in our earlier submission. CDEC is an opportunity to transform UK's presence in these

programme to one that sets the agenda in ICT and uses it for industrial, not just academic, advantage.

As the new CDEC scope is defined, we are concerned that it is too wide. The strength of the creative sector in the UK economy demands its own focus in technology innovation. The vital role of ICT in services across all sectors demands a focussed centre of its own. Other opportunities have tremendous potential. One can argue (and we have) that Security of internet infrastrucutres and internet services can be a huge potential business for the UK. How can this, and other important areas with huge potential, grow to cricital mass in an centre with a scope as large as that defined fort he CDEC? Remembering the argument of the Hauser report which aregued for Fraunhofer-style innovation centres and stressed concentration of effort and focus on critical areas, we in HP labs are concerned that the CDEC might be in danger of being a collection of many disparate projects, not a nationally and internationally visible leader in a few key ares.

In HP we look forward to the establishement of the new CDEC and hope for much fruitful collaboration, and believe that in time it will become an effective and valuable resource.

Nick Wainwright, HP Labs.

Hewlett Packard input to the TSB on the need for an Innovation Centre in Information and Communication Technologies
February 2011

HP believes that the TSB should create a Technology and Innovation Centre in Information and Communications Technologies. HP has had a research lab in the UK for over 25 years and we think that the UK is a good place to do technology research and innovation in ICT. We believe the UK is positioned well to benefit from and lead the changes that the next phase of the Internet will drive across the breadth of the UK economy and even globally, however we believe that the TSB should consider carefully the focus, skills, funding, and location of a TIC in ICT to ensure that the investment delivers new value and is not simply an extension of the status-quo in ICT research in the UK. In this input to the TSB consultation we lay out the opportunity that we believe an ICT TIC should address, outline some of the key areas of growth that it should focus on, and describe some of the critical factors that must be addressed to ensure that a new ICT TIC achieves its potential for impact.

The case for a Technology and Innovation Centre in ICT
The prospectus for the TIC published by the TSB identifies the aims of the new TICs as to

- Provide businesses with access to world leading technology and expertise
- reach into the knowledge base for world-leading science and engineering
- be able to undertake collaborative applied research projects with business

- be able to undertake contract research for business
- be strongly business focused with a highly professional delivery ethos
- create a critical mass of activity between business and the knowledge base
- Provide skills development at all levels.

HP is the world's largest technology company by revenue and has created leading edge innovative products and services over a history stretching back half a century. HP has a very large presence in the UK, with over 20,000 employees delivering IT systems and services, HP products on the high street and online, and our HP Labs strategic research centre located in Bristol in the UK is at the heart of HP In the UK. HP Labs is the company's long term research arm and develops technologies and systems critical for the future of the company and our customers. The HP Labs facility in Bristol been established for over 25 years and has a worldwide responsibility for HP's research into cloud systems and information security as well as imaging and display technologies.

In HP we believe that ICT and Internet technologies will continue to create new value disrupt business models and generate new opportunities in the future just as they have in the past. The UK has not perhaps captured as much of the leadership in the Internet technology sector as we would have liked, particularly in the computer and communications software and hardware sectors, but the ICT sector has a habit of rapidly displacing existing strong players and concentrations of power in favour of disruptive new entrants.

Looking to the future we see more disruptive changes on the horizon; to services, devices, systems, and software, creating even wider opportunities for application of Internet technology than in the past. We believe that concentrating significant capacity for ICT innovation into an ICT Technology and Innovation Centre will give the UK the ability to capitalise on these opportunities. For HP, we hope to see an ICT TIC that can be a significant research partner for us over the next decade with greater capacity and impact through concentrated funding, people, and knowledge; the centre of a real ICT knowledge cluster. The ICT industry is fickle, the industry leaders of ten or even five years ago are challenged by disruptive new entrants, new competition, changing business models (look at Microsoft, Cisco, or Nokia today). An ICT TIC could make a real difference to the position of the UK in the world in ICT but to do so it must focus on the growth areas of the future, not those we missed in the past. The growth areas of the future will be the application of ICT into every aspect of business, industry, environment, and services.

Future opportunities for technology-led innovation through ICT

The Internet's global reach, massive scale and open markets create tremendous opportunities for business and citizens powered by a technology industry that has seen huge growth and new businesses and business models emerge over the past 30-40 years. Information and communication technologies have changed so many aspects of life and created so many new technology businesses that it has become something of a mantra to reel off a list of transformational technologies and technology driven services that have arisen from the Internet over the past thirty years. Wireless, cellular telephony, search, web, online shopping, app-stores, location services, digital media, and today's favourite, Facebook to name just a few. ICT's have transformed business operations, customer service, logistics, customer relations, marketing and advertising, creating new ways to do business, new business opportunities, and driving operational efficiencies across entire sectors.

In HP, we believe that new opportunities, more transformation, continuing disruption to the business world, new benefits for consumers, employees and citizens and new opportunities in the

technology industries will continue to occur over the next ten to twenty years. These opportunities are driven by some deep underlying shifts in the ICT landscape: away from software, computers, specialised IT departments and IT professionals towards a world where everything is available as a service and usable by everyone in their life and work; a shift from specialised devices such as PC's and TV's towards a world of Internet services available through a rich spectrum of devices, displays, and interfaces that we own, borrow or just use because they are just 'there'; and perhaps most importantly, the embedding of 'Internet' across all the service sectors in the economy, energy, transport, retail, media, government, environment, waste; a shift to the Internet powering both core services and at the same time providing consumers with rich ways to interact, control, influence and benefit from 'Internet style' interaction.

It's this 'Internet style' approach to innovation that is most beguiling – the scale and openness of the Internet; it's reach into every sector of our industry and every aspect of our lives, and at the same time the idea that three students in a garage can come up with 'the next big thing', changing industries and business models by some clever re-jigging of services and insight into how the Internet generation behaves. These stories that catch the headlines, behind them are many valuable innovative services, components, and systems that drive them, providing the technology, services, and systems on which these new businesses are founded.

Focus on the next high-growth areas for ICT

An ICT TIC must focus on the growth areas for the future; we believe that the areas outlined below must be at the centre of the ICT TIC's growth strategy.

A transition to services. The world is changing to one where ICT is consumed as a service, not as products. The challenge for an ICT TIC is to see this ICT services sector as high-tech, high-growth with global business opportunities. Fully 80% of the UK ICT industry is now a services business. Companies are shifting from buying ICT products and running themselves to consuming ICT as a service. New 'Internet services' are displacing traditional software offerings. Consumers buy services through smart phones and PCs. The service sectors such as retail, energy, transport, and so on, will be transformed and disrupted not by products that they will buy and deploy themselves but by new Internet services that will be deployed and run by others. An ICT TIC must have a deep understanding of this transition to services, must be able to spin-out services business and be able to help companies benefit from it.

Exploiting the value of data. The new Internet opportunities will be built on data, huge quantities of it from a vast array of different sources. The ability to extract value from this data will be vital to the growth industries. It's easy to imagine that Google will have scooped up all the data and there will be no space for new value here, but looking ahead five to ten years nothing could be further from the truth. Data from sensors, from business operations, from citizens, from the environment must be managed, analysed, and exploited. Information governance makes new demands on data-owners. However the value will be in the application of the technology to other industries. An ICT TIC must be able work across the breath of the economy creating opportunities for all sectors to exploit the value of data using innovative new services and approaches.

ICT embedded in the physical world. Hitherto we have experienced ICT through PCs and more recently smartphones. An area for future growth will be both the sensor systems that provide the intelligence about the real world, whether homes, roads, buildings, energy systems, environment, and the systems through which we interact with services, such as displays, haptic interfaces, and the

like which will interact seamlessly through gesture, voice and other natural means as well as through the devices we carry. An ICT TIC must address this opportunity in a way that delivers value across a range of industries and applications, not as an interesting experiment and research area on its own.

Internet Infrastructure – Our Internet infrastructure will undergo huge changes in the next ten years as massive growth in applications, devices, and users as the more of the population of Asia and Latin America get online and new services and embedded ICT become pervasive. ICT infrastructure technologies are in a period of convergence as communications, computing, and storage technologies come together as 'internet infrastructure'. An ICT TIC must choose it's path carefully in this area, given UK weakness in computing and communications hardware and software industries, nevertheless there will be opportunities in this area, perhaps through specialisation in key areas – sensor networks, or security for example could be areas of real leverage and links to UK expertise.

Success factors for an ICT TIC

Location: An ICT TIC must be located where it can be the centre of an 'Internet business cluster'.
The location of an ICT TIC does matter. Just as manufacturing technology centre benefits from being close to the industries it serves and the skills base it is built on, an ICT TIC must be close to the services sectors that it will address and the ICT people and knowledge that it will draw on. ICT industries are global. Easy access to Heathrow is essential. London and the M4 corridor have a strong case; other locations would have to make a similarly strong case.

People: Attracting the best people means thinking about where they go after the TIC. A TIC should aim to be a centre and environment for outstanding technologists and innovators to work and network with technologists and business with a value system that recognises and rewards innovative technology and business outcomes. It should not be the case that staff coming from the academic sector should be obliged to publish continually for the sake of their future careers while at a TIC.

Funding: The third coming from industry should be new funding and from a range of sources.
The UK industrial research base in ICT is small. HP, Microsoft and BT are the main industrial research organisations in the sector, all working closely with some outstanding university based expertise. Some contract research is carried out more widely, but historically the contract-based research model that has worked well in technologies closer to physics and devices has not worked well in 'systems' technologies, and the success of UK academics in bringing in EC funding in ICT is not matched in general by UK industrial participation. An ICT TIC should cast the funding net wider, and aim to build new funding partnerships and contracts both with ICT sector industries and with end users of the new ICT technologies in other sectors, particularly the service sectors. Contributions in kind from the existing industrial research base would not have the innovation outcomes we aim for.

Innovation: This is as much about innovation using ICT as it is innovation in ICT.
Conventional wisdom targets high growth start-ups as the target output of innovation centres. In ICT the opportunity is to target the entire digital economy, particularly the services sectors, not just the technology sector. This means working with large industries and corporations to transform their operations and bring the benefits of ICT innovation to them. Sometimes it even means disrupting them though technology. Many of these companies are HP customers, and our experience is that they are crying out for innovative ICT solutions to their problems.

Skills: An ICT TIC should emphasise 'Systems Thinking' and foster 'Internet Style' technologies.
The opportunity for an ICT TIC to create real value lies in applying Internet-style technologies and

skills to a wide range of problems. This is not about algorithms and point technologies; it needs architecture and systems thinking applied to real problems. To be successful it must take a 'big picture view' over the developing impact of the Internet to the sectors that it targets and in doing so it could provide some needed leadership, insight, and expertise to them .

Focus: **Don't confuse an ICT TIC with TICs addressing Digital Media or Semiconductor Devices.**
The UK has a strong creative industries sector and a case can be made for an innovation focus there but it's not the same as a TIC addressing systems technology focused on the opportunities we have described above. Similarly, the UK has a good base in semiconductor devices, and a similar case can be made there. There are obvious synergies but we should not imagine that a Creative Industries TIC or a Digital Devices TIC will have the kind of systemic impact that we would like to see from an ICT TIC.

Wireless: The opportunity to apply Internet-style ICT into every aspect of our economy absolutely requires a high speed and pervasive communications and wireless infrastructure in the UK. Indeed, the opportunity would not exist without it and as our economy relies more on the Internet it will even more critical. Wireless is like the M25. We put it in, it transformed the landscape and as a consequence we need even more deployed capacity. However the innovation focus must now turn to the deeper application of ICT in the economy, we should not conflate wireless infrastructure deployment with the opportunities available by applying ICT broadly. If the focus for an ICT TIC is wireless, it will miss the point. The communications industries have not been the innovators in applications and there is no reason to believe that they will be in the future. The application of ICT into new areas will drive demand for more wireless, not the other way around.

Connected Digital Economy Workshop
Oxford Internet Institute
May 2012

Notes/thoughts from Evelyn Wilson (Director, the Culture Capital Exchange and co-Head of Knowledge Exchange Curation, Creativeworks London (AHRC hub)

Connected. How might we think about the notion of 'connected' in a more fruitful way and what could that contribute to the CDEC. e.g Community, Network, Trust, Collaboration, Hanging out, Friendship, Visible and Invisible Connections, Power Connections, Deep Connections, Distributed Connections, Loose Connections, Global, Local and so on.

How best to use the CDEC to creating stronger networks between thinkers, researchers, technologists, creative content producers and those who are concerned with change, development and innovation regardless of whether that is for economic gain.

How can the knowledge and outputs that this generates, given that is publicly funded, be made publicly available or accessible? How might we ensure that the public purse doesn't purely pay for private gain.

Therefore, how too might or could the CDEC help with wider social and global concerns beyond economic gain. What kinds of 'growth' do we need to be thinking about that have the potential for the significant public or social benefits. Why not 'change' as well as 'growth'.

How might the CDEC help different configurations of people to work together in new and unexpected ways and what mechanisms would need to be put in place to help this a. to happen and b. to utilise the unexpectedness to best effect.

Does the CDEC seem routed in the language of enterprise and therefore somehow intuitively anti-innovation.

At the same timet here is tremendous potential for it to be really dynamic and exciting. How might we work to construct a really brave approach to the partnership itself that needs to be put in place. A need to look beyond the usual suspects and an opportunity to meld new and unusual collaborations from the onset. What might that look like. How can non strategic partners best be incentivised? People may be fearful of exploitation or sceptical about the motivations of the CDEC. How to best mitigate against that.

Small versions of what the vision for this CDEC appears to be are already happening and they are right at the start of the innovation or technology curve. The rise of the 20% or 30%. Free time What if those collective efforts became the Catapult instead of the proposed model of 'strategic' (read 'big' partners) and then lots of little players. Might this be a more rich (if practically complicated) method of creating a more fertile environment that can multi-task in the generation of diverse innovations that have multiple sets of benefits? (Does the Catapult have a 'heart'?)

How to best animate/create imaginative content, solutions and practical applications for various cornerstones of the CDEC; respectively a. media convergence and multiple delivery b. mobile commerce c. the Internet of things (the agency of things).

Through which processes and by bringing together what sorts of partnerships might the CDEC support those working in fields as diverse such as programming, creative content generation,

technology developers, curators, healthcare professionals, educationalists, retail managers, architects, designers etc need now so that they can 'innovate' in their respective fields. What types of connectivities do we need. New labs for change

Post Facebook. Smaller networks that have money, choice and are mobile.

Creative and Digital Economy: A New Fusion

Prof. Gillian Youngs, University of Wales, Newport

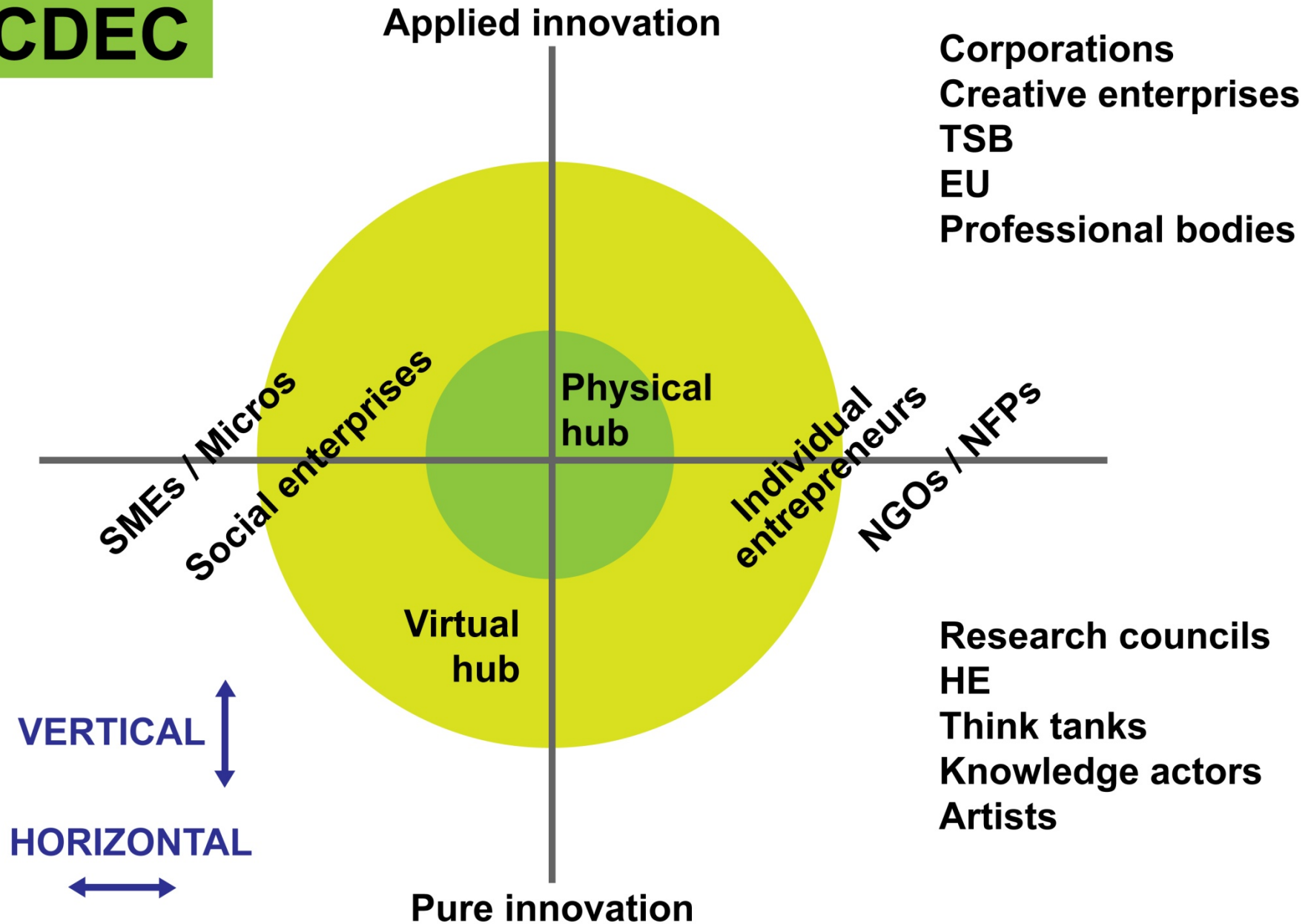Email: gillianyoungs@newport.ac.uk

Innovation: Key Challenges

- Harnessing the **full** and **integrated** potential of: technological and creative capacities, skills and processes; human-centred power of creative and digital economy; new relationships across corporate, SME, micro and graduate start up sectors; fresh research and applied synergies across HE (disruptive interventions); social and horizontal transformations in economic ontologies

Gillian Youngs, University of Wales, Newport. May 2012

2

Creative and Digital Value

- Value needs to be revisited, opened up and reconceptualized because:

- Economic structures and processes feature new characteristics, drivers and settings for innovation

- Ideas are more democratic than capital

- Multimedia intensity reframes real experience and reach (deep space/time connectivity)

Gillian Youngs, University of Wales, Newport. May 2012

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Gillian Youngs, University of Wales, Newport. May 2012