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**RUDQ?**

**DIGITAL SKILLS: CRISIS OR OPPORTUNITY?**

THE RT HON THE LORD MAYOR OF LONDON ALDERMAN PETER ESTLIN



Ladies and Gentlemen,

With Christmas still fresh in our minds, I'd like to begin by describing a situation that might be rather familiar. Imagine that you are sat at a table, with a jigsaw puzzle spread out in front of you. So far, so good. All the pieces are there... or are they? Before you can pull the pieces together, you need to know what the big picture looks like.

My suggestion is that we face much the same situation regarding digital skills training in the UK: we can see all the pieces, but the big picture is harder to ascertain.

Some of you will know already that my theme, as Lord Mayor, is "Shaping Tomorrow's City Today." My team and I will spend the year highlighting initiatives and activities currently taking place, as well as developing new initiatives and activities to close the skills gap. The point is to shape the future, rather than letting the future shape us.

Over the year, we'll be "Shaping Tomorrow's City Today" by:

- promoting the innovation and technology that help our economy to thrive;
- championing the digital skills vital for our future; and
- addressing digital and social inclusion, working towards opportunity for all.

This evening's lecture will focus on the latter two of these aims: championing the digital skills that we all need to live and work in the 21<sup>st</sup> century; the digital skillset that will be a critical enabler for a thriving economy; the skills that will allow us all to make the most of the digital era; skills that will be essential for an inclusive society.



The arrival of the digital era is widely regarded as the “Fourth Industrial Revolution.” Britain pioneered the *first* industrial revolution; the *fourth* presents us with an opportunity to lead the world again. However, brave and bold action will be required to ensure that this is indeed an opportunity rather than a crisis.

To set the scene for this lecture, I’d like to begin by taking us back to the industrial revolutions of the 18<sup>th</sup> and 19<sup>th</sup> centuries. Then we’ll look at the situation today, particularly a 2016 report by the House of Commons’ Science & Technology Committee, titled *The Digital Skills Crisis*.

In the second half of the lecture, I’ll touch on some of the initiatives that are addressing this “crisis” and I’ll explore what additional measures we can take to fully leverage the “opportunities” of the digital era. At the end, we should have time for questions.

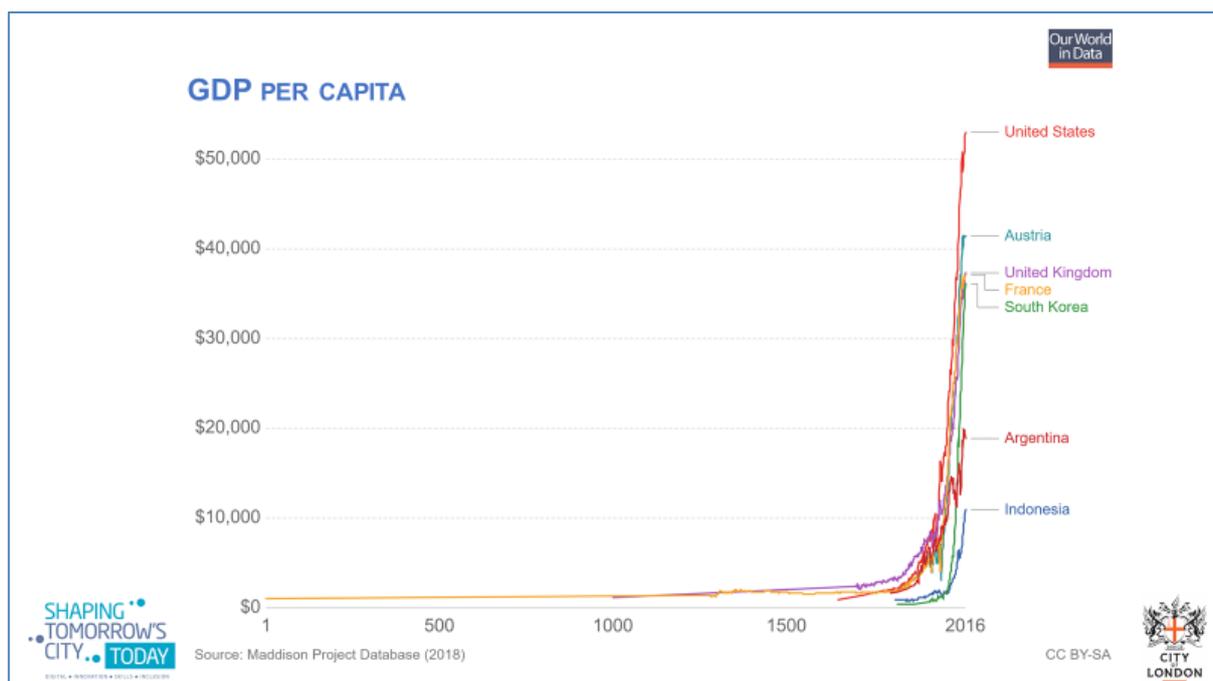
## The Industrial Revolution

In the late 18<sup>th</sup> century, the UK was the birthplace of the First Industrial Revolution.

People often joke that I talk a lot of hot air. Well maybe I do, but let’s not forget the importance of hot air. For it was hot air, or more precisely steam, that allowed the first industrial revolution to happen. This was a revolution of steam power, machinery, factories: the arrival of modern methods of production; the migration from manual forms of manufacturing to machine-led automation. Textiles were the dominant industry and workers needed physical skills – basic mechanical engineering skills – to handle the increasingly powerful machines.

Among the major developments at that time, automation led to industrial-scale printing. As a result, the world of publishing flourished – books, newspapers and pamphlets – coinciding with significant increases in literacy levels.

By the end of the nineteenth century, manufacturing processes had become more refined and more efficient. What followed was the Second Industrial Revolution, when better engineering and automation released workers’ bodies – requiring, instead, their minds to manage processes now at scale. The mass manufacture of steel, for example, following the invention of the Bessemer process at Ironbridge, and the greater use of both chemicals and electricity led to significant industrial growth. Indeed, while the industrial revolution started in England, its impact included exponential growth in GDP per capita across most continents, but most notably in Europe – and, later, the US.



Source: Bolt, Jutta, Robert Inklaar, Herman de Jong and Jan Luiten van Zanden (2018), “Rebasing ‘Maddison’: new income comparisons and the shape of long-run economic development”, Maddison Project Working Paper 10. Via: <https://ourworldindata.org/grapher/maddison-data-gdp-per-capita-in-2011-us-single-benchmark>



The nineteenth century also saw a massive increase in population. England’s population nearly quadrupled within a century: from 8.3 million in 1801 to 30.5 million in 1901.<sup>1</sup>

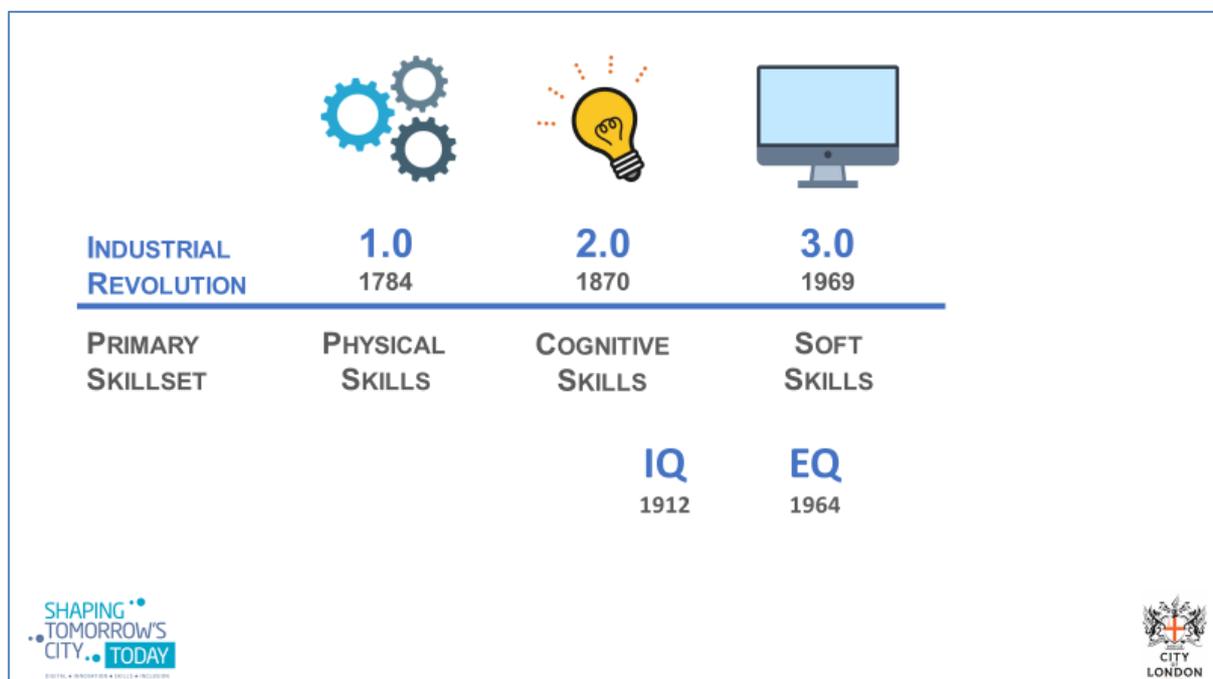
Educating this increased population became a priority to provide educated labour, to prevent civil unrest and to raise living standards. So, in 1870 the Elementary Education Act was introduced – the first of a series of Acts over the next thirty years that brought about compulsory education, first at primary level and later, at the turn of the 20<sup>th</sup> century, at secondary level.

Policymakers knew that a national education system was needed to produce “knowledge workers” for the new economy. Academic success gradually became the hallmark and, by and large, a precondition of a successful career.

Early in the 20<sup>th</sup> century, a German psychologist, William Stern, recognised the importance of knowledge and cognitive skills and developed the concept of IQ. Stern proposed IQ – or “intelligence quotient” – as a measure and comparator of human intelligence. This became an educational framework that was used extensively throughout the 20<sup>th</sup> century.

As the century progressed, economic growth was underpinned in the UK by the development of financial markets to facilitate industrial expansion. Strong legal, professional and cultural foundations enabled entrepreneurs to flourish and a consumer society to develop. As such, the UK shifted towards a service-based economy. By the 1960s, the UK was experiencing its Third Industrial Revolution: the Computing Revolution.

The confluence of these two developments – that is, the proliferation of powerful computers and the shift to a serviced-based economy – meant that, again, a different skillset was required in the workplace. Work involved increasingly nuanced personal interactions, more complex processes and negotiations, often within more sophisticated national and international organisations. Skills like communication, empathy and leadership grew in prominence. These “soft skills” were not so much “quantitative intelligence,” but “social intelligence.”



In 1964, Michael Beldoch of Cornell University published a paper about a new concept: EQ, or “emotional intelligence quotient.”<sup>2</sup> But the concept wasn’t popularised until 1995, when the science journalist Daniel Goleman wrote about the impact these “soft skills” had on business performance. Goleman concluded that emotional and social skills like empathy, listening, influencing and leadership, were twice as effective in business performance than IQ alone.<sup>3</sup>



EQ did for the soft skills what IQ did for knowledge and cognitive skills: it provided a framework and a focus around which new education and training programmes could be developed.

## The Digital Era

Now, let's turn to the 21<sup>st</sup> Century.

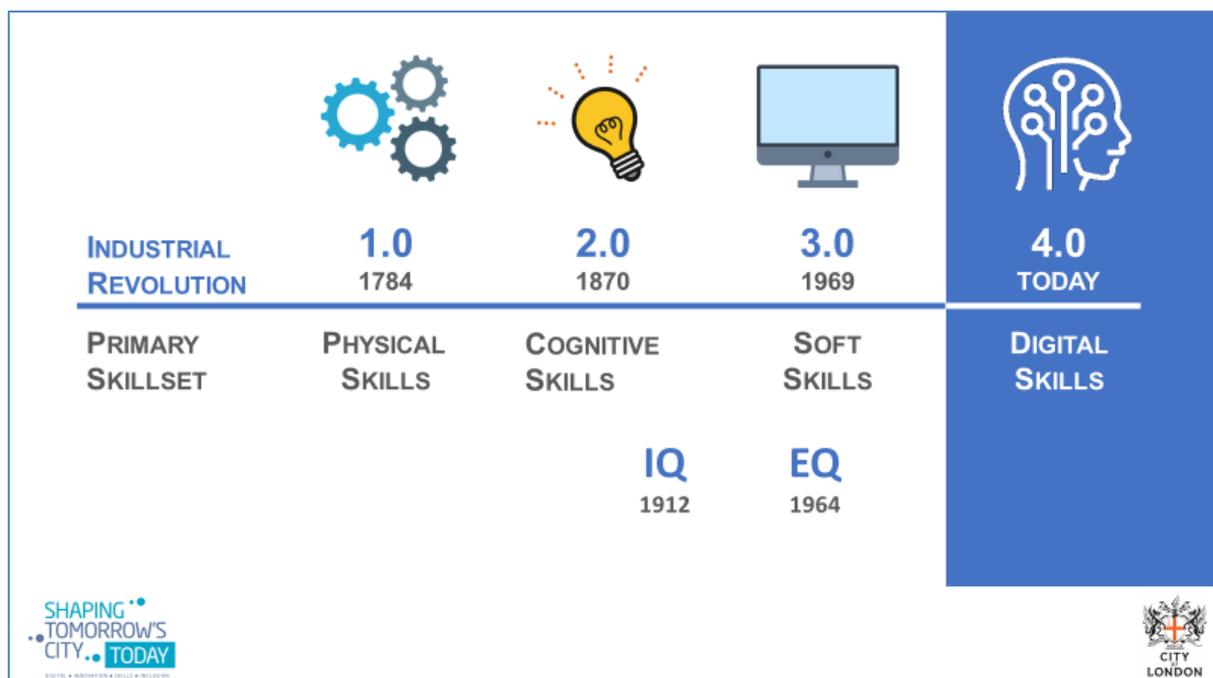
We are, without doubt, in the midst of the Fourth Industrial Revolution. The boundary lines between different industries are becoming blurred, just as our physical, biological and digital worlds are fusing together.

The economy and, indeed, life in general are rapidly advancing towards a world of AI, Big Data, quantum computing, nanotechnology, the Internet of Things and many other technological innovations. Much of our day-to-day lives are now spent online, from shopping to news, from health services to entertainment. Digital has become the new norm.

The UN agency for Internet and Communications Technology has calculated that more than half of the world's population is now online.<sup>4</sup> They also estimate that this is likely to rise significantly over the next ten years, bringing disruption and risk as well as opportunity to everything we've inherited from the pre-digital age.

I'm sure we've all seen the newspaper reports about how automation will take jobs away from people. I certainly took note when I saw my first profession, accountancy, near the top of the list of jobs to go. Similar worries existed in the early 1800s. The Luddites sought to destroy manufacturing plants for fear of job losses: an understandable fear, but it proved otherwise. Over the past 200 years, automation has skyrocketed, and yet today the UK is close to full employment with a working population that has grown nearly twelve-fold in the same period.

So perhaps we should actually be listening to those who predict that AI, augmented reality and other digital innovations will in fact create a net increase of jobs.<sup>5</sup> Of course, these will be new types of jobs, requiring new skills – skills that complement physical, cognitive and soft skills: Digital Skills.



Last year, the UK Government, in its *Digital Strategy*, reported that at least 90% of all jobs in the next 20 years will require digital skills.<sup>6</sup> Perhaps more importantly, we will all need digital skills outside of work too. Wealth is becoming less-and-less the sole measure of economic development. Although difficult to measure, economic



security, health and happiness are becoming more important barometers of societal progress. So we'll need the skills to keep us engaged, happy and healthy in a world that is becoming more digital by the day.

Let me give you an example. Our relationship with knowledge has already changed. When I was young – admittedly way back in the last century – I was taught to memorise information as well as develop my understanding of it. In so doing, I developed my cognitive skills. If I wanted to find something out, initially I would ask, then I would read from a book, accessed from a library – assuming of course they had it, or it wasn't out on loan.

But these days, if I want to find something out, I'd probably use Google from my smartphone or tablet. In fact, the challenge now is that there is too much information. So, these days, the skill is in accessing data, triangulating sources and discerning knowledge.

Andreas Schleicher, Director of Education for the OECD, has said that “Anything not built for the Network Age is falling apart.”<sup>7</sup> Now whether he meant our libraries, I'm not sure, but as we move further into the digital age, the evidence is building that we need to develop an appropriate set of digital skills.

### **Digital Skills: a Crisis?**

In the summer of 2016, the Science and Technology Committee of the House of Commons published a report on the UK's digital skills readiness, building on the earlier work of the Shadbolt and Wakeham reviews. This report made stark reading. Even its opening sentence gave cause for concern: “The evidence is clear that the UK faces a digital skills crisis.”<sup>8</sup>

What evidence were they were looking at?

Well, they were looking at the 12.6 million adults in the UK (that's 23% of our adult population) who lack basic digital skills, like finding information online, completing digital forms, or sending messages through a device. They were looking at the 5.8 million adults in the UK (9% of the population) who had never even used the Internet, in most cases because they didn't know how, not for lack of access. And the Committee was also looking at the schools without hardware, the teachers without qualifications, the job vacancies without skilled applicants, and the cost to our economy, at £63 billion pounds per year in lost GDP.<sup>9</sup> That's about 8% of government spending.

So the Committee was right: the evidence really is clear. It's widespread, too. McKinsey,<sup>10</sup> Accenture,<sup>11</sup> NESTA<sup>12</sup> and London First<sup>13</sup> have all drawn attention to digital skills shortages in the jobs market. The Government's white paper on the UK Industrial Strategy has highlighted the limited take-up and application of technology in business, particularly for SMEs. Meanwhile, last year's *Charity Digital Skills Report* revealed that 45% of charities don't yet have a digital strategy to outline their use of technology.<sup>14</sup>

On the face of it, then, we really are experiencing a digital skills “crisis.” However, it is often said that every crisis presents an opportunity. In this case, we are presented with an opportunity for the UK to do what the UK does best: innovate.

The *Digital Skills Crisis* report clearly articulated the scale of the challenge. It also indicated the urgency: after all, the pace of change today is considerably faster than the pace of change in the 18<sup>th</sup> and 19<sup>th</sup> centuries and, I suspect we would all agree, continues to accelerate.

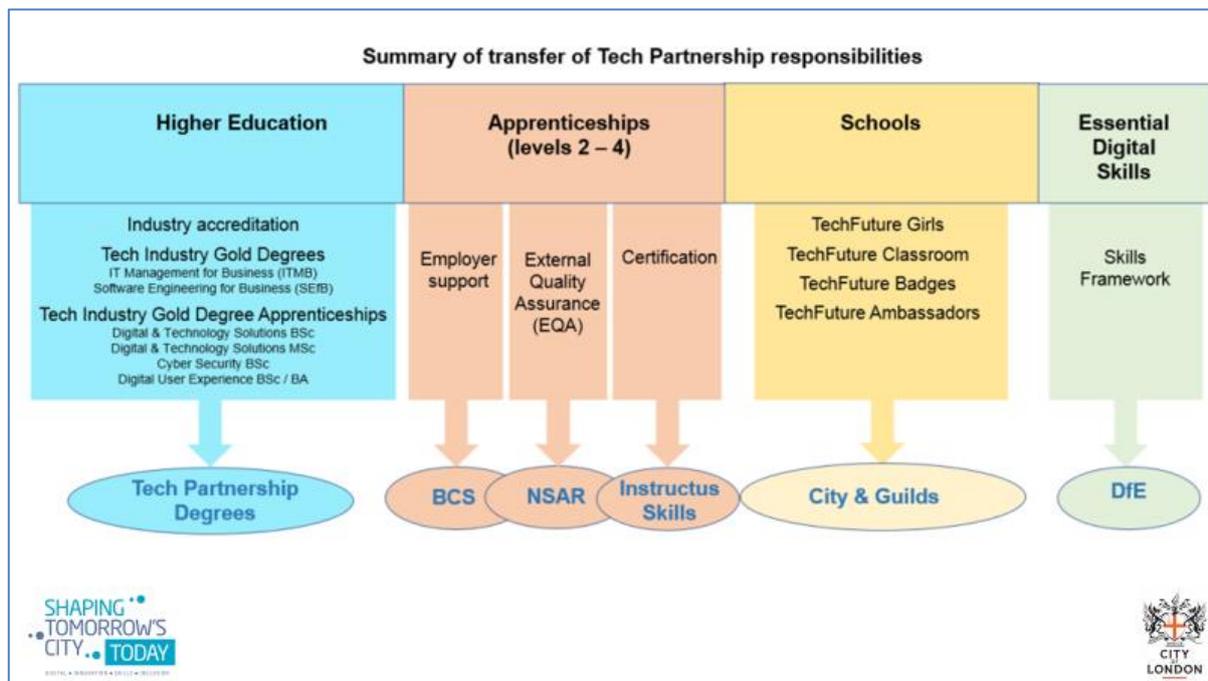
So what is being done?

The report recognised that actions had been, and were being, taken to develop a more digitally skilled workforce, with a focus on the need to broaden our education system. For example, computing has been introduced to the national curriculum, there has been a drive for more technical apprenticeships, and digital skills colleges have been launched.



However, the report also warned that “only urgent action from industry, schools and universities, and from the Government can prevent this skills crisis from damaging our productivity and economic competitiveness.”

Until a few months ago, the Tech Partnership drew together a programme of digital skills initiatives aimed largely at those in education and not yet in work.<sup>15</sup> The Tech Partnership, however, has now been disbanded, and its programmes have been passed over to separate organisations to continue with their delivery.



Source: Tech Partnership, “Tech Partnership Legacy.” Available at: <https://www.tpdegrees.com/tech-partnership-legacy/>

One of those actions was the publication of a guide to *Essential Digital Skills*, a document that sets out the five basic skills identified by the Department for Education in collaboration with a number of businesses and educational organisations.<sup>16</sup>

Underpinned by what the guide calls “Digital Foundation Skills”, the five basic skillsets are:

- Communicating
- Handling information & content
- Transacting
- Problem solving and
- Being safe & legal online.

However, the *Essential Digital Skills* publication – useful though it is – does not offer a comprehensive framework that can guide and advise us in how to develop skills and access capacity.

The Tech Partnership and the organisations behind the *Essential Digital Skills* report were not alone in trying to address the challenge that I’ve been talking about. London First, a London business membership organisation, highlighted these same issues in their recent *Employment and Skills Action Plan*.

Meanwhile, there is already a wide array of training materials and programmes in digital skills. Many businesses run MOOCs – or “massive online open courses.” Barclays, for example, has LifeSkills, a set of online tools and training courses for young people, parents, educators and businesses, helping to prepare young people for the modern workplace. So far, LifeSkills has more than 6 million users.<sup>17</sup> Local Authorities run similar schemes, often through partnerships with training providers like ADA, the national college for digital skills in Tottenham. Charities, too, are involved: Enabling Enterprise is just one example of an online skills builder.<sup>18</sup>



The problem is that these initiatives are fragmented. Like I said at the start of this lecture, it's as if we have all the jigsaw pieces, but no sense of what the big picture looks like.

Just as we had IQ and EQ in the 19<sup>th</sup> and 20<sup>th</sup> centuries, now in the 21<sup>st</sup> century we need a new framework for a far more comprehensive programme of education and skills development. What we need is a framework that sets out the need for these skills, clearly defines them, and then guides people to where they can go to develop them.

Furthermore, there has so far been an emphasis – particularly in the *Digital Skills Crisis* report of 2016 – on those who are “not yet in work.” Now, while that is economically the right priority, the report didn't consider “those already in work” or “those who have left work.” There is a tacit assumption that those currently in work will be helped by their employers, as part of workplace investment, keeping employees trained.

Yet the accelerated pace of change across the world and the fact that more and more basic services are being digitalised make it critical that we consider the needs of everyone, in and out of work. With nearly 20% of the UK's population over 65 – estimated to rise to 25% by 2046 – there is a need to ensure that these people (and I'll be one of them!) are also able to access appropriate skills workshops.

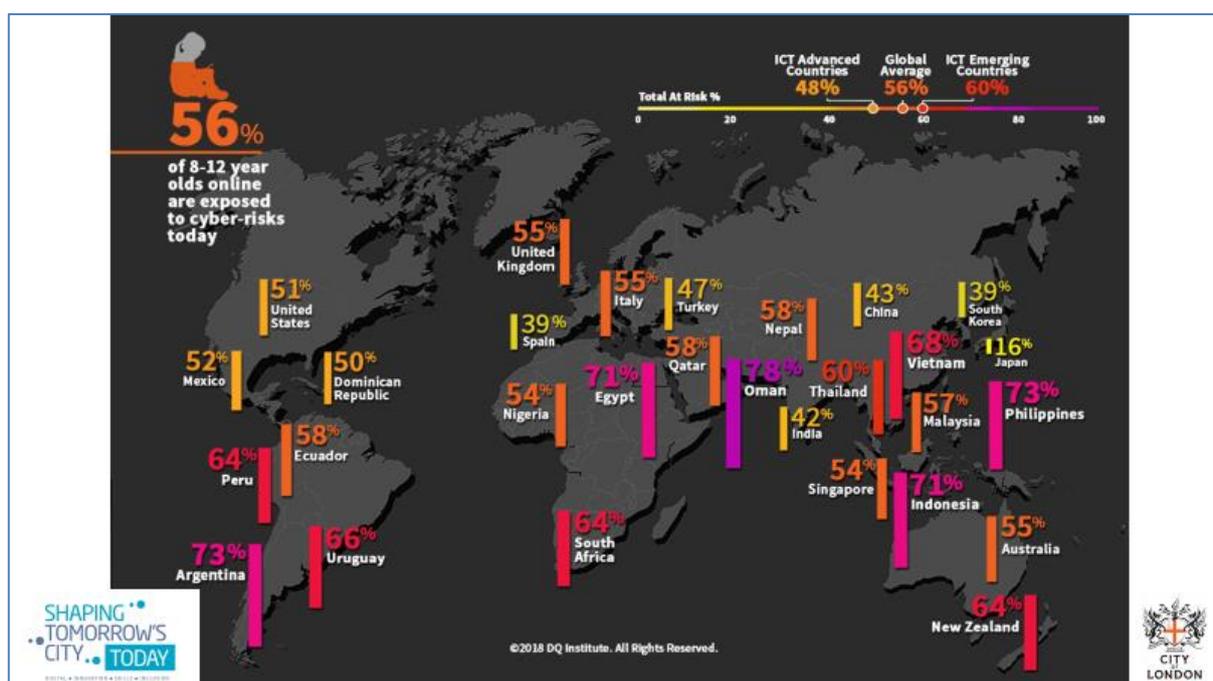
Again, businesses in some sectors have done some work in this area. Barclays's Digital Eagles programme, run from Barclays branches, empowers customers and local communities to be more confident with technology as we move forward in a digital world.

Whatever framework we eventually adopt as the best to equip the UK population with the skills required for the digital economy, surely it must be a lifelong system accessible to everyone. As I like to say, every one of us needs a regular skills MOT to remain a fully engaged citizen of the digital age.

This situation is not unique to the UK; it is a global challenge.

Back in the summer of 2016, as the *Digital Skills Crisis* report was being published here in the UK, Dr Yuhyun Park presented to the World Economic Forum two papers on the universal need for digital skills.

Dr Park pointed out that there is an abundance of initiatives out there to develop digital competence, particularly at specialist levels like digital creativity and entrepreneurship. However, basic digital skills – or what Dr Park called “digital citizenship” – receive far less attention.



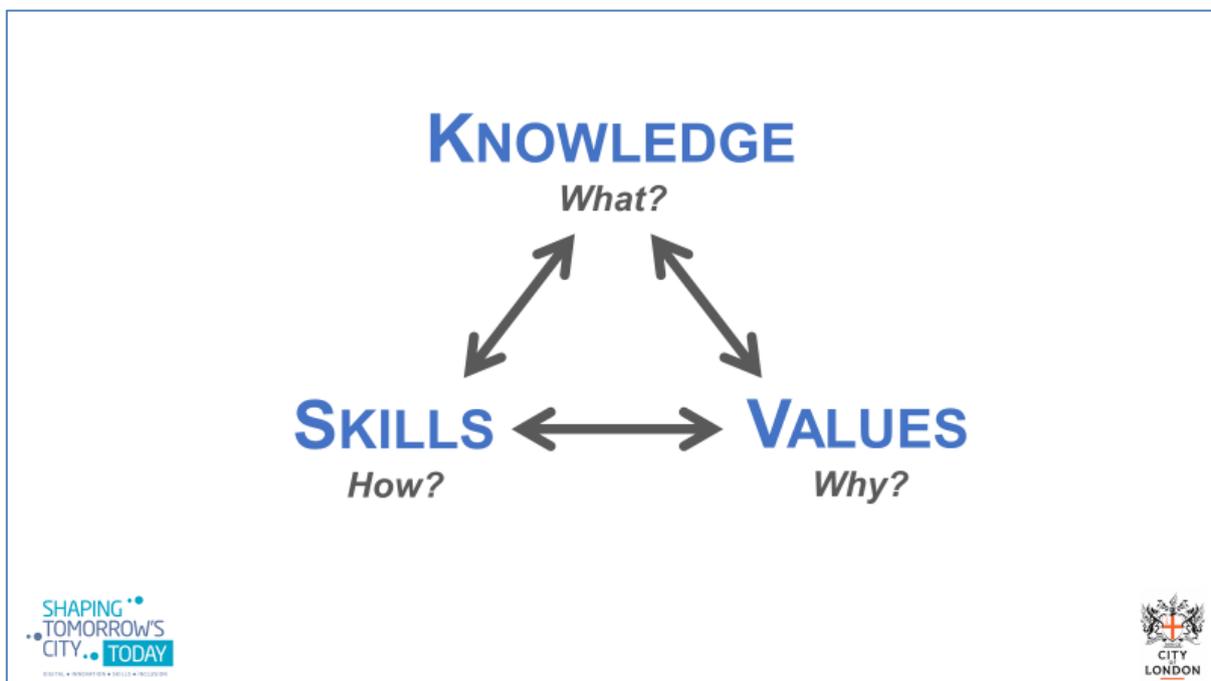
Source: DQ Institute, “2018 DQ Impact Report.” Available at:



Many young people are now “digital natives.” They use technology very differently to adults: a situation that itself creates a digital skills gap. Through extensive international research, Dr Park found that 56% of 8 to 12-year-olds are exposed to cyber-risks like cyberbullying, video game addiction, offline meetings, and online sexual behaviours.<sup>19</sup>

I’m sure that any parents or grandparents in this room will recognise the sense of dread on contemplating the threats from predators lurking online. On top of issues around protection and security, there are questions of safeguarding and mental health. This means that there’s a qualitative aspect to the digital skills debate. After all, no matter what role AI plays in our lives, surely our world remains a human one.

IQ and EQ are still important. We require knowledge and skills, and they need to be complemented by values. Values that will ensure the Digital Age works for us, and not the other way around. So, we need the ‘What?’, the ‘How?’ and the ‘Why?’ We need a framework that can equip people with the knowledge, the skills, and the values of the Digital Age: a framework that encourages adaptability and lifelong learning; a framework that allows individuals to position themselves within the knowledge–skills–values triangle and to pursue careers that suit them.



I’m a great believer in “non-traditional” career pathways – particularly apprenticeships. After all, the City and its Livery Companies were founded on the practice of training apprentices and ensuring that high standards were maintained in industry through rigorous and structured training of young people. A more multi-faceted understanding of digital skills will, I believe, provide momentum to the UK’s apprenticeship programmes and other “non-traditional” career paths.

## Digital Intelligence

Following the publication of her papers on the digital skills gap, Dr Park went on to introduce the concept of “DQ” – or “Digital Intelligence Quotient.”

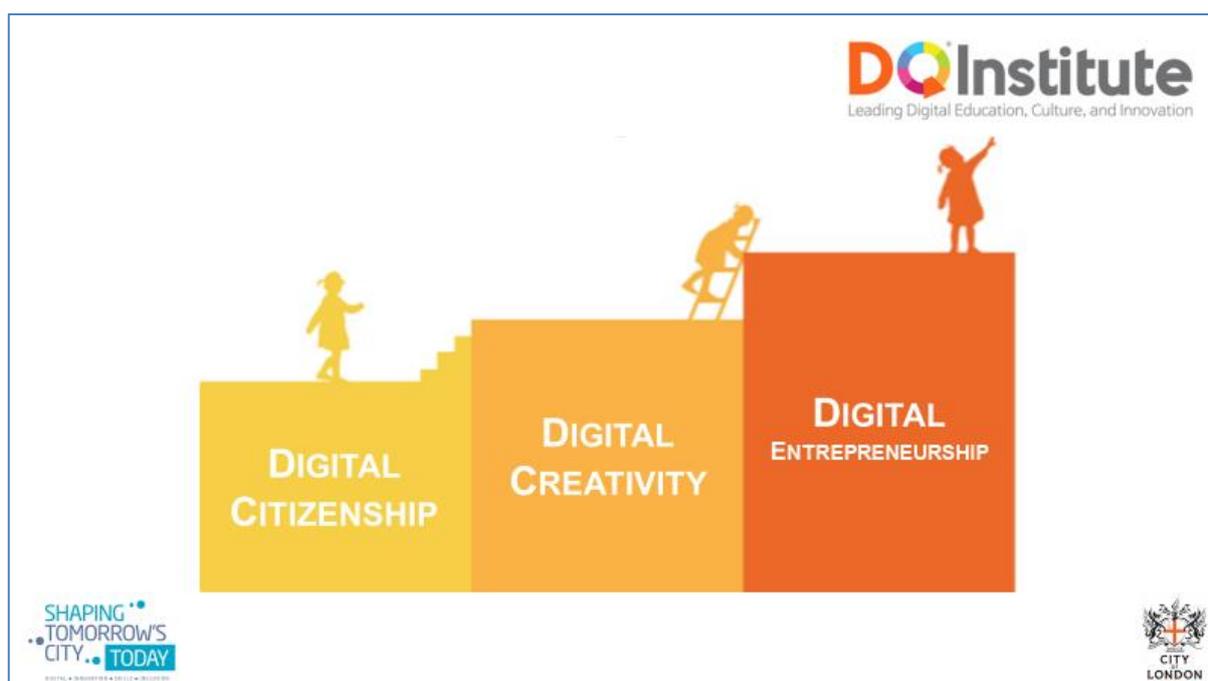


In the same way as Stern and Beldoch introduced IQ and EQ respectively, Park made the case for DQ to be understood as a framework, representing the sum of the social, emotional and cognitive abilities that enable individuals to meet the challenges of digital life and adapt accordingly. DQ was developed through analysing more than 20 of the existing global approaches to digital skills according to three requirements:

*Digital Citizenship* – providing a basic but necessary understanding in the use of digital technology in ways that are safe and responsible, applicable to everyone;

*Digital Creativity* – the ability to become a part of the digital ecosystem, to create content and turn ideas into reality; and

*Digital Entrepreneurship* – going even further, gaining the ability to use digital technology to solve global challenges and create new opportunities.



Source: DQ Institute, "What is DQ?" Available at:  
<https://www.dqinstitute.org/what-is-dq/>



On “Digital Citizenship,” Park identified 8 areas in which we all as digital citizens need to be competent: Digital Identity, Digital Use, Safety, Security, Digital Emotional Intelligence, Communication, Literacy and Rights. These 8 areas were subsequently referenced in the Department for Business, Energy and Industrial Strategy’s *Made Smarter* report of 2017.<sup>20</sup>



Source: DQ Institute, “What is DQ?” Available at: <https://www.dqinstitute.org/what-is-dq/>

The concept of DQ provides a universal standard from which a more comprehensive understanding of the need for digital skills can be developed. This allows us to build on existing initiatives and set out the actions we need to take. As a framework, DQ provides a basis for measurement and comparison, in the same way as IQ has been used until now.

I mentioned already the importance of Digital Citizenship for young people’s safety. Park and her team at the DQ Institute have demonstrated a relationship between a child’s DQ score and their online safety. As a child’s DQ score increases, so their risk of sharing personal data online decreases.<sup>21</sup> **The DQ Institute has already been working with the** World Economic Forum, the OECD and the Institute of Electrical and Electronics Engineers to share DQ around the world. They – and I – believe that digital skills must become a universal human right.

I’ve also spoken about the relationship between IQ, EQ and the various stages of the industrial revolution. But why did the Industrial Revolution begin in Britain, rather than any another industrially-advanced country? Historians have suggested that it related to Britain’s status as (then) the world’s leading commercial hub and its position within a politically-diverse Europe. Many different ideas were able to develop in parallel within a “marketplace of ideas.”<sup>22</sup>

What this tells us about the Fourth Industrial Revolution is that collaboration and exchange of ideas are, once again, crucial if we are to ensure that every citizen is to be given the opportunity to develop the skills needed for the digital era. As both the *Digital Skills Crisis* report and London First’s *Skills Action Plan* have recommended, industry, communities, educators and government must come together to innovate at scale. Britain’s historical role through the industrial revolution has set the precedent for how this can be done. Now, it’s time for us to come together again – but, this time, towards the digital revolution.

## Coalition for Digital Intelligence



As I have said, there are, already, many digital skills initiatives and programmes scattered across the public, private and charity sectors. Millions have been – and continue to be – invested in digital skills around the world. The question we must now ask ourselves is, “How do we coordinate these efforts?”

There’s also a question around how we make sure that digital skills are developed for everyone, and that we don’t exacerbate inequality. The needs of our younger generation – the digital natives – will be different to those of older generations. While the principles are the same, the application is different. As the speed of progress accelerates, we need to ensure that digital literacy keeps pace. As the science-fiction writer William Gibson has said, “the future is here it’s just not very evenly distributed.”

The most exciting opportunity, in my opinion, is the emergence of the Coalition for Digital Intelligence.<sup>23</sup> Though it is still at an embryonic stage, the Coalition seeks to provide a platform for organisations to coordinate their efforts to set global standards and share understanding for the advancement of digital intelligence.

In the UK, this could be the next generation of the Tech Partnership, making the most of the digital skills opportunity and facilitating collaboration between industry, educators, charities and government.

Over the next few months, as part of my mayoral programme, we will look to solicit interest in a UK Coalition for Digital Intelligence. This will have the following aims:

- to help organisations advance their digital intelligence;
- to promote a common understanding of digital literacy and skills;
- to define and disseminate best practice as well as usable metrics; and
- to highlight sources of funding and capability.

This was one of the key actions that emerged from a Digital Skills Summit held at the Mansion House last November. We welcomed 300 representatives from businesses, social enterprises, charities and local government to discuss the digital challenges that they face, and the opportunities for collaborative solutions. It was a really inspiring and productive day, and another step towards developing new partnerships.



The Coalition for Digital Intelligence is just one of the ways that we are looking to embed digital skills across the City of London Corporation’s diverse areas of activity. As many of you will already know, the Corporation represents the Square Mile and, by extension, the UK’s financial and professional services sector. In addition, as a local authority, the Corporation is responsible for the City of London Police, its schools and academies, open spaces – including Epping Forest and Hampstead Heath – and cultural institutions including the Barbican. That breadth of responsibility gives us lots of opportunity for partnerships through which we can promote digital skills.



One example is a curriculum pilot which is running with 165 students in Year 7 at City of London Academy Islington. Those students are engaging with both formal and informal learning activities to develop their digital skills. We recognise that to be innovative and inspiring, our schools need to be research-led, and they need to take risks in piloting new, original and collaborative approaches. We want to develop the behaviours and skills that employers want and which will prepare these young people for digital life. If successful, this pilot will be rolled-out to the City of London Academy Highbury Grove next year.

Another example relates to technological innovation and its applications. In the Corporation, we've been working on various work-readiness schemes – exploring, for example, the role of digital apps like “Workfinder” and “Placer” in supporting young people, from all social and economic backgrounds, to access meaningful work experience. These technologies match work experience opportunities with those seeking them: a UCAS system for work experience, if you like.

All of these activities are grouped under the Corporation's own *Digital Skills Strategy* which was launched late last year.<sup>24</sup>

## Conclusion

Ladies and gentlemen,

I hope you agree that there is a clear need for us all to embrace digital skills. I hope to have convinced you that we are not facing a crisis, but an opportunity – an opportunity to shape the future.

A fundamentally different skillset is needed for us to cope with, and thrive in, today's digital landscape. This skillset extends from basic digital citizenship skills – like accessing the Internet, sending a message or buying something online – to more advanced creative skills, like competence with augmented reality experiences, or entrepreneurial capabilities with AI and quantum computing.

Technical skills will need to be complemented by practical and social skills to avoid cyberbullying and address the mental health issues that are increasingly associated with the “always-on” digital world.

Similarly, our focus must not be limited to those not yet in work, the digital natives, but must include those in work and those retired from work too. We'll need to address the growing digital skills gap and achieve pan-generational digital inclusion.

And finally, success will require greater collaboration, idea-sharing and innovation – the same principles that catalysed the first industrial revolution in Britain. I believe that our next step must be with a UK Coalition for Digital Intelligence.

So, before we move into the Q&A, I have one question to put to you all.

RUDQ?

Thank you.

© Alderman Peter Estlin, December 2018



## REFERENCES

- <sup>1</sup> 1801 and 1901 Census data via <http://www.visionofbritain.org.uk/census/index.jsp>
- <sup>2</sup> Michael Beldoch, “The ability to express and perceive vocal communications of feeling,” in Joel Robert Davitz (ed.), *Communication of Emotional Meaning* 1964.
- <sup>3</sup> Daniel Goleman, *Emotional Intelligence: Why it can matter more than IQ* 1995.
- <sup>4</sup> ITU, *Measuring the Information Society Report* 2018. Available at: <https://www.itu.int/en/ITU-D/Statistics/Pages/publications/misr2018.aspx>
- <sup>5</sup> Marc Hauschild, “Digital transformation to create more jobs than to destroy,” *The Manufacturer* 12 April 2018. Available at: <https://www.themanufacturer.com/articles/digital-transformation-creating-jobs-destroying/>
- <sup>6</sup> Department for Digital, Culture, Media & Sport, *UK Digital Strategy* 2017. Available at: <https://www.gov.uk/government/publications/uk-digital-strategy/executive-summary>
- <sup>7</sup> <https://www.coalitionfordigitalintelligence.org/>
- <sup>8</sup> Science and Technology Committee, *Digital Skills Crisis: Second Report of Session 2016–17*, 13 June 2016. Available at: <https://publications.parliament.uk/pa/cm201617/cmselect/cmsctech/270/270.pdf>
- <sup>9</sup> Ipsos Mori, *Basic Digital skills UK report* 2015. Available at: [http://s3-eu-west-1.amazonaws.com/digitalbirmingham/resources/Basic-Digital-Skills\\_UK-Report-2015\\_131015\\_FINAL.pdf](http://s3-eu-west-1.amazonaws.com/digitalbirmingham/resources/Basic-Digital-Skills_UK-Report-2015_131015_FINAL.pdf)
- <sup>10</sup> McKinsey Global Institute, *Skill Shift: Automation and the Future of the Workforce* 2018. Available at: <https://www.mckinsey.com/~media/McKinsey/Featured%20Insights/Future%20of%20Organizations/Skill%20shift%20Automation%20and%20the%20future%20of%20the%20workforce/MGI-Skill-Shift-Automation-and-future-of-the-workforce-May-2018.ashx>
- <sup>11</sup> Accenture Strategy, *Reworking the Revolution* 2018. Available at: [https://www.accenture.com/t00010101T000000Z\\_w\\_/gb-en/\\_acnmedia/PDF-69/Accenture-Reworking-the-Revolution-Jan-2018-POV.pdf#zoom=50](https://www.accenture.com/t00010101T000000Z_w_/gb-en/_acnmedia/PDF-69/Accenture-Reworking-the-Revolution-Jan-2018-POV.pdf#zoom=50)
- <sup>12</sup> Nesta, *Which digital skills do you really need?* July 2018. Available at: [https://media.nesta.org.uk/documents/Which\\_digital\\_skills\\_do\\_you\\_really\\_need.pdf](https://media.nesta.org.uk/documents/Which_digital_skills_do_you_really_need.pdf)
- <sup>13</sup> London First, *An Employment and Skills Action Plan for London* 2018. Available at: [https://www.londonfirst.co.uk/sites/default/files/documents/2018-06/SkillsandEmploymentActionPlan\\_0.pdf](https://www.londonfirst.co.uk/sites/default/files/documents/2018-06/SkillsandEmploymentActionPlan_0.pdf)
- <sup>14</sup> Skills Platform, *The Charity Digital Skills Report* 2018. Available at: <http://report.skillsplatform.org/charitydigitalreportdetail-2018/>
- <sup>15</sup> <https://www.tpdegrees.com/tech-partnership-legacy/>
- <sup>16</sup> Department for Education, *Essential Digital Skills Framework* 2018. Available at: <https://www.gov.uk/government/publications/essential-digital-skills-framework/essential-digital-skills-framework>
- <sup>17</sup> <https://barclayslifeskills.com/>
- <sup>18</sup> <http://enablingenterprise.org/>



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<sup>19</sup> DQ Institute, *DQ Impact Report* 2018. Available at: [https://www.dqinstitute.org/2018dq\\_impact\\_report/](https://www.dqinstitute.org/2018dq_impact_report/)

<sup>20</sup> Department for Business, Energy and Industrial Strategy, *Made Smarter* 2017, p117. Available at:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/655570/20171027\\_MadeSmarter\\_FINAL\\_DIGITAL.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/655570/20171027_MadeSmarter_FINAL_DIGITAL.pdf)

<sup>21</sup> DQ Institute, *What is DQ?* Available at: <https://www.dqinstitute.org/what-is-dq/>

<sup>22</sup> Joel Mokyr, *The Market for Ideas and the Origins of Economic Growth in Eighteenth Century Europe* 2006. Available at:

<https://www.ifs.org.uk/conferences/mokyr.pdf>

<sup>23</sup> <https://www.coalitionfordigitalintelligence.org/>

<sup>24</sup> City of London Corporation, *Digital Skills Strategy* 2018–2023. Available at:

<http://democracy.cityoflondon.gov.uk/mgAi.aspx?ID=76540>