The Royal Society of Edinburgh
RSE @ Inverness Outreach Programme
Scotland 2030 – Technology and Society

Discussion panel chaired by the Rt Hon Ken Macintosh MSP

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Report: Kate Kennedy

At this event, held in conjunction with Scotland's Futures Forum's Scotland 2030 Programme, speakers Chris van der Kuyl FRSE, Maree Todd MSP and Nicola Martin discussed the big technology changes already happening and how Scotland could and should respond.

Scotland's Futures Forum is the Scottish Parliament's own think tank. Its purpose is to consider, evaluate and share ideas and issues affecting Scotland beyond the immediate election and budget cycle, from a non-party-political viewpoint. One of their current main projects is focused on assessing how Scotland's society and culture will look in the year 2030. The panel for this event comprised Dr Chris Van Der Kuyl FRSE, owner of 4G, the Minecraft game developers; Futures Forum Fellow and University of Stirling postgraduate student Nicola Martin; and Maree Todd MSP, a Highlands and Islands Member of the Scottish Parliament.

Dr Chris Van Der Kuyl FRSE – The year 2030 may be 12 years away, but the pace of technology change that we are living through today has never been as fast, but will also never be so slow again. Every eighteen months, the capacity of technology doubles; a cycle that has been repeated since the 1960s. Indeed, if the development of the motor car had progressed at the same speed as digital technology, then we would all be driving cars capable of an average of 25,000 miles per hour and would be able to travel around the world eight times on a teaspoonful of petrol costing less than one penny. The technological capability of a mobile phone today eclipses the desktop computer of ten years ago, and with the advent of the Cloud, computing power has become almost infinite. The growth of technology has had, and continues to have, a huge impact on society.

One practical example of this ever-increasing technology that we are likely to experience in civic society relatively soon is the development of autonomous vehicles. Dr Van Der Kuyl commented that it is extremely important that the United Kingdom is involved with, and encourages, new technologies and technology companies to locate and develop in the country. However, this technological development will still require human involvement; therefore, it is unlikely that all jobs will be replaced by computer and digital technology. Key to success in this field are excellent skills in creativity, innovation and imagination – things that technology is unable to do. Technology is excellent at streamlining and improving processes, but it still needs people to think of ideas in the first place. However, Scotland has a fantastic tradition in creativity and innovation and in terms of computer games, Scotland has led the way. The gaming industry in Scotland represents the best of technology combined with the best of creativity. However, continued success relies upon how well we educate our people and how we think about education; this is crucial to our survival as a society within Scotland, and even as human society on a global level. Dr Van Der Kuyl stated that "if we continue to educate people as we have done since the Victorian era (i.e., funnelling people a certain way and setting them up with 'jobs for life'), then we will not survive the transition into a world where artificial intelligence and technology is at the forefront." Scotland needs to embrace new technologies and build smart, critical thinking

within its society. If such skills are combined with building better societal values, team working, fun and creativity, then Scotland will have a successful future in the new technological era.

To achieve this success, it is vital that education receives the right level of investment, something that is a definite challenge for politicians, given the demands from all areas of society. But if this does not happen, then other countries will seize the opportunities and will overtake and leave Scotland behind. "We do have the raw materials in Scotland, including excellent minds and talent, but we are not putting enough money into developing these vital skills compared with other global regions such as the United States and Asia. Grasping and investing in new technologies will help make Scotland successful in the future, but we cannot wait around. The world will blast past us if we don't prepare everyone for a future with expanding technology".

Nicola Martin – Society has been shaped by technology over previous centuries, sometimes producing seismic consequences for the people living through these changes. We can learn lessons for the future by considering how society adapted, or failed to adapt, to changes in the past. Two of the major periods of historical change brought about by advancements in technology were the Agricultural and Industrial Revolutions of the 18th and 19th Centuries. The Agricultural Revolution transformed Scottish agriculture from a system that was largely reliant on subsistence farming into a modern system which was much less labour intensive and was highly productive. Although change continued over a number of centuries, it was at its most rapid in the 1760s and 1770s. Due to the development of new machinery (for example, the threshing machine, seed drill and reaper), the agrarian workforce shrank as production increased, leading to migration to urban centres in search of employment. This increased productivity, and the move from a rural to an urban environment, played an important role in stimulating the first Industrial Revolution, taking place from *c.*1760 to 1840. Again, the development of new inventions and mechanisation of processes reduced the reliance of human power in various industries, such as textiles. The first Industrial Revolution represented a clear shift from hand production to machine production and, whilst rural Scotland remained an agrarian society, urban towns and the Scottish Lowlands became important manufacturing and commercial centres. Indeed, Glasgow gained much of its initial wealth from the rapid expansion of the cotton industry in the late 18th Century. This helped fund the city's diversification into heavy industry, engineering and shipbuilding.

By the early 19th Century, Scottish society was unrecognisable. In 1750, 9% of the population lived in towns of over ten thousand people; by 1800 this had almost doubled and by 1850 the proportion had risen further to 32%. Although more Scots did continue to live in rural locations than urban centres, urban growth was rapid, and industry was concentrated in the towns and cities. Some people, including the newly-emerging middle class, did benefit from industrialisation and urbanisation through investing in and embracing new technologies; however, most of Scottish society was left behind as the rate of change outstripped the ability of many individuals to adjust. For the overwhelming majority of Scots, the standard of living dropped during the Industrial Revolution and in the following decades. Many farmers branched out into more productive forms of agriculture, such as sheep farming and cattle ranching, and other industries such as shooting. This led to the large-scale clearance of people from the rural landscape, a phenomenon not solely restricted to the Highlands. Some people voluntarily migrated in search of better circumstances throughout the Empire and this resulted in the significant depopulation of rural Scotland and the standard of living for those who remained was poor. Additionally, for those working in manufacturing in urban locations, the standard of living was also poor. The working class was left behind and the alienation of this group led to the growth of radicalism in the late 18th and early 19th Centuries.

General economic depression caused discontent amongst workers, who increasingly protested against their situation. A similar situation in England led to the rise of the Luddite

Movement – specifically targeting machinery and factories and protesting against factory owners who employed under-skilled workers to maximise their profits. Despite the fact that, today, the term Luddite is used to describe someone with an aversion to new technology, the Luddites did not actually protest against technological advancement itself but, rather, the roots of the protest lay in the rapid industrialisation and urbanisation that had caused such huge changes to Scottish society. It was society's failure to adapt to these events in a way that was inclusive for the majority of people that caused discontent and protest. Government intervention, though it was slow to develop, was important in improving living conditions throughout Scotland, as society did gradually begin to adapt over the following century. As we currently stand on the cusp of a technological revolution, we need to consider what we can learn from how society adapted to the Industrial Revolution and how we can ensure that a majority of Scots are not left behind once again.

Maree Todd MSP – New advances in technology have an impact on people living in the Highlands of Scotland today. In the past, politicians have not always thought ahead to the long term and it is vitally important that this changes. Progress should not be seen as a bad thing, but sometimes it can be difficult to try to imagine the difference that changes in technology will have on society. Indeed, some new current technologies were unthinkable only a few years ago; for example, Skype and other video-calling platforms. Technology has the potential to transform global communication; however, there is a fear that people living in more remote, rural regions can get left behind. These are genuine problems for the Highlands of Scotland, where broadband is not yet available to everyone. There is a real chance that people in this region, without digital literacy, could be left out of future progress. Furthermore, connectivity is key to life in the Highlands, both in terms of transport and through keeping communities connected over large distances with difficult topography and sparse populations.

There are various technology projects being developed and tested in the Highlands and Islands that may work towards enhancing society in this region. One of these is a project whereby a 'pill camera' can transmit internal images of patients to consultants at Raigmore Hospital in Inverness, meaning less travel upheaval for the patient, a quicker response time and less invasive treatment. Furthermore, a project sponsored by the European Space Agency is working on the communication between ambulances and the hospital via satellite connections to ascertain if scans, etc., can be done on route to the hospital, with two-way information relayed between the ambulance and the hospital. Modern medicine is now very complex and requires expertise that is not possible in every community hospital or care provision premises. With the application of this new technology, it would be possible for people throughout the Highlands and Islands to be transported over long distances to Raigmore, with specialist advice being fed directly to the ambulance. Another collaborative project, called *Fit Homes*, builds houses that are able to monitor the person living within them. For example, this includes technology such as floor sensors that recognise if a person has had a fall. Taking it to next level, the project will look at using predictive analytics to get data from the individual living in the house and recognising changes in behaviour. This will assist with identifying vulnerable people and helping with preventative medicine. Such technology has the potential to enable people to remain living in their communities in the Highlands when they become old and frail. At the moment, many people have to be relocated in this stage of life.

Q and A

Does Dr Van Der Kuyl limit his own children's screen time and if so, why?

Yes, the computer games industry is brilliant at creating addictive technology and making people feel good about themselves. They create games that make it easy to keep you playing and make you feel good. However, young brains do not have a level of discipline which enables them to move away from the screen when they have had enough. However, parents also need to take responsibility for this. Computer games are an excellent tool for developing cognitive and fine motor skills, but balance is important, and kids can get excessive.

Were people in the 18th and 19th Centuries aware that they were living through an Industrial Revolution?

People were aware of things changing. Writing from the time tells us this; for example, Adam Smith wrote about the fact that Scotland was moving from an agrarian society to a commercial, industrial, civilised society. However, the working classes, although aware of the changes, were having to react to and be impacted upon rather than affecting this change. Some people today suggest that we are on the cusp of another Revolution. At least today we are talking about how we will manage the impact on society. (Nicola Martin)

We should definitely embrace change and progress, but it is also important for politicians and other civic leaders to ensure that elements of society are not left behind. Leaders need to be sensitive to change and how this affects people. (Maree Todd)

We are currently living through an Information Revolution. Over the last ten years, things have changed dramatically. Things people today take for granted, such as Skype, we thought were magic ten years ago. Some of the reasons humans reject change are because the consequences can be both terrifying and fabulous. This is affecting us already. Indeed, some of the recent political changes in the United States and Europe could relate to disenfranchisement due to technology. The answer to this is education. There is no barrier for people to get on board with these changes other than education. The cost is negligible. Everyone in Scotland should have access to technology by right and there is no reason why people in Scotland cannot be part of this Technological Revolution. Access to Broadband should be a fundamental human right. Furthermore, in the future people will not be confined by physical boundaries; we will very much more live in a virtual world where nation states are less relevant. For this, we need to understand how technology works and be comfortable with it. It will be vital to understand technology to engage in future society. (Chris Van Der Kuyl)

The Highlands has a shortage of computer teachers. How important is it to learn to code?

It is vital for career prospects. Demand for this skill is already huge and will become greater. It is madness not to teach computing as early in life as possible. Being able to understand computing is as vital as speaking English. (Chris Van Der Kuyl)

We also need to emphasise that education isn't just for the young. When trying to put technology into people's homes, initial reaction can be that they don't and can't understand it. But if the time is taken to educate and explain at a basic level, people do start to understand and appreciate the benefits. We need to get over the 'I can't' attitude. (Audience comment)

All human beings can continue learning and it is important to undertake knowledge transfer at all levels. It is often a case of 'learning how to learn' in technology rather than learning the facts, as they change dramatically very quickly. (Chris Van Der Kuyl)

There are obvious ethical issues associated with children and digital technology. How do we overcome these, whilst also ensuring they are involved and knowledgeable?

Internet safety is extremely important. The minute you let a child near the internet they need to understand the fundamental principles of privacy and not disclosing identity. Scepticism has to be there and be paramount. The Internet is full of both good and bad people. Education is vital, as are building skill levels, responsibility and morals. Parents also have to be vigilant and understand the technological and gaming world. For example, computer games with an 18 certificate should only be played by over-18s. (Chris Van Der Kuyl)

Where is Scotland compared to other countries in the world with regard to the development of the Technological Revolution?

Scotland has the raw materials and is starting to see some successes in terms of Scottish companies that have been developed and people having confidence. We now need to make some bold steps and encourage businesses to come to Scotland, not for a low wage economy but for its intellectual talent and creativity. There is a totally unfulfilled global appetite that Asia doesn't fulfil properly. Scotland is doing well, but should be doing better. (Chris Van Der Kuyl)

There is a sense and fear that other countries are already overtaking us. How do we get this sense of urgency across to the wider public and communicate this? Can schools do this by themselves?

We need politicians to recognise the opportunity and necessity and bring the civil service and population with them. There needs to be real leadership and communication. It is tricky, but has to be done. We also need excellent civic and professional leaders. Things, however, can take time to change. (Maree Todd)

Technology is years ahead of education and resources in schools – roll-out programmes of devices, etc., take a long time and by the time schools receive them, technology and the children's knowledge of it have moved on. Technology costs for schools are too high, but if we focus on skills and experience, then we have a chance of keeping up and preparing young people for the future. (Audience comment)

Scotland has been very good in the past at inventing things, but very poor at developing them. It is difficult to get the general public to embrace new ideas and inventions. There is a fear of new ideas and technologies. (Audience comment)

We need open mindedness and the ability to work in multidisciplinary teams and develop ideas. This can be a frustrating experience at times when people are protective of their specialisms and take a long time to make decisions. We need to develop excellent team-working skills and collaboration. (Audience comment)

Technology is an enabling thing, not a secret science. A good technologist should be able to enable people to do their jobs better, not to control them and keep things secret. Organisations which take no risks, go nowhere. (Chris Van Der Kuyl)

People are scared of how quickly society is changing – not necessarily of the technology itself but the impact it has on society. They feel alienated and this makes a huge contribution to global politics, such as the election of Donald Trump. Education is hugely important to counteract this fear. We need people involved in new technologies to be role models and visible in society/the media. (Audience comment)

A Vote of Thanks was offered by the Rt Hon Ken Macintosh MSP.