

TECH REPORT 2020

Addleshaw Goddard
in partnership with the
Fraser of Allander Institute



FOREWORD BY STEPHEN INGLEDEW, CEO, FINTECH SCOTLAND

WHAT DO WE MEAN WHEN WE TALK ABOUT TECH?

Technology now plays a significant role in all of our personal and working lives with pervasive impact right across all dimensions of society and the economy.

Furthermore, the rapid advances of new technologies and data intelligence are reshaping all aspects of communities and business effectively resulting in new paradigms for everyone.

For example, new technological enabled economic clusters are creating innovative enterprises, the virtual interaction and collaboration between different global communities as well as new ways of working combining human engagement with digital capabilities.

The pace of these dynamic developments are challenging the traditions and conventions that have existed for many decades across business and leaders will need to consider how they adapt to embrace the opportunities.

Most importantly, this unprecedented time, often referred to as the fourth industrial revolution, will require people from all walks of life to consider how they balance the human and technology interactions to achieve the best outcomes and progress.

In this report, Addleshaw Goddard uncover the major technology trends in Scotland today with valuable insight on where the innovation is happening in businesses, where the tensions are between stakeholders, what challenges need a more progressive thinking as well as the opportunities for sustainable growth through diverse and inclusive participation.

The 'future is unwritten' and everyone has a role to play in shaping the new digital and data driven economy. This report makes an important contribution to how we can progress with confidence as innovative, collaborative and inclusive business leaders.



**73% OF BUSINESSES SAID THAT THE
PANDEMIC HAS ENCOURAGED THEM
TO ADOPT NEW TECHNOLOGY**



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With thanks to contributors: Fraser of Allander, Royal Bank of Scotland, Par Equity, FNZ, XDesign, The Law Society Scotland, Phlo, The Data Lab, Snag Tights, Scottish Futures Trust, Commsworld, Strathclyde University, Obashi, Sekoia.

EXECUTIVE SUMMARY

OVER THE SECOND QUARTER OF 2020:



Every business today is a technology business. But education and understanding of what technology makes possible remains insufficient. Businesses still confuse IT – I'll fix the photocopier for you – with technology – how can I turn my operating model upside down to drive efficiency, new ways of working, profit and sustainable growth? Boards setting business agendas don't know what they don't know.



People no longer buy products, they buy solutions. Business leaders need to get their heads around delivering agile hardware, algorithm-streaming access – and all these services as a service. Business models that have been sound for decades will have to transform or disappear.



Data is the new oil. How oil flows from wells to shores, through pipes to refineries and is distributed around the world - this is how we need to start mapping and modelling data flows.



Data ownership and value is perhaps the biggest unanswered question when it comes to harnessing the value technology presents. This isn't a domestic issue or even a national one. It is international, and the longer it remains unanswered, the question becomes ever more complex.



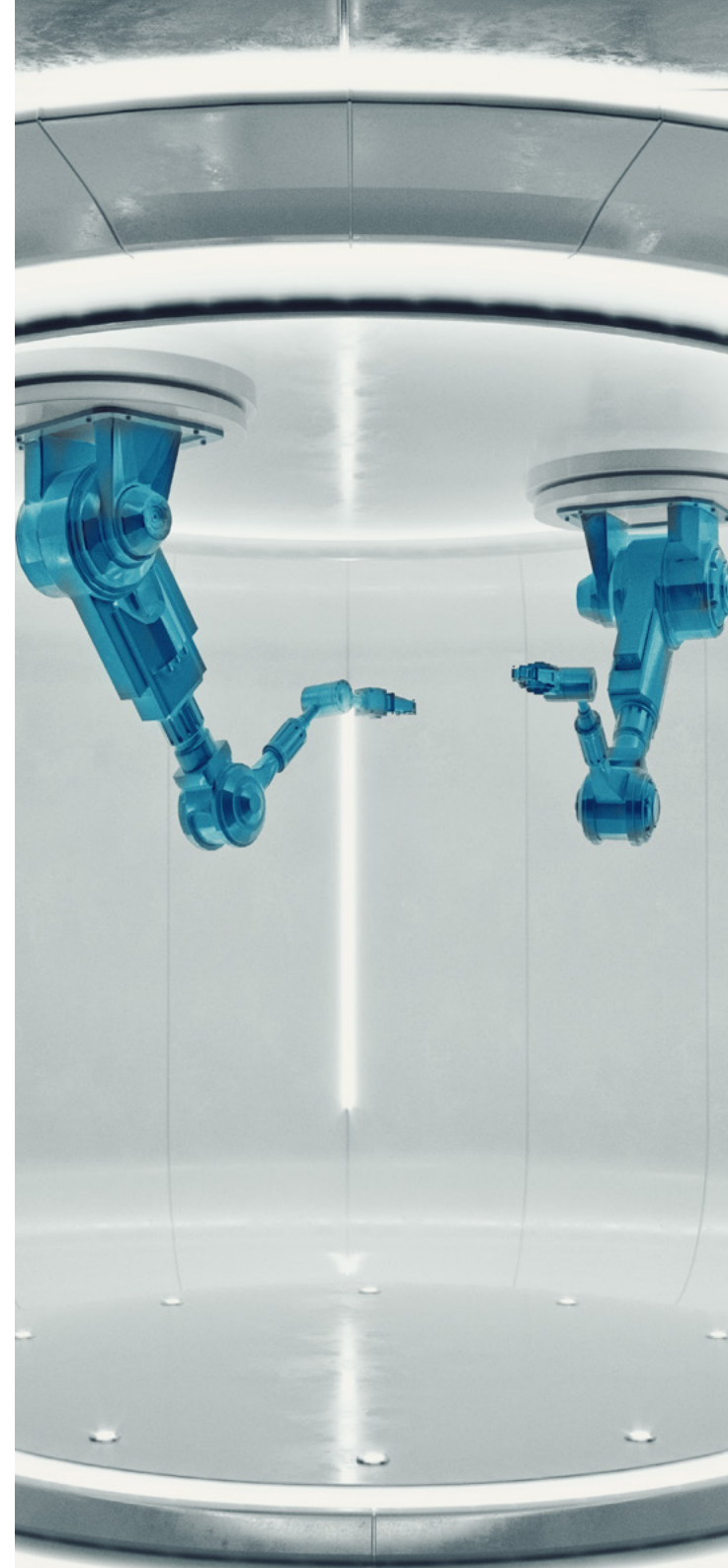
Five years ago, health and social care providers didn't even know digital systems existed to help them improve their services. Education for business leaders is critical – data is no use if you don't know what to do with it.



How do you align the need for much broader connectivity across Scotland and internationally with commercial interests? Public policy and investment has to plug the gap that is holding up vital infrastructure investment into fibre, 5G and data centres.



Are politicians being far-sighted enough? We need to consider the carbon cost alongside return on investment when we think about investing in technology - and nobody is good at that now. Bringing these two policy areas together is crucial.



OVERVIEW BY DAVID ANDERSON & LYNSEY WALKER - PARTNERS, ADDLESHAW GODDARD

Describing the state of play in technology is no mean feat. What do we mean by technology? The laptops, mobiles, tablets and desk top computers we use to interact digitally? Or the software that sits behind that which does all of the processing and makes digital language intelligible to those who aren't fluent in java, html or python, to name just three?

Is it the technology companies that design, deliver and support other companies' technology systems? What about the machines that run the manufacturing process? Or the data that all that processing produces? The cloud? Data centres? Fields of servers? Is it the fibre beneath our feet or the frequencies in the air?

Technology now is all of these things and more. It infiltrates and permeates every business, the lives of every individual and increasingly, our social, personal and commercial relationships.

Where once, technology in a business would have been characterised as the IT guy who fixed the photocopier, today, IT usually refers to a desktop support function. The role technology has to play within commercial enterprise is now far broader than that. It has shifted from something which supports business function into perhaps the primary strategic consideration that a company's leaders must consider.

The dawn of cloud storage, uptake of smart phone usage, and development of ecommerce and social media have changed the game in a very short period of time.

This is the fourth industrial revolution, said one contributor to this report. Another said: 'Oil used to be called black gold. Now data is gold.'



Digital gold it has become, but what has been made clear in collating the views within this report is that mapping and modelling data so that companies can make use of it to deliver value to customers is still relatively narrowly understood.

Risk, compliance and security, meanwhile, cast large shadows over all boardroom tables. Protecting individuals' data is vital and a legal requirement but still, when the chips are down, capable of inciting terror among C-suite executives.

Most business leaders know they need to know more. Few know exactly what they need to know. The old adage, there are things you know, things you don't know and things you don't know you don't know.

The majority of individuals and company boards are in that final space still.

But there is a rapidly increasing desire to address this, accelerated by the almost overnight shift from office-based employment to working from home across many sectors and necessitated by the coronavirus lockdown measures.

Necessity is the mother of invention, and so the results of our survey of Scottish business leaders, done in partnership with the Fraser of Allander Institute, show.

Some 73% of businesses said that the pandemic has encouraged them to adopt new technology to provide their goods and services. 81% of large businesses said they had accelerated digital plans while 54% had introduced them and 66% of small and medium sized businesses said they had accelerated digital plans while 34% had introduced them.

This is undoubtedly true, but one contributor noted the enormous discrepancy between a business' perception of digital plans and the reality.

'Moving workers from an office to their home is not a digital plan,' they stated. 'It's operational.'

Technology and how we understand it is changing rapidly, something that we are all gradually becoming more aware of.

As fibre broadband is rolled out and 5G coverage delivered, things will change all over again and in ways that most of us cannot, today, comprehend.

We have not sought to give answers in this report. Instead, we ask questions – those that must be answered over the coming few years if the United Kingdom and Scotland are to thrive economically at home and internationally.

With sincere thanks to all of those who contributed to its contents.



OIL USED TO BE CALLED BLACK GOLD. NOW DATA IS GOLD.



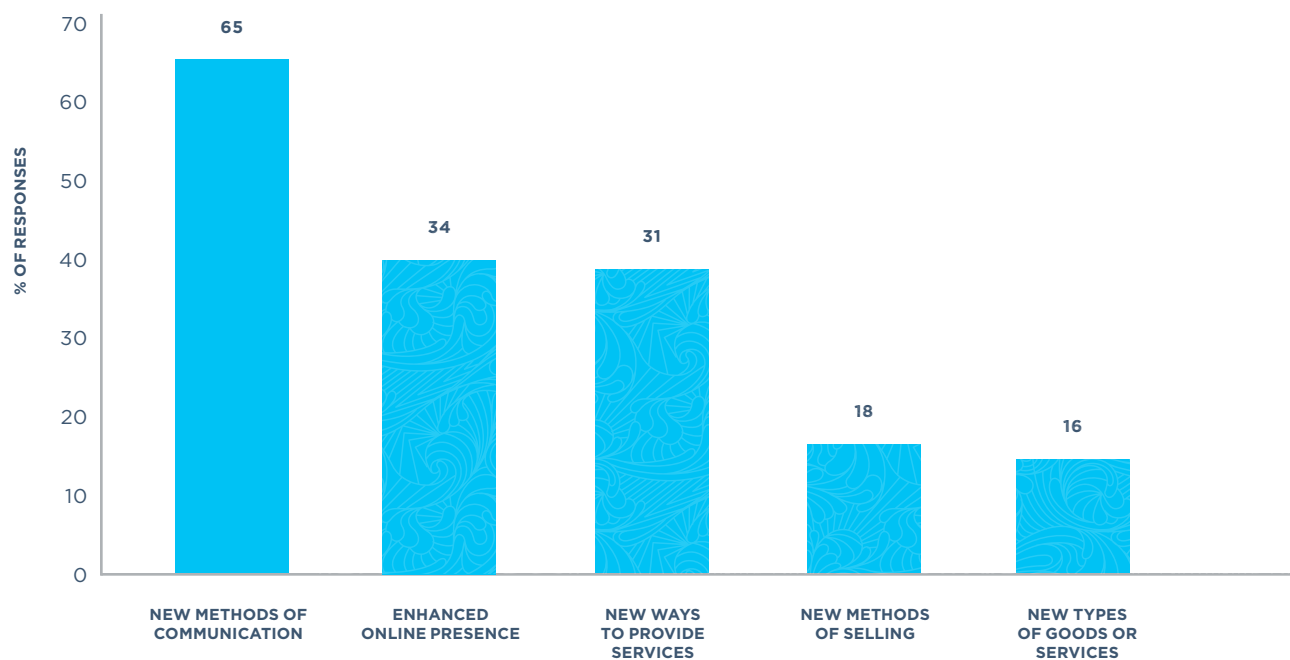
FACTS AND FIGURES

73% of businesses said that the pandemic has encouraged them to adopt new technology to provide their goods and services

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66% of small and medium sized businesses said they had accelerated digital plans while 34% had introduced them

Which new technologies has your business adopted or enhanced since the start of the pandemic?



Source: Fraser of Allander Institute

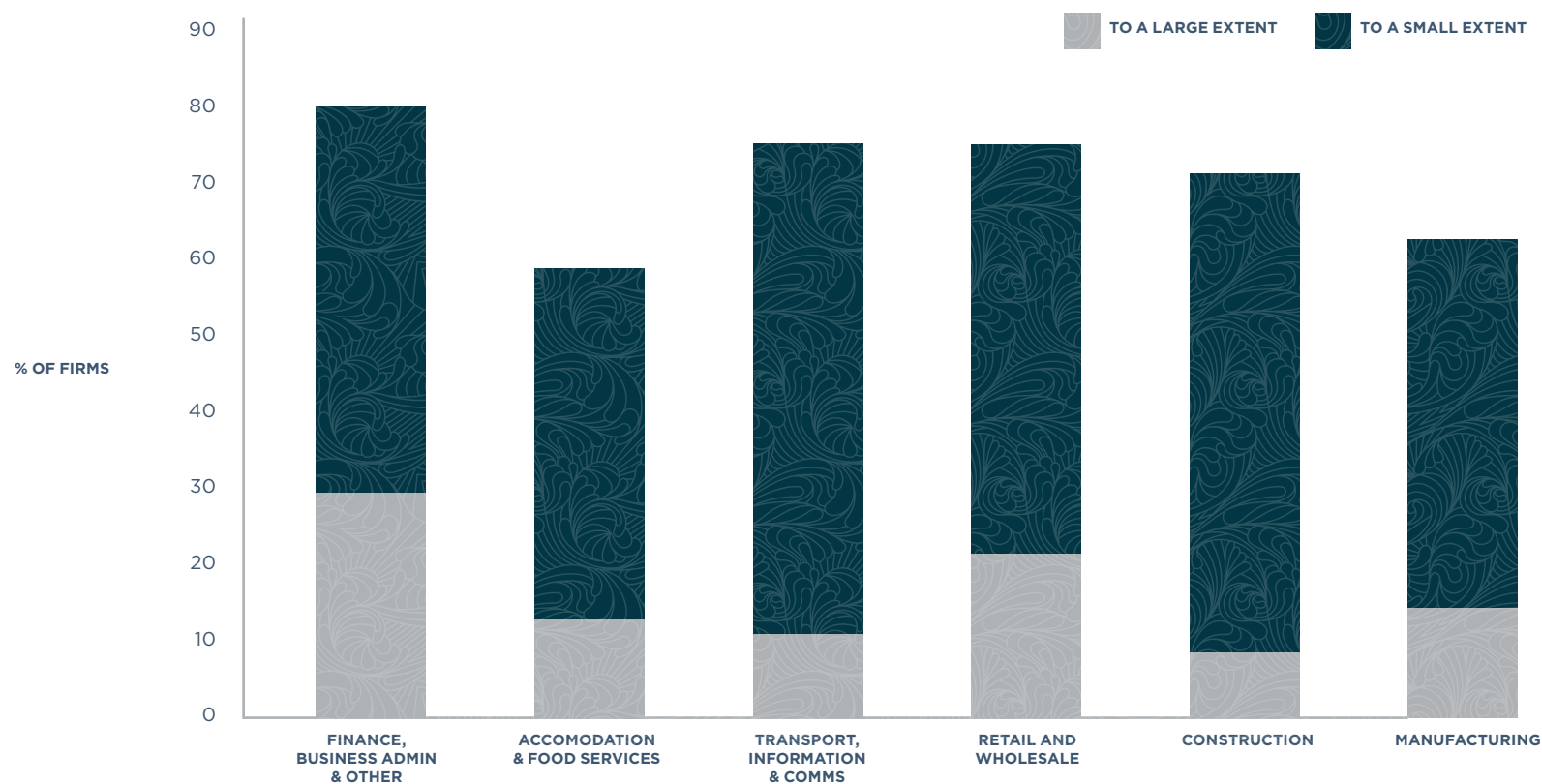


FACTS AND FIGURES

Many firms also stated that these technological changes are here to stay – 93% of firms said that these changes will persist in the long-term, with 44% stating that this would be to a large extent.

57% of large firms expected these changes to persist to a large extent, compared to 42% of small or medium sized firms.

Has the pandemic encouraged your business to adopt new technology in order to provide your goods and services?



Source: Fraser of Allander Institute

FACTS AND FIGURES

COMMUNICATIONS INFRASTRUCTURE IN SCOTLAND

FIXED COVERAGE

97%

OF COMMERCIAL AND RESIDENTIAL PREMISES IN SCOTLAND HAVE ACCESS TO A DOWNLOAD SPEED OF 10MBIT/S OR HIGHER ACCORDING TO OFCOM'S SEPTEMBER 2020 REPORT

30^{MB}

A SECOND ACCESS OF OR OVER DROPS TO 93 PER CENT IN SCOTLAND, WITH JUST 71 PER CENT OF PREMISES IN RURAL AREAS ABLE TO ACCESS THIS SPEED

300^{MB}

A SECOND DOWNLOAD SPEEDS OR FASTER ARE AT JUST 49 PER CENT, WITH 57 PER CENT OF PREMISES IN URBAN AREAS ABLE TO ACCESS SUPERFAST SPEEDS AND JUST 11 PER CENT OF PREMISES IN RURAL AREAS ON THE FIXED INFRASTRUCTURE NETWORK THAT FACILITATES THESE SPEEDS

MOBILE COVERAGE

81%

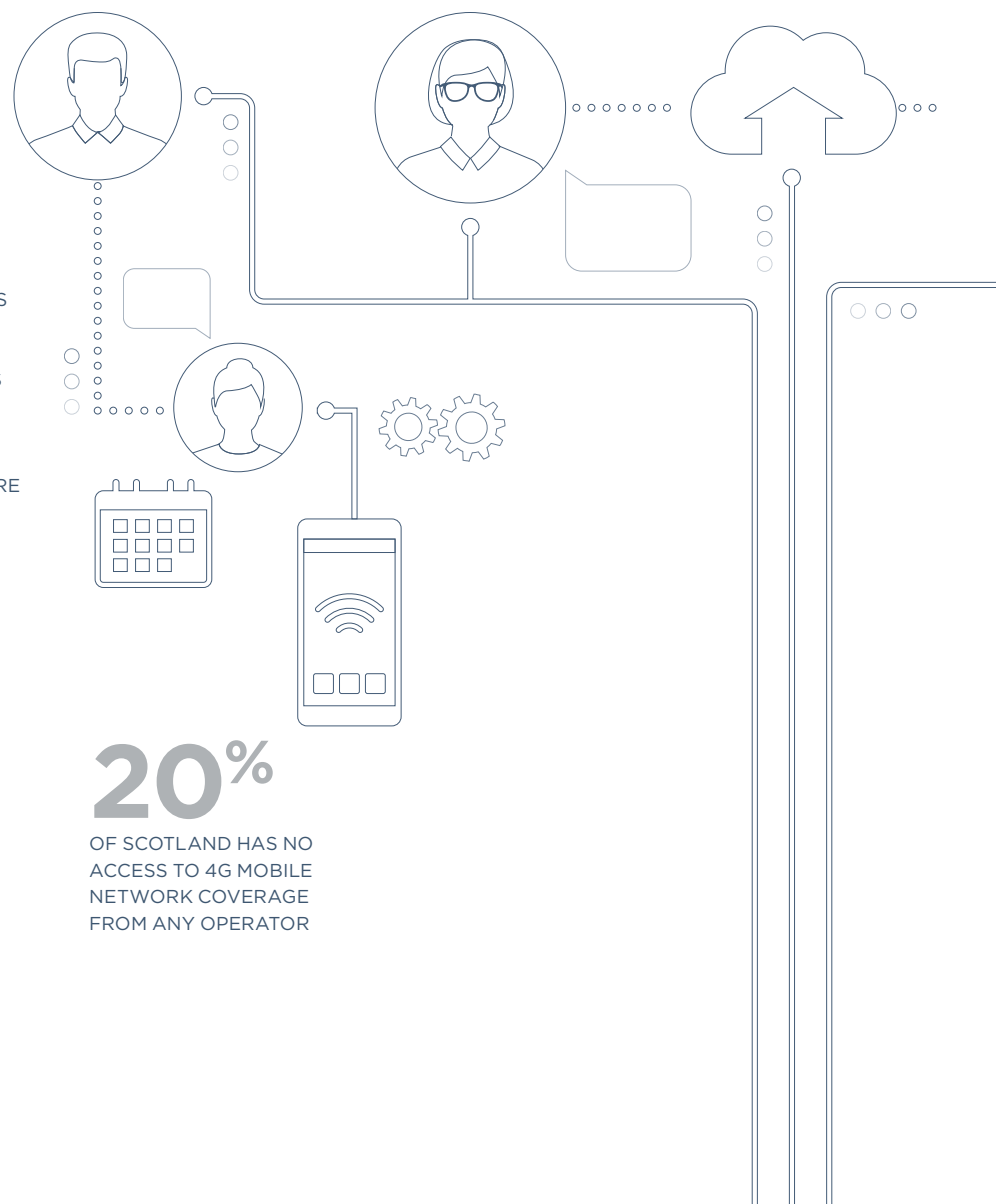
OF SCOTTISH PREMISES HAVE 4G COVERAGE WHEN CONSIDERING ALL OPERATORS ACCORDING TO OFCOM'S SEPTEMBER 2020 REPORT

50%

OF RURAL PREMISES IN SCOTLAND HAVE 4G MOBILE COVERAGE

43%

ACROSS THE WHOLE OF SCOTLAND OF THE GEOGRAPHICAL AREA HAS 4G COVERAGE, COMPARED TO 82 PER CENT IN ENGLAND, 77 PER CENT IN NORTHERN IRELAND AND 58 PER CENT IN WALES



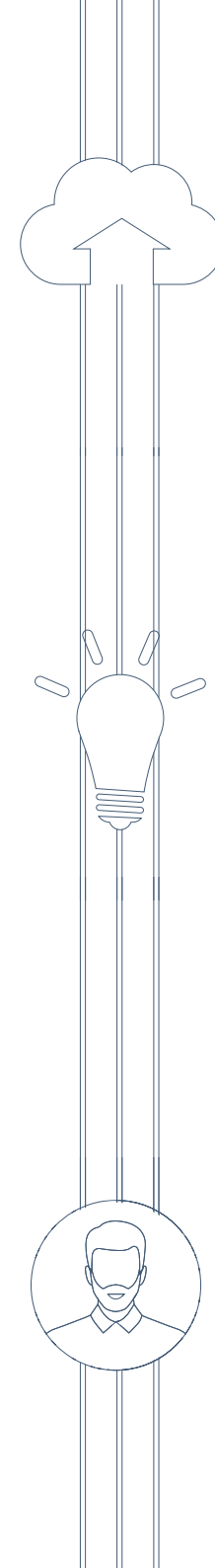
FACTS AND FIGURES

COMMUNICATIONS INFRASTRUCTURE IN SCOTLAND



IN THE SPACE OF A SINGLE YEAR, WE HAVE SHATTERED ALL RECORDS, WITH TECHNOLOGY INVESTMENT IN THE UK SOARING BY **44%** TO OVER **£10 BILLION** - MORE THAN FRANCE AND GERMANY COMBINED. BRITAIN IS SECOND IN THE WORLD FOR FINTECH, WITH INVESTMENT RISING BY OVER **100 PER CENT** IN THE LAST YEAR ALONE. AND WE ARE **NUMBER ONE** IN EUROPE FOR THE EMERGING TECHNOLOGIES THAT WILL TRANSFORM THE LIVES OF EVERY SINGLE HUMAN BEING.

UK Government, Source: Tech Nation Report 2020



FACTS AND FIGURES

COMMUNICATIONS INFRASTRUCTURE IN SCOTLAND

UK FINTECH IS A COMPETITIVE STRENGTH FOR THE UK ECONOMY,
LEADING IN BOTH INVESTMENT AND CONTINUED GROWTH

**£10.1
BILLION**

INVESTMENT INTO UK TECH
COMPANIES IN 2019
- A RECORD

**£1
BILLION**

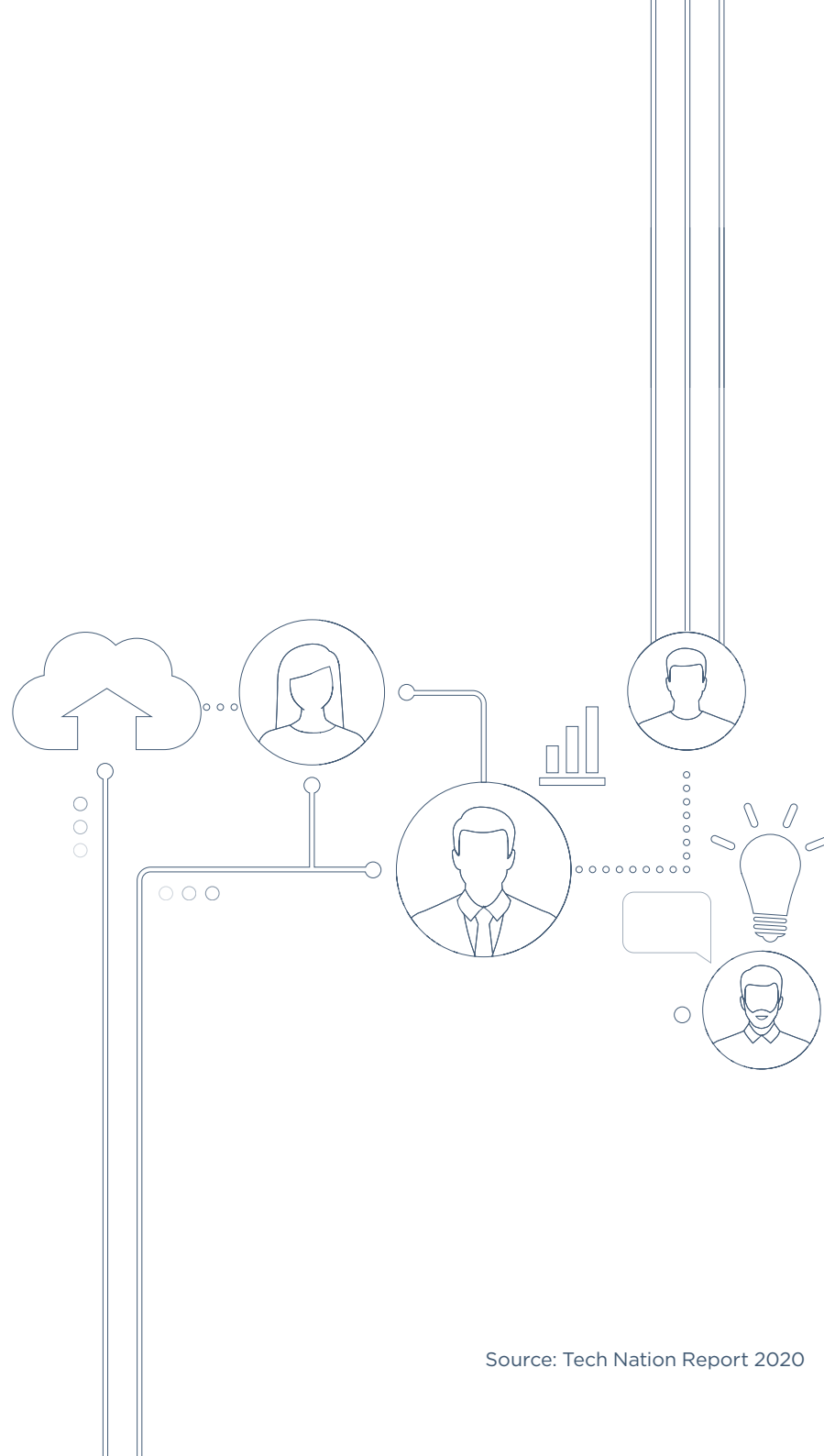
VALUATION OF 77 TECH
COMPANIES. THE UK IS 3RD
IN THE WORLD FOR TECH
UNICORNS BEHIND ONLY
THE US AND CHINA

**£4
BILLION**

INVESTED IN FINTECH FIRMS
IN 2019. THIS MAKES FINTECH
THE UK'S LARGEST TECH SUB-
SECTOR FOR INVESTMENT,
WITH STILL HUGE POTENTIAL
FOR CONTINUED GROWTH.
FINTECH INVESTMENT IN THE
UK MORE THAN DOUBLED
FROM 2018 TO 2019

TOP 20

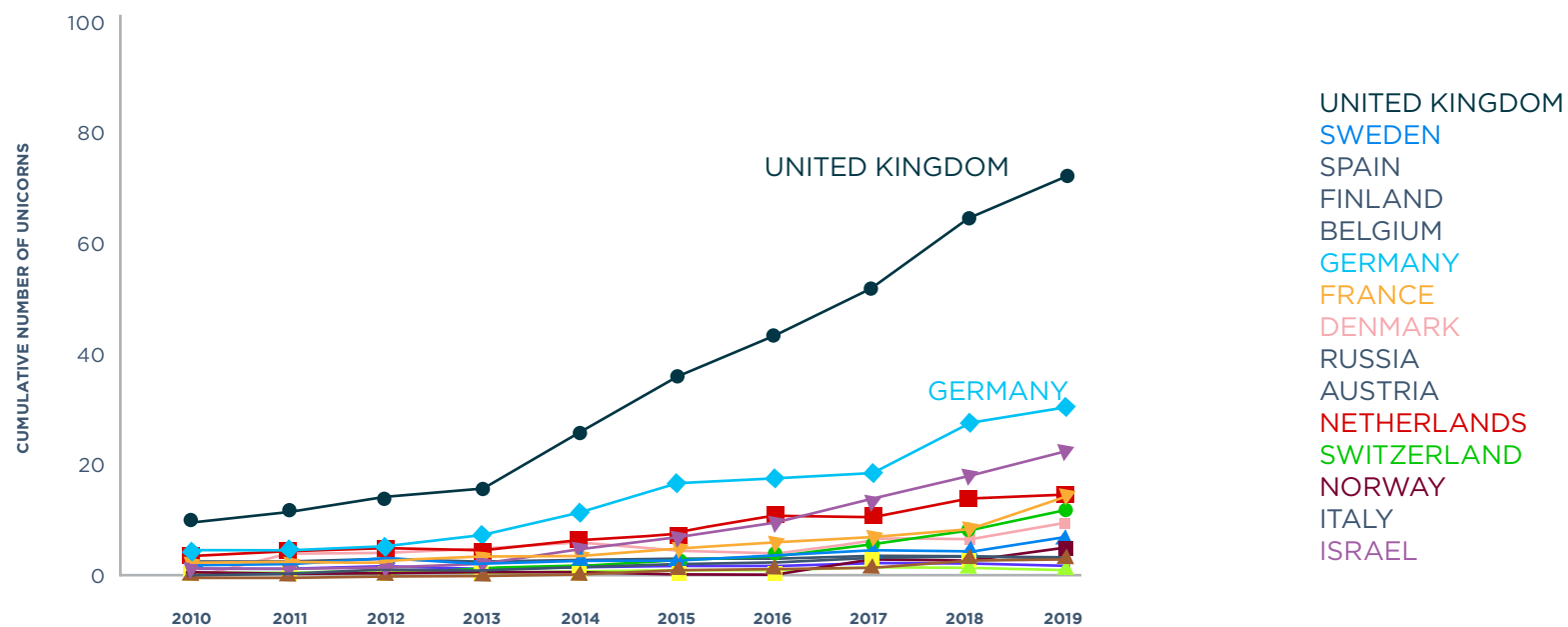
EUROPEAN CITIES FOR TECH
INVESTMENT - EDINBURGH



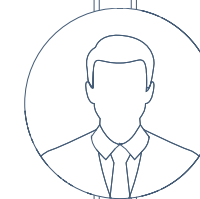
FACTS AND FIGURES

COMMUNICATIONS INFRASTRUCTURE IN SCOTLAND

UNICORN COMPANIES BY COUNTRY FROM 2010 TO 2019



Source: Tech Nation Report 2020



1 TECHNOLOGY IN BUSINESS: FROM FUNCTIONAL TO STRATEGIC

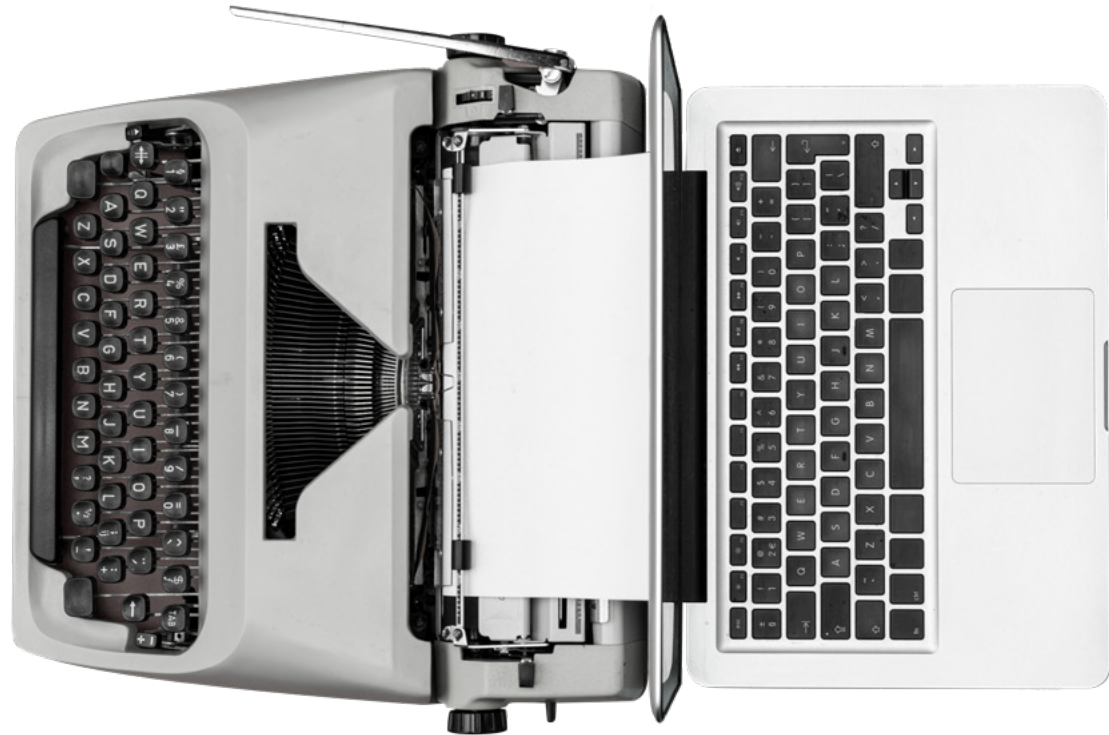
The role of technology in business over the past 200 years has been largely functional. The introduction of mechanical machinery in place of people in the manufacturing sector goes back further still - the printing press was brought to England in 1476 by William Caxton.

Since the Victorian era, which ushered in major industrial change relatively quickly, we have seen robotics supersede manually operated machinery, typewriters replace pens and paper, personal computers in place of the typing pool, and now, many companies use instant messengers powered by artificial intelligence and able to learn over time in place of call centre staff.

Moving from analogue to digital

The speed of change has been rapid, but in the past 15 or so years, it has been exponentially so. Access to smart phones has driven a step change in how individuals use technology. 4G and the widening out of fibre broadband has supported the increase in online communications.

Businesses have been forced to adapt. Some sectors have been more successful than others at integrating technology into their operations. Others have been reticent to change processes



The rise of the CTO

Reliance on home broadband networks has posed all businesses with both operational and security risks that were hitherto of small concern. This, more than any other consideration, has propelled company CTOs into the boardroom spotlight.

In August this year, Mark Logan published the results of his independent review of the Scottish technology ecosystem, commissioned by the Scottish Government. He concluded that in order to produce more cutting-edge companies, the entire ecosystem needed a rethink. Fundamental to this is education, from a young age right through to executives already sitting in (virtual) company boardrooms, to equip the future workforce with the skills that a more developed technological world demands.

There were mixed responses to how boardroom decisions on technology were being made today. One respondent suggested that chief executives really needed to understand the opportunities and technicalities presented in their use of technology themselves, indicating the fundamental need for a chief technology officer on all company boards but suggesting that CEOs need to do much more too.

'Technology is not a choice now,' said the contributor. 'It's the normal state. As a young company, we have understood that and built our business starting with the technology and how it can serve customer needs faster, cheaper and more smoothly.'

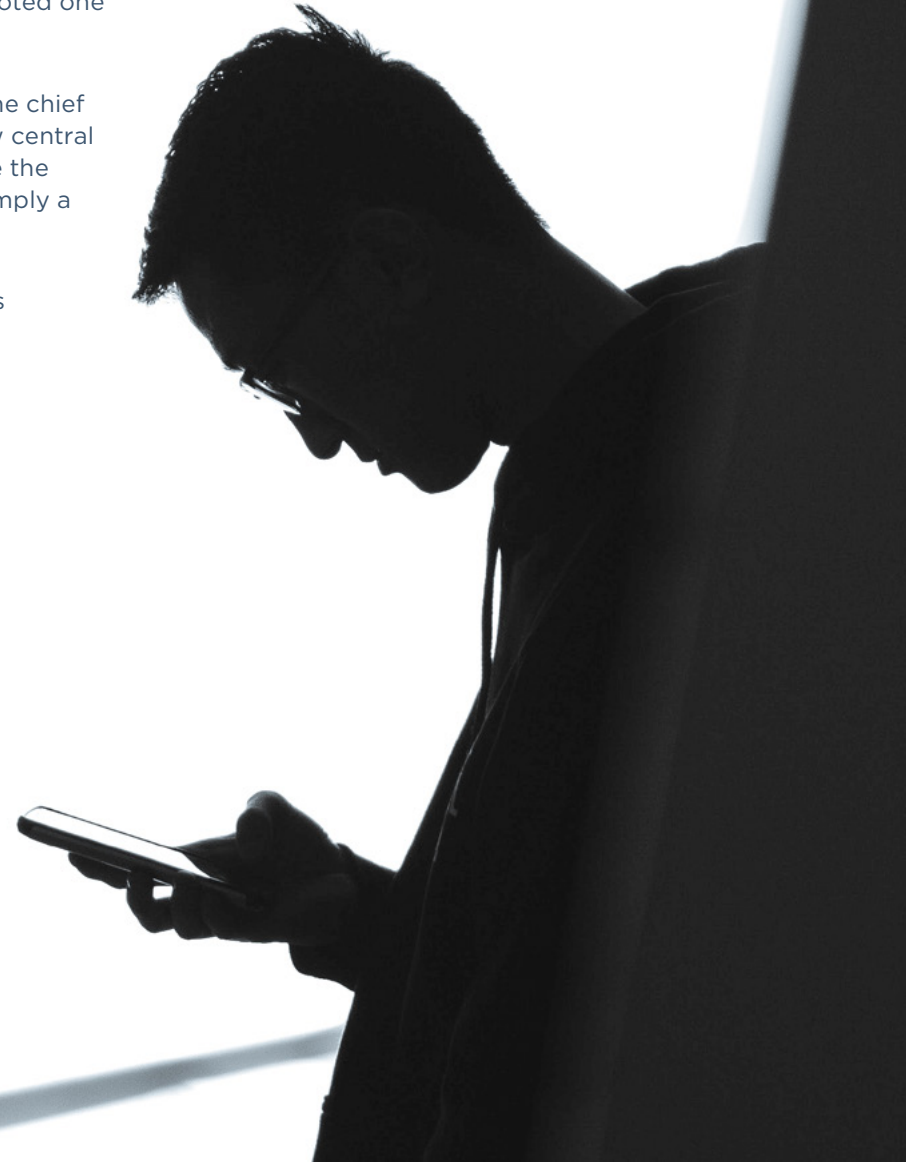
There was a general consensus that the speed of change in the types of technology available

– cloud storage, fast and stable broadband connectivity, broader mobile network coverage – has left many senior executives behind.

'There's also a massive geographical divide happening, because these services aren't available equally across the UK. Rural areas are really struggling still, and that is reflected in where it's possible to raise investment,' noted one contributor.

All respondents agreed that the role of the chief technology officer in businesses was now central – a company's use of technology must be the driver of business strategy rather than simply a support function or afterthought.

'All companies are technology companies today,' noted one contributor. 'If they aren't, they won't be around for long.'



What you don't know you don't know

Another respondent noted the potential for cyber attack was a rapidly growing fear in most company boardrooms. 'The risk of personal and commercial data being hijacked or stolen is now huge,' they said.

'Leaders and board members know this, but they don't know where to start when it comes to addressing it. Businesses really need to implement a broad based staff education programme at all levels of the business so that everyone understands this threat. That is currently not happening as fast as it needs to.'

Another contributor noted this as an issue when it came to more established companies looking to upgrade their technology or systems.

'A little bit of knowledge about tech is actually quite dangerous,' they said. 'There is a really big difference between understanding what's possible and what's available. Because very few people really understand how software is build and integrated, it's very hard to know how to procure what you need to buy – especially at boardroom level.'

'Businesses still confuse IT – I'll fix the photocopier for you – with technology – how can I turn my operating model upside down to drive efficiency, new ways of working, profit and sustainable growth. Boards setting business agendas don't know what they don't know.'

The fact that software languages are multiple and all completely different, pointed out the contributor, makes it almost impossible even for those with technical understanding to grasp what technology might be able to deliver.

'We need to see more people seeking to bridge the gap between a business' intent and what they think they want.'

Accessing digital

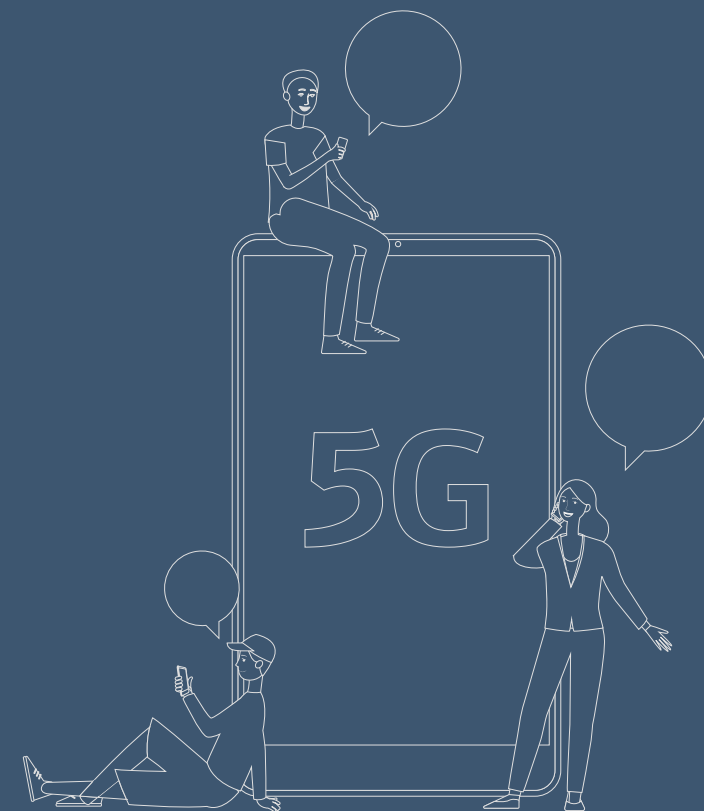
There are challenges here as well as opportunities. Access to hardware, social exclusion, a digital skills gap, lack of access to coverage and the high correlation between low digital access and social deprivation all present government and companies with pause for thought. Delivery of services digitally must not exclude those who need them in favour of those with a preference for them.



**THE ECOSYSTEM
HAS THREE MAIN
DEPENDENCIES: EDUCATION,
INFRASTRUCTURE AND
FUNDING.**

THE NEED FOR FIBRE

Technology is rife with the risk of not knowing what you don't know. The current conversation around the physical infrastructure needs to support faster communication and transmit vast volumes of data rapidly focuses on the imminent need to extend the fibre broadband network out across all areas of UK geography. Without fibre, 5G is a pipe dream, but one that almost everyone is aiming to deliver. It will be a game changer for the transmission of huge volumes of data, speed and quality and reach of coverage.



2 DATA: SECURITY, RISK, COMPLIANCE, BIG DATA, ANALYTICS, AI AND PREDICTIVE MODELLING

‘Data is the new oil.’

Not one, not two, but three separate respondents made this statement. Move over black gold, digital gold is the future. The value opportunity that data offers is vast, all agreed. Extracting that value on the other hand, is still very poorly understood, according to contributors, each, interestingly, from different sectors.

There was a general consensus that the recent introduction of General Data Protection Regulation – commonly referred to as GDPR – has actually been good for companies, despite the administrative headache that complying with it has posed.

‘GDPR is really helpful when it comes to thinking about data,’ said one respondent. ‘It forces companies to state up front what their intents are for the data they collect. That means they need to think about why they’re collecting data as well as simply collecting it with no purpose in mind.’

Before companies even reach this point however, they need to consider the flow of data within and between their business and its surroundings. One contributor noted that this concept of data flow can be helpfully analogised with the flow of oil.

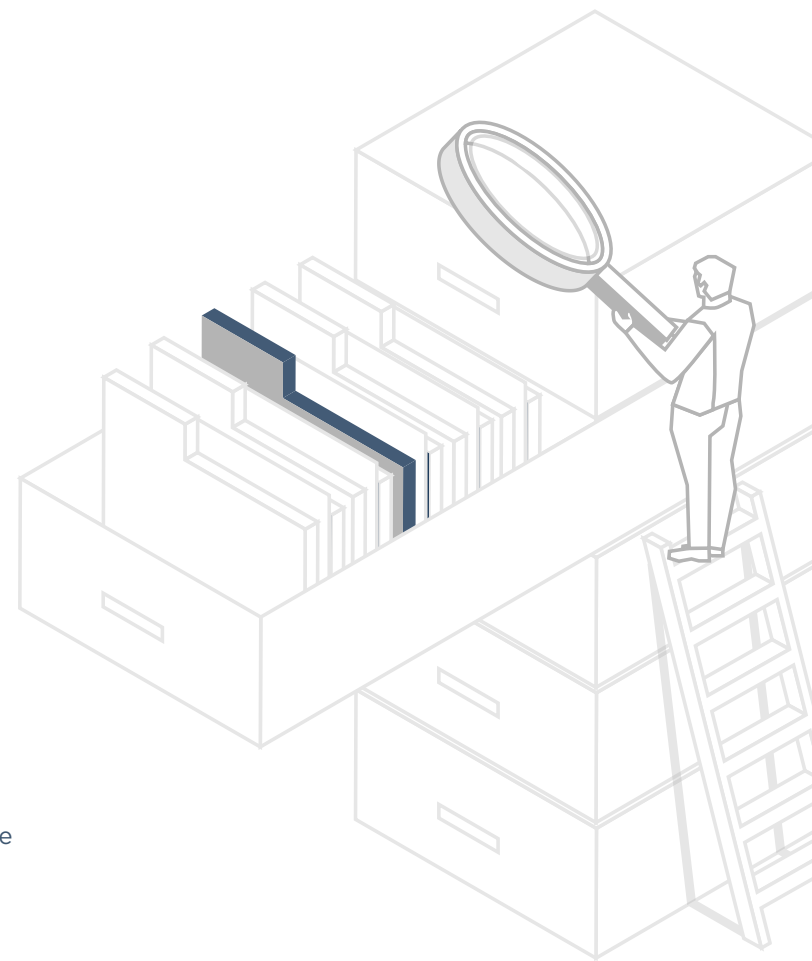
‘Data flow is now the most important flow in the world and in Scotland, we have a really good understanding of the engineering of flow. 60 per cent of Europe’s oil and gas flow from Scotland, Grangemouth Refinery is the biggest in Europe. As a nation, we understand how to map, model and ensure the safe and efficient flow of oil and gas through the use of complex engineering and decades of studying it.

‘Data flow hasn’t been studied or measured in this way properly yet and technology and IT infrastructure hasn’t always been designed or delivered based on stringent engineering principles.’

He pointed to ‘software sold as a solution’ and the plethora of coding languages. ‘Data flow has lacked the discipline, design and common language of engineering from the start. Mapping and modelling these data flows is now critical.’

All contributors agreed that data presents both the biggest risk facing businesses and at the same time, the biggest opportunity.

‘How businesses and even the Bank of England understand risk in the economy as well as at a firm level is now dependent on more than just the flow of money. Data is critical to risk assessment and mitigation,’ noted one contributor.



'Then there is the risk of turning data flow off – do business recovery plans consider the impact of a failure of energy supply to data centres that power data storage held in the cloud? This is why the flow of data is fundamental.'

Cyber security also relies on a much more accurate picture of data flow: without a map, blueprint or schematic, it does not seem straightforward to identify or address areas of weakness.

Another contributor observed that the existence and manipulation of data using analytics, machine learning and AI has changed reality.

'Data has meant that seeing is no longer believing,' they said. 'There's no smoke without fire has been true forever. But now, technology and data records mean smoke can be created without fire. This is the world we are now operating in, and I'm not sure businesses have really understood the implications.'

The power of data

Contributors from all sectors expressed real excitement about the opportunity data offers to improve all sorts of services. Healthcare was an example cited repeatedly and by several separate respondents. The case study below gives real world benefits made possible through the intelligent use of data and predictive analytics.

CASE STUDY: SEKOIA

'The untapped potential that data carries especially in a healthcare setting is huge and it's no exaggeration to say that it can have life-changing benefits,' said one. 'The ability to capture every interaction between a frontline staff and a service user, and through mapping of this data over time, the insight gathered can be extremely valuable.'

'Our customers already realise the benefits and see an increased quality of reporting by recording care digitally. However, we are ambitious in our vision for this, and want to take it one step further. So that they are not only analysing these events after they have occurred, but in time using AI in a way that will allow them to even pre-empt these occurrences.'

'For example, not only am I able to tell you why these falls or this infection occurred so you can be smarter about it tomorrow. But in time I can tell you that a fall is 'about to occur' or this person 'is likely to develop an infection', so you can prevent it from occurring in the first place. That is the goal.'

The Internet of Things

With 5G and fibre, the desire is to enable the internet of things to become a reality that can deliver on the vision outlined above. Sensors in patients' homes, wearable technology that monitors vital statistics and consistent and accurate transmission of this data is fundamental to delivering on this.



THE PROCESS OF COLLECTING, AGGREGATING AND ANALYSING DATA FOR THE PURPOSE OF SUCCESSFUL OPERATION IS NOTHING NEW FOR COMPANIES. HOWEVER, THE AMOUNT AND VARIETY OF DATA THEY USE HAS INCREASED DRAMATICALLY IN RECENT YEARS.

‘In fact, data have often become a central element in business models, posing fresh challenges to researchers and policymakers alike.

‘[The] data value-generation process [is based] on the concept of the ‘data value chain’. It is composed of four stages: i) data collection, ii) data aggregation, iii) data analysis, and iv) data use and monetisation, all of which are underpinned by data storage and (cross border) data flows.’

David Nguyen and Marta Paczos UK Economic Statistics Centre of Excellence

Source: OECD Digital Economy Papers no 297, August 2020

How do you value data?

This was a question raised by all contributors, all of whom noted there was no answer as yet. Some raised the debate currently ongoing around valuing data based on ‘the benefit it delivers to a business or organisation’. Others noted that there is a need to value data before the benefit materialises – how then is an accurate value ascertained?

‘This is especially pertinent when it comes to infrastructure. It is a physical piece of equipment which needs a geographical location – how do you value the land, or street furniture required to place a transmitter or receiver for example? Finding a means to do this that suits both the landlord who is leasing the land and the mobile operator who must demonstrate the business case for any investment is a huge challenge at the moment,’ said one.

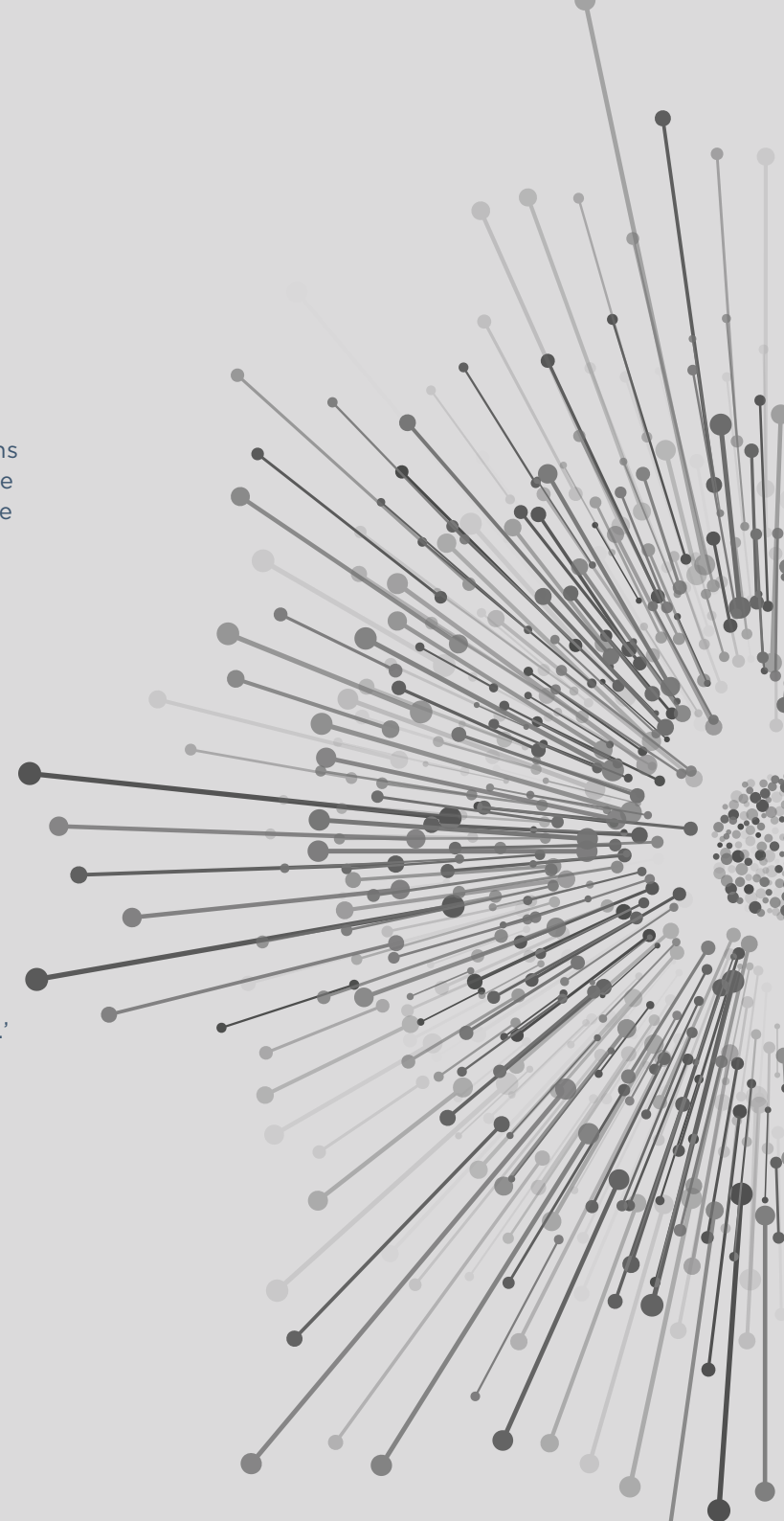
‘The insurance market could offer another potential avenue for deriving the value of data held by businesses, since insurance companies need to assess the value of data held inhouse or in data centres. Insurance against data breaches is becoming more important given the strong reliance on data by an increasing number of businesses.

‘Therefore, the pricing of (data) insurance as well as (possibly) negotiations around insurance claims in case of data breaches could both potentially be informative (although the latter could also include litigation payments or legal costs and hence go beyond the value of data per se).

‘Related to the insurance of data itself is the notion of insuring continuous service delivery against failures of enabling IT infrastructure, including data centres. Interruptions of service provision to the end-user can entail significant costs to businesses (loss of revenues as well as reputation).

‘Since under certain circumstances, the infrastructure providers might be liable for such losses, they take out insurance to protect themselves against such eventualities (Data Center Knowledge, July 2016). There are a number of factors shaping these estimations, including third party liability and first part losses.’

Source: OECD Digital Economy Papers no 297, August 2020





CASE STUDY: THE INDUSTRIAL INTERNET OF THINGS

Industrial manufacturing involves large capital expenditure on massive fixed infrastructure that is very rigid and tightly focused on one type of product. When production contracts are long, that model works. But technology has shifted customer behaviour and demand patterns, shortening contracts and making manufacturing business models unfit for a more flexible future.

In Scotland, the majority of production lines deliver supply chain manufacturing as third parties – they build the components that will feed in to engines or other machinery built elsewhere by larger organisations. While production lines within the automotive or aerospace industry where components are assembled, have moved to lean processes and just in time stock management long ago, for smaller manufacturers, the cost benefit of automating their fixed process has just not existed previously.

But the data available within the machinery in manufacturing processes is rich. It is not, currently, accessible. To address this, the National Manufacturing Institute Scotland has invested in research to extract this data, make it useable and ultimately enable commercially viable automation

of production processes that will be fit for the future.

‘These machines are not plug and play like laptops, with customer interfaces. The safety of the system is paramount in manufacturing, making it desirable for data to be inaccessible, reducing the likelihood of something going wrong. Every system is different, and uses different protocols and different bespoke hardware.

‘It’s one of the biggest barriers to creating the industrial internet of things, where machines can learn to identify malfunctions and fix them before they occur.

‘We are looking at how best to interface with the data locked into these systems to give us insight into where and how to improve the supply chain process. The key is to analyse data in as close to real time as possible.’

For this, the use of 5G with its seamless transition between digital infrastructures, will be fundamental.

‘So we are looking at deploying a private 5G network, mainly because it is ultra low latency and allows us to massively increase the number of devices we can connect in a stable environment.

We are looking to develop a test site that will allow businesses to test their systems in order to establish a business case for automating in this way.’

The opportunity that access to real time supply chain data offers is immense. ‘The whole model of manufacturing is to buy a product – your machinery – and hold it. But people nowadays don’t want a product, they want a solution to a problem.

‘Imagine a scenario where you can write a manufacturing process into an algorithm, which you can lease to anyone as a service, for a limited time and without them having the key to the algorithm. To know how to do that well and efficiently, you need to understand the systems much better than we currently do, relying on manual data printouts and after the fact reads.

‘With realtime data analysis across the entire manufacturing chain, what you can sell is completely transformed. In the same way that Netflix and Spotify turned the TV and music industries on their heads using streaming, at the same time as solving the loss of value created by pirating, it is theoretically possible to stream manufacturing data as a service, without even having to transfer data ownership so that value is protected.’

3 INFRASTRUCTURE: FIBRE, 5G AND CONNECTIVITY IN SCOTLAND

All contributors to this report recognised that fundamental to Scotland's future resilience and growth was investment in the infrastructure needed to deliver faster, more secure and more stable communications. The extension of the fibre network was considered the backbone of this infrastructure, particularly given that without it, the roll out of 5G nationally would be impossible.

Several contributors noted challenges in this area, including the commercial dynamics of the existing system. Currently, mobile networks and broadband operators are required to install fibre and masts to enable 5G. This requires the purchase or long-term leasing of land which is very hard to value. Additionally, the cost of laying fibre – while improved by recent changes to legislation giving all networks the right to use underground tubing owned by BT Openreach – remains disproportionately high, particularly in rural areas.

Given that this infrastructure is currently in the purview of private sector companies, all of which must demonstrate value to stakeholders, the return on this investment is key to getting infrastructure in and on the ground. Currently, the

returns on rural communications infrastructure are a barrier to its installation.

There is significant work ongoing between the Scottish government, UK government, public sector bodies, local authorities and the private sector to address this challenge. Several cross sector bodies have also been set up in Scotland and nationally in the past 18 months, specifically to join the dots on delivering infrastructure everywhere it is needed.

One said: 'Infrastructure is always a big part of the deployment of a system such as ours which runs on wifi and/or data. The implications of not having good connectivity in a remote location or an old structured building, will always pose a challenge.'

Every contributor to the report agreed that the roll out of 5G would be a game-changer across industries, and had the power to establish the bedrock for new technologies the UK can export globally – something that is of particular value following Brexit.

'We are big supporters of investment in infrastructure,' noted one contributor. 'This is the single biggest thing the economy needs to recover post-Covid.'

Scotland's international connectivity was also raised a number of times as being insufficient at present, and over-reliant on connections accessible through England, and mainly London.

'You have to think of data flows in the way you do trading and distribution lanes,' said one contributor. 'Connectivity is the thing that underpins this, and at the moment the whole of the UK is pretty poorly connected. This is the future economy and it has to start with public money invested in the right way.'

Another said: 'Scotland has no communications link with any other country in the world other than via England.'

They pointed to both Ireland and Singapore as good examples of governments funding public infrastructure, recognising that it would protect their global competitiveness in a future financed by data.

Scotland's limited number of data centres was raised as a potential stumbling block in the infrastructure puzzle. 'At the moment, we have between five and seven data centres across Scotland. That is not enough for the amount of data we are talking about generating, storing and using in the really quite near future,' noted one respondent.

'We need a more coherent national strategy on how to address this shortage – not just with massive data warehouses full of servers, but also at more local and central sites. How this plays into the net zero carbon targets is going to be critical. Dublin has done a really good job on pulling together energy policy and digital infrastructure policy. The two are increasingly interdependent.'

CONCLUSION

Resetting our frames of reference

From product to solution, social change and a new mindset

Scotland's technology sector is impossible to reduce into one report. It is entwined in everything individuals and businesses do day to day. It underpins the world of finance and of fishing, of oil production and the making of paper plates, of communication, social interaction and even political influence.

The global coronavirus pandemic has not changed the technology available to businesses seeking to improve their efficiency, reduce costs and deliver better service to their clients and customers. What it has done is to sharpen business leaders' focus on the strategic and corporate value that the clever use of technology can deliver.

One contributor to the report noted: 'The amount of data we are producing now is so vast, the human brain just isn't built to deal with that number of variables. It's why we built computers in the first place.'

Another added: 'The challenge we have across all societies is catching up with the technology itself. Data and networks have grown organically, exponentially, in multiple languages, reliant on vastly variable protocols, interfaces and hardware. Finding a language to describe this new ecosystem is the first step to giving it form and meaning so we can harness and use the potential it offers.'

Data is slippery, offering companies both risk and reward. That it flows not only around our national ecosystem of networks and platforms but instantly and without barrier over international borders also requires new thinking if governments are to protect the individual rights of their citizens. It is well known that technology giants Facebook, Apple, Netflix, Google and Amazon, Alibaba and Tencent have balance sheets larger than entire nations.

Governance of who owns what data, how it is valued and transacted as well as protected are the big questions societies which wish to keep (or take back) control of their individuals' most valuable future commodity must now ask themselves.



PROBLEMS. POSSIBILITIES.
COMPLEXITY. CLARITY.
OBSTACLES. OPPORTUNITIES.
THE DIFFERENCE IS IMAGINATION.

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