

Scotland's Tech Future

Contents

- Introduction ▲
- Scotland's tech landscape
- Don't fear the robots
- Diversity in technology
- Our innovations
- Appendix of contributors

Introduction

We are in a time of rapid transformation and change. From the moment we wake up to the sound of our morning alarms, to logging into work emails and ordering your dinner on food delivery apps, new technology has integrated itself into every part of our lives.

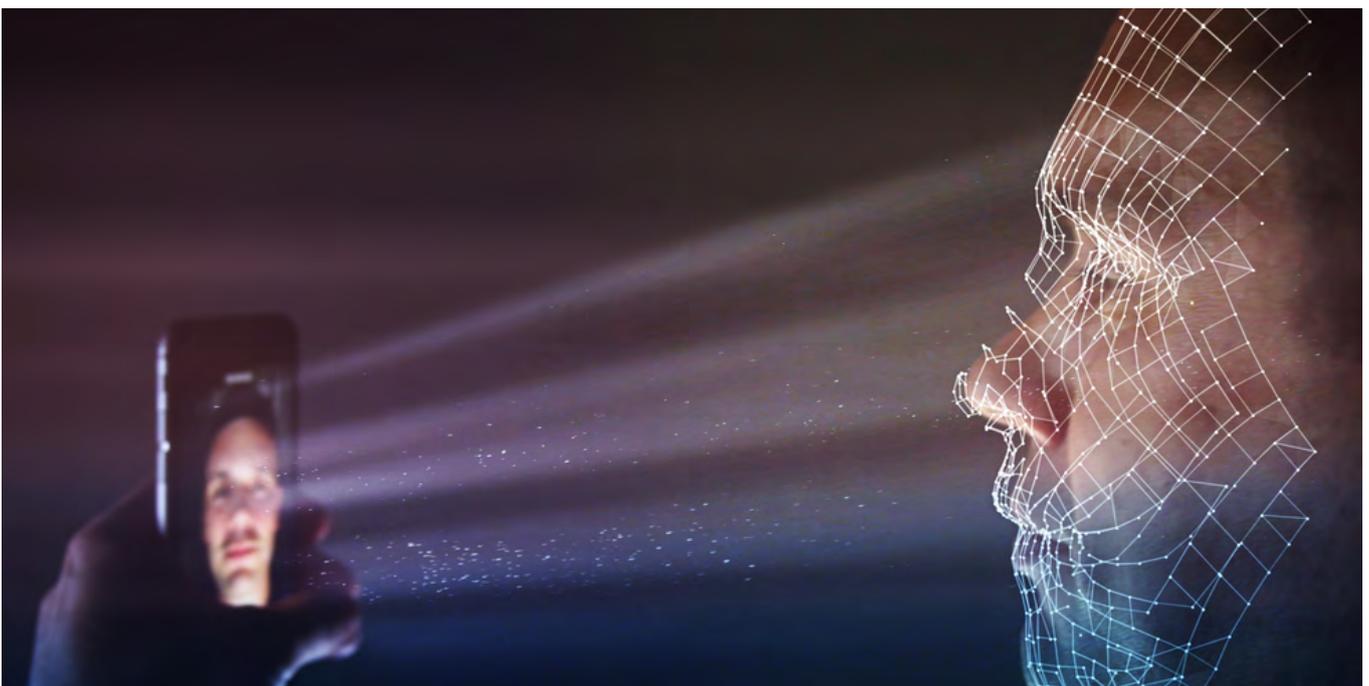
At Royal Bank of Scotland, we are continually developing and updating new products and features designed to make banking more convenient and secure for our customers. The past few years have seen numerous changes and technological innovations across the banking industry.

Technologies that would have been seen as a work of fiction are now a daily reality, with many of them now just a touch ID away.

Facial recognition is one such innovation. Until recently, the general public's experience of this technology would have been during the annual excitement of a summer holiday and passing through airport security. Today at Royal Bank of Scotland, Face ID is something our customers use to log in securely to their account when looking at their phones.

Artificial intelligence (AI) has been fodder for science fiction for decades, but in the last year we developed Cora, a web-based chatbot using the latest in AI that can answer basic customer queries. This year alone, Cora has held over one million conversations with customers and answering their questions.

Recognising how people live and work in the modern age and finding technology-led solutions to make the customer journey better is at the heart of everything we do at Royal Bank of Scotland. For example, we appreciate that keeping track of expenses can be challenging, so we introduced new features to our award-winning app such as Receipts and FreeAgent that help individuals and small businesses manage their finances. Looking for opportunities where there is a genuine customer issue is something that is incredibly important to us. Our customers expect personalised and seamless experiences across products, services and devices and we work hard to push the barriers and to develop solutions for them.



Scotland's Tech Future Survey

In October 2018, we took a detailed look at the attitudes of Scots towards technology. We explored the knowledge and understanding Scots have of modern inventions and the mindsets of Scottish consumers who are using technology as part of their everyday lives.

The findings from the research indicate Scotland is a nation that is adopting and benefiting from emerging technology, with 68% saying that new technology makes their life more efficient.

This report explores the exciting path that technology is taking and how consumers and businesses can adapt to make it part of the world we live in and what we at the Royal Bank of Scotland are doing to ensure our customers are always operating safely and securely.



Scotland's tech landscape

“We are, at heart, as much a technology company as we are a bank.”

- Kevin Hanley, Head of Innovation at Royal Bank of Scotland.

Scots have been at the heart of iconic inventions which have altered the course of human history and now play a key role in our everyday lives.

Pioneers such as John Logie Baird, Mary Somerville, Alexander Graham Bell and Willamina Fleming have helped Scotland become synonymous with technology and innovation.

Scotland's rich history of discovery and invention shows no sign of slowing down. Whether it's from the network of small businesses across the nation or the larger corporations representing Scotland on an international scale, discovery, exploration and striving for improvement are in Scotland's DNA.

Scottish inventions and discoveries that changed the world

- Refrigerator – William Cullen (1748)
- Discovery of Neptune – Mary Somerville (1846)
- Telephone – Alexander Graham Bell (1876)
- Classification of stars - Willamina Fleming (1888)
- Toaster – Alan MacMasters (1893)
- Television – John Logie Baird (1927)
- Penicillin – Sir Alexander Fleming (1928)
- RADAR – Sir Robert Alexander Watson-Watt (1935)
- Automated teller machines and PIN systems – James Goodfellow (1966)

According to Royal Bank research, 60% of Scots are most excited by instant access to information. This thirst for knowledge is most prevalent among older age groups, with more than 70% of those aged 65+ saying instant access is the most exciting aspect of technology for them.

Despite growing up in our 'always on' world, young people (aged 16-24) are the least motivated by instant access to information and would rate the speed and efficiency that technology brings as one of its greatest strengths.

Other key findings include:

- Over two thirds (68%) believe technology has made their lives more efficient
- Over a quarter (27%) are most excited by the potential medical developments of technology
- More than three quarters (83%) are comfortable acknowledging their strengths and weaknesses with technology

Royal Bank is at the heart of innovation

“From a banking perspective it’s hard to think of another industry that has gone through so much change, so quickly”

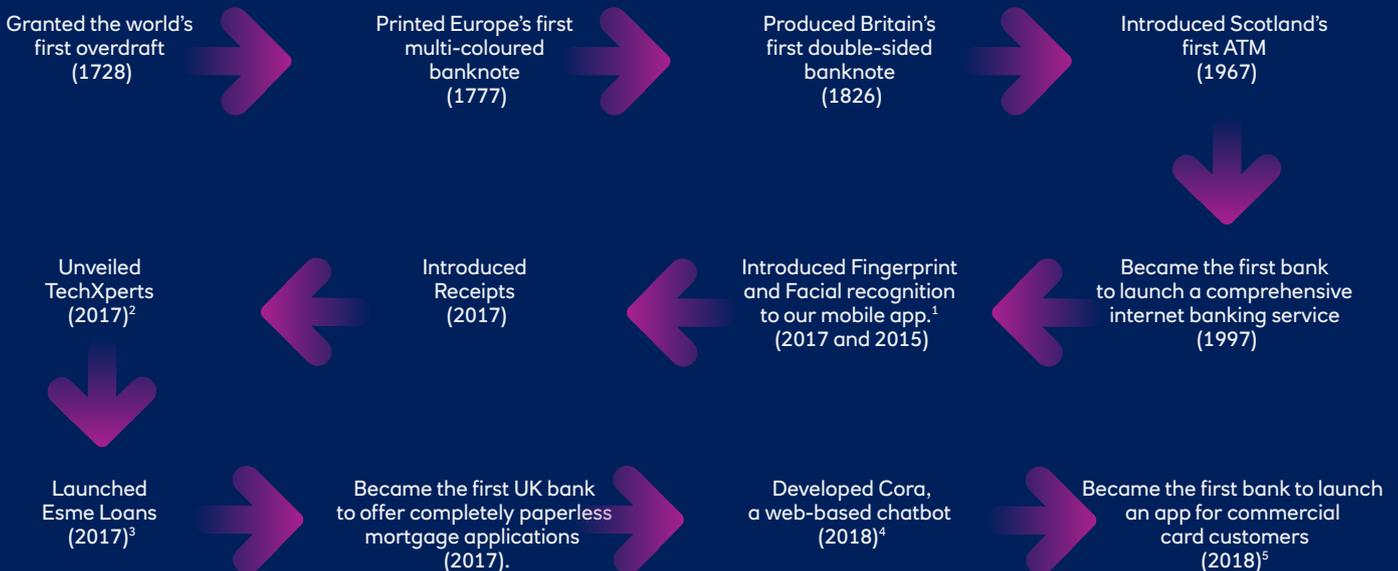
- Kevin Hanley, Head of Innovation at Royal Bank of Scotland

Royal Bank of Scotland has a proud tradition of being at the forefront of innovation.

From printing the first multi-coloured banknotes and installing some of the first ATMs, Royal Bank of Scotland is always looking to develop new products and services to better serve our customers’ needs. Sometimes it is even a case of developing products that customers didn’t realise they needed at the time – but couldn’t live without today.

The first ever smartphone was unveiled less than 30 years ago by IBM, yet today we run our lives from them. To consider what has been achieved in the technology sector in the last decade is astounding, particularly in the banking industry. It is a truly exciting era for banking with incredible opportunities on the horizon.

Timeline of Royal Bank development/system introductions through the centuries



1. We introduced Face and Fingerprint ID to our mobile app so customers can log in securely just by looking at their phone and International payments can now be made via the app.
 2. In every NatWest and Royal Bank of Scotland branches to help customers use online and mobile banking and raise awareness of other convenient ways to bank. Our TechXperts can demonstrate and teach you how to use every feature of mobile banking. This includes everything from staying safe online to registering for Digital Banking and using our mobile app
 3. A digital lending platform that allows UK-based SMEs to quickly obtain unsecured loans between £10,000 and £150,000.
 4. Cora, web-based chatbot, developed using the latest in artificial intelligence. In 2018, Cora has held over one million conversations with customers.
 5. ClearSpend is a free web and mobile app that gives commercial card customers complete control of their account in real-time, offering them greater visibility and control over business spending.

• **Mobile app:** App available to customers with Digital Banking and a UK or international mobile number in specific countries.
 • **Face ID and Fingerprint ID:** Apple Touch ID and Face ID available on selected Apple devices. Android Fingerprint available on selected Android devices..
 • **Esme:** Esme Loans targets UK SMEs Over 18 years old, a director of a UK Limited company, have been actively trading for at least 18 months turning over more than £15k per annum and able to provide a personal guarantee.
 • **Receipts:** Mobile App available to Digital Banking customers with a UK or international mobile number in specific countries. Receipts is available to Premier & Business Banking customers only. Available on iOS (9 and above) and Android (4.4 and above).

Reflecting on the current landscape, Wincie Wong, Head of Innovation for Supply Chain Services, Royal Bank of Scotland said: **“It is both breathtaking to witness and a privilege to be a part of the pace and scale of innovation taking place in today’s world. Concepts such as API (a set of tools for building software) and Open Data (freely available data without restriction from copyright and patents) are transforming and disrupting industries.**

“There is much greater transparency within the market and competitors are more able to see what each is doing. FinTech firms are learning from each other’s products, creating an ever-quickenning innovation loop where each discovery drives the next.”

So, how can we ensure we stay at the forefront of technology?

Royal Bank of Scotland’s development teams are consistently walking in the steps of customers to understand what makes life easier, faster and safer- and predicting the different paths they might follow next. One example of these efforts to stay ahead of the game is the newly designed, artificial intelligence-powered “digital human”, Cora.

Through Cora, Royal Bank of Scotland is the first UK bank to use artificial intelligence as a chatbot. Cora converses with customers in branches and has the ability to answer more than 200 queries, including “how do I log in to online banking?”, “how do I apply for a mortgage?”, “what do I do if I lose my card?”, as well as providing advice on fraud prevention and card payments.

From Cora and Artificial Intelligence to the latest developments in security features such as facial recognition and Fingerprint ID, the Royal Bank of Scotland is consistently pushing boundaries of innovation.

What does the future hold?

With such a rate of transformation and change within the industry, it is important to reflect on where we are now and what direction the sector is heading towards.

Louise Smith, Head of Digitisation, Personal and Business Banking, believes that the direction of travel has to be towards the customer: **“It is a massively exciting time in banking and financial services. There are thousands of opportunities appearing each day and the challenge is to decide what will bring the most benefit to our customers and society.”**

Taking a customer-centric approach requires a company to understand its customer base in order to design and innovate in ways that meet their needs.

“The core skill sets of problem solving and creativity will continue to be as relevant as they ever have been Smith added. However, I believe we will see an increasing blurring of the boundaries between creative industries which will require us to develop a broader skill set. We need an exciting, diverse mix of skills and people from every background to be involved in innovation because we need a workforce that will fundamentally reflect and understand our customer base. We must create experiences that our customers really want to engage with. ”

Don't fear the robots

While Scots are excited about the new world that technology is creating, there are aspects that give some people considerable concern.

The survey shows that for half of Scots (54%), the fear of personal information falling into the wrong hands creates some degree of nervousness.

There is some disparity between men and women around such concerns, as well as across age groups. Almost two thirds (60%) of women listed data and personal information as a concern compared to only 47% of men.

Perhaps unsurprisingly, 16-24-year-olds were the least concerned about data capture (43%) while over 65s felt this most strongly (69%). It is possible that this reflects the fact that younger age groups are more likely to think of themselves as digital natives and have grown up with technology that requires personal data playing an integral part of their everyday lives.

Being comfortable and confident with technology is important. From this year's Royal Bank Mobile Microleisure Report, we know that young people are also the least likely of all age groups to take measures such as installing security software on their mobile devices. With a greater percentage of their lives documented through data capture than ever before, it is important for society to help young people to make smart decisions on who they grant permission to use their data and how much data they provide.

At the Royal Bank of Scotland, we have recently introduced new measures to help our customers stay safe and secure online. From Digital TechXperts and Community Bankers placed in the heart of local communities across Scotland providing training and advice on mobile banking, to our Secure Banking Promise and the Little Book of Big Scams produced in partnership with Police Scotland, the Bank is always looking to stay one step ahead and protect our customers by using the latest technology.

Losing the human touch

Scots are also worried about the impact that technology is having on the way we interact with one another. Four out of ten Scots fear society losing social skills and human interaction as a result of technological development. Almost one third (31%) worry that too many aspects of modern life are reliant on technology.

Keeping pace

The pace of change is another theme which has been identified as a primary concern for Scots in the research:

- 21% of Scots fear having to keep up with the latest technology
- A further 21% fear the constant change that technological advances bring
- More than one in ten (12%) fear losing their job entirely to technology

Although the survey highlighted that Scots are, on the whole, open to technological innovation, the research also revealed that there was a lack of understanding when it came to certain products or tech and digital tools. Scots reported that they have a poor or very poor understanding of Blockchain (75%), Cryptocurrency (62%) and Artificial Intelligence (37%).

Blockchain: A digital record of transactions. The name comes from its structure in which individual records, called blocks, are linked together in a single list, called a chain. Blockchains are used for recording transactions made with cryptocurrencies.

Artificial Intelligence (AI): An area of computer science that emphasises the creation of intelligent machines that work and react like humans.

Cryptocurrency: A decentralised digital or virtual currency that uses cryptography for security. The first blockchain-based cryptocurrency was Bitcoin, which remains the most popular.

Internet of Things: The interconnection via the internet of computing devices embedded in every day objects, enabling them to send and receive data.

Open Data: Open data refers to the idea that some data should be freely available without restrictions from copyright, patents or other mechanisms of control.

Understanding of these things is greater the younger you are, with 21% of people aged 25-34 reporting that they have at least a good understanding of Blockchain technology, compared to just 4% of 55-64-year-olds.

There is a role for organisations such as Royal Bank when it comes to educating people about new technologies and making sure confidence is grounded in solid understanding and a knowledge of how to apply technology in a way that works best for individuals and businesses.

Dan Salmons, Director of Innovation at Royal Bank said:

“I’m tremendously positive about technology. Ultimately, we control it and it’s there to solve problems and to serve us.

“I remind people that Daleks can’t climb stairs, so it will be quite a long time before they take over the world.”

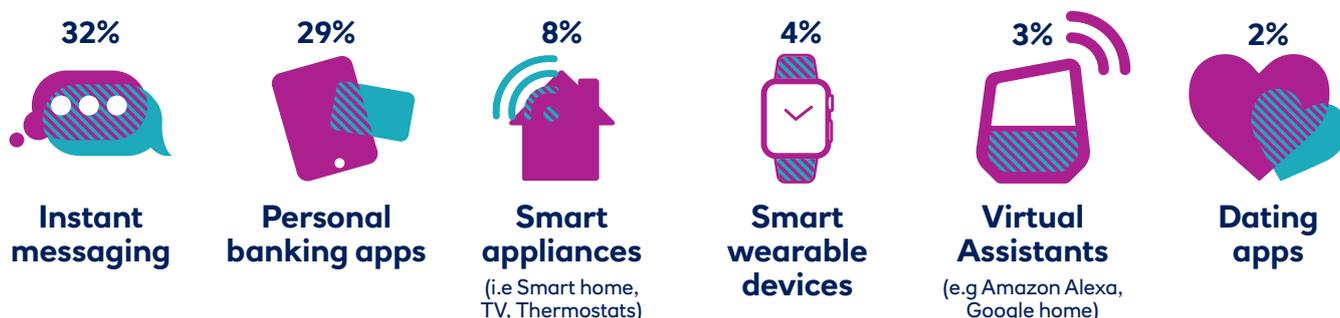
Building on those thoughts and commenting on the potential impact of technological change on businesses, Louise Smith, Head of Digitisation, Personal and Business Banking at Royal Bank of Scotland said:

“Robots are not going to take over the world, the key is how you combine humans with technology. The opportunity concerns how you work with customers and clients to connect into the latest technology to create the best experiences”.

The companies that are most successful in the future will be those that engage with a changing technological environment.

“You don’t have to have all the skill sets yourself. You don’t have to be coders or engineers: you’re the experts in the industry you’re in, and that’s still valid. But if you combine that with the technology, it becomes incredibly powerful.”

Over the past ten years, these are the inventions Scots say have made the biggest difference to their daily life.



Diversity in technology

A culturally and intellectually diverse workforce is the key to a forward-thinking business. It's about bringing together individuals, ages, backgrounds, cultures and preferences to help foster ideas, challenge the norm – an essential in innovation.

A business is likely to perform better financially if its workforce is more diverse. McKinsey and Co (2017) examined over 1,000 companies across 12 countries and found that firms in the top quartile for gender diversity are 21% more likely to enjoy above average profitability than companies in the bottom quartile.

Findings from the latest survey show that despite technology becoming increasingly incorporated into our daily work tasks, Scots perceive there to be significant barriers for women working in the technology industry with 40% of those polled believing so. Almost half (46%) of women surveyed agreed and this figure rose to 57% for those aged 16-24.

Futureproofing

According to Skills Development Scotland, the most recent ONS Annual Population Survey (2018) shows the number of women in tech has risen from 18% to 23.4% in the last two years, and has more than doubled in the last eight (rising from 10,300 in 2010 to 24,000 in 2018).

While this means a record number of females are joining the tech sector and that the number of women pursuing digital careers has risen by more than 30% in Scotland, there is still work to be done.



MoneyMatiX - a business customer at Royal Bank of Scotland

Tynah Matembe is the co-founder at MoneyMatiX, a personal finance management platform for the family aimed to give adults financial wellbeing and help them role model good financial habits for young people using fun interactive money management tools.

After spotting a gap in the market, Tynah and her business partner, Helene Rodger, decided to set up MoneyMatiX. Their research found that there was a necessity for more financial role models in education in local communities.

To engage with young minds, MoneyMatiX uses technology to make learning about finance fun. Creativity is a central theme with online tools including board games and quizzes as well as the Kidpreneur Challenge, a series of fun boot camps that seed healthy money habits by encouraging participation and group ideas.

MoneyMatiX Kidpreneur provides grounding for young people to apply enterprise, creativity, fun and wealth management by embracing their passions, creative energy and effectively exploiting their talents and gifts through entrepreneurship.

Tynah said: "We love to teach and interact with parents on how they can support their kids learn. It's very important to make it fun. By using game technology, we can encourage young people to be immediately interested – it's what has set us apart from others in the market and definitely given us a creative edge."

Kevin Hanley is Head of Innovation at the Royal Bank. He believes a desire to ‘create’ in all its forms requires more than technical skills but a capability to be curious.

“When I first started out in the industry I realised that what drove my ambition was a curiosity about what the future looked like and how I could be part of a team that shaped that.”

“The barriers for people looking to do anything in the technology space are far less now than they have ever been. Technology is becoming more democratised, cheaper and accessible. It’s an environment that is literally open to all at a cheap price point.”

“Our role at the Royal Bank is to inspire the curiosity. What will make young minds tick? How do we help them stay curious and interested? When we crack that nut, we’re set.”

Kristen Bennie, Head of Open Experience at Royal Bank: “The biggest barrier still lies in the industry’s ability to inspire women to study and subsequently pursue a career in science and technology. As a double arts major myself I came to technology via a more circuitous route from the worlds of branding, design, marketing and advertising.”

Royal Bank internal programmes

Royal Bank of Scotland runs a number of employee programmes to develop the best talent. The ‘Women Network’ was launched in 2017 to attract, retain and develop talented female members of staff and supports the bank’s aspiration to have a fully gender-balanced workforce by 2030.

The Rainbow Network has been providing insight, education and support to help members of the Lesbian, Gay, Bisexual and Transgender (LGBT) community since it was founded in 2005. It’s run by volunteers and uses the influence of the Royal Bank to make sure we provide the right services to customers, colleagues and communities.



Our innovations

Cora

Using the latest in artificial intelligence, we have developed Cora, a web-based chatbot that can answer basic customer queries. In 2018, Cora has held over one million conversations.

The service is available 24 hours a day. Customers interact with Cora by typing their questions into a chat window before an answer is presented by it moments later. Where Cora is not able to provide the information, the message will be sent to a human adviser for consideration.

We are also investing to build an evolution of Cora. In partnership with Soul Machines, we are giving Cora a visual avatar acting as the interface with customers. We're currently trialling the new Cora avatar with customers and the feedback so far has been excellent.

Receipts

We have introduced a Receipts feature to our mobile app which helps Premier and Business banking customers to manage their expenses digitally through the app.

This is just one of the improvements we have made to our mobile app. We've introduced Face ID to our mobile app so customers can log in securely just by looking at their phone and International payments can now be made via the app. New international payments must be made in Digital Banking before you can make payments to them through our app.

Clearspend

We became the first bank to launch an app for commercial card customers, ClearSpend, offering them greater visibility and control over business spending.

ClearSpend is a free web and mobile app that gives Commercial Cards customers complete control of their account in real-time and lets employees check their balance on the go. ClearSpend is a UK banking industry first and works across all the major platforms, whether that's Android, iOS or through your web browser.

TechXperts

We introduced a TechXpert to every one of our Royal Bank of Scotland branches to help customers use online and mobile banking and raise awareness of other convenient ways to bank.

Our TechXperts can demonstrate and teach you how to use every feature of mobile banking. This includes everything from staying safe online to registering for Digital Banking and using our mobile app as well as the do's and don'ts of digital and mobile banking. Our community bankers also host training sessions in digital and mobile banking in towns and villages across the country.

Esme Loans

We launched Esme Loans, a digital lending platform that allows UK-based SMEs to quickly obtain unsecured loans between £10,000 and £150,000. And we've bought FreeAgent, a FinTech that provides cloud-based accounting software for small business owners to track their finances, manage invoices and report their taxes digitally.

Appendix of contributors



Wincie Wong, Head of Innovation for Supply Chain Services, Royal Bank of Scotland

Wincie Wong is an international leader in FinTech and banking with a specific focus on growing inclusivity in technology-based industries. She works at the forefront of creative and disruptive innovations in the banking industry and her work involves harnessing change to create the best experiences for Royal Bank customers.

As a co-founder of the ‘Girls Can Code’ employee-led network at Royal Bank of Scotland, Wincie champions the cause of increasing female participation and inclusivity within technology.

“Recent studies have shown that only 15% of people working in STEM roles within the UK are women. In a 2017 survey which asked FinTech executives what skill they were looking for most often, the most popular answer was coding and software development.

“We can see already that companies are struggling for talent and resource in these specialist skillsets as they look to build their companies. This skill gap will remain the same if only half the population are working on it.

“One of the solutions lies in education; we need to discover how we can inspire more girls and people of different backgrounds (race, age, preferences) to enter into the world of coding. We need to position FinTech as a creative industry and ask ourselves what we can do to show people that technology is more than just something that runs in the background of life.

“At Royal Bank of Scotland, we have set ourselves the goal of being ranked number one for customer service, trust and advocacy by 2020. Customers need to be at the heart of everything we do. It’s our lifeblood. We owe it to them. All innovation has to have the customer at its core.”





Dan Salmons, Director of Innovation, Home Buying and Ownership

Dan has led innovation within the financial services sector for over 20 years. His current role, working with the specialist banking team, partners and FinTechs, is to define the future mortgage customer experience, drive digital transformation and bring new customer propositions to market.

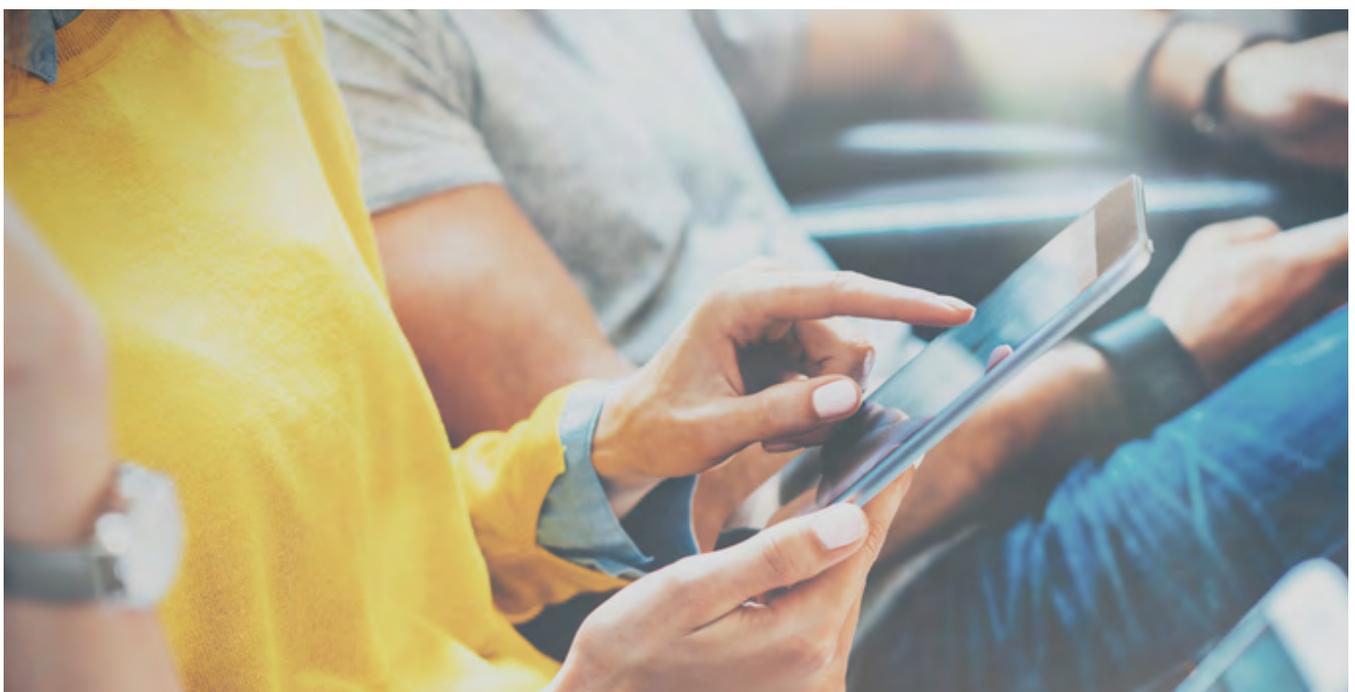
In his role as Director of Innovation, Dan is responsible for delivering innovation strategy at the Royal Bank of Scotland and making sure that internal systems are designed to best allow innovation to thrive. Part of that role is to make sure that he is in connection to innovative companies coming up with new developments in the industry.

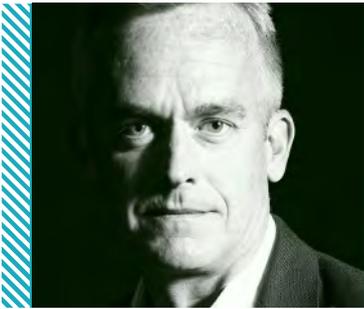
“I’m tremendously positive about technology. Ultimately, we control it and I think it’s there to solve problems and to serve us.

“However, I do have a concern around the phenomenal pace of change. With any change, there is always a risk that people get left behind. That being said, new technology doesn’t tend to completely replace the old, often it sits alongside existing technology in a new capacity. I believe that it’s up to us as humans to think thoughtfully about how we use technology to make sure that people have what they need. I always remind people that Daleks can’t climb stairs, so it will be quite a long time before they take over the world.

“I like new technology and I like old technology that continues to work but what I really like is new things that work better than old things. I love coming across a product that fits a hole that I know I’ve got. Innovation should solve a business problem. If you don’t have a problem, then don’t fix it.

“I love solving problems to help people see a way through any obstacles. The best things for me are the things which change customers lives even if it’s something small.”





Kevin Hanley, Head of Innovation

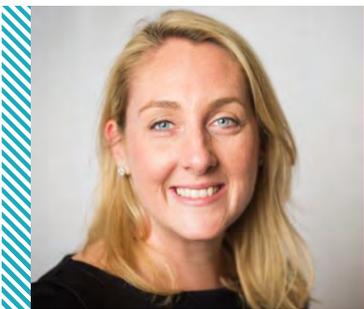
Kevin heads up the Innovation department at Royal Bank of Scotland, working across multiple business units to find creative solutions to the key challenges faced by the bank and its customers.

Kevin joined the Royal Bank as Chief Architect in 2009, bringing with him over 20 years of industry experience having worked within financial institutions in Europe and the United States of America.

He assumed the Head of Innovation position in May 2016. In his current role, Kevin's work is split into two parts. Firstly, he is responsible for creating an effective climate for change and innovation to thrive, engaging with the senior management team, business stakeholders and board members. He is also tasked with finding answers to the innovation challenges facing the bank.

“The greatest risk that we have as a bank is not changing quicker than the world around us. There is a disproportionate amount of our time in the industry looking out of a rear-view mirror and not the windscreen. At Royal Bank of Scotland, we are always coming up with creative ideas and solutions that suit a world that doesn't pass us by.

“The scale of innovation is huge, we are seeing fundamental changes taking place in the world of FinTech with increasing regularity. It is becoming harder and harder to be truly disruptive. We're looking for things that can be delivered into the hands of our customers at scale.”



Kristen Bennie, Head of Open Experience at Royal Bank of Scotland

Kristen led the creation of Open Experience at Royal Bank of Scotland. "OX" is a creative, collaborative space within the bank's headquarters at Gogarburn in Edinburgh which is dedicated to bringing people together from across the business and elsewhere to develop new innovative products, services and experiences.

As Head of Open Experience, Kristen works at the intersection of design and technology, working to revolutionise banking for customers. He oversees all operations within Open Experience, driving forward a strategy predicated on agility, immersion, problem-solving, collaboration and customer insight.

“The biggest barriers for technology and innovation still lie in the industry's ability to inspire women to study and subsequently pursue a career in science and technology. A double arts major myself I came to technology via a more circuitous route from the worlds of branding, design, marketing and advertising.

“Some of the most exciting innovation currently taking place focused on improving connectivity. Technology can have massively powerful benefits when it comes to bringing people closer to their friends and family as well as businesses with their customers. New technology helps inspire me that everything is possible. The only limits are our imagination. That thought alone is truly exciting.”



**Louise Smith,
Head of Digitisation, Personal and Business Banking Services**

As head of Digitisation, Louise is at the heart of preparing Royal Bank of Scotland for the future.

Louise is currently leading and implementing the Royal Bank's Personal and Business Banking transformation plan, using customer experience and insight to simplify and differentiate the service and activity that Royal Bank delivers to the public.

As a member of Royal Bank's regional Scotland Board, Louise drives the business' digital design and transformation activity, with a specific interest in areas including Artificial Intelligence, Open Banking, innovation and the human interface of new technologies.

Louise is Chair of the Scottish Financial Enterprise Fintech Steering Committee and is one of only two female Government Fintech ambassadors for Scotland. Louise is recognised at a national and international level and regularly contributes to thought leadership programmes, most recently, The India Fintech Forum in Mumbai and The Times Future Scotland series. She has also been published in The Times and Financial Times.

Louise has previously been listed in the BIMA Hot 100 for digital leadership.

“It is a massively exciting time in banking and financial services. There are thousands of opportunities appearing each day and the challenge is to decide which ones will bring the most benefit to our customers and society.

“Robots are not going to take over the world, the key is how you combine humans with technology. The opportunity concerns how you work with customers and clients to connect into the latest technology to create the best experiences.

“The core skill sets of problem solving and creativity will continue to be as relevant as they have ever been. However, I believe we will see an increasing blurring of the boundaries between creative industries which will require us to develop a broader skill set. We need an exciting, diverse mix of skills and people from every background to be involved in innovation because we need a workforce that will fundamentally reflect and understand our customer base. We must create experiences that our customers really want to engage with.

“The companies that are most successful in the future will be those that engage with a changing technological environment. You don't have to be coders or engineers: you're the experts in the industry you're in, and that's still valid. But if you combine that with the technology it becomes incredibly powerful.”