

# Research and innovation for UK FinTech

January  
2021

Authored by  
Gavin Powell, Nicola Anderson,  
Johnny Mayo, Stephen Ingledew

© 2020 Gavin Powell, Nicola Anderson, Johnny Mayo, Stephen Ingledew. All rights reserved.

Full Paper



“A new economy requires a new finance. A new finance to serve the digital economy, a new finance to support the major transactions underway across the globe and a new finance to increase the sectors resilience..... UK FinTech companies are creating this new finance, .....efforts will be even more effective if you have the right condition in which to innovate”

Mark Carney

Governor Bank of England, July 2013 - March 2020

A Platform for Innovation Speech

# Table of Contents

<b>TABLE OF CONTENTS</b> .....	<b>3</b>
<b>AUTHORS</b> .....	<b>1</b>
<b>FOREWORD</b> .....	<b>2</b>
<b>DEFINING FINTECH</b> .....	<b>3</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>5</b>
<b>1. THE UK'S FINTECH OPPORTUNITY</b> .....	<b>9</b>
1.1. UK FINTECH IS ENABLING NEW FINANCE.....	9
1.2. A PROGRESSIVE REGULATORY ENVIRONMENT .....	11
1.3. THE STRATEGIC IMPERATIVE OF DATA .....	12
1.4. REGIONAL FINTECH ECOSYSTEMS OR CLUSTERS .....	12
<i>FinTech in Scotland</i> .....	13
<i>FinTech in Wales</i> .....	14
1.5. COMPLEMENTING REGIONS .....	16
1.6. GLOBAL COMPARISON .....	17
1.7. THE POTENTIAL IMPACT FROM UK FINTECH.....	17
1.8. THE RIGHT CONDITIONS FOR FINTECH R&I.....	18
<b>2. BUILDING A FINTECH R&amp;I STRATEGY FOR THE UK</b> .....	<b>20</b>
2.1. INCLUSIVE COLLABORATION, DATA DRIVEN AND COMMUNITY OWNED .....	21
2.2. LONG TERM PLANNING, ROAD-MAPPING AND COMMON CHALLENGES.....	21
<i>Early indications of common challenges, disruptors and cross sector opportunities</i> .....	22
2.3. A GOVERNANCE APPROACH THAT WORKS NATIONALLY AND REGIONALLY .....	23
2.4. ALIGNING TO FINTECH WAYS OF WORKING AND AGILE INNOVATION .....	24
2.5. INNOVATION DIFFUSION.....	25
2.6. REGIONAL CONTRIBUTION.....	26
<i>Regional activities in action</i> .....	26
<i>Working to Build Scotland's FinTech research and innovation roadmap</i> .....	27
<i>Working to Build Wales' FinTech research and innovation roadmap</i> .....	28
<b>3. THE SIGNIFICANCE OF FINTECH</b> .....	<b>31</b>
3.1. FINTECH WILL SUPPORT THE DIGITAL ECONOMY, THE MOVEMENT OF MONEY AND EXCHANGE OF VALUE....	31
3.2. THE POTENTIAL FOR CROSS SECTOR VALUE .....	32
<i>Cross-sector case study - FinTech in Agriculture</i> .....	33
<i>Cross-sector case study – FinTech in Electricity, Energy and Net Zero</i> .....	34
<i>Cross-sector case study – FinTech in Health Care</i> .....	34
<i>Cross-Sector case study – FinTech in Oil and Gas</i> .....	34
3.3. ALIGNMENT TO THE UK'S INDUSTRIAL STRATEGY .....	35
<i>Industrial strategy – Artificial intelligence and financial services data</i> .....	35
<i>Industrial strategy - Ageing society</i> .....	35
<i>Industrial strategy - Clean growth</i> .....	36
<i>Industrial strategy - Future of mobility</i> .....	36
<i>Cyber by design</i> .....	37
<b>4. REALISING THE FINTECH R&amp;I AMBITION</b> .....	<b>38</b>
<i>Scale of the ambition</i> .....	40

<b>5. OUR FINDINGS SUMMARISED .....</b>	<b>43</b>
<b>6. CONCLUSION .....</b>	<b>45</b>
<b>APPENDIX .....</b>	<b>46</b>
<i>APPX-1 FinTech Scotland ecosystem .....</i>	<i>46</i>
<i>APPX-2 Global Analysis .....</i>	<i>47</i>
<i>APPX-3 Ways of working.....</i>	<i>50</i>
<i>APPX-4 FinTech Wales innovation roadmapping.....</i>	<i>53</i>
<b>ABBREVIATIONS .....</b>	<b>58</b>

## Authors

Scotland and Wales are two of a number of UK regions that have FinTech representation, that not only interact with that regional sector but also with HM Treasury through the appointed FinTech Envoys. This paper is the view of the authors from the perspective of those relative regions.



**Gavin Powell, Director FinTech Wales (Connect & Convey)**



**Nicola Anderson, CEO FinTech Scotland**



**Johnny Mayo, Strategic Advisor FinTech Wales**



**Stephen Ingledeew, Executive Chairman FinTech Scotland**

We would like to acknowledge all those who contributed to this work, the FCA, University of Edinburgh, University of Cardiff, University of Strathclyde, as well as Cardiff City Region, Scottish Enterprise and the FinTech Cluster businesses and partners in both Scotland and Wales.

# Foreword

Fintech, or the application of new technologies and data to the financial services sector, is already transforming financial transactions across our personal and working lives.

These transformations offer the opportunity to enable, sustainable and inclusive innovations such as green finance, prevention of fraud, or offer better choice in managing money and debt, as a step towards eliminating poverty.

These changes are significant for the UK's financial services sector and the wider digitally driven economy and society. FinTech has already become a global movement and is evolving at rapid pace as technology and data capabilities enable innovation at scale. The rise of FinTech-enabled economies around the world are presenting competition to the standing of the UK's financial services. Growth of FinTech in the UK is, therefore, important for securing future sustainable economic growth, skilled employment and improved productivity, as well as maintaining our position as a leader in the global digital economy.

The combination of a respected and robust financial services sector, an innovative and entrepreneurial tech sector and respected regulators and business laws, has enabled record levels of investment in new financial innovations. However, progress could be accelerated by unleashing collaborative innovation and research opportunities, as observed in other sectors of the economy such as aerospace, life sciences and engineering.

For the UK financial services sector to retain its coveted status as a world leading centre and adapt to a post-Brexit and post-Covid-19 environment, a paradigm shift is required. This will include adoption of FinTech innovation across the whole financial services sector, the broader economy and society. A more strategic and systematic approach to research and development (R&D) is also required, to drive cross-industry collaboration, inclusive citizen participation and academic engagement.

FinTech Innovation provides the opportunity for the UK to leverage the capabilities and expertise that exists across the UK regions and devolved nations, and ensure the benefits are embraced beyond London.

This paper demonstrates the imperative to act and to ensure the UK, as a whole, embraces Fintech innovation across the financial services sector and the broader economy; leveraging regional skills and expertise to execute a unified strategy and unleash the full potential of all nations and regions within the UK.

**Ian Campbell**

**Innovate UK CEO (Interim)**

**November 2020**

## Defining FinTech

Financial Services (FS) are defined by Oxford Dictionary Press as '*professional services involving the investment, lending, and management of money and assets.*' Professional Financial services are a key part of the UK economy, utilised by all sectors, and historically, provided through typical means and organisations.

FS is a sector made up of companies that provide finance related services and products. Originally those companies relied on labour intensive methods to create and supply those products and services. As technology has matured it has been utilised to improve the efficiency and effectiveness of those companies, and their existing products and services. Recent advances in technology and regulation has allowed technology centric companies to exist, offering variants of existing products and services, or new products and services, which are driven and enabled by technology. Generally working under different business and operational models to the more traditional companies in the sector allows them to be disruptive.

*For this paper we define FinTech as being technology used as part of the delivery of financial products and services.*

*A FinTech company is one that has a business and operational model based around fintech enabled products and services.*

A FinTech company can i) offer variants of existing products and services through application of technology to reduce labour time and cost and be much leaner and agile in operation. ii) leverage from technological advances and changes in financial and regulatory practices to offer new and different products and services.

FinTech development is radically transforming how people and businesses engage with money. FinTech represents a significant disruptive force both economically and socially and is becoming revolutionary to both the FS sector and the wider digital economy.

This sector has been dominated by large incumbent multinationals and difficult market barriers to entry. Combined with high regulatory compliance thresholds, risk adverse cultures and a lack of disrupting factors, the status quo and sector dynamics have remained relatively unchanged over the decades.

We are now starting to see changes in policy and regulation aimed at improving competition and reducing barriers to entry. When married with the maturation of both generic enabling technologies, and more specific financial ones, the opportunity has been created for FinTech to, not only disrupt FS but become a revolutionary enabler across all sectors. FinTech companies are challenging existing FS offerings and enabling new products and business model opportunities across current and emerging sectors.

FinTech has transitioned from a term describing the technology to support FS into its own ecosystem or cluster of communities, business models, organisations, best practices, products, services and relevant technologies.

FinTech is becoming an umbrella term that covers all aspects of technology in finance and in the evolution of the digital economy. There are a number of different terms connected to FinTech that describe the predominant focus of the FinTech business, these include Bankingtech, Paytech, Insuretech, LendingTech, Wealthtech and RegTech (Technology used to support regulatory compliance) and others. This paper acknowledges the importance of all of these terms in the development and evolution of FinTech and uses the term FinTech in a variety of settings including:

- Technology created, deployed and used to enable improvements in the FS sector
- New technology focussed entrants to the FS sector, competing with incumbents and offering FS products and services to businesses and consumers e.g. Digital Banks, peer to peer lending platforms
- New technology focussed entrants to the digital economy utilising finance and technology to offer new and different processes that could service all sectors of the economy. e.g. (payments related) digital currency, e-money, (financial data security/cyber)
- New technology focussed entrants that support and enable new and changed business models for existing and emerging sectors e.g. blockchain



## Executive summary

Powered by new technologies, the way we live our lives and the way we do business is being transformed across the world. FinTech, integrates finance with technology in ways that will change the emerging digital economy to enable progressive financial services sector that will serve the future.

The UK has a world leading Financial Services sector which is one of the country's most valuable economic assets and one where FinTech will play a major role in its future success and sustainability. FinTech is also critical to the wider economy as both established and emerging sectors increase their usage of, and reliance on, FinTech.

However, when compared to other economic sectors, an effective environment with mechanisms to encourage collaborative FinTech and FS Research & Innovation (R&I) ideas, and see them through to exploitation, is missing for the UK. R&I that does occur is closed, the necessary long-term planning in support of collaborative research doesn't happen, and skills agendas are often reactive rather than proactive.

A focus on FinTech innovation, and the disruptive nature of its application, that leverages the strengths and capabilities from the regions across the UK, is imperative for the UK to secure future sustainable economic growth, improved productivity, social inclusion as well as being a global digital economy leader.

### **The FS sector is critical to the UK economy.**

It is fundamental in facilitating people's everyday lives and providing vital services that keep businesses working and the economy operating.

The way we move money, save, borrow and bank is changing significantly. The application of new technologies to traditional businesses and personal finance processes including banking, working capital, supply chain, payments, deposits, investments, pensions, lending, insurance and capital markets, is driving financial innovation.

Changes are needed as the digital economy emerges and permeates all aspects of business and society. Uber, the world's largest taxi company, owns no vehicles. It does however use apps and FinTech to operate a significant part of its business. Airbnb, the world's largest accommodation provider, owns no real estate, but uses digital practices and FinTech to operate.

### **Innovations emerging from FinTech are significant.**

FinTech is replacing traditional systems and methods. Opportunities are created by offering better services and products and enabling the creation of new business models. FinTech brings with it greater efficiencies, economies of scale and promotes financial inclusion.

Notable changes to date include digital banking; alternative finance through peer to peer lending and crowdfunding investment; electronic-money and digital payments;

digital currencies; chat bot services and robotic advice; digital platforms and comparison websites for insurance, credit cards and other financial products.

### **Global comparisons show we need to act.**

FinTech is still young and developing, and the UK needs to work hard to secure and maintain its place in the face of stiff competition from the rest of the world, and in particular, Asia, China and North America.

### **The impact of Fintech will be felt across all sectors.**

We are beginning to understand the true versatility of FinTech and the role it will play in the developing and emerging digital economy.

FinTech is starting to become a horizontal application as sectors of the economy look for new ways to access finance, meet customer expectations and support more agile ways to move money and provide value. Analysis already shows opportunity and a need for FinTech applications in the Energy sectors, the future of Oil and Gas, and 'Cleantech', and Agriculture.

FinTech also presents a significant opportunity to progress 'Green Finance' with use cases developing for renewable energy and carbon credits, and climate finance through innovations in climate-related and values-related investments.

### **Existing UK capabilities need to be leveraged.**

The UK has a well-regarded combination of a robust financial services sector, an innovative and entrepreneurial culture, respected regulators and business laws. This has helped attract record levels of investment capital in new financial technology innovations and enabled the UK to build a reputation as a significant global FinTech hub. FinTech can offer products and services to support the UK in this disrupted world, as well as being an industry that is positioned and placed to grow and stimulate economic activity.

However, the work so far has been iterative, needs better industry engagement and a larger scale strategic collaborative approach that could help significantly realise the benefits of such methods.

For the financial services sector to retain its coveted status as a world leading centre and adapt to a post Brexit and post COVID19 environment, then a significant paradigm shift is required including the meaningful adoption of FinTech innovation across all aspects of the finances and broader economy.

HM Treasury has announced a FinTech review<sup>1</sup> that has been considering "How the UK can continue to foster innovation", and "promote the integration of new technologies across financial services" to support the ongoing success of the UK FinTech sector.

---

<sup>1</sup> [HMT - Fintech review ToRs June 2020](#)

This paper brings a specific focus to the role of R&I in both the FS sector and the broader digital economy and complements the HM Treasury FinTech Review on skills, policy, investment etc.

R&I plays a major role in the progression of FinTech, and as such ensuring the best environment and mechanisms exist in the UK is paramount to its success.

### **The regions of the UK have a significant role to play.**

Regional strengths are epitomised by the integrated and connected FinTech clusters and enterprise led by FinTech bodies across the four nations of the UK including FinTech Scotland, FinTech Wales, FinTech Northern Ireland, as well as further regional representation in England, through FinTech North, FinTech West and Innovate Finance.

The FinTech bodies across the four nations have formed the Fintech National Network enabling collaborative and inclusive discussion and national FinTech connections.

This paper uses the FinTech clusters in Scotland and Wales to illustrate the networks experiences, and collaborations in the regions. These are both representative examples of the growing FinTech capabilities across the regions of the UK. Each is home to experienced and developing financial services economies, technological capabilities, excellent academic communities, an innovative and diversified talent pool, and an ever-increasing number of opportunities specific to the field of FinTech.

The paper proposes that utilising the UK's regional developments through a collaborative and more strategic approach to FinTech R&I will augment and advance the fuller UK opportunity, building the resilience and interoperability required to serve the broader economy.

### **A FinTech R&I strategy for the UK is essential.**

Bodies such as Innovate UK perform a key role in driving and steering 'good innovation' across the country with the research councils performing similar for their respective areas and supporting research. The expertise of UKRI is vital in ensuring the UK has a long-term vision and remains resilient across key future sectors of the UK economy, including FinTech.

This report encourages UKRI and bodies such as Innovate UK to play a role in the future development of FinTech in the UK, to drive the FinTech innovation environment and pipeline, from early stage research through to application and exploitation.

It also considers the opportunity to further strengthen the economic potential of FinTech, supporting and building on the March 2015 'FinTech Futures' report<sup>2</sup> by then Government Chief Scientific Advisor, Sir Mark Walport.

The 'FinTech Futures' report made recommendations on how the government, regulators and academia can adopt FinTech innovations to better serve consumers,

---

<sup>2</sup> [Mark Walport - FinTech Futures](#)

businesses and the financial services sector as a whole. Since then, the UK financial services regulators, the FCA and the Bank of England have progressed their position, acknowledging the role of technology in financial services and the opportunity for R&I to support new finance for the digital economy.

The HM Treasury FinTech review and this report continue to recognise the value and opportunity FinTech offers the UK economy, supporting and further complementing the earlier review.

The recommendations below are intended to provide the foundations needed to support the necessary evolution of FinTech R&I to support the UK economy, creating opportunities that build on the remarkable and developing regional strengths<sup>3</sup>, knowledge and expertise, and protect the UK's standing as a global competitor.

### **Proposal**

This paper proposes that as key economic enablers bodies such as Innovate UK and UKRI play a primary role in the development of UK FinTech R&I. It also proposes that intervention and collaboration are required to transition the current R&I environment for UK FinTech to protect and grow existing activity, while adding resilience and utilising the growing regional capabilities.

Our proposals ask that Innovate UK works across the regions of the UK to develop a strategic approach that utilises the regional capabilities and developed ecosystems, advancing business led research and creating economic development through regional success, enterprise and skills for the future.

The imperative to act on this is now to build a longer-term R&I plan that leverages the regional skills and expertise to execute a unified strategy and develop the necessary mechanisms to support greater collaboration, delivery and implementation.

Drawing on the experiences of the regional FinTech clusters in the UK, it is our view that focus on R&I in FinTech, and the disruptive nature of its application, is imperative for the UK in securing future sustainable economic growth.

---

<sup>3</sup> [UK Gov - UK Research and Development Roadmap](#)

# 1. The UK's FinTech opportunity

FinTech is growing and will impact the UK economy at scale. The opportunity is driven by a number of factors.

## 1.1. UK FinTech is enabling new finance

An innovative FS sector and a developing digital economy requires a modern digital infrastructure that is safe, secure and resilient. Change is here to stay for the FS sector and that will have an impact for us all, including citizens, businesses, regulators, industry and the economy.

FS is critical to the UK. It's contribution to the economy was £132bn<sup>4</sup> in 2018 (6.9% of total UK economic output). It accounts for 1.1 million jobs (3.1% of UK jobs) and contributed £29bn in tax in the UK in 2017/2018.

It's of equal importance to the UK regions, as shown in Figure 1, contributing £9.2bn to the Scottish economy in 2017, with 84,000 jobs, while in Wales £2.8bn was put into the economy from 33,000 jobs<sup>5</sup>. As well as being a significant provider of jobs, it is the largest contributor of taxation for the nation and the most internationally competitive industry in the UK.

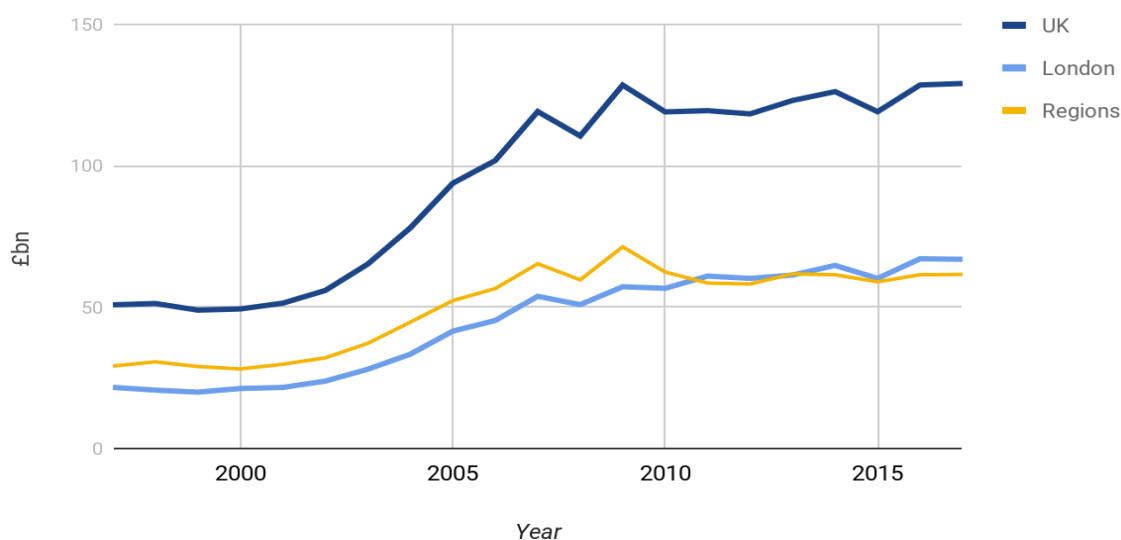


Figure 1 GVA (income approach) for financial services

Technology is accelerating change in this sector and across the digital economy. FinTech developments are transforming FS. In 2019, 56% of traditional financial institutions had put technology disruption at the heart of their strategy and 82% of incumbents expected to increase FinTech partnerships in the following three to five-year period.

<sup>4</sup> [House of Commons Library - Financial services: contribution to the UK economy](#)

<sup>5</sup> [Office for National Statistics - Regional economic activity by gross value added \(balanced\), UK: 1998 to 2017](#)

FinTech is at the heart of enabling a new disruptive finance and is driving change across the full spectrum of financial services and products. Its transformative effect has started to define the direction, shape and pace of change across almost every financial services subsector providing a genuine, creative and fast-moving force.

There are currently over 1,600<sup>6</sup> FinTech SMEs across the UK, generating yearly revenues of £11bn and employing 76,500 people UK wide. Employment numbers were anticipated to reach 105,500 by 2030, and 42% of workers in UK FinTech are from overseas. Numbers are expected to increase significantly as FinTech is integrated into the wider digital economy, across existing sectors and enabling emerging sectors.

Consumer adoption is also growing, with 71%<sup>7</sup> of the digitally active population in the UK already using some FinTech and more than 22 million<sup>8</sup> people using banking apps to regularly access their accounts, make payments, transfer money or communicate with their account provider whenever and wherever they please. This level of adoption places the UK ahead of the global average of 63%. Global leaders for consumer FinTech adoption continue to be China and India (87%)<sup>9</sup>.

FinTech growth across the UK has been enabled by a number of key factors.

- Nationally through:
  - A supportive investment landscape;
  - A robust and progressive regulatory regime;
  - Maturation of enabling generic and specific technologies; and
  - Advancements in the control, availability and strategic importance of data.
- Regionally through:
  - Devolved government support;
  - A series of FinTech bodies and hubs that build connected clusters encouraging impactful collaboration and knowledge sharing

### **Investment opportunities continue to show growth**

*In 2019, the UK FinTech sector saw record investment of \$48.5bn<sup>10</sup> growing from \$25.4bn in 2018. This accounted for half of Europe's ten biggest deals and over 80% of the continent's overall FinTech funding of \$58bn. The US and Asia also saw record levels of investment and global investment in FinTech reached \$137.5bn in 2019.*

<sup>6</sup> [UK FinTech - State of the Nation](#)

<sup>7</sup> [EY - Global FinTech Adoption Index 2019](#)

<sup>8</sup> [UK Finance – The Way We Bank Now](#)

<sup>9</sup> [EY - Global FinTech Adoption Index 2019](#)

<sup>10</sup> [KPMG - Pulse of Fintech H2 2019](#)

## 1.2. A progressive regulatory environment

With initiatives such as the Regulatory Sandbox<sup>11</sup>, Tech-Sprints<sup>12</sup> and the Global Financial Innovation Network<sup>13</sup>, the UK's Financial Conduct Authority (FCA) has been a global pioneer in regards its innovation agenda. It is currently working to further evolve its innovation approach through enhancing the current sandbox, accelerated to support innovative initiatives that will help address challenges caused by the COVID-19 pandemic<sup>14</sup>.

The Bank of England is also looking forward and considering the 'Future of Finance'. In a recent review that summarised the emergence of a new economy, it outlined that regulators and the private sector can collaborate in new ways as technology breaks down barriers.<sup>15</sup>

Changing regulations and planned Bank of England (BoE) changes to the payments and settlement infrastructure<sup>16</sup> will enable even further advances for FinTech in the payments market and movement of money. Its anticipated that these structural changes will allow increased access to a resilient and secure infrastructure enabling money to move across businesses, borders and individuals in real time.

This opens up the concept of payments as a service and could enable a future of around the clock access to the real time movement of money and digital currency. In turn it can help progress a range of possibilities for the broader economy and helps FinTech provide disruptive opportunities for other economic sectors such as energy, transport, construction and agriculture.

Both regulators are working with the Alan Turing Institute (ATI) exploring AI transparency in financial services<sup>17</sup> and are committed to supporting the right environment to foster innovation in regulation.

These collaborative initiatives from the UK regulators are helping to fuel FinTech innovation building an essential environment to foster technology application to meet regulatory obligations and advance RegTech<sup>18</sup>, a key aspect of FinTech developments and fundamental for the future of financial services regulation.

The UK regulators continue to push boundaries and lead international developments on the future of innovation, technology and data in Financial Services.

---

<sup>11</sup> [FCA - Innovation](#)

<sup>12</sup> [FCA - Tech Sprints](#)

<sup>13</sup> [Global Financial Innovation Network](#)

<sup>14</sup> [FCA - Regulatory sandbox](#)

<sup>15</sup> [Bank of England - The future of finance report](#)

<sup>16</sup> [BoE - RTGS renewal programme](#)

<sup>17</sup> [FCA - BoE ATI](#)

<sup>18</sup> [FCA - RegTech](#)

### 1.3. The strategic imperative of data

Data has a significant role to play in the future of business and FinTech development both in the UK and globally. Its strategic importance to the development of the UK economy is recognised through the National Data Strategy<sup>19</sup> and UK City Region Deals<sup>20</sup>.

Advances through 'Open Banking'<sup>21</sup>, generated a series of UK regulatory reforms that introduced a significant change in FinTech and innovators ability to access new data. Consumers and businesses now have the freedom to share their financial data with third parties. It has required the UK's largest banks to enable secure access to this data using a consistent set of technical standards and is a powerful change enabling research and innovation and prompting further discussion on the topic of 'Open Finance' to include other sectors.

FinTech's data analytic capabilities will be vital in helping address new and developing business and consumer needs. As the UK's digital economy develops and recovers from the impact of COVID-19 there will be an increasingly greater need to develop finance products that serve the needs of the changing workforce. New products and services that have the ability to continuously adapt and bend with new ways of working, changing work patterns and business needs will be vital.

#### **A strong national toolkit**

*The combination of regulation, infrastructure and data creates a strong set of national tools to enable further FinTech innovation.*

*Including bodies such as Innovate UK and UKRI support would further strengthen the national tool kit for FinTech innovation, and importantly, provide a further strategic influence to create a longer-term plan for FinTech innovation.*

### 1.4. Regional FinTech Ecosystems or Clusters

The regions of the UK also strengthen the UK's FinTech tool kit. They are well represented by each of the FinTech bodies and associated HM Treasury FinTech envoys for the devolved nations. Regional FinTech bodies include FinTech Northern Ireland, FinTech Scotland, FinTech Wales, and in England, FinTech North, FinTech West and Innovate Finance. Collectively they provide valuable capabilities that together represent FinTech in the UK.

The real strength from the regional bodies comes through their ability to foster local collaboration that builds practical, on the ground connections, creates business led research that supports enterprise, skills development and economic growth. With growing ecosystems and existing connected networks FinTech bodies across the regions are already supporting cluster development, providing a strategic opportunity to help the UK maximise its FinTech potential and build inclusive growth across the country.

<sup>19</sup> [UK Gov - National data strategy](#)

<sup>20</sup> [Data driven innovation - Regional city deal](#)

<sup>21</sup> [Open Banking UK](#)



This paper uses the lens of Scotland and Wales to demonstrate that capability. Through our experiences we have built the assumption that while there are regional specifics these are good examples of how the UK's FinTech clusters can work to support practical collaboration and create an environment for knowledge sharing and strategic economic growth.

Through the collaborative environment of the FinTech National Network (FNN), the regions can work together to support this strategic view. The work on this paper commenced earlier this year and complements the work and any support the FNN will provide to the HM Treasury FinTech review.

To encourage support for the proposals in this paper, we have preliminarily assessed the regional and national approaches related to R&I in FinTech in Scotland and Wales. A key step in the next phase of this work is to complete similar analysis across all the regions to build the full UK picture.

Key highlights from our analysis show that both Scotland and Wales are supported by renowned research infrastructures, have depths of experience and expertise in the FS sector and have the backing of progressive devolved governments that recognise FinTech as economic opportunities in their programme for government. Both are seeing growing numbers of FinTech enterprises however both recognise R&I in FinTech has current limitations, needs further intervention and greater support.

## FinTech in Scotland

***FinTech in Scotland is enabled by the strength of its FS sector and evolving through research capabilities and government support. The developing cluster is led by FinTech Scotland which was established in early 2018.***

Scotland's FS sector contributes £9.2 billion to the local economy. It directly employs more than 84,000 people, rising to 163,000<sup>22</sup> when combined with related professional services. It is the largest UK FS centre outside London and has key strengths in banking, asset management, insurance, and pension services. Many of the UK and world's leading financial institutions have an established presence in Scotland including RBS, Lloyds Banking Group, Standard Life Aberdeen, HSBC, Barclays, Royal London, JP Morgan, Virgin Money, Tesco Bank, Ballie Gifford and M&G Prudential.

Scotland's digital sector contributes £6.6bn to the local economy and employs 97,000 people<sup>23</sup>. This sector includes homegrown businesses such as Skyscanner and FanDuel as well as international businesses including IBM, Fujitsu and Hewlett Packard.

The Scottish Government has identified FinTech and innovation in FS as key areas for future growth, aligned to Economic Strategy (2015), FinTech Opportunity Plan (2017), and Programme for Government (2019) which specifically references innovation and FinTech.

---

<sup>22</sup> [The City UK - Key facts about UK-based financial and related professional services](#)

<sup>23</sup> [Scottish Enterprise - Latest stats and facts on Scotland's digital economy](#)

Scotland is emerging as a global centre of excellence for FinTech innovation. Through focused effort Scotland has established the fundamentals needed to create the innovative and integrated cluster needed to drive FinTech growth (see APPX-1). This work is proactively led by 'FinTech Scotland'<sup>24</sup>, an organisation launched in 2018 as a joint initiative across the industry, Scotland's universities and Scottish Government.

There are over 150 FinTech SME's in Scotland. Scotland has seen success in Data Driven FinTech innovations with growing FinTech capabilities in Open Banking, RegTech<sup>25</sup>, investment platforms and wealth management, and payments – with emerging capabilities in digital currencies. Scotland is attracting entrepreneurs, foreign investment and founders from overseas.

In recent years the levels of investment in the FinTech SME's start up community in Scotland has risen significantly to over £130m, with levels reaching approx. £60m in 2019. Scotland is seeing businesses such as Modulr<sup>26</sup>, a new payments FinTech, relocate much of its base to Scotland investing £20m in the local economy, it also boasts a FinTech Unicorn<sup>27</sup>, FNZ an investment platform is valued at £1.65bn.

FinTech Scotland works as a cluster strategic enabler, it has built connected networks and focused on leveraging the existing and developing strengths across the different communities to help enable innovation, impactful collaboration and an inclusive cluster.

The FinTech Scotland cluster received formal bronze accreditation of cluster excellence in January 2020 from the European Secretariat for Cluster Analysis (ESCA). It recognises the strategic importance of the FinTech cluster and the growing significance of cluster management to sustainable economic development.

The accreditation process confirmed the need for greater emphasis on FinTech Research and Innovation. Therefore, a focused effort is needed to capitalise on the positive progress already made, leverage Scotland's economic strengths and research capabilities to help maintain and build its competitive advantage not only in FS but in other key sectors that can be positively impacted by FinTech developments.

## FinTech in Wales

***FinTech in Wales is evolving through strong government support and successful FinTech entrepreneurs. This developing cluster is being led by FinTech Wales.***

Wales employs 40,000 people in the financial and insurance services sector as per the latest ONS data who in turn generate economic activity of £2.8bn. Wales has strong roots in various areas but insurance (and online digital comparison identified as world leading by the

---

<sup>24</sup> [FinTech Scotland](#)

<sup>25</sup> [Investopedia - What is RegTech](#)

<sup>26</sup> [Modulr - Investment in Scotland](#)

<sup>27</sup> [Insider - FNZ reaches unicorn status](#)

MIT-REAP programme<sup>28</sup>) is a key capability with homegrown success stories including the likes of Admiral group who make up close to one quarter of all FS employment in Wales, along with Confused.com, GoCompare and MoneySupermarket.

FinTech is recognised as one of 5 key sectors for Wales both by regional bodies, such as city deals, and the national Government including the Review of Digital Innovation by Professor Philip Brown<sup>29</sup>. FinTech Wales operates as a not for profit organisation to support growth of the local capabilities, impacting ways of working and supporting creation of the right environment for innovation.

Wales now boasts a rapidly emerging FinTech cluster with a number of national success stories in the areas of insurance, price comparison, payments and lending. With local law firms and business schemes becoming specialised in FinTech, Wales is increasingly becoming a leading tech hub of choice for entrepreneurs and founders outside of London.

Recent years have seen increased levels of investment in Welsh FinTech firms. Cardiff based Sonovate, the UK's leading finance and back-office tech provider to recruitment agencies, raised £110 million Series C in September 2019. Private Asset Infrastructure as a Service providers Delio raised £3.3 million to help the business scale its international sales team across Europe, Asia, the Middle East and North America. Business intelligence start-up AMPLYFI closed a \$5 million growth round in April 2020 bringing its total raised across all rounds to \$10 million. In May 2020 Anna Money received investment of £17.5m to increase their product offerings and recently Aviva spent £17m buying robo-advisor startup Wealthify. The Development Bank of Wales has been one of the country's most active seed investor funding sums in the region of £250,000 to multiple FinTech startups such as MoneyShake, Yimba, Monva, and W2 to name a few.

Combined with recent Cardiff Capital Region funding<sup>30</sup> to FinTech Wales this demonstrates a focus of investment to support progression and growth with both commercial and strategic objectives.

### **Admiral Pioneer – Case study**

Admiral's founder Henry Engelhardt had a vision of creating a new insurance company which would innovate and disrupt the market as it stood back in the early 1990s.

Since then Admiral Group has grown to become a FTSE 100 Financial Services company with a presence in eight different countries, 7 million customers worldwide and employs over 11,000 people across its operations, including 7,500 at its offices in Cardiff, Swansea and Newport.

Admiral's unique employee ownership model means every member of staff has a stake in Admiral and their success ultimately determines that of the business too.

<sup>28</sup> [MIT - REAP programme](#)

<sup>29</sup> [Welsh Government - Review of Digital Innovation for the Economy and the Future of Work in Wales](#)

<sup>30</sup> [CCR - Seed funding for FinTech Wales](#)

Leading FinTech companies like Admiral Group's price comparison platform, Confused.com, have helped to pave the way for other companies looking to expand or relocate to Wales because the infrastructure and business support network is already well established. Three of the four main price comparison websites are now based in Wales.

There has already been a huge shift towards increased remote working and digital technologies during the global covid-19 pandemic and this is likely to impact further still.

One of the unexpected long term effects of the coronavirus outbreak has been the acceleration of digital trends, and the FinTech sector is perfectly positioned to capitalise on the new ways that we interact, live, work, and take care of our finances, to make life easier

There's been a steep rise in the use of FinTech apps across Europe at a time when many sectors of the global economy are beginning to feel the effects of a worldwide recession. FinTech is expected to continue growing and Wales is well positioned to lead this.

As we move into the next phase of our growth plan, Admiral Group has launched a new business - Admiral Pioneer.

Admiral Pioneer's key objective is to seed, launch and scale new businesses that will become the growth engines for Admiral over the next decade by experimenting, testing and proving new products, business models and partnerships through a disciplined, discovery driven approach

The business will benefit from being able to build a dynamic and stimulating environment which provides all the excitement and freedom of a scale up but with the support and stability of an established large organisation.

## 1.5. Complementing regions

The regions complement and augment growing FinTech capabilities. Through this process we have identified common themes across these regions, as well as complementary areas which will help the UK benefit from a regionally collaborative approach.

Both regions have centres of expertise across the more generic enabling technologies of FinTech including AI, cyber, and data science, as well as emerging bachelors and masters degrees that have a FinTech focus. They both have the necessary enabling elements for a regional cluster to exist including:

- Alignment and support from local Government on national strategies for FinTech
- Proactive, progressive FinTech bodies creating connected networks and ecosystems
- Regional city growth deals that recognise FinTech as a key regional cluster
- Sectors and topics that will become consumers of FinTech e.g. net zero carbon

Regional differences were noted in two areas:

1. Niche financial services capability exist. Scotland's analysis shows strength in Open Banking, Capital Markets and strength in the Payments sector, Wales' analysis shows strength in online Digital Comparison and Insurance.
2. Other FinTech consuming sectors e.g. Oil & Gas, H2, Health, Agriculture and Manufacturing have respectively localised expertise and capability

Collectively the picture highlights positive markers that Scotland and Wales, and the regions are prepared and well positioned to support FinTech innovation and growth.

## 1.6. Global comparison

Global analysis (APPX-2) shows the time to act is now. When compared internationally the UK and London continue to rank highly. London is currently ranked as the only top global FinTech hub in Europe, where notably FinTech ecosystem development is slower when compared to Asia and North America<sup>31</sup>. Industry analysis in March 2020<sup>32</sup> shows London ranking 2<sup>nd</sup> in the world, behind New York.

However, the same analysis showed that both London and the UK's standing is fast being challenged by growing Asian centres who are focusing on public sector initiatives to become competitive locations for FS and FinTech innovation. North America is also generating a competitive environment for FinTech, again focusing on developing technology and creating innovative ecosystems to encourage collaborative development.

Google, Amazon, Facebook, and Apple<sup>33</sup> are all exploring how they enter the world of FinTech and across the world newer innovations are emerging including digital currencies<sup>34</sup>, differential privacy<sup>35</sup> and stablecoins<sup>36</sup>.

## 1.7. The potential impact from UK FinTech

Changes in technology and a supportive regulatory environment have acted as enablers for the emergence of FinTech. It has allowed FinTech to progress from servicing those traditional business lines of the FS sector, to wider direct engagement with other sectors to provide new collaborative opportunities.

The HM Treasury review into FinTech recognises the valuable opportunity this innovation presents to improve financial services for the benefit of citizens, businesses and government. It also acknowledges that now is the time to build on current success<sup>37</sup>.

---

<sup>31</sup> [2018 Global FinTech Hub Report - The Future of Finance is Emerging: New Hubs, New Landscapes](#)

<sup>32</sup> [Long Finance - The Global Financial Centres Index 27](#)

<sup>33</sup> [CNBC - Big Tech will push into finance in 2020 while avoiding bank regulation](#)

<sup>34</sup> [Central Bank - Digital Currency: opportunities, challenges and design](#)

<sup>35</sup> [Towards data science - Understanding Differential Privacy](#)

<sup>36</sup> [ETORO - Can Stablecoins Promote the Mass Adoption of Cryptocurrencies?](#)

<sup>37</sup> [HMT - Fintech review ToRs June 2020](#)

With continuing developments and global competition, we are at a point where the adoption of FinTech to service the UK economy is not an either/or choice – but the speed of adoption is. Analysis by Strathclyde Business School suggests that slow adoption (i.e. without a co-ordinated FS /FinTech collaboration strategy) could reduce Scottish FS competitiveness over the next ten years leading to 14,000 job losses and (£0.7) billion GVA. Rapid adoption, in contrast, may lead to uplifts of 15,000 new jobs and £1.1 billion GVA.

If these ranges were replicated across the UK losses could amount to 212,000 jobs (and around £18.4 billion GVA) or gains of 230,000 jobs (and £20 billion GVA), when focussing on FS alone.

In addition, there is potential for long-term pervasive economy wide benefits, that could be realised through adoption of FinTech, for example:

- Open Banking Ltd<sup>38</sup> estimates consumer savings could reach £12bn annually through more effective access to better rates on overdrafts, savings, credit cards and mortgages through FinTech innovation
- Other analysis highlights opportunities for business-wide productivity gains, for example, from reduced transaction costs, including borrowing and cash flow management that will free up collateral and working capital for more productive uses (e.g. Cap Gemini estimate smart contracts could reduce Bank costs by £1.3 billion annually).

## 1.8. The right conditions for FinTech R&I

The UK has been successful in other sectors, such as Aerospace (through the Aerospace Technology Institute), in transforming the R&I pipeline to operate as a true ecosystem.

FinTech development needs this type of support, learning lessons from these innovative sectors to understand how stakeholders work together, identifying and addressing shared common goals and objectives, sharing knowledge and capability to progress initiatives.

We have seen green shoots as technology and a supportive regulatory environment help progress, but there remains an opportunity for the UK to strengthen R&I in FinTech and embed a truly transformative environment that embraces collaboration, learning, enterprise and productivity.

However, to realise the opportunity, we must overcome the current challenges. From assessing the current status of FinTech in Scotland and Wales there is evidence that R&I is underperforming. FS has differed significantly compared to other sectors in how it approaches R&I and has been relatively constrained in how it engages with the research communities.

In the past, driven by influences such as competition, high regulatory compliance thresholds and risk averse cultures the FS industry has been cautious when it comes to experimenting with new technologies.

---

<sup>38</sup> [Open Banking report - Consumer Priorities for Open Banking](#)

Generally, past experiences have shown that:

- Many are dealing with legacy systems and have been previously focused on maintaining the stability, security and resilience of their technology stack;
- Culture and ways of working have limited the opportunities for collaboration and the sharing of knowledge is guarded.

Through experience of the regulatory sandbox the FCA has also identified that it's not seeing really true disruption at scale<sup>39</sup>. Certain sectors in financial services are less likely to use the sandbox and big or mid-sized players in the market are not making use of the facility.

In addition, research in FS is a relatively new landscape for universities, who are building their understanding of the needs, challenges and opportunities for the sector. (Experiences from both Scotland and Wales). There is an acknowledgement that the very strong university R&I is not always matched by a wide base of business R&I, and businesses under exploit the strong regional university knowledge.

### **Changing the Status Quo**

Fulfilling the opportunity needs an integrated R&I strategy with greater stakeholder alignment and collaboration that builds trust and access to the right resources, including data, funding, skills and expertise. To build sustainable interest it needs to demonstrate quick wins and create an environment where research and business can grow together.

There is an opportunity and a need to utilise the existing skills and expertise of the UK's research community led by bodies such as Innovate UK and UKRI to build an environment, plan and regional contributions that capitalise on the UK's FinTech opportunity.

---

<sup>39</sup> [FCA - Speech on meeting pace technological change](#)



## 2. Building a FinTech R&I strategy for the UK

The way in which the UK, nationally and across the regions, responds to the FinTech opportunity is critical for the future UK economy and its financial services sector.

Former governor of the Bank of England, *Mark Carney*, addressed this challenge, noting that the new emerging economy driven by changes in technology will require a 'new finance': one that serves the digital economy, is more efficient, more inclusive, and better tailored to support the transition to a sustainable economy<sup>40</sup>.

In a Mansion House speech, he stated "*Efforts will be more effective with **the right conditions in which to innovate***".

Compared to FS, FinTech has a greater reliance on R&I with fast project development cycles. It needs an opportunity to learn from other innovative sectors to understand how stakeholders work together, identifying and addressing common goals and objectives, sharing knowledge and capability to progress initiatives.

This is fast becoming a time sensitive issue as other countries are actively establishing R&I practices for FinTech increasing the level of competition to the UK. At the same time the current approach to the limited R&I in UK FS could be considered as non-collaborative, and without intervention that behaviour has the potential to become embedded in FinTech innovation, making necessary change harder to achieve.

We're encouraging discussion on this issue and believe the time to act is now. Our analysis has identified a number of steps that need to be taken to protect, grow and improve resilience by creating the necessary conditions for FinTech R&I. These include the right interventions, governance, mechanisms, and stakeholders, to enable the full potential of FinTech to be realised.

Alignment can be achieved by a shared ownership approach that creates the right environment for collaboration to progress a FinTech R&I strategy, where all stakeholders have a role and responsibility.

Our proposals suggest closer collaboration with bodies such as Innovate UK and other stakeholders to develop a UK R&I strategy, utilising regional strengths to help UK FinTech build momentum through:

- Stakeholder acknowledgement that FinTech needs help to de-risk R&I supported by an enabling funding stream; and
- An integrated UK R&I strategy and pipeline, that uses a community owned approach, with collaboration and stakeholder engagement at its heart. Envisioning the R&I strategy, it would include:
  - Shared and common FinTech challenges identified through a national and regional road mapping exercise (10-year horizon)
  - A governance approach that brings the key stakeholders together supported directly and in partnership with UKRI and Innovate UK

---

<sup>40</sup> [Remarks by Mark Carney - A Platform for Innovation](#)



- Regional contributions that leverage local business strengths and connected networks with innovation programmes will cover both common national specialities and regional niches
- Principles of operating that align to the agility of the FinTech sector, encourage inclusion and diverse contribution

## 2.1. Inclusive collaboration, data driven and community owned

***'At the heart of any high-performance R&I system is collaboration.'***

The value and need of collaboration are often misunderstood in the FS sector. Collaboration is sometimes seen as business sensitive, a threat to operations, and a potential competitive threat.

To address this issue, it is imperative that the approach draws in key stakeholders and enables strategic alignment, building collaboration and a shared agenda. Stakeholders include industry, government, regulators, academia and the public sector. Collaboration across this group will allow common challenges to be identified and overcome, reducing rework and inefficiencies in the system, while creating new capabilities through shared knowledge and skill sets.

A data driven process will identify and address issues of exclusion while recognising national needs and acknowledging regional strengths

Working with bodies such as Innovate UK and UKRI would strengthen this further, being able to utilise the extensive expertise and experience would be invaluable in helping FinTech access the knowledge, partners, investors and markets it needs to innovate and grow.

## 2.2. Long term planning, road-mapping and common challenges

***'Planning is required to support the necessary changes, enable stakeholder alignment and build trust.'***

In working to build a national approach a longer-term plan is needed. We recommend accelerating the process by starting at regional levels, leveraging local knowledge and the networks from the FinTech bodies. We also see significant value in utilising the existing analysis from regulators, the UK industry, and global competition. Collectively this will support a roadmap that will:

- Identify the common challenges in the short, medium and long term
- Recognise market disruptors and cross sector opportunities
- Highlight the needed resources, including data, funding, skills and expertise
- Allow for more revolutionary products and services to be created

- Create time to engage the proposed mechanisms so that collaborations can occur across all TRLs<sup>41</sup> and time to market will improve competitiveness
- De-risk and accelerate the R&I process
- Leverage added value and remove inefficiencies from the system

It is our view that this approach will support the transition of the FinTech system in the UK from reactive to proactive. Experience shows the impact in the mid to long term will be seen across skills<sup>42</sup>, products and services. More immediate effects will be felt as the roadmap contributes to the strategic development of a FinTech R&I environment and works as a unique selling point for the UK helping to attract inward investment.

## Early indications of common challenges, disruptors and cross sector opportunities

Adopting the methodology above, we note the issues and themes the UK regulators have identified in connection to the potential future of FinTech in the new economy. They have started to encourage innovation to advance understanding and new initiatives needed to support the digital economy. These include:

- FinTech innovations that support the UK in the move to a greener economy<sup>43</sup>
- FinTech innovations and regulatory technology that could help overcome regulatory challenges and drive efficiency<sup>44</sup>
- Critical digital infrastructure to support Interoperability<sup>45</sup> enabling consistent standards, the ability to share data securely, with robust cyber security and better communication abilities
- 'Socio-focused' research including the impact of technology<sup>46</sup> on consumers and society and the resulting roles and responsibilities of stakeholders including regulators.
- Central backed digital currencies and the technologies needed to enable any developments to be resilient, fast, efficient and scalable<sup>47</sup>.
- Research and innovation to help make advances in combating financial crime<sup>48</sup>

From global analysis we would also include:

- Digital Identity. It is a term that is currently undefined but carries significant implications for both the future of finance and the future of the digital economy. For example, it could represent the first step in the creation of a services ecosystem where innovation can prosper. Work is needed to develop a harmonised

---

<sup>41</sup> [NASA - Technology Readiness Level](#)

<sup>42</sup> [The City UK - Financial Services Skills Taskforce](#)

<sup>43</sup> [Speech by FCA's Director of Innovation - Meeting the Pace of Technology Change](#)

<sup>44</sup> [FCA - Call for input on supporting the development and adopters of RegTech](#)

<sup>45</sup> [FCA - Call for Input: Open finance](#)

<sup>46</sup> [FCA - Research agenda](#)

<sup>47</sup> [BoE - Central Bank Digital Currency March 2020 Opportunities, challenges and design](#)

<sup>48</sup> [FCA - FCA Research agenda](#)

understanding and approach to digital identity that could act as a unique connection to unite relevant data flows.

In addition, the FinTech clusters can also identify regional business-led priorities. By way of example FinTech Scotland and FinTech Wales are both developing their regional longer-term road maps and are starting to build an understanding of their regional business-led priorities. The work so far has found that as well as aligning to the national topics above there are complementary topics that can help augment the UK's competitive advantage. Further detail of this regional analysis is found in Section 2.5.

### 2.3. A governance approach that works nationally and regionally

***'A unifying national governance approach is needed to support collaboration and enable the longer-term community owned plan.'***

To help the UK achieve its FinTech potential we propose a national governance approach that enables a unified approach and connects the related stakeholders. The mechanism will understand the capabilities across the regions, address existing and emerging gaps or weaknesses and consider any misalignment that exists between new FinTech ways of working and traditional methods of intervention.

Adopting some of the experiences from successful institutes (such as the Aerospace Technology Institute) we propose developing a **FinTech Innovation Institute (FII)** that will support a means for open and good innovation, engage and align enabling interdisciplinary research, provide transparency, reduce friction and represent all the necessary stakeholders, becoming:

- An independent body with the ability to operate virtually and in the interests of the UK and its regions
- A transparent body where the roadmap, and therefore direction of proposed supported work, would be community owned and defined
- Inclusive of non-typical stakeholders such as VCs and Angels, to support additional funding options and models
- An opportunity to include UK regulators, public and third sectors in R&I planning, recognising the impact of regulation and legislation on FinTech developments
- A true collaboration mechanism for the regional hubs, to capture and leverage from local networks, capabilities and opportunities

Figure 2 describes the potential makeup of that FII.

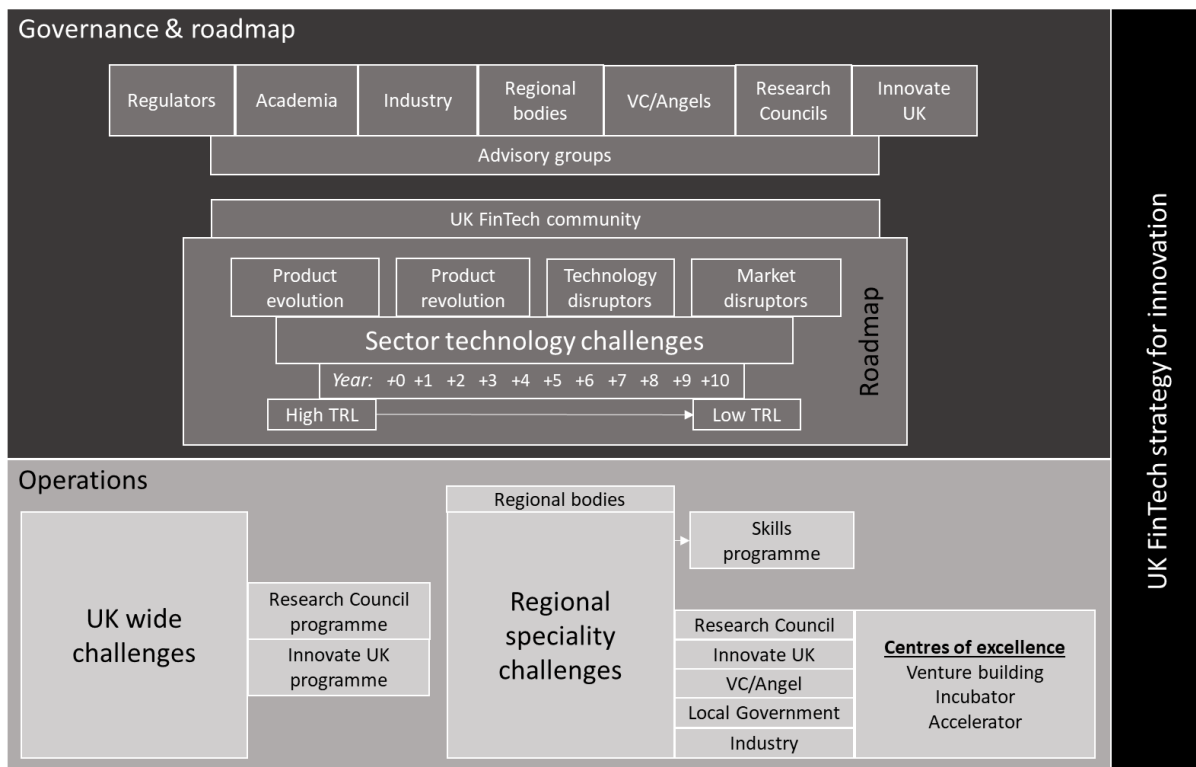


Figure 2. UK FinTech innovation institute

This body could support any national interventions, from bodies such as Innovate UK and UKRI, working as a trusted proxy to offer methods to intervene that are more familiar and aligned to the ways of working in FinTech but avoiding the burden of instigating in-house process change. This could allow more rapid adaptation and intervention at scale and offer efficiencies in portfolio management.

## 2.4. Aligning to FinTech ways of working and agile innovation

***'FinTech is fast moving and uses agile methodologies that can be leveraged for innovation'***

Emerging tech-based areas of the UK economy, such as FinTech, tend to operate in *agile methodologies*. Adopted from early software engineering approaches, it moves away from the traditional waterfall model used in other sectors. This approach defines FinTech companies in terms of product conception and development and underpins the ways of working and ethos for the companies.

To fully support the FinTech innovation opportunity, we propose the R&I strategy and associated actions aligns with these ways of working to:

- Support the necessary speed of innovation
- Provide the right incentives to enable information flow and reduce friction; and
- Enable the UK to remain globally competitive

This creates a different approach related to agility, trust and outcomes with a focus on 'good innovation' and moving away from highly process and metric driven approaches. More detail on suggested ways of aligning to agile methodologies can be found in APPX-3. Similar approaches have been implemented in programmes such as the Defence and Security Accelerator.

In summary, enabling all of the above will help realise the opportunity that FinTech presents for the UK and ensure the UK maintains its competitive advantage in Financial services. Adding regional contributions strengthens the opportunity further and solid regional foundations are already in place via each of the FinTech bodies.

## 2.5. Innovation Diffusion

Innovation is the development of an innovative idea or concept and progressing it through to exploitation. From this it's clear to see that that value is intrinsically linked not only to the 'thing' that is being developed, but to what extent that it is eventually used, or adopted. The wider the adoption the more the innovation has diffused through a company, community, sector or even a nation or globally. Innovation can take place in many ways and for many reasons, where the output can be commercial, non-profit, commercially sensitive or publicly available and published. Which of these is relevant to a particular innovation will determine which form of diffusion is best suited to it.

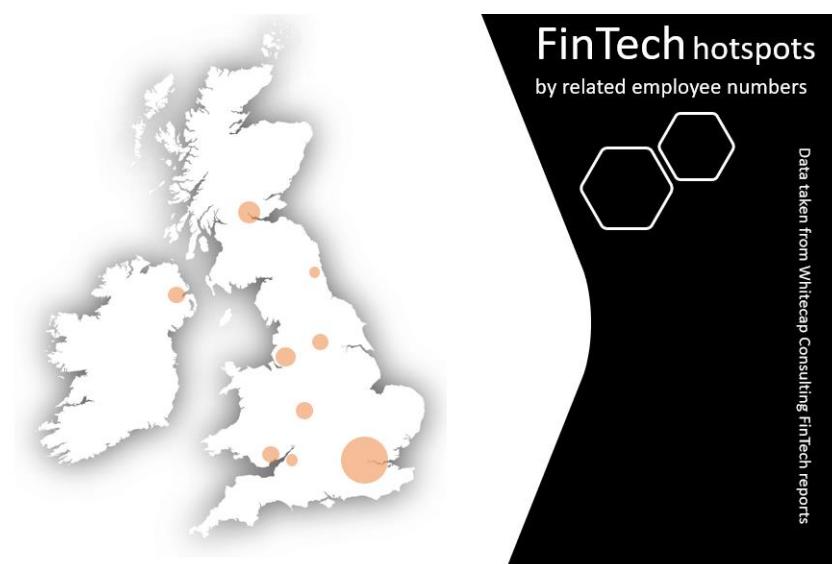
Diffusion of innovation can act as a multiplier to the return on investment and as such is a valuable element to innovation. When diffusion is considered at the early stage of any innovation programme, it allows a proactive approach that then outputs innovation that is well positioned for widespread diffusion and can maximise that multiplier effect. This can be achieved by i) identifying common and shared technology challenges ii) ensuring those challenges are abstracted away from the commercially sensitive business application. Addressing these two points within the strategy for a FinTech intervention will create the opportunity of diffusion and associated multipliers.

The act of diffusion can take place organically as dictated by the environment and community that exists but can also be managed and controlled. Typically, this would involve addressing awareness and understanding, acceptance and trust, and finally, usage and adoption. Diffusion of innovation to a world outside of its primary usage is sometimes seen as non-value adding for the respective organisations, and as such it doesn't feature as a priority to those executing collaborative projects. Diffusion should be incentivised from within the contract of any intervention project such as a bonus, bond or performance related scheme.

## 2.6. Regional contribution

***'FinTech Scotland and FinTech Wales are good examples of the clusters developing in the regions.'***

The regions of the UK are well represented by each of the FinTech bodies and associated HM Treasury FinTech envoys. These are fast becoming the best route and point of contact into the regional economies, stakeholders and their opportunities. Each region at present has its own relatively independent FinTech strategy, often driven by a combination of the views of the FinTech body and its relative governments and partners.



*Figure 3. UK FinTech Hotspots as per Whitecap report data*

Practical local engagement and connection will enable focused business-led R&I helping to drive economic growth and build greater resilience across the whole of the UK. Using the current experiences in Scotland and Wales as relative indicators of what's happening across the regions of the UK, our analysis has highlighted that the regional clusters deliver value for the local economy, but support is needed to strengthen R&I. With the right support from bodies such as Innovate UK the clusters could be utilised to effectively enable progressive R&I, develop local plans and roadmaps that combine to deliver an integrated UK R&I strategy.

### Regional activities in action

Scottish and Welsh governments are each undertaking assessments of their manufacturing sectors to form an action plan for future innovation and prosperity. FinTech Scotland and Fintech Wales are each aligning their FinTech agendas across various localised sector specifics. In Wales the government are undertaking a consultation to form 'A manufacturing future for Wales: a framework for action.'<sup>49</sup> On behalf of the government FinTech Wales are undertaking the consultation for technology usage, adoption and exploitation for the future

<sup>49</sup> Welsh Government - Manufacturing future Wales framework action

of manufacturing. This will include aligning fintech and manufacturing roadmaps to help identify further opportunities. Proactive regionalised activities such as this leverage local opportunities and extend the case for supporting regional niches if a more optimised innovation system is to exist in the UK.

## Working to Build Scotland's FinTech research and innovation roadmap

Through our analysis we know that FS and FinTech are both strategically and emergingly important to the Scottish economy however both have been identified as under-represented for R&I in Scotland. Until recently university and industry engagement has been focused on skills development and graduate recruitment. In addition, research in FS is a new landscape for the research community who are proactively building their understanding of the needs, challenges and opportunities for the sector.

With its industry connections and strategic partners FinTech Scotland is executing a strategy to build on its cluster approach that facilitates integration and collaboration, focusing on priority themes and initiatives. The cluster strategy is building a way of working that enables business led, strategic and industry wide, thematic research and innovation.

The approach aims to support the growth of the fintech SME community, enable collaboration with committed participants, drive an innovation road map and develop an inclusive and globally engaged fintech cluster. APPX 1 provides further information on stakeholders engaged in the FinTech Scotland strategy. This strategy brings together the FS sector, FinTech SME's and research communities and is targeting enhanced cluster excellence through growth and scaling of the fintech SME community, impactful collaboration with partners, executing a R&I road map and attracting inward investment and export opportunities.

Work on the R&I roadmap is at an early stage and we anticipate this approach will build on Scotland's existing research capabilities and focus on priority themes identified at industry level. Working across its cluster and focusing on regional economic and research strengths, FinTech Scotland has identified a number of immediate primary areas for strategic FinTech R&I. These relate to:

- Big data analytics and AI (Open Finance Data)
- Regulatory Technology (RegTech) Innovation in Financial Services
- Payment Innovation including Digital Currencies and Blockchain
- Capital Markets Innovation (including Trusted Automated Systems)
- Finance in Energy Transition and Climate Change 'Green' Economy Challenges
- Social Inclusion and Well Being Innovation (including health related)
- Customer Digital Transformation (end to end customer experience)

This is not an exhaustive list and the works requires continued stakeholder contribution and agreed prioritisation, as well as leadership and direction.

As an example, a positive strategic step in the executing the fintech cluster collaboration, stakeholder alignment and funding (through UKRI, Strength in Places Fund) is the

establishment of **the Global Open Finance Centre of Excellence (GOFCoE)**<sup>50</sup>, led by the University of Edinburgh with FinTech Scotland. It will focus on Open Finance Data and its aim is to equip the future financial services market with data-driven technologies and innovations for the new era of Open Banking and Finance.

This is one example of establishing the longer-term plan needed for Scotland and the UK to compete with the emerging global markets who are all assessing the opportunity for FinTech and building R&I plans for first mover advantage.

Given the speed with which markets are pursuing FinTech innovation, Scotland sees FinTech as a strategic priority, and its role is in working to play a fuller part in strengthening the UK's FinTech opportunity, and build local place based economic growth.

## Working to Build Wales' FinTech research and innovation roadmap

The UK Innovation Survey 2019 ranks Wales as second after England in terms of the proportion of innovative businesses<sup>51</sup>. In 2018 the same survey noted that Wales has significant strengths across a range of sectors including AI and data, clean growth, and advanced manufacturing.

Digital penetration in Wales is the second highest in the UK with 84% of the population having internet access<sup>52</sup> and 89% of internet users in the country using internet banking or buying goods and services online<sup>53</sup>, demonstrating that the market is ready and primed for further FinTech adoption. There are currently no specific nation-wide innovation initiatives in FinTech, with the little activity being relegated to hyper-local business incubators such as the Natwest Entrepreneur Accelerator Hub or Barclays Eagle Labs. However, the Welsh government provides strong support to financial and professional services firms both in attracting them to Wales and also providing supporting infrastructure, a notable example of which is the Cardiff Central Enterprise Zone<sup>54</sup>, a 140 acre site in Cardiff city centre dedicated to financial and professional services firms that offers additional business support packages to investors. Additional development is currently taking place to add new mixed-use areas to the city centre of Cardiff which will include an area given to emerging technology<sup>55</sup>. Satellite FinTech focusses are also present in Newport, Swansea, and Wrexham, and Fintech Wales expect to open academies in both Cwmbran and Bridgend in the near future.

After initial assessment of the sector FinTech Wales realised the need for a longer-term shared roadmap of technology and challenges that brought together market, business and technology drivers for R&I and new products and services, as shown in Figure 4. This roadmap will make innovation more effective and change ways of working to be more collaborative. There is a lead time for both innovation and skills development so a failure to

---

<sup>50</sup> [FTS - The Global Open Finance Centre of Excellence project](#)

<sup>51</sup> [UK Gov - UK innovation survey 2019](#)

<sup>52</sup> [Ofcom - Communications Market Report 2017](#)

<sup>53</sup> [Welsh Government - National Survey for Wales, 2018-19 Internet use and digital skills](#)

<sup>54</sup> [Trade & Invest Wales - FinTech](#)

<sup>55</sup> [Central Quay - A new neighbourhood for Cardiff's next generation](#)



identify and plan in advance will only result in a lack of competitiveness to those nations that are able to plan properly.

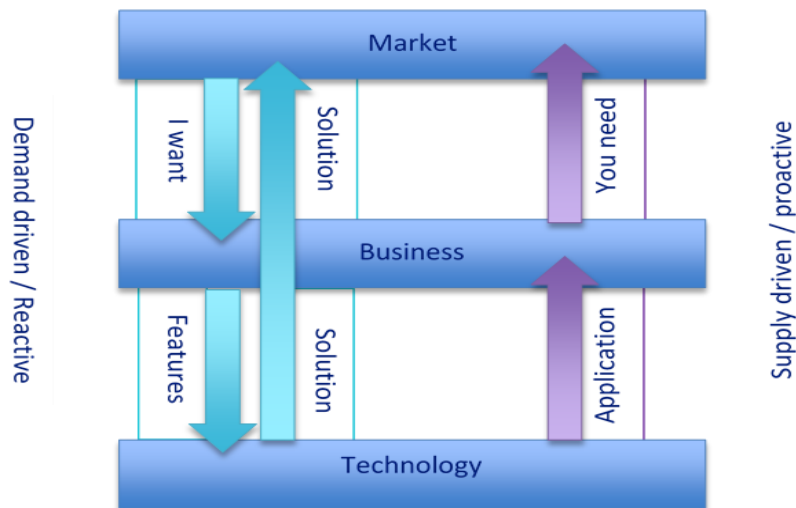


Figure 4 Drivers for new products and R&I

Based on this FinTech Wales have created a Technical Advisory Group, initially of a small influential set of organisations, to initiate the creation of an innovation roadmap. As a second iteration this will engage all relevant organisations in Wales, as well as cross cutting sectors.

The first iteration has taken place to gain insight of the varying innovation needs and the summary of the findings can be found in APPX-4. As this is a first iteration it should only be taken as a representative insight and was part of proving the roadmapping process.

The exercise focussed on assessing four elements:

1. Products and services external to the company
2. Products and services internal to the company
3. Future market disruptors
4. Technology opportunities and disruptors

The timeline of consideration was zero-ten years and we took a semi structured approach asking who needed it, what was required, why it was required and how important it was to their operations and strategy. All respondents were CTO/Director level in large organisations, academia or SMEs.

The format of responses was in an agile user story format<sup>56</sup> to describe what they 'wanted', and opportunities related to an innovation system. We also added Kano<sup>57</sup> modelling to understand the positioning of that 'want'.

This process is available in more detail on request and is the one that is proposed to be replicated across all regions and will support any proof of concept that occurs with FinTech Scotland and FinTech Wales.

<sup>56</sup> [Mountain Goat - Agile user stories](#)

<sup>57</sup> [Wikipedia - Kano model](#)

***'Across both regions there is a growing understanding of the potential significant for FinTech'***

We are beginning to understand the much broader role FinTech will play in the development of the UK economy. The very nature of finance means that technological and FinTech advances have beneficial ramifications in numerous other industries. The involvement of finance is intrinsically linked to any organisation or business where there is an exchange of goods or services.

This breadth, covered in more detail in the following chapter, adds to the need for a UK FinTech R&I strategy. We will begin to see FinTech capabilities advance the digital economy. It is imperative the UK is able to maintain a competitive position or risk the advance of global competitors and lagging operating systems.

## 3. The significance of FinTech

The FinTech clusters across the UK continue to develop a deeper understanding about the versatility of FinTech and its potential to unlock broader economic opportunities as the digital economy develops.

For example, FinTech applied technologies such as blockchain could play a significant role in the digital economy and the economic recovery following COVID-19. Blockchain capability builds supportive trusted infrastructures that could allow trade to flow and help maintain global trade by ensuring efficient access to trusted and reliable goods and services.

We are also seeing a growing global demand for transformation of the payments industry, where FinTech has a key role to play. Some significant signs of change include the central banks work on digital central currencies and other industry developments in crypto currencies. Non-traditional players will continue to enter the market from global technology giants, to car manufacturers and energy providers bringing new industries into the world of payments. FinTech has a significant role to play from helping develop the necessary infrastructure, to the way we store value in the future and process the insights from the collection of financial data.

### 3.1. FinTech will support the digital economy, the movement of money and exchange of value

However, to enable the right progress an innovative and developing digital economy requires a modern digital infrastructure that is safe, secure and resilient.

This future view includes the capabilities that depend on digital connectivity and interoperability, greater agility in the FS sector, and one where FinTech's agility, ability to innovate and collaborate quickly has a significant role to play.

FinTech is one of the rare applications of technology that can cut across the UK economy, its true value is just starting to be understood and should not be underestimated. A UK FinTech R&I strategy will help harness its potential to support the broader development of the emerging digital economy.

The diagram below dictates our perception of the future of FinTech and its role in the UK economy and aims to demonstrate how FinTech will directly service existing and emerging sectors of the UK economy, as well as FS. We have looked at changes in markers that relate to innovation activity for FinTech within each of the sectors, to create a model of anticipated FinTech value.

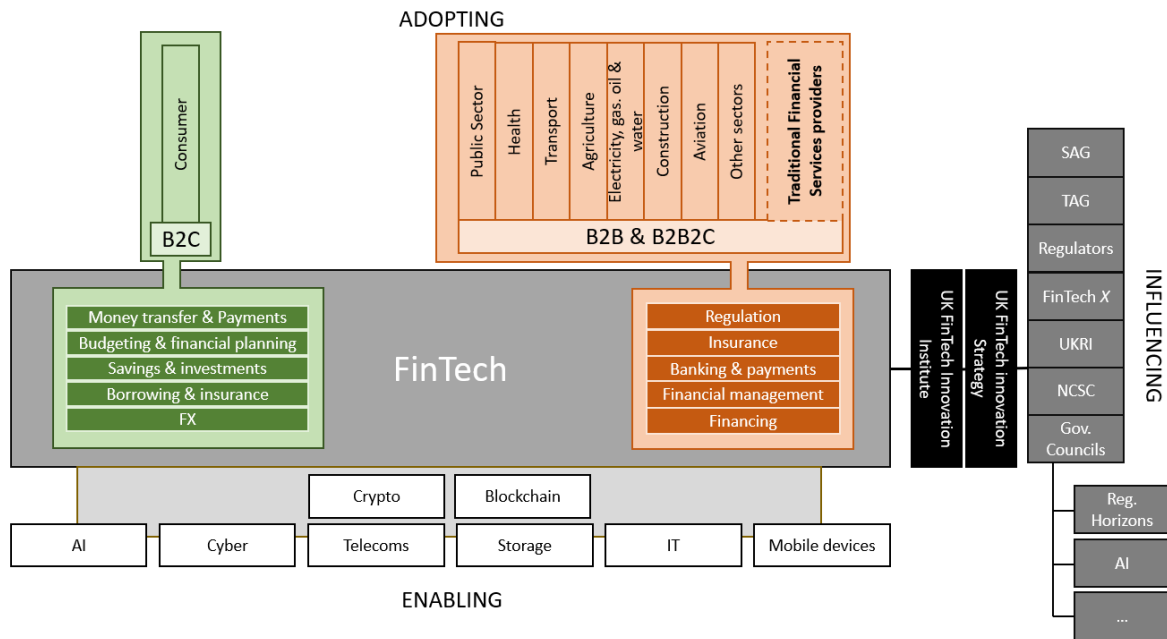


Figure 5 Interactions of FinTech

### 3.2. The potential for cross sector value

Our research looked at a wide range of economic sectors and has aimed to produce a model that highlights how the value of FinTech could look across a non-exhaustive selection of different sectors of the economy. Specifically:

Oil, Gas, Water, and Electricity	Transport	Aviation	Agriculture	Construction	Healthcare
----------------------------------	-----------	----------	-------------	--------------	------------

For completeness this research also included the sub-sectors in FS including:

Insurance	Banking	Payments	Investments	Regulation
-----------	---------	----------	-------------	------------

Other sectors will be impacted in a similar manner such as logistics, public sector, education and many more, but for brevity we focus on the above to demonstrate a point.

Figure 6 summarises our analysis and highlights the opportunity for FinTech as it transitions from being an FS enabler, and a vertical application, to developing horizontal applications with direct products and services that will facilitate new systems, operations and business models.

It is a model that demonstrates the potential for growth as FinTech becomes understood by the broader economy and integrates into various sectors. FinTech integration will include the use of financial data, integrating data and modelling, blockchain, digital currencies, critical infrastructure security, value exchanges such as crypto-assets and stock trading.

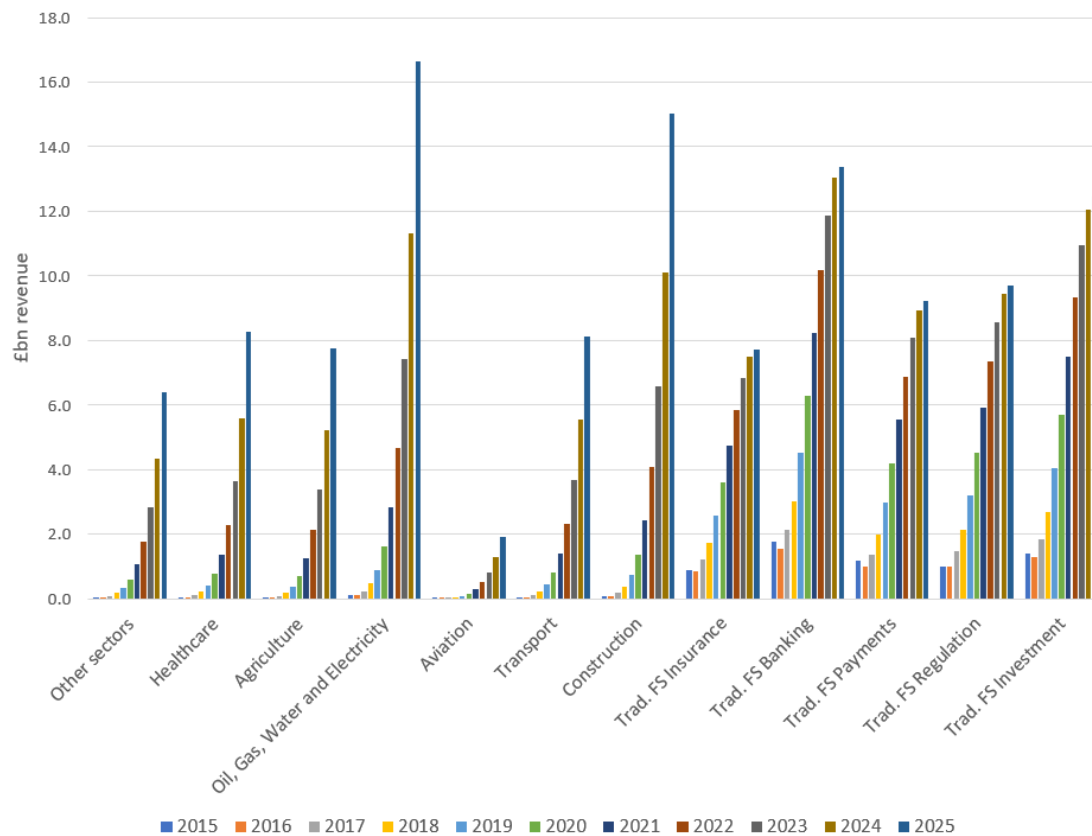


Figure 6 Value of FinTech by sector over time

## Cross-sector case study - FinTech in Agriculture

Agxio, a data science and machine learning company that specialises in the biotech, life sciences and agricultural science industries, are expert in the interplay between AgriTech and FinTech and have provided the following view.

“Agriculture contributes over £24 billion to the UK economy and employs around 475,000 jobs directly. Indirectly, it enables the UK to source around 61% of its agri-food needs which in turn is worth around £108 billion of GVA and employs 3.7 million jobs<sup>58</sup>. Post-Brexit and pre-COVID, the supply chain for agriculture was recognised as critical for innovation. The UK is a world leader in farming but intensive farm practices, concerns over sustainability of land and environmental issues, a heavy dependence on farm subsidies (especially from Europe), has led to the UK agricultural industry being in extreme stress.

Financial and operational transformation through both Agri-Tech and Agri-Fintech innovation is vital to ensure the UK’s food supply chain and security is secure. There is also an opportunity for the UK to become a leader in Agri-Tech, which includes FinTech, innovation for export globally, a market worth in excess of £217 billion. There is a growing trend in the UK to address the economics of farming. Digital innovation, regulatory efficacy, and financial

<sup>58</sup> [NFU Mutual - Contributions of UK agriculture](#)

supporting infrastructure will enable the UK's agricultural industry to continue to be a major contributor to the UK's economy."

## Cross-sector case study – FinTech in Electricity, Energy and Net Zero

The Wales Hydrogen Trade Association is the membership body to advance the hydrogen economy in Wales in the 2020s. They provide comments on the integration of FinTech into future business models for energy supply and demand:

"Two mega-trends are shaping the energy industry: to be clean and distributed. The established order of centralised, inefficient and dirty power is disrupted out of necessity to reduce carbon emissions and on cost by smaller, more efficient and cleaner energy generation.

Energy infrastructure is undergoing tremendous upheaval. The energy grid of the future will be made up of microgrids buying and selling energy. The digital infrastructure to support this will be the future brains of the energy network. This new infrastructure will need to be able to respond to demand and price signals, to both balance supply and demand and to optimise prices. Furthermore, the microgrid can be connected to the main grid to participate in balancing and in response to markets.

This model is not restricted to home but can be extended to incorporate hydrogen and electric vehicles in both the supply and demand of energy.

An innovate, integrated energy/digital/fintech system can provide resilience, deliver new zero and boost the UK economy."

## Cross-sector case study – FinTech in Health Care

FinTech developments that drive efficiencies in operating practices could also help drive efficiencies and solutions in the care sector. AI, automation, chatbots and blockchain technology are building interoperable and trusted networks that could transform data flow and citizen interaction. Helping to target resource where needed and with potential to predict emerging issues that need more specialist intervention, all offer the potential to improve operational efficiency.

## Cross-Sector case study – FinTech in Oil and Gas

Interest is growing in the FinTech capability for marketplace lending as a potential solution to the Oil and Gas, and 'cleantech' sector's funding gap. Marketplace lending, which started as peer-to-peer has grown to involve a broader and diversified set of investors. FinTech capability could create an environment for the registration, tracking and promotion of clean infrastructure opportunities, creating the ability for both public and private sponsors to log and share update potential opportunities, and generating a global data base of investment prospects. FinTech capabilities have the potential to give investors speedier access to opportunities targeted to match their investment preferences and ethical values. A recent

blog<sup>59</sup> on this topic suggested a clean infrastructure platform could connect investors with available shares in infrastructure projects, have the ability to improve investment opportunities and help clean infrastructure finance become more data driven.

### 3.3. Alignment to the UK's Industrial Strategy

Our analysis also considered the role FinTech could play in the UK's industrial strategy specifically considering the grand challenges.

#### Industrial strategy – Artificial intelligence and financial services data

Given the scale and reach of the UK's financial services sector the depth and breadth of its data provides a vital resource to help build a greater understanding of the underlying UK economy. FinTech uses the ability to adopt and adapt AI, Machine Learning and Deep Learning into a specific value adding set of tools to develop FinTech products and services that can be utilised across the economy.

It unlocks valuable insights to better evaluate customers and provide a more personalised experience. This capability can go some way to helping the UK solve some of its more pressing problems and we can see opportunities connected to the ageing society, clean growth and the future of mobility that exist in the Industrial Strategy.

#### Industrial strategy - Ageing society

Research indicates that six out of ten people in the UK put off contributing to their pension because they don't understand the system. FinTech can play a significant role in helping to simplify systems and processes, enabling easier interoperability across tax, investments, pensions and assets, while educating citizens on planning for their long-term financial future.

The Money and Pensions Service (MaPS) has recently released its 2030 strategy<sup>60</sup> for Financial Wellbeing. It includes the following goals, which FinTech, with the right interventions, can play a significant role in going forwards.

- **Financial Foundations:** 6.8 million children and young people getting a meaningful financial education - an increase of 2 million from 2019
- **Nation of savers:** 16.7 million working age people who are 'struggling and squeezed' saving regularly - an increase of 2 million
- **Credit counts:** 2 million fewer people often using credit to pay for food or bills
- **Better debt advice:** 2 million more people getting the debt advice they need; currently only 32% of those who need debt advice access it
- **Future focus:** 28.6 million people understanding enough to plan financially for their later lives, and during them - an increase of 5 million

There are also cross cutting themes of mental health, gender and workplace.

---

<sup>59</sup> [Energy and carbon - Fintech in solving clean energy](#)

<sup>60</sup> [Money and pensions service - UK strategy for financial wellbeing](#)

## Industrial strategy - Clean growth

The global shift towards clean growth and away from high carbon technologies is one of the biggest challenges of our time and we are seeing more FinTech innovation in this area.

Sometimes referred to as 'green finance' or 'sustainable finance' they are emerging markets of their own with big data, IoT and blockchains amongst the enabling technologies. FinTech could act as an enabler, allowing new and improved business models and ways of operating that are essential if the UK is to achieve decarbonisation targets. Many options related to clean growth rely on accurate and timely supply and demand models and data.

The United Nations Environment Programme (UNEP) has identified numerous applications<sup>61</sup> of FinTech for sustainable development with varying levels of sophistication and implementation, including pay-as-you-go resource utilities; flexible energy supply and demand and peer-to-peer renewable energy. A large number of use-cases with implications for green and sustainable development involves the transparency of supply chains.

FinTech capabilities such as Blockchain have the ability to track assets and help transform the ways in which natural resources are recorded and traced across a variety of subsectors, including fisheries and forestry, to carbon accounting and energy.

## Industrial strategy - Future of mobility

The next generation of transport networks are already deep in development since the advent of organisations such as Uber (ride-hailing) and Tesla (autonomous vehicles).

FinTech in-car payment technology is on the rise and essentially turning vehicles into mobile wallets, currently focused on paying for parking or fuel, there is much potential for growth, including digital leasing and lending and the development of the new transportation-sharing economy. This new economy has already transformed how traditional car ownership is perceived by consumers with a growing number of commuters adopting on-demand and sharing services as their primary modes of transportation.

FinTech innovation in the insurance sector will allow new advances in transport. Autonomy and onboard sensors will provide both disruption and opportunities to the sector. FinTech will change how claims are made, how evidence is gathered and how responsibility is apportioned.

### **Realising these possibilities needs collaboration and an effective mechanism to help align stakeholders and priorities**

The cluster and regional analysis are just starting to uncover the true extent for the potential economic breadth for FinTech innovation. With capabilities such as effective application of technology and data, and intrinsic agility, FinTech business and innovation could be well placed to support the UK in developing the mechanisms and structures needed

---

<sup>61</sup> [UNEP - FinTech and sustainable development](#)



to address known and emerging challenges, as well as meet the opportunities and expectations of an accelerating digital landscape.

The UK has a global reputation for innovation, a FinTech R&I innovation strategy will enable the necessary collaboration needed to help FinTech play the right role for the future.

## Cyber by design

Cyber is an enabler, a consumer and a critical element of the future of FinTech. Due to the expected role, scale and economic value of FinTech it is a target for cyber-crime. As such it is imperative that Cyber by Design becomes fundamental to any FinTech innovation. Taking reference from the UK Government paper for Online Harms<sup>62</sup> where they are "*committed to developing a framework on safety by design and innovation, to make it easier for start-ups and small businesses to embed safety in their products. Stakeholders expressed broad agreement and recognition that safety is improved when organisations build in user-safety at the design and development stage of their online services.*"

The FinTech innovation strategy would engage and embed such a framework to ensure that this critical sector of the UK economy does not make cyber security an afterthought in the product and service creation process.

---

<sup>62</sup> [UK Gov - Online Harms 2020](#)

## 4. Realising the FinTech R&I ambition

The impact for FinTech on the UK economy will continue to build. It's evolution in FS is already progressing through iterative developments. The impact on the developing digital and wider economy is beginning to unfold, and the innovative application of technologies will continue to create new and disrupt old business models. It's time to advance the opportunity and develop the right interventions to invest for the future developments.

The FinTech Futures report in 2015<sup>63</sup>, set out the following vision that continues to be a useful point of reference:

"The UK will be the premier location for starting, growing and retaining innovative financial technology businesses. The UK environment will provide outstanding access to leading academic talent, investment and facilities and promote global thought leadership on emerging digital solutions. It will provide unrivalled international connectivity, a regulatory environment that balances risk and innovation, and will foster and maintain optimal conditions for growing businesses."

Utilising the connectivity and networks that the regional clusters facilitate, further strengthens this vision enabling knowledge share, business led research to be applied generating future enterprise.

Realising the full extent of the ambition through the creation of a UK wide programme of works, enabled through the regions, with a portfolio of collaborative projects and mechanisms will take some time to achieve.

To accelerate progress, we propose a series of steps that would entail collaboration and work with UK research experts such as Innovate UK, the FS industry and the FinTech regions across the UK to build and implement a plan that promotes FinTech innovation and supports the UK's vision of achieving global leadership in FinTech.

### Next Steps

1. Encourage support and commitment from research experts such as Innovate UK and the research councils to help build academic and R&I leadership in FinTech

This is a key step for UK FinTech innovation, and we welcome the opportunity to work with Innovate UK, sharing knowledge and experience to build a fuller understanding of the right approach for the UK to create an environment for FinTech R&I.

2. Develop, pilot and test some of the proposals set out in this discussion paper

Early engagement from Innovate UK would help develop this proposal further and we suggest undertaking a low risk and rapid pilot of the opportunities and mechanisms

---

<sup>63</sup> [UK Gov - Fintech Futures 2015 report](#)

described in this paper. Utilising regional clusters will help test the key components we suggest are needed for a successful UK R&I approach, including:

- Collaboration
- Stakeholder alignment
- Agile innovation
- Road-mapping, and
- The Fintech Innovation Institute

The pilot will help to test ways to approach regional collaboration and stakeholder alignment, as well as processes and mechanisms helping identify any areas for further improvement. We will work with industry and regulators to prioritise the project themes, and applications for innovation funding will be subject to a competitive process.

Through this pilot we will complete a detailed lesson learned exercise focused on identifying new opportunities including new approaches for, planning, decision making and governance mechanisms to and help accelerate the ability to develop and operate the future strategy.

We see this as an opportunity to build the principles and governance approach for future FinTech interventions and the potential Fintech Innovation Institute.

### 3. Build further Stakeholder engagement and contribution

We propose to leverage the networks of UKRI and the regional FinTech clusters and hubs to look hard at the current approach for FinTech innovation through a series of stakeholder discussions.

Using the FinTech bodies and HMT envoys to facilitate stakeholder contribution will bring researchers, industry, government, regulators and research councils together to understand current issues, share lessons and explore how best to generate the right collaboration to raise our research ambitions, and develop, implement and deliver a longer-term plan.

### 4. Build the longer-term plan and establish the objectives and principles for the FinTech Innovation Institute (FII)

We propose work is started across the regions to complete a fuller R&D roadmap that enables the necessary stakeholder alignment and provides the foundations for the right collaboration and mechanisms to strengthen the interactions between discovery research, applied research, innovation, commercialisation and deployment. Aligning to the UK's Research and Development Roadmap<sup>64</sup> it will be essential for this work to stimulate private sector investment, support public services and deliver societal benefit.

To develop the objectives and principles for the FII, we recommend a steering group of experts from across key stakeholders is established to review lessons from the pilot and establish the best ways to support and enable an environment that encourages the right kind of innovation as well as takes account of the place-based needs across the regions. We

---

<sup>64</sup> [UK Gov - UK Research and Development Roadmap](#)

would like to see principles develop that enable access to the right resources (including data), encourage ways of working that align to the speed and agility of developing FinTech innovation and reduce bureaucracy. We anticipate the FII will create the means to identify relative research and innovation strengths, weaknesses, comparative advantages, share knowledge and enable a culture of inclusion and diverse contribution.

## 5. Implementing a Funding Portfolio to enable Innovation, Application and Productivity

Our final proposal asks Innovate UK and the research councils to provide long-term investment and offer new funding streams to support the delivery of the long-term roadmap through a UK wide portfolio of interventions. These interventions will be supported by the FII with delivery and management of regional portfolios undertaken by proxy through the regional bodies.

In considering this ask we suggest comparisons could be drawn from other sectors and have used the aerospace sector as a potential baseline. Our initial view suggests minimum level of investment could start at £150m per year for a minimum 5-year period.

### Scale of the ambition

***'For context we initially draw some comparisons to the more familiar Aerospace sector and the Aerospace Technology Institute (ATI)'***

The Aerospace Technology Institute, as a mechanism, has similarities to our proposed FII and so we use their levels of funding in Aerospace to provide context and act as a baseline to perform some simple tests.

Figure 7 below shows the R&I spend for both Aerospace and FS. We can see that R&I spend in FS has nearly tripled in the years from 2010-2018, and the levels of spend is expected to match that of Aerospace in 2021. For these charts we continue with the assumption that R&I spend in FS is on FinTech. As such we suggest that a similar level of intervention could be made in FinTech as has occurred in Aerospace.

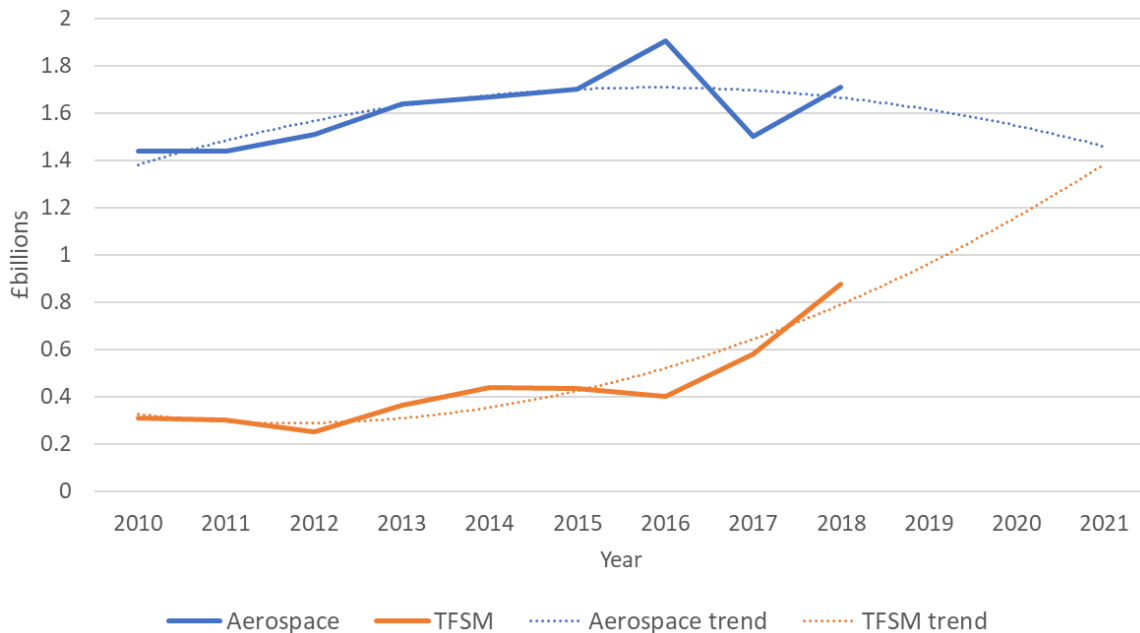


Figure 7. R&D performed in UK businesses

Figure 8 below shows R&I as a percentage of GVA. This is an indicator of how much relative expenditure on R&I that sector has had over time, and thus its role within that sector. For Aerospace this has been relatively steady, but for FS (FinTech) we can see that there are rapid increases. We propose that this is due to the uptake and progression of FinTech.

Interventions from bodies such as Innovate UK and UKRI are key to promoting an efficient and effective R&I system, as such there is a need to act within this sector to ensure that the growing reliance of R&I and the opportunities that offers to the sector are realised, maximising its impact on TFSM.

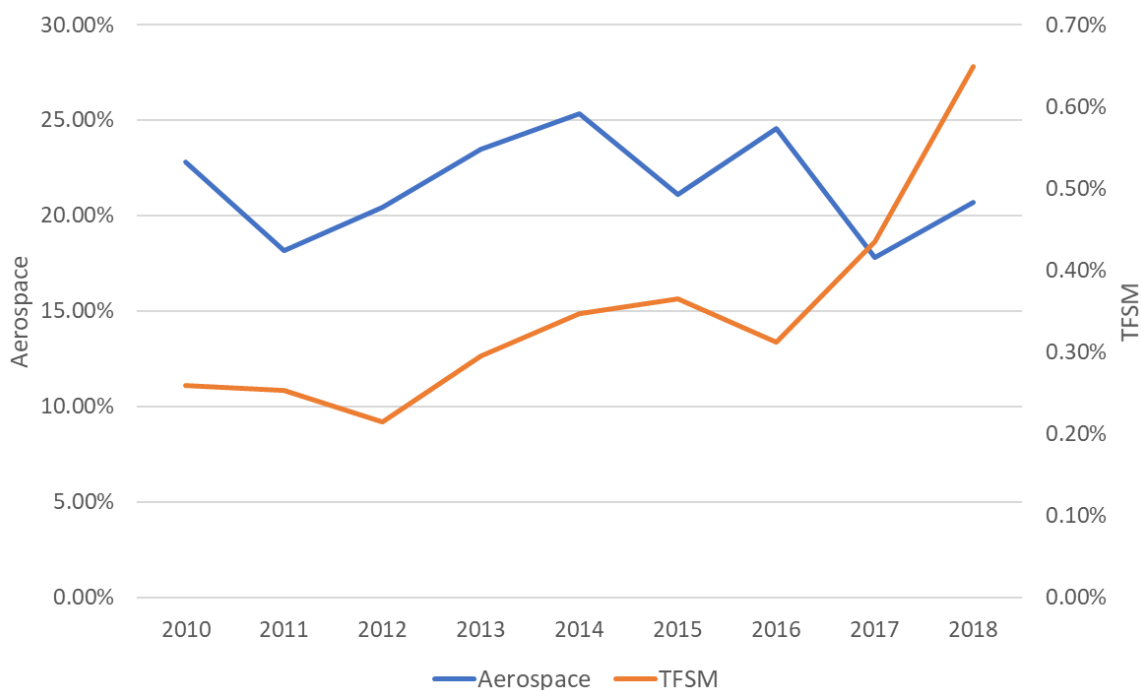


Figure 8 R&D spend as % of GVA

The conclusions that we draw from this data is that FS has historically operated with a low R&I spend, which is typical of our experience of the sector. As FS has become more reliant on and driven by innovation, and FinTech that R&I spend has increased. This data supports the previous propositions related to our Fintech value model of:

- R&I in FS is predominantly FinTech
- FinTech is transitioning the FS sector

In terms of scale the ATI was provided with £150m per year for 7 years from Innovate UK and was matched by industry giving it an initial £2bn programme. Applying a series of very simple tests against FS (as a proxy for FinTech R&I spend) will provide insight into whether a similar level for FinTech would be feasible. There are two key questions to be asked:

**Q1. Is there the appetite in the UK to match fund at £150m per year?**

Yes, the current volume of R&I spend within FS is similar to those levels within Aerospace in 2013, when the ATI was set up. Given we are proposing that Fintech is predominantly FS R&I, it holds that the same is true regarding FinTech.

**Q2. Is there likely to be a useful return on investment seen at this scale?**

Yes, the R&I effort within FS and FinTech is underperforming which has a bearing on a potentially very large sector with cross cutting application in the economy, and through interventions with UKRI strong improvements can be made with UK economy impacts.

## 5. Our findings summarised

Financial Services is mission critical to the UK being valued at providing £132bn in 2018 into the UK economy. FinTech is transitioning and disrupting the sector, from being an enabler to a provider of FS. As such it is showing rapid growth and had an estimated value to the economy in 2015, by Ernst and Young, of £6.6bn. That said the innovation pipeline was weak with limited collaboration in innovation.

Changing the ways of working to encourage innovation and collaboration could be facilitated through the creation of a Fintech Innovation Institute (FII). If bodies such as Innovate UK and UKRI support the proposals of this paper then transitioning the current Innovate UK (and UKRI) ways of working to ones more aligned to the sector through learning from agile methodologies could also support that change. Additionally, taking on a community owned approach to governance and generation of an innovation roadmap and strategy will encourage buy-in from the sector.

As a disruptor to the FS sector, Fintech will impact all sectors in the UK economy, replacing traditional methods and offering new opportunities and collaborations. Our model (Figure 6) has sought to offer insight into the value across various sectors.

The regions have a key role to play through their cluster developments and connected networks. There are also regional niche areas that exist across financial services and alternative sector applications. To fully utilise regional capabilities and opportunities each FinTech regional body will be part of the definition of a roadmap of common challenges and strategy for FinTech innovation (and related research).

We propose a series of steps to enhance collaboration including the development of the FII. This could be utilised to transition the sector from a reactive means of operating to a proactive, robust and collaborative one based on the right interventions from research bodies such as Innovate UK (and UKRI). Support for the proposals in this paper present an opportunity to engage Innovate UK and UKRI in discussions to consider and explore different ways of approaching intervention definition and delivery to bring benefit to any programme and that could support agile methodologies and associated agile innovation.

The key messages from this research are outlined below and we welcome the future stakeholder discussion and contribution to help progress the proposals outlined in this paper.

- Financial services is a mission critical element of the UK economy
- FinTech is a growing disruptor of Financial Services
- The HMT FinTech review acknowledges the value FinTech presents for improving Financial Services. This paper complements that review and supports its objective of maintaining and advancing the UK's FinTech reputation
- Our research shows that FinTech has the potential to impact the broader sectors of the UK economy
- The regions have a significant contribution to make through the proactive networks and ability to build collaboration

- To advance the opportunity better collaborative agile R&I is needed in Fintech
- A UK innovation strategy and body will help advance regional competencies and encourage agile R&I
- Regulation, and the leadership from the UK's regulatory bodies enables a powerful means to focus and ignite R&I in financial services
- The Global FinTech market is highly competitive and the UK must act to maintain its leading position
- Gaining commitment from bodies such as Innovate UK and other stakeholders would enable good R&I in FinTech



## 6. Conclusion

This paper was written with the goal of articulating and discussing the case for support of innovation in the FinTech sector and creation of the necessary environment to innovate.

Our approach through regional analysis has used Scotland and Wales to consider the benefits of community-based clusters and connected networks. The FinTech National Network, across the four nations, has also provided a collaborative forum for working across all the UK regional FinTech bodies.

Our analysis indicates that Financial Services, and FinTech, have been dis-aligned with the research communities and UKRI when compared to other sectors and given the prominence of Financial Services to the UK economy. Levels of unsuccessful engagement from both sides have resulted in a sector that is not fulfilling its innovation potential.

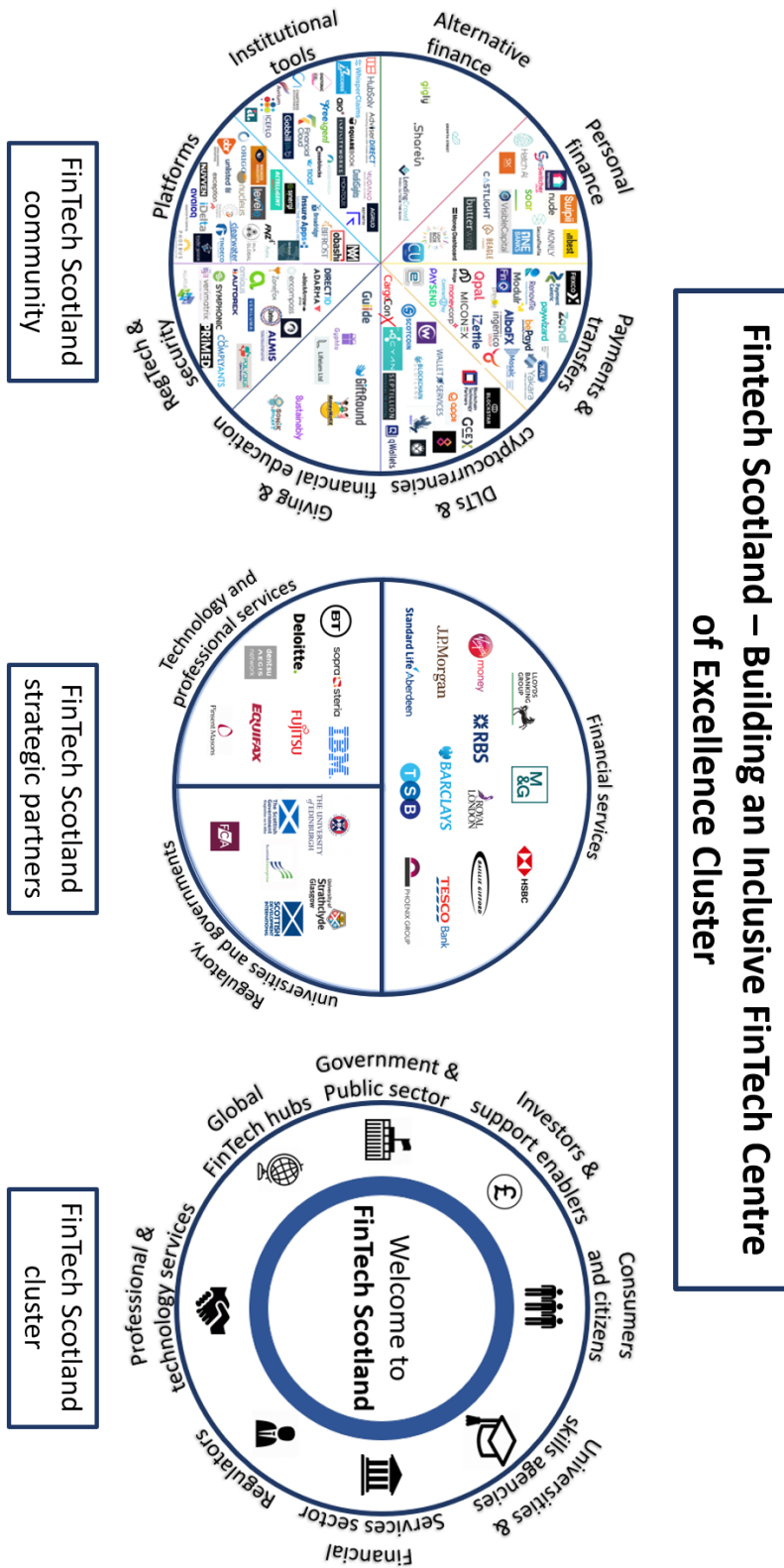
It is our view that now is the time for strategic collaboration across the UK to develop the necessary FinTech innovation. We are calling on bodies such as Innovate UK and the research councils to engage with us and utilise regional expertise to help change the current direction, evolve the necessary interventions and develop agile methodologies that can be leveraged for innovation. This is a win-win situation, and the counterfactual could see the demise of one of the most important sectors of the UK economy.

Our work started in Q2 2020. It complements the HM Treasury FinTech review by looking specifically at FinTech R&I and supports the objectives of ensuring UK FinTech has the right Innovation resources and conditions to grow and to maintain and advance its global reputation.

This paper aims to start the appropriate and necessary discussions. We look forward to next steps and engagement with stakeholders across the UK to address the current situation, to ensure that FinTech is a protected, grown and resilient part of the UK economy.

# Appendix

## APPX-1 FinTech Scotland ecosystem



## APPX-2 Global Analysis

### Singapore

Singapore is one of the fully-fledged most desirable FinTech hubs in Asia. It has a vibrant ecosystem that is supported by a strong stable of investors, proactive regulators and a visionary public sector. It is home to 45% of FinTech companies in ASEAN with the Singapore FinTech Association listing almost 1000 start-ups in its directory. As of September 2019, 51% of the US\$1.14 billion that was raised by fintech start-ups across ASEAN, went into Singapore<sup>65</sup>.

In 2015 the regulatory body, Monetary Authority of Singapore (MAS) launched an SGD\$225m fund, to support innovation initiatives in the financial services industry, with the ultimate aim of establishing Singapore as a Smart Financial Centre<sup>66</sup>. Similar to the UK, MAS has created a regulatory sandbox, but has taken the concept further by offering a means to approve for some lower-risk FinTech firms within 21 days of applying. There are also a number of specialised grants available to local FinTech firms to cover everything from AI adoption and overseas expansion to talent generation and business development support. In the wake of COVID-19 MAS announced a support package to enhance operational readiness and resilience, accelerate digitalisation and boost capabilities across the sectors<sup>67</sup>.

The Singaporean government has identified FinTech as a key enabler of its digital economy agenda and launched multiple projects including the Smart Nation initiative to build a digitally integrated economy. Through this initiative it has made it policy to try and purchase services directly from FinTech start-ups. It also supports the Singapore's MyInfo initiative, a digital identity scheme that enables citizens to authorise 3rd party access to their data. It means Singaporeans can instantly apply for credit cards online or open bank accounts using their MyInfo data, which is now being utilised by more than 20 financial institutions to provide more than 110 digital financial services<sup>68</sup>.

### North America

The United States ranks as the world's leading FinTech hub and accounted for 57% of the global market in 2018<sup>69</sup>. It is home to approx. 8,775<sup>70</sup> FinTech start-ups, considerably more than the combined 7,385 in Europe, the Middle East, and Africa, and the 4,765 in the Asia Pacific region.

New York and Silicon Valley are the largest FinTech hubs in the country, and while they account for the majority of investment and operations, there are a growing number of other FinTech ecosystems springing up, with Chicago, Boston and Charlotte all regarded as emerging hubs.

---

<sup>65</sup> [UOB - FinTech in ASEAN: From Start-up to Scale-up \(2019\)](#)

<sup>66</sup> [Monetary Authority of Singapore - FinTech and innovation](#)

<sup>67</sup> [Monetary Authority of Singapore - MAS' Response to COVID-19](#)

<sup>68</sup> [GovTech Singapore - MyInfo](#)

<sup>69</sup> [Mordor Intelligence - US FinTech Market: Growth, Trends & Forecast \(2020 - 2025\)](#)

<sup>70</sup> [Statista - Number of Fintech startups worldwide from 2018 to 2020](#)

The US FinTech industry is seeing an 8.6% cumulative average growth rate (CAGR) which is expected to continue at the same rate until 2024<sup>71</sup>. Digital payments (including mobile payments via smartphones apps) is the main market segment and one of the key contributors in boosting FinTech adoption in the US. Despite developments they only equate 10% of the payments market, with legacy systems, rewards cards and lack of national agenda cited amongst the reasons for low adoption<sup>72</sup>.

The US regulator, Financial Industry Regulatory Authority (FINRA) has been actively deploying technology in its regulatory functions since the 1980s, including most recently new technologies such as big data analytics, natural language processing, and cloud computing to enhance its market surveillance and better ensure regulatory compliance. In its 2018 report<sup>73</sup> FINRA committed their continued support to the industry.

US FinTech includes the involvement of homegrown BigTech companies. Apple launched Apple Card<sup>74</sup> with Goldman Sachs, Google is partnering with Citigroup on current accounts<sup>75</sup> and, as well as Facebook Pay<sup>76</sup>, Facebook is working on its digital currency project 'Libra'<sup>77</sup> that aims to support both existing government-backed currencies, like the US dollar and the euro, and the upcoming Libra token.

## Sweden

While consumer adoption of FinTech in Sweden is in line with the global average of 64%, it is one of the leading cashless economies in the world, with just 1% of their GDP circulating in cash in 2018<sup>78</sup>, compared to 11% in the eurozone, 8% in the United States and 4% in Britain. Many banks no longer offer cash services and some businesses, including public services such as buses and trains, don't accept cash.

Sweden's Central Bank, the Riksbank, has been one of the biggest driving forces for a cashless society, implementing its mobile payment system, Swish, in 2012. This enables frictionless, instant and free transactions between Swedish bank accounts and is used by approx. 66% of the population. In addition, the Riksbank is currently conducting a pilot to develop a national digital currency, the e-krona. It uses Distributed Ledger Technology to create a user-friendly currency that can be stored and spent via a mobile app wallet and wearables<sup>79</sup>. In January 2020, the Riksbank invited the Bank for International Settlements to open an innovation hub in Sweden<sup>80</sup>.

---

<sup>71</sup> [Research & Markets - US Fintech Market - Growth, Trends, and Forecast \(2019 - 2024\)](#)

<sup>72</sup> [CNBC - Mobile payments have barely caught on in the US, despite the rise of smartphone](#)

<sup>73</sup> [Technology Based Innovations for Regulatory compliance](#)

<sup>74</sup> [Apple Card](#)

<sup>75</sup> [Google Current Account](#)

<sup>76</sup> [FaceBook Pay](#)

<sup>77</sup> [FaceBook Libra](#)

<sup>78</sup> [Riksbank - Payments in Sweden 2019](#)

<sup>79</sup> [Riksbank - The Riksbank to test technical solution for the e-krona](#)

<sup>80</sup> [Central Banking: Riksbank asks BIS to establish innovation hub in Sweden](#)

The Swedish FinTech Association lists more than 50 active FinTechs<sup>81</sup> including two unicorns Klarna, and iZettle.

### **Klarna**

A bank known for its buy now, pay later scheme that provides online financial services such as payment solutions for online storefronts, direct payments, post purchase payments and more. It has been prized as one of Europe's most prized start-ups and valued at US\$5.5bn in 2019.

iZettle's business model focused on smart phone based mobile commerce and was bought by PayPal in 2018 for US\$2.2bn

Such success stories have helped Sweden's position as a leading FinTech hub and have helped create a culture of entrepreneurship that is increasingly supported by academia, where Sweden's universities have created a number of world-class entrepreneurship programmes in recent years.

---

<sup>81</sup> [Swedish FinTech Association](#)

## APPX-3 Ways of working

If there is interest in exploring new approaches to provide different types of support and interventions as suggested, then we would propose discussion around the ways of working that could fit well with the approach to innovation across the FinTech community. We draw conclusions when considering a typical innovation mechanism and make suggestions of what may be preferential when working with the FinTech community.

### **Engagement with Sector to Define Direction**

Building a community focussed mechanism provides an opportunity to ensure that the people and organisations performing the innovation are empowered to contribute and hold a responsibility to support the development of the innovation system. It provides a contrast in approach to a more top-down, prescriptive way of operating an innovation system and creates a sense of shared ownership and transparency. An organisation such as the FinTech Innovation Institute (FII) could efficiently enable this capability, identifying developing trends through community engagement, and acting as a proxy for operating the innovation system and interventions for any governmental funding body.

### **Potential Barriers to Entry**

While the rationale for the specifics of the questions within a typical application are appreciated, they could potentially be viewed as barriers to entry in a sector such as FinTech where working practices are agile and iterative. Extra support and resource are often needed, to understand the process, terminology, etc., while completing an application, adding another layer of complexity to the process. It will be useful to gain feedback on the application process from any organisations identifying as FinTech, that has applied to recent schemes, with a view to considering alternative options.

For example, progress could be made by considering a common language and milestone familiar to FinTech companies such as 'The Pitch Deck'. This is used as a tool to articulate the proposition and progress across the relatively well-established route a FinTech company takes for funding acquisition from pre-seed through to series A, B, C and beyond. These are key stages in the life of a FinTech start-up and there is support available in the community to ensure that the actual company is in the right state of maturity to be pitched, that the team can create a good pitch deck and deliver that pitch well. Re-use of such a tool would make the application process much more appealing to the community, reduce costs, drive efficiencies and encourage more innovation.

Some items such as economic impact are not generally a part of the Pitch Deck process but are very important when assessing the investment of public money. Items such as economic impact could perhaps be answered by other means and through the developments of data analytics and machine learning in generating predictive models. This provides an alternative way to perform the assessment that may provide deeper insight.

The second tool that is common to most FinTech companies is more agile methods of running projects. Through this approach they get to understand the customer, articulate the

problem and deliver the solution. Alignment of the application process to that language and mentality/structure could reduce perceived barriers in applying.

### **Awareness of available support**

Our experience has identified that awareness to the potential support and opportunities for innovation grant funding is low and the UK FinTech industry would benefit from a greater awareness of the opportunities. The potential for bodies to partner in the FinTech Innovation Institute (FII) may be a valuable step towards achieving that awareness and change in understanding.

### **Length of cycle from engagement through to project completion**

There may be benefit in considering how to adapt the timescales and phasing of any challenge generation, application and review process.

Experience shows that FinTech generally works in an agile manner and rapid turnaround of innovation is a major driving force, not only for the success of a company but also is a major attractor to the way finance is raised. This creates competition within the industry and time to MVP or time to market are key. This alternative way of working raises a question and an opportunity to consider the phasing and timescales currently used in funding calls.

### **Identifying calls for proposals**

Many companies work on a very intense and short project lifecycle, particularly in SMEs and Micro businesses. They also work in an agile manner when managing projects allowing them to be more flexible on market changes and needs. They have to be able to adapt their products and service plans quickly. It would be useful to explore if relevant interventions could follow a similar route, to support true innovation.

The ability to create themes for funding in a rapid manner based on stakeholder engagement and direction from the roadmap, could allow hackathon type approaches to be utilised gaining knowledge of developing trends and needs, and identifying where focus is needed for intervention.

The FinTech Innovation Institute (FII) could facilitate such activities against the national agenda enabling perhaps an approach that could see, hackathon in week one, review in week two and the call for proposals released in week three or week four. This type of timeframe could maintain and advance the UK's competitive edge in fintech and accelerate the sector.

### **Proposal Assessment**

As mentioned above the mechanism and structure of future project proposals may benefit from adopting some of the agile methodologies used in FinTech. The assessment of proposals may also benefit from this approach looking to understand the fintech's ability to perform in an agile manner and have the ability to 'do good innovation'. If a project is able to 'do good innovation' by proxy it should be taken as a given that the other typical metrics will be met. If the focus of the proposal assessment remains the same as current practices,

then the ideology that we could achieve and are trying to promote and grow, will become lost. The assessment needs to be about finding and accelerating good innovators. Good innovators will provide market impact, added value to GVA and more jobs, by the fact they have innovated well.

### **Monitoring Process**

The monitoring process is vital for good governance and accountability. As the opportunity unfolds to explore the potential for other ways of operating this could also expand to the monitoring process, and this process too could align to agile methodologies.

FinTech teams are well versed at regular reporting, working through iteration, learning lessons and enabling innovation, this internal project reporting process could be used as a monitor, to avoid having to double report and add additional process to a project. The teams often work remotely and can operate project controls well under those conditions.

The tools that are commonly used to facilitate remote working and reporting, could be leveraged for the monitoring of any project under the Fintech Innovation Institute (FII). Similar tools can be used that will offer a live view of project progression and remove the need for an additional set of reporting mechanisms. This would adhere to the agile innovation method whereby monitors mainly intervene and request additional engagement as and when it is needed (where a project is deemed out of control). This approach would not only make the process more efficient but would also add to the perception of value and encourage more innovation in UK FinTech.

### **Non-Typical Means of Intervention**

Facilitating collaboration (to change ways of working for FinTech) and accelerating innovation in financial services are key goals for the proposed Fintech Innovation Institute (FII). The FinTech community is familiar with modern ways of working, starting and building businesses through approaches that includes accelerators, incubation hubs and venture labs. Although there is great merit in the more typical collaborative innovation projects there are additional relevant means to achieve those goals. These can include use of 3<sup>rd</sup> party finance, with potential of equity shares. These can also encourage, and de-risk projects post TRL6 and provide more certain routes to exploitation. As a proxy the FII could harness some of these other means of working and support the regions in their plans to enable fintech to achieve good innovation. This would advance regional competencies, expertise and accelerate those regional excellences.



## APPX-4 FinTech Wales innovation road mapping

A summary of results of the FinTech wales first iteration road mapping

### Products and services external

These are a summary of the top-level items that were discussed with respect to what innovation can address for those products external to the current means of operation in and around Financial Services/Fintech. The action column is a note on potential responses to this input from industry/academia.

<b>I want</b>	<b>So that</b>	<b>Kano</b>	<b>Action</b>
Visibility of current and planned innovation and its value	To avoid replication and engage on opportunities	Basic	Create a transparent and open innovation reporting platform aligned to UKRI reporting with independent assessment by the FinTech Innovation Institute
Ability to test innovation products	Identify and exploit opportunities of potential products more quickly	Performing	Provide industry use cases for TRL 3 PoC and TRL 6 demonstration to accelerate exploitation
Inclusion of security within innovation	Authentication and privacy is included by design	Performing	Engage with NCSC to offer cyber by design within any innovation programmes
Bespoke financial products	Reduce finance 'spam' and optimise financial usage and planning	Exciting	Leverage AI to fit financial products to people/organisations in an ethical and responsible manner

Access to innovative capability	Provide evolutionary and revolutionary products and services to customers	Exciting	Create venture labs, accelerators and incubators that are outcome and collaborative / community focussed
---------------------------------	---	----------	--

### Products and services internal

Similarly, to above this is the summary of items related to innovation that organisations see would be useful to their internal business operations with respect to Financial Services and FinTech.

<b>I want</b>	<b>So that</b>	<b>Kano</b>	<b>Action</b>
Visibility of cutting and bleeding edge disruptors	To learn and share knowledge to influence company direction	Basic	Provide visibility of ongoing horizon scanning and innovation portfolio reporting
Transparency of stakeholders and their innovation roadmaps	To learn and share knowledge to influence company direction	Basic	Engage in a sector wide technology and innovation road mapping exercise
Virtual guide to support search, find and demonstrate of products and services	Reduce search time and ensure correct products and services are used	Performing	Engage with existing AI/ML/NLP bots to pivot and reappropriate
Means to navigate, summarise and visualise reports, their topics and outcomes	To better influence decision making	Performing	Engage with existing AI NLP and pivot to support the FinTech/FS sector with open text document assessment

Methods to deliver product and services to market more quickly	Improve agility and ability to respond to market and customer needs	Performing	Leverage the newly created ecosystem to steer, drive and acquire from innovators, entrepreneurs and SMEs
Ability to automate the understanding of contractual and legal implications	To de-risk and reduce manual efforts for innovation compliance	Exciting	Engage with existing AI NLP and pivot to support the FinTech/FS sector with open text legal and contractual document assessment

### Market disruptors

This covers the opportunities where innovation can occur which is often initiated or created by external factors. As such the impact can be on the direction of a market, causing both threats and opportunities. These types of disruptors need to be identified in a timely manner to ensure the best actions can be taken to minimise threats and maximise opportunities.

<b>Disruptor</b>	<b>Impact</b>
Movement of more FS products to aggregators	Reduction in manual brokered workload
Use of blockchain in multiparty 'events' that may include non-FS actors	More automated and faster means of delivering products
Innovation and SME friendly common procurement process for FinTech	Improve opportunities, speed and ability for all stakeholders engage including start-ups, SMEs and large organisations
Autonomous Cars and UGVs	i) Automation of cause/fault assessment and claim for insurance events.

	ii) New models in insurance to account for different owners of risk and responsibility (i.e., not the driver)
Personal flying vehicles and UAVs	New product lines, models and responsibilities for changing habits of travel
Ability for new pivoting players in sectors to offer B2C without legacy requirements on resources or infrastructure to distribute/interface the financial aspect to customers	Breaks down monopolies and offers opportunities for new competition, ensuring customers receive a more optimal offering.

### Technology opportunities and disruptors

Finally, we looked at technology that is 'somewhere' on the horizon that can enable disruption of the FinTech sector, when it is applied to new products and services. Often with this technology maturation is undertaken in academic institutions where all of the potential opportunities for its application have not been realised. Raising awareness of such technologies to industry can support ideation on areas of possible application which can start further low TRL iterations.

Technology	Comments
Shared/Centralised Cyber services for Fintech	SoC, DDoS, skilling resources, CERT
Aligned and shared identity verification/trust resources for FinTech	Reduce replication and provide standard service allowing better focus on innovating other areas rather than the enabling tech
Open finance to allow integration/sharing of data across FinTech	Create FinTech opportunities based on data from multiples FS sources
Shared infrastructure for common requests, e.g., big data, AI/ML, HPC, cloud	Centralised provision and management of enabling resources needed for innovation in FinTech

Common messaging standards (software/hardware) across FinTech and any integrating sectors	
Integrated payment services for cross-sector multi-modality payments	Cover emerging and existing modes of payments e.g. crypto
Hybrid Neuro-Symbolic AI	Next evolutionary move towards GI
Human-AI collaboration	Means to leverage the best of both worlds fitting AI into existing human operations as a partnership
Quantum Computing	More data processed quicker to uncover more detail in patterns, process and predictions. Models can be built and applied in real time
Bots/Advisors as a virtual FinTech PA	Optimise product fit based on individual needs of customers.
5G, mobile and interactive/immersive	More digitalised means of interaction in the B2C space, offering FS to offer more remote services.

# Abbreviations

AI - Artificial Intelligence

API - Application programming interface

APIX - API Exchange (APIX)

ASEAN - Association of southeast Asian nations

ATI - Aerospace technology institute

B2B - Business to business

B2B2C - Business to business to consumer

B2C - Business to consumer

BofE - Bank of England

CAGR - Cumulative average growth rate

COVID-19 - Coronavirus disease 2019

Cyber - Cyber security

FCA - Financial conduct authority

FII - FinTech innovation institute

FINRA - Financial industry regulatory authority

FS - Financial services

FinTech - Financial technology

GBP - Great Britain pound

GVA - Gross value added

HMT - Her Majesty's treasury

ID - Identification

InsurTech - Companies, products and services with a major reliance/focus on insurance technology

IUK - Innovate UK

MAS - Monetary Authority of Singapore

MVP - Minimum viable product

NCSC - National cyber security centre

ONS - Office for national statistics

R&D - Research and development

R&I – Research and innovation

RegTech - Companies, products and services with a major reliance/focus on regulation technology

RoM - Rough order of magnitude

SGD - Singapore dollar

SME - Small or medium enterprise

TFSM - Traditional financial services methods

TRL - Technology readiness level

UK - United Kingdom

UKRI - UK research and innovation

UN - United Nations

USD - United States dollar