



**Automation and  
Sector Impacts  
Research 2016**



**Financial &  
Business Services  
Sector Outlook**

Scottish Enterprise

**Report**

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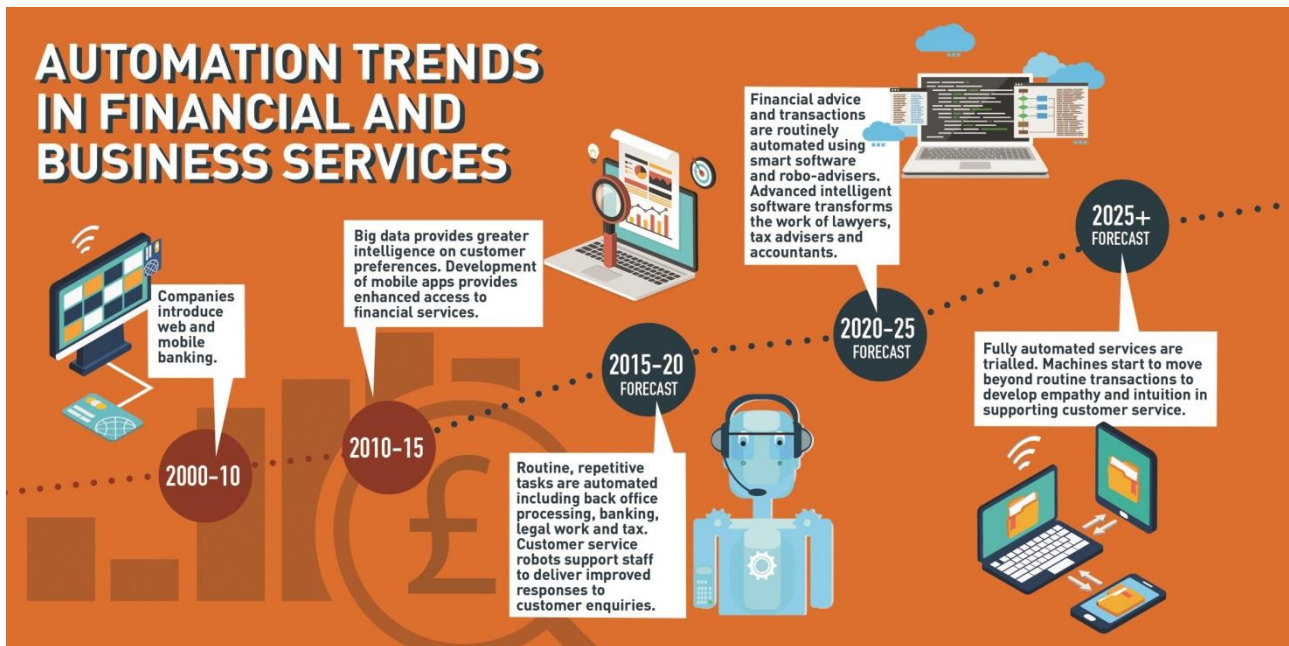


## Executive Summary

This report considers current and future adoption of automation by the financial and business services (F&BS) sector in Scotland to 2025 and beyond. It has been developed with contributions from sector companies, industry representatives and leading academics in this area. The key findings of the report are:

- Technological advancement in areas of big data, analytics, internet of things and artificial intelligence are the foundations of automation and are driving adoption levels of automation solutions by the F&BS sector
- Technology convergence, however, is also a disruptive force for the F&BS sector as it is changing the competitive landscape, creating new business models and reshaping the value proposition of products and services
- Adoption of automation solutions is an opportunity to benefit from short-term cost reduction, agility, efficiency, accuracy, speed, greater performance, and quality. As well as long-term benefits such as re-deployment of resources for more strategic, value-added initiatives, while creating more agile organisations that can improve customer experience
- Automation in the F&BS sector is facilitated by small, lightweight, easy-to-program software tools that automate a range of digital activity rather than a physical handling device (physical robot)
- Automation applications within the F&BS sector are plentiful due to the combination of high transaction volumes, data handling and increased regulation which obliges an organisation to streamline and ensure appropriate levels of control. The most common application is to automate repetitive tasks using robotic process automation (RPA) e.g. data entry and validation of insurance claims. There are also emerging trends for intelligent automation (IA) to be applied to support automated customer service due to advancements in human like decision making and intuition capabilities of new automation solutions.
- F&BS are now a globalised service facilitated by emerging technologies, which means that business location is less relevant, however, Scotland benefits from retaining some of the world's leading F&BS companies and the UK as a whole is forging a reputation as a FinTech world leader
- The F&BS market is growing with consumers are driving demand for omni-channel delivery as a result of increased adoption of smart devices and this will naturally impact on levels of automation adoption within the sector as businesses respond to customer demand
- There are examples of Government initiatives, both at a Scottish and UK level, which aim to encourage innovation in the sector and ultimately ensure the sector is capable of responding to technological developments, including automation
- Adoption of automation has the potential to change the roles of the labour force within the F&BS sector as roles will become highly skilled and highly paid as they will focus on technological capabilities and/or advanced customer service

- Increased levels of automation will require different skills from the F&BS labour force, much of which will be technological in nature due to data analytics and technological convergence. The sector needs to work with education, training and skills intermediaries to ensure future labour forces are equipped for the higher levels of automation in the sector



**Figure 1: Automation Trends in Financial and Business Services**

This report provides examples of current and leading-edge automation technologies relevant to the F&BS sector in Scotland, as illustrated above and explained throughout the report and uses stakeholder feedback and desk research to develop a vision for 2025. The report comments on key issues that need to be addressed to achieve such a vision, and makes recommendations for companies operating in the sector, industry bodies and the public sector.



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## **1. Purpose and overview of the research**

### **1.1 Objective of the research**

This report is one of three similar reports, with the other two focusing on automation in food manufacture (including agriculture) and in construction. The key findings of all three reports are summarised in a separate Strategic Overview report. The objective of this report is to provide an overview of the current level of adoption of automation in the Scottish/UK financial and business services (F&BS) sector and identify how this might change over the period to 2025. The report identifies examples of automation that have been adopted by F&BS in other countries and potential future applications.

### **1.2 The research process**

Research for this report was carried out during August and September 2016. This involved a combination of secondary research and primary research. The sources of secondary research are listed in appendix A with detailed references provided as footnotes throughout the report. The primary research obtained feedback from three industry and academic stakeholders. Industry stakeholders provided insight from the perspective of financial and business services products and from trade representative perspective. Academic stakeholders provided input from a broader sector and research perspective. However, it should be noted that although there are research activities taking place in relation to F&BS across the UK, it appears to be a relatively closed community which is protective of IP, as such there was no specific projects referenced. Nonetheless, there are notable research efforts in relation to robo-advice, FinTech, RegTech and cryptocurrency.

### **1.3 Definition of automation in F&BS**

In the context of F&BS, automation is facilitated by small, lightweight, easy-to-program software tools that can automate a range of digital activity rather than a physical handling device.

F&BS organisations face the need for rapid change, driven by a combination of evolving customer needs, advances in digital technologies and tighter regulatory regimes. Consequently, F&BS organisations are embarking on a comprehensive digitization journey, which is different from the path they were on just three years ago, when the majority of efforts related to isolated initiatives such as division-focused big data projects, the launch of individual apps, and improvements to their online and mobile channels. Today, for example, banks and insurers are changing the ways that they interact with customers, giving customers a wider range of choices and greater control over the interaction itself. Additionally, a number of F&BS organisations have begun to establish processes, governance, policies, standards and tools for data management, strengthening their ability to leverage big data, meet regulatory requirements, and ensure consistent and timely reporting. Moreover, some are experimenting with new and evolving digital technologies, such as robotics process automation (RPA), big

data, internet of things (IoT), gamification, artificial intelligence and block chain; which together have the potential to deliver step changes in speed and efficiency.

There are two main types of automation in the F&BS sector:

1. Robotic Process Automation (RPA)
2. Intelligent Automation (IA)

The Institute of Robotic Process Automation define RPA as *"the application of technology that allows employees in a company to configure computer software or a "robot" to capture and interpret existing applications for processing a transaction, manipulating data, triggering responses and communicating with other digital systems"*<sup>1</sup>. RPA combines artificial intelligence including natural language processing, machine learning, autonomies, and machine vision with automation to handle high-volume, repeatable tasks that previously required a human to perform.

In contrast to the routine tasks associated with RPA, IA relates to non-routine tasks; those involving intuition, judgment, creativity, persuasion, or problem solving and which would appear to be very difficult to automate.

A high level comparison of RPA and IA tools is illustrated below<sup>2</sup>:

	Robotic process automation	Intelligent automation
Automates tasks that are...	Routine: Methodical, repetitive, rules-based	Non-routine: Requiring a thoughtful consideration
Able to...	Follow instructions	Come to conclusions
Application is...	Broader: Can automate any suitable process	Narrower: Application should be targeted to deliver meaningful, insightful outputs
Market offerings are...	Maturing	Emerging
Implementation and ongoing costs are typically...	Lower	Higher
Implementation timeframe are typically of the order of...	Weeks	Months

**Figure 2: Comparing RPA and IA**

<sup>1</sup> <http://www.irpanetwork.com/about-irpa/>

<sup>2</sup> Deloitte (2015) Automate This: The business leader's guide to robotic and intelligent automation



Automation technologies can unlock value across a range of tasks within F&BS including:

- Data entry and validation
- File and data manipulation
- Automated formatting
- Multi-format message creation
- User Interface manipulation
- Web scraping
- Text mining
- Uploading and exporting
- Downloading and importing
- Workflow acceleration
- Currency/exchange rate processing
- Reconciliations

## 1.4 Definition of the scope of F&BS sector

Scotland's Economic Strategy<sup>3</sup> identified Financial & Business Services (F&BS) as one of the key growth sectors for Scotland. It was identified as a sector that could be built upon to increase productivity and growth. Scotland is recognised internationally as the UK's second financial centre (outside of London) and has a number of global organisations providing asset servicing, banking, investment management, corporate finance, general life assurance and pensions. Additionally, business services are also important for Scotland as it has developed a broad range of professional services.

The F&BS sector comprises a diverse range of activities as illustrated in the Standard Industrialisation Classification code definition:

The Financial and Business Services growth sector is defined by the Standard Industrialisation Classification (SIC) 2007 codes:

- 64.1 - Monetary intermediation
- 64.3 - Trusts, funds and similar financial entities
- 64.9 - Other financial service activities, except insurance and pension funding
- 65 - Insurance, reinsurance and pension funding, except compulsory social security
- 66 - Activities auxiliary to financial services and insurance activities
- 69.1 - Legal activities
- 69.2 - Accounting, bookkeeping and auditing activities; tax consultancy
- 70.2 - Management consultancy activities
- 71.129 - Other engineering activities (not including engineering design for industrial process and production or engineering related scientific and technical consulting activities)
- 73.2 - Market research and public opinion polling
- 74.3 - Translation and interpretation activities
- 78.109 - Activities of employment placement agencies (other than motion picture, television and other theatrical casting)
- n.e.c.
- 78.3 - Other human resources provision
- 82.1 - Office administrative and support activities
- 82.2 - Activities of call centres
- 82.3 - Organisation of conventions and trade shows
- 82.91 - Activities of collection agencies and credit bureaus
- 82.99 - Other business support service activities n.e.

<sup>3</sup> <http://www.gov.scot/Resource/0047/00472389.pdf>

### **1.4.1 Market overview**

Financial services contributed £8.8 billion to the Scottish economy in 2010<sup>4</sup> and employment in the F&BS sector stood at 226,700 in 2014<sup>5</sup>, representing a 5.6% increase from 2013 (up 12,000 jobs). In Scotland, the sector accounts for 8.9% of employment, whilst across the UK as a whole, the Scottish sector accounts for 7.6% of employment in F&BS. Just over 19% of the jobs relate to the activities of banks and building societies. Management consultancy activities account for 13% of jobs. Financial services and insurance activities, other engineering activities and legal activities represent approximately 13%, 12% and 10% of jobs in this sector respectively.

#### **Financial services market disruption**

Technology is a core element to the connected world we now live in and has brought a high degree of disruption to every area. The financial services sector is no exception; the volume of technology-driven applications across the sector continues to grow and the landscape is changing. This change is being driven by financial technology (FinTech).

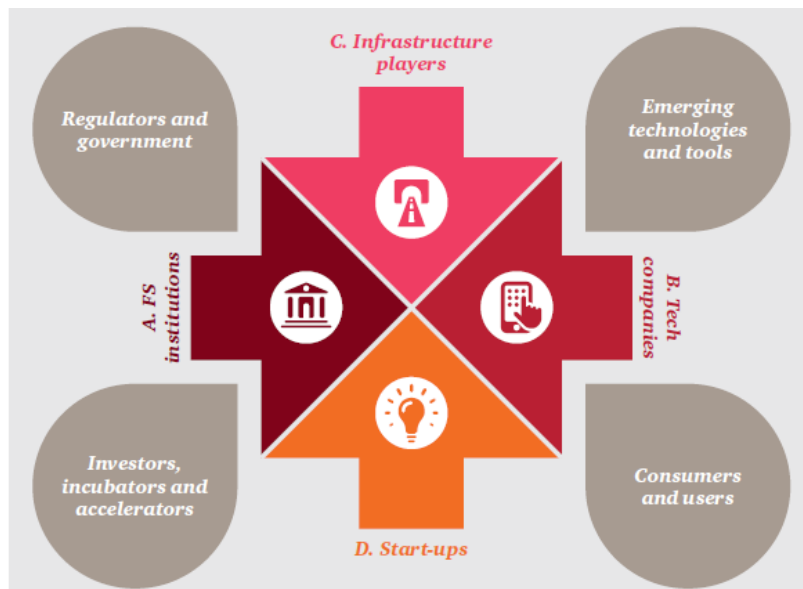
FinTech is a disruptive force within the financial services sector. It is at the intersection of the financial services and technology market and is innovating products and services that were once provided by traditional financial services companies; as such the competitive landscape is changing and the lines are being blurred between markets, as illustrated below<sup>6</sup>.

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<sup>4</sup> ONS regional accounts

<sup>5</sup> Scottish Government (2016) Growth Sector Briefing – Financial and Business Services

<sup>6</sup> PWC (2016) Blurred lines: How FinTech is shaping financial services



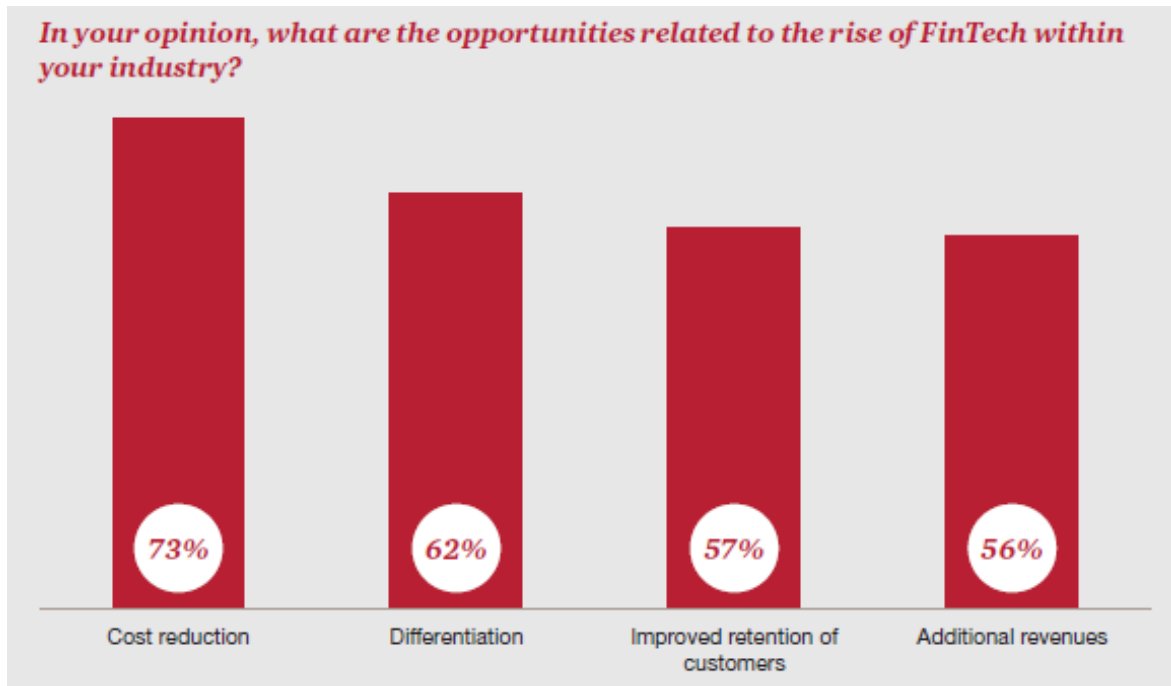
**Figure 3: Changing financial services landscape**

The landscape now encompasses four key player groups; financial institutions, infrastructure players, start-ups and technology companies. All of whom are aiming to provide products and services to meet the needs of consumers.

The emergence of FinTech is not only changing the competitive landscape, with bank executives viewing non-traditional players as a threat<sup>7</sup>, but the emerging digital technologies are also reshaping the value proposition of existing financial products and services. Automation is one technological element within FinTech that is disrupting the market place for traditional financial services players.

Furthermore, FinTech offers the financial services sector a number of opportunities, as illustrated below.

<sup>7</sup> PWC (2014) Retail Banking 2020 Evolution or Revolution?



**Figure 4: Benefits of FinTech innovations**

Financial services based organisations need to shift their traditional mind-set and adapt to emerging technologies in order to continue to meet customer needs and leverage the potential of FinTech.

**Business services market disruption**

In recent times Uber has disrupted the taxi industry whilst Airbnb has shaken the hotel market; such disruption is coming to business services.

The disruption of the business services market has arisen from emerging digital technologies; fuelled by the convergence of social, mobile, cloud, big data, artificial intelligence and growing demand for “anytime-anywhere” access to information<sup>8</sup>. Consequently, business models are being challenged and the key to ensuring successful business services is to embrace the opportunities that disruptions present.

These emerging technologies and new business models drive the ‘on-demand economy’ i.e. economic activity created by technology companies that fulfil consumer expectations via on-demand access to goods or services with the click of a mouse or swipe of a smartphone app. Research demonstrates that millennials expect to interact with technology that works and they are a social generation both offline and online and technology is at the heart of this social

<sup>8</sup> Wharton University of Pennsylvania (2015) How Professional Services Can Disrupt its Way Out of Automation

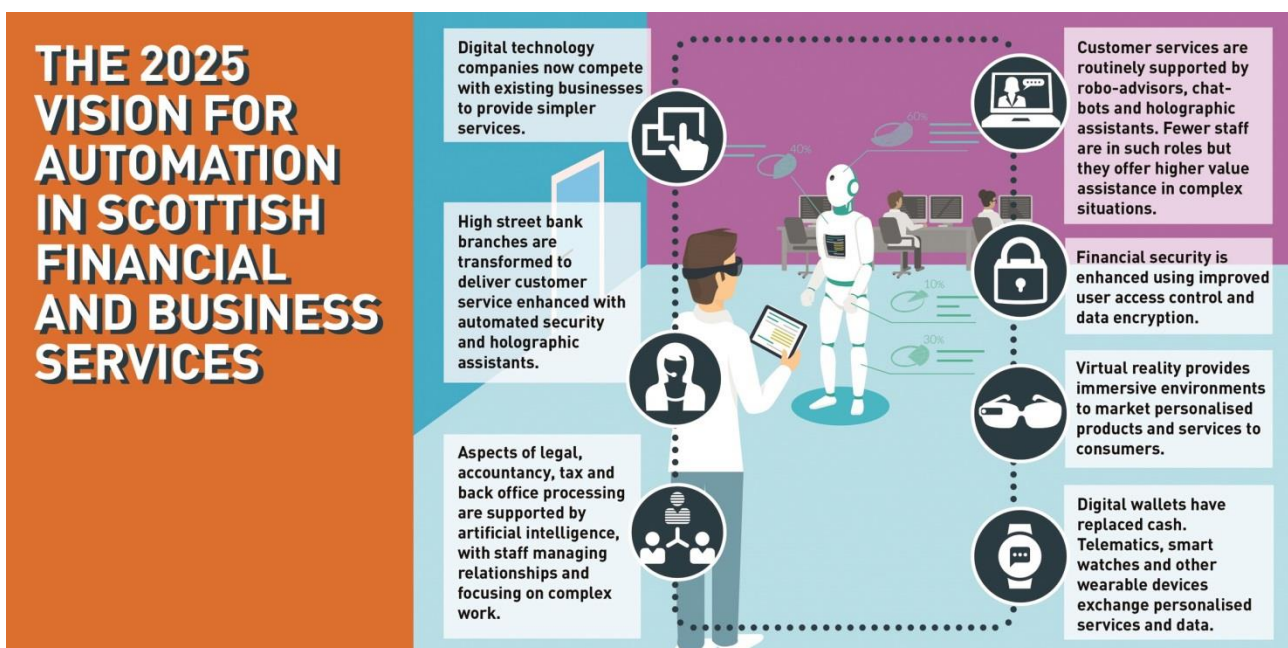


interaction. Therefore, the intelligence, automation and convenience of emerging technologies facilitates the on-demand economy that millennials expect and the challenge for business services is to adapt in order to fulfil customers' expectations or risk being overtaken by digital entrants.

## 2. Vision for 2025

The vision for automation in the F&BS sector by 2025 has been developed through consultation with a number of F&BS stakeholders in the area and supplemented by secondary research.

### 2.1 F&BS of the future



**Figure 5: 2025 Vision for Automation in Scottish Financial and Business Services**

The key elements of F&BS of the future include:

- An increasing share of the financial services supply chain is taken by digital technology firms. Following the success of Google’s email money transfer and digital wallet services as well as Amazon’s loan services for sellers<sup>9</sup>, more and more new entrants have entered the market offering simpler financial services
- There are fewer bank branches on the high street as branches have undergone significant transformation. The branches are now sleek buildings [FBS2] which reply upon biometric fingerprint scanning access [FBS3] as well as holographic assistants [FBS4] and smart walls [FBS5] to facilitate customer services
- An increasing share of the legal services supply chain will be dominated by license cloud-based, AI lawyers which will provide legal advice, sidestepping the use of human lawyers altogether for basic business dealings. These AI lawyers will predict the likely outcome of a legal dispute, helping companies decide whether to make the costly investment of hiring a traditional legal firm to apply a lawsuit.

<sup>9</sup> Computer Business Review (2016) Is Google Banking on Financial Services?

- Customers have responded well to technology and utilise smart watches [FBS1] and wearable devices [FBS9] to connect to their F&BS provider. For example, to process transactions, to manage personal affairs and communicate with providers.
- Transactional security concerns have been addressed through improved user access control, multiple sign on and data encryption
- Customer services include a combination of holographic assistants, robo-advisors [FBS6] and face-to-face assistance from personnel. Although staff levels have decreased overall, the personnel are highly skilled and highly paid; roles focus on 'backup advice', for example, when the complexity of an enquiry is beyond the capability of the robot and/or when a customer requests specific human support
- Service centres have evolved and are playing an increasingly important role in business, as they are now an integral part of business strategy, acting as a relationship hub rather than just a means for dealing with immediate problems. Work is now much more highly skilled, needing excellent communication skills along-side analytical problem-solving and project management skills. Customer service agents are adaptable to changes in technology, from becoming experts in apps and social networks to using an increasing range of data.
- Virtual reality continues to transform marketing and advertising as it enables brands to bring the reality of their products/services to consumers through personalised, dream like worlds, brands can now access the consumer's mind with no other distractions. Virtual reality is offering a whole new world of immersion and as a consequence, audience engagement.
- There is less money in circulation as cash usage is low as it has become the least attractive method of payment; digital wallets replace money [FBS7]
- Data analysis has enabled truly personalised services [FBS8] as previous behaviours are analysed including spending and saving patterns to offer tailored products and services. The focus is now on customers rather than products and services

### **2.1.1 High level benefits/implications of the vision**

There are benefits and implications of the bank of the future for both financial service providers and consumers, for example:

- Significant increase in productivity and customer service
- The competitive landscape is continuously changing with more and more new digital entrants as such there is now a plethora of providers facilitating more choice for consumers
- There is new and improved customer engagement as a result of omni-channel communication which has resulted in renewed trust between customers and providers
- There are a variety of new business models and processes available for service delivery
- There is demand for increased levels of transactional security as millennial consumers are more tech-conscious

- There is demand for data scientists and programmers as a greater proportion of the work has moved from customer facing roles to back-office technical roles
- The provision of personalised services has enabled key players in the market to gain competitive advantage over mass service providers



### 3. Market drivers and barriers

This section describes the key drivers and barriers to adoption of automation in the F&BS sector. This was identified through consultation with academic, industry and other stakeholders. This feedback complemented the findings of the desk-based review.

#### 3.1 Drivers

Drivers influencing the adoption of automation in F&BS include:

- Increased productivity and efficiency; automated tools can deliver faster, more accurate decisions, and can be performed repeatedly and frequently compared to manual handling.
- Customer experience; pressure to improve the customer experience and reduce lead times. Research<sup>10</sup> shows that staff can spend as much as 40% of their time on non-value adding, data intensive, repetitive tasks, leaving them with limited time to focus on higher value, customer-focused activities. Automation enables focus to switch to higher value activities such as customer service and experience. Additionally, stakeholders revealed that improved customer service is a win-win for businesses as happy customers will lead to greater levels of loyalty and follow on purchase.
- Cost benefits; replacing human workforce in high-frequency tasks and at the same time reduce processing time of those tasks. For example, there can be up to 50%-70% cost savings for some of the automated activities. Savings that can be achieved by automation solutions are far greater than those achieved by relocating processes to near shore or off-shore locations. For example, Ernst and Young estimate that cost of a robot is one-third of that of an off-shore employee<sup>11</sup>.
- Omni-channel; omni-channel integration is rising up the agenda as customers are increasingly using multiple channels in parallel – from smartphones to tablets, PCs and ATMs – and expect their F&BS providers to offer an integrated experience. Primary research indicated that millennials and digital natives are driving online products and services through increased usage of smart devices.
- Data; data analytics is driving personalisation of products and services. Research indicates that UK consumers are more willing than the rest of Europe to allow banking and insurance providers to use their personal data to offer new products and services<sup>12</sup>.

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<sup>10</sup> Cap Gemini (no date) Robotic Process Automation Solutions for Financial Services

<sup>11</sup> Ernst and Young (2016) Robotic Process Automation in the Finance Function of the Future

<sup>12</sup> Fujitsu (2016) Banking on Change; consumers drive digital change in financial services

## 3.2 Barriers

The barriers facing F&BS can be differentiated between financial services and business services, as follows:

### 3.2.1 Financial services barriers

- Regulations; are one of the biggest concerns for the sector, in particular, for US and European banks<sup>7</sup> as the sector continues to see regulations as a burden. Consultation with sector trade bodies revealed that the Retail Distribution Review<sup>13</sup> and Financial Advice Market Review<sup>14</sup> are causing concern because the risk of non-compliance and resulting fines prevent providers from offering financial advice. It is also suggested that the market is polarised as a result of the regulations as it is unprofitable for banks to offer investment advice to customers with less to invest, therefore regulations create an environment whereby advice is only available to the wealthy. Additionally, Ernst and Young highlights that many providers are discouraged from innovation due to the time and cost of registering and complying with regulations as well as the potential consequences if they don't<sup>15</sup>. Likewise, the new business models that are arising as a result of emerging technologies operate within a regulatory system that itself is struggling to keep pace; the Financial Conduct Authority are now working closely with providers in the sector to tackle this challenge<sup>16</sup>.
- Limited exploitation; Scotland is currently awakening to the potential of automation, but like the data revolution, there is a need for awareness raising and education as there are limited case examples. Academic stakeholders indicated during the consultations that Scotland and the UK is currently at the prototype stage; as such there is not yet wide scale automation exploitation.
- Legacy systems and service delivery; replacing or overhauling legacy systems can take time and have significant costs associated with it, depending on the size and complexity of the enterprise. Additionally, legacy systems are not always compatible with emerging technologies and solutions which may create integration issues. Consultations with industry revealed that there is a constant battle to keep pace with emerging technologies.
- Employment sensitivities/fear; angst about automation typically focuses on the substitution effect, whereby jobs once done by people are taken over by machines. The current fear is that ever more versatile robots will substitute human labour on a scale never seen before. For example, research by a global job board reveals that four in ten accountants are worried that developments in technology and automation will make their jobs obsolete in the future with half planning to set up their own business<sup>17</sup>. Primary research revealed that if the sector fails to respond to disruption from automation a significant number of jobs will be lost.

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<sup>13</sup> <https://www.barclaysstockbrokers.co.uk/Pages/rdr-faqs.aspx>

<sup>14</sup> <https://www.fca.org.uk/firms/financial-advice-market-review-famr>

<sup>15</sup> Ernst & Young Financial Services Institute (2015) Financial Regulation of FinTech, The Journal of Financial Perspectives: FinTech, vol 3

<sup>16</sup> Financial futures, UK Government Office for Science Blackett Review.

<sup>17</sup> Careersinaudit.com (2016) Feel the fear at work and do it anyway?

- Ethical aspects; the world financial crisis resulted in a wave of new financial regulation, many of which focus on ethical aspects. For example, ethical behaviour of providers; staff supervision; transparency of service and risk evaluation. This is further complicated as providers also aim to respond to the emerging technologies which consumers now demand. Research indicates that ethics remains a challenge for the sector; regulations relating to data storage and handling are causing major operational concerns whilst the use of data mining and/or data analytics carries potential ethical problems of its own, such as possibly compromising customer privacy<sup>18</sup>.

### 3.2.2 Business services barriers

- Skills; businesses are concerned that employees do not have the necessary skills for success in automation. This technological era requires business acumen alongside analytical expertise. For example, Marketing Weekly<sup>19</sup> recently reported that 32% of marketing companies believed their employees did not have the skills to implement automated marketing.
- Perceived complexity; many businesses believe automation systems are too complicated (again relates to technical skills and capability) but also relates to the learning curve that is faced as mass exploitation progresses.
- Data quality; effective management and use of data are paramount to the success of automation. For example, Deloitte notes that poor quality input data can cause exceptions in performance<sup>20</sup>.
- Success of off-shoring; the proven benefits of off-shoring is reported as a key barrier across the literature<sup>9, 21</sup>.
- Understanding solutions; the decision making process and level of commitment required often make adoption difficult, evaluating which automation solution best fits is challenging for many organisations. As indicated elsewhere in the report, businesses are currently facing a learning curve and are experimenting with options (prototyping).
- Market maturity; relating to the point above, businesses often find it difficult to adopt automation solutions and as such would rather wait until the market matures i.e. when technologies and solutions have proven success and applications across a range of sectors.

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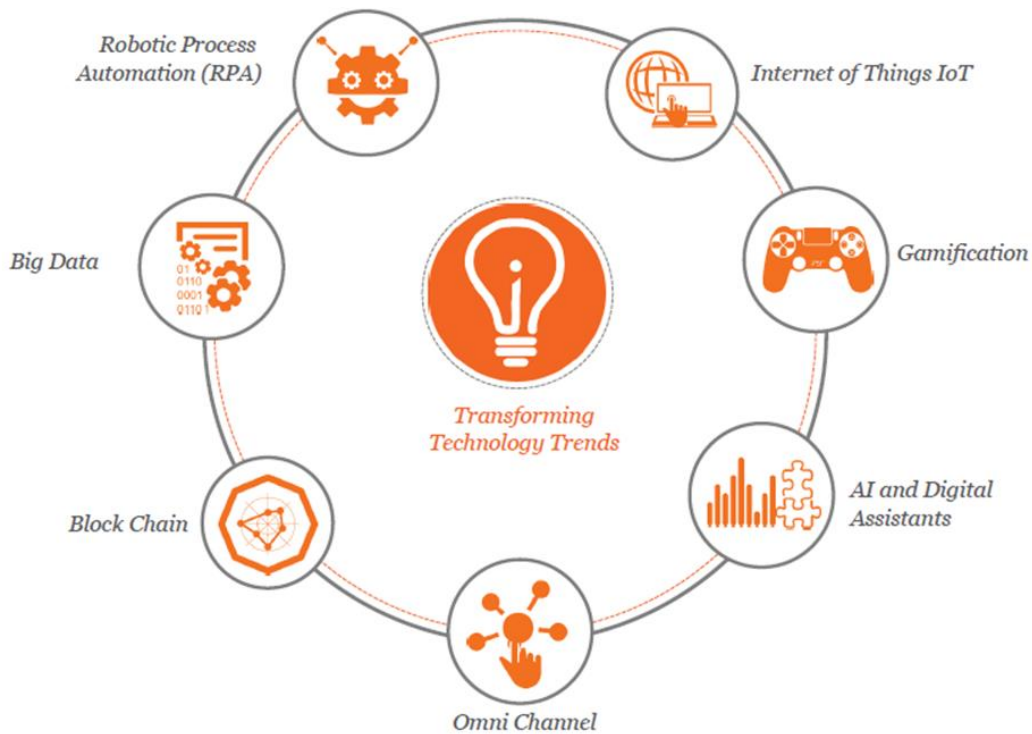
<sup>18</sup> The Economist (2016) Digital Finance: Meeting ethics and compliance challenges in financial services

<sup>19</sup> Marketing Weekly (2016) How to overcome the barriers to marketing automation

<sup>20</sup> Deloitte (2015) Automate this; The business leaders guide to robotic and intelligent automation

<sup>21</sup> European Knowledge Centre for Information Technology

The key trends in the F&BS are technological in nature and include:



**Figure 6: Technological Trends<sup>22</sup>**

These trends are driving four key business priorities, including:

1. Improving customers experience – cross channel and always available
2. Creating new revenue streams – next-generation services, leveraging intelligence of connected ecosystem
3. Better address regulations – prevent business issues through real-time insights
4. Optimising business process and cost – improve productivity and enhanced employee performance

<sup>22</sup> Virtusa RPA Best Practices in Financial Services

#### **4. Current patterns of adoption of automation technologies**

Feedback from consultation is that whilst F&BS globally are early adopters when compared to other sectors such as construction and oil & gas, the use of automation is still at an early stage in Scotland. The view expressed by some stakeholders is that Scotland is at a prototyping stage whereby exploration and testing is taking place. However, having said that, there are some leading financial services companies located in Scotland which are driving changes including for example, Royal Bank of Scotland and Aberdeen Asset Management. However, it is also important to remember that F&BS are now very much a globalised service as a result of technology convergence. Therefore, the location of companies is less relevant, as digital technologies facilitate global service delivery. In this context, Scotland is a leader, as it has significant technological expertise which will enable and facilitate the development of automation solutions. For example, consultations reveal that Scotland has key strengths in data analytics and machine learning and sensor technologies, as well as an emerging strength in visualisation. All of which is consolidated with reputable academic expertise and research. These technological capabilities will be the foundation of automation within the F&BS sector.

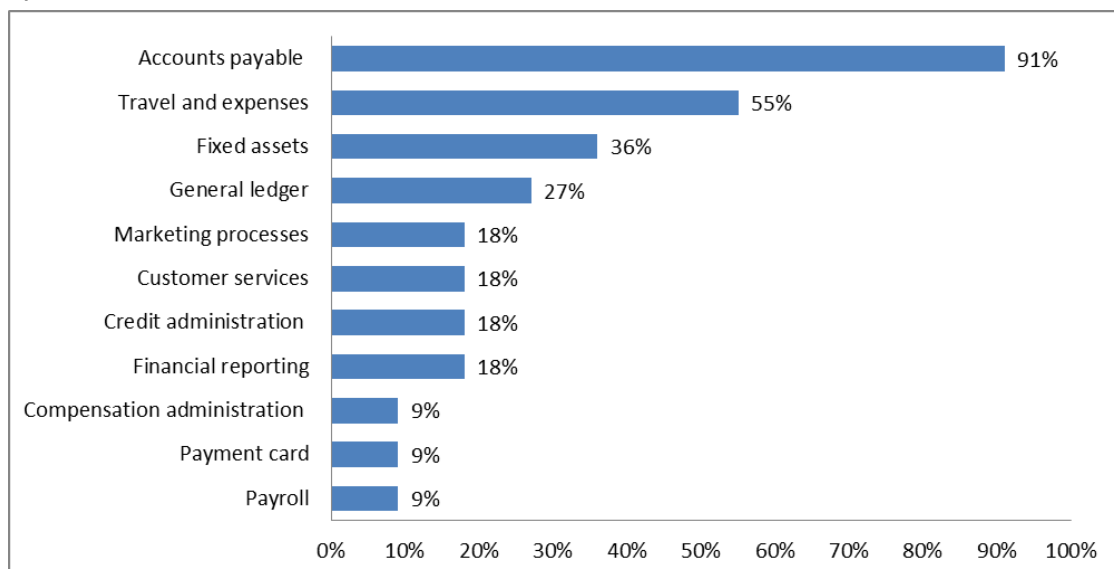
To date, automation has primarily been implemented and the benefits realised in back office functions of F&BS. For example, current applications of RPA within financial services include:

Finance and Accounting	Sourcing and Procurement	Regulatory and Compliance	Financial Risk Management	Cyber Risk and Resilience
<p><b>Fixed Asset Accounting</b></p> <ul style="list-style-type: none"> <li>Calculate asset depreciation</li> </ul> <p><b>Procure to Pay (AP)</b></p> <ul style="list-style-type: none"> <li>Manage incoming vendor invoices</li> <li>Process vendor payments</li> <li>Handle vendor inquiries/disputes</li> </ul> <p><b>Order to Cash (AR)</b></p> <ul style="list-style-type: none"> <li>Establish sales quotes.</li> <li>Validate sales orders</li> <li>Monitor customer credit</li> <li>Create and distribute customer invoice</li> <li>Process customer payments and apply cash</li> </ul> <p><b>Record to Report (GL)</b></p> <ul style="list-style-type: none"> <li>Record journal entries</li> <li>GL account reconciliation</li> <li>Intercompany transactions</li> <li>Maintain accounting master data</li> </ul> <p><b>Travel and Expense</b></p> <ul style="list-style-type: none"> <li>Audit expense reports</li> </ul>	<p><b>Contract Management</b></p> <ul style="list-style-type: none"> <li>Systematically vetting of contract details and populating appropriate metadata is captured in straight through processing systems</li> </ul> <p><b>Invoice Processing</b></p> <ul style="list-style-type: none"> <li>Scanning invoices and automatically preparing payment file using logic and rules to validate invoices and route to appropriate teams to manage exceptions (no middleman)</li> </ul> <p><b>Reconciliation</b></p> <ul style="list-style-type: none"> <li>Automatic evaluation of open orders or non-receipts through business logic and rules route to appropriate team for resolution or close item</li> </ul> <p><b>Spend Analytics</b></p> <ul style="list-style-type: none"> <li>Robust spend analytics tools to allow for a single stop for supplier management, contract compliance and spend data</li> </ul>	<p><b>Licensing and Registrations</b></p> <ul style="list-style-type: none"> <li>Data entry and validation for U4 Form and other jurisdictional forms</li> <li>Transfer amendments</li> </ul> <p><b>Personal Account Dealing</b></p> <ul style="list-style-type: none"> <li>Periodic disclosure attestations with changes.</li> <li>Review of account openings with paper statements.</li> <li>Paper trade entry</li> <li>Paper statement uploading to accounts</li> <li>Transfer disclosures</li> </ul> <p><b>Outside Affiliations and Private Investments</b></p> <ul style="list-style-type: none"> <li>Affiliations and investment reviewing with papers artefacts and responses from other functions within the organization</li> <li>Periodic disclosure attestations</li> <li>Transfer disclosures</li> </ul> <p><b>Gifts and Entertainment</b></p> <ul style="list-style-type: none"> <li>Reconciliation of the gifts and entertainment to expense system</li> </ul>	<p><b>Risk Change Explain</b></p> <ul style="list-style-type: none"> <li>Identification and explanation of exposure movements</li> <li>Determination of data-related or business-related causes for exposure movement</li> </ul> <p><b>Limits Management</b></p> <ul style="list-style-type: none"> <li>Perform evaluation of credit limits</li> <li>Determine causes for limit breaches</li> <li>Recommend or perform remediation action based on circumstance</li> </ul> <p><b>Risk Reporting</b></p> <ul style="list-style-type: none"> <li>Aggregate and segment data for standard reports (e.g., Top 50 Counterparty Report)</li> </ul> <p><b>Data Quality</b></p> <ul style="list-style-type: none"> <li>Execute timeliness, accuracy, and comprehensiveness checks, and initiate remediation actions where required</li> </ul> <p><b>Data Quality Control Testing</b></p> <ul style="list-style-type: none"> <li>Ongoing evaluation of real-time, in-line controls, or post-process controls on data</li> </ul>	<p><b>Control Assessment</b></p> <ul style="list-style-type: none"> <li>Analyze standardized control evidence to substantiate effectiveness</li> </ul> <p><b>Activity Tracking</b></p> <ul style="list-style-type: none"> <li>Examine system logs to identify suspicious or illegal activity</li> </ul> <p><b>Client On boarding / Know Your Customers</b></p> <ul style="list-style-type: none"> <li>Validate customer due diligence info and enter into account opening system</li> </ul> <p><b>Reporting</b></p> <ul style="list-style-type: none"> <li>Compile information into standard reporting formats, and act on results</li> </ul> <p><b>Data Reconciliation</b></p> <ul style="list-style-type: none"> <li>Reconcile processes, risks, and controls across operational risk management and business process management systems.</li> </ul> <p><b>Anti-Money Laundering (AML)</b></p> <ul style="list-style-type: none"> <li>Suspicious activity report prep based on AML monitoring outcomes</li> </ul> <p><b>Comprehensive Capital Analysis Review</b></p> <ul style="list-style-type: none"> <li>Run models, and prepare reporting based on model outputs</li> </ul>

Source: Accenture (2016) *Innovations in Finance and Risk – Robotic Process Automation*

**Figure 7: RPA applications in F&BS**

Deloitte (2015)<sup>9</sup> indicate that RPA is anticipated to be implemented in the following areas of F&BS by 2017:



**Figure 8: Areas of RPA implementation**

## 4.1 Applications of automation in F&BS

Automation has many applications in the F&BS sector, where the combination of high transaction volumes, data handling and increased regulation obliges an organisation to streamline operations and ensure appropriate levels of control. Breaking the F&BS sector down into sub-sectors, automation can be used, for example, in:

### **Finance and accounting**

It can be used for fixed-asset accounting, to record journal entries, conduct general ledger account reconciliation, perform intercompany transactions and maintain accounting master data. Firms can also use robotics to audit expense reports, manage incoming vendor invoices and process vendor payments while handling vendor inquiries and/or disputes.

### **Regulation and compliance**

It can help firms review employees' disclosures regarding personal accounts and automatically examine account openings and paper statements – making employees' trades and transfer disclosures subject to immediate and appropriate levels of review. Disclosure attestations and transfer disclosures can also be examined automatically, and it can reconcile employee reports on gifts and entertainment to the expense system and spot possible anomalies and potential issues.

### **Financial risk management**

It can help identify and explain changes in risk exposure and determine data-related or business-related causes for such movement. As well as being used to evaluate credit limits and determine causes for breaches in such limits, with recommendations for remedial action generated automatically.

### **Insurance**

It can support the processing of payment protection claims, automation of administration, reinsurance processes and data collection, cleansing and analysis. Emerging technologies such as AI will also reshape the industry, for example, how will automotive insurance react to the rise of self-driving vehicles where the number of accidents could potentially decrease and the ownership model may be radically different?

### **Marketing**

It can help to automate repetitive tasks such as emails, social media and other website actions, automation technologies simplify these tasks. Automated marketing helps to generate more leads, qualify and optimise leads, nurture those leads that are sales-ready, managing campaigns and provide success reports of campaigns. Automation enables marketing departments to save time and resources.

### **Legal services**

It can help to automate more routine parts of legal work so that lawyers focus on more complex, high value areas of client work. For example, document and case management has been successfully automated for years in terms of sorting and searching for files as well as automated templates, billing and other productivity tasks that used to be performed by clerical personnel. In contract management, new data-driven applications are automating far less structured tasks, while other technologies can extract common contract provisions and create a basic template, going on to highlight discrepancies between the template and contracts proposed by other parties. In case management, structured tasks such as billing and docketing have been automated, while unstructured tasks, such as monitoring junior lawyers' work and dealing with parties who fail to honour contractual obligations require a level of human interaction which computers and technology are unlikely to be able to replace.

### **Tax and audit**

Online computerized tax preparation software can help to capture relevant data, calculate tax owed, submit the final return, compose formal accounts and reports, and forecast and test different tax strategies; all without the need for human intervention. Likewise, the emergence of online accounting software has minimised the need for human experts. Computer-based systems are also being utilised to tackle tax evasion and fraud.

From an auditing perspective, it can enable auditors to automate tasks that have been conducted manually for decades, such as counting inventories or processing confirmation responses. And as a result, auditors can focus on enhancing quality by evaluating advanced analytics, spending more time exercising their professional judgment, and providing greater insights. One specific area in which auditors are taking advantage of the benefits of cognitive technologies is document review; reading through stacks of contracts to extract key terms.

### **Management consulting**

Consultants have traditionally been appointed to help solve complex problems and this has always involved a level of analytics. However, the role of consultants is now being transformed due to big data; consultants now need to demonstrate a broad range of data science skills. The connection between consulting and data science is growing due to two transformations in the information management environment; introduction of new analytics architecture and growth of advanced analytics. Emerging analytics architectures ensure large data can be captured and analysed to create value. As well as data storage tools there are a number of analytical tools which are implemented to obtain raw analytics insights with capabilities to extract and source data from these new data storage environments. Additionally, there are a growing number of analytics techniques which have arisen because of the capability to capture and store new types of data, and, of course, there is far more data to analyse. Techniques include customer analytics, marketing analytics, web analytics, text and speech-to-text analytics, pricing and sales analytics and workforce analytics. Consequently, RPA and IA can help consultants respond to a continuously evolving business environment and



be in a position to utilise new tools to ensure they have the skills and capabilities to solve the complex problems in the most efficient and effective manner.

However, although RPA can be applied to F&BS for a range of purposes and offer significant benefits, there are, of course, **drawbacks** including;

- Impact on existing staff; new technologies can often manifest fear in employees, as discussed in the barriers section. Media coverage tends to scaremonger rather than focus on the benefits. For example, there are often headlines referring to the substitution effect, whereby jobs once done by people are taken over by machines.
- Employment consequences; the impact on jobs is not definitive and there are contrasting reports in the consequences. However, there are reports that suggest job losses are expected across a range of roles. For example, Deloitte reports that the business services sector is at high risk of automation, with more than a quarter of jobs being threatened by robots<sup>23</sup>. Similarly, financial services also face job losses. For example, as a result of robo-advisors RBS intend to shed more than 500 jobs<sup>24</sup>.
- Technological and infrastructure requirements; often requires upfront investment to update existing systems and/or to ensure integration with new technologies which facilitate automation.
- Loss of skills; automation can lead to a reduction in skills as fewer full time equivalent personnel will know and understand processes in detail<sup>25</sup>.
- Maintenance; automated solutions require regular maintenance, for example, to ensure the interface with applications remains up to date as screen layouts change.
- Downtime; automation server downtime must be considered, and obviously this downtime will impact upon throughput rates.

## 4.2 Case examples

There are several examples of automation taking place within organisations in Scotland and the UK. These include for example:

### **RBS: Artificial Intelligence – Luvo (UK)<sup>26</sup> [FBS10]**



*RBS announced this spring (2016) that it would be trialling advanced human artificial intelligence (AI). Luvo is intended to provide support to employees who manage relationships with small businesses. Luvo is able to understand questions and filter*

<sup>23</sup> <http://economia.icaew.com/news/july-2016/one-quarter-of-business-services-jobs-threatened-by-robots-deloitte-says>

<sup>24</sup> <https://www.theguardian.com/business/2016/mar/13/rbs-royal-bank-scotland-cut-550-jobs-automating-investment-advice>

<sup>25</sup> <http://www.computerworld.com/article/2845383/how-automation-could-take-your-skills-and-your-job.html>

<sup>26</sup> <http://www.rbs.com/news/2016/march/rbs-installs-advanced-human-ai-to-help-staff-answer-customer-que.html>

through huge amounts of information in a split second before providing an answer. If it is unable to answer a question it will refer the query to a member of staff that can handle more complex problems. Although AI has been used in F&BS for a long time, the unique aspect in this example is that a human like personality has been created for it. This ensures it is relatable for employees and they can interact with and seek help from Luvo.

In the months to come, RBS will explore if Luvo could answer questions direct from customers, but this will only be considered after customer pilots prove the potential value.

RBS believes it is 12 months ahead of competition when it comes to AI in the sector.

"Luvo is an exciting technology that brings AI to life and will help our staff serve customers better..." Simon McNamara, Chief Administration Officer, RBS.

### **Simpson and Marwick Solicitors: data extraction automation solution (Scotland)<sup>27</sup> [FBS11]**

Simpson & Marwick Solicitors, a leading Scottish commercial litigation firm, has successfully implemented a data extraction automation solution, for easy and fast report generation for clients and management. The LexisNexis Visualfiles Reporting Toolkit has been implemented which has given the firm the ability to produce a range of bespoke and complex reports on client matters, case work and life cycles and the business itself, almost instantaneously. Previously, report production was a lengthy and time consuming process with little or no flexibility to tailor content to meet individual client and business needs.

Automation of the data extraction process has also improved the accuracy of management information reports produced by Simpson & Marwick. The toolkit extracts data from the firm's LexisNexis Visualfiles case management system and loads it into an SQL Server, a third party database application, from which reports are generated. This means that the toolkit essentially creates a copy of the case management system, which is the central store of all information, as data is fed into it from all the other business systems deployed within the firm.



"Report production is an important deliverable for us, both internally to the firm's management and externally to our clients .... we are able to generate bespoke reports instantaneously. More importantly, we are able to do so with complete confidence that the data used is the latest and most accurate at any given time." Graham Herd, IT Manager, Simpson & Marwick.

<sup>27</sup> <http://www.lexisnexis.co.uk/en-uk/media/press-details.page?date=09/17/2009&id=1>

**Aberdeen Asset Management: robo-advisor (Scotland)<sup>28</sup> [FBS12]**



Aberdeen Asset Management has completed the acquisition of platform, robo-advice provider and discretionary fund manager (DFM) Parmenion.

Accenture define robo-advice as "a catch-all for any kind of automated wealth management service that uses algorithms and other digital techniques to build and manage portfolios without the involvement of a human advisor"<sup>29</sup>.

"This acquisition ensures Aberdeen is at the forefront of the digital revolution within asset management and augments our strategic aim to grow our Aberdeen Investment Solutions business" Martin Gilbert, CEO, Aberdeen Asset Management.

**The Co-operative Bank: business process automation (UK)<sup>30</sup> [FBS13]**

As part of the Co-operative Bank's drive to improve customer service levels, it focused on a business process automation project in order to reduced levels of administration in the business and move staff away from time-consuming manual activities and into customer-facing roles.



The bank identified 10 processes including direct debit cancellation, account closures, clearing house automated payment system payments, foreign payments, audit reports and internet applications.

The return on investment was rapid with staff released immediately from their manual workload.

"We exceeded our FTE savings target by 25% ....apart from the obvious cost savings...we're able to resolve customer queries in one phone call, our staff now spend more time dealing directly with customers...improve(ing) the experience that customers have with the Co-operative Bank" Joanne Masters, Business Systems Manager, The Co-operative Bank.

**Davies Group Insurance Claims Solutions: implementing RPA (UK)<sup>31</sup> [FBS14]**

The Davies Group is an insurance claims outsourcing and loss adjusting firm which has successfully implemented RPA. The company realised that the in-house document capture solution had started to show that it lacked the scalability and flexibility the business needed.

<sup>28</sup> <http://media.aberdeen-asset.com/en/mediacentre/news/aberdeen-completes-acquisition-of-parmenion>

<sup>29</sup> Accenture Consulting (2015) The Rise of Robo-Advice: Changing the Concept of Wealth Management

<sup>30</sup> <https://www.finextra.com/finextra-downloads/featuredocs/co-op%20case%20study%20final.pdf>

<sup>31</sup> <http://www.celaton.com/davies-case-study>

*The organisation decided to explore alternative solutions and decided to switch to a managed service – inSTREAM from Celaton which is an intelligent automation technology.*

*The solution enables a team of four to handle 3,000 documents per day, of which 25% are paper. The job is to receive incoming claims, correspondence, complaints, under writers reports, cheques and all other documents relating to insurance claims, into the right systems and queues such that their processing meet or exceed the service levels required by the insurance companies and the FSA.*

*inSTREAM processes scanned and electronic documents, automatically identifies claim information and other metadata, and deposits the results in SQL databases and document stores reading for processing by the claims handlers and systems.*

*"inSTREAM helps us to reduce claims cost and speed up the claims process, a win-win outcomes for insurer and policy holder alike" Mark Grocott, Operations Director, Davies Group.*

### ***PensionBee: marketing automation (UK)<sup>32</sup> [FBS15]***

*As a start-up business PensionBee were confident that people would like their concept and be engaged when they signed up for the pension consolidation service. However, the key to success would, of course, be turning prospects into customers; marketing would be key to this transition. As such the company had a number of marketing goals including; maintaining engagement via personalised email communications, converting incomplete leads via continuous customised follow up and seamless CRM integration via a lead nurturing solution.*

*PensionBee implemented IBM's Marketing Cloud solution because it met the business needs; allowed personalised emails to be disseminated daily and facilitated dynamic content which aligned with the nurturing process.*

*"...provides us with all the functionality we need...thousands of automation, optimized emails we have delivered ...have ensured prospects stay engaged, and our account managers benefit from a time savings of 50% compare with manual email lead nurturing. This is time they can use to generate new business or convert existing hot leads" Jasper Martens, VP of Marketing, PensionBee.*

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<sup>32</sup> <http://www.silverpop.com/Clients/Silverpop-Case-Studies/PensionBee/>

## 5. Leading-edge developments

The potential for automation in F&BS, within the next ten years in Scotland/UK, will be influenced by the types of solutions being adopted by the F&BS sector in other geographic areas. This section provides some examples of these developments.

Success in today's complex global financial and business markets requires unprecedented levels of speed, accuracy, and cost efficiency beyond what a human workforce can provide. It is for this reason that a number of organisations have adopted automation technologies to ensure continued service delivery and enhanced productivity. There are currently five main areas of development taking place globally, including:

1. Robo-advice
2. Automated customer service
3. Artificial intelligence in legal services
4. Automated personalisation
5. Regulatory Technology (RegTech)

### 5.1 Robo-Advice [FBS16]

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Robo-advisors offer automated, low cost, investment advisory services through web-based and/or mobile platforms<sup>33</sup>

Robo-advice is a global phenomenon. The Financial Times estimates that the market for funds advised by hybrid robo-human services will grow to \$16.3 trillion worldwide in the next nine years<sup>34</sup>.

Interestingly the research notes that, for now, the English-speaking and non-English speaking financial advisory sectors are very much separate. But, financial globalisation is allowing investors to connect with professionals from countries and cultures that would have been unreachable just a couple decades ago

Although at the early stages of the adoption curve there are several international examples of robo-advisors. For example:

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<sup>33</sup> AT Kearney (2015) Hype vs Reality: The coming waves of robo adoption

<sup>34</sup> The Financial Times (2016) The unstoppable rise of robo-advisors

### **Betterment (US)<sup>35</sup>**

*Betterment is the pioneer of automated investing and was one of the first robo advisors. It has built a robust set of tools to help novice investors and provides easy to use tools to help investors make the stock/bond allocation decision.*

### **Stockspot (Australia)<sup>36</sup>**

*Stockspot is Australia's fastest growing automated investment service. It offers a simple, transparent, low-fee online investment service.*

### **MoneyFarm (Italy)<sup>37</sup>**

*MoneyFarm are an Italian online investment advisor and one of the biggest digital wealth management companies in Europe.*

Although initially dominated by the US, Europe is now also making strides in developing robo-advisors and there are several examples referenced here:

<http://www.investopedia.com/articles/financial-advisors/032216/7-top-nonus-roboadvisors.asp>

## **5.2 Automated customer service [FBS17]**

Automation technologies to support customer services and enhance customer experience are another global development where there are a plethora of examples:

### **Mitsubishi UFJ Financial Group (Japan): Robotic Customer Service<sup>38</sup>**



*MUJF is employing 'Nao', a multilingual 5.4kg robot, who will begin work in a branch in April (2016).*

*Equipped with a camera on his forehead, Nao is programmed to speak 19 languages. He analyses customers' emotions from their facial expressions and tone of voice, enabling him to greet customers and ask which services they need.*

*Depending on his performance, more robots could appear at other branches in the coming months.*

<sup>35</sup> <https://www.betterment.com/resources/personal-finance/goals-and-advice/what-is-a-roboadvisor/>

<sup>36</sup> <https://www.stockspot.com.au/>

<sup>37</sup> <https://www.moneyfarm.com/uk/>

<sup>38</sup> <https://www.theguardian.com/world/2015/feb/04/japanese-bank-introduces-robot-workers-to-deal-with-customers-in-branches>

**Australia and New Zealand Banking Group (ANZ): Global roll-out of RPA<sup>39</sup>**

ANZ is an international bank operating in 33 countries with more than 10,000 people in four Asian delivery hubs it sought technological support to support how it operated.



ANZ started on a RPA journey in early 2015. Beginning the deployment in its Bengaluru global in-house center, it quickly ramped up across all four of its Global Hubs in Asia and Pacific. The program rapidly scaled to over 100 robots, with another 100 expected in the coming quarter, and nearly one thousand more in 2016.

Automation has been applied in a range of areas across institutional and retail banking, including processes such as transaction investigations, tracing funds, recalling funds, audit certificates and funds disbursements for construction loan mortgages. The team has been able to decrease the level of human involvement significantly, whilst decreasing the time required to execute these processes. In addition to improving the quality of work, the benefits of increased speed and greater accuracy are improving customer satisfaction.

ANZ plan to use machine learning and operational analytics to deal with exceptions and move more and more transactions into the standard process.

"Cost savings are often 40% or more and there is a substantial reduction in the end-to-end delivery time for the customer" Pankajam Sridevi, Managing Director of ANZ Bengaluru Hub

**Tieto – automation for customer service<sup>40</sup>**

Headquartered in Helsinki, Tieto offers a wide range of IT services, including consulting, development and outsourcing to customers in more than 20 countries across the globe. Tieto is one of Europe's largest IT service providers, with 13,000 employees, a development centre in India and a data centre in Finland.

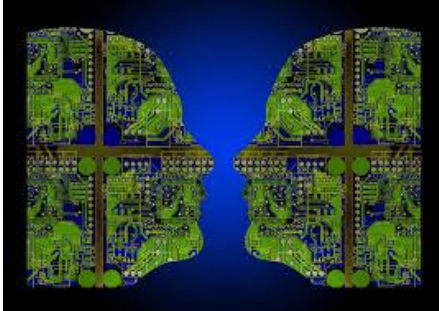
To simplify mainframe management and enhance customer services, Tieto needed to replace its legacy tools with an integrated, automated solution that was based on standardised best practices and processes.

"With more efficient, standardised processes, we can deliver a better service to our customers, which is key to our growth and for their competitive advantage" Stanislav Nosal, Senior Technical Specialist at Tieto

<sup>39</sup> <https://www.automationanywhere.com/images/guides/practitioner-perspectives-anz.pdf>

<sup>40</sup> <http://www.ca.com/content/dam/ca/us/files/case-studies/tieto-improves-customer-service-levels-and-cost-control-with-ca-technologies-mainframe-solutions.PDF>

### 5.3 Artificial Intelligence (AI) in legal services [FBS18]



The legal sector is expected to be the next target of technological disruption<sup>41</sup>. As such, there is a revolution of AI in the legal sector and the ever-growing amount of data is driving legal firms towards AI tools. AI solutions have become interoperable allowing firms to combine various types of AI, for example, machine learning, natural language processing, speech recognition, to name a few, to

enhance one another. This allows lawyers to mine the huge volume of content using AI to extract and interpret relevant information which leads to further differentiation for firms.

#### ***DoNotPay: Robotic Lawyer (Global)***<sup>42</sup>

*DoNotPay is a chat bot which has been developed by a British student (Joshua Browder) which helps people to dispute parking violations. The chat bot is a free to use tool available via the DoNotPay website.*

*The chat bot is based on machine learning and is capable of understanding human messages. The chat bot asks the user a number of questions which are designed to work out if a ticket can be appealed, including whether there were clear parking restriction signs or if the driver was travelling to hospital urgently. After determining that an appeal is viable, it then walks the user through the steps of appeal.*

*There are future plans to expand the artificial intelligence lawyer, which can also work out compensation for delayed flights, to help vulnerable groups navigate complicated legal systems, including people who are HIV positive and refugees in foreign countries. The latter will use IBM Watson to translate Arabic and English.*

*"Over 250,000 people have used the service so far... Of the \$4 million (£3 million) worth of tickets overturned, about 150,000 were in London" Joshua Browder, Developer of DoNotPay*

There are also several firms now implementing AI to support business services, for example:

#### ***Linklaters (London)***<sup>43</sup>

*Linklaters has signed on with developer RAVN and developed a computer programme to sift through various UK and European regulatory registers to check client names for banks.*

#### ***Pinsent Masons (London)***<sup>44</sup>

<sup>41</sup> Financial Times (2016) Legal Firms Unleash Office Automations

<sup>42</sup> <http://www.telegraph.co.uk/technology/2016/06/29/19-year-olds-robot-lawyer-overturns-160000-parking-tickets/>

<sup>43</sup> <http://www.legaltechnology.com/latest-news/linklaters-confirms-ai-deal-with-ravn/>



*Pinsent Masons has developed a programme to read and analyse clauses in loan agreements and to point lawyers towards applicable precedents.*

***BakerHostetler (US)***<sup>45</sup>

*BakerHostetler has taken on ROSS Intelligence's AI legal research product. The product allows lawyers to ask research questions in natural language. It then reads through the law, gathers evidence, draws inferences and returns answers.*

**5.4 Automated personalisation [FBS19]**

Personalisation is a data-driven discipline; businesses now have more customer information and data analysis can extract real value from this data which allows businesses to optimise content appropriately whilst building trust and loyalty with customers through real-time personalised promotions and offers.

***UBS: personalised services***<sup>46</sup>



*The Swiss bank launched a hackathon offering a cash prize for a solution which could help it better understand its clients and tailor advice based on those insights.*

*Sqream Technologies secured the prize and developed artificial intelligence to help deliver personalised advice to the bank's wealthy clients.*

*The automated solution must extract the information most relevant to an individual client from an explosion of data and deliver this tailored content to clients' mobile phones, iPads and other digital devices.*

<sup>44</sup> <https://www.ft.com/content/19807d3e-1765-11e6-9d98-00386a18e39d>

<sup>45</sup> <http://www.forbes.com/forbes/welcome/?toURL=http://www.forbes.com/sites/davidparnell/2016/07/20/steven-kestner-bakerhostetler-ross-a-i-strategic-expansion/&refURL=https://www.google.co.uk/&referrer=https://www.google.co.uk/>

<sup>46</sup> <http://www.bloomberg.com/news/articles/2014-12-07/ubs-turns-to-artificial-intelligence-to-advise-wealthy-clients>

### **Xero – personalised communication<sup>47</sup>**

Xero is a New Zealand-based software company that develops cloud-based accounting software for small and medium-sized businesses. The company has recently deployed Marketo’s marketing automation platform and Salesforce CRM to improve how it interacts with end-user customers. Previously the business had been explicitly sales-led and used MailChimp for its email marketing activities. However, Marketo and Salesforce have now been brought together to ensure a two-way customer data



exchange. Data analysis allows Xero insights which can be used to tailor digital messaging and content for customers/prospects. However, it’s not just email communications that are changing as a result of these insights; Xero is also looking at using real-time bidding engines to change the Web experience a customer or prospect has. To do this, Xero has connected up automation with its CMS (Adobe Experience Manager) and digital personalisation engine (Adobe Target). The idea is that once the business defines certain groups of people it can start surfacing relevant content via its digital properties, including login screens.

“We’re at the beginning in terms of getting real-time personalisation and Adobe Target working well together,” Schick said. “But the plan is that every element of the Xero website can be changed depending on which bucket that customer sits in.” Andy Schick, Global marketing operations and automation director.

## **5.5 Regulatory technology (RegTech) [FBS20]**

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RegTech is “the use of new technologies to solve regulatory and compliance requirements more effectively and efficiently”<sup>48</sup>

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Increasing levels of regulation and more challenging regulatory expectations are having significant operational impacts on firms requiring people, process and technology based solutions. RegTech is the latest innovation to offer new capabilities that are designed to leverage existing systems and data to produce regulatory data and reporting in a cost-effective, flexible and timely manner without taking the risk of replacing / updating legacy systems.

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<sup>47</sup> <http://www.cmo.com.au/article/601300/how-marketing-automation-helping-xero-achieve-real-time-personalised-communication/>

<sup>48</sup> Institute of International Finance (2016) RegTech in Financial Services: Technology Solutions for Compliance and Reporting

Strong support from the UK Government Office for Science and the Financial Conduct Authority (FCA) has seen the UK emerge as a global leader with North America and Ireland also appearing as front-runners.

**FundApps**<sup>49</sup> (UK) wraps regulatory information in a cloud-based managed compliance service for asset managers, hedge funds and institutional investors.

**Suade**<sup>50</sup> (UK) designs technology specifically around regulatory concerns. Suade's solutions enable banks to achieve continuous compliance, manage their costs and easily conduct analyses.

**Trulioo**<sup>51</sup> (USA) provides AML/KYC compliant electronic identity verification to over 300 enterprise customers worldwide including financial institutions, money transfer companies, online gaming, marketplace and many more.

**Quarule**<sup>52</sup> (USA) provides risk controls and compliance certification technology for coordinating governance automating oversight retaining & reusing knowledge.

**Vizor**<sup>53</sup> (Ireland) provides software that enables the supervision of companies by a supervisory authority (central bank, financial regulator or tax authority). It is trusted by central banks and financial regulators across the globe including; Bank of England Prudential Regulatory Authority, Central Bank of Ireland, Bank of Canada, Dubai International Finance Centre Authority and the New Zealand Inland Revenue Department, to name but a few.

**AQMetrics**<sup>54</sup> (Ireland) offers integrated regulatory risk and compliance management solutions across a range of markets including; hedge funds, asset management and small and large financial institutions. Example customers include Opus Fund Services, Mediolanum International Funds and Global Reach Securities.

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<sup>49</sup> <https://www.fundapps.co/>

<sup>50</sup> <https://suade.org/>

<sup>51</sup> <http://www.trulioo.com>

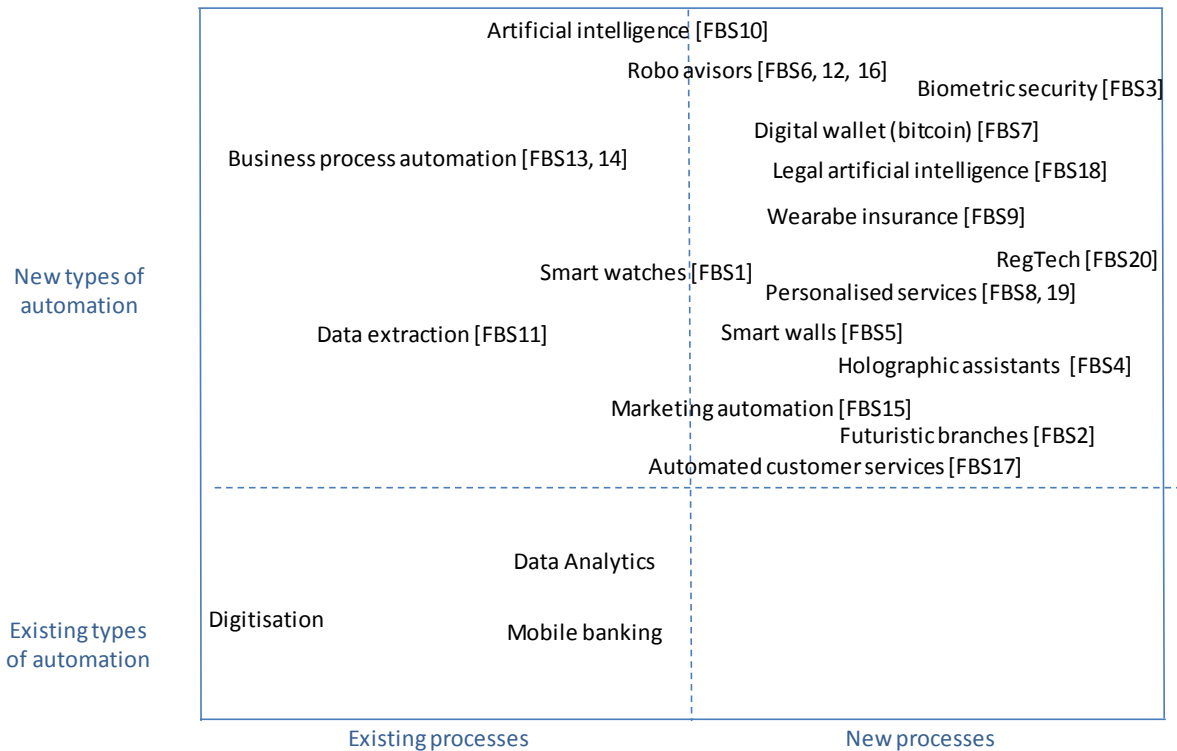
<sup>52</sup> <http://www.quarule.com/>

<sup>53</sup> <http://vizorsoftware.com>

<sup>54</sup> <http://www.aqmetrics.com>

## 5.6 Summary of current and leading-edge developments

The above developments in automation are summarised in the figure below.



**Figure 9: Examples of current and leading-edge developments**

The developments are segmented depending upon whether they directly replace a human process or whether the robot achieves an outcome that could not be achieved by a human in an economic way. The developments are also segmented depending on whether they involve existing automation or will require new technology.

## 6. Analysis of potential implications

### 6.1 SWOT analysis

The strengths, weaknesses, opportunities and threats related to the adoption of automation by the Scottish F&BS sector are summarised below.

<b>Strengths</b>	<b>Weaknesses</b>
<ul style="list-style-type: none"> <li>- Scotland is leading from an enabling technology perspective, including:               <ul style="list-style-type: none"> <li>➤ Existing expertise in data analytics and machine learning which will be essential to the success of automation as much of it relies upon data e.g. data capture, process, manipulation before communicating with other digital systems.</li> <li>➤ Emerging strength in visualisation which will be paramount in relation to the system interfaces of automation solutions.</li> <li>➤ Existing strength in sensor technology which will facilitate much of the cyber networks in automation.</li> </ul> </li> <li>- There are dedicated Innovation Centres which are directly relevant to the technologies needed to facilitate automation including The Data Lab<sup>55</sup> and Centre for Sensor and Imaging Systems<sup>56</sup>.</li> <li>- Scotland has a strong support infrastructure which will be essential to support company transition towards automation, including for example Scottish Enterprise, ScotlandIS, Scottish Financial Enterprise and the aforementioned Innovation Centres.</li> <li>- The UK has a strong financial services support infrastructure including UKTI Financial Services Organisation and has recently announced three new initiatives<sup>57</sup>:               <ol style="list-style-type: none"> <li>1. establish a FinTech panel and delivery support function which will set an overarching FinTech strategy for the UK and monitor and drive forward FinTech initiatives</li> <li>2. create a professional services information hub for FinTechs, making it easier for them to source legal and accountancy</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>- Not yet reached mass adoption in Scotland; many companies are at the prototyping stage, as such there is the potential to lose traction and competitive advantage to new digital entrants.</li> </ul>

<sup>55</sup> <http://www.thedatalab.com/>

<sup>56</sup> <http://censis.org.uk/>

<sup>57</sup> <https://www.gov.uk/government/news/uks-world-leading-fintech-industry-to-be-given-new-government-boost>

<p>services, and access practical and cost-effective basic services</p> <p>3. alongside UK Trade and Investment will establish 'FinTech Bridges' with priority global markets, helping UK FinTechs to expand internationally</p> <ul style="list-style-type: none"> <li>- The UK Open Bank API framework<sup>58</sup> also aims to facilitate innovation by empowering retail clients and SMEs to access their bank data via APIs.</li> <li>- The UK financial regulatory framework is well respected across the world.</li> </ul>	
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>- Emerging regulations aim to support innovation in F&amp;BS therefore; opportunity to explore how automation can support new business models which comply with the regulations whilst at the same time providing services for consumers.</li> <li>- An omni-channel approach is needed; therefore, there is an opportunity to really understand the customer, streamline systems and focus attention on the most profitable.</li> <li>- Improve financial literacy of society; opportunity through new business models and personalised services to educate citizens on financial matters e.g. pensions, savings, investments.</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>- Disruptive digital entrants in both FinTech and RegTech could pose landscape threats to incumbent suppliers.</li> <li>- Regulations pose a threat to F&amp;BS providers as the consequences of non-compliance are significant.</li> <li>- Unstable political environment – financial services is regulated at the UK level and is well respected. However, recent events such as Brexit and the potential of another Independence Referendum create instability and nervousness within the sector.</li> </ul>

**Figure 10: Adoption of automation in Scottish/UK F&BS - strengths, weaknesses, opportunities and threats**

<sup>58</sup> <http://www.openbankproject.com>

## 6.2 Key market barriers and potential solutions

The table that follows summarises the key barriers identified through the consultations and secondary research. Solutions to overcome these barriers are also summarised.

Barriers	Solutions
Regulations	Workshops/Webinars/Seminars – to provide advice and guidance on new regulations and compliance. This would enable businesses to develop a better understanding of how technology opportunities in this area interact (and are constrained by) regulations.
Limited exploitation i.e. not mass scale exploitation	<p>Scottish Financial Enterprise is the representative body for Scotland's financial services industry. It has established a FinTech Strategy Group (comprising Scottish Enterprise, Deloitte and the Financial Services Industry Advisory Group), which could play a key role in disseminating automation advice and guidance to ensure successful exploitation of solutions.</p> <p>An Automation Centre of Excellence would be advantageous, as it could:</p> <ul style="list-style-type: none"> <li>- communicate the benefits of automation and raise awareness</li> <li>- provide a directory of case studies – proven examples to demonstrate the potential</li> <li>- provide a demonstrator – opportunity to see first-hand the potential of automation and test small use cases</li> </ul>
Legacy systems and service delivery	<p>Feasibility studies – to determine the level/number of changes required to integrate with legacy systems; reducing the complexity of the IT solution (e.g. via SMART Scotland programme from Scottish Enterprise).</p> <p>Innovation assistance – to support the development of an automation transformation strategy – helping organisations to prioritize and sequence initiatives for maximum impact on business and operations (e.g. via Innovation Expert Help programme from Scottish Enterprise).</p> <p>Research and development support – to encourage exploration of new solutions and technologies (e.g. via R&amp;D Programme from Scottish Enterprise).</p>

Skills	<p>Facilitate upskilling and training – provide training to support upskilling; enabling employees to leverage the robots rather than being fearful of the changes.</p> <p>Educational initiatives – improving educational opportunities by providing access to related FE/HE courses to ensure a talent pipeline; ensuring individuals are able to access the skills and capabilities to operate in this rapidly changing field. For example, the UK already has several related initiatives including;</p> <ul style="list-style-type: none"> <li>➢ Government STEM policy paper “2010 to 2015”: actions to encourage STEM in schools. Includes STEMNET (which covers ambassadors to assist teaching, after-school clubs, and STEM education advice to schools)</li> <li>➢ ICT Curriculum Review (2013): replaced previous ICT curriculum with computer science and coding course in schools.</li> </ul> <p>Technological education will be vital to ensure employees of the future have the necessary skills and capabilities to operate in a digital environment.</p>
Market maturity	<p>The aforementioned Centre of Excellence and Scottish Financial Enterprise could provide signposting and advice on specific solutions available in the supply chain.</p>

**Figure 11: Summary of barriers and solutions to increasing automation in F&BS**

### 6.3 Strategic implications for the sector 2015-2025

Achieving the vision, described in section two, requires the F&BS sector to continue to invest time to develop and evaluate the business case for adopting automation technologies. This includes considering automation technologies that are already developed, those that are emerging (leading-edge) and those at research stage requiring collaboration with the automation supply chain to develop new solutions.

In some cases adopting automation technologies can be piloted on a smaller scale within an organisation, which can act as a test case to support the business case. For example, automating individual processes/tasks to evaluate the benefits before deciding whether to adopt more widely. This is a practical approach where investment is relatively low, such as RPA for data entry and validation by financial services. In such cases the action for the F&BS sector is to identify suitable processes/tasks to pilot the automation solutions and evaluate the benefits.



Where the automation solutions are being developed then the action for the F&BS sector is to act as a lead market for the supply chain and become involved in the innovation process so that the end solution matches market need. Many of the new developments within F&BS are technological driven; this therefore requires activities to create links between companies in the F&BS sector and new or existing technology innovators in the supply chain. The F&BS sector could then express a credible level of future demand for new automated technologies to drive innovation in the supply chain. Collaboration between the Innovation Centres, support/trade organisations, academic institutions and the supply chain is crucial to facilitating this collaboration; ultimately driving lead markets and demand for solutions.

The task of adopting automation technology is significantly more difficult where capital investment is much higher. For example, investing in robo-advisors is a significant capital investment for an organisation. As indicated previously, stakeholders suggested that the maturity of the market limits the level of both adoption and investment. Therefore, action is needed from the public sector to build upon initiatives to ensure the UK is supporting the development of new business models and disruptive technologies, breaking down barriers to entry and boosting productivity<sup>59</sup>.

#### **6.4 Strategic labour market implications 2015-2025**

The adoption of automation by the Scottish/UK F&BS sector offers the opportunity to rethink how organisations get work done, and how they deploy limited talent and scarce resources. For example, reducing repetitive tasks carried out by humans will transform processes and redefine job roles; the ability to redeploy workers to areas where they can add more value, relieving them of routine and repetitive tasks will lead to better employee retention rates and morale as human labour can be reinvested into more rewarding and value-adding jobs. A key action for the F&BS sector is to identify repetitive tasks/processes that have the potential to be carried out by existing and emerging automation solutions and to identify re-deployment opportunities for human labour.

A shift in job roles and/or creation of new roles is also a trend that some stakeholders suggest will impact the F&BS sector. Deloitte research<sup>60</sup> has shown that technology has created nearly four times the number of jobs than have been lost. Where automation has been widely implemented there has not been a significant reduction in headcount rather it has been used to increase the efficiency and productivity of workers. For example, trade representatives suggested that there will be the same number of jobs within F&BS, but the jobs will be different in type i.e. more technological in nature and/or customer service related.

A key action for the F&BS sector is to work with the education sector to clarify the technological skills and capabilities of the future labour force so that training and education

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<sup>59</sup> <https://www.gov.uk/government/consultations/consultation-on-draft-innovation-plan-for-financial-services/consultation-paper-on-draft-innovation-for-financial-services>

<sup>60</sup> Deloitte (2016) Augmentation through Automation: The Future of Automation in the UK Business Services Sector



courses reflect the need for expertise in relevant technological areas including, but not limited to, data analytics, AT, IoT, gamification and blockchain.

## 7. Conclusions and recommendations

This section describes the conclusions and recommendations arising from the research.

### 7.1 Conclusions

The key conclusions of this research are:

- Scotland has a vibrant F&BS sector that is recognised globally; including indigenous and international firms. However, based on feedback from stakeholders, much of the activity in Scotland is at the prototype stage rather than mass exploitation.
- Scotland has strong technological expertise which will shape and drive automation as these technologies are the foundation of automation solutions; including data analytics, machine learning and information visualisation. This technological expertise will ensure continued success for the supply chain and competitive advantage for Scotland during the advancement of automation adoption.
- There are a range of initiatives and trade bodies supporting the FinTech agenda in Scotland including; the Scottish Financial Enterprise Fintech Strategy Group, Scottish Parliament and ScotlandIS.
- There is already a co-ordinated effort by UK Government to increase innovation in the financial services sector (including automation) via a number of initiatives (see SWOT analysis).
- Automation will impact upon the labour market; but feedback suggest it is expected to have a positive impact on jobs as there will be a mix of automated and human service going forward. Consequently, human jobs will be highly skilled and highly paid and are likely to be in specialised roles such as technical engineers, data scientists, customer service representatives, and professionals.
- There are many examples of automation technologies already being used globally. These offer good opportunities to adopt in Scotland/UK in the next five years. This includes, for example, robo-advice, automated customer services and automated personalisation.
- Based on stakeholder consultations a key issue affecting the F&BS sector is regulations. The regulations on advice and guidance is creating fear in the sector as the potential for miss-selling and the associated fines is resulting in retail banks withdrawing advice services. This has huge implications for society and for the sector. The Financial Conduct Authority (FCA) needs to recognise that organisations are scared to provide advice and this is not ideal for either the sector and/or the consumer.

### 7.2 Recommendations

To increase levels of adoption and to exploit opportunities in the Scottish F&BS sector the following recommendations could be considered (segmented by actions to be led by F&BS sector companies and supply chain, industry bodies and the public sector):

### 7.2.1 F&BS sector companies and the automation supply chain

- Identify processes and/or tasks to pilot automation technology that has been demonstrated elsewhere
- Identify opportunities to collaborate with the current and emerging automation supply chain to develop new automation solutions that meet market needs. For example to enable Scotland to adopt and take advantage of the leading-edge automation solutions, including for example;
  - Robo-advice
  - Automated customer service
  - Artificial intelligence (legal)
  - Automated personalisation
  - RegTech
- Promote the short-term benefits; cost reduction, agility, efficiency, accuracy, speed, greater performance, and quality. As well as long-term benefits including re-deployment of resources for more strategic, value-added initiatives, while creating more agile organizations that can improve customer experience

### 7.2.2 Industry bodies

- Raise awareness of the short and long term benefits (as outlined above) that have been achieved by others in the F&BS sector as a result of adopting automated solutions; promote best practice via a directory of case studies
- Collaboration between the Innovation Centre, support/trade and industry bodies to catalyse joint development projects in areas of common unmet need where a consortium of F&BS companies can act as a credible source of future demand and active participants in the development of innovation automation solutions
- Liaison with the education and training sector, F&BS companies and the supply chain to determine future labour market skills requirements which are expected to arise from increased adoption of automation solutions

### 7.2.3 Public sector

- Further develop the role of Scottish Financial Enterprise and the FinTech Strategy Group as a key enabler for the F&BS sector in Scotland
- Continue to support the F&BS sector at a UK level through the creation of a FinTech panel and support function, the UK FinTech Strategy, information hub and FinTech Bridges initiatives
- Continue to provide relevant education and training courses e.g. STEM and ICT related as this will ensure the future workforce has the necessary skills to work within continuously increasing digital environments
- Provide support to F&BS sector companies interested in investigating adoption of automation solutions through relevant support programmes (e.g. SMART Scotland)

Grants, Innovation Expert Help and the R&D Grant Scheme operated by Scottish Enterprise)

- Collaboration between industry and academia e.g. through innovation competitions to encourage linkages and advanced thinking and solutions for automation within F&BS

## Appendix A – Bibliography/ List of sources

In addition to the footnote references to specific case examples and other evidence, the following sources were used to inform this report:

- ACCA (2015) The robots are coming? Implications for finance shared services
- Accenture Robotic Process Automation Video: <https://www.accenture.com/no-en/insight-financial-services-robotic-process-automation>
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- Quantify (2015) The Future of Management Consulting and Analytics

## Appendix B – Glossary of terms

<b>Term</b>	<b>Definition</b>
Automation	The substitution of human labour by machine labour to carry out physical, cognitive and organising tasks
Artificial Intelligence (AI)	The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.
Big Data	Extremely large data sets that may be analysed computationally to reveal patterns, trends, and associations, especially relating to human behaviour and interactions.
Block Chain	Blockchain is a public ledger of all Bitcoin transactions that have ever been executed. It is constantly growing as 'completed' blocks are added to it with a new set of recordings. The blocks are added to the blockchain in a linear, chronological order.
Financial Advice Market Review (FAMR)	FAMR was launched in August 2015 to examine how financial advice could work better for consumers.  The aim of the Review has been to explore ways in which Government, industry and regulators can take individual and collective steps to stimulate the development of a market which delivers affordable and accessible financial advice and guidance to everyone, at all stages of their lives.
Financial Technology (FinTech)	Financial technology, also known as FinTech, is a line of business based on using software to provide financial services.
Gamification	The application of typical elements of game playing (e.g. point scoring, competition with others, rules of play) to other areas of activity.
Intelligent Automation (IA)	IA is the combination of artificial

<p>Internet of Things (IoT)</p>	<p>intelligence and automation.</p> <p>IoT is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.</p>
<p>Omni-channel</p>	<p>A multichannel approach to sales that seeks to provide the customer with a seamless shopping experience whether the customer is shopping online from a desktop or mobile device, by telephone or in a bricks and mortar store.</p>
<p>Regulations Technology (RegTech)</p>	<p>The use of new technologies to solve regulatory and compliance requirements more effectively and efficiently.</p>
<p>Robo-advice</p>	<p>Automated, low cost, investment advisory services through web-based and/or mobile platforms.</p>
<p>Retail Distribution Review (RDR)</p>	<p>RDR is an initiative of the financial services regulator, the Financial Conduct Authority. Its objective is to raise professional standards in the industry, introduce greater clarity between the different types of service available, and make the charges associated with advice and services very clear.</p>
<p>Robotic Process Automation (RPA)</p>	<p>The application of technology that allows employees in a company to configure computer software or a “robot” to capture and interpret existing applications for processing a transaction, manipulating data, triggering responses and communicating with other digital systems.</p>



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