

FinTech Scoping Review

Establishing Scotland as a FinTech centre

May 2016





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Executive Summary

FinTech (Financial Technology) is undoubtedly challenging and re-shaping the traditional set of products, processes, support and user-experiences across the Financial Services (FS) industry. Whilst the use of technology to support business is not new, it is apparent that the rate of change across technology, the changing-tide of a more digitally aware and astute user-base, and the potential to drive down cost and manage risk more effectively is leading to a considerable upsurge in FinTech activity and, in some cases, disruption. This disruption is a positive force – in the last few years a sea-change has occurred where customers expect customer-centric experiences, with easy, transparent, and human-like services and products. The FS industry also continues to be under pressure to reduce cost and manage risk more effectively. The opportunity to consider and deploy FinTech solutions is attractive, and in turn is fuelling a growing industry of in-house innovation and start-ups focussed on solutions and services in response to the challenges faced across the industry.

Scotland, in principle, is no different to other emerging FinTech centres around the world where a number of the same components central to establishing a successful and rich eco-system are in place. There is a great opportunity for Scotland to really thrive in this space, with over 85,000¹ people directly employed in Financial Services, a rich and diverse set of university courses aimed at creating a next generation of programming, data science, user-experience and development professionals, and a range of support services, Scotland should be firmly on the FinTech map. The reality, however, is that as a nation Scotland is not yet fully formed or established on that map.

Our study has highlighted that investment and commitment is required to progress a number of actions that will clearly lay down a FinTech strategy and vision for Scotland, create a much stronger community, and focus on the development of a rich and connected talent network. Progressing the actions in this report will not only accelerate the growth of the sector now but also inspire and equip the next generation of leaders and influencers that are currently entering the early stages of our education systems and working environments.

Our research has also sought to provide a comprehensive mapping of Scotland's FinTech eco-system, identifying where gaps exist, and making recommendations where improvements could be made to existing services and support, or where investment should be made to support new initiatives or to take specific action.

Where possible we have also recorded the number of FinTech specialists operating within the firms we surveyed. Whilst our report does capture some detail, it is fair to say that this is not something that is readily known to firms and in some cases is either estimated, or unknown. Taking forward the action highlighted to define and connect the community would help obtain a more accurate view of total numbers in future.

i) Defining FinTech in Scotland

The definition of FinTech is crucial context for the reader as part of this executive summary and the broader report. We recognise that a variety of definitions are used across the sector, however we believe the following is the most appropriate:

“The consideration, application or provision of support to new or repurposed technology that creates efficiency, reduces costs, manages risk or generates new insights to organisations working within, or supporting, the Financial Services industry. This also includes the crossover of pre-existing technologies prevalent in other industries into financial services organisations and applies to all types of organisations from start-up through to established firms.”

It is important to note that across this study we have intentionally used a broader definition of both 'FinTech' and what we deem to constitute FinTech development and innovation activity. This allows for the inclusion of independent activity taking place within the established firms, activity that can be in partnership with start-ups, and/or activity focussed in areas perhaps not covered by any start-ups operating in the current eco-system, e.g. blockchain. This approach creates a more comprehensive view of the true market size of FinTech activity in Scotland. We believe, and have seen through our research that the internal activity on the part of established industry firms has the potential to increase the amount of activity that would be captured by studying the start-ups operating in this space alone, and gives a truer representation of the potential FinTech opportunity in Scotland. Taking this approach aligns with the definition used by other studies to understand the true extent of FinTech activity across a particular geography.

Our study focussed on undertaking secondary, desk-based research to establish a view of the broader industry commentary and perspective for Scotland's potential as a FinTech centre. This research was coupled with primary research which saw us consult with 45 stakeholders across the eco-system to gather a much deeper view and perspective from the key players within the sector. Importantly, we have also sought to use Deloitte's extended network and experience in the FinTech domain to draw insight from other FinTech centres across the globe, namely London, Dublin and New York. Indeed, our consultations also included interviews with the CEOs from Level 39 (FinTech accelerator) in London and AlleyNYC (technology accelerator) in New York to bring depth and insight into the comparisons and recommendations made within the report.

ii) There is no doubting the opportunity for Scotland

Globally, FinTech activity has surged in recent years with an estimated \$20bn in financing in 2015, and employing an estimated 230,000 people in the 7 largest marketsⁱⁱ. In the UK the trend is continuing, with an estimated 61,000 people employed in FinTechⁱⁱⁱ (2nd only to the US), and a 51% increase in investments over the last 5 years^{iv}. There is little doubt that the trend in statistics and supporting industry commentary suggests this is a sector that is flourishing, and particularly in the UK where supportive government policy, access to industry experts, and a healthy interest in the technology scene is fuelling the growth.

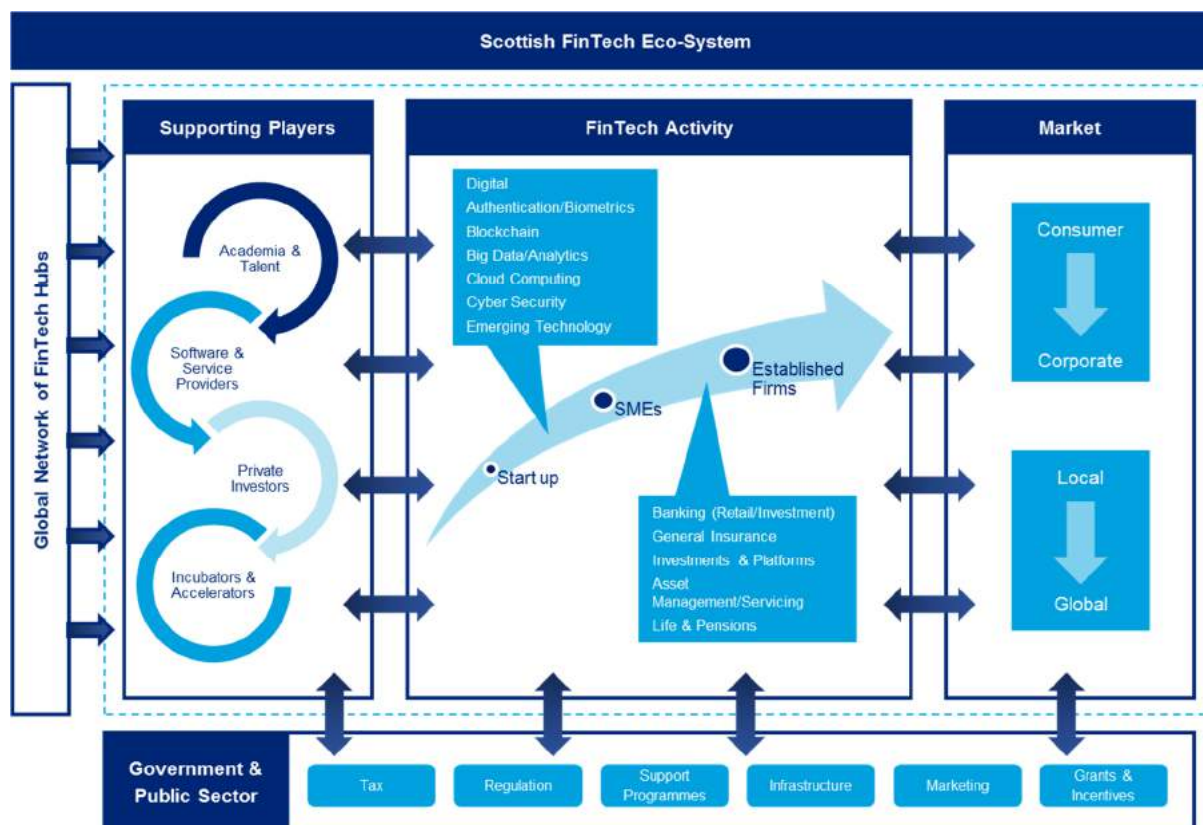
Throughout our research it has become increasingly clear that FinTech is a sector in Scotland where many see an opportunity - indeed more than 80% of our respondents are 'bullish' on the opportunity that FinTech has to disrupt the sector over the next 3-5 years. What is also clear is that Scotland is in a very unique and privileged position – the concentration of FS experts and industry heritage, the globally renowned universities, and the blossoming technology scene mean that this is a country that has a potential to burst onto the FinTech stage. However, our research highlights a number of important points that need to be addressed if this opportunity is to be realised. These points are considered in detail within our report, and summarised in this executive summary.

iii) Scotland has a diverse and developing FinTech eco-system

It is important to understand the 'fabric' of a typical FinTech eco-system, the key components, and the supporting elements that are required to develop an effective FinTech centre. We are firmly of the belief that successful FinTech hubs have a strong, integrated, self-serving 'eco-system' at their heart. Driving the activity on the 'demand side' are the needs and wants of customers – personal and business; often augmented by other stakeholders such as shareholders looking for a better return. Government, public sector agencies and regulators will help shape the market and the operating parameters; as well as often being a key source of advice or funding. The FinTech companies themselves range across a broad spectrum from start-ups and small firms to the larger, established firms adapting and developing a range of new services and solutions. Also integral to success is the

connectedness of the eco-system, the leadership and culture that exists to support and develop it, and the ability to have a clear vision and strategy to develop it.

Our research focussed on mapping and understanding the components of the eco-systems, their relative strengths and weaknesses, and the potential opportunities and threats that are prevalent across each element. In order to baseline a view of the FinTech eco-system in Scotland we have developed the following diagram to highlight each of the components and the connections they have between each other.



iv) The perspective and requirements of each part of the eco-system

The following summarises the strengths, weaknesses, opportunities and threats across each part of the Scottish FinTech eco-system. Consideration is also given to the specific FinTech related requirements of each group. The identified gaps are then addressed through our recommendations in section vi.

The established firms – These are the traditional FS firms operating across the key sub-sectors, including: retail banking, investment banking, asset management and servicing, insurance, and life & pensions. These organisations will typically have ‘matured’ along the organisational lifecycle and will serve both local and global markets and customers. Examples of established firms we consulted include: Tesco Bank, Barclays Wealth, Royal London, Sainsbury’s Bank, Clydesdale Bank, JP Morgan, Morgan Stanley, Aberdeen Asset Management, HSBC, Standard Life, and a number of others.

Our research highlighted that whilst focus on FinTech innovation and development internally currently lies in areas such as data analytics, digital and cyber security many of the more tech-savvy firms see the potential in areas such as robotics, blockchain and biometrics and are looking seriously at how

they could be applied to their business. The established firms considered the lack of connection between participants within the eco-system as a weakness. This weakness prevents them from understanding the services or solutions that might exist to address their needs, in turn stifling the opportunity for FinTech firms to evolve and develop. A point also raised in all consultations was the real concern over the ability to attract and retain talent in the organisation, and the threat that has on their internal ability to develop new solutions and services in the future. Whilst recognising that there are still some internal challenges (navigating procurement, changing mind-sets and overcoming regulatory hurdles) the established firms recognise that FinTech providers can bring credible solutions and products to help address real business challenges. Importantly, the established Firms are keen and willing to participate in supporting the development of FinTech in Scotland.

The FinTech start-ups / Small to Medium size Enterprises (SMEs) – Not traditional financial services organisations or technology companies. This group range from pre-start-up through to SMEs and are defined as true innovators, applying technology across a range of traditional processes or activities in order to address significant ‘pain points’, generate new insights or disrupt traditional FS operations. Serving both local and global customer bases, these firms often operate across a range of different areas including, but not limited to: cyber security, Artificial Intelligence (AI), robotics, payments, software, data analytics, personal financial management and digital identity.

FinTech start-ups and SMEs consulted in this research include: miiCard, G2G3, Nucleus, Symphonic, FreeAgent and MoneyDashboard.

Although our research highlighted the emergence of some dedicated FinTech firms within Scotland, opportunity and support exists for far more to emerge in future, indeed it is fair to conclude that the number and pace of true FinTech start-ups in Scotland is low compared to other key FinTech centres such as London, New York, Tel Aviv and Dublin. Our research highlighted very few FinTech firms in Scotland solely dedicated to bringing new products or services to Financial Services, in Ireland there are circa 70 firms that could claim this.

Access to the established firms to understand the business challenges and develop focussed ‘use-cases’, the availability of skilled resource and the ability to tap into the broader support network are considered areas where potential strength and opportunities lie for the start-ups and SMEs in Scotland. However, what is clear from our research is that without connecting the FinTech community the start-ups will struggle to access local opportunities or work collaboratively to develop new solutions. A sense of community is also very important to this group to obtain better access to talent in Scotland. Without addressing these points it is likely that start-up activity will continue to be limited.

Academia & Talent – Focussing predominantly on higher education institutions, as these form the primary source of talent flows into the local labour market, academia also covers primary, secondary and further education, and initiatives or programmes such as modern apprenticeships and skills academies. Also included in this group is the activity that some academic institutions develop in pioneering and developing research, and the range of services they can offer to support university spin-outs or start-ups. Although early stage support to emerging talent is considered in this report, our core focus has been on the university networks.

Talent covers those organisations focussed specifically on recruitment and executive search activity within financial services, and for the purposes of this study, those with a direct focus on roles requiring specific technology-based skillsets. We have also included a range of services and initiatives across Scotland that supports the development of talent in specific areas, such as The DataLab, CodeClan and the Cyber Academy. Primary research consultees in this group include Edinburgh University, Edinburgh Informatics Ventures, Skills Development Scotland, MBN Recruitment, The DataLab, Carlyle Associates, Head Resourcing, and Glasgow Economic Leadership.

There is evidence to suggest that across Scotland this network is enabling strength in capability in areas such as data analytics, accounting, technology and finance. There are also a number of really important and valuable initiatives that are driving Scotland's FinTech capability to a level higher than has been seen before, such as the work done by DataLab, CodeClan, the Cyber Academy, Skills Development Scotland and Glasgow Economic Leadership. However, a significant challenge still exists in funnelling this expertise to supporting Scotland's FinTech development. The supply and retention of talent, and the overall 'attractiveness' of FinTech in Scotland needs continued focus and support to ensure that going forward the opportunity is not curtailed by the talent pipeline drying up. Also prevalent here is the need to develop skills earlier in schools and colleges, and find ways to access a broader demographic interested in working in this sector but are currently unable to access or are unconnected to the opportunities that exist. A number of specific steps to address these points are considered throughout our report.

The software and service providers – Software and service providers are the organisations usually focussed around the deployment of software, hardware, networks and/or hybrid IT solutions. These firms are typically global players, serving business customers across the world. Our primary research consultees included; FIS, Avaloq, and Oracle.

Although there is limited scale and presence in some of these organisations within Scotland (notwithstanding Oracle and SAS), there is strength and opportunity to both leverage their global network, and their depth of experience. The desire from these firms to collaborate and provide their research and development capability was evident through consultations undertaken and the perspective on the role they play. A potential challenge and threat to their success in adapting to a more agile FinTech world lies in their ability to flex and adjust their traditional commercial models, indeed in some cases the ability for established firms to develop internally and in a more agile way could pose a real threat to the traditional services the software and providers have historically catered for. What is clear however from our research is the opportunity the group also feel is present within Scotland, and their willingness to play their part in Scotland's evolution through support in access to their research and development capability, and opening up 'sandboxes' to support FinTech exploration and development.

The private investors – The investor community is clearly a core part of the success of any ecosystem, with FinTech being no different. Within Scotland there is a strong investor community more interested than ever in supporting the development or emergence of FinTech enterprises. Key to this group however is the ability to connect with the community and the visibility they have across the emergence of new solutions. In particular, the ability to really accelerate ideas beyond incubation in Scotland was felt to be lacking by this group – which in turn leads to the point where the investors do not feel there are enough FinTech companies with scale to invest in.

Incubators & Accelerators – This component considers the facilities in place to grow FinTech solutions and capability, and the role they play in connecting the community. The role of this group within the eco-system is crucial, and in many ways acts as the catalyst to a FinTech centre reaching its potential. Across Scotland there are a number of incubators, accelerators, and supporting groups that provide a degree of strength and support across technology development more broadly. This is evident through the facility provided by CodeBase, the initiatives run through E-spark and many of the supporting on-campus university incubators that exist to nurture ideas generated through academia.

In Scotland there is no dedicated FinTech 'hub' to bind the community or act as a focal point for the growing FinTech sector to share common issues, in the way that Level39 does in London. Equally there is no clarity around the associated strategy or vision that should exist around it. The development of a dedicated facility to support and galvanise the FinTech community across Scotland is required, and is eagerly anticipated by the majority of the consultees engaged. Similar to many

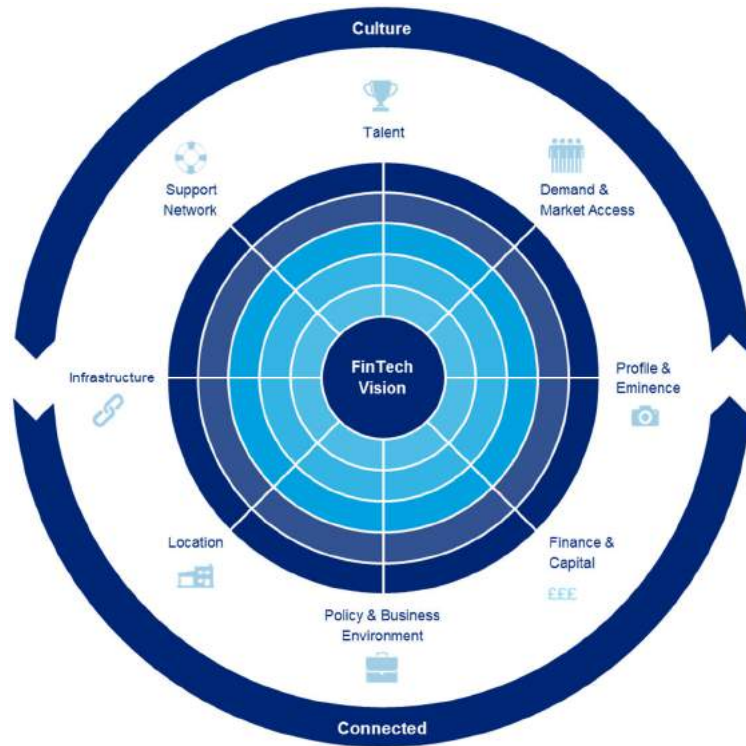
other centres around the globe the establishment of a central hub for FinTech has been the real differentiator in driving forward success.

Government & Public Sector – Government policy and support is critical to enable a FinTech eco-system. Across Scotland, and the UK, there is strong and progressive support through both the taxation policy and the investment support to entrepreneurial business. In addition to this a change in some regulation to support development of FinTech solutions is also occurring, this is apparent through the evolution of legislation such as the Payment Services Directive II, the Open Bank initiative, and the emergence of an FSA ‘sandbox’, all of which is evidence of a more open market being created and of support being provided to help organisations be more innovative as FinTech’s potential develops. A key challenge outlined amongst our consultees focussed on the perennial need for clarity across a complex picture and a view on who is driving the agenda. Overall however the Scottish, and UK regime is considered a strength that is similar in nature to other successful hubs, e.g. Ireland, and could certainly support the acceleration of Scotland’s potential.

There is no doubt that the completeness and richness of Scotland’s eco-system is a huge strength – the scene is set for the nation to be a progressive and lead the way in FinTech development, however a number of specific actions need to be taken to address some of the threats highlighted.

v) The key building blocks are in place but there is a need to develop some areas, and for the community to join up

After defining and considering the components of the eco-system it is important to then consider the elements that make up a successful FinTech centre. To do that we have developed the following view of the ‘building blocks’ that are required. This view is based on our research and supported by our study of FinTech centres around the world and the key factors that make them successful. Through our research we have focussed on refining this framework and sought a view from our consultees on Scotland’s standing against each of the elements contained within it.



We have also summarised below, how Scotland compares against each component.

FinTech building blocks	Attribute	Establishing a FinTech centre - what does good look like?	Summarised assessment	Gap Ref
FinTech culture	Entrepreneurial culture	Strong heritage and culture across all components of the eco-system. Clear culture of support to entrepreneurs.	Supportive and entrepreneurial culture however, this is not leveraged currently to progress FinTech. Some challenges exist with culture and education across established firms.	EF6, EF7
FinTech Strategy & Vision	Clear vision	An agreed strategy and vision established and supported across the community. A supportive plan in place aligned to each FinTech sub-group and executed effectively. Clear leadership and accountability for setting and developing the FinTech strategy.		No clear strategy or vision in place to support development of Scotland as a FinTech hub. A range of views exist but these are not consolidated and presented as a single strategy for Scotland. No clear leadership and accountability in place for setting or developing the Scotland's FinTech vision. Please note: as of May 2016, the SFE FinTech Strategy Group has been established to address this point.
	Strong strategies and plan			
	First class execution			
	Entrepreneurial culture			
Talent	Availability	Clear pipeline of talent through the eco-system, with both the right volume of resource and mix of skillsets. Dedicated programmes to support smooth transition from academia to industry, supported by a range of groups and communities. Strong and encouraging culture.		Strong range of academic courses, and related bodies supporting upskilling in particular areas. Challenges exist with the supply and industry readiness of specific skillsets to support FinTech activities, and cross-skilling of employees within the established firms. No dedicated academic offerings to specifically support FinTech development.
	Pipeline			
	Industry ready candidates			
Finance & Capital	Seed	A range of funding structures and support models, from private investors to government support programmes. Absolute clarity on how these are accessed and efficient process for applying and drawing-down funding support.		A range of early stage funding and support options through investor community and public sector funding programmes, such as the Scottish Investment Bank (SIB). Challenge associated with the ability to access funding quickly, and the ability to access funding beyond seed and incubation stage. A need to continually communicate sources of funding and support to ensure there is clarity for those trying to access it.
	Growth			
	Listed			
	Government support			
Customer Demand & Access to Markets	Consumer	Clear demand from consumers and business communicated and shared amongst the community. Supportive structure helping access markets and refining opportunities for FinTech start-ups		Healthy consumer and business demand, although not clearly communicated and linked to FinTech capability in Scotland. Challenges lie with FinTech start-ups access to corporate opportunities and ability to navigate some internal corporate barriers, e.g. procurement, etc.
	Business/Corporate			
	Access to markets			
Policy & Business Environment	Regulation	Stable and supportive government regime providing a range of support options to FinTech community, including appropriate tax and conducive regulatory structures. Efficient and cost-effective start-up options supported by government through key stages of the lifecycle.		Stable and relatively supportive government regime and taxation on policy. Regulatory regime evolving to support emerging FinTech development (PSD2, Open Bank API). Low cost of business in Scotland. Some uncertainty around impact of 'Brexit' referendum.
	Taxation policy			
	Political stability			
	Fiscal burden and environment			
	Cost of 'doing business'			
	Legal environment			
Infrastructure	Transport links: road, rail and air	Efficient and reliable transport networks and infrastructure in place. Suitable and cost-effective office space providing appropriate technology infrastructure and facilities.		Overall there is a good transport infrastructure. Some improvements could be made to inter-city connections. Reasonable availability of office space and facilities across major cities, some hindering factors, e.g. minimum lease-terms.
	Availability of suitable property			
	Technology infrastructure			
Support Network	Incubators	Clear facilities to support and galvanise the community through an appropriate FinTech hub/accelerator. Appropriate and shared strategy and vision. Supportive and engaged participant structure around the FinTech hub, with commitment from each section of the eco-system. Network of support groups in SMEs mentoring and leading the FinTech strategy.		Lack of dedicated FinTech development centre or hub to build community and support effective communication across the eco-system. Insufficient mentoring and support across the community, particularly into new FinTech start-ups. Commitment to support FinTech development, but no dedicated group or function driving the overall FinTech support strategy. Please note: as of May 2016, the SFE FinTech Strategy Group has been established to address this point.
	Accelerators			
	Leadership development & mentoring			
	Industry engagement			
Location	Lifestyle	Strong and well-communicated image. Healthy lifestyle balance and inclusive environment catering for a range of demographics.		Renowned and well-communicated image as a FS and Tech hub. Attractive location for good work-life balance. More could be done to support a dedicated FinTech message.
	Image			
Profile & Eminence	Clear and consistent proposition	Structured marketing and PR campaigns aligned with overall strategy and FinTech proposition. Series and range of profiling events (both locally and internationally) supporting overall FinTech strategy, vision, and attractiveness.		No clear and consistent messaging or PR around Scotland's FinTech capability or opportunity. Some showcase events have taken place but not including full eco-system representation or communication of Scotland's overall FinTech strategy.
	Marketing			
	Showcase events			
"Connectedness"	Formal	Clear examples of FinTech connection and communities across the eco-system. Both through formal support networks, and informal group-meet-ups, message boards, etc.		Some connections in place across the eco-system, tend to be relatively informal. No central connections in place across all parts of the eco-system.
	Informal			

No coverage, establish and prioritise action
 Partial coverage, considerable gaps, prioritise action
 Partial coverage, some action required
 Mosts element in place, refinement required
 All elements in place, no action required

It is important to recognise that Scotland has all of the building blocks required to emerge as a FinTech centre. Supportive government policy, an attractive location and business environment, good access to funding and the fact that all components of the eco-system exist in such close proximity in Scotland is seen as a huge benefit and strong base to work from. Scotland's culture and heritage also set the ideal backdrop for a sector that could blossom in the months and years to come. Throughout our research our consultees were often at pains to point out that there *could* be a huge opportunity for Scotland, but at present it is just not being seized.

However, the lack of clear strategy and vision and the gaps in overall connectedness of FinTech components through any form of a dedicated FinTech hub pose a challenge that, if not addressed, could hamper the ability for Scotland to truly emerge. Although our universities and talent networks are creating specialists in supporting fields of expertise, these skills are not yet making their way into driving the development of FinTech solutions either in the form of new start-ups or within established firms.

Furthermore, Scotland has not yet truly found its voice with FinTech, perhaps as a symptom of the lack of connectedness, or perhaps because more culturally we tend not to 'shout it from the rooftops'

– either way Scotland needs to create a lead, grow its message, and promote broader eminence in order to truly land successfully on the world’s FinTech stage.

These are very real challenges which without focus and mobilisation now, could prevent the country from reaching its potential in this fast-moving environment.

vi) A strong-base to move forward from... but time is of the essence.

The scale of the opportunity in Scotland is not in question. However, what come into focus are the key steps that should now take place to evolve Scotland’s position on the FinTech stage. Fundamentally, the ‘supply’ and ‘demand’ timing in Scotland is perfect - the established firms are increasingly looking for FinTech innovation, while Scotland’s range of supporting eco-system players means the ‘supply’ could be created. However to develop and join both of these elements, a number of signature actions should be taken.

- **Establishing a vision and raising Scotland’s voice** – setting a clear strategy and vision, whilst simultaneously developing a programme of activity to build eminence is crucial to helping Scotland build a head of steam and creating support. Finding a clear leader for setting and developing the FinTech vision and engaging each community should be a focus.
- **Creating a single hub for FinTech to thrive in Scotland** – the creation of a dedicated FinTech hub in Scotland should be a primary focus. Importantly, this must seek to engage each community and element of the eco-system, while driving a deep culture of ‘connectedness’. The creation of this type of ‘hub’ has been at the heart of many FinTech centres across the world, and our view of a proposed implementation plan is provided below.

Establishing a dedicated FinTech Hub in Scotland	
FinTech Foundations (0-3 months) Establishing the FinTech hub (0-6mth) Evolving the FinTech Hub (9mths+)	
<i>An integrated community with a clear understanding of the shared vision and strategy.</i> <i>A space that allows the eco-system to work together in creating or sharing solutions, and nurturing talent</i> <i>A thriving and vibrant place that supports a range of needs from across the FinTech eco-system.</i>	
Characteristics	<div style="border: 1px solid #92d050; padding: 5px;"> <p>Foundation level focus should be on setting a clear strategy and longer-term blueprint for a FinTech hub. Early steps taken to connect the community and provide a set of tools that help the community connect more closely;</p> <ul style="list-style-type: none"> • Development of a shared FinTech strategy. • Creation of a FinTech directory (website) that can be used by each member of the community matching ‘demand’ with ‘supply’ • Horizon scanning in place capturing new developments across the eco-system and alerting impacted participants. • Establish long-term leadership and support structure. </div> <div style="border: 1px solid #92d050; padding: 5px; margin-top: 5px;"> <p>Focus on establishing presence, engaging and mentoring start-ups and connecting the ‘supply’ and ‘demand’ stakeholders in a single place. Focus on early stage creation of the hub in an agreed location with representation from each eco-system group;</p> <ul style="list-style-type: none"> • Creation of a shared location for 2-3 start-ups with representation from established Firms. • Established programme of events to share use-cases and promote mentoring. • Academia and talent networks involved and shaping a view of the role they play. • FinTech mentors engaged and supportive. </div> <div style="border: 1px solid #92d050; padding: 5px; margin-top: 5px;"> <p>Scale-up the FinTech Hub, incorporating additional eco-system stakeholders, extending the support services and engaging with hubs/eco-systems in other FinTech Centres;</p> <ul style="list-style-type: none"> • Clear ‘pathway’ programme in place for each start-up resident at the FinTech Hub • Weekly programme of events supported by each community within the hub, e.g. regulatory advice, investment guidance etc. • Dedicated talent and academia programmes nurturing new talent. • Engaged and supportive FinTech mentors. • Fully connected eco-system both within the UK and across other FinTech centres. </div>
Actions	<div style="border: 1px solid #92d050; padding: 5px;"> <ul style="list-style-type: none"> • Define a FinTech hub short-medium term strategy. • Establish a project to determine the hub ‘blueprint’ • Run a series of connection events to help foster closer links between communities and refine FinTech Hub blueprint. • Scope and build an online Scottish FinTech directory (website) to support closer connection and flow of information. • Build a horizon scan process to keep up to date with new developments across the eco-system and create new connections. • Investigate and explore ‘best-practice’ </div> <div style="border: 1px solid #92d050; padding: 5px; margin-top: 5px;"> <ul style="list-style-type: none"> • Establish a strategic partnership to support the creation of physical space. Circa 10-15 desks in first instance. • Define governance, roles & responsibilities. • Define business case for FinTech hub, highlighting cost vs. revenue model. • Define performance success factors • Determine long-term plan and leadership • Determine quid pro quo for each stakeholder • Establish clear PR and Marketing campaign. • Extend coverage and connection with academia and talent networks </div> <div style="border: 1px solid #92d050; padding: 5px; margin-top: 5px;"> <ul style="list-style-type: none"> • Build PR and marketing to attract and encourage new and emerging Fintechs • Scale-up space to accommodate additional tenants. • Seek commitment from established firms, and other stakeholders to have permanent residency at the FinTech Hub. • Establish weekly programme of events – including education, mentoring, show-casing, etc. • Define and agree specific programmes to support academia and talent. • Agree exchange/knowledge programmes with other global FinTech centres. </div>
Lead	<div style="border: 1px solid #92d050; padding: 5px;"> <ul style="list-style-type: none"> • Primary Lead: Scottish Government • Potential support from external supplier to drive the creation of a blueprint and early build of FinTech directory and horizon scanning applications. </div> <div style="border: 1px solid #92d050; padding: 5px; margin-top: 5px;"> <p>Primary Lead: TBC – Likely 3rd party. Sponsor: Scottish Government. Support: FinTech hub Steering Committee made up through representation from each eco-system group.</p> </div>

- **Establishing a set of actions to support the development and flow of talent** – Taking a series of actions now to support the attraction, development, and retention of talent around the FinTech eco-system is crucial to Scotland’s success. Engaging under-represented demographics, and encouraging from a ‘grass-roots’ level all the way through Scotland’s education and support system, will be critical to sustainable success. Developing a specific programme to build the ‘attractiveness’ of FinTech and the opportunity in Scotland is also important to inspiring and developing a rich talent pool. A combination of new initiatives and the ongoing support and development of existing ones should now be a focus.

Our research findings and supporting report highlight a number of additional lower-level actions that should take place to drive improvement and seize the opportunity. Central to this is also the identification and empowerment of FinTech ‘Mentors’ that will act as a dedicated support network across the eco-system and crucially, act as ‘flag-bearers’ as Scotland develops real eminence on the FinTech scene.

Importantly, steps should be taken now to address the action points raised – time is of the essence. The rapid growth and development of the sector in recent years highlight that Scotland should move fast to seize the opportunity. The appetite across the main eco-system players is there, the building-blocks are in place – therefore what is important now is taking the actions highlighted to address the identified weaknesses, set a clear strategy and vision and connect the components in a way that will drive Scotland firmly onto the global FinTech map.

vii) Immediate actions - what next?

It is recommended that a task-force is enabled to take these recommendations forward, likely led by government and focussed on making progress against the suggested actions quickly and effectively. This taskforce should include key stakeholders from each community, stakeholders passionate and visionary about both the opportunity that exists and a clear view on how it could be enabled.

We have outlined a series of lower-level actions we recommend should now be taken to move recommendations forward, with focus placed immediately on those deemed as a high priority. It is important to recognise the criticality of timing here, for Scotland to really emerge as a FinTech centre it is important that these actions are considered now, in order not to miss the market opportunity that clearly exists.

Ref	Recommendation Title	Suggested actions	Action Type	Suggested Lead	Priority
1	Forging a clear FinTech vision and strategy for Scotland.	<ul style="list-style-type: none"> • Support gaps have been identified by this research. Further appraisal, research and stakeholder engagement may be required before committing to intervention. • Establish key eco-system representatives to consider and agree strategy. • Draft strategy and 	<p>Create</p> <p>Influence</p>	<p>Vision & strategy to be owned by Financial Services Advisory Board (FiSAB).</p> <p>Potential for SFE Strategy Group to lead on development, with SDI leading the PR and marketing campaign.</p>	High

Ref	Recommendation Title	Suggested actions	Action Type	Suggested Lead	Priority
		<p>seek approval from all stakeholders.</p> <ul style="list-style-type: none"> Establish PR and marketing campaign. Launch strategy and associated development roadmap. 			
2	The creation of a dedicated FinTech Hub in Scotland.	<ul style="list-style-type: none"> Carry out further appraisal on creation of a hub. Agree core community and leadership structure. Take steps highlighted in FinTech Hub design and implementation actions. Identify and establish medium to long-term partnerships required. Agree marketing and PR campaign around the FinTech hub. Transition hub leadership to industry or 3rd party cohort. 	Create	<p>FiSAB with support from Scottish Enterprise.</p> <p>Option to commission external advisory support to lead the development and build of a FinTech Hub.</p>	High
3	The creation of a dedicated FinTech programme to support talent attraction, development, and retention.	<ul style="list-style-type: none"> Engage main parties fundamental to the development of the talent network. Run 2-day workshop exploring and agreeing specific programmes to progress talent agenda. Form a joint industry and academia group to help create more 'industry-ready' students. Develop short-term action plan to pilot new initiatives. 	Create Influence	<p>This initiative should be led by Skills Development Scotland (SDS), but quickly establishing the development of each initiative through Talent Scotland, Glasgow Economic Leadership, CodeClan, DataLab, etc.</p> <p>Opportunity to influence existing programmes such as the Digital Skills Investment Programme run by SDS.</p>	High

Ref	Recommendation Title	Suggested actions	Action Type	Suggested Lead	Priority
4	Focussing energy in the key areas where opportunity lies.	<ul style="list-style-type: none"> Engage Industry in order to clearly articulate the use-case / pain points where FinTech solutions may apply. Identify and agree where focus should lie (likely cyber in first instance). Identify industry SMEs / start-ups focussing in these areas. Pilot initial SME forum to consider further step that can be taken to capitalise on opportunity. Publish agreed action plan and roadmap to develop capability and promote opportunity 	<p>Create</p> <p>Influence</p>	This initiative should be led by the SFE FinTech Strategy Group, with Scottish Enterprise supporting.	Medium
5	Dedicated and sustained programme of activity to develop the attractiveness of FS & Tech roles in Scotland.	<ul style="list-style-type: none"> Engage PR and marketing teams to 're-brand' FinTech and Tech in Scotland. Agree partners to work with and key messaging Establish marketing and communication mediums and related plans Plan and agree associated event and related publications. Agree and launch a 90-day programme aimed at boosting attractiveness of FinTech in Scotland 	<p>Create</p> <p>Influence</p>	<p>This overall initiative should be led by the SFE FinTech Strategy Group, with the opportunity to influence existing programmes such as the Digital Skills Investment Programme run by SDS.</p> <p>SDI should take specific lead on raising international profile of FinTech in Scotland.</p>	Medium
6	FinTech 'Mentors' – a network of specialists and influencers.	<ul style="list-style-type: none"> Identify likely mentor community in Scotland, and the role they would play supporting start-ups or established Firms. Establish the benefit and opportunity for the mentors (the 'quid pro quo') Outline mentor programme and 	<p>Create</p> <p>Influence</p>	This initiative should be led by the SFE FinTech Strategy Group.	Medium

Ref	Recommendation Title	Suggested actions	Action Type	Suggested Lead	Priority
		<p>associated success metrics.</p> <ul style="list-style-type: none"> • Make introductions and form relationships. • Establish long-term plan for mentors, the role they play and areas of focus. 			
7	Clarity of service and community offerings.	<ul style="list-style-type: none"> • Design a central repository mapping the FinTech ecosystem in Scotland. • Establish and agree ownership of this repository and responsibility for ongoing update and refresh. <p>Incorporate into the FinTech Hub.</p>	<p>Create</p> <p>Influence</p>	<p>This should sit as part of the responsibility of the FinTech Hub leadership.</p>	Medium
8	Review of Public Sector funding for FinTech initiatives beyond incubation.	<ul style="list-style-type: none"> • Engage FinTech community in series of working sessions to understand specifically the funding range that is weakest • Consider options to extend or adjust existing funding and support models. • Develop deeper understanding of the key drivers of FinTech funding needs 	<p>Influence</p> <p>Create</p>	<p>Scottish Enterprise / Scottish Investment Bank (SIB) / Public Sector led.</p> <p>There is an opportunity here to potentially adjust existing funding support schemes, as well as consider new ones.</p>	Medium

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1. Introduction

FinTech (Financial Technology) is undoubtedly challenging and re-shaping the traditional set of products, processes, support and user-experiences across the Financial Services (FS) industry. Whilst the use of technology to support business is not new, it is apparent that the rate of change across technology, the changing-tide of a more digitally aware and astute user-base, and the potential to drive down cost and manage risk more effectively is leading to a considerable upsurge in FinTech activity, and in some cases, disruption. This disruption is a positive force – in the last few years a sea-change has occurred where customers expect customer-centric experiences, with easy, transparent and human-like services and products. The FS industry also continues to be under pressure to reduce cost and manage risk more effectively. The opportunity to consider and deploy FinTech solutions is attractive, and in turn is fuelling a growing industry of in-house innovation and start-ups focussed on solutions and services in response to the challenges faced across the industry.

A strong FinTech community is made up of a number of component parts, each of which plays an important role in driving forward development and innovation. The research undertaken to support this report has sought to identify the strengths, opportunities, weaknesses and threats that impact each of the FinTech components and how they interact with each other, as well as highlighting a set of recommendations that should be considered to support the broader development of Scotland as a FinTech centre.

2. Objectives

Supported by primary and secondary research the overall objective of this report is to present an independent appraisal of whether further support is required to grow the FinTech activity and the supporting 'eco-system' in Scotland. Furthermore, the objective is to make recommendations on where improvements or investments can be made to the provisions of existing services to advance the sector. The output of our research also provides a mapping of the FinTech expertise and current services within Scotland to support in understanding the existing landscape.

3. Approach

To support this report we have completed primary research covering 45 consultations across the key organisations within the FinTech eco-system (Please see **Appendix A** for complete consultee list and **Appendix B** for comprehensive coverage of key players across entire eco-system). We have also used a questionnaire to gather data to help validate our points and understand coverage across specific areas. Furthermore, we have completed extensive secondary research on the view of industry subject matter experts, commentators, and protagonists to help contextualise our findings and gather perspectives on the opportunity for Scotland, and the options that might exist around the provision of new or additional services to support FinTech development. Our

secondary research has also included drawing from the research resources we have across the broader Deloitte network to help understand the attributes that have made other FinTech centres around the world successful and their potential applicability to Scotland.

4. Definitions & Classifications

To fully contextualise our findings and understand the market backdrop we must first of all establish a definition for each part of the environment considered within this report.

4.1 Financial Services (FS)

A term used to refer to the products and services provided by institutions operating within the finance market and financial services industry to both consumers and businesses, and those organisations tasked with the management of money and other financial and investment based products and services. This study has considered firms active across a number of FS sectors including: Retail banking, Investment banking, Asset management and servicing, Insurance and Life & Pensions.

4.2 Technology

For the purpose of this study technology is the term used to describe both the software and hardware used to support the development and delivery of Financial Services processes, products or services. Importantly, our definition does not discriminate between emerging or new technology, and the use of existing technologies repurposed to support the development or improvement of existing processes, products or services. Within this report we also make reference to other technology providers who, whilst not traditionally aligned to Financial Services, could be considered as potential providers to the industry in future, e.g. Google, Apple, etc.

4.3 'FinTech'

For the purposes of this study, we have defined 'FinTech' as:

"The consideration, application or provision of support to new or repurposed technology that creates efficiency, reduces costs, manages risk or generates new insights to organisations working within, or supporting, the Financial Services industry. This also includes the crossover of pre-existing technologies prevalent in other industries into financial services organisations and applies to all types of organisations from start-up through to established firms."

4.4 'FinTech Development and Innovation'

This term is used throughout our study to understand activity underway in some organisations and is defined as:

"The study, exploration and use of existing and emerging technology to disrupt and improve process, enhance or build new products and services, improve customer interaction, reduce cost, drive new insight, and/or advance risk management."

Examples of development and innovation in FinTech include: (1) research and study into how technology could be applied to address challenges or realise new opportunities; (2) the incubation and prototyping of new technology solutions to address challenges or realise new opportunities, (3) the creation and implementation of new technology based solutions; and (4) engagement with user-groups, communities, and peers to discuss latest solutions in the market and their applicability.

It is important to note here that we have intentionally used a broader definition of both 'FinTech' and what we deem to constitute 'FinTech development and innovation activity'. This allows for the inclusion of independent activity taking place within the established firms, activity that can be in partnership with start-ups, and/or activity focussed in areas perhaps not covered by any start-ups operating in the current eco-system. This approach creates a more comprehensive view of the true market size of FinTech activity in Scotland. We believe, and have seen through our research, that the internal activity on the part of established firms has the potential to increase the amount of activity that would be captured by studying the start-ups operating in this space alone, and gives a truer representation of the potential FinTech opportunity in Scotland. Taking this approach aligns with the definition used by other studies to understand the true extent of FinTech activity across a particular geography.

5. Industry Commentary

5.1 Global

Everybody's talking about it.

FinTech is on everyone's lips, in all the key financial centres around the world – and a few that are not traditionally seen as leading in the sector. There is a collective recognition across all parts of the eco-system that FinTech will genuinely be transformational for the industry. Huge prizes are on offer for the winners and everyone is queuing up to be a part of it.

Investors who want a slice of the hottest action since the 'tech bubble' of the early 1990s; entrepreneurs who see the potential to create something with lasting and lucrative effect; governments who recognise the economic and social benefits of attracting investment and stimulating growth; established firms across all parts of the financial services sector who range from those whose business models are under real threat to others who see an opportunity to steal a march on the competition; regulators who feel they have to worry about it (see Figure 1); and academic institutions who realise the significance of their role in nurturing and developing the next generation of talent to support growth. Everyone is talking about it, and quite a few are doing something about it.

Nobody can quite agree on the size of the prize ... but it's big and diverse.

Over the past couple of years there have been many reports talking about the size and nature of the FinTech opportunity. Globally, FinTech financing has jumped six-fold over the past three years with over US\$20 billion estimated to have been reached in 2015, a 66% increase on 2014^v. At a revenue level, the seven largest markets (California, New York, London,

Figure 1: FSB FinTech Worries



Germany, Hong Kong, Singapore and Australia) together estimate revenues in 2015 well in excess of US\$20 billion; and employ over 230,000 staff^{vi}. From an investment perspective, compound rates around investment and deals over the past 5 years have been north of 25%^{vii}.

Of course size is not everything. Until recently most of the focus of FinTech activity has been around banking (including payments, credit and lending activities); however, recent research suggests that the insurance and investment sectors are starting to attract greater investment as opportunities emerge around areas such as robo-advice and blockchain in the settlements process^{viii}. We recognise that FinTech development could also impact a number of parties across the FS supply chain. Furthermore, the geographic diversity of FinTech is expanding every year with the recent KPMG/H2 Ventures, FinTech 100 report showing: 40% Americas, 20% Europe, 18% UK and 22% Asia-Pacific. This regional diversity is even more interesting when you look below the surface. The Asia-Pacific contingent includes seven Chinese companies, up from one in 2014 - many commentators believing that China's FinTech sector will grow dramatically over the next few years based on the sheer scale of the

indigenous financial services sector and an 'arms' length' approach being taken by the regulators. FinTech in Europe has seen centres emerge in places such as Ireland, Malta, Isle of Man, Italy and Poland – all with their own unique development story and 'mini centres of excellence' around particular technologies, products or processes.

Whether you measure on the number/diversity of businesses emerging, revenue generated, investment growth or jobs created you are left with two clear conclusions: firstly, none of them are particularly accurate, being based on inconsistent definitions of FinTech and focused predominantly on start-up or disruptive businesses ignoring potentially the biggest part of the market, the established banks, insurers, asset managers and other financial services businesses. Secondly, the first conclusion doesn't matter too much because whatever way you cut it – it is big, it is growing incredibly quickly and we are almost certainly underestimating the impact it could have on the global economy.

5.2 UK

The UK is at the heart of the growth story

The UK is doing well in this fledgling market. In terms of bare numbers: UK FinTech is growing faster than any other major centre (74% growth in deal volumes over the past 5 years against a global average of 27%; 51% growth in investments over the same period against global growth of 26%^{ix}); has more staff involved in FinTech than all of Europe, Hong Kong, Singapore and Australia put together, with 61,000 (which is not far off California, the largest global centre at 74,000); and its market size is believed to be bigger than both New York (£5.6bn) and California (£4.7bn)^x.

The numbers tell a story about where we are today using a few crude and, as noted, inconsistently applied measures. The future success of a FinTech centre is almost certainly driven by a broader set of factors that support the sustainability of growth. In a recent EY study for HM Treasury,

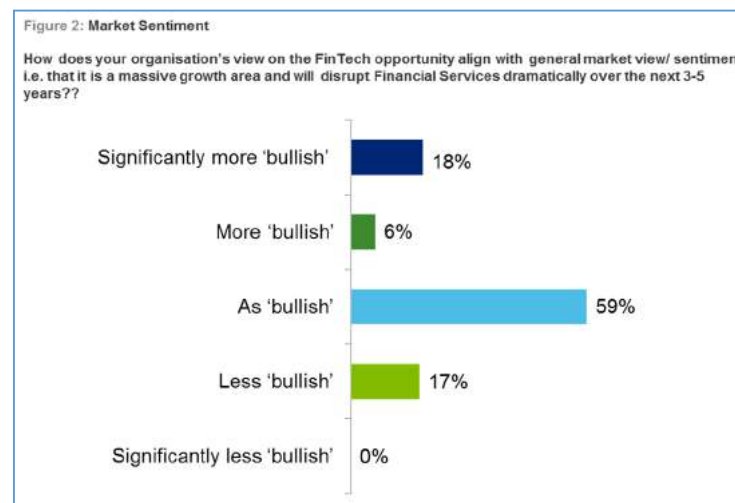
they concluded that the UK was in fact the global leader in FinTech when you take into account factors that play to the longer term success of the sector such as: talent pipeline; ongoing access to a range of sources of capital; a supportive regulatory and tax regime; and continued access to a 'tech savvy' customer base both locally and nationally.

The study, whilst very positive about the current position, does make it clear that the competition is 'hotting up' and if any form of complacency is allowed to creep in, that global leadership position could very easily come under threat.

5.3 Scotland

Where does this leave Scotland at a macro opportunity level?

There is little or no data available to date on the scale of the opportunity; however, there are a number of reasons why Scotland should be optimistic about the future of FinTech. Our consultations with all parts of the Scottish FinTech eco-system support this view with 83% 'as bullish' or 'more bullish' than general market sentiment. So why should we be 'bullish'



about the opportunity? (Figure 2)

Firstly, whilst the Scottish Financial Services sector is significantly smaller than London and has seen much of its historic 'decision making' power gradually moving South over the past few years, there is still a very substantial, flourishing and influential organisational landscape in Scotland. Over 85,000^{xi} people are still directly employed in Financial Services, with the same again in support organisations; it generates around £8 billion for the Scottish economy, more than eight per cent of Scottish onshore economic activity; it manages over £800 billion of funds; and accounts for 24% of all UK employment in life assurance, and 13% of all banking employment – many of whom now work for 'challenger' organisations such as Tesco Bank, Sainsbury's Bank, Virgin Money, Clydesdale Bank and the recently established Hampden Bank^{xii}. Importantly, it continues to attract investment from global institutions – including JP Morgan, Morgan Stanley, BNP Paribas, State Street and BlackRock - who see Scotland as a great place to house parts of their global operations.

Whilst there are concerns around areas such as investment scale, size of the talent pool and global reach, it was clear that leaders based in Scotland can see the inherent benefits of being part of a smaller community. They still get many of the 'halo effects' from London – including tax/regulatory policy landscape, infrastructure investment, demand proximity – but the ability to operate in a more 'joined up' fashion across the eco-system is greater in a smaller market. Furthermore, smaller often implies greater flexibility and agility – this is definitely something Scotland needs to make more of.

Secondly, Scotland has a long history of innovation and is globally recognised for its entrepreneurship, particularly in the worlds of technology

and finance – the ATM, radar, MRI, the telephone and hundreds of other globally recognised technologies were created by Scots men and women. This heritage, and the related culture and education system that perpetuates it, means that Scotland continues to punch above its weight in terms of technological innovation. Recent successes such as Skyscanner, Wolfson Microelectronics, Rockstar Games, FanDuel, Speech Graphics, LUX Assure and many others point to the fact that this innovative environment is alive and well.

*“...Scotland is developing a new spirit of entrepreneurship and it is absolutely crucial that we encourage and support the next generation” –
Mike Russell MSP, Cabinet Secretary for Education and Lifelong Learning^{xiii}*

The annual Scottish Technology Industry Survey (November 2015), highlighted that one in 25 Scots is now employed in the country's booming technology sector and there are more than 1000 workplaces in IT and telecoms, worth an estimated £4 billion annually. Furthermore, confidence is high with 87% of technology companies reporting as being 'optimistic' or 'very optimistic' about the year ahead; and the majority are adding staff in the year, almost 60% expected to be found in Scotland.

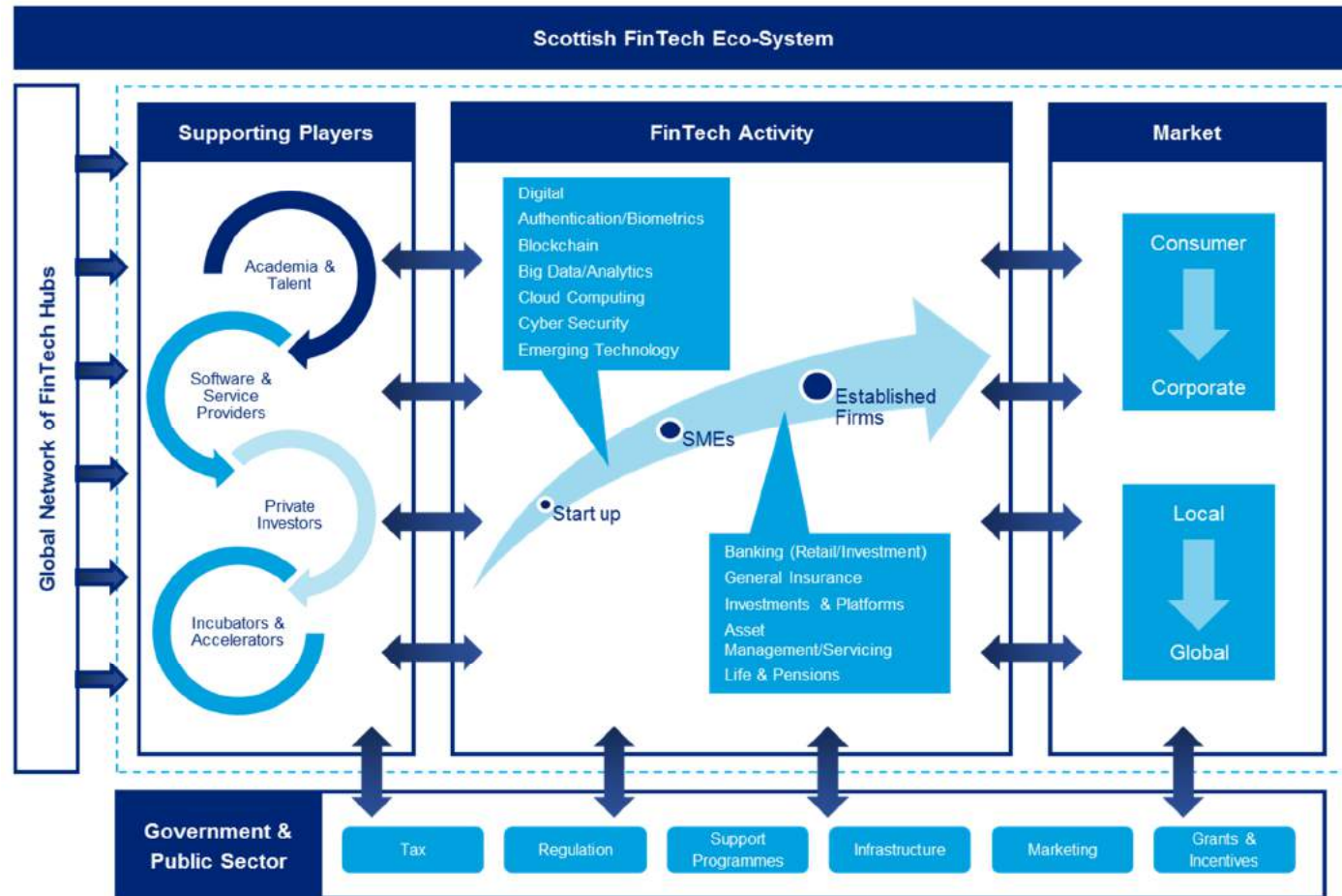
This combination of: a strong, influential and flexible Financial Services sector; the positive 'halo effect' from London and the wider UK environment; the recognised strength of the universities, colleges and vocational support; the confidence and continued success of the technology sector; and the nation's heritage and culture of innovation means Scotland has a lot to be 'bullish' about.

6. The landscape of the Firms operating in Scotland

This section of our study introduces and profiles the landscape of what we consider to be Scotland's FinTech eco-system. We also present the mapping between each component of the eco-system and a view on the strength of the inter-relationships and connections across the FinTech community in section 6.2. Understanding the landscape and the inter-connectedness across the eco-system is a key first step prior to making an assessment of the respective strengths, weaknesses, opportunities and threats of each group individually, which we consider in section 8.

There are a number of ways in which previous studies across the UK and beyond have sought to capture effective views of their country's eco-system – our view of Scotland's landscape is outlined in Figure 3. Further detail on the specific mapping of the key firms present within Scotland's eco-system, together with their markets, processes and services, is highlighted in the FinTech mapping matrix supporting this

Figure 3: A Graphical Representation of the Scottish FinTech Eco-System



report.

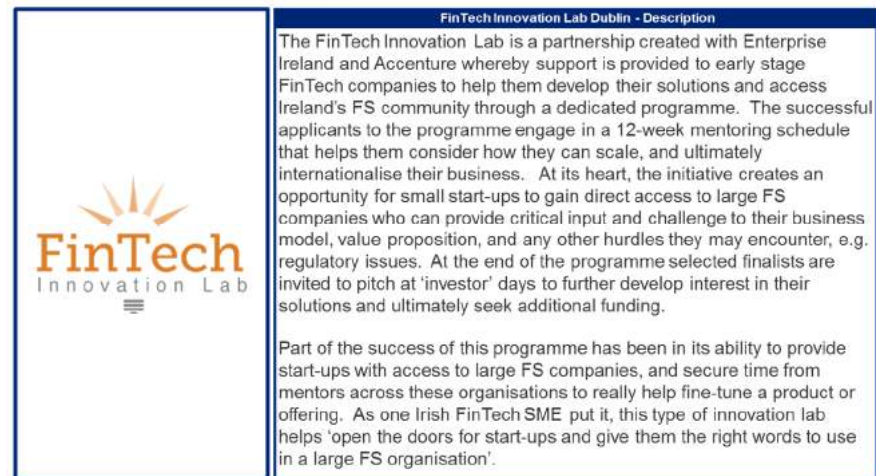
6.1 The FinTech eco-system in Scotland – Key components

We are firmly of the belief that successful FinTech centres have a strong, integrated, self-serving eco-system at their heart. Driving the activity on the ‘demand side’ are the needs and wants of customers – personal and business; often augmented by other stakeholders such as shareholders looking for a better return. Government, public sector bodies and regulators will help shape the market and the operating parameters; as well as often being a key source of advice or funding. The FinTech companies themselves range across a broad spectrum from start-ups and SME Firms to large established firms adapting and developing a range of new services and solutions. Importantly, the flow of talent, money, advice, support services, infrastructure and great ideas goes in all directions between each of the key players present within the FinTech eco-system. It is the strength of relationships between these components and the effectiveness of the communication between them that is often so critical to the overall success of the eco-system. Furthermore, we believe the connection to other FinTech centres in the UK, and more globally, is an important element to support continued development and knowledge sharing.

An interesting parallel to draw is the evolution of Ireland’s, now well established, FinTech eco-system. Over the last 10 years the combination of emerging and flowing tech talent and the existing FS skill base, combined with strong government and investor advice and support, has all helped to create a surge of FinTech development in the country. Ireland now has 70+ FinTech organisations in existence across a range of FS disciplines, the resulting well-established eco-system prompts and supports further organic growth and development across the country - a truly virtuous cycle. Part of Ireland’s success has been the establishment of the FinTech innovation Lab in Dublin (See Figure 3b).

The eco-system in Scotland is similar to that of Dublin – a close community, global FS organisations on the doorstep and a range of technology skillsets coming from universities and other technology companies. In addition some of the same challenges exist – namely start-up access to large organisations, and understanding the use-case¹ a product of service is responding to. Therefore, a number of the points that have been successful in Ireland should also be considered in the blueprint and design for Scotland’s FinTech Hub, as highlighted in our recommendations.

Figure 3b: FinTech Innovation Lab Dublin

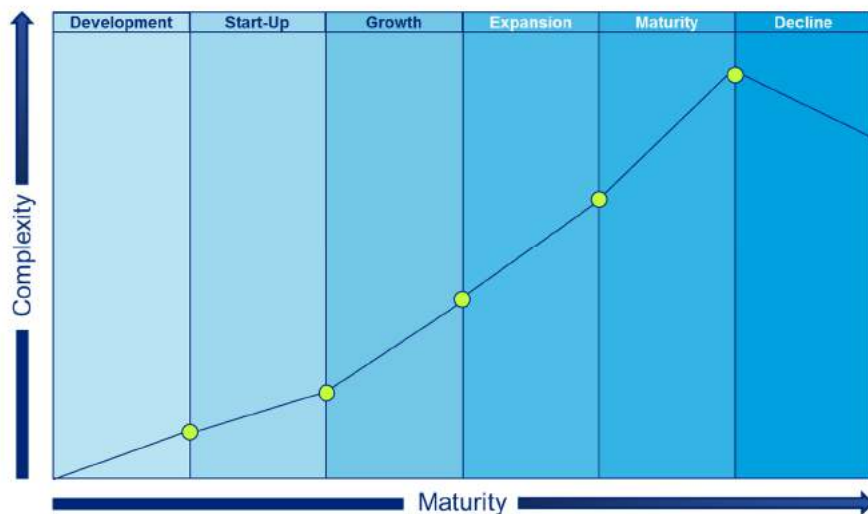


6.1.1 Established Firms

¹ A ‘use-case’ is the terminology used to describe a challenge or problem experienced by the user or the organisation.

Traditional Financial Services (FS) firms operating across the key sub-sectors, including: retail banking, investment banking, asset management and servicing, insurance, and life & pensions. These organisations will typically have 'matured' along the organisational lifecycle (See Figure 4), and will serve both local and global markets and customers. It is important to recognise that some of the established firms we consulted with as part of this research do not have full local decision-making powers, so whilst there is presence in Scotland and some FinTech activity is taking place the power-base for decision-making often sits in London, or further afield, e.g. the US. Examples of established firms we consulted include: Tesco Bank, Barclays Wealth, Royal London, Sainsbury's Bank, Clydesdale Bank, JP Morgan, Morgan Stanley, Aberdeen Asset Management, HSBC, Standard Life and a number of others.

Figure 4: The Organisational Lifecycle



6.1.2 FinTech Start-ups & Small to Medium Size Enterprises (SME)

Not truly traditional financial services organisations or technology companies, these firms range from pre-start-up through to SMEs and are defined as true innovators, applying new or repurposed technology across a range of traditional processes or activities in order to address significant 'pain points', generate new insights or disrupt traditional FS operations. Serving both local and global customer bases, these start-up firms often operate across a range of different areas including, but not limited to: cyber security, Artificial Intelligence (AI), robotics, payments, software, data analytics, personal financial management and digital identity. Start-ups and SMEs will typically fall under the 'Development', 'Start-up', or 'Growth' stages of the organisational lifecycle (Figure 4). FinTech start-ups and SMEs consulted in this research include miiCard, G2G3, Nucleus, Symphonic, FreeAgent, and MoneyDashboard.

6.1.3 Academia & Talent

Focussing predominantly on higher education institutions, as these form the primary source of talent flows into the local labour market, academia also covers primary, secondary and further education, and initiatives or programmes such as modern apprenticeships and skills academies. Also included in this group is the activity that some academic institutions develop in pioneering and developing research, and the range of services they can offer to support university spin-outs or start-ups. Although early stage support to emerging talent is considered in this report, our core focus has been on the University networks.

Talent covers those organisations focussed specifically on recruitment and executive search activity within financial services, and for the purposes of this study, those with a direct focus on roles requiring specific technology-based skillsets. We have also included a range of support services and initiatives across Scotland that supports the development of talent in specific areas, such as The DataLab and CodeClan.

Primary research consultees in this group include Edinburgh University, Edinburgh Informatics Ventures, Skills Development Scotland, MBN Recruitment, The DataLab, Carlyle Associates, Head Resourcing, and Glasgow Economic Leadership.

6.1.4 Software & Service Providers

Software and service providers are the organisations usually focussed around the deployment of software, hardware, networks and/or hybrid IT solutions. These firms are typically global players, serving business customers across the world. Our primary research consultees included; FIS, Avaloq, and Oracle.

6.1.5 Private Investors

For the purposes of this study we classify private investors as those people and/or organisations who invest money or some other resource towards supporting local FinTech firms or activities, with the expectation of financial or some other form of gain in return. There are a number of different forms of investor support across the eco-system in Scotland, ranging from early stage funding through the maturity lifecycle. Our primary research consultees from this group included; Exolta Capital Partners, Par Equity, Scottish Equity Partners, and Multrees Investor Services.

6.1.6 Incubators & Accelerators

Incubators are a property-based venture providing both tangible and intangible services to technology as well as FinTech specific start-ups, entrepreneurs, and spin-offs. These services typically include providing tenants with affordable, open office space and critical business infrastructure, coupled with the promise of access to a business-led peer support network as well as investors. The fundamental aims of such ventures are to boost start-up survival rates, whilst simultaneously helping foster wealth and job creation through the creation of innovative technology.

Accelerators, on the other hand, although similar to incubators in the provision of office space, infrastructure, mentoring and access to potential investors, tend to be specific fixed-length programmes, typically hosted by established organisations, sometimes in return for an equity stake in the business.

Although definitions vary, incubators tend to support early stage development, prior to and including first stage funding. Accelerators take start-ups at second or third round of their funding and help accelerate further investment or take steps to IPO. Accelerators also provide help and advice on the supporting infrastructure required for a business to scale.

To support our research and give further insight in this area we consulted with Laurence Wintermeyer, CEO Innovate Finance and Jason Saltzman, co-founder of AlleyNYC.

6.1.7 Government & Public Sector

The Government – UK and Scottish – and the broad range of public sector agencies and organisations have a critical role to play in the future success of Scotland as a global FinTech centre. Whether setting the policy (tax, regulation, immigration, education and many others); encouraging and providing investment support (e.g. Scottish Investment Bank); marketing to potential inward investors (e.g. SDI); playing a leading role in

talent attraction and development (e.g. Skills Development Scotland); creating a transport (e.g. Transport Scotland) and technology infrastructure (e.g. Digital Programme Office) that removes barriers to start-up and growth; or being the 'oil' in the eco-system helping the flow of ideas, funding, talent and market access; the vibrancy, flexibility and effectiveness of the business environment they create will make or break the success.

6.1.8 Demand Side (Consumers and Corporate)

The demand side comprises an organisation's customers, both business and commercial, that drive the demand for FinTech products and services across local and global markets. The demand side also includes shareholders of organisations looking for improved returns through continual improvement across processes and services provided.

NB: The following information is based on consultations with 45 participants from across the FinTech eco-system		Academia/ Talent						Established Firms						Eco-System Components				Incubators/ Accelerators			
		Schools	Universities	Edinburgh Research & Innovation	Informatic Ventures	DataLab	CodeCJan	Talent/ Recruitment	Asset Servicing	Asset Management	Investment	Retail Banking	Investment Banking	Life & Pensions	Investor	Software & Service Providers	SME/Start-up	Government	CodeBase	E-Spark	StartEDIN
Academia/ Talent	Schools																				
	Universities																				
	Edinburgh Research & Innovation																				
	Informatics Ventures																				
	DataLab																				
	CodeCJan																				
	Talent/ Recruitment																				
Established Firms	Asset Servicing																				
	Asset Management																				
	Investment																				
	Retail Banking																				
	Investment Banking																				
	Life & Pensions																				
Eco-System Components	Investor																				
	Software & Service Providers																				
	SME/Start-up																				
	Government																				
Incubators & Accelerators	CodeBase																				
	E-Spark																				
	StartEDIN																				
Unknown	No relationship		Willingness to engage but no current relationship			Minimal engagement - conversations held			Some engagement - discussions on potential relationship				Full engagement - actively working together								

6.2 Strength of eco-system connection in Scotland

A key element of this study is the focus given to understanding the extent of interaction between the various groups operating across the eco-system in Scotland, and the strength of each connection. The matrix in Figure 5 outlines these relative strengths, utilising a scoring system ranging from no current relationship, right through to full engagement. We felt it was important to also outline where a clear willingness to engage was present, even if no relationship was currently in existence. This matrix was formed from perspectives gained during our 45 consultations across the eco-system, and whilst useful in providing a view must be considered as a representation and not an in-depth market study across all groups.

Notwithstanding, there are a number of conclusions we can draw. While further, more detailed, reflection is given to these as we drill into the findings associated with each component in Section 8, there are some great examples of strong and key relationships currently working well within the eco-system, they include:

- The collaboration between academia and banking clients in developing tailored course content to help better prepare students for entering the FinTech labour market, most notably HSBC and Stirling University's collaboration on an MSc in Data Science.
- The DataLab bringing business, academia and the public sector closer together in order to leverage and exploit emerging developments in data science and analytics.
- Banking clients running engagement programmes in schools to promote technology to young students, and programmes specifically tailored to help promote female interest in both technology and financial services, including the work being carried out by JP Morgan and HSBC.

- Established firms working closely with accelerator programmes by providing office space, IT infrastructure and access to mentors from within industry, such as the RBS and Entrepreneurial Spark collaboration at Gogarburn.
- Incubators providing cheap office space and infrastructure to local start-ups, including CodeBase housing both miiCard and Money Dashboard.
- StartEdin's joint relationships across academia, banking, and the Start-up community.

What the inter-relationship matrix also highlights, however, is a number of key areas where we would expect to see stronger relationships in place, but that are not currently evident. These are explored in more detail in Section 8, and include:

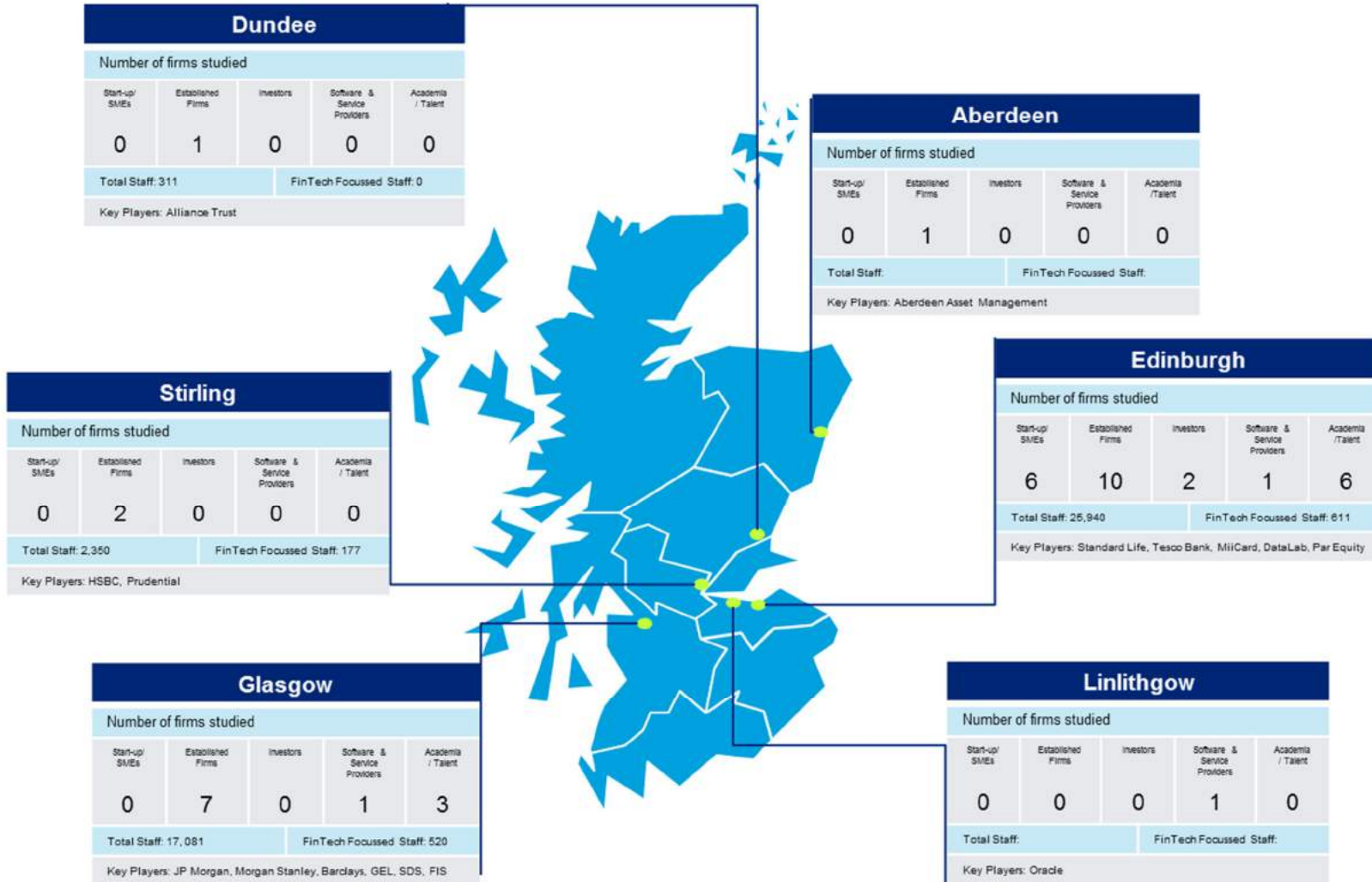
- The lack of direct engagement between the start-ups and established firms, resulting in a very real threat to start-up survival as they are not able to gain access to the very organisations they wish to attract, nor gain visibility of the problems their technology could address.
- A gap in the engagement or relationship between schools and the broader FinTech eco-system.
- No clear evidence of relationships between StartEdin and many components of the FinTech eco-system.
- No player acting as, or providing a central hub or directory that all entities across the eco-system can tap into in order to see what FinTech activity or support is available to assist with their own objectives.
- Lack of collaborative relationships across the eco-system to promote the attractiveness of financial services to students within academia, or highlighting to students the FS industry pain points that advances in technology could potentially address.

- No visible relationships between the established firms and incubators such as CodeBase, to allow key players within FS to see the solutions and talent that are available within the technology firms housed there.

Many, if not all, of the points listed here boil down to an overarching theme that will be explored in more detail throughout this report, that of the need for a cohesive FinTech 'community' and hub in Scotland.

'Community is king' – A common point clearly recognised across a number of FinTech centres around the world is the collaboration and support the community brings to innovation, nurturing and development of new ideas. Level39 in London and the various FinTech programmes in place in Ireland concur that this is critical to driving new ideas and supporting development. A leading technology incubator in New York (AlleyNYC) believes that without close linkage across the community, a start-up could be significantly held back. Indeed the slogan 'community is king' is their over-arching mission statement, and they believe, central to their success.

Figure 6: Participant Coverage

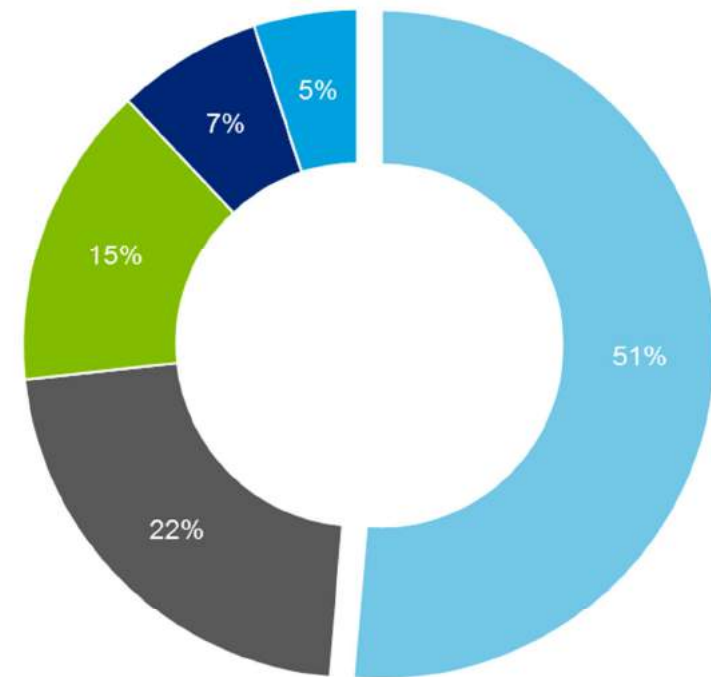


The research undertaken across our agreed consultee list includes representation from across a range of organisations and elements of the Scottish eco-system, and whilst not every firm or organisation in Scotland was involved, our mix of participants gives a strong indication of the strengths and opportunities that exist, and the steps that could be taken to advance Scotland's eco-system and overall position as a recognised FinTech centre.

It is also important to note that desk-based secondary research, and supporting conversations with a number of other protagonists from across the eco-system all contributed to the findings outlined in this report and the recommendations we have made. Some of our consultations also included a view from others outside of the region in order to make comparisons or draw views on what has been successful in other parts of the world. (A full list of participants is outlined in **Appendix A**). Whilst the profile of participants and input allow us to establish valid conclusions, it should be recognised that this is a fast-changing environment and perspectives and quantitative inputs reported during the study are likely to evolve in the coming months.

Figure 6 highlights the coverage of participants engaged in our research. Clearly a core part of our research was to study the coverage and perspectives across each component of the eco-system. The primary focus of our coverage lay on profiling the established firms potentially engaged in FinTech activity (banking, insurance, asset management and life & pensions incumbents), and the start-ups. The breakdown of the consultees across the eco-system groups is highlighted in Figure 7a.

Figure 7a: Breakdown of consultees by eco-system component



- Established Firms
- Academia & Talent
- Start-Up/SMEs
- Software & Service Providers
- Investors

7. The trends and forecasts shaping the FinTech opportunity in Scotland

This section of our report covers two important elements of our research. Firstly, based on our consultation responses coupled with output from our secondary research, we report on the trends that are shaping the FinTech opportunity within Scotland.

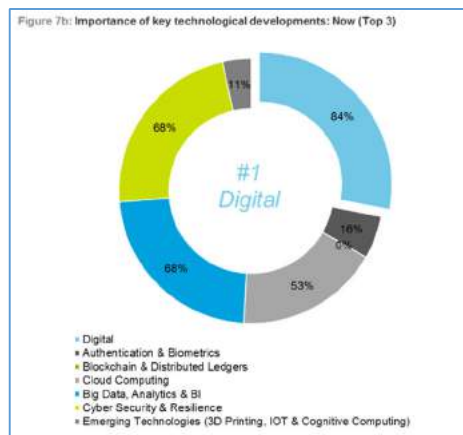
Secondly, we consider the key factors driving those trends, both at an organisational level and across the broader environment.

Understanding both of these elements is an important part of establishing where opportunity might lie for Scotland going forward, and indeed where further investment might need to be made to support growth.

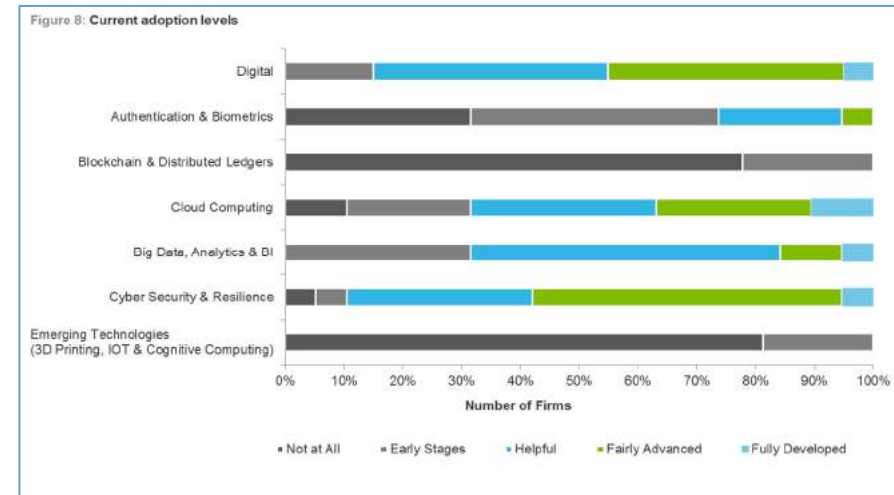
7.1 Key trends

7.1.1 Digital strategy is at the heart of FinTech

Unsurprisingly 84% of our consultees nominated their digital strategy as being within their top 3 areas of focus right now (Figure 7b). Digital is a broad-ranging term. For the purpose of this survey we defined digital as being the use of technology to engage or offer services to customers through new digital channels (i.e. mobile, online), or support middle/back-



office automation and improvement. Approximately three quarters of the firms we sampled suggested their digital strategy was either 'fairly advanced' or 'fully developed' (Figure 8).



It is perhaps fair to say that 'digital' is more advanced in its evolution and, therefore, expected to be a key focus. Over time one might expect that the use of digital will become the norm, and assumed as the backbone to new technology advances – this is supported by the conclusion from our research that in 3-5 years only a third of respondents consider it to be a key technological development (Figure 9 on the following page).

7.1.2 FinTech development to support cyber security

68% of our consultees consider cyber security and resilience as one of the top 3 areas where FinTech development will focus. Again, this is perhaps unsurprising given the number of high-profile cyber-attacks (TalkTalk, MasterCard, Target, JPMorgan Chase – see Figure 10), and the ongoing focus from both the Boards of organisations and the regulators. Similarly

to digital, the majority of organisations consider themselves to be well developed in this domain; the focus in coming months and years is likely to be in continuing to develop the understanding of different types of attack scenarios, and moving towards a more dynamic way of profiling or 'gamifying' cyber-attack. Gamification solutions use technology to simulate what attacks might look like across an organisation and allow users to understand the impact different responses might have to mitigating the risk. Cyber security is a consistent theme both now, and in the 3 to 5 year view, emphasising perhaps the level of focus it is currently being given. (See Figure 9)^{xiv}.

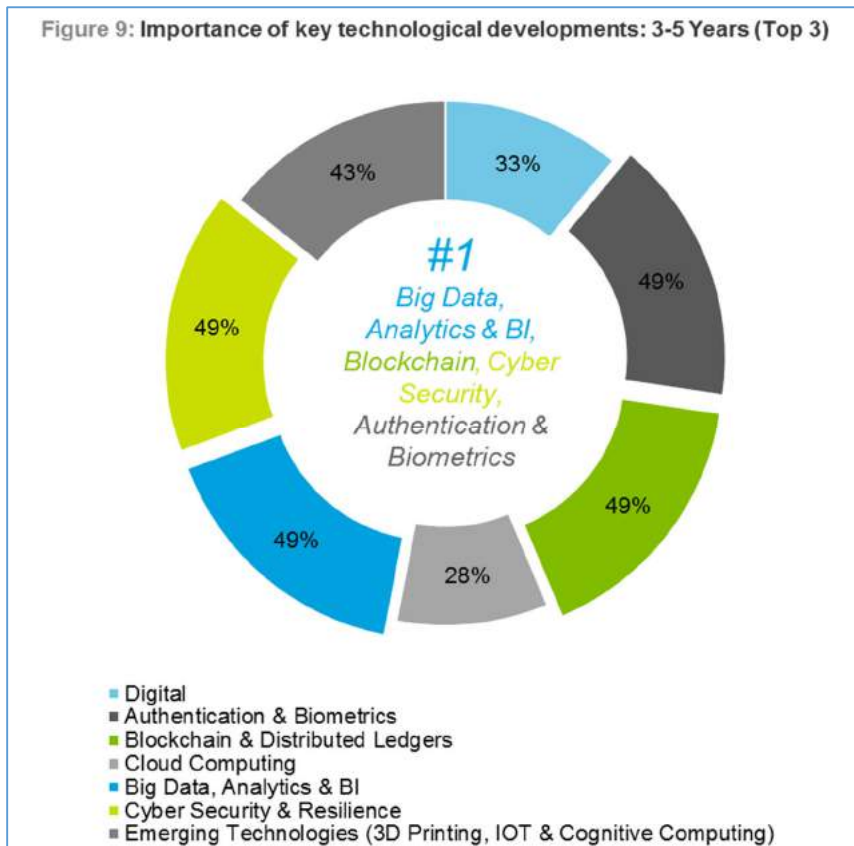


Figure 10: JPMorgan Chase Cyber Breach

	Breach Description
	<p>In the autumn of 2014, JPMorgan Chase announced that the names, addresses, telephone numbers and emails of 76m households – or just under two-thirds of the total households in America – were “compromised” in a cyber attack.</p> <p>The bank claimed there was “no evidence that account information for such affected customers”, such as account numbers, dates of birth and social security numbers, were accessed (unlike other such attacks on the likes of Target and Home Depot), however the attack remains one of the biggest in terms of customers affected.</p> <p>Such attacks have called for increased measures to be put in place across the industry to protect customer data, with financial institutions among the biggest at risk.</p>

7.1.3 Data...the new oil?

The use of data to drive better insights, improve customer treatment and guide product development is a key theme from our research with 68% of respondents citing this as being in their current top 3 areas of focus. The ongoing proliferation of data, the opening up of new potential for data services under regulations like the Payment Services Directive 2, and factors such as the ongoing business focus on conduct risk are all drivers that continue to fuel the interest in data analytics. 49% of respondents consider it to be a top 3 focus area in the next 3-5 years (See Figure 9).

Specifically in Scotland, investments made towards initiatives such as the DataLab are supporting and growing the appetite for many of the established firms to further develop and grow their capabilities in data and analytics. Interestingly, there are no dedicated FinTech firms specifically providing dedicated analytics products or services to FS in Scotland, therefore one can conclude that the opportunity for emerging start-ups in this space does exist.

7.1.4 Technology fully enabled through a cloud infrastructure

The flexibility and low cost often associated with leveraging a cloud infrastructure can create a range of efficiencies and flexibilities across the organisation. This is something clearly on the minds of our consultees with over 50% citing it within their top 3 areas for technological development (See Figure 7b). Again, similar to cyber and digital, this drops away in the 3 to 5 year view where perhaps it becomes assumed as a part of the overall technology operating model. What is clear from our consultations both as part of this work, and further afield, is that whilst there is a huge opportunity for cloud technology there still exists some challenge and internal protocol around the security levels and assurances required with storing customer or sensitive business data in a cloud network.

“...In the global race for growth, business and government need every competitive advantage possible. We need a strong, thriving and innovative ICT sector across the UK and here in Scotland. Technologies such as cloud computing can have a real impact on competitiveness, creating new ways to deliver services and collaborate as well as reducing costs...” – David Mundell, Secretary of State^{xv}

7.1.5 Blockchain – something there but do we understand it?

It is perhaps as a result of huge media interest, or a growing understanding of the application of the technology, that 49% of our consultees suggested blockchain will be in the top 3 of technological developments over the next 3-5 years (See Figure 9). Throughout our consultations we became aware of early studies being undertaken by two organisations into the potential use of blockchain (one in understanding deployment across KYC / AML, and one to support asset management contracts for clients). However, to date we have not seen any real

deployments or applications (highlighted through the fact the adoption is ‘early stages’ or ‘not at all’ – See Figure 8). Similar to the broader industry the perception is that blockchain can and will disrupt, but we are just not sure how, and when. Given the level of interest in this technology this is an area where we can expect to see further development in the short-term.

“...It’s very early days for this technology but the potential is phenomenal...” – Simon Taylor, Vice President, Blockchain Research & Development, Barclays^{xvi}

7.1.6 The exciting advancement of other emerging technologies and solutions

Internet of things (IOT) and 3D printing were not specifically prominent as we surveyed the eco-system; however a number of additional technology trends were mentioned in our consultations as being either a focus now, or in the next 3 to 5 years.

- **Digital Identity** – the creation and commoditisation of a digital identity is a trend that will drive opportunity for companies like miiCard (See Figure 11) to further develop solutions that will enhance fraud risk management, vastly improve customer journeys, and create efficiency across a number of identity-related processes. The UK Government Digital Service has also been working to create their own official online identification service (See Figure 12). In the last 12-18 months customer perception of a bank-verified digital identity, that can be shared securely with multiple parties, has also shifted, to the point where we now assume the right security is in place and we are more comfortable to participate in sharing our data to help with a smoother customer journey, or secure a better deal.

Figure 11: miiCard Company Overview


	<p>Company Description</p> <p>Founded by serial entrepreneur and Edinburgh resident James Varga, miiCard offers a free online B2C service that puts customers in control of their identity, leveraging the trust already held with their online bank and promising the protection of strong authentication. miiCard lets customers sign up to new services and verify their real identity without having to go offline, send in forms or scan in documents. miiCard's B2B service, DirectID, provides digital ID&V as well as advanced insight and analytics capabilities to Banking clients across the globe.</p> <p>Founded in 2010, and based out of CodeBase on Lady Lawson Street in Edinburgh City centre, miiCard is the perfect example of a FinTech start-up using cutting edge technology to address serious industry pain points across financial services.</p>
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Figure 12: GOV.UK Verify Programme Overview

<p>GOV.UK Verify Programme (2015)</p>	<ul style="list-style-type: none"> • GOV.UK Verify is being built by Government Digital Service (GDS), working with government departments, the private sector and the Privacy and Consumer Advisory Group. This creation of an official online identification, will allow consumers to prove who they are online, providing access to various government services including viewing driving licenses or filing tax returns. • The service (currently running in BETA) uses certified companies, such as Experian, the Post Office and Verizon, to perform the initial checks, and consumers will need to provide them with relevant information/documentation in order to set up the service. • Once set-up, verification takes less than a minute each time a subsequent online government service is used. • The rationale behind using different identity providers to perform this rather than within government itself spans 5 broad areas: User choice – being able to choose identity provider; No centralised identity database – protection of privacy as each gov department will only have access to the data it needs; Security – no single point of failure; Developing a Market – allowing identity providers freedom to design services which can then be used by wider public and private sectors; and Making the most of Available Technology – private sector organisations are better placed to keep up with evolving technology developments.
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- **Artificial Intelligence (AI) & Cognitive Computing** – although it is in the early stages the potential of AI and cognitive computing is an area gathering interest and momentum. Our research highlights 16% of

organisations are actively exploring how cognitive computing could help support customer experience and sentiment analysis, and potentially disaggregate large and complex reporting datasets. Interestingly, our research did not identify any start-ups actively focussed in this space in Scotland. Across the FS market within Scotland there are a number of deep FS domain experts that are likely to be extremely well positioned to support in the development of AI type solutions, particularly in areas such as understanding regulation or investment management rules and principles.

- **Robo-Advice** – the emergence of robo-advice, specifically in the Wealth Management and Investment space is gradually gathering momentum across a number of firms surveyed, although it is consistently recognised that the overall pace of development in this area will be hugely determined by pace of customer acceptance, and potentially regulatory intervention (See Figure 13)^{xvii}. Undoubtedly however, the opportunity is clear to many of the firms surveyed. Again, interestingly there is no Scottish FinTech start-up dedicated to pioneering robo-advice. What is evident however is the early exploration and testing of robo-advice amongst 3 of the Firms surveyed through either partnering with a large Firm (e.g. IBM) or developing internal processes using their data analytics team to develop and train new AI algorithms.
- **Robotic Automation** – use of Robotics to automate repetitive and simplistic processes is also emerging in some of the established firms we interviewed in Scotland. In areas such as claims processing some early advances are being made, and with great results. There is an optimism around the significant potential for robotics to automate other areas of operational process, and although still in its infancy, its application will likely develop quickly as organisations become more comfortable with the technology and the use-cases against which it can be applied.

Figure 13: RBS Robo-Advice Initiative

Initiative Description	
	<p>RBS recently announced it would be cutting the jobs of 220 face-to-face advisers, as it switches customers to an automated online Robo-Advice service. It said personalised advice would now only be offered to customers with more than £250,000 to invest. However, the Financial Conduct Authority (FCA) said such services could make financial advice cheaper.</p>
	<p>A Natwest and RBS spokesperson said in a statement: "Our customers increasingly want to bank with us using digital technology. As a result, we are scaling back our face-to-face advisers and significantly investing in an online investing platform that enables us to help a new group of customers with as little as £500 to invest."</p>
	<p>The FCA said it should also set up a new advice unit to help financial firms set up the robo-advice programmes. Such programmes allow consumers to go online, answer some questions, and receive financial help without having to pay for individually-tailored suggestions.</p>
<p>It is understood that RBS are not alone however, with at least three more High Street banks thought to be planning to launch such services.</p>	

"...Robo-advice tools will help people to engage with their finances and make investment decisions. They are an extension of the calculators, information, guides and tools already on offer via direct-to-consumer investment services. They range from ideas for simple model portfolios, through to more sophisticated cash flow scenario modelling and everything in between. The investor answers a number of questions and is given an answer..." – Danny Cox, Hargreaves Lansdown^{xviii}

- **Personal Financial Management (PFM)** – the growing shift towards data aggregators and the onset of the open bank initiative has prompted an upsurge in PFM solutions. Locally, Money Dashboard remains the main business solely dedicated to this type of offering; however through our consultations we also became aware of a number of the established firms starting to consider how they might

develop similar offerings. As regulation evolves over the coming years, and supports more open access to personal data, the role of aggregators is likely to drive further innovation and bring the creation of new solutions to market.

Figure 14: Money Dashboard Company Overview

Company Description	
	<p>Money Dashboard is a free online personal financial management (PFM) service, providing users with a single view of all of their financial accounts, as well as the ability to analyse past trends and budget for the future, through a set of easy to understand visuals. Utilising powerful analytics and associated insight, without compromising security, Money Dashboard promises to help customers better organise their finances more effectively, whilst contemporaneously allowing the planning and achievement of future financial goals.</p>
	<p>Founded in 2009, and based out of CodeBase on Lady Lawson Street in Edinburgh City centre, Money Dashboard is a great example of a FinTech start-up using advanced analytics to address the evolving needs and wants of the modern, tech-savvy personal consumer.</p>

"...Money Dashboard is in a unique position to tap into the growing desire of consumers to more easily take control of their finances. It has a strong vision of how the market will continue to develop and we believe in that vision..." – Richard Moore, Calculus Capital Investment Director^{xix}

- **Virtual Reality (VR)** – although not talked about with any of the firms we consulted with, one industry subject matter expert talked about the potential emergence of VR technology to support more advanced gamification across sub-sectors of the industry, such as insurance. We see early developments of these initiatives already, e.g. The Aviva Driver's App – the perspective of this SME is that in the years to come this technology will advance to develop solutions that allow detailed simulation and assessment in areas such as customer treatment or risk management.

7.2 What is shaping these trends?

It is clear that within Scotland the established firms recognise the likely disruption FinTech will create in the coming months and years. It is also clear that there is an opportunity for new start-ups to develop services and solutions across some of the themes our consultees talk about being interested in, but are not catered for locally. Through our consultations (including questionnaire responses) and secondary research we have established 4 key elements shaping and driving emerging trends in Scotland.

7.2.1 Evolving customer expectations

Perhaps the biggest driver of new trends is the rapidly evolving expectations of the customer-base, not unexpected and not unreasonable. The ability to deal with customers in real time, customise a service, bespoke a product, find specific advice, seamlessly open an account and transfer money instantly are all examples of how customers expect to engage with Financial Services in the 21st century. The established firms and the start-ups understand that there is a great opportunity to develop new products or services that respond to that need. One participant perspective considered the shift in 'ownership' of individual's data, from the organisation to the individual themselves, as being a primary driver. The theory being that as we become custodians of the data organisation's hold about us, the ability to demand and expect better and more bespoke treatment becomes the next logical conclusion.

“Our clients are demanding real-time data. Who wouldn't want to know how they are doing right now, and then use that information to scale their business? Cash may be king, but knowledge of how that cash is used is gold.” – Colin Hewitt, Float CEO^{xx}

7.2.2 Digitally enabled customer base

In addition to the desire to have services and products available 'anytime, anywhere, and anyhow' customers are far more digitally enabled and in-tune with the capabilities that technologies should be providing – this is driving a new type of expectation across Financial Services products and services and opening up significant opportunity for technology savvy companies to consider the next generation of offerings. According to Deloitte research 76% of UK consumers now own or have access to a smartphone and 60% own or have access to a tablet^{xxi}. Furthermore, a range of connected devices such as smart wristbands, watches, and connected TVs are also increasing meaning we are more and more managing aspects of our lives online.

7.2.3 Changes in the regulatory landscape

It is also apparent that recent changes made, or about to be made, in regulation are supporting the development of new FinTech solutions (See Figure 15). Particularly, the second iteration of the Payment Services Directive (PSD 2) will see the opening up of transaction data for organisations outside of the typical financial services institutions to develop insight or new supporting services. This updated directive is seen as seminal across the industry and will allow for a host of new service providers to develop new solutions, most likely in data analytics, personal financial management and digital identity. In addition to this a series of other key regulatory initiatives are potentially setting out support for a more disaggregated landscape going forward.

Figure 15: Changes in Regulatory Landscape

Initiative	Description
Payments Services Directive 2 (2017)	<ul style="list-style-type: none"> The Directive on Payment Services (PSD) provides the legal foundation for the creation of an EU-wide single market for payments. PSD aims at establishing a modern and comprehensive set of rules applicable to all payment services in the European Union. The target is to make cross-border payments as easy, efficient and secure as 'national' payments within a Member State. PSD also seeks to improve competition by opening up payment markets to new entrants, thus fostering greater efficiency and cost-reduction. PSD 2 widens the scope of the PSD by covering new services and players as well as by extending the scope of existing services (payment instruments issued by payment service providers that do not manage the account of the payment service user), enabling their access to payment accounts. It also enhances cooperation and information exchange between authorities in the context of authorisation and supervision of payment institutions. The European Banking Authority will develop a central register of authorised and registered payment institutions. To make electronic payments safer and more secure, PSD2 introduces enhanced security measures to be implemented by all payment service providers, including banks. The EBA will develop specific and objective security standards to that end.
Cyber Security Legislation	<ul style="list-style-type: none"> The last 4 years has seen numerous initiatives in the cyber security space come to the fore, including: UK Cyber Security Strategy (2011), Cyber Essentials Accreditation Scheme (2014) and CiSP(2013). All of these initiatives aim to bolster UK Business resilience to cyber attacks, share threat information, and set out clear standards for cyber security measures that should be adopted within industry.
Open-Bank Initiatives (In Progress)	<ul style="list-style-type: none"> The UK Government recently called for evidence on how to set-up and utilise APIs in the banking industry, as a means to promote innovation in the use of bank and financial data, and increase competition across the industry. The Open Banking Working Group has thus been tasked with devising a detailed framework for the design of an Open Banking Standard in the UK, ensuring the key principles of data protection and data privacy are upheld.

7.2.4 The benefits of technology-led change

The established firms are beginning to truly see the competitive advantage that digitally enabled, and technology-led disruption can have on their business. The ability to dive deep into customer behaviour and understand the 'heart-beat' of the customer will continue to be a differentiator to the services or products a customer procures. The

landscape for market share is more competitive than it has ever been, and the ability to tailor products or services at a customer level is considered the holy grail, which now, more than ever, is potentially within the grasp of FS organisations. Furthermore, the ability to manage risk far more effectively is also considered a key driver for emerging FinTech trends. The ability to assess and model customer exposure through far deeper data sets is helping craft more effective credit risk management strategies and product pricing. Equally, the ability to reduce fraud and manage financial crime risk is also now supported by new and enhanced solutions that provide better profiling of customers and businesses.

7.3 Key trends and drivers summary

The following table summarises the current activity levels present in Scotland across each of the technology trends identified above. Also provided is a capability evaluation and our view on whether Scotland as a FinTech collective, should focus support, investment, and capability development in these areas. This is referenced in our recommendations and action plan in sections 10 and 11 respectively.

Trend	Current Activity	Capability Score	Focus Priority	Rationale
Digital	Over 80% of our consultees are already focussing on their Digital strategies with approximately three quarters suggesting these are either 'fairly advanced' or 'fully developed'.	High	Medium	Already a key focus area, as digital capability underpins almost all activity in the FinTech space. Current strategies amongst consultees are well developed and well supported, meaning we do not see this as a high priority focus area for support in Scotland moving forward.
Cyber Security	68% of consultees see this as key focus area, with only 58% suggesting current capability is either 'fairly advanced' or 'fully developed'. Surprisingly, the only start-up currently focussing on developing cyber security related products/services is G2G3, who focus on the gamification of attack scenarios.	Medium	High	The increasing number of high profile cyber-attacks, coupled with increased attention from both organisations' boards and regulators means this is a real opportunity area for Scotland to develop capability in response to demand. The nature and complexity of attacks will become more sophisticated and establishing focussed subject matter expert forums and communities around this area would help to rapidly identify opportunities and take steps to either support start-up activity, or develop capability within established firms.
Big Data, Analytics & BI	68% of consultees see this as key focus area, with only 16% suggesting current capability is either 'fairly advanced' or 'fully developed'. Investments being made towards initiatives such as the DataLab are helping grow capability across Scotland.	Low	High	There are no FinTech firms specifically providing dedicated analytics products or services to FS in Scotland. This represents a clear gap in the market, and hence opportunity for new start-ups to emerge or further development of established capability to respond to demand.
Cloud Computing	Just over half of our consultees see this as a key focus area, with 37% suggesting current capability is either 'fairly advanced' or 'fully developed'.	Medium	Medium	Although current capability amongst consultees is not overwhelming, cloud computing has been around for a while, and focus is expected to cool over the coming years as it becomes assumed as a part of the overall technology operating model. Furthermore, the fact there still exists some challenge and internal protocol around the security levels and assurances required with storing customer or sensitive business data in a cloud network, coupled with stiff competition from global technology giants hosting the required infrastructure, means we do not see this as a high priority area in which Scotland should focus.

Trend	Current Activity	Capability Score	Focus Priority	Rationale
Blockchain	Although not a key focus now, with 100% of our consultees suggesting current capability is either non-existent or in very early stages, approximately half see this as a key focus area over the coming years. Consultations do suggest some early studies are being undertaken, most notably in areas of potential deployment of blockchain across KYC/AML and smart contracts.	Low	High	Currently we are seeing no real deployments or applications in this area within Scotland. The perception amongst consultees, along with the broader industry, is that blockchain can and will disrupt. The number of potential use-cases and applications across FS grows on a daily basis, and Scotland can truly leverage this interest, with the right support, to satisfy this demand and become a world leader in this domain.
Emerging Technology	Like blockchain, although not a key focus now, with 100% of consultees again citing current capability as in its infancy, 49% see emerging technologies and solutions as a priority over the coming years. We are starting to see local players emerge in the areas of digital identity (miiCard) and PFM (MoneyDashboard), while a number of our consultees are exploring and/or testing the potential use of robotic automation, robo-advice, and cognitive computing.	Medium	High	Given the start-up capability already in place, coupled with growing industry interest, the fast-paced environment of change and significant potential to develop capabilities further, we see this as a high priority focus area for Scotland. The concentration of banking and asset management firms locally, sectors in which robotics and robo-advice stand to gain most traction respectively, means dedicated communities and investment around these areas should be established in order to truly leverage Scotland's potential and satisfy the demand within the local market.
Authentication & Biometrics	16% of our consultees see this as a key focus area currently, with only 5% suggesting current capability is either 'fairly advanced' or 'fully developed'. There are however, currently no plans amongst our consultees to focus effort explicitly in these areas in Scotland.	Low	Low	Although we are seeing initial applications of biometric authentication come to the fore across the wider FS industry, most notably with HSBC introducing voice and fingerprint recognition to its online banking services, we feel the technology is still very much in its infancy and should therefore not be a high focus area for Scotland as it stands.

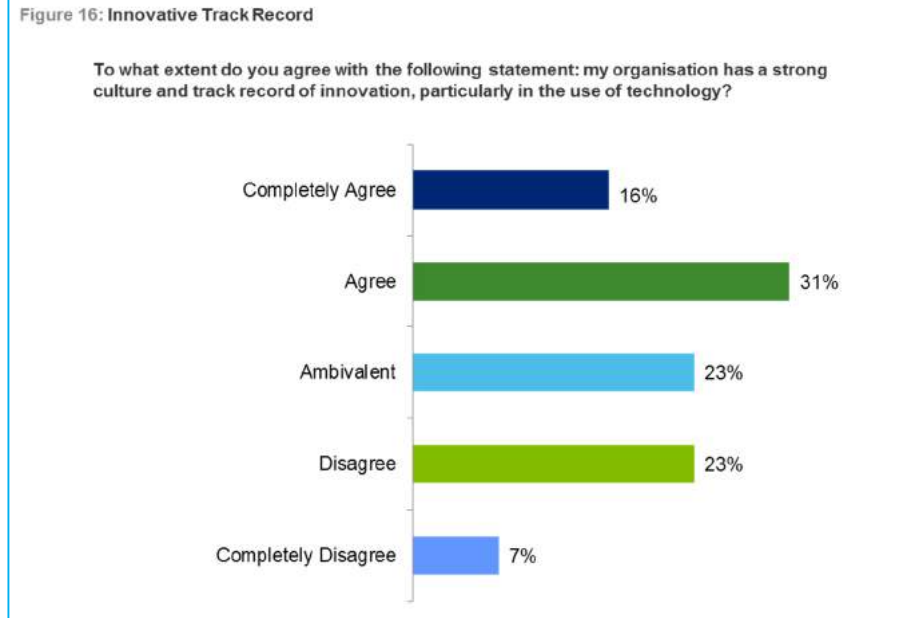
8. Eco-system Assessment – Detailed Findings

This section of our report drills into more detail across each of the components that comprise the Scottish FinTech ‘eco-system’. From our research questionnaire, extensive consultations, and secondary research we have identified the key strengths and potential opportunities for each component, and highlighted the key weaknesses and threats to their future success. This high level SWOT analysis and gap identification feeds into the overall eco-system assessment in section 9 and informs the recommendations and actions we put forward in section 10 and 11 respectively.

8.1 The established firms

8.1.1 Introduction

There is a clear recognition from across the network of FS firms we studied of the opportunity to embrace not only the offerings that the FinTech start-ups may bring, but also to encourage, nurture and develop the ability of in-house teams to place a stronger focus on innovation and development. The changing landscape across FS more broadly, along with the emergence of the ‘challenger’ organisations is also setting the tone for development opportunities and the emergence of new entrants. Innovation and a supporting culture and track record to ‘be innovative’ are central to many of the organisations we studied (Figure 16). Whilst this is setting a path to help engender FinTech development it is not without its challenges. What is clear through the majority of our consultations is agreement that the backdrop of Scotland’s heritage in FS expertise, combined with a strong technology scene, provides a healthy environment for the country to grow and excel as a key FinTech centre.



8.1.2 Key strengths and opportunities

The following section gives further detail on the strengths and opportunities for the established firms that we studied.

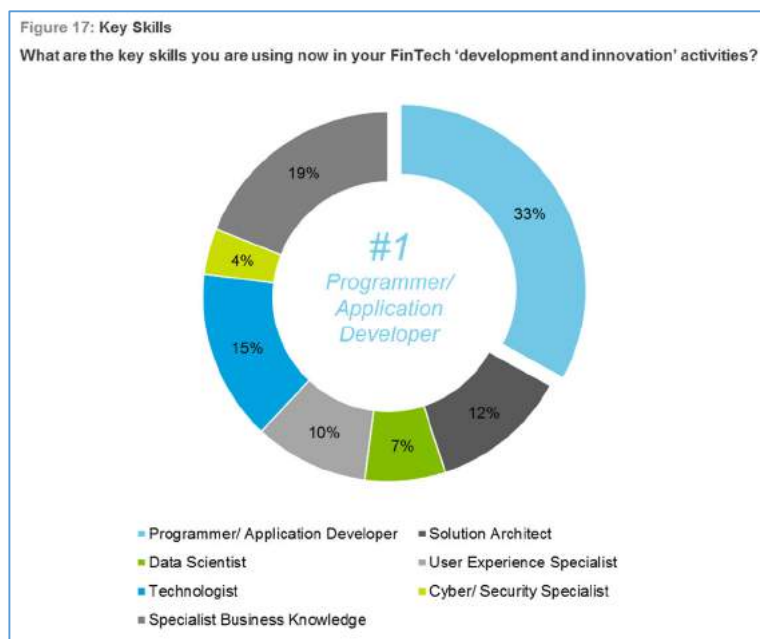
8.1.2.1 There is a strong existing skill-base within the established firms

Where possible we recorded the number of FinTech specialists operating within the firms we surveyed. Whilst our report does capture some detail, it is fair to say that this is not something that is readily known to firms and in some cases is either estimated, or unknown. Taking forward the action

highlighted to define and connect the community would help obtain a more accurate view of total numbers in future.

However, from the firms we were able to gather data from we can see there is currently a broad range of existing skills within the business that are being deployed to support FinTech development and innovation.

As one might expect programmers and application developers are the key skills currently focussed on developing FinTech 'in-house', however beyond this group there is a fairly rich mix of skillsets operating across development and innovation (Figure 17). Through our consultations we also learned that, in some organisations, there are initiatives underway to try and cross-train skills to further help expand the development capability going forward. This was specifically mentioned in conversations with JPMorgan and Morgan Stanley where there are initiatives and programmes underway that look at how staff are rotated and supported to get involved in different projects that help grow their skillsets.



This strong skill-base provides the opportunity for the established firms to go on to develop new initiatives within the organisation, or build relationships with local start-ups to understand how their solution or service might benefit the business going forward.

Across the region more broadly there is a highly concentrated base of talent, and unlike many other regions outside of London this skill-base is diverse across Financial Services. Scotland has long had a well-established history of banking, insurance and asset management companies, and importantly many of the employees operating within these firms have clear exposure and insight into the challenges that exist across fairly antiquated systems, processes and controls. This depth and strength of knowledge creates a real opportunity if tapped in the right way, to drive fresh thinking and bring support to the internal development of FinTech, or engagement with local start-ups.

“...Scotland has a solid reputation for financial services and of course has highly talented and skilled people ...” – Jayne-Anne Gadhia, CEO, Virgin Money^{xxii}

8.1.2.2 The environment of innovation within the established firms

In line with the depth of capability that exists, a focus within the established firms is now being placed on innovation and the use of different technologies or services to address current business challenges. Furthermore, leaders across the FS organisations we studied are actively exploring the opportunity that might be created by embracing FinTech. Although this is still being cautiously explored it is evident that many senior members of FS firms understand and see the benefits that technology could bring to truly understanding the customer, differentiating products, and driving cost out of the business, which together, are all creating an environment more conducive to FinTech-type development. This, in turn,

is empowering staff within the organisations to challenge the status quo, and develop 'sprint' projects designed at outlining the types of improvements FinTechs and FinTech type innovation can bring to the organisation.

Standard Life and RBS are both fantastic examples of companies leading the way in fostering innovation and 'start-up' behaviours across their organisation, with the former's marketing director Stephen Ingledew recently emphasising Standard Life's focus on spending an increasing amount of time in collaborating with small enterprises who are bringing new insights into how Standard Life can operate in the future. RBS have set up dedicated scouting teams tasked with finding and engaging innovative start-ups, coupled with the recent partnership with Entrepreneurial-Spark which has brought an in-house accelerator programme into their Gogarburn Campus (as discussed further in section 8.5). Through our research we have learned of others taking positive steps in this direction. Interestingly, one of the Asset Management organisations commented that bringing this environment of innovation to life in the business has helped hugely in nurturing new, and retaining existing, talent – a point we will reflect on when we consider the steps each sub-group can take to resolving what is more often seen as a challenge to the established firms.

It is also worth noting that 23% of our respondents did not feel there is a strong track record and culture of innovation (Figure 16). It is fair to conclude from our consultations the reason for this is the lack of priority focus right now, and in some cases lack of executive buy-in. This is covered further in section 8.2.2.

8.1.2.3 Local established firms are a launch-pad into global organisations

A key strength of the established firms operating in Scotland is the access potential they bring for start-ups to launch their services into a global organisation. Although there are clearly some challenges associated with getting access in the first instance, there is no doubt that having global

organisations on our door step is a great strength to the potential Scotland has to become a FinTech centre. Indeed for one identity management start-up we surveyed, being able to access established global banks locally with relative ease, has meant that they can access the whole group to potentially roll their services out more widely.

8.1.2.4 A healthy opportunity to 'acquire innovation'

Given the size of the eco-system and relative potential ease of access to the start-up community an opportunity exists in Scotland for the established firms to work closely with them and in some ways undertake a form of enhanced due diligence on the firms they may then go on to buy. Although a bit unorthodox, this is sometimes the exit strategy hoped for by the start-ups in question. Whilst not specifically mentioned in our consultations, the ability to acquire innovation through takeover and acquisition is likely to continue to develop over the coming months and years.

8.1.2.5 A supportive regulatory environment

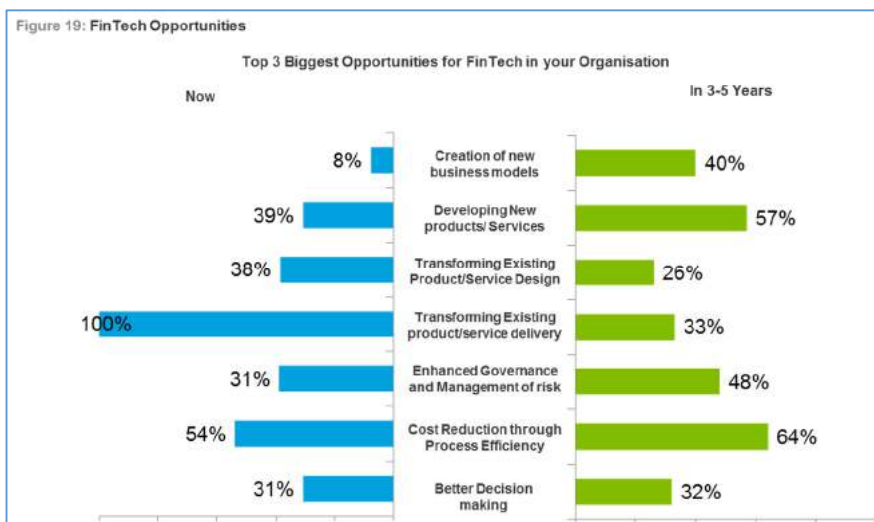
The opportunity to develop and embrace FinTech innovation within the established firms is also beginning to manifest as a result of specific regulatory changes that are afoot. The Payment Services Directive 2, the Open Bank initiative, and the FCAs development of a FinTech 'sandbox' (see Figure 18 on next page) are paving the way for a far more open environment for innovation, and with that the need and desire to innovate and develop parts of the business that have remained static for a considerable period of time^{xxiii}. This is particularly acute in areas such as payments, customer management, servicing and advice, and compliance management.

Figure 18: FCA Project Innovate

Initiative	Description
FCA Regulatory Sandbox – Project Innovate (2016)	<ul style="list-style-type: none"> The FCA developed Project Innovate to foster competition and growth in financial services by supporting both small and large businesses that are developing new products and services that could genuinely benefit consumers. In its first year, Project Innovate helped over 175 innovative businesses, five of which have now been authorised to undertake regulated activities. Now looking to expand Project Innovate, the FCA are introducing a regulatory sandbox that will act as a 'safe space' in which businesses can test innovative products, services, business models and delivery mechanisms without immediately incurring all the normal regulatory consequences of pilot activities.

8.1.2.6 Process efficiency and new products and services are a focus for FinTech in the future

Through our research we also sought to identify where opportunities will lie for FinTech in the established firms, both now and in the future. Figure 19 shows that presently the opportunity is focussed on 'transforming' existing products and service delivery; this is unsurprising given the period of change, mergers and migrations since 2008.

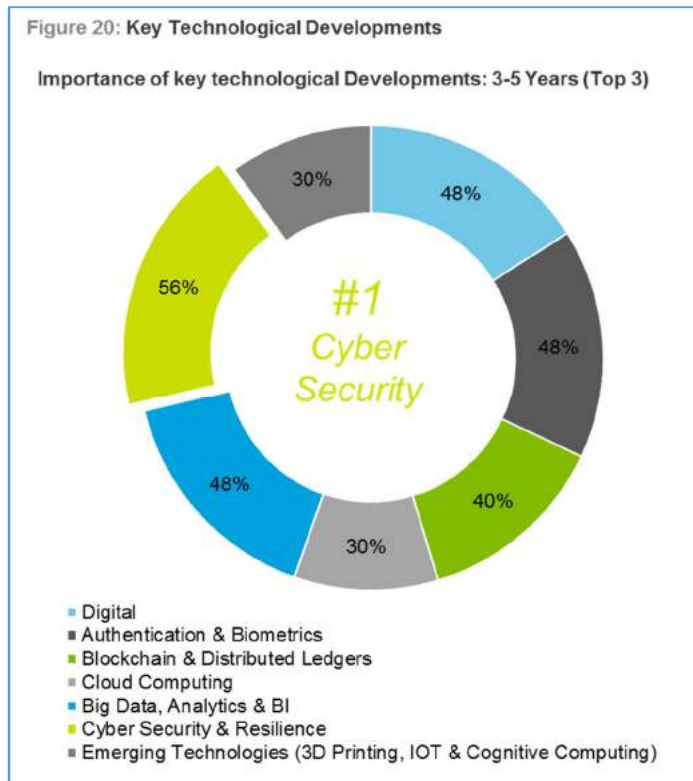


Going forward our research shows the focus for FinTech opportunity shifts toward cost reduction through process efficiency (64%) indeed, this is perhaps already starting through the work currently being done on robotic automation in some organisations. Unsurprisingly the creation of new services and products (57%) is also considered a key area, again the point made earlier in section 7 around the changing shape of customer expectation and 'digital-awareness' is likely fuelling this. The enhanced management of risk begins to also feature more heavily in the forward-looking view. What is apparent through this research is that our consultees are active, and thinking about how and where FinTech solutions are developed and deployed across their organisation.

8.1.2.7 The opportunity to develop FinTech solutions that address cyber risk

Figure 20 on the following page shows cyber security and resilience as the area where the biggest FinTech developments are expected, this is unsurprising given the current industry focus in this area. What does become apparent within our research is the skills gap that is likely either in existence now, or will become acute in the future (as explored in the next section). At present, only 4% of our respondents are using cyber or security experts in their FinTech development and innovation activities, whilst there is clearly an opportunity here, the lack of resource must present a threat.

In the US the prevalence of Cyber security FinTech firms is growing rapidly, evidenced by the emergence of companies such as Centrify, Veracode and Webroot who are leading the creation of new products and software solutions aimed at preventing and detecting cyber threats. Given the ongoing threat to the industry in this area, and the likelihood of it continuing, developing FinTech solutions that address cyber risk could be a high-growth area.



8.1.3 Weaknesses and threats

Whilst there are a number of strengths and opportunities for the established firms, there are also some key weaknesses and threats to them either fully developing their own FinTech solutions, or supporting the establishment of a rich eco-system in Scotland.

8.1.3.1 Building awareness and connectivity

A threat to the established firms focuses on a point that repeated in many of the consultations – they often feel ‘unsighted’ on what makes up the local eco-system and their understanding of who the key start-ups are that could help them or they could work with, i.e. they don’t often feel fully connected. There is a general consensus among the organisations we sampled that whilst there appears to be a lot of activity there is a feeling that the lack of connection and no central FinTech ‘hub’ is threatening the ability of the established firms to understand, engage, or support the FinTech community. Overall there is a view that without this clear connectivity, the ability for Scotland to develop as a FinTech centre will be threatened. The principle of ‘community’ is key to the success of any FinTech centre, as referenced earlier in this report.

“The key missing element available to established firms, is something as simple as a website, potentially facilitated by SE, profiling all of the local FinTechs, giving a brief summary of services, maturity, contacts etc. i.e. If you want to plug in, THIS is how you go about it” **CIO, Scottish Retail Bank**

8.1.3.2 The new entrants that ‘unbundle’ the established firms

A threat to the established firms is the emergence of start-ups cannibalising or ‘unbundling’ their business, or potentially replacing them entirely. Accenture recently predicted that by 2020 full service banks may lose up to 35% of their value to FinTech challengers eroding their business and attracting customers away through smarter or more customer friendly solutions or products^{xxiv}. Some of the consultees interviewed believe the biggest threat will be the likes of Google, Apple and Amazon who may replace their business entirely, while others look at different parts of the value chain (such as customer servicing, cross-sell of products, or

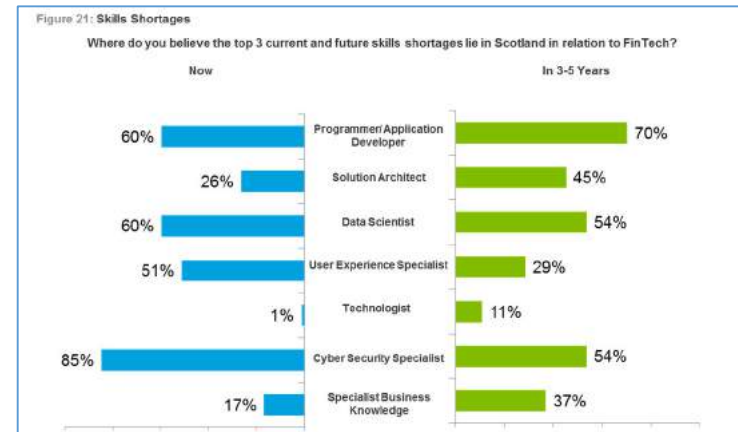
payment services) and understand that in years to come this may become challenged by emerging start-ups who can move quickly to building products or services that challenge their incumbency. What is clear amongst all of the respondents is the need to continually drive the focus on innovation and pioneer initiatives that will challenge and disrupt existing solutions. Alternatively, the established firms could work in collaboration with the emerging FinTech start-ups to understand the opportunity for each party to either co-develop or disrupt existing products or solutions. Our research uncovered the co-development of solutions is an area that one bank will be focussing on quite heavily in the second half of 2016.

8.1.3.3 The talent challenge - a specific shortage of cyber security specialists and developers

A significant threat to established firms making headway in FinTech is undoubtedly the anxiety that exists around talent, and it is a complex picture. It is clear that in future the need for cyber security specialists and developers are the key areas, and given the growing focus on cyber security this is perhaps where the most acute shortage will emerge. What is interesting is also the drop-off we see in the expectation across the user-experience SMEs, this is perhaps symptomatic of an environment where established firms will feel they understand the needs and requests of the customers more clearly, but need skills to turn that understanding into new or enhanced products and services.

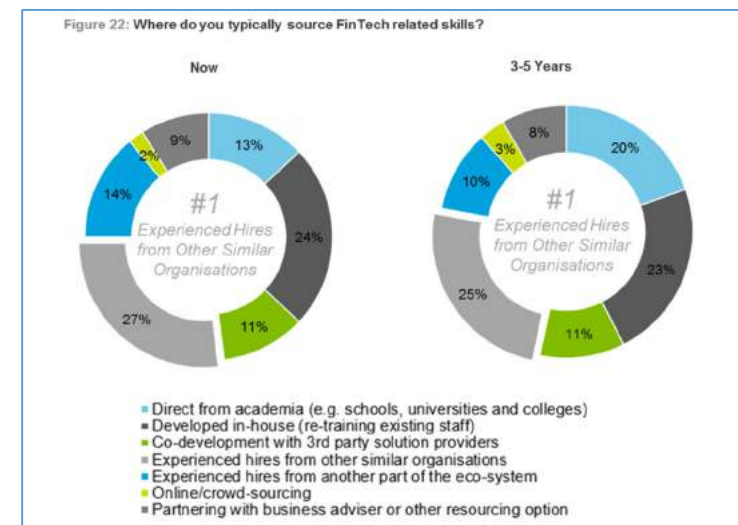
What is perhaps more worrying is the finding that developers/programmers and data scientists are pivotal to the development of FinTech solutions, both now and in the future. However, this is also currently where the biggest skills shortages are perceived (see Figure 21), both now (60% across both programmers and data scientists) and going forward (70% and 54% respectively). What becomes clear through these statistics is the need for Scotland's community to act now to ensure potential is not hamstrung by the lack of technical resource in key fields. What is also interesting is the view on where the talent might come from (see Figure

22). Over the immediate future, the established firms don't believe the sourcing of talent will change that dramatically. Whilst that might be bearable if there is a shortage now, without addressing and developing the



talent pool how can the shortage be addressed in future?

One of the key changes is the belief that in 3-5 years more resource will come directly from academia. This is encouraging and will support the opportunity that exists for Scotland's further education system, but it must also act as a prompt for even more support to be given to candidates coming from education to become 'business ready', a challenge referred to



by a number of our consultees.

Also important is the continued emphasis placed upon 're-training' existing staff in order to help address the skills gap going forward. This is an area that will continue to be considered over time as the roles and responsibilities of individuals change, and indeed something actively being progressed within firms like JP Morgan and Morgan Stanley.

More broadly, our research has also touched on other key points surrounding talent. These have been highlighted as major factors across most elements of the eco-system, but for the established firms this is predominantly felt in three key areas:

- a) **Attracting talent** – In recent years FS has suffered a significant decline in its 'attractiveness'. This is particularly true with regards the millennials coming out of higher education, or advancing in their careers. This is most significant in cities like Edinburgh, Glasgow and Dundee where a history of successful technology companies such as Skyscanner, FanDuel, and RockStar are influencing the career paths of our next generation of coders, developers and potential FinTech specialists. The inability to attract talent from schools, universities or competitors is a real threat to the development of FinTech capability within Scottish organisations. The reality is simply that Financial Services is not considered dynamic, fast-paced, risk-taking or exciting; whilst there are clearly elements of truth here, there are no doubt areas within financial services where this is not necessarily true. Consideration to how this threat is mitigated should continue to be the focus and responsibility of all of the groups in the eco-system.

"... We have wholeheartedly welcomed initiatives such as the Skills Investment Plan for Scotland's Digital Technologies and ICT Industries but our results show that this problem is growing increasingly acute. While businesses of all sizes reported plans to recruit, the demand for

different types of skills varies. Software engineering talent is the biggest requirement for small companies while mid-sized companies are as likely to be seeking staff with commercial and business support skills and project management capabilities. Meanwhile, the biggest demand among larger companies is in infrastructure support and management, again followed by project management..." – Polly Purvis, executive director of ScotlandIS^{xv}

- b) **Retaining Talent** - Consultees also acknowledged the challenge associated with retaining talented and innovative individuals that can drive or introduce FinTech change into the business. A number of our consultations reflected on the opportunity that exists to grow and develop a team of FinTech professionals if the working environment for them within the organisation was adapted, e.g. the ability to work far more flexibly and in different working environments, and even be relieved of the traditional business dress-code. These are all small actions but would create an environment more akin to tech development and less so banking and finance. One of our consultees from a major Bank highlighted the need for consideration to be given to the rewards package offered to employees. He argued that rather than focussing on pension schemes and company shares, established firms should do more to ensure rewards packages were more flexible, instead incorporating 'free-time' made available to employees to work on their own ideas, whilst also providing them with access to the toolkits required to support this activity. This, he argued, was a key way in which innovative talent could be retained within the organisation.
- c) **Gender balance** – It is apparent across the established firms (as it is in other parts of the eco-system) that there is a significant lack of females engaged in technology roles within FS, and even more so in the FinTech domain. We are starting to see an increasing

number of initiatives across the UK focussed on attracting female talent into the FS sector (see Figure 23)^{xxvi}, while within a couple of the consultees surveyed, moves are afoot to address this issue specifically in Scotland; most notably JPMorgan, Morgan Stanley and HSBC. However, it is evident that more could be done to address this point; further detailed consideration is given to this in our recommendations.

Figure 23: Gender Imbalance – Fresh Look

	Initiative Description
	<p>We are currently seeing an increasing number of events targeted at attracting female university students into the FS sector. Fresh Look is a prime example of this, where senior female managing directors within nine investment banks (Bank of America Merrill Lynch, Barclays, Credit Suisse, Deutsche Bank, Goldman Sachs, J.P Morgan, Morgan Stanley and Nomura) look to inspire first-year students towards a career in the sector.</p> <p>What we are also seeing, is an increase in banks targeting girls undertaking their A-levels or even those in primary schools, offering insight days where students have a chance to network with senior staff and learn about the skills needed to work in the industry.</p> <p>More innovative schemes are however needed, and more of a focus should be given to Scotland, as currently the majority of these initiatives are run in England alone.</p>

8.1.3.4 Innovating in the face of current and existing pressure

One must also temper the point made earlier around the ‘environment of innovation’, of course this creates opportunity for the established firms, however in some cases the reality is yet to really take hold. Our consultations were balanced, so alongside the fervour and agreement of the opportunity that exists, there is often a barrier and threat to innovation set out when challenges such as budget constraints, executive buy-in, short-term return, the value proposition or complete compliance with

regulation cannot be immediately understood. In many organisations there is still significant challenge associated with getting incubation of new initiatives up and running, and in some cases it was cited that within the organisation there are not enough ‘innovators’. Whilst this is not new it must be recognised that the industry as a whole is still acclimatising to FinTech disruption. The shift in culture required to fully embrace it is not quite universal.

8.1.3.5 Innovation vs BAU

A further point worth noting is the existing ‘book of work’ that some of the consultees reflected on during our research. As one might expect, there are a number of existing internal programmes that command the attention of technology and business budgets and resource, who in many cases would love to spend more time on innovation and FinTech-type initiatives.

“We have very limited investment or change capacity due to focus on migrating onto new core banking platforms” SM Risk Systems, Scottish Retail Bank

The resource demands of the existing BAU change agenda, typically focussed on managing regulatory change, integrating new products or services, or migrating to new platforms can pose a threat to the focus on innovation or FinTech development. Indeed, in two of the so-called challenger banks we interviewed this threat is particularly acute and those that we spoke to mentioned the only focus right now is migrating to a new platform, and stabilising the ‘book’. Of course, the balance of effort and investment on BAU vs. innovation in nothing new, but recognising this as a potential threat to development is important.

8.1.3.6 ‘Turning the tanker’

For a number of organisations the ability to move quickly, and in an agile way, creates a challenge for them in either embracing or adopting a FinTech solution, or developing their own. Whilst moves are afoot in some organisations to help remove layers of bureaucracy, simplify funding routes and procurement processes, or engage and mobilise teams quickly, it is clear that this still remains a challenge across the industry. The added requirement in Scottish firms to sometimes have to seek sanction from the HQ in London or the US can also add to the steps required before change can start. Although this must be highlighted as a challenge, our consultations did evidence examples of people within firms 'seeking forgiveness, rather than permission'. In some organisations, such as RBS, small 'scouting' teams are in place to consider new technologies and how these might benefit the organisation, and importantly how they might go on to navigate the procurement process in order to develop short proof-of-concept exercises. Although the green shoots are emerging, changing the pace and agility of the supporting organisation should currently be recognised as a threat.

"...The default position of some big banks is arrogant and dismissive of FinTech, and they are going to get a big shock. Their problem is that they have massive legacy systems [ad hoc computer systems acquired over decades], big branch networks and lots of employees. They can't move quickly, they are not fleet of foot, and that's a very dangerous position to be in now..." – Scots Financier, Callum Campbell of Fireflock^{xxvii}

8.1.3.7 Executive education

The ability to overcome the internal challenges is key to the success of the established firms, both in willingness to trial, adopt, or support incoming FinTech solutions, and in the ability to nurture and sponsor innovation inside the business. In some respects, and supported by our research, overcoming this challenge will likely require both a combination of education and awareness, and an appreciation that in some cases it might

just take time for the organisation to become comfortable with the advancing pace of technology. For those decision makers within the established firms, educating on the threats and opportunities that exist will be key.

In addition to this many executives making decisions on the future and direction of the business don't come from a technology background, and are often not measured on the success of FinTech programmes or innovation. It is therefore hard in some cases for them to truly understand the benefit that might be delivered, or support proposed initiatives. Going forward, this may change as the growing roles and influence of the Chief Information Officer (CIO) and the Chief Data Officer (CDO) develop. The emerging role of the Chief Digital Office (CDiO) is also now gathering momentum in the industry and helping educate the broader leadership team. However, as things stand today it is fair to conclude that the understanding of the value FinTech could bring to the organisation is still in its infancy for many.

"...one challenge was to convince senior execs to back the public cloud strategy. We had some work to do to convince our stakeholders that cloud computing was going to deliver our strategic objectives in a secure way. Our day one proposition wasn't about trying to deploy killer applications, this was about ensuring we built a solid foundation onto which we could deploy increasingly complex production workloads and store customer data with confidence and highlight some 'quick wins' where cloud could achieve cost savings..." – Allan Brearley, Tesco Bank's Head of Transformation^{xxviii}

8.1.3.8 FS is always going to be regulated

Perhaps abating somewhat, but still in the minds of the established firms, is the challenge and constraint regulatory regimes might bring. For

example, the FSB viewpoint called out in section 5.1. One observation, citing the comparison with the pharmaceutical industry, gives a positive outlook ('it is as heavily regulated, but with far more innovation'), whilst others believe regulation could still stifle significant innovation. No doubt it will continue to be a focus, but going forward it is generally felt that with closer liaison and focus from the regulator, the push to developing FinTech solutions will not be constrained by heavy regulation.

8.1.4 Summary of key gaps

The following table summarises the key gaps (strengths to build on, weaknesses/threats to address and opportunities to explore) identified in the high level SWOT analysis covered in this section. Our proposed response to these gaps are subsequently covered in our summary assessment (section 9, p.67) and recommendations (section 10, p.71).

Ref	Gap Description
EF1	Lack of awareness and connectivity meaning firms feel unsighted on what opportunities exist within the eco-system.
EF2	Gap in the supply and industry readiness of specific skillsets to support FinTech activity within established firms.
EF3	Resource gap particularly prevalent across developer community, data scientists, and cyber security specialists.
EF4	Increased number of initiatives required in order to cross-train existing strong skillsets to help expand the FinTech development capability going forward.
EF5	Inability to attract talent from schools, universities or technology focussed firms due to decline in FS industry attractiveness. This gap is even more pronounced across the female population.
EF6	Lack of innovative and entrepreneurial culture coupled with reluctance to accept agile working environment still prevalent across many established firms.

Ref	Gap Description
EF7	Gap in executive education, required in order to increase understanding of the value FinTech could bring to established organisations.
EF8	Increased importance moving forward, on regulator liaising more closely with rest of eco-system so as not to stifle innovation.
EF9	More attention to be focussed on how FinTech developments can be leveraged given the increasingly open innovation environment encouraged by recent regulatory changes (e.g. PSD2/Project Innovate/Open Bank Project).

8.2 The FinTech Start-ups/Small to Medium Size Enterprises (SMEs)

8.2.1 Introduction

As with the established firms, there is undoubtedly opportunity for the FinTech start-ups and SMEs across Scotland, indeed one might expect this to be a blossoming community given the backdrop and landscape that exists. Whilst there are a number of exciting and innovative businesses from Scotland who have established themselves, it is fair to say that there ought to be more. Our consultations with start-ups and SMEs clearly supports the view of the opportunity that exists, however there are some specific challenges and threats to Scotland being able to offer an environment for FinTech start-ups that can compare with established centres in the UK and beyond.

8.2.2 Strengths and opportunities

There are a number of strengths and opportunities associated with the FinTech start-up and SME community across Scotland. Perhaps most clear, is the proximity of the whole eco-system and the ability to tap into a rich and diverse network of financial service specialists – this presents a huge strength and opportunity.

8.2.2.1 Access to a global market

The ability to have deep FS expertise and large organisations ‘on the doorstep’ means that the FinTech start-ups and SMEs should be in a position to not only regularly test and develop their use-cases, but also access opportunity to showcase their solutions and products across a global business. Outside of London, there is perhaps no better place in the UK to access such a concentrated pool of global FS organisations. Whilst the reality of making headway with the established firms is not without its challenges, there is clearly an opportunity within the Scottish eco-system to access significant market players. More recently we have also become aware of the large global firms becoming interested in speaking to the start-ups to understand what they might have that could

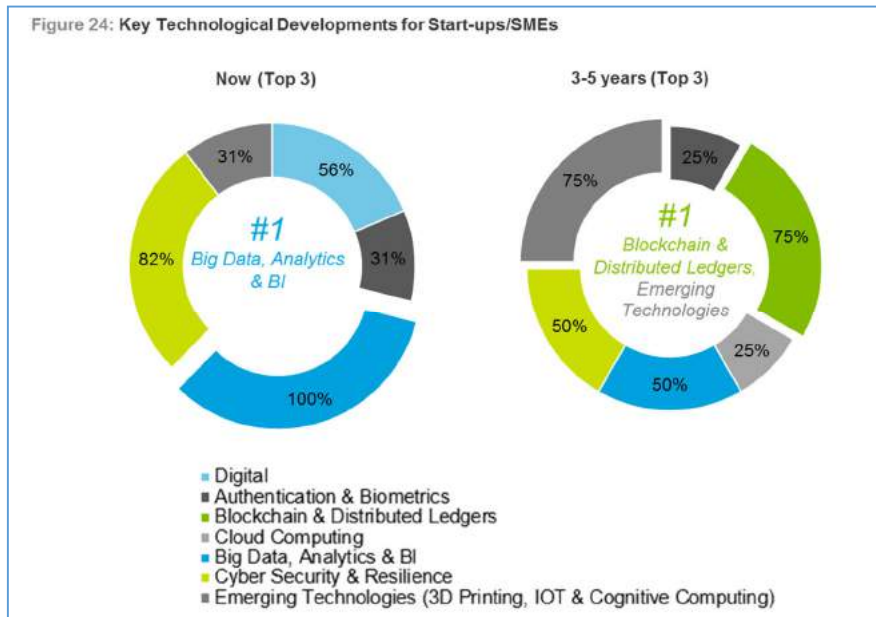
help address specific challenges, or where they might work in collaboration. Examples of where this is occurring were shared with us from a retail bank based in Glasgow and an Asset management firm in Edinburgh. Whilst this is not yet commonplace, it is potentially a sign of changing attitudes and starts to give some level of ‘blessing’ to the opportunity the new breed of FinTech’s might have.

8.2.2.2 The surge in Fintech focus

The opportunity for the start-ups and SMEs to thrive is also buoyed by current focus and industry excitement around the ability for FinTech firms to change the shape of Financial Services. This in turn is supporting an environment that will allow for closer liaison between the industry and the local FinTech start-ups to enhance existing offerings or develop new ones.

8.2.2.3 Data Analytics and Business Intelligence (BI) are focus for today, with blockchain a focus in future

Interestingly, when we surveyed the start-up community they felt that currently the biggest opportunity for FinTech development is in big data analytics and BI, cyber security and digital. What is even more interesting is that none of these are areas where we see dedicated FinTech start-ups focussing at this time. Although it is a relatively small sample of organisations, there clearly is an opportunity for start-ups to consider these as areas where there is seemingly demand.



Going forward, our research highlighted blockchain and emerging technologies (e.g. robotics and cognitive computing) as being the key areas where developments would occur in the next 3-5 years (see Figure 24). Current industry ‘buzz’ around blockchain is likely fuelling an element of this, although broader industry commentary would seem to back it up. Robotics and cognitive computing is an area where demand is growing, and therefore could provide a good opportunity to emerging start-ups.

Although we were aware through our consultation that some early research and insight into blockchain technology was underway, this has not yet evolved or advanced either within the start-up community or the established firms. The growing industry focus on robotics and potential of cognitive computing also featured significantly across a number of the consultations we completed; with a number concluding that in years to come the ability to either automate processes or advice and guidance

would likely make big advances. We can conclude that although these are areas where development is expected in the not too distant future, and that there is evidently a market within the established firms, there is no start-up or SME yet focussed in this space. With the right support in Scotland these areas must surely create opportunities for new start-ups to emerge.

Whilst not specifically surveyed through this report payments should also be an area where Scotland might emerge as a strong player in innovation. The onset of new regulation (PSD2) clearing the way for disruption in this area and with local strength and expertise in the market, the opportunity for start-ups to emerge in this space is apparent - this is an area where the Irish FinTech community has focussed, and to date made significant progress (See figure 25)^{xxix}. This, in part, is likely due to the concentration of subject matter experts in this field, and a conducive support network to prove the ‘use-cases’.

Figure 25: Payments Innovation in Ireland

	Description
	<p>According to IDA Ireland there are now 12 multinational payment companies present locally, employing around 3,700 people, including large global payments brands such as MasterCard, PayPal and Elavon. Importantly, these three global powerhouses, have all recently set-up innovation centres for payments in the country, reinforcing the area's reputation as an innovative payments hub, whilst boosting the local FinTech eco-system more widely.</p> <p>MasterCard has now based its global innovation ‘hub’, MasterCard Labs, in Dublin with 200 people employed there. Similarly, Elavon supports a variety of business lines globally through its 400-strong workforce in Ireland, and has recently partnered with Irish-owned Realex Payments to offer a gateway solution for online retailers across Europe, helping drive the company's growth into UK and European markets. Paypal, set up in 2003, now employs over 2,400 people at its Dublin plant, and continues to push the boundaries on all things payments related.</p> <p>This has led to an increasing number of new and innovative solutions emanating from Ireland – from payments technology to entirely new payment concepts.</p>

“... *“Technological innovation has triggered a dramatic increase in digital payments ... shift from physical to digital payments not only provides simpler, faster and secure payments, but has also enabled new and progressive business models to emerge..”* – **Marion King, Director of Payments, RBS^{xxx}**

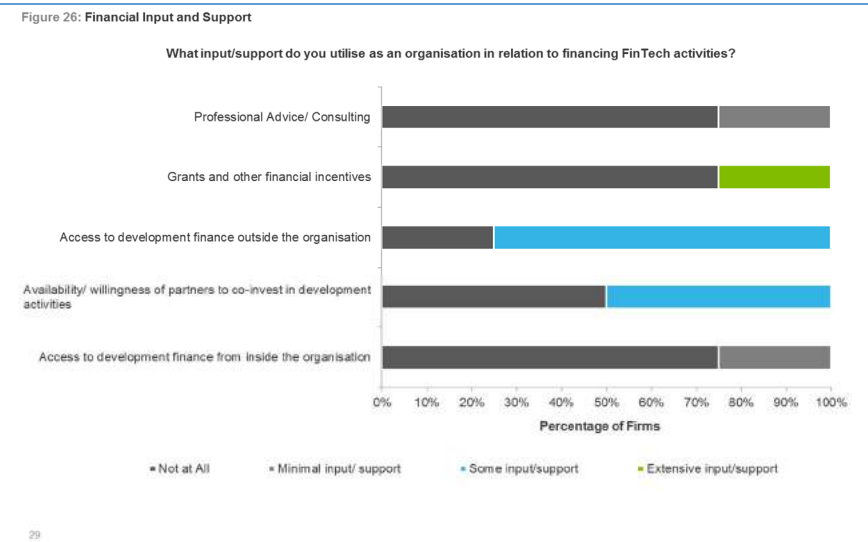
8.2.2.4 Varied and vibrant early-stage funding options

In addition to the areas where opportunities lie for start-ups, there is also a vibrant and progressive private investor community and government and public sector support network available to fund early-stage start-ups and help them establish a presence in Scotland. Public sector support includes: the Scottish Investment Bank (SIB), Scottish Seed Fund, Scottish EDGE Fund, Scottish Co-Investment Fund and Scottish Venture Fund. These organisations, and a number of other private investors (explored in detail in section 8.6), have helped a number of companies over the last few years, and this community is keen to understand where further innovation and start-up will occur. Although this is a strength within the Scottish eco-system and should be recognised as such, it is evidently not used as extensively as one might think. For example, 75% of respondents reported no use at all of grants and other financial incentives (See Figure 26).

Encouragingly, 75% of the firms also surveyed had utilised some input and support from development finance outside the organisation, which included the SIB, Scottish Co-Investment Fund, and the Scottish Venture fund. Although some financial support is being accessed by Scotland's start-up communities, there is opportunity for existing and emerging firms to draw from this more extensively to develop their business. Furthermore, although the majority of our consultees agreed there exist a multitude of good funding options, it was remarked that there are often a number of lengthy processes to go through before this funding can be accessed. This

is evidently frustration, and can limit the start-up's ability to move quickly in developing a product or service.

“...*a big part of our funding has been angel investment. Scottish Enterprise and co-investment grants make early funding stages much more practical for young companies...internationally, the Scottish government has been fantastic in helping us develop new external markets...*” – **James Varga, CEO, miiCard^{xxxix}**



8.2.2.5 Active and innovative support network

As well as investor and government backing, there is also a broader network across Scotland that can bring considerable strength to the start-up community. Initiatives such as the DataLab, StartEdin (Figure 27),

CodeBase and Espark, coupled with the broader support of skill development initiatives such as CodeClan, offer fantastic opportunity for FinTech to thrive. Our research supports this point with many consultees citing their awareness of these groups and the real power they can bring to making the community more successful. As this report will cover later however, it seems that finding the right way to connect each of the communities is the key that is required in order to unlock the potential for Scottish FinTech.

Figure 27: StartEDIN

	<p>Company Description</p> <p>Co-founded by the City of Edinburgh Council and James Varga, one of Scotland's most active entrepreneurs, StartEDIN is a membership-led organisation based in Edinburgh City Centre, which is focussed on promoting the city's dynamic tech ecosystem (StartEdin.com) on the international stage.</p> <p>Touting Edinburgh's successful start-up ecosystem, entrepreneurial culture, well-established successful finance sector, and quality of living amongst other attributes, the organisation's aims are to bring more cohesion to the local community whilst simultaneously boosting its allure for national and international resources, most notably talent and inward investment.</p>
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... When we had our vision of creating an entrepreneurial renaissance in Scotland it was always our aim to be able to provide support to ambitious start-ups in every area of the country... We help them build smart, build fast and build cheap..."

– Jim Duffy, Co-founder, Espark incubator^{xxxii}

8.2.2.6 Scotland's low cost base and quality of living

Importantly, a huge strength also lies in the comparatively low cost base associated with starting up a business in Scotland. In addition to this, the standard of living and related living cost is attractive to many companies looking for a cost-effective centre with access to talent, investor and customer opportunities. For many working in this sector the work:life balance is important. Scotland is a great country to use as a case-study for this type of balance, and it is often cited as a major reason for people coming to live here. Indeed this view was captured in our consultations from 'London returners' who were eager to bring re-balance to their working lives. The key element here to promoting this strength is in proactively and boldly 'shouting it from the rooftops' and in continuing to specifically advertise this point. Our research suggests that there is currently a reluctance to do this, as we discuss later in this report.

8.2.2.7 A potentially strong talent pipeline

Although not without its challenges, there is no doubt that Scotland has, potentially, a very strong talent pipeline from which it can draw to support the development of the next group of FinTech entrepreneurs. The range of strength with Scotland's academic offerings and variety of support initiatives (as detailed in Section 8.3) all set a backdrop to suggest a strong foundation for developing the next generation of FinTech specialists. The key to realising this strength is the ability to attract, retain and develop that pipeline. This has yet to be realised however, as we discuss further in later sections of this report.

8.2.3 Weaknesses and threats

Although it is apparent that there are a number of strengths and opportunities for start-ups and SMEs in Scotland, the weaknesses and threats should be given careful review and consideration. Importantly, there are some very specific points highlighted that, although in many

cases are not difficult to address, can have a material impact on the success of a start-up or SME.

8.2.3.1 Accessing the decision makers and understanding the business

Through our consultations we have identified 3 key areas that present an ongoing threat to the success of the FinTech start-ups as they interact with the established FS firms:

- a) **Getting in the door** – simply getting access to some of the organisations that start-ups want to attract can be a threat to their success. There is a further challenge in accessing some of the global players who have offices in Scotland, as often many of the decision makers and influencers are based out of London or further afield. Steps to bring communities closer together and developing an understanding of the right doors to push and right people to engage within the established firms is considered a key requirement in developing a more effective eco-system and increasing the success and life-span of the start-ups.
- b) **Defining the ‘use case’** – in a number of our interviews our respondents commented that whilst they understand the business challenge at a broad level, they lack the detailed expertise of the business users to fully define the use-case or value proposition to fully highlight their offerings.
- c) **Navigating the business.** Furthermore, the ability to navigate elements such as procurement process, the legal department, or manage information security requirements when engaging with large organisations was considered a threat to success.

In addition to this there is some concern around the larger organisations innovating internally and taking potential business (and talent) away from

the start-ups. Although this is considered a threat, there is a consensus view that suggests the larger organisations will struggle to move fast enough to innovate, or with time, work out ways in which collaboration with start-ups might be a smarter way to innovate quickly (as highlighted in earlier sections).

8.2.3.2 Attracting, recruiting and retaining talent

Similarly to the established firms, the FinTech start-ups/SMEs surveyed also reflected that the ‘talent drain’ in Scotland was a particular threat to the ongoing success of their business. It was mentioned that talent is often quick to go directly to an organisations like Skyscanner or FanDuel rather than directly into FinTech related roles. The ability to attract, recruit and retain talent continues to be a concern over the medium to long-term, and whilst initiatives such as DataLab and CodeClan are viewed very positively, some considered their impact will not be a felt immediately.

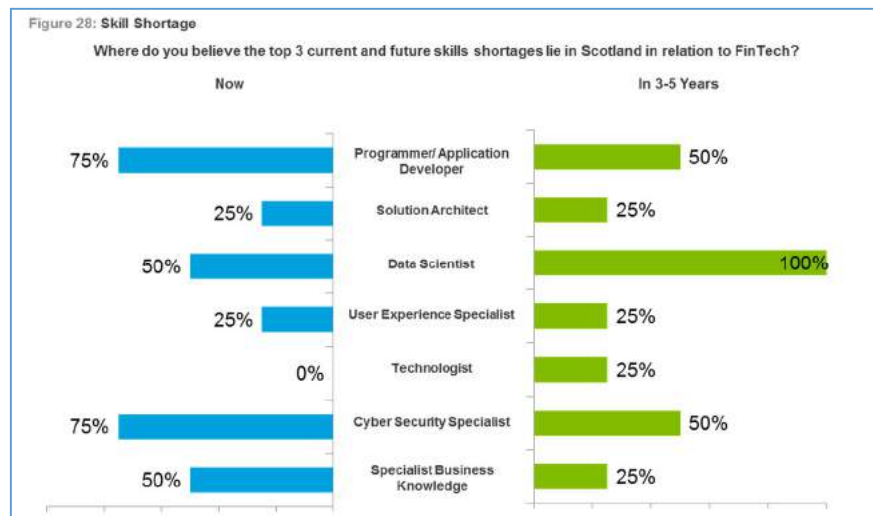
Also noted was the continued threat to talent through an inability to really attract and nurture skills at an early age – many questions still emerge about Scotland’s ability to effectively teach coding at a grass-roots level, or educate both our early-year students (primary / secondary) and their influencers (parents / teachers) on the opportunity that might exist in Scotland for FS and technology skills going forward. Teaching children to code is considered by many as critical to the development of digital skills in the UK and is being supported through the launch of the microbit as part of the BBC Make it Digital Campaign^{xxxiii}.

A potential lack of talent in future is not a new threat and it is one repeated across many of the eco-system components. The response to how Scotland might address this point is considered in our recommendations.

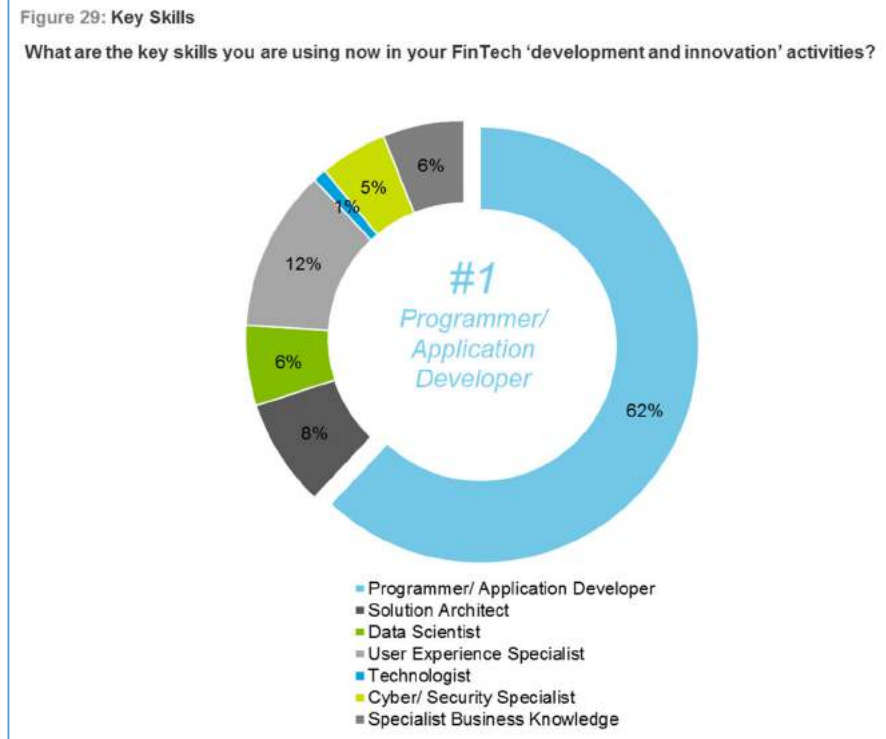
“... At Nucleus, we work hard to evolve the Fintech sector in Scotland and are also working hard at recruiting the right people for some genuinely exciting roles where recruits can help create something radically new. The biggest challenge for many Chief Technology Officer’s (CTOs) is trying to secure the right people for all the great new tech roles out there. The CodeClan initiative, therefore, is a brilliant new way for recruiters to secure genuine coding talent from motivated individuals ripe for a career in technology development...” – **Andrew Smith, CTO, Nucleus**^{xxxiv}

8.2.3.3 Specifically where does the talent challenge arise?

More specifically the start-ups and SMEs feel the talent shortages will lie across 3 areas in the future – data science, cyber security, and developer support (see Figure 28).



Interestingly, these are the same top 3 areas cited by the established firms. What is worrying here is the fact that developers currently account for over 60% of the resource utilised by start-ups in their FinTech development and innovation activity, further emphasising the impact this particular skills shortage can have on driving the industry forward (see Figure 29). What is also interesting across these facts is that although the community agree in the strength and value of the initiatives currently being progressed in Scotland; it is still felt that the country is heading towards a skill shortage across these areas. There is little doubt that ongoing focus and the continued development of initiatives to support these skillsets should be a priority.



8.2.3.4 The allure of London or further afield

Although not specifically referenced heavily in our primary or secondary research it would be foolish not to reflect the pressure FinTech start-ups are likely to feel to move to larger centres across the world. To date, we have not experienced active FinTech departure from Scotland; however the threat could emerge in months or years to come if steps are not taken to preserve and evolve the local eco-system. The impact of a potential 'Brexit' would also likely threaten the attractiveness of FinTechs to stay in Scotland, or indeed the UK. In fact, in a recent study completed by Reuters 7 out of 10 London FinTech companies said they would move their headquarters should an 'out' vote prevail, all 10 confirmed the forthcoming referendum as a 'serious concern'^{xxxv}. There is little doubt amongst protagonists that Britain leaving the EU could have significant damage on the future of the FinTech industry.

"I don't think there's a contingency plan, which is part of my personal concern...I think there would be a bit of a reset of people, offices, HQs and activities if Britain were to leave Europe" – Eileen Burbidge, British Treasury's envoy for FinTech and chairwoman of government agency Tech City UK

8.2.3.5 Struggling to make connections

Our consultees also commented on their awareness of a range of groups, initiatives, and local support functions such as tech or data meet ups, FinTech breakfast briefings, or meet-ups run by CodeBase. In many cases our consultees reported that they were unaware of how these could be accessed or how they connected to other elements of the eco-system. Whilst it is recognised that there is a huge amount of value contained

within these groups, there is little clarity in the role the start-ups play to support them, or how they might draw expertise and talent from them. To be clear, the presence of all of these support groups is considered a strength, but it becomes a threat and weakness to business when start-ups spend a lot of time trying to navigate them, or find they are not adding a huge amount of value to them.

8.2.3.6 Lack of funding at upper end of the scale

The FinTech start-ups/SMEs surveyed also reflected that although there are some good funding options available to help with early stage development (as mentioned in Section 8.2.2.4), there is currently not enough private or Public Sector funding available at the upper end of the scale to provide serious support to start-ups. This challenge typically exists around series B funding and beyond (circa £2-4m+). It was suggested that this may potentially be due to a lack of understanding around exactly what is required to robustly support a FinTech start-up beyond the seed and incubation stages.

8.2.4 Summary of key gaps

The following table summarises the key gaps (strengths to build on, weaknesses/threats to address and opportunities to explore) identified in the high level SWOT analysis covered in this section. Our proposed response to these gaps are subsequently covered in our summary assessment (section 9, p.67) and recommendations (section 10, p.71).

Ref	Gap Description
FT1	Start-ups face real challenge accessing established firms and corporate opportunities, coupled with difficulty in navigating internal corporate barriers such as procurement.

FT2	Lack of business support on hand to help define and develop use-cases.
FT3	Gap in the supply and industry readiness of specific skillsets to support FinTech activity.
FT4	Resource gap particularly prevalent across developer community, data scientists, and cyber security specialists.
FT5	Inability to attract talent from schools, universities or technology competitors due to decline in FS industry attractiveness. This gap is even more pronounced across the female population.
FT6	Preservation, evolution and promotion of local eco-system required in order to attract new businesses and relieve pressure on existing start-ups to move to higher profile FinTech centres.
FT7	Lack of awareness around key players within eco-system and how to access the number of support services available locally.
FT8	Challenges surrounding ability to access early-stage funding quickly, including a lack of communication covering available support.
FT9	Gap in supply of reasonably available office space with minimum lease-terms currently acting as blocker.
FT10	Insufficient mentoring and support from wider eco-system components.
FT11	Cyber security, big data and analytics, blockchain, robotics and cognitive computing are all areas where demand is growing, but where we see little focus and support on dedicated supply capability in Scotland.
FT12	Evidence to suggest insufficient Public Sector funding and support models for start-ups/SMEs beyond the seed and incubation stages.

8.3 Academia & Talent

8.3.1 Introduction

Across Scotland there are a significant number of FS and Technology related courses that, on an annual basis, supply the market with a diverse and rich set of skills to draw from in developing FinTech capability - one only has to look at the successful technology ventures that have emanated from the universities of Strathclyde, Edinburgh, Dundee, Aberdeen and Glasgow. Our research has considered the range of courses that exist across Scotland, and developed a sense of the role the Scottish universities play in supporting the development of talent.

Our research also focussed on the role of the 'talent networks' that exist across the eco-system. Organisations like Carlyle Associates, MBN Recruitment, Harvey Nash, and Head Resourcing are prominent within this market and help not only to source candidates, but also in the role they play in developing the overall talent network. Equally, the work done by Skills Development Scotland, Glasgow Economic Leadership and initiatives such as CodeClan and the DataLab are considered in this section.

8.3.2 Strengths and opportunities

Scotland has strength in the level and quality of courses offered to undergraduates coming in to further education; this became clear as we researched the number and types of courses that exist across each of the universities (see Figure 30 on the following page). Not only is there strength in depth in the courses generating highly technical skilled graduates, there are also a number of initiatives across the universities supporting the transition from education to business.

8.3.2.1 High profile Universities with a range of courses

Firstly, one should consider the breadth and depth of courses available. Our research has highlighted an aggregate view of the courses on offer that may support the development of FinTech talent in Scottish universities (see **Appendix C**). What becomes immediately clear is the extent to which Scotland has a set of courses that naturally set a healthy foundation for potential FinTech talent of the future. In 2013/14 computer science graduates accounted for 32% of all financial technology related graduates (defined as students studying any academic discipline which lends itself to working within technology and/or financial services), coming out of Scottish Universities as classified by Scottish Development International, drawing on figures from the Higher Education Statistics Agency^{xxxvi} (Figure 31). This number totalled nearly 3,300 last year^{xxxvii}. Furthermore, the profile and eminence of Scotland's universities in technology disciplines (amongst others) is significant across the world – the ability to both attract the talent of the future to study in Scotland and do so in leading universities, is a huge strength to the country and potential future of FinTech.

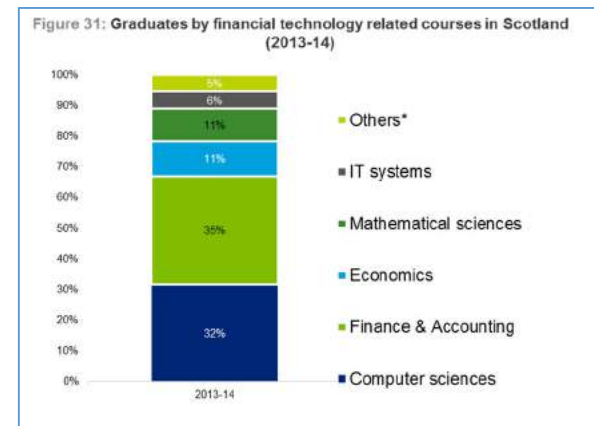
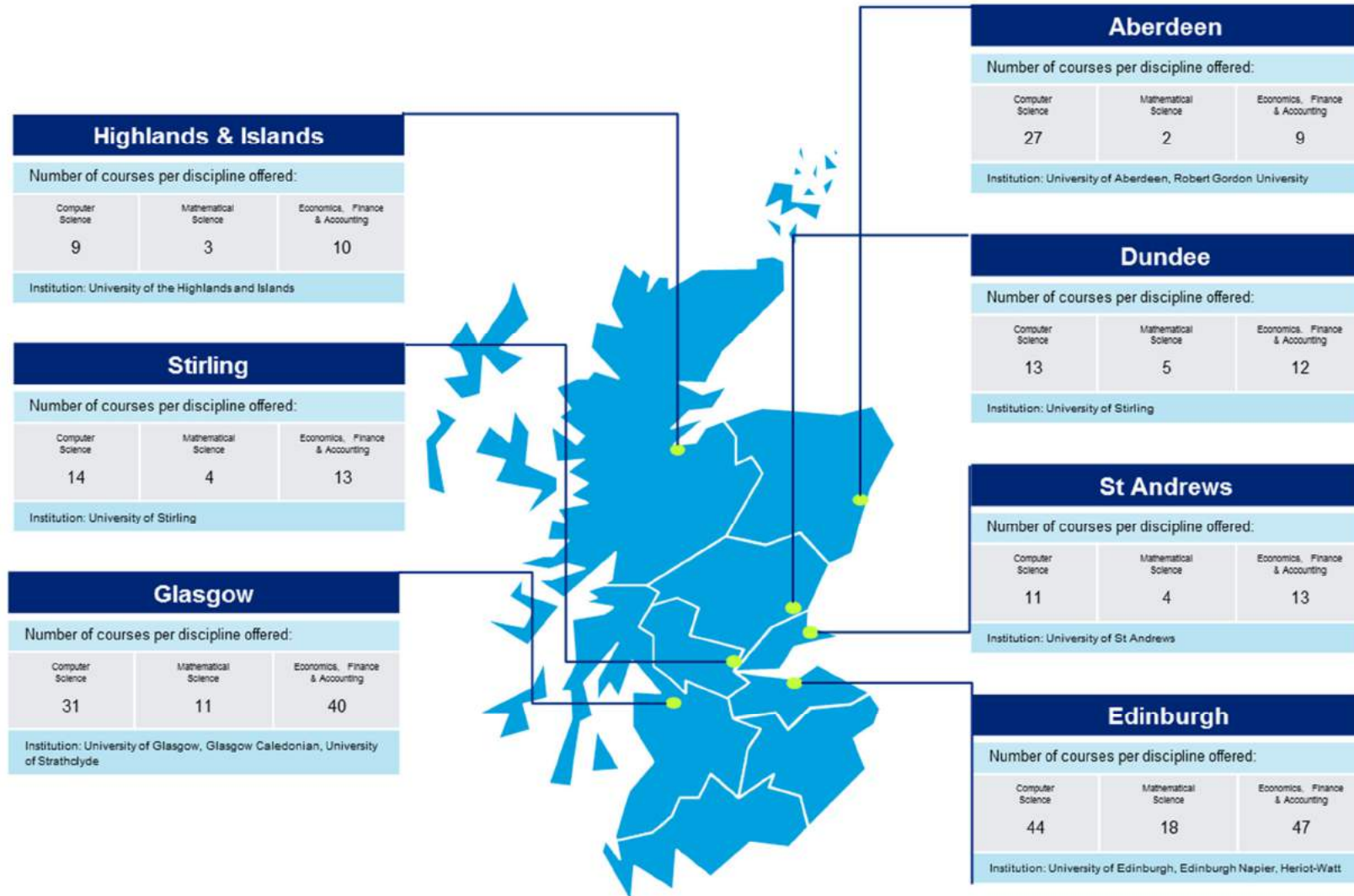


Figure 30: Scottish University Course Distribution



8.3.2.2 Strong partnerships and alliances emerging

A further strength that becomes apparent across academia is the extent to which partnerships and alliances are forming with corporates to help bridge the gap between technical and academic teaching, with practical business understanding. Given our earlier finding from the industry around the challenge in producing ‘business-ready’ graduates, it seems there is an opportunity to do more in this space. Some examples of closer cohesion between academia and corporates includes the relationship HSBC has formed with SAS and Stirling University (Figure 32), Glasgow Caledonian University partnering with CGI and IBM (Figure 33) and the inroads Dell are making to help support the development of ICT students across a number of Universities. It is important to point out however that these alliances focus more broadly on ICT (Information, Communication & Technology). Going forward there is opportunity to focus more specifically on the FinTech support and the development of specific capabilities to support the market opportunity.

“...We’re working very closely with the universities in Edinburgh around the course content. So when we get graduates coming into the marketplace, they actually have all of the skills that match the needs of the industry, which I think is vital. Early on we’re identifying what that skills gap might be, and helping to build that and making sure that these graduates are moving into employment after graduation. ...” – Ishbell MacPhail, General Manager, Dell Scotland^{xxxviii}

Figure 33: Academia – Industry Collaboration



	<p>Initiative Description</p> <p>Glasgow Caledonian University (GCU) is looking to address a technology skills shortage by offering work-based degree programs that allows employees to spend one day per week at University and work for their employers during the remaining days.</p> <p>It has partnered with IBM and CGI for this initiative.</p>
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Figure 32: Academia – Industry Collaboration

	<p>Course Description</p> <p>The MSc. in Big Data at Stirling University is a taught advanced Masters degree, covering the technology of Big Data and the science of data analytics. This particular course is a prime example of academic courses that have been developed in partnership with global and local companies who employ data scientists, in this case, SAS.</p> <p>Furthermore, HSBC, out of their development centre in Stirling, are providing students with interesting and industry relevant Big Data projects as part of their studies.</p> <p>The course also features a long summer project, which will generally be in partnership with a local firm or technology provider, thus providing students with a showcase of their skills to take to employers or launch online.</p>
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8.3.2.3 Universities supporting innovation

Within the universities themselves, our research also highlights the support being provided to nurture and develop ideas or small start-ups. The structure in place through the Informatics Ventures (Figure 34), and Edinburgh Research and Innovation teams (Figure 35), is providing great opportunity for students and academics to develop their ideas and incubate them to become a ‘Minimal Viable Product’ (MVP) and beyond.

“...Edinburgh is now emerging at the largest technology hub outside London, and at the heart of that phenomenon is the university and its enterprise scheme...” – Grant Wheeler, Edinburgh Research and Innovation^{xxxix}

Strathclyde University and Glasgow Caledonian also have incubators that support early technology and solution development from classroom to prototype, albeit not specifically focussed on FinTech. The supporting

network to help innovation in universities is a particular area in which Scotland truly ‘punches above its weight’, with the country accounting for 20 per cent of all active firms launched out of the UK’s universities, ahead of both London (14%) and the South-East (12%), according to the 2015 Spinouts UK report^{xi}. It is important to point out that these initiatives would support any FinTech activity, however to date there have been no initiatives focussed solely in this space.

Figure 34: Informatics Ventures

	<p>Company Description</p> <p>Informatics Ventures is a knowledge exchange program that runs across the Scottish Informatics and Computer Science Alliance (SICSA) and helps foster innovation and entrepreneurship within Scottish start-up and spin-out companies and develops strong relationships between Industry and Academia.</p> <p>Through their technology investor showcase (EIE) and practitioner-led entrepreneurship education and community networking, IV promise to prepare and equip Scotland’s technology entrepreneurs to scale up internationally, whilst simultaneously connecting them with investors from across the globe.</p>
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Figure 35: Edinburgh Research and Innovation


	<p>Company Description</p> <p>With over 40 years’ experience, Edinburgh Research and Innovation (ERI) is one of the leading University technology transfer offices in the UK for promoting the world-class research and commercialisation expertise and IP of the University to potential funders, collaborators, licensees or investors (ERI website).</p> <p>ERI’s fundamental aim is to facilitate the development of fruitful partnerships between academia, business, and industry through a range of technology transfer services including: Technology licensing, Industrial studentships, sponsored research collaborations, commercial use of research facilities, access to academic expertise, and assisting the formation of new University spin-out or start-up companies.</p>
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There are also examples across the region of technology incubators that exist within the likes Robert Gordon University and Dundee University. These are critical to enabling the lifeblood of technology companies and helping take them from concept stage into early production or proof-of-concept. Whilst these initiatives and support frameworks are a huge strength to Scotland, one must consider whether there is further opportunity to create specific FinTech support. What is apparent across these centres and support networks is that whilst some early FinTech capabilities are starting to emerge in the analytics space through the work done by the DataLab, this has not yet led to an increase in start-ups focussing in this area.

8.3.2.4 Supporting initiatives to grow talent

Beyond the educational institutions, it is also apparent that the work being done by government and supporting bodies to help foster skillsets and capability, is a great string to Scotland’s FinTech bow. The work currently being undertaken by Glasgow Economic Leadership^{xii} (Figure 36) and Skill Development Scotland (Figure 37) to forge closer links with industry, universities, colleges and schools to develop a deeper range and set of

Figure 36: Glasgow Economic Leadership

	<p>Initiative Description</p> <p>The Financial and Business Services work stream within Glasgow Economic Leadership, brings together some of the most influential figures from within industry to work on recommendations to support the growth and future success of the sector.</p> <p>Currently the team are focussing efforts around 2 main areas, namely:</p> <ul style="list-style-type: none"> – Ongoing development of the IFSD Glasgow: aiming to build further success and address concerns over supply of Grade A office space. – People and Skills: looking at opportunities to help grow Glasgow’s skilled labour supply including, developing a clear demand statement to inform a skills development strategy and the development of an ‘internship programme’.
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programmes designed at progressing ICT skills, is a significant and continued step to progressing FinTech capability going forward^{xiii}. There is opportunity for these types of programmes (such as the SDS Digital Skills Investment initiative) to evolve to consider the overlay of specific FinTech subject and content, to help further in developing Scotland's next

Figure 37: Skills Development Scotland

	<p>Initiative Description</p> <p>A graduate apprenticeship in digital skills offering a degree-level qualification is to be made available for the first time. Skills Development Scotland (SDS) is working in partnership with global IT company CGI Group Inc. and a number of Scottish universities on the project to tackle the shortage of skills in Scotland's growing digital sector, it will see the firm funding at least 20 graduate-level apprenticeship starts over the next two years.</p>
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generation of FinTech leaders.


Our research also highlighted specific initiatives being pioneered by industry to consider how support might be brought to bridging the gap between academia, talent and the industry, as highlighted below. This is a huge strength and step in the right direction for an eco-system that recognises the current and widening skills gap, and is discussed in more detail in following sections.

8.3.2.5 Addressing the talent gap - Scottish DataLab, CodeClan and Cyber Academy

In addition to dedicated courses, alliances, and support programmes through academia, a real strength for Scotland is in the specific initiatives such as DataLab (Figure 38), CodeClan (Figure 39a) and the Cyber Academy (Figure 39b). All of these programmes, whilst not FinTech focussed per se, add a huge amount to advancing the capabilities across Scotland, and potential to support the development of FinTech solutions. Importantly, these communities and programmes set out to not only


educate and develop skills, but also seek to really develop the networks with Scotland and foster a strong sense of community. Throughout our consultations there was strong support for the work that these groups do, but equally a desire to understand further how they might work together

Figure 38: The Data Lab

	<p>Company Description</p> <p>The Data Lab is one of the eight innovation centres funded by the Scottish Funding Council through the Innovation Centres programme. With hubs across Edinburgh, Glasgow and Aberdeen the DataLab enables industry, public sector and world-class university researchers to innovate and develop new data science capabilities in a collaborative environment.</p> <p>Its core mission is to generate significant economic, social and scientific value from data and is projected to return a minimum of 248 new jobs and an additional £104.5 million of value to the Scottish Economy. To date the DataLab has created a significant impact in helping develop Scotland's capability in Data Science.</p>
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more closely in the future, and potentially develop more specialised 'use-cases' that the students attending these groups could focus on.

Figure 39a: CodeClan

	<p>Company Description</p> <p>CodeClan, with the support of The Scottish Government, Scotland's digital technologies trade body, ScotlandIS, and Skills Development Scotland CodeClan supports the development of programming skills through a highly focussed 16-week intensive programme aimed at helping develop the digital skill base in Scotland.</p> <p>Approved by the Scottish Qualification Programme, and with an extensive list of industry support networks keen to explore how they on-board the CodeClan cohorts once they have graduated, CodeClan represents a leading light in the support available to help enable Scotland's digital potential.</p>
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Overall there is clearly a significant strength in Scotland around academia and the support initiatives in place to help educate the next generation of technology and data science talent in Scotland. Marketing Scotland as a

FinTech centre to further build the profile and eminence Scotland's universities and colleges would undoubtedly be a further step forward in helping develop talent of the future.

Figure 39b: The Cyber Academy

	<p>Initiative Description</p> <p>Led by Edinburgh Napier University, the Cyber Academy brings together industry professionals, law enforcement and academics with a view to develop new skills and training frameworks to combat the growing criminal use of hacking software to steal money, data and intellectual property.</p> <p>The Academy integrates with the EU-funded Dynamic Forensics Evaluation and Training (DFET) project, which is a two-year collaborative, trans-national project to develop cloud-based cybercrime training environments to support authorities, businesses and citizens in the fight against cyber crime.</p>
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8.3.2.6 Talent – the evolving role of the recruitment business

As well as academia's role in developing talent it has also become apparent through our research that the forward-thinking recruitment industry is evolving and innovating to support the broader development of talent in progressive areas such as data science and technology. Organisations such as MBN Recruitment (Figure 40), Head Resourcing and Harvey Nash are now so much more than just recruitment firms.

More recently these firms have spent time focussing on connecting the networks, hosting meet-ups, discussing challenges around skill shortages and sharing notes on how the community can work more collaboratively to address the need in certain areas. This has to be a strength for the industry and going forward there is likely much broader opportunity as these firms continue to evolve. Our recommendations talk of the need to build a consolidated view of the networks, its players, and opportunities - leveraging the work these firms do to help develop and connect the broader FinTech network would help achieve this.

“...There is a clear demand from employers in Scotland’s digital sector for new entrants with higher-level skills, and SDS is working with industry and education to help satisfy this demand. This bold new initiative offers real potential to boost the skills pipeline, and underlines the fundamental importance of work-based learning in aligning education with the needs of industry...” – John F McClelland CBE, Chair of SDS^{xliii}

8.3.3 Weaknesses and threats

Figure 40: mbn Solutions

	<p>Company Description</p> <p>Based in Glasgow, MBN solutions pride themselves on values of deep, real subject matter knowledge in the Data Science, Big Data, Analytics and Technology space, taking a passionate approach to developing their own consultants and a strategy placing clients at the heart of their business. Not happy with being labelled a recruitment business MBN market themselves as a 'People Solutions' business.</p> <p>Importantly for the purposes of this study, MBN with the help of the Data Lab and WeAreTheFuture, are actively organising collider events across the community (such as Data Talent Scotland), which will bring together postgraduate data science students, data enthusiasts, universities and businesses from across Scotland, with the aim of connecting new data talent and education with industry, providing businesses with a fantastic opportunity to access the best of Scotland's data science talent and education.</p>
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Whilst there is little doubt that a broad range of courses and initiatives exist to support the development of talent, a number of key challenges have emerged from our research that outline the need to take action in specific areas.

8.3.3.1 A dedicated focus on FinTech?

It is apparent that there is a strong body of support to developing data science and digital talent across the region; however one must also question whether a threat to FinTech capability in the future is the fact that there are no dedicated programmes or support agendas that specifically focus in this area. We have highlighted within this research that understanding the specifics of the use-case, the challenges and how the technologies might be used to address them is critical. Whilst timing may be a factor, a number of our consultees focussed on the question that asks why are there no dedicated courses focussing on FinTech as a discipline and skill-set in its own right? Addressing this would help both budding innovators understand how new technology could be developed and applied in established firms, and also provide a solid base for entrepreneurs starting up in future. This was a point supported in conversations we had with Edinburgh Business School.

8.3.3.2 The 'business readiness' of students coming from academia into roles in either the established firms, or start-ups

Whilst it is understood and recognised that the universities, colleges, and schools are there to teach rather than train people to become industry specialists. As a result, there is still a gap between candidates coming out of university, and their ability to land successfully into the world of work. This disconnect is not new, but going forward does threaten the ability to drive talent straight into FinTech roles, and help to keep them there. Our consultees felt that whilst some of the more recent initiatives are helping fill the gap, e.g. Skills Development Scotland (SDS) initiatives, DataLab and CodeClan, some work is still required to help educate students in the specific challenges or processes within Financial Services that FinTech products or solutions could address.

'Enterprise and education need to work in partnership to address this issue, from the development of work-based learning to ensuring all of our young people have the chance to learn computing science in our classrooms. Our investment in the future of the country's growing IT sector demonstrates this, with our commitment to graduate apprenticeships reflecting their potential in offering an innovative new route into the industry...' – **CGI's Public Sector Scotland Director, Maggie Morrison^{xliv}**

Although the issue of timing once more comes into play, the lack of any form of dedicated content to help develop FinTech skillsets is a threat to developing future capability. Content here would help both budding innovators understand how new technology could be developed and applied in established firms, and also provide a solid base for School.

8.3.3.3 Time in its own right is a challenge

Educational institutions are there to educate, businesses predominantly exist to make money and be commercial, whilst each have a role to play supporting talent, in some cases this can become an 'edge of the desk' activity. Looking to the recruitment industry in future might be the right place to help bridge some of the gaps, and further encouragement from the corporates will likely see a continued drive to nurture talent, however, one should not forget the challenge associated with committing significant time to such efforts.

8.3.3.4 Refresh

A further challenge that will impact the skillsets of the individuals coming through academia is the ability to refresh content and provide latest insight

on FinTech trends and opportunities. Within FS (notwithstanding regulation) this is perhaps the fastest-moving area – the ability to update, adjust and adapt the content used to teach and train the next generation of FinTech leaders is likely to be a significant challenge to Scotland's education and support network.

“... It's promising to see the graduate demand is still there, however this area continues to be one of contention as we have recently voiced concern over the lack of Scottish talent coming through at this level. IT education has been said to be as much as 5-10 years out of date, and is not as widely supported as it should be which is continuing to let down our students, and subsequently our companies' bottom line performance...” – Gordon Brown, CEO of 9-20 Recruitment^{xiv}

8.3.4 Summary of key gaps

The following table summarises the key gaps (strengths to build on, weaknesses/threats to address and opportunities to explore) identified in the high level SWOT analysis covered in this section. Our proposed response to these gaps are subsequently covered in our summary assessment (section 9, p.67) and recommendations (section 10, p.71).

Ref	Gap Description
AT1	No dedicated programmes or support agendas that specifically focus on FinTech.
AT2	Gap in academic courses focussing on FinTech as a discipline and skill-set in its own right.

AT3	Despite initiatives from CodeClan, SDS and DataLab being helpful, work still required to help educate students on specific challenges/processes within FS that FinTech products could address.
AT4	Continued gap in supply and industry readiness of specific skillsets to support FinTech activity.
AT5	Opportunity to do more in promotion of closer cohesion between academia and corporates to bridge gap between technical and academic teaching, with focus on practical business understanding.
AT6	More should be done to leverage the work the evolving recruitment firms have undertaken in order to help develop and connect the broader FinTech network and eco-system.

8.4 Software & Service Providers

8.4.1 Introduction

Our research included documenting the views and perspectives of the software and service providers across Scotland, including Oracle, Avaloq and FIS (Figure 41) as primary research candidates and a range of secondary research input. There is no doubt each of these participants see and share the view of the broader eco-system group that Scotland has a great opportunity based on the talent and diversity of tech and FS skillsets across the region.

*"...The universities here have a very good name and the city has a highly skilled labour market. It's an important financial market in its own right and is also close to London." As well as RBS's private banking arms, the firm's list of customers serving well-heeled clients includes Barclays Wealth, HSBC and Nomura..." – **Chris Zwicker, Managing Director, Avaloq**^{xlvi}*

Figure 41: FIS



8.4.2 Strengths and opportunities

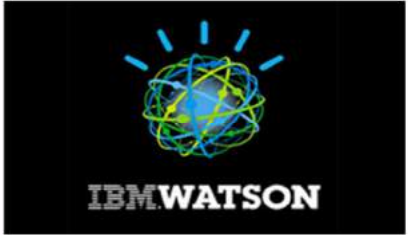
8.4.2.1 Access to real breadth and depth

The capability that exists across the software and service providers can bring a real strength to the development of new solutions. Although not all resident in Scotland the ability to draw from a network of specialists from across their respective organisations brings a fantastic portal of support to the established firms, or start-ups, when seeking or developing FinTech solutions. In addition to this, the ability of software and service providers to support the development of FinTech capability with a view from across the globe is a real asset and strength within the local market. There is a real opportunity for FinTech start-ups liaising with these organisations to access not just their expertise and APIs (Application Programme Interface), but also potentially the broader set of clients that they work with. Indeed during our consultations the software and service providers stressed the fact that they would be keen to be closer to the community and offer access to their 'sandboxes' and APIs to help nurture the development of FinTech solutions.

8.4.2.2 Changing needs and dynamics

As the environment evolves and the needs of their client base changes there is an opportunity for the software and service providers to diversify or adapt their services and products to respond to change. More broadly the software and service providers are developing enhanced cyber security, cloud and digital services, and in cases like IBM making significant investment in areas such as cognitive analytics, AI and robotics (Figure 42)^{xlvii}.

Figure 42: IBM Watson

	<p style="text-align: center;">Technology Description</p> <p>IBM Watson is a technology platform that uses natural language processing and machine learning to reveal cognitive-powered insights from large amounts of unstructured data. The technology analyses unstructured data using natural language processing to understand grammar and context, understands complex questions by evaluating all possible meanings and determining what is being asked, and presents answers and solutions based on supporting evidence and the quality of information found.</p> <p>Although AI is by new means classified as a 'new technology', more recent advances in supporting areas such as processing power have allowed the likes of IBM's Watson technology to make real inroads into the realms of cognitive computing in areas such as analytics, and importantly here, specific robo-advice and robotics deployments within FS organisations.</p>
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Our primary research consultations highlighted the development of digital banking platforms and services, automated workflow and advanced analytics as examples of services that the software and service providers are actively developing and in discussion with clients on (both the established firms, and the start-ups/SMEs). This focus is likely to shift somewhat however over the next 3-5 years as the this group look into how advances in cognitive, robotics and biometrics can help spur further co-development with clients. In fact in a recent Digital Predictions Review by Deloitte, it was estimated that 80 of the world's 100 largest enterprise software companies will have integrated cognitive technologies into their products by the end of 2016 – up 25% on 2015^{xlviii}.

Across Scotland Firms like Avaloq and Oracle are developing 'bank-ready' solutions and have been recognised for their FinTech solutions in areas such as wealth management. Going forward the opportunity to continually diversify this product set for the Scottish market is very likely to continue.

“...Increasingly, there is growing demand for private banking services in the UK and private banks are focusing on wealth management rather than core banking, a gap in the market which we seek to address with the help of Oracle. We view delivery of outstanding client service as a priority, which in today's world needs to be supported by the best technological core banking platform available...” – Graeme Hardtop, CEO, Hampden & Co (Oracle FLEXCUBE on Managed Cloud Services will provide Hampden & Co. with a digital banking platform)


8.4.2.3 The ability to be agile and build deeper collaboration

A great opportunity that exists for this group, and specifically amongst the Scottish challenger banks, is the ability to be agile and work as co-development partners. Our research has highlighted that in order to develop successfully there is a need to collaborate and find partners who can bring different skillsets and technologies. This is an opportunity for the software and service providers in the eyes of the established firms and start-ups, who under the right circumstances would welcome the opportunity to co-develop. It is fair to say that the software and service providers themselves are also keen to see a closer relationship develop.

8.4.2.4 Research & Development

A real strength that exists within Scotland also lies in the availability of the Research & Development (R&D) capability and innovation support centres that exists nationally. The likes of Oracle, Avaloq, NCR and SAS all boast local capability and support that actively works both internally and with clients on developing the next generation of solutions (Figure 43).

Figure 43: NCR

	<p>Company Description</p> <p>NCR currently have 105 people working in Edinburgh, of which 85 are developers focussing on FinTech and digital banking activities, as well as mobile ticketing and big data.</p> <p>Because of the software talent available in Scotland, NCR is setting up a centre of engineering excellence in Edinburgh. Their digital insight team, who are also Edinburgh based, develop a range of digital banking solutions currently helping over 800 financial institutions and reaching over 10 million end users.</p>
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“...SAS is proud to be building on its existing operations in Scotland. There is a lot of talk about big data, but not so many examples of companies capitalising on it, but you are starting to see early examples, such as, here in Scotland, how banks are making liquidity more easily accessible for small and medium businesses so they can grow. That has come on the back of big data analytics. And Nationwide has reduced its losses from fraud by 75%. There is also a sleeping giant in services. In Scotland, while 80-85% of GDP is in services, only 15-18% is in exports. Analytics can change those numbers. A retailer that knows a bit more about a client can make an incremental difference in its services revenue...” – Mikael Hagstrom, SAS, Executive Vice-President for EMEA & Asia-Pacific^{xlix}

8.4.3 Weaknesses and threats

8.4.3.1 Traditional commercial models and structures

One point mentioned a couple of times during our consultations was the notion from established firms that within some software and service provider relationships they feel ‘beholden’ to inflexible licence models and commercial structures that may have been established at the start of a

relationship. It has become apparent that these are often no longer conducive to supporting agile and innovative development associated with exploring and trialling new FinTech concepts. This type of traditional restrictive commercial structure is perhaps a weakness and threat to the evolution of more dynamic services. Feedback from consultees suggests that in order to be really collaborative with the software and service providers, a more flexible commercial arrangement needs to exist.

8.4.3.2 The emergence of challengers and in-house development

The development of internal capabilities and access to cloud-based platforms and web-services is opening the door more than ever before to the ability to ‘self-develop’. Whilst this is perhaps a benefit and opportunity to the established firms and start-ups, this is likely to pose a threat to the software and service providers who for many years have directly provided services to clients. In line with any form of market evolution, the onus will be on the software and service providers to consider how they adapt to this threat.

8.4.3.3 Proximity to the client decision-makers

Specifically in Scotland, the challenge associated with getting to the right decision-makers to sanction FinTech work or development is a weakness which means depth and breadth of capability in Scotland has never traditionally been significant. This may change in the months and years to come as Scotland develops a stronger eco-system around FinTech, however as it currently stands, this continues to be a challenge to the software and service providers.

8.4.3.4 The focus on migrating, integrating and stabilising the business

A challenge at the moment, not only for the software and service providers but also the banks they service, is the ability to move away from traditional services they provide towards offering and co-developing more advanced FinTech type solutions. The reality (post-2008) and going forward, is that the focus for most clients they are currently servicing, surrounds migrating onto or off of a particular platform, integrating, or stabilising their processes – of course this is core business but in some ways slows down the ability to work on developing new solutions.

8.4.3.5 Resource and talent

As so often mentioned across our research the ability to attract, source and retain talent is also a challenge for the software and service providers. One key point here however, is that any pressure or resource shortage in Scotland does not impact them as much as others, given they have the ability to address any shortfall through accessing a broader resource pool internally. However, to develop further coverage and support in Scotland, the ability to secure the right resource could well be a challenge, as our research has shown for all of the other groups active within the eco-system. Again, similar to the other groups, programme / application & developer support is where their current resource focus lies. Going forward, and again consistent with the wider eco-system, the software and service providers expect resourcing needs to focus on the developer community, data scientists, and solutions architects. Worryingly, these are the exact 3 areas where the biggest skills gaps are perceived now, and are anticipated to be, moving forward.

8.4.4 Summary of key gaps

The following table summarises the key gaps (strengths to build on, weaknesses/threats to address and opportunities to explore) identified in the high level SWOT analysis covered in this section. Our proposed response to these gaps are subsequently covered in our summary assessment (section 9, p.67) and recommendations (section 10, p.71).

Ref	Gap Description
SSP1	Inability to access the right decision makers to sanction FinTech work/development as Scotland not viewed as innovation hotbed within global organisations.
SSP2	Lack of ability to attract, source, and retain entrepreneurial, FinTech focussed staff.
SSP3	Resource gap particularly prevalent across developer community, data scientists, and solutions architects.
SSP4	Gap in collaboration between software and service providers and FinTech start-ups, despite willingness from both parties, meaning access to expertise, APIs and broader set of clients are not being leveraged to help nurture the development of FinTech solutions locally.

8.5 Incubators & Accelerators

8.5.1 Introduction

An important part of any FinTech centre are the support hubs that help foster and nurture development and bring communities together. Scotland is no different, and to date a number of broad technology incubators and accelerators exist to help evolve the opportunities and start-ups that are present.

A summary of Scotland's most prominent incubators and accelerators is highlighted in Figures 44, 45 and 46.

Figure 44: Scotland's most prominent incubators & accelerators

Name	Description
CodeBase	<ul style="list-style-type: none"> Edinburgh based incubator funded by private equity aiming to drive investment across tech start-ups. Services include office space, IT infrastructure, and access to industry and investment mentors.
Entrepreneurial-Spark	<ul style="list-style-type: none"> Privately backed, non technology specific, incubator and accelerator for early stage ventures providing mentors, ambassadors, supporters and workshops. Programme lasts between 6 and 18 months, taking start-ups and entrepreneurs through a cognitive and action centred development process.
Innovation Centres Scotland (ICS)	<ul style="list-style-type: none"> Provider of incubation services and innovation support for early stage, growing businesses in Scotland through its two tech focused incubation centers (Alba Innovation Centre and Hillington Park Innovation Centre). Focussing on technological innovation, ICS are dedicated to helping the continual success of Scotland's economy through a range of support methods for new enterprises.
Launch.ed	<ul style="list-style-type: none"> Covering all of Edinburgh University's incubators, including ERI and ETTC, Launch.ed offers start-ups flexible office space, a vast support network from independent advisors and university staff, as well as access to the University's facilities and workshops free of charge.
Strathclyde University Incubator	<ul style="list-style-type: none"> Scotland's very first business incubator, offering support services to both early stage ventures as well as those looking to downsize or diversify. Flexible working space and access to academics across multiple disciplines are provided.
UHatch	<ul style="list-style-type: none"> Fast growing incubator run out of Glasgow Caledonian University. Not limited to technological innovation, UHatch offers parties linked to the institution a helping hand in the world of business by surrounding them with likeminded people, and has recently secured a partnership with Entrepreneurial Spark.

Figure 45: CodeBase

Company Description
<p>Based entirely on private equity, CodeBase markets itself as the largest technology incubator in the UK and one of the fastest growing in Europe.</p> <p>Currently housing over 60 technology start-ups, the establishment on Lady Lawson Street (Edinburgh) provides tenants with affordable, open office space and infrastructure, coupled with the promise of access to a business-led peer support network as well as local and international investors.</p>

What is clear however, is that without the development of the right type of incubator or accelerator for FinTech community in Scotland, many of the weaknesses, challenges and constraints will continue to hamper our capability and potential. Successful FinTech hubs across the world have at their heart a clear vision and supportive eco-system that benefit the whole community.

Figure 46: Entrepreneurial - Spark

Company Description
<p>Entrepreneurial Spark is the world's largest business accelerator for early stage and growing ventures. The proprietary 'entrepreneurial enablement' programme lasts between 6 and 18 months taking start-ups and entrepreneurs through a cognitive and action centred development process.</p> <p>Benefits include access to a collaborative office environment suitable for building teams, free IT & wifi, and access to business enablement and support from a pool of over 50 business mentors. The programme also boasts networking opportunities during compulsory events, workshops, and pitch practice.</p> <p>With multiple centres across the UK, e-spark's presence in Scotland spans Ayrshire, Glasgow and perhaps most notably, Edinburgh, where they have teamed up with RBS to create a 'Hatchery' within the bank's Gogarburn campus.</p>

The successful internal ‘fabric’ of a FinTech hub includes clear support from industry to advise and support FinTech ideas and proof-of-concepts, dedicated input from software and service providers to provide APIs and ‘sand-boxes’ for experimentation and close involvement and liaison with academia and talent networks to draw plans on averting talent shortage and training, as well as exciting the new generation of FinTech specialists.

Around a successful FinTech hub there must also be a government support network and investor and advisor community to be on hand to nurture, guide, and support start-ups. Finally, it is critical that commitment is given to marketing and PR – putting a country on the map as a FinTech centre requires dedicated marketing programmes and charismatic ‘flag-bearers’.

“...When we had our vision of creating an entrepreneurial renaissance in Scotland it was always our aim to be able to provide support to ambitious start-ups in every area of the country...We help them build smart, build fast and build cheap...”

– Jim Duffy, Co-founder, Espark incubator¹

8.5.2 Strengths and opportunities

8.5.2.1 Some of the right parts are already in place

When we consider the facilities that currently exist, it is fair to conclude that within Scotland some of the components, protagonists and supporting elements are already in place. The opportunity now is in leveraging each of these components, and adding some more, to create a dedicated FinTech hub to benefit all. Seizing the opportunity will really accelerate Scotland’s position as a FinTech centre - from empowering and supporting

start-ups, to garnering the support of the established firms, to supporting a richer set of academic content, to generating ‘attractiveness’ within the sector and shouting the potential ‘from the rooftops’. The need to create a dedicated FinTech hub in Scotland is an opportunity that a significant number of our consultees from across the eco-system groups agree with. A real opportunity to accelerate this would be to develop the MOU (Memorandum of Understanding) that exists between Innovate Finance, Edinburgh Council and SFE to support the development of a dedicated FinTech hub in Scotland. It should be recognised that as a community where start-up is supported more generally (i.e. not specifically FinTech), Scotland has a significant and not to be underestimated existing ‘network strength’ that could be leveraged to develop the FinTech opportunity more specifically.

8.5.3 Weaknesses and threats

8.5.3.1 The right type of hub specifically for FinTech

Throughout our research our consultees have often commented that whilst they see a level of support given to start-ups, there is nothing that gives the depth or breadth of support that is provided by other dedicated and focussed incubator or accelerator programmes across the globe (such as Level 39 or Alley NYC), and certainly nothing dedicated to FinTech in Scotland. What is important to recognise are the needs of the community within Scotland across all components. The research undertaken suggests that across the existing elements of support there are critical parts of the incubation and acceleration support network and services missing. The potential to address this is considered in our recommendations.

8.5.3.2 Lack of awareness around the facilities that exist

For a number of consultees there was also a general lack of awareness as to what exists within Scotland, to either help the established firms get a sense of what is available to them, or to offer services and support. This is a fundamental gap – one example of this included an Asset Management business pioneering a number of FinTech initiatives, but being unaware of the community that exists less than half a mile away from their office. Importantly, our research outlined that the established firms are interested in not only understanding what exists locally, but also in potentially collaborating to develop solutions or provide valuable ‘use-cases’ that so many of the start-ups require. It is important to point out that Scotland is still early in its evolution within FinTech, however steps can be taken to join the dots and address some of the weaknesses highlighted.

8.5.3.3 Engaging the right components

A successful FinTech hub needs input and commitment from a range of sources and experts from across each component part of the eco-system. Finding and engaging these people is often a challenge that is faced and difficult to execute unless the business model, ethos, and delivery is 100% clear. At the centre of a FinTech hub should be the right leader (person or organisation) to help secure commitment from experts, and be able to navigate and understand the different needs of each community. This has been central to the success of initiatives such Level39 in London.

“... We also need to become better at engaging successful entrepreneurs to help early-stage companies, particularly with regard to their business model and go-to-market strategy....” – Paul Atkinson, Partner, Par Equityⁱⁱ

8.5.3.4 Who leads...who funds...and who benefits?

A perennial challenge in the creation of any successful FinTech hub, whichever path is taken, inevitably circles back to these three questions, which invariably become the threat and challenge to creating something truly meaningful. At the broadest level the lack of a clear and concise strategy for ‘FinTech in Scotland’ is hindering its ability to really surface as a leading FinTech centre. To overcome this challenge a dedicated and focussed process must take place to understand the commitment required, the contribution, and importantly what the quid pro quo is for each party. There is a considerable level of detail to this, and with the right approach there is no reason why a successful model can’t be adopted. Recent reviews of similar programmes in Londonⁱⁱⁱ (Figure 47) and New Yorkⁱⁱⁱⁱ (Figure 48) have shown that significant success and energy can be generated if the right structure and model is adopted.

Figure 47: Level 39



Figure 48: Alley NYC



IA5	No clear and concise strategy for FinTech in Scotland resulting in inability to understand commitment required, contribution, and quid pro quo for each party involved in a successful hub, despite many expressing willingness to be engaged.
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8.5.4 Summary of key gaps

The following table summarises the key gaps (strengths to build on, weaknesses/threats to address and opportunities to explore) identified in the high level SWOT analysis covered in this section. Our proposed response to these gaps are subsequently covered in our summary assessment (section 9, p.67) and recommendations (section 10, p.71).

Ref	Gap Description
IA1	No dedicated FinTech hub in Scotland providing breadth and depth of support that is given to start-ups in other dedicated incubator and accelerator programmes across the globe.
IA2	Critical parts of incubation and acceleration support network and services are missing, including mentoring.
IA3	General lack of communication and awareness as to what services do currently exist in Scotland.
IA4	Lack of input and commitment from range of experts from across each component part of eco-system.

8.6 Private Investors

8.6.1 Introduction

The private investment community is a critical part of the FinTech ecosystem, not only in providing funding support across the various stages of a FinTech start-up lifecycle, but also to guide, shape, introduce and mentor as the product or service evolves. Scotland has long had a heritage of strong investor support across a range of tech start-ups; the following considers this landscape and support across the FinTech community.

8.6.2 Strengths and opportunities

8.6.2.1 The proximity of the investor community

A real strength within Scotland cited by both the investors and the start-ups consulted within our research was the geographical proximity and concentration within Scotland. This is considered a significant strength to investors who want to mentor the organisations they support, and understand the local community they have access to. The opportunity created by the proximity between investors and their interests mean Scotland should be an attractive place to foster and develop new ventures.

Figure 48b provides an overview of the investor landscape, outlining the key players in Scotland, as highlighted by our secondary research. Our research highlighted that Par Equity have been actively investing in Scottish FinTech start-ups (most notably in miiCard & MoneyDashboard), however given the sometimes confidential nature of funding it is difficult to draw the definitive picture of where specific investment has or hasn't been made locally.

“... We strongly believe one of the things about being a business angel is actually being able to get to the company, see the company, to work with the company and to help it...” – **Jock Millican, Chairman, Equity Gap^{liv}**

Figure 48b: Scotland's most prominent investors

Name	Type	Focus	Stage
Apollo Informal Investment	Venture Capital	SEIS Qualified	Early stage
Archangels	Business Angel	Technology and lifesciences	High Growth
Calculus Capital	Venture Capital	Technology	SME
Discovery Investment fund Limited	Private Equity	Diverse	High Growth
EOS Technology Investment Syndicate	Investment Syndicate	Sciences and technology	Early Stage
Equity Gap	Private Equity	Diverse	Early and mid-stage
Gabriel Investments	Investment Syndicate	Diverse	Early Stage
Halo	Business Angel	Diverse	Late Stage
Highland Venture Capital	Venture Capital	Diverse	Early and mid-stage
Kelvin Capital	Private Equity	Diverse	Early Stage
Lancaster Capita	Private Equity	Technology	Early Stage
LDC	Private Equity	Diverse	High Growth
London & Scottish Investment Partners	Business Angel	Diverse	High Growth
Macklin Enterprise Partnerships	Private Equity	Diverse	Early Stage
Maven Capital Partners	Private Equity	Diverse	Late Stage
Par Equity	Private Equity	Diverse	Early and mid-stage
Pentech Ventures	Venture Capital	Technology	High Growth
Scottish Equity Partners	Venture Capital	Technology	High Growth
Synova Capital	Private Equity	Diverse	High Growth
Souter Investments	Private Equity	Diverse	SME
TRI Capital	Private Equity	Diverse	Early Stage

8.6.2.2 If the eco-system is conducive, there is a significant opportunity

Throughout our research the community has been very clear that there is a significant opportunity for successful start-up and FinTech across Scotland. With that clearly comes an opportunity for the investor community to not only support via traditional investment support, but also consider additional services and support they might offer to a sector in the ascendency, such as developing a Fintech investor platform where information and data might be shared across the community. If the eco-system was growing fast enough this is an option one investor we interviewed would be keen to explore.

8.6.2.3 The opportunity to develop crowdfunding models

As the eco-system grows there is opportunity for firms to potentially consider more innovative ways to support crowd-funding of opportunities. Going forward this could be supported by the investment communities or crowd-funding platforms facilitated by others.

“...uptake of crowdfunding in Scotland has been behind the curve...lack of crowdfunding uptake in Scotland may be due to SMEs lacking awareness...” – Ross Brown, Centre for Responsible Banking & Finance, University of St Andrews^{iv}

“...There may be scope for policy makers in Scotland, such as Scottish Enterprise, to consider signposting firms towards this important source of growth finance...” – Suzanne Mawson of the University of Stirling on considering crowdfunding options for startups^{vi}

8.6.3 Weaknesses and threats

8.6.3.1 A lack of support to grow FinTech business to scale

The inability to grow FinTech companies to scale is a threat to the investor community in Scotland. At present, there is a degree of ‘incubation’ support in place through facilities like CodeBase, however without broader support in the eco-system to accelerate FinTech development beyond the initial stages of growth there is a risk that the investor community simply won’t have enough opportunity to invest locally. Supporting the development of this industry in Scotland is crucial to ensuring our investor community has attractive and credible options to invest in going forward.

Similar to the gap in latter stage Public Sector funding outlined in section 8.4, this is also a problem prevalent across the private investor community.

8.6.4 Summary of key gaps

The following table summarises the key gaps (strengths to build on, weaknesses/threats to address and opportunities to explore) identified in the high level SWOT analysis covered in this section. Our proposed response to these gaps are subsequently covered in our summary assessment (section 9, p.67) and recommendations (section 10, p.71).

Ref	Gap Description
IV1	Lack of attractive investment opportunities in growing FinTech businesses due to wider eco-system support failings.
IV2	Gap in visibility of available start-ups operating across community.
IV3	No clear and consistent messaging or PR around Scotland’s FinTech capability or opportunity, resulting in lack of inward investment.
IV4	Lack of support from investment community in helping firms consider more innovative ways to promote crowd-funding of opportunities. Overall eco-system growth should support this.

8.7 Government & Public Sector

8.7.1 Introduction

The Government – UK and Scottish – and the broad range of public sector agencies and organisations have a critical role to play in the future success of Scotland as a global FinTech centre. Whether setting the policy (tax, regulation, immigration, education and many others); encouraging and providing investment support; playing a leading role in talent attraction and development; creating a transport and technology infrastructure that removes barriers to start-up and growth; or being the ‘oil’ in the ecosystem helping the flow of ideas, funding, talent and market access; the vibrancy, flexibility and effectiveness of the business environment they create will make or break the success.

8.7.2 Strengths and opportunities

8.7.2.1 Simple, transparent and industry-led regulatory approach

The UK’s regulatory regime has long been recognised globally for its industry-led approach to developing and implementing effective regulation. In the 2016 EY/HMT report, ‘UK FinTech: On the Cutting Edge’, the UK was ranked as the most supportive across the major FinTech centres for its regulatory regime^{lvii}. Whilst few firms – big or small – would support the view that it has got the balance right, most would recognise the progress made over the past few years and the overall intent behind the focus and what is being done.

More recently, the key financial services regulatory bodies have been showing an increasing interest in the role that technology is playing – and will play in the future – in the sector; and importantly, the role of smaller,

Technology-led firms in the future landscape. The FCA’s Project Innovate, set up in late 2014 to establish an ‘innovation hub’ to foster competition and growth in financial services by supporting both small and large businesses that are developing new products and services that could genuinely benefit customers, has already helped over 175 innovative businesses, particularly around the traditionally opaque and time consuming authorisation process.

Although many of our consultees did identify the complex regulatory system as a challenge, the majority felt that the regulator was becoming easier to deal with around innovation and technology (as well as having a better grasp of what it means for the industry – albeit still ‘playing catch-up’ in some regards) and was not the ‘blocker’ it possibly once was in the sector. Some of the start-up and SME businesses, who don’t have the ‘regulatory heritage’ (or experience) did cite that understanding regulatory processes and how to work with the regulator still remained a challenge for them.

8.7.2.2 Progressive taxation policy aligned to entrepreneurship

Whilst it will always be a challenge for most small or growing businesses, the UK tax system is viewed favourably against equivalents in countries with significant FinTech activity – US, Hong Kong, Australia and Germany. Importantly, when looking at tax initiatives that are aimed at promoting business set-up, financial investment (across all stages of business lifecycle), innovation and talent acquisition/retention, the UK has a number of ‘world class’ schemes (Figure 49).

“... there is no doubt the EIS tax breaks involved in this kind of investment [smaller, high-risk businesses] have also encouraged me to continue to invest, even when I know the risk of making losses is high ...”
– Paul Atkinson, Partner, Par Equity^{lviii}

Figure 49: Taxation Policy

Scheme	Overview
R&D Tax Credits (2002)	• Provides tax relief on a broad range of R&D activities
Enterprise Investment Scheme (EIS) (1994)	• Provides a form of tax relief for those investing in smaller high-risk businesses
Seed Enterprise Investment Scheme (SEIS) (2012)	• Similar to EIS but focused on high-risk start-up projects
Patent Box	• Special tax regime for Intellectual Property revenues
Innovate Finance ISA (2016)	• New ISA that incorporates investment in P2P loans
VCT Scheme (1995)	• Long standing relief for investors in Venture Capital Trusts
Entrepreneurs Relief (2008)	• Capital Gains Tax relief for entrepreneurs when they sell business assets

It is also worth noting that the UK Corporation Tax is ‘globally competitive’ at 18%, albeit not as attractive as Ireland, where the current Corporation Tax rate is only 12.5%.

From April 2017, the Scotland Bill 2015-2016 will give the Scottish Parliament control over rates and bands of income tax for the first time and half of VAT raised in Scotland will be passed directly into the Scottish ‘coffers’. Air Passenger Duty is also being devolved, with the SNP keen to cut it significantly. At this stage, it is not clear whether any of these powers will have an impact on FinTech activity in Scotland but any changes proposed will need to be looked at closely to see whether they are likely to have a negative or positive effect going forward.

8.7.2.3 Competitive financial incentive and investment package

In addition to the tax initiatives noted above, Scotland provides business and entrepreneurs with access to a wide range of financial incentives (e.g. grants) and investment options beyond the private sector covered in the previous section. In general, the consultees have been fairly

complementary about the range of financial support available to the start-up and growth company sector in Scotland. In particular, the work of the Scottish Investment Bank with its range of funds (Seed, Co-investment, Loan and Venture) targeting different levels of investment has attracted favourable support from the FinTech community.

“... A big part of our funding has been angel investment. Scottish Enterprise sand co-investment grants make early funding stages much more practical for young companies...” – James Varga, CEO, miiCard^{lix}

8.7.2.4 Commitment to improving infrastructure

The importance of world class infrastructure – transport, technology and property – in Scotland has long been recognised as central to the country’s ability to attract foreign investment and support indigenous business start-ups and growth.

From a transport perspective, whilst still not world class, the transformation of Edinburgh airport with the related improved global connectivity, the upgrade of the Glasgow to Edinburgh train line, the Edinburgh tram system and the ongoing programmes of improvement along the main trunk roads in the country are all going in the right direction. No one cited transport links as a major ‘drag’ on FinTech growth but continuing the investment programme is critical.

‘Scotland’s Digital Future: Infrastructure Action Plan’, published in 2012, set out the government’s commitment and the steps it will take to achieve a world class, future proofed infrastructure that will deliver digital connectivity (superfast broadband) across the whole of Scotland by 2020^{lx}. An Ofcom report in December 2015 confirmed that the programme is on track – and indeed slightly ahead of plan, with 85% of homes and businesses now having access to superfast broadband. Whilst other key global locations potentially have better connectivity now, the investment

being made will put Scotland in a competitive position over the coming years.

8.7.3 Weaknesses and threats

8.7.3.1 *It's a complicated picture*

In talking to consultees one of the key concerns raised is understanding the respective roles and responsibilities of the many government and public sector agencies and organisations in relation to the multitude of issues and opportunities presented by FinTech. Add to this, how these organisations relate to other parts of the eco-system including trade bodies (e.g. British Bankers Association, UK-wide agencies (e.g. UKTI) and private sector enterprises (e.g. Scottish Financial Enterprise), you end up with a pretty complex picture.

The sense is that for those that have 'grown up' in the middle of this it is pretty clear but for those coming into it for the first time – new to the market, new company, new to business – it can at times seem impenetrable. There is recognition that they are all doing valuable jobs in promoting and supporting the FinTech sector in Scotland but there is definitely an opportunity to make this all clearer and more cohesive.

*“... I'm pretty sure everyone is doing a valuable job but from the outside in, it looks like a bit of a dog's dinner, and that's from someone who's worked in the sector all his days, I daren't imagine how it must feel if you are new to business or new to Scotland ...” – FinTech firm
(Established)*

8.7.3.2 *Taking the lead*

This complex picture can make this difficult when it comes to setting direction and taking action. Again, the consultees felt that there are many fantastic initiatives and activities underway in Scotland – both public and private sector led - aimed at growing the FinTech sector; all individually (and collectively) making a difference. However, a number of consultees have highlighted the fact that: (1) there is no clear, singularly supported FinTech vision for Scotland that the various stakeholders can rally behind, (2) no strategic plan or objectives in place to which current and future activity can be aligned, and (3) it is not clear who is responsible for driving this forward.

In the absence of these key elements, at best the opportunity will not be optimised and resources may be wasted; at worst the opportunity could pass us by as other FinTech centres press ahead. Whilst it is recognised that this is not solely an issue for the public sector, the feeling is that a lead on this should probably come from the government with strong support and involvement from all interested parts of the eco-system.

8.7.3.3 *Keeping international talent*

International students staying on after completing their studies is a political 'hot potato' at the moment. Since the post study work visa scheme was scrapped in 2012, there has been growing pressure from Scotland's business community, educational organisations and the majority of the Scottish political establishment to bring it back in some form so that they can reap the benefits that these students bring by remaining here to work once they graduate – filling the gaps in many of our key professions and skills, (including technology), as well as helping mitigate some of Scotland's demographic challenges.

“... Many talented international students studying in Edinburgh can’t stay without a visa, so it is often difficult to access graduates we would actually like to hire ...” – Chris Zwicker, Managing Director, Avaloq^{xi}

Not only will the skills that have been learnt in Scotland never be applied in our industries but there is a growing feeling that other countries who recognise the value of a ‘learn, build and apply’ eco-system e.g. Canada, Australia and New Zealand, will snap up the best students. Recent figures suggest that more than £250m has been lost to the Scottish economy since 2012 as a result of this decision^{lxii}. There are concerns that the current situation may be tightened even further in the future making this an even bigger issue.

“... Scottish universities need action from government now to improve its post-study work offer. We are losing out in key markets as our competitors take steps to attract more international student talent ...” – Alastair Sim, Director of Universities Scotland^{lxiii}

8.7.3.4 Political uncertainty

The uncertainty created by the 2014 Independence referendum has subsided following a definitive ‘no’ vote. However, the pending European Union referendum has re-opened the debate as to whether a ‘Brexit’ would potentially trigger another Scottish independence referendum.

During the run up to the 2014 vote ‘uncertainty’ (in its many guises) was cited by the pro-union campaign as a potential hindrance to business growth, job creation and inward investment. Both sides of the argument highlighted actions or intentions to support their view, neither of which was conclusive. Regardless of what would actually happen, the majority of

consultees who expressed a view did feel that the continued political uncertainty was unlikely to help and therefore having some clarity around the future would be beneficial.

8.7.4 Summary of key gaps

The following table summarises the key gaps (strengths to build on, weaknesses/threats to address and opportunities to explore) identified in the high level SWOT analysis covered in this section. Our proposed response to these gaps are subsequently covered in our summary assessment (section 9, p.67) and recommendations (section 10, p.71).

Ref	Gap Description
GT1	Lack of clarity around the many respective roles and responsibilities of the various government and public sector agencies/organisations operating across the FinTech space, and how these interact with wider eco-system.
GT2	Gap in promotion and PR of FinTech sector in Scotland.
GT3	Lack of clear, singularly supported FinTech vision for Scotland that various stakeholders can rally behind.
GT4	No strategic plan or objectives in place to which current and future activity can be aligned.
GT5	Gap in clarity surrounding who is responsible for driving this strategic plan.
GT6	Political uncertainty impacting on confidence and investment.
GT7	Threat of continued international talent loss since abolition of post study work visa scheme, further compounding skills gap and potential loss in competitive advantage.

9. Overall assessment

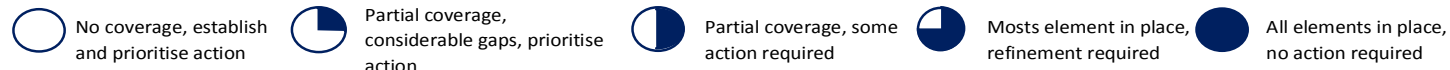
The primary and secondary research we have completed as part of this study draws together a comprehensive view of the strengths, weaknesses, opportunities and threats that exist for each component of the Scottish FinTech eco-system. Joining this with the insights and perspectives we have gathered from a broader set of stakeholders and industry specialists helps draw an overall assessment of the opportunity for Scotland to command its space on the FinTech stage.

To contextualise our overall assessment we have established the following framework (FinTech 'building blocks') based on our study of FinTech centres around the world, and the key factors that make them successful (Figure 50) - against this we have summarised how Scotland compares against each component, along with a reference to the gaps identified in each eco-system subgroup in section 8. (Figure 51). Please note the gaps highlighted in bold have a direct link to the building blocks that form the eco-system. Those in brackets are more subjective, however do still have an influence on the related building block.



Figure 51: FinTech 'Building Blocks' assessment

FinTech building blocks	Attribute	Establishing a FinTech centre - what does good look like?	Summarised assessment	Gap Ref
FinTech culture	Entrepreneurial culture	Strong heritage and culture across all components of the eco-system. Clear culture of support to entrepreneurs.	Supportive and entrepreneurial culture however, this is not leveraged currently to progress FinTech. Some challenges exist with culture and education across established firms.	EF6, EF7
FinTech Strategy & Vision	Clear vision	An agreed strategy and vision established and supported across the community. A supportive plan in place aligned to each FinTech sub-group and executed effectively. Clear leadership and accountability for setting and developing the FinTech strategy.		No clear strategy or vision in place to support development of Scotland as a FinTech hub. A range of views exist but these are not consolidated and presented as a single strategy for Scotland. No clear leadership and accountability in place for setting or developing the Scotland's FinTech vision. Please note: as of May 2016, the SFE FinTech Strategy Group has been established to address this point.
	Strong strategies and plan			
	First class execution			
	Entrepreneurial culture			
Talent	Availability	Clear pipeline of talent through the eco-system, with both the right volume of resource and mix of skillsets. Dedicated programmes to support smooth transition from academia to industry, supported by a range of groups and communities. Strong and encouraging culture.		Strong range of academic courses, and related bodies supporting upskilling in particular areas. Challenges exist with the supply and industry readiness of specific skillsets to support FinTech activities, and cross-skilling of employees within the established firms. No dedicated academic offerings to specifically support FinTech development.
	Pipeline			
	Industry ready candidates			
Finance & Capital	Seed	A range of funding structures and support models, from private investors to government support programmes. Absolute clarity on how these are accessed and efficient process for applying and drawing-down funding support.		A range of early stage funding and support options through investor community and public sector funding programmes, such as the Scottish Investment Bank (SIB). Challenge associated with the ability to access funding quickly, and the ability to access funding beyond seed and incubation stage. A need to continually communicate sources of funding and support to ensure there is clarity for those trying to access it.
	Growth			
	Listed			
	Government support			
Customer Demand & Access to Markets	Consumer	Clear demand from consumers and business communicated and shared amongst the community. Supportive structure helping access markets and refining opportunities for FinTech start-ups		Healthy consumer and business demand, although not clearly communicated and linked to FinTech capability in Scotland. Challenges lie with FinTech start-ups access to corporate opportunities and ability to navigate some internal corporate barriers, e.g. procurement, etc.
	Business/Corporate			
	Access to markets			
Policy & Business Environment	Regulation	Stable and supportive government regime providing a range of support options to FinTech community, including appropriate tax and conducive regulatory structures. Efficient and cost-effective start-up options supported by government through key stages of the lifecycle.		Stable and relatively supportive government regime and taxation policy. Regulatory regime evolving to support emerging FinTech development (PSD2, Open Bank API). Low cost of business in Scotland. Some uncertainty around impact of 'Brexit' referendum.
	Taxation policy			
	Political stability			
	Fiscal burden and environment			
	Cost of 'doing business'			
Legal environment				
Infrastructure	Transport links: road, rail and air	Efficient and reliable transport networks and infrastructure in place. Suitable and cost-effective office space providing appropriate technology infrastructure and facilities.		Overall there is a good transport infrastructure. Some improvements could be made to inter-city connections. Reasonable availability of office space and facilities across major cities, some hindering factors, e.g. minimum lease-terms.
	Availability of suitable property			
	Technology infrastructure			
Support Network	Incubators	Clear facilities to support and galvanise the community through an appropriate FinTech hub/accelerator. Appropriate and shared strategy and vision. Supportive and engaged participant structure around the FinTech hub, with commitment from each section of the eco-system. Network of support groups in SMEs mentoring and leading the FinTech strategy.		Lack of dedicated FinTech development centre or hub to build community and support effective communication across the eco-system. Insufficient mentoring and support across the community, particularly into new FinTech start-ups. Commitment to support FinTech development, but no dedicated group or function driving the overall FinTech support strategy. Please note: as of May 2016, the SFE FinTech Strategy Group has been established to address this point.
	Accelerators			
	Leadership development & mentoring			
	Industry engagement			
Location	Lifestyle	Strong and well-communicated image. Healthy lifestyle balance and inclusive environment catering for a range of demographics.		Renowned and well-communicated image as a FS and Tech hub. Attractive location for good work: life balance. More could be done to support a dedicated FinTech message.
	Image			
Profile & Eminence	Clear and consistent proposition	Structured marketing and PR campaigns aligned with overall strategy and FinTech proposition. Series and range of profiling events (both locally and internationally) supporting overall FinTech strategy, vision, and attractiveness.		No clear and consistent messaging or PR around Scotland's FinTech capability or opportunity. Some showcase events have taken place but not including full eco-system representation or communication of Scotland's overall FinTech strategy.
	Marketing			
	Showcase events			
"Connectedness"	Formal	Clear examples of FinTech connection and communities across the eco-system. Both through formal support networks, and informal group - meet-ups, message boards, etc.		Some connections in place across the eco-system, tend to be relatively informal. No central connections in place across all parts of the eco-system.
	Informal			



Reflecting on the summary above it is fair to say that there is a great opportunity for Scotland to emerge as a key FinTech centre, however specific focus must be given across several key areas, namely;

Ref	Finding Title	Assessment	Building Block(s)
1	No overall FinTech strategy & vision for Scotland	Central to the success of any FinTech centre is the definition of a clear strategy and vision that is agreed and supported by each component of the eco-system. A common vision often sits around the creation of 'community', or 'enablement' of emerging FinTech start-ups. Scotland does not yet have a clear vision, or indeed a voice championing a consistent and agreed FinTech strategy. It is also important a 'leader' is established to set the tone, agree accountabilities and drive the strategy – this could be led through an industry leadership body or a government body.	FinTech Strategy and Vision FinTech Culture Connectedness Location Profile & Eminence
2	The collective challenge in identifying, attracting, training, and retaining talent	The ongoing challenge associated with talent is a specific threat to the success of FinTech - from the encouragement given to grass roots teaching and development, to the on-boarding and retention of some of our smartest minds. There is clearly an opportunity in Scotland to tap into existing skills coming out of universities and further education more effectively, but also to take steps now to plant seeds in the minds of the future talent pool that exists in schools and colleges.	Talent Profile & Eminence Connectedness
3	The need to bind a community	Although all the components of an effective eco-system exist in Scotland, there is a disconnect within the community and a need to bring each component closer together. Scotland has a number of community initiatives and support networks, however dedicated focus is needed to define and create a specific place and set of courses or business links where the community can connect their efforts and experience, incubate new ideas and collaborate more closely. The need to bring established firms, start-ups, academics and industry experts together in a close and collaborative environment will make a considerable difference to each component of the eco-system being successful in achieving their own aspirations.	Support Network Connectedness Infrastructure Customer Demand & Access to Markets Finance & Capital
4	No FinTech voice for Scotland	Scotland does not yet have a voice in FinTech. Perhaps our style and approach is to not 'shout from the rooftops' however, in order to become a leader on the FinTech stage, this is undoubtedly required. Building appropriate networks, 'flag-carriers' and dedicated PR activity could see	Talent Profile & Eminence

Ref	Finding Title	Assessment	Building Block(s)
		Scotland develop at a similar pace to the experience of other communities, such as Ireland. Our research across other FinTech centres has taught us that creating clarity and energy can act as a catalyst to lasting success.	Location
5	The need to build awareness, understanding and energy	A common observation centres on the lack of broader awareness and understanding of the current and future FinTech solutions and support available in Scotland. This in turn is leading to a lack of energy across the sector and is undoubtedly impacting on the 'attractiveness' of the opportunities that could attract and retain talent.	Connectedness Profile & Eminence Customer Demand & Access to Markets Talent

For an alternative summary view of current service support and gaps, please see **Appendix D**.

Whilst the overall assessment established during this research points to some very clear areas for focus it is evident that there is a strong and very positive sentiment around the possibility for Scotland becoming a FinTech centre in the future, it is important now to take specific steps to bring this to life.

10. Recommendations

The following section outlines our recommendations on where focus should lie and investment made to support in developing Scotland as a FinTech centre. This is then complemented by a more granular action plan proposal in Section 11.

Ref	Recommendation Title	Recommendation Description	Finding(s) Addressed
1	Forging a clear FinTech vision and strategy for Scotland	An immediate focus should be on defining a clear vision that will outline Scotland's ambitions as a FinTech centre, help galvanise the community and act as a launch pad for effective PR and marketing - as a first step this is critical to unlocking Scotland's potential. Central to the strategy should be the championing of Scotland's unique position – the concentration of FS, the technology capability, the potential in the talent pool and the fantastic standard of living. Consensus on the vision and creating a following behind it is also key. Once this is in place, the ability to action further elements of the strategy, encourage new ways of working within established firms, or generate a wave of PR, becomes much easier. Our recommendation is that this is led by an industry leadership body or government.	Defining an overall FinTech strategy & vision for Scotland
2	The creation of a dedicated FinTech Hub in Scotland	A common theme throughout our research focussed on the need to create a dedicated FinTech hub in Scotland. Similar to Level39, and other shared spaces across the globe, this would help accelerate business ideas, bring communities together to share business challenges, and use-cases, educate stakeholders within established firms, and allow start-ups and SMEs to present new solutions and technologies to a captive audience looking for alternatives or opportunities to collaborate. A potential way to accelerate this would be to develop the MOU that exists between Innovate finance, Edinburgh Council and SFE to support the development of a dedicated FinTech hub in Scotland. Importantly, a dedicated hub would provide an opportunity for academia, industry and start-up experts, to work together to shape courses, cross-skill resource, influence and share insight with the next generation of leaders. It is recognised that the 'fabric'	The need to bind a community

Ref	Recommendation Title	Recommendation Description	Finding(s) Addressed
		<p>of Scotland's FinTech Hub must be considered carefully. The best and most befitting elements should be taken from across successful ventures in other FinTech centres, in order to set something in place that specifically addresses the unique need in Scotland. There are a number of elements to this that should be considered, namely:</p> <p>a) The constituent parts of a FinTech hub – A successful hub must incorporate and be represented by all communities within the FinTech eco-system. The final complexion and coverage of each group is an important factor to get right, i.e. not over-bearing with established firms, talent scouts, not too technical, etc. The art of creating the right hub lies as much in the balance of eco-system participants as it does in the services it offers. The hub should also focus on including regulatory input and forge close links with initiatives such as the FCA regulatory 'sandbox' that is specifically designed to support safe testing and trialling of new FinTech initiatives.</p> <p>b) The roles and responsibilities of each part of the FinTech hub – Driving out absolute clarity on the roles and responsibilities of each community across the FinTech hub is also crucial to its success. Understanding the quid pro quo for everyone involved, the expectations set and how they might evolve over time is key to ensuring that the hub is successful as the FinTech landscape changes. A clear role and responsibility for the FinTech hub leadership should be to develop and build relationships with others hubs across the UK and more broadly. Leveraging these relationships will be a key element of success.</p> <p>c) The programmes and activities – a clear series of programmes and support activities should be considered and established to truly understand what will benefit the FinTech community in Scotland. Each programme of activity or support must clearly align with the needs of the community and be run or supported by dedicated and appropriate subject matter experts ('FinTech Mentors'). Clear commitment to manage and run the programmes of support for the FinTech community should be the responsibility of the FinTech Hub's management.</p>	

Ref	Recommendation Title	Recommendation Description	Finding(s) Addressed
		<p>d) The success factors – At an early stage it is important to outline the success factors that one will measure the FinTech hub's performance against. Of course there are unknowns, but being clear on a few key metrics important to the community and each individual stakeholder, will ensure the FinTech hub is always focussed on its 'true north'.</p> <p>In addition to the specific elements highlighted above, the FinTech hub leaders and participants should continually reflect on 'what good looks like' in order to benchmark and calibrate the focus and support the community is giving to each area.</p>	
3	The creation of a dedicated FinTech programme to support talent attraction, development, and retention	<p>The ability to attract, manage and retain talent will continue to be a challenge. The development of a series of programmes will support the central understanding of how we nurture talent from an early stage and give individuals the best opportunities to stay within FinTech thus supporting the local market. Extending the work that SDS and Glasgow Economic Leadership are focussed on, and considering the development of FinTech specific content, courses and schemes, will support in developing the next generation of disrupters and leaders.</p> <p>We also recommend that an industry:academia group be formed to support discussions on how that community could combine to support and contribute to helping students become more 'industry-ready'. Whilst it is recognised that there is no immediate benefit for the established firms here, the collective benefit of bringing business-ready people to the market is clear. Further to this, there should be a set of dedicated initiatives to focus on creating more diversity in the community. Specifically, tapping new sources such as 'Scots returning from London' should be considered to foster greater diversity and extend the talent pool.</p>	The collective challenge in identifying, attracting, training, and retaining talent
4	Focussing energy in the key areas where opportunity lies	<p>Our research has highlighted a number of areas where specific opportunity lies for developing capability, and start-ups in Scotland (see section 7.2.4). These include cyber security, analytics and an emerging focus on blockchain and robotics. Establishing focussed subject matter expert forums and communities around these areas would help to rapidly identify opportunities and take steps to either support start-up activity, or develop capability. It is recommended that dedicated groups be set-up, likely with an industry SME at the centre and a clear and supported mandate to develop the opportunities in each specific field. The likely early members should include industry, start-ups and academia.</p>	Defining an overall FinTech strategy & vision for Scotland

Ref	Recommendation Title	Recommendation Description	Finding(s) Addressed
5	Dedicated and sustained programme of activity to develop the attractiveness of FS & Tech roles in Scotland	Alongside the creation of dedicated support to nurture and retain talent we have also recommend that a programme of awareness and marketing is created to rejuvenate the perception of FS and technology across the sector. This programme would likely profile the emerging trends, their overspill into more exciting areas of technology, and highlight the use-cases against which new technology can be applied. Delivering a series of short and exciting messages via social media or similar, could radically enhance the attractiveness of FinTech careers in Scotland. As part of this it is also important to highlight the features and benefits of different cities within Scotland to help stimulate and support growth across the region, rather in just the most obvious places.	Sharing the message
6	FinTech 'Mentors' – a network of specialists and influencers	<p>A dedicated network of specialists to support both a FinTech hub in Scotland and conversations more broadly across the community, would accelerate both the understanding of emerging technologies as well as helping start-ups, and potentially established firms refine their FinTech solutions or services in full understanding of areas such as FS regulation. Across Scotland there exist a number of ex-Financers, successful entrepreneurs, procurement & regulatory specialists, etc. that, if formed and empowered in the right way, could help the components of the eco-system navigate threats and challenges.</p> <p>It is also recommended that this network specifically involve under-represented communities, such as women in technology or part-time work. A fantastic way to energise and empower certain communities that are under-represented would be to have them play specific roles in helping generate FinTech development in Scotland. FinTech 'Mentors' such as 'FinTech-Mums' who are passionate and keen to carry on their careers but are also managing a family, experts who have taken a career break but want to share their knowledge, SMEs in a particular age demographic, or individuals that are in teaching that just love FinTech and can bring it into the classroom, are all critical to the creation of a rich and diverse eco-system. Investment should be made to developing these types of initiatives to support the development of FinTech and create balance in the experts engaging with it.</p>	The need to bind a community

Ref	Recommendation Title	Recommendation Description	Finding(s) Addressed
7	Clarity of service and community offerings	As part of the supporting services to the FinTech eco-system, our research lends itself to the recommendation that investment be made to creating a central repository that maps and connects all the communities and support services in Scotland. Whilst it is evident that some organisations do try to do this, it is recognised that this will always be one-sided. Similarly to the supporting collateral that exists as part of other FinTech centres around the world, the creation of a central and shared repository can act as a significant accelerator in connecting the eco-system.	Building awareness, understanding and energy
8	Review of Public Sector funding for FinTech initiatives beyond incubation	Whilst our evidence suggests there are a number of early-stage funding support models available, consideration should be given to developing a set of funding vehicles that will support investment beyond initial incubation.	The need to bind a community/ Defining an overall FinTech strategy & vision for Scotland

11. Action Plan

In order to make progress immediately and make sure momentum is not lost we have highlighted a set of actions that should be taken against each of the recommendations made in this report. It should be noted that these actions form a starting point – wider planning and additional items will undoubtedly be required as the activity evolves. We have also highlighted who should take initial lead, and where existing initiatives may be influenced or adjusted to address the recommendations made in this report.

Ref	Recommendation Title	Suggested actions	Action Type	Suggested Lead	Priority
1	Forging a clear FinTech vision and strategy for Scotland.	<ul style="list-style-type: none"> • Support gaps have been identified by this research. Further appraisal, research and stakeholder engagement may be required before committing to intervention. • Establish key eco-system representatives to consider and agree strategy. • Draft strategy and seek approval from all stakeholders. • Establish PR and marketing campaign. • Launch strategy and associated development roadmap. 	Create Influence	Vision & strategy to be owned by Financial Services Advisory Board (FiSAB). Potential for SFE Strategy Group to lead on development, with SDI leading the PR and marketing campaign.	High
2	The creation of a dedicated FinTech Hub in Scotland.	<ul style="list-style-type: none"> • Carry out further appraisal on creation of a hub. • Agree core community and leadership structure. • Take steps highlighted in FinTech Hub design and implementation actions (Appendix E). • Identify and establish medium to long-term partnerships required. • Agree marketing and PR 	Create	FiSAB with support from Scottish Enterprise. Option to commission external advisory support to lead the development and build of a FinTech Hub.	High

Ref	Recommendation Title	Suggested actions	Action Type	Suggested Lead	Priority
		<p>campaign around the FinTech hub.</p> <ul style="list-style-type: none"> Transition hub leadership to industry or 3rd party cohort. 			
3	The creation of a dedicated FinTech programme to support talent attraction, development, and retention.	<ul style="list-style-type: none"> Engage main parties fundamental to the development of the talent network. Run 2-day workshop exploring and agreeing specific programmes to progress talent agenda. Form a joint industry and academia group to help create more 'industry-ready' students. Develop short-term action plan to pilot new initiatives. 	<p>Create Influence</p>	<p>This initiative should be led by Skills Development Scotland (SDS), but quickly establishing the development of each initiative through Talent Scotland, Glasgow Economic Leadership, CodeClan, DataLab, etc.</p> <p>Opportunity to influence existing programmes such as the Digital Skills Investment Programme run by SDS.</p>	High
4	Focussing energy in the key areas where opportunity lies.	<ul style="list-style-type: none"> Engage Industry in order to clearly articulate the use-case / pain points where FinTech solutions may apply. Identify and agree where focus should lie (likely cyber in first instance). Identify industry SMEs / start-ups focussing in these areas. Pilot initial SME forum to consider further step that can be taken to capitalise on opportunity. Publish agreed action plan and roadmap to develop capability and promote opportunity 	<p>Create Influence</p>	<p>This initiative should be led by the SFE FinTech Strategy Group, with Scottish Enterprise supporting.</p>	Medium

Ref	Recommendation Title	Suggested actions	Action Type	Suggested Lead	Priority
5	Dedicated and sustained programme of activity to develop the attractiveness of FS & Tech roles in Scotland.	<ul style="list-style-type: none"> Engage PR and marketing teams to 're-brand' FinTech and Tech in Scotland. Agree partners to work with and key messaging Establish marketing and communication mediums and related plans Plan and agree associated event and related publications. Agree and launch a 90-day programme aimed at boosting attractiveness of FinTech in Scotland 	<p>Create</p> <p>Influence</p>	<p>This overall initiative should be led by the SFE FinTech Strategy Group, with the opportunity to influence existing programmes such as the Digital Skills Investment Programme run by SDS.</p> <p>SDI should take specific lead on raising international profile of FinTech in Scotland.</p>	Medium
6	FinTech 'Mentors' – a network of specialists and influencers.	<ul style="list-style-type: none"> Identify likely mentor community in Scotland, and the role they would play supporting start-ups or established Firms. Establish the benefit and opportunity for the mentors (the 'quid pro quo') Outline mentor programme and associated success metrics. Make introductions and form relationships. Establish long-term plan for mentors, the role they play and areas of focus. 	<p>Create</p> <p>Influence</p>	<p>This initiative should be led by the SFE FinTech Strategy Group.</p>	Medium
7	Clarity of service and community offerings.	<ul style="list-style-type: none"> Design a central repository mapping the FinTech eco-system in Scotland. Establish and agree ownership of this repository and responsibility for ongoing update and refresh. Incorporate into the FinTech Hub. 	<p>Create</p> <p>Influence</p>	<p>This should sit as part of the responsibility of the FinTech Hub leadership.</p>	Medium
8	Review of Public Sector	<ul style="list-style-type: none"> Engage FinTech community in 	Influence	Scottish Enterprise / Scottish Investment	Medium

Ref	Recommendation Title	Suggested actions	Action Type	Suggested Lead	Priority
	funding for FinTech initiatives beyond incubation.	<p>series of working sessions to understand specifically the funding range that is weakest</p> <ul style="list-style-type: none"> • Consider options to extend or adjust existing funding and support models. • Develop deeper understanding of the key drivers of FinTech funding needs 	Create	<p>Bank (SIB) / Public Sector led.</p> <p>There is an opportunity here to potentially adjust existing funding support schemes, as well as consider new ones.</p>	

12. Conclusion

Based on our research it is clear that a significant opportunity exists for Scotland. The common success of many FinTech eco-systems is based on the recognition of community, clarity of vision and understanding of the specific challenge each component faces, and the willingness to act on solving them. The FinTech 'movement' will continue to evolve; moving forward the recommendations highlighted in this report will support in taking Scotland firmly onto the map and setting the country on a course to becoming a recognised FinTech centre. Beyond this, clear leadership, shared accountability and the ability to keep abreast of how the needs of each component are evolving will be critical to realising continued success.

13. Contacts

13.1 Scottish Enterprise / Scottish Development International FinTech Team



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Bill is an experienced Business Development Executive with a background in growing businesses. He is currently working to identify FinTech opportunities that will help develop a thriving FinTech community for both inward investors and indigenous companies.



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Graham leads Scottish Enterprise's activity within FinTech. This work is focused on three areas; growing FinTech within Scotland, helping Scottish FinTech companies expand internationally and encouraging international FinTech companies to invest in Scotland.



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Andrew's remit within the FinTech team is to identify indigenous Scottish companies that have an opportunity to internationalise and to help the Scottish FinTech community grow.

13.2 About the Authors – Deloitte Risk Advisory (Scotland)



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Dougie is a Partner with over 20 years' experience supporting FS clients across a range of areas. Most recently Dougie has led the development of the Analytics practice in Scotland and delivered a number of projects focussed on bringing innovation and new technologies to clients.



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Kent leads the Risk Analytics and FinTech Practice in Scotland, working with a number of FS clients and 'start-ups' on new and innovative technology solutions. Kent has over 12 years' experience across a range of FS disciplines having worked both in the industry and in an advisory capacity.



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David is a manager within the Deloitte Risk Analytics and FinTech practice in Scotland, with a focus on leading FinTech related initiatives for the Firm across local and national clients.

14. Appendices

14.1 Appendix A: Participant List

Organisation	Sub-group	Consultee	Consultation Date
Aberdeen Asset Management	Established Firms	Derrick Hastie	23/02/2016
Aegon	Established Firms	Alasdair Rhind	05/02/2016
Baillie Gifford	Established Firms	Richard McGrail	03/02/2016
Barclays Wealth	Established Firms	Alistair Hudson	04/03/2016
BNP Paribas	Established Firms	Margaret Lees	27/01/2016
Citi	Established Firms	Colin Stewart	18/01/2016
Clydesdale Bank	Established Firms	Craig Paterson	18/02/2016
HSBC	Established Firms	Paul Kelly	09/03/2016
JP Morgan	Established Firms	Mark Napier/ Stephen Flaherty	12/02/2016
LBG Insurance	Established Firms	Donald Mackechnie	07/02/2016
Martin Currie	Established Firms	Geoff Garner	22/02/2016
Morgan Stanley	Established Firms	Khalid Rafiq	27/01/2016
Multrees	Established Firms	Jaco Cebula	22/02/2016
Prudential	Established Firms	Ally Thomson	19/02/2016
Sainsbury's Bank	Established Firms	Alan Hyndman	04/02/2016
Scottish Friendly Group	Established Firms	Jeff Wilson	07/03/2016
SLI	Established Firms	Mike Tummilty	15/02/2016
Standard Life Group	Established Firms	Robert McGill	14/01/2016
Student Loans Company	Established Firms	David Wallace	04/02/2016
Tesco Bank	Established Firms	Derek Tucker	22/02/2016
TSB	Established Firms	Graham Reed	25/01/2016
FreeAgent	Start-up/SMEs	Olly Headey	21/01/2016

Organisation	Sub-group	Consultee	Consultation Date
G2G3	Start-up/SMEs	Glenn Exton	20/01/2016
miiCard	Start-up/SMEs	James Varga	(various)
Symphonic	Start-up/SMEs	Derick James	22/02/2016
Money Dashboard	Start-up/SMEs	Steve Tigar	28/01/2016
Nucleus	Start-up/SMEs	Andrew Smith	14/01/2016
Carlyle Associates	Academia/Talent	Duggie Carlyle	21/01/2016
Edinburgh Research and Innovation	Academia/Talent	Grant Wheeler	04/02/2016
Edinburgh Data Lab	Academia/Talent	Gillian Docherty	27/01/2016
Edinburgh University	Academia/Talent	Douglas Graham	25/01/2016
Glasgow Economic Leadership	Academia/Talent	Maxine McClintock	11/03/2016
Informatics Ventures	Academia/Talent	Danny Helson	26/02/2016
MBN Solutions	Academia/Talent	Michael Young	20/01/2016
Head Resourcing	Academia/Talent	Huw Martin	15/02/2016
SDS	Academia/Talent	Claire Gillespie	15/01/2016 and 16/02/2016
Avaloq	Software & Service Provider	Christoph Zwicker	04/02/2016
FIS	Software & Service Provider	Bruce Jennings	12/02/2016
Oracle	Software & Service Provider	Caroline Stuart	04/02/2016
Exolta	Investor	Russell Dagleish	03/03/2016
Par Equity	Investor	Paul Atkinson	15/02/2016
Alley NYC	Incubators/ Accelerators	Jason Salzman	10/02/2016
Level 39 / Innovate Finance	Incubators/ Accelerators	Laurence Wintermeyer	02/03/2016
Braidwood Associates	FinTech - Subject Matter Expert	Richard Braidwood	08/02/2016 (various)
Ross Laurie	FinTech - Subject Matter Expert	Ross Laurie	01/02/2016 (various)

14.2 Appendix B: Scottish FinTech Eco-System – Key Players

Organisation	Sub-group	Included in Consultations
RBS	Established Firms	No
Aberdeen Asset Management	Established Firms	Yes
Adam & Company Group	Established Firms	No
Aegon	Established Firms	Yes
Alliance Trust	Established Firms	No
AON	Established Firms	No
Artemis	Established Firms	No
Aviva	Established Firms	No
AXA	Established Firms	No
Baillie Gifford	Established Firms	Yes
Barclays Wealth	Established Firms	Yes
Blackrock	Established Firms	No
BNP Paribas	Established Firms	Yes
BNY Mellon	Established Firms	No
Cigna	Established Firms	No
Citi	Established Firms	Yes
Clydesdale Bank	Established Firms	Yes
Deutsche Bank	Established Firms	No
Direct Line	Established Firms	No
First State Investments	Established Firms	No
FNZ	Established Firms	No
Franklin Templeton Investments	Established Firms	No
Hampden & co Bankers	Established Firms	No

Organisation	Sub-group	Included in Consultations
HSBC	Established Firms	Yes
JP Morgan	Established Firms	Yes
Kames Capital	Established Firms	No
Kennox Asset Management Limited	Established Firms	No
Leapfrog Investments	Established Firms	No
Lloyds Banking Group (Bank of Scotland)	Established Firms	No
Lloyds Banking Group (Scottish Widows)	Established Firms	Yes
Martin Currie	Established Firms	Yes
Morgan Stanley	Established Firms	Yes
Multrees Investor Services	Established Firms	Yes
Prudential	Established Firms	Yes
Royal London	Established Firms	No
Ruffer LLP	Established Firms	No
Sainsbury's Bank	Established Firms	Yes
Scottish Friendly Group	Established Firms	Yes
SLI	Established Firms	Yes
Standard Life Group	Established Firms	Yes
State Street	Established Firms	No
Student Loans Company	Established Firms	Yes
Tesco Bank	Established Firms	Yes
Triodos Bank	Established Firms	No
TSB	Established Firms	Yes
UBS	Established Firms	No

Organisation	Sub-group	Included in Consultations
Virgin Money	Established Firms	No
Walter Scott	Established Firms	No
Auto-Enrolment.Co	Start-up/SMEs	No
Beeks Financial Cloud	Start-up/SMEs	No
Big Data for Humans	Start-up/SMEs	No
Clear Returns	Start-up/SMEs	No
Comcarde	Start-up/SMEs	No
Digital Receipts	Start-up/SMEs	No
Float	Start-up/SMEs	No
FreeAgent	Start-up/SMEs	Yes
G2G3	Start-up/SMEs	Yes
Helixion	Start-up/SMEs	No
miiCard	Start-up/SMEs	Yes
Money Dashboard	Start-up/SMEs	Yes
Moneydance (Infinite Kind)	Start-up/SMEs	No
Nucleus Financial	Start-up/SMEs	Yes
Payfont	Start-up/SMEs	No
PlanitMoney	Start-up/SMEs	No
ShareIn	Start-up/SMEs	No
SmartLoyal	Start-up/SMEs	No
Swipii	Start-up/SMEs	No
Symphonic	Start-up/SMEs	Yes
ZoneFox	Start-up/SMEs	No

Organisation	Sub-group	Included in Consultations
Aberdeen University	Academia	No
Dundee University	Academia	No
Edinburgh Data Lab	Academia	Yes
Edinburgh Napier University	Academia	No
Edinburgh Research and Innovation	Academia	Yes
Edinburgh University	Academia	Yes
Glasgow Caledonian University	Academia	No
Glasgow University	Academia	No
Heriott-Watt University	Academia	No
Informatics Ventures	Academia	Yes
Robert Gordon University	Academia	No
St Andrews University	Academia	No
Stirling University	Academia	No
Strathclyde University	Academia	No
University of the Highlands and Islands	Academia	No
CodeClan	Skills Academy	No
Carlyle	Talent identification and sourcing	Yes
Harvey Nash	Talent identification and sourcing	No
Head Resourcing	Talent identification and sourcing	Yes
MBN Solutions	Talent identification and sourcing	Yes
Skills Development Scotland (SDS)	Advisors	Yes
Glasgow Economic Leadership	Advisors	Yes
StartEDIN	Advisors	No

Organisation	Sub-group	Included in Consultations
Oracle	Software & Service Provider	Yes
Avaloq	Software & Service Provider	Yes
Cisco	Software & Service Provider	No
Dell Secure Works	Software & Service Provider	No
FIS	Software & Service Provider	Yes
Hewlett Packard Enterprise	Software & Service Provider	No
NCR	Software & Service Provider	No
SAS	Software & Service Provider	No
Accenture	Professional Services	No
Deloitte	Professional Services	No
EY	Professional Services	No
KPMG	Professional Services	No
PwC	Professional Services	No
Sopra Steria	Professional Services	No
CodeBase	Incubator/Accelerator	No
Creative Exchange	Incubator/Accelerator	No
Entrepreneurial Spark	Incubator/Accelerator	No
Innovation Centers Scotland	Incubator/Accelerator	No
Launch.ed	Incubator/Accelerator	No
UP Accelerator	Incubator/Accelerator	No
Apollo Informal Investment	Investors	No
Archangel Investors Limited	Investors	No
Discovery Investment Fund Limited	Investors	No

Organisation	Sub-group	Included in Consultations
EOS Technology Investment Syndicate	Investors	No
Equity Gap	Investors	No
Exolta	Investors	Yes
Fireflock	Investors	No
Gabriel Investment Syndicate	Investors	No
Highland Venture Capital	Investors	No
Kelvin Capital	Investors	No
Lancaster Capital	Investors	No
LDC	Investors	No
Lending Crowd	Investors	No
London & Scottish Investment Partners	Investors	No
Macklin Enterprise Partnerships	Investors	No
Maven Capital Partners	Investors	No
Par Equity	Investors	Yes
Pentech Ventures	Investors	No
Scottish Equity Partners	Investors	No
Souter Investments	Investors	No
SquareKnot	Investors	No
TRI Capital	Investors	No
Richard Braidwood (Braidwood Associates)	FinTech - Subject Matter Expert	Yes
Ross Laurie	FinTech - Subject Matter Expert	Yes

14.3 Appendix C: University course disciplines split by institution

Courses Offered	Aberdeen	Dundee	Edinburgh	Edinburgh Napier	Glasgow	Glasgow Caledonian	Heriott-Watt	Highlands and Islands	Robert Gordon	St Andrews	Stirling	Strathclyde
Computer Science												
Database/Data Management	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
Web Technology	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Algorithmic Problem Solving	✓	✓	✓	✓	✓		✓		✓	✓		
Human Computer Interaction	✓	✓	✓	✓	✓			✓	✓		✓	✓
Distributed Systems	✓		✓		✓					✓	✓	✓
Adaptive Interactive Systems	✓	✓	✓	✓	✓							
Artificial Intelligence	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
Operating Systems	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Computer Languages	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Software Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Business Computing	✓			✓				✓	✓		✓	✓
Peer to Peer Computing	✓											
Mobile Computing	✓			✓					✓	✓		
Computer/Cyber Security	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
Machine Learning		✓	✓		✓		✓					
Information Technology		✓	✓	✓			✓	✓	✓	✓	✓	✓
Ethical Hacking						✓						
Mobile Security			✓	✓		✓						✓
Systems analysis and design	✓	✓		✓	✓		✓			✓	✓	✓
Digital Business and markets				✓				✓			✓	
Innovation and emerging technologies			✓	✓	✓		✓				✓	
Blockchain												
Smart technology									✓			

Courses Offered	Aberdeen	Dundee	Edinburgh	Edinburgh Napier	Glasgow	Glasgow Caledonian	Heriott-Watt	Highlands and Islands	Robert Gordon	St Andrews	Stirling	Strathclyde
Economics, Finance and Accounting												
Global Economy	✓	✓	✓	✓			✓	✓	✓		✓	
Micro Economics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Macro Economics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Business Finance	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Financial Markets	✓		✓	✓	✓	✓			✓		✓	✓
Statistics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Corporate Finance	✓		✓	✓	✓	✓	✓		✓	✓		✓
Financial Strategy	✓		✓	✓		✓	✓		✓	✓		✓
Accounting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Innovation and enterprise										✓		
Business Economics		✓	✓	✓			✓	✓	✓		✓	✓
Financial Economics		✓	✓	✓	✓	✓	✓			✓	✓	✓
Economic Statistics		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Behavioral Finance			✓							✓		
Business Ethics			✓	✓		✓			✓		✓	✓
Technology Management/Business Technology		✓	✓	✓		✓	✓	✓	✓		✓	✓
Financial Risk Management		✓	✓	✓		✓				✓		
Valuations		✓	✓		✓					✓	✓	
Financial Planning			✓		✓		✓				✓	
Banking						✓						
Financial regulation				✓		✓						
Digital Economy								✓				
Behavioral Economics/ Contracts, Incentives										✓		✓

Courses Offered	Aberdeen	Dundee	Edinburgh	Edinburgh Napier	Glasgow	Glasgow Caledonian	Heriott-Watt	Highlands and Islands	Robert Gordon	St Andrews	Stirling	Strathclyde
Mathematical Sciences												
Optimization and Numerical Analysis	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Probability and Statistics	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Data Analysis			✓	✓	✓	✓	✓	✓				
Logic and Inference			✓		✓			✓		✓	✓	✓
Financial Mathematics			✓					✓				
Statistical Modelling				✓	✓	✓	✓	✓	✓			✓
Risk Theory				✓	✓			✓			✓	

14.4 Appendix D: Current Service Support and Gap Summary

Area of Prospective Support	Provider(s)		Criteria for assistance	Suitability for FinTech	Gap in Support (L/M/H)
Skills Development / Availability	Public Sector Support <ul style="list-style-type: none"> • Skills Development Scotland (SDS) • Scottish Universities 	Private Initiatives <ul style="list-style-type: none"> • CodeClan • Cyber Academy • Glasgow Economic Leadership • The DataLab • MBN Recruitment • Harvey Nash • Carlyle Associates 	Programmes designed at progressing FinTech skills.	Current initiatives are predominantly ICT focussed. Requirement for specific FinTech programmes. There is opportunity for these types of programmes (such as the SDS Digital Skills Investment initiative) to evolve to consider the overlay of specific FinTech subject and content. Some work is still required to help educate students in the specific challenges or processes within Financial Services that FinTech products or solutions could address.	M
Access to Finance / Funding	Public Sector Support <ul style="list-style-type: none"> • R&D Tax Credits • Enterprise Investment Scheme (EIS) • Seed Enterprise Investment Scheme (SEIS) • Patent Box • Innovate Finance ISA • VCT Scheme • Entrepreneurs Relief 	Private Investor Community <ul style="list-style-type: none"> • Apollo Informal Investment • Archangels • Calculus Capital • Discovery Investment Fund Limited • EOS Technology Investment Syndicate • Equity Gap • Gabriel Investments • Halo • Highland Venture Capital • Kelvin Capital • Lancaster Capital • LDC 	Easy access to and availability of seed, growth and listed funding options via private investor community or government/ public sector support.	A range of early stage funding and support options available through investor community and government funding programmes. Challenge associated with the ability to access funding quickly, and the ability to access funding beyond seed and incubation stage.	M

Area of Prospective Support	Provider(s)		Criteria for assistance	Suitability for FinTech	Gap in Support (L/M/H)
	<ul style="list-style-type: none"> • London & Scottish Investment Partners • Macklin Enterprise Partnerships • Maven Capital Partners • Par Equity • Pentech Ventures • Scottish Equity Partners • Synova Capital • Souter Investments • TRI Capital 				
Specialist Property Including easy in/out lease terms)	Public Sector Support No coverage	Private Incubators/Accelerators <ul style="list-style-type: none"> • CodeBase • Entrepreneurial – Spark • Innovation Centres Scotland (ICS) • Launch.ed (including ERI) • Strathclyde University Incubator • UHatch • Informatics Ventures 	Suitable and cost-effective office space providing appropriate technology infrastructure and facilities.	Reasonable availability of office space and facilities across major cities, some hindering factors, e.g. minimum lease-terms. A number of private incubators provide cheap space and business infrastructure for broader technology start-ups. Lack of dedicated FinTech development centre or hub to build community and support effective communication across the eco-system.	H
Access to Markets / Customers Domestically	Public Sector Support No coverage	Private Initiatives No Coverage	Clear facilities to support and galvanise the community through an appropriate FinTech hub/accelerator. Appropriate and shared strategy and vision. Supportive and engaged participant structure around the FinTech hub, with commitment from each section of the eco-system.	Challenges lie with FinTech start-ups access to corporate opportunities and ability to navigate some internal corporate barriers, e.g. procurement, etc.	H

Area of Prospective Support	Provider(s)		Criteria for assistance	Suitability for FinTech	Gap in Support (L/M/H)
Internationalisation Support	Public Sector Support <ul style="list-style-type: none"> • SDI 	Private Initiatives <ul style="list-style-type: none"> • startEDIN 	Structured marketing and PR campaigns aligned with overall strategy and FinTech proposition. Series and range of international profiling events supporting overall FinTech strategy, vision, and attractiveness.	No clear and consistent messaging or PR around Scotland's FinTech capability or opportunity. Some showcase events have taken place but not including full eco-system representation or communication of Scotland's overall FinTech strategy.	H
Leadership / Management Capability	Public Sector Support No Coverage	Private Initiatives No Coverage	Network of support groups in SMEs mentoring and leading the FinTech strategy, across both established firms and start-ups.	Insufficient mentoring and support across the community, particularly into new FinTech start-ups.	M
Business Coaching and Mentoring	Public Sector Support No Coverage	Private Initiatives No Coverage	A dedicated network of specialists to support both a FinTech hub in Scotland and conversations more broadly across the community, thus accelerating both the understanding of emerging technologies as well as helping firms refine their FinTech solutions or services in full understanding of areas such as FS regulation.	Insufficient mentoring and support across the community, particularly into new FinTech start-ups.	H

14.5 Appendix E: Early Thoughts on Shaping a FinTech Hub

Establishing a dedicated FinTech Hub in Scotland			
	FinTech Foundations (0-3 months)	Establishing the FinTech hub (0-6mth)	Evolving the FinTech Hub (9mths+)
	<i>An integrated community with a clear understanding of the shared vision and strategy.</i>	<i>A space that allows the eco-system to work together in creating or sharing solutions, and nurturing talent</i>	<i>A thriving and vibrant place that supports a range of needs from across the FinTech eco-system.</i>
Characteristics	<p>Foundation level focus should be on setting a clear strategy and longer-term blueprint for a FinTech hub. Early steps taken to connect the community and provide a set of tools that help the community connect more closely;</p> <ul style="list-style-type: none"> • Development of a shared FinTech strategy. • Creation of a FinTech directory (website) that can be used by each member of the community matching 'demand' with 'supply' • Horizon scanning in place capturing new developments across the eco-system and alerting impacted participants. • Establish long-term leadership and support structure. 	<p>Focus on establishing presence, engaging and mentoring start-ups and connecting the 'supply' and 'demand' stakeholders in a single place. Focus on early stage creation of the hub in an agreed location with representation from each eco-system group;</p> <ul style="list-style-type: none"> • Creation of a shared location for 2-3 start-ups with representation from established Firms. • Established programme of events to share use-cases and promote mentoring. • Academia and talent networks involved and shaping a view of the role they play. • FinTech mentors engaged and supportive. 	<p>Scale-up the FinTech Hub, incorporating additional eco-system stakeholders, extending the support services and engaging with hubs/eco-systems in other FinTech Centres;</p> <ul style="list-style-type: none"> • Clear 'pathway' programme in place for each start-up resident at the FinTech Hub • Weekly programme of events supported by each community within the hub, e.g. regulatory advice, investment guidance etc. • Dedicated talent and academia programmes nurturing new talent. • Engaged and supportive FinTech mentors. • Fully connected eco-system both within the UK and across other FinTech centres.
Actions	<ul style="list-style-type: none"> • Define a FinTech hub short-medium term strategy. • Establish a project to determine the hub 'blueprint' • Run a series of connection events to help foster closer links between communities and refine FinTech Hub blueprint. • Scope and build an online Scottish FinTech directory (website) to support closer connection and flow of information. • Build a horizon scan process to keep up to date with new developments across the eco-system and create new connections. • Investigate and explore 'best-practice' 	<ul style="list-style-type: none"> • Establish a strategic partnership to support the creation of physical space. Circa 10-15 desks in first instance. • Define governance, roles & responsibilities. • Define business case for FinTech hub, highlighting cost vs. revenue model. • Define performance success factors • Determine long-term plan and leadership • Determine quid pro quo for each stakeholder • Establish clear PR and Marketing campaign. • Extend coverage and connection with academia and talent networks 	<ul style="list-style-type: none"> • Build PR and marketing to attract and encourage new and emerging Fintechs • Scale-up space to accommodate additional tenants. • Seek commitment from established firms, and other stakeholders to have permanent residency at the FinTech Hub. • Establish weekly programme of events – including education, mentoring, show-casing, etc. • Define and agree specific programmes to support academia and talent. • Agree exchange/knowledge programmes with other global FinTech centres.
Lead	<ul style="list-style-type: none"> • Primary Lead: Scottish Government • Potential support from external supplier to drive the creation of a blueprint and early build of FinTech directory and horizon scanning applications. 	<p>Primary Lead: TBC – Likely 3rd party. Sponsor: Scottish Government. Support: FinTech hub Steering Committee made up through representation from each eco-system group.</p>	



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