RSE RESPONSE TO THE MARK LOGAN REPORT INTO THE SCOTTISH TECHNOLOGY ECOSYSTEM

Summary

The Royal Society of Edinburgh (RSE) welcomes the report into the Scottish Technology Ecosystem by Mark Logan (the Report). The Report provides a useful insight into the importance of the sector to Scotland's economic recovery from the COVID-19 pandemic. While the focus on the technological innovation through start-ups and spinouts is welcomed, this does not represent the full technology ecosystem as the report title suggests.

The application and invention of technology are not fully considered in the Report in as much detail as one would hope. The former is crucially important across organisations in the private, public and third sector, as they all rely on some form of technology in one way; further analysis of the application of new technologies across sectors in Scotland will be required. The latter is of growing importance in Scotland due to recent developments from the UK Government, as it is committing £8bn per year to fund scientific research and development.

The importance the report places on expanding and improving the provision of computing science in Scotland is broadly welcomed by the RSE. The issues that are identified by the Report have been impacting the provision of computing science over a significant period of time. We agree that improving the provision of computing science across all levels of education should be a key objective for the Scottish Government. This will require a range of interventions including those aimed at improving the attractiveness of teaching and the development of new models of teaching. The Scottish Government should consider existing research in this area before fulfilling the recommendations in the Report.

We support the recommendations made across the areas presented; Network of Tech Scalers, Foundational Talent Pipeline, International Market Square, and Funding. The Scottish Government has swiftly accepted all the recommendations which is welcome but as these are targeted there is a potential for unintended consequences. For instance, focusing solely on the recommendations without considering the wider tech sector could lead to other sub-sectors such as hardware and IT, being overlooked. Additionally, governance is critically important to the successful implementation of these recommendations; therefore, it is important that clarity is provided around how the recommendations will be implemented and to what extent government agencies will be involved and how success is to be measured.

There is an array of existing initiatives and projects that are aimed at supporting the sector in Scotland. The Report highlights that there is an unstructured approach across the existing infrastructure in Scotland. Therefore, we would encourage the Scottish Government to adopt a structured approach to supporting the technology ecosystem which will connect the existing initiatives, while boosting funding to better utilise the existing infrastructure across agencies and institutions. As work begins on implementing these recommendations, we look forward to engaging further with the Scottish Government in the development of the Digital Strategy for Scotland.

Introduction

1 The commissioning of a review of the Scottish technology ecosystem, and the subsequent report by Mark Logan, is welcomed by the Royal Society of Edinburgh (RSE), Scotland's National Academy. At a critical time, the Report is a timely reminder of how important technological innovation through start-ups and spin outs will be to the Scottish economic recovery post-Covid. Currently the landscape is cluttered with initiatives, from the private, public and third sectors, is unstructured and not performing as well as it should. It is hoped that the Report, through implementation of its recommendations, can encourage government to develop a structured approach to supporting the technology ecosystem which is backed up with adequate resources and funding.

2 The RSE plays an active role in supporting innovation and entrepreneurialism, namely through our successful Enterprise Fellowship programme and our participation in the Unlocking Ambition programme. Our Economy and Enterprise Committee supports entrepreneurialism and economic wellbeing through providing advice to governments and parliaments, as well as proactive work, including our report, Entrepreneurial Education in Scotland, some of whose findings and recommendations remain relevant today.[1]

3 While the Logan Report is not the subject of formal consultation, given our expertise, experience and interest in the issues considered, the RSE is keen to engage with the Scottish Government and others as consideration turns to implementing the report's findings. We would be pleased to meet with government officials to discuss further our comments and the work of our Post-COVID-19 Futures Commission which will aim to inform and influence the discussion on how Scotland recovers from the pandemic.

Report Coverage

4 The Report's broad title, *Scottish Technology Ecosystem Review*, leads to the assumption that it considers the entirety of Scotland's technological ecosystem. However, as the Report itself acknowledges, it is narrowly focused on one aspect of the technology ecosystem – those software businesses which operate by adopting internet economy methodologies. As the Report recognises, attempting to define technology or what a technology business is can be 'problematic'. In implementing the recommendations of the Report, we would ask Scottish Government to accept that further changes in the ecosystem are required to support a broader range of technology businesses. Relying solely on this Report's recommendations could lead to unintended consequences, including the creation of an ecosystem which is exclusionary and fails to harness the potential of the wider technology sector.

5 The Scottish Government has previously defined technology in their STEM strategy as 'produced through the application of scientific technology to human activity. Together (with engineering) these cover a wide range of fields including, business, computing science, chemicals, food, textiles, craft, design, engineering, graphics and applied technologies including the built environment and biology'.[2]

6 We therefore ask that the Scottish Government consider a review of the current ecosystem in its entirety for all technology businesses to build on the Report which has focused on internet economy methodologies.

Application of Technology

7 As *all* businesses and enterprises increasingly rely on some form of technology, they will naturally look to technology to improve their efficiency. The application of technology across public services, private and third sectors is where the significant economic benefits lie, particularly in post-Covid economic recovery. Further analysis and consideration by government around the application of new technologies, and the use of existing technologies more innovatively, in public, third and private sectors is required.

1 Royal Society of Edinburgh. 2015. 'Entrepreneurial Education in Scotland'. URL: https://www.rse.org.uk/advice-papers/entrepreneurial-education-in-scotland/
2 Scottish Government. 2017. 'Science, Technology, Engineering and Mathematics (STEM Evidence Base).

Invention of Technology

8   The invention of new technologies is also important to the growth of the tech sector. The development of new tech products is associated with the need to spend money on scientific research and development in universities and research institutions, which was a key early factor in the development of new tech products in the west coast of the United States. This model appears to be adopted by the UK Government, with UK Research and Innovation (UKRI) committing £8bn per year to fund research and development. This commitment is a significant step towards taking UK investment to a similar level of government spending as percentage of GDP on research and development as the United States.[3] This is a significant development which increases the capital available. The RSE is engaging with the UK Department for Business, Energy and Industrial Strategy (BEIS), including on the R&D Roadmap,[4] so that the UK's future R&D strategy takes account of the distinctive needs and priorities of Scotland's researchers, innovators and entrepreneurs.

Focus on Scale Ups

9   The RSE has previously highlighted the barriers to creating more start-ups and spinouts in previous work such as our report on Entrepreneurial Education and response to the Scottish National Investment Bank. The growth of start-ups and spinouts will be an essential component to the post-Covid recovery. The RSE welcomes the Report's focuses on the need to scale up start-ups and spinouts.

10 The RSE's ongoing work on the role of the Scottish National Investment Bank,[5, 6, 7] ('the Bank') identifies scaling up as a significant problem in Scotland for all technology businesses and not only those which adopt an internet economy methodology. Causes include low provision of capital, as well as lack of business confidence and leadership skills, which the Report also correctly identifies. It is hoped that the Bank will increase the provision of capital available to businesses. However, improving business leadership skills will require a coordinated approach which utilises the resources within higher education and the experience in existing business networks.

11 In addition, the Report does not make reference to the importance of market creation. This will involve the government, via the Bank, investing in areas where there is little or no market activity, due to low financial returns resulting in a lack of private sector activity. While there is a strong base of technology businesses, we would still expect there to be a role for government to create and nurture markets in this sector through the Bank.

Education, Skills and Career Pathways

12 The importance and attention that the Report places on computing science is welcomed by the RSE. We understand that this Report has been well received by the computing science education community as it reinforces longstanding issues and concerns. These concerns are well documented in research[8] which can inform the Scottish Government on how the problems can be solved and recommendations successfully fulfilled.

13 Improving the provision of computing science at all levels of the education system is a key objective of the Report, with improving the provision of computing science in the school curriculum the main focus. The RSE strongly agrees with this, and has previously worked with the British Computer Society to produce teaching resources which exemplify aspects of computing science within Curriculum for Excellence.[9] We also coordinate the Learned Societies' Group in Scotland which brings together the learned societies and professional associations in STEM areas, including computing science, to consider and take action on STEM education developments.

3   World Bank. 2020. 'Research and Development Expenditure as a % of GDP'. URL: https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS

4   https://www.gov.uk/government/publications/uk-research-and-development-roadmap

5   Royal Society of Edinburgh. 2017. 'Scottish National Investment Bank'. URL: https://www.rse.org.uk/wp-content/uploads/2017/11/RSE-Response-to-Scottish-Government-Scottish-National-Investment-Bank-Consultation-AP17-27.pdf

6   Royal Society of Edinburgh. 2018. 'Scottish National Investment Bank 2018'. URL: https://www.rse.org.uk/wp-content/uploads/2018/11/AP18_19-3.pdf

7   Royal Society of Edinburgh. 2019. 'Scottish National Investment Bank 2019'. URL: https://www.rse.org.uk/wp-content/uploads/2019/05/AP19-05-2.pdf

8   Robertson, J. 2019. 'Towards a sustainable solution for the shortage of computing teachers in Scotland'. University of Edinburgh.

9   https://www.rse.org.uk/schools/resources/

14 An additional important component in such improvement will be the expansion of outreach programmes, which will require cooperation with our education institutions and the third sector; however extra-curriculum activities should not replace learning in the classroom. We are disappointed that there is little mention in the Report of the role of colleges and universities in improving the provision of computing science, data science, and data analytics. With the Scottish Funding Council (SFC) Review on the provision of higher and further education underway, as well as the Organisation for Economic Co-operation and Development (OECD) review of Curriculum for Excellence, we believe that there is an opportunity for the Scottish Government to take a holistic approach in increasing the importance of computing science within and across the school curriculum and higher and further education.

15 To support that development, the Scottish Government will need to address continued digital exclusion in communities and families in Scotland. The third sector and social enterprises have an important role in providing and improving accessibility to technology, particularly in providing access to skills development for those furthest from the labour market. There are good examples which should be built upon; for instance, the Scottish Tech Army works with communities across Scotland to improve people's access to technology and help social enterprises use technology for their benefit.[10]

Recommendations:

16 We support the Scottish Government's swift response in accepting all the recommendations of the Report. However, given, that these recommendations and interventions are targeted on technology driven start-ups and spinouts there is potential for unintended consequences. As previously commented upon, focusing too heavily on the recommendations without considering the wider tech sector could lead to the other sub-sectors of technology, such as hardware development, being overlooked, resulting in high growth companies losing out to investment. As the recommendations are focused on one sub sector they should not be used as a blueprint to achieve success in other sectors. Therefore, the Scottish Government should consider how best to implement the recommendations while working to achieve growth in other important sectors.

17 Governance is critically important to the successful implementation of the recommendations; therefore, it is important that clarity is provided around how the recommendations will be implemented and to what extent government agencies will be involved and how success is to be measured.

18 Furthermore, the implementation of the recommendations will require cooperation with the private sector, government agencies, education institutions and social enterprises. Therefore, we believe it will be important for the Scottish Government to begin a mapping exercise of existing infrastructure and services that support businesses across the sector. This may help reduce the risk of duplication and identify best practice that can be supported.

Network of Tech-Scalers

19 We welcome the recommendations and aspiration to develop a nationwide network of tech-scalers that will assist potential high growth companies throughout Scotland. The Scottish Government has acted quickly in announcing the creation of five new technology scaler hubs. While we support this, it is important that these are implemented through consultation and engagement. To date there is no evidence that the existing models of tech hubs work in the regional context in the rural areas of Scotland. We believe that any introduction of new tech scaler hubs should be accompanied with a consultation and review of current incubator provision, including from private stakeholders who provide a similar service, to ensure that the tech scaler hubs do not duplicate existing services.

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10   Case Studies from the Scottish Tech Army can be found on their Blog page at: https://www.scottishtecharmy.org/blog

Foundational Talent Pipeline

20 A primary focus on a strong education and skills system to provide the skills needed for the sector is paramount. Skills development from the education system in Scotland remains the backbone of sectors across Scotland, so focus should remain on ensuring it meets the demands of business and the economy.

21 As mentioned above, the provision of computing science is critical to the foundational talent pipeline. We agree that computing science is currently not signalled as important as other subjects, such as Physics and Mathematics. We support recommendations to increase the importance of computing science within education and reduce barriers. Recommendations such as the introduction of an annual Scottish computing science teaching conference, can be easily achieved as this previously existed as the 'Computing Teaching at Schools Scotland'.

22 Different models of computing science teaching provision in schools should be considered with the aim of attracting more pupils and potential teachers to the subject. While bursaries to attract people into computing science teaching are available, longer term, career development, progression, and remuneration remain an issue. These are issues which are covered in detail within the research by Judy Robertson referenced in paragraph 12. We are aware that gender differences are still prevalent within computing science, with female participation in the subject becoming worse; therefore, research should be undertaken to discover why. Nonetheless, action should be taken through existing initiatives such as the SCDI Young Engineers and Science Clubs and the Scottish Tech Army, to encourage more women into computing science and technology.

23 The skills gaps across computing science and data are increasing. Interventions which are aimed at creating skills to jobs pathways will be beneficial in the medium to long term, but targeted interventions are required to address skills gaps in the short term. Interventions such as reskilling and upskilling those in the current workforce or transferring those from redundant jobs to the tech sector, are possible interventions that could address gaps in the short term. Through the SFC review of provision of higher and future education, there is scope to expand the provision of accelerated teaching models through tertiary education providers. Colleges play an important role in reskilling and upskilling, and it is disappointing that they are mentioned so infrequently in the Report. Additionally, apprenticeships have an important role and potential in addressing skills gaps, and we would encourage the Scottish Government to explore, with Skills Development Scotland and colleges, how best apprenticeships can address skill gaps.

24 The SFC review of the provision of higher and further education offers the opportunity to redistribute funding to institutions, and the potential to introduce targeted funding which is aimed at supporting subjects and courses where there are significant skills gaps. Distributing funding which is targeted to improve the provision and uptake of certain subjects and courses could allow government and institution to easily measure success, as there is an overarching objective with easily identifiable indicators.

International Market Square [11]

25 The recommendations that are aimed at enhancing Scotland's market square activities, particularly the recommendations around internationalising Scottish tech conferences, are welcomed. The implementation of these recommendations will require a 'Team Scotland' approach, which may have to be led by the Scottish Government. This approach should aim to promote collaboration over competition and grow our international business networks. Additionally, the government could also pursue interventions that help boost the success of the technology sector, such as procuring, and encouraging other business to procure, from the sector.

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[11] This refers to activity within Scotland that attracts international firms, including existing tech companies and investors, specifically international conferences, exhibits and festivals.

Funding

26 The Report, like others before it, highlights the funding gaps in the Scottish economy. Notably, Scotland lacks the provision of substantial capital to support firms to scale up. This is a problem that has been longstanding in the Scottish financial sector and one that we hope the Bank could help address. Grant funding provided by the Scottish Government, while helping businesses in their early years, does not grow businesses over the medium to long term. This model has led to companies competing for small pockets of money and to them chasing grants in the short term, restricting their foresight into the medium to long-term, and in obtaining larger investment necessary to scale up.

27 There are success stories from existing initiatives that should be supported, notably the RSE's Enterprise Fellowship programme which provides support to aspiring entrepreneurs, who are usually tech based. As well as financial support, the programme provides business training and mentorship. Our programme has demonstrated clear economic impact as highlighted by Biggar Economics in their independent evaluation of the scheme. They found that every £1 invested in the programme is estimated to have generated £10 for the UK economy and £6 for the Scottish economy. Despite the challenges these tech-led businesses faced, 81% were still operating after five years which is almost double the national average for equivalent companies (45%).[12] Other initiatives such as Converge Challenge and CivTech have been successful in supporting entrepreneurs and the tech sector.

28 Therefore, it may be necessary to review the current funding and support landscape to assess what works well. The review should consider the need to improve the venture capital network in Scotland, and the role of the Bank, and how it cooperates with the British Business Bank, in providing capital to firms to scale up.

Concluding Remarks

29 The Report is a welcome and useful insight into the importance of one aspect of the Scottish tech sector and its role in the economic recovery. There is an array of existing initiatives and projects that are aimed at supporting the sector in Scotland; and the Report highlights that there is an unstructured approach across the existing infrastructure.

30 Therefore, we would encourage the Scottish Government to adopt a structured approach which will connect the existing initiatives and projects supporting the technology sector, while boosting funding to utilise the existing infrastructure across agencies and institutions. This will allow the recommendations of the Report, and those of future reports, being fulfilled easily through the forthcoming Digital Strategy,[13] which we will be pleased to engage with.

12 Biggar Economics. 2019. 'Royal Society of Edinburgh Enterprise Fellowships – Evaluation and Economic Impact Assessment'. http://www.rse.org.uk/wp-content/uploads/2019/10/RSE-Enterprise-Fellowship-Final-Report13.8.19.pdf

13 Scottish Government. 2020. 'Digital Strategy for Scotland'. URL: https://consult.gov.scot/digital-directorate/digital-strategy-for-scotland/

Additional Information

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