scottish science advisory council

Making the most of our Scientific Excellence

SCIENCE AND ENGINEERING DELIVERING THE FUTURE

FEBRUARY 2013

The Scottish Science Advisory Council (SSAC) is Scotland's highest level science advisory body, providing independent advice and recommendations on science strategy, policy and priorities to the Scottish Government.

The terms of reference for the SSAC are to advise the Scottish Government's Chief Scientific Adviser on a broad range of scientific issues and science-related policies that will grow our economy and raise our quality of life and will further enhance Scotland as a science nation. To address the breadth of the remit of the SSAC the membership of the Council has been drawn from right across the science, business and academic communities and has a broad range of expertise and experience in science-related matters.

Further details about the SSAC, including a full list of members, can be found on its website: www.scottishscience.org.uk

SSAC Innovation Sub-Group Members

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Executive Summary

1. Many measures of the output and quality of the scientific research undertaken at Scotland's universities place our performance as very high compared with other countries, certainly in the top quartile.

2. It is generally accepted that innovation is a strong driver of economic growth, for it is usually by the creation of new goods and services that business can grow and prosper in today's fast moving competitive global economy.

3. However, despite Scotland's excellent performance in scientific research, the country's economic growth has been relatively poor, in the third quartile, well behind countries with a less productive science base. Similarly, our relative investment in commercial R&D also lags comparable economies.

4. It would seem that our excellence in scientific and other research is not generating the economic benefits that might be expected. The SSAC determined to undertake an investigation into why this is so and how to alleviate it.

5. In preparing this report, the SSAC organised a number of workshops to explore 'facilitating innovation' in Scotland. The purpose of these workshops was to explore relevant issues and to encourage some fresh thinking based on the experiences of the participants and new ideas generated through discussion.

6. A wide range of participants from industry and industrially connected academia attended the workshops and took part in the discussions. Workshop participants were encouraged to think constructively about measures that could increase the delivery of economic value from Scotland's science and engineering base. The outputs of these workshops identified the perceived barriers to successful innovation or knowledge transfer from the viewpoint of the various participants.

7. The overwhelming conclusion from these workshops was that Scottish universities were not as strongly connected to the wider economy as might be desired. In particular:

    - Graduates, although equipped with a high quality education in their respective disciplines, do not acquire adequate skills required for operating in a commercial environment in subjects, such as negotiation, budgeting and project management, which would better equip them for managing projects in their subsequent careers.

- Many university researchers are dissuaded from becoming engaged in external commercial activities (even those that follow on directly from the outcomes of their research), often perceiving it as not positively contributing to their research career or career progression.
- The transfer of inventions and techniques from the research base to successful commercial exploitation is often fraught with difficulty and this process should be simplified and improved.

8. Very few of the industrial attendees at these workshops reported any meaningful connection with the university research sector. We suggest that this lack of commercial skills in our graduates and lack of engagement with the wider economic community means that Scottish business is significantly less innovative than might otherwise be the case.

9. The workshop events and other meetings helped to inform the thinking and direction of the SSAC project by defining the themes, capturing the issues and proposing ways forward. Subsequent work by the SSAC sub-group has sought to develop these ideas. This report summarises the work undertaken and makes a number of recommendations which we believe will be helpful in seeking to increase the level of economic benefit arising from the nation's investment in the science and research base. A full list of all recommendations is included in Appendix A.

Principal Recommendations

10. With respect to skills within our universities we recommend that:

- Commercial skills should be embedded in all Science, Technology, Engineering and Mathematics (STEM) courses and that a rigorous and consistent approach should be adopted across the sector that would apply to all Scottish STEM graduates irrespective of their institution or subject discipline.
- A series of carefully designed annual 'entrepreneurship' summer schools is established for self-selecting enthusiastic undergraduates.
- Consideration should be given to defining and implementing promotion criteria, appropriate to individual institutions, that encourage and reward STEM academics who focus, for a period, on innovation or commercialisation associated with the outcomes of excellent research.

11. With respect to licensing technology from universities we recommend:

- A more consistent approach towards IP licensing, spin-out formation and investment and neonatal support be developed across the sector in Scotland together with a number of simple and standard 'boilerplate' legal agreements and investment conditions.

12. With respect to supporting the survival of growth-based businesses we recommend:

- The Scottish Government examine setting up a 'payroll support' scheme to encourage specifically postgraduate-level employment in SMEs based in Scotland.

Innovation

1. The word innovation means different things to different people. Innovation may be defined as *"the creation of better or more effective products, processes, services, technologies, or ideas and utilisation of them through acceptance by markets, governments, and society in general"* or, alternatively as *"the whole process from: invention, development, pilot production, marketing to production. Invention is just invention*".

2. The above definitions make it clear that innovation encompasses invention or discovery but goes much further in that innovation incorporates the practical development and application of any new idea or method. Invention (or discovery) refers more directly to the creation (or realisation) of the idea or method. While society may ultimately be enhanced by new knowledge deriving from invention and/or discovery, it is the process of innovation that translates this knowledge into practical applications that result in societal and economic benefit.

3. In the context of this report we define innovation as *"the creation and utilisation of better or more effective products, processes, services, technologies, or ideas arising directly or indirectly, wholly or partly, from the presence or activities of the science and research base".* Thus, when we talk about increasing innovation within this report, we mean increasing the level of useful economic activity and related benefit that derives, at least to some extent, from the practical application of the research and other academic activities of the science and research base.

4. Considering ways in which to increase innovation is not new. Innovation has been considered many times before with mixed success. At a UK-level, the House of Commons Science and Technology Select Committee recently conducted an inquiry into the difficulties of translating research into commercial application, concentrating in particular on the lack of funding or so-called 'valley of death'.[1] The successful Silicon Valley model of innovation has proven very difficult to emulate despite many efforts around the globe during the last 20 years. Our purpose is not to revisit all that has gone before, but rather to view the topic in the context of current circumstances.

5. One key component of innovation is scientific research. On the basis of the number of scientific papers per head of population published in major peer reviewed publications, and which are cited by others as significant, Scotland performs extremely well in the international arena. In 2009, Scottish publications received 1.8% of world citations and Scotland produced 1.9% of the world's top 1% of highly-cited papers.[2]

6. Unfortunately, there is little evidence to suggest that over the years Scotland has been as successful in translating this scientific prowess into commensurate economic growth. The country remains third quartile in measures of relative economic growth, well behind countries with a much less productive science base. Business expenditure on research and development is recognised to be crucial to increasing economic competitiveness. In 2010, Business Enterprise Research and Development (BERD) expenditure was equivalent to 0.52% of GDP in Scotland compared to 1.09% of GDP in the UK. Similarly BERD expenditure as a percentage of GDP has historically been lower in Scotland than in most competitor countries.[3]

7. The key question, therefore, is: "*is it possible to better utilise a well established and internationally recognised science and research base to aid national economic performance?*". This report looks at ways in which Scotland's performance in innovation might be enhanced.

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1 http://www.parliament.uk/business/committees/committees-a-z/commons-select/science-and-technology-committee/news/111215-new-inquiry---bridging/
2 Scottish Government, International Comparative Research Performance, 2009
3 Statistics Publication Notice - BERD 2010, A National Statistics Publication for Scotland, Scottish Government, http://www.scotland.gov.uk/Topics/Statistics/Browse/Business/RD/BERDreport10

8. We consider three broad areas where it may be possible to make improvements to the process of innovation. These are:

   - **Better equipping the graduate workforce.** Here we consider ways of making the graduate workforce more economically productive through encouraging more commercially and entrepreneurially aware graduates. We recognise that graduates are one of the most significant contributions that our Higher Education Institutes make to the Scottish economy and it is hoped that by engendering a change in perspective and mindset this will lead to a positive effect on the economy in the longer term.
   - **Increasing Knowledge Transfer leading to economic growth.** Here we propose methods of targeting, promoting, easing and accelerating the translation of research outcomes from the science and research base into a commercial environment in which they can be exploited effectively.
   - **Boosting the survival and growth rates of young knowledge-based companies.** High-technology start-up companies and university spin-out companies today face a very challenging environment in which to grow and prosper. We propose some mechanisms through which the constraints and challenges of the current environment can be alleviated.

9. Some of our recommendations are, we believe, new. Some are not entirely new but have been adapted to better fit the current context. Some have been tried before and appear to have failed, but where the perceived failure has been down to implementation or other circumstances such as premature truncation, they are considered to be worth revisiting.

Better Equipping the Graduate Workforce – Students

10. In addition to the leading-edge research being undertaken in Scotland's universities, a major and perhaps sometimes under-recognised way in which academic institutions contribute to the Scottish economy is through the provision of talented graduates who enter the workforce. Ninety per cent of Scottish graduates in 2008/09 found employment or started further learning within 6 months of graduating and brought their new-found skills and knowledge to their new roles.[4] It would be helpful, therefore, if government could work with both universities and industry to ensure that graduates from Scottish universities are equipped with the necessary commercial and managerial skills and, in some cases, entrepreneurial spirit to effectively and quickly contribute to the Scottish economy.

[4] Universities Scotland, Briefing Paper: Knowledge Exchange: an overview, http://www.universities-scotland.ac.uk/index.php?page=briefing

11. We advocate neither revolutionising the way that STEM is taught in Scottish universities nor diluting the excellent scientific grounding that students receive, but we posed the question: *"Are there some generic skills or awarenesses that would be useful in making early career graduates in a broad range of working environments more productive and more valued by employers and which could be incorporated into current STEM degree courses in Scotland?".*

12. The clear answer that came back through our research and workshops was that a greater commercial awareness and a stronger, inter-disciplinary and entrepreneurial mindset amongst our graduates would be of benefit to, and greatly valued by, a wide range of businesses, both large and small. While most employers and potential employers recognised that considerable progress had been made in terms of improving soft skills such as team working and presentation abilities, there was a general feeling that many graduates, although proficient in their particular disciplines, were still 'commercially naïve'.

13. **Equipping graduates for the workforce – embedding commercial skills.** Scotland has a long and proud history of distinctiveness from the rest of the UK (RoUK) in, for example, its systems of law and education. We propose to emphasise this distinctiveness in our STEM graduates in a way that is timely and meaningful. Whilst accepting that some students will eventually pursue a career in academia, the vast majority will pursue other careers. Our proposal is that Scottish degree programmes in STEM subjects should ensure that students graduate with a solid grounding in commercial skills. The detailed specification and implementation of such skills is beyond the scope of this document but they would include areas such as financial planning and budgeting, project planning and monitoring, risk analysis and mitigation together with negotiation and people management skills. It is important to emphasise that such skills are not the sole preserve of commercial or business related areas. They are applicable to a wide range of activities which STEM students are likely to encounter throughout their working life, whether they move into academic research and development or into the wider world of work.

14. We recognise that not all undergraduate students will be receptive to the inclusion of these topics into their degree programme, preferring to focus exclusively on their discipline of choice, so it may be preferable to weave these topics closely into the existing fabric of the degree rather than treat them as additional bolt-on modules. A recent report from the Royal Academy of Engineering reinforces this view – 'Educating Engineers in the 21st Century' – recognised the need for a *"limited requirement for training in key business skills, envisaged primarily as commercial awareness – an understanding of*

how businesses work and the importance of the customer – combined with the basic principles of project management".[5]

15. We believe this will help to differentiate Scottish graduates and give them a competitive advantage in the graduate job market. While we recognise it is beyond the remit of SSAC, we are minded to suggest that consideration be given to this component being included within all Scottish degree courses irrespective of the particular discipline. As exemplified by the first Case Study, much good work is already being done in this area although overall it appears to vary significantly across disciplines and institutions.

16. We recommend that commercial skills be embedded in all STEM courses and that a rigorous and consistent approach be adopted across the sector which would apply to all Scottish STEM graduates irrespective of their institution or discipline.

[5] Educating Engineers for the 21st Century, The Royal Academy of Engineering, June 2007

Case Study 1: Bio-Business – Inspiring the Next Generation of Business Savvy Scientists

Andy Porter, Prof of Molecular and Cell Biology, University of Aberdeen. Founder of Remedios and Haptogen

At the University of Aberdeen we believe that life science graduates need to be 'business-savvy' to compete in the marketplace today and of the future. We have, therefore, put significant resources into developing a series of Bio-Business degrees that enable our students to benefit from the expertise and experience of bio-entrepreneurs from academia and industrialists from the biotechnology and pharmaceutical sectors.

With the appropriate training our life science students graduate with not only a strong scientific grounding but also an understanding of Bio-Business. This provides them with a competitive edge when seeking employment (now documented in a number of case studies). Our postgraduate Bio-Business degrees have been running for about 5 years and their success has led us to develop an equivalent undergraduate programme.

The Bio-Business component of the undergraduate degree requires the students to take additional credit bearing courses over 3 of their 4 or 5 year degree programmes. Courses run for first or second year students (combined) followed by a third year and finally fourth year courses. The Bio-Business options lead the students progressively through an understanding of the language of business and finance to the protection and commercialisation of intellectual property and finally to the setting up of their own small pharma or biotech business. We use the drug development process as a model and build the business scenarios around pharma and biotech businesses and business strategies. Students learn everything from project management and budgeting to the role of Directors on a Board (on which they sit as part of their 4th year course) and they are eventually required to pitch for cash in a 'Dragon's Den' setting in front of real investors and biotech entrepreneurs.

Our first cohort of Bio-Business students graduated in July 2012. The Bio-Business options are incredibly popular with our undergraduates and there are currently more than 70 students enrolled on the programme.

Building on the success of our undergraduate and postgraduate programmes we have now developed (and run very successfully several times) a 1.5 day CPD course which is designed to provide bench research scientists in academia (PhD and above) and in small biotech companies with the understanding and skills they will need to begin to either commercialise their own scientific research or better understand the importance of the experiments they are performing in a commercial setting.

17. **Equipping graduates for the workforce – multi-disciplinarity.** University education in STEM is designed to provide a broad based education as opposed to a narrow specialist training for a particular job. It is widely recognised that most large and complex STEM related problems are solved by multi-disciplinary teams. However, with the exception of options to take an outside course in the first and second year, it would appear that most STEM graduates are educated within an environment which is largely that of a single discipline (or two closely linked disciplines in the case of a joint honours degree) and almost always that of a single faculty or college.

18. We recommend that close attention be given to preparing graduates to operate in and collaborate in a multi-disciplinary environment and suggest that avenues such as cross-disciplinary projects and other activities in the latter years of a degree be explored.

19. **Equipping graduates for the workforce – entrepreneurship.** Entrepreneurship, unlike commercial awareness, is not for, nor does it appeal to, everyone. However, Scotland urgently needs to identify, nurture and unlock more of the entrepreneurial potential within its undergraduate population. The Scottish Institute for Enterprise (SIE) is the national organisation for promoting and supporting enterprise and entrepreneurship in Scotland's universities.[6] It has done, and continues to do, a good job of inspiring students who may never have thought about starting a business through a number of successful, high-profile events such as annual Student Enterprise Summit and activities such as the Residential Bootcamp where anyone can try out their ideas. However, the funding of the Scottish Institute for Enterprise has been limited and its activities are spread very thinly among all of Scotland's Higher Education Institutions. Another interesting initiative is the TechMeetUp, a monthly event organised and run by volunteers which allows developers and others in the tech community to meet up to discuss their latest work, promote innovation and commercial opportunities.[7]

20. We recommend that a series of annual 'entrepreneurship' summer schools is established for self-selecting enthusiastic undergraduates together with a review of the funding allocated for the SIE.

6 http://www.enterprise.ac.uk/index.php/members/item/120-scottish-institute-for-enterprise
7 http://techmeetup.co.uk/

21. **Equipping graduates for the workforce – global perspective and cultural diversity awareness.** Like research, business and commerce is increasingly global in its scope and reach. If Scottish graduates are to help their organisations compete in the global marketplace it is important that they should graduate with a global perspective and awareness of cultural differences. This is particularly relevant for Scotland given the relatively isolated geographic nature of the country and relatively small size of the home market. By way of example, it is generally accepted that countries, such as the USA, that appear to breed graduates with creative, ambitious and 'can-do' entrepreneurial mindsets have stronger track records in generating economic impact from research excellence.

22. There is valuable learning to be gained from exposing Scottish students and graduates to these more enterprising attitudes. The British Council has drawn attention to this in a recent report.[8] Key findings, based on the responses of UK business leaders to a survey, that are relevant include:

- For job seekers, knowledge and awareness of the wider world is more important than degree classification.
- Three-quarters of businesses think we are in danger of being left behind by emerging countries unless young people learn to think more globally.
- Those businesses for which at least three-quarters of their trade is with people from another culture find it significantly harder to recruit employees with the right skillsets than less globally-oriented businesses.

23. There are already some existing programmes that seek to achieve this, such as the Saltire Foundation[9] (see Case Study 2). This is an independent charity foundation that arranges international commercial/industrial experience for two early career key groups, Saltire Scholars and Saltire Fellows, with the aim of substantially enhancing their global perspective and commercial productivity.

24. We recommend that attention be given to increasing the scope of, and access to, initiatives such as the Saltire Foundation that can help to enhance the global perspective of graduates.

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8 The Global Skills Gap - Preparing young people for the new global economy. Think Global &The British Council, 2011. http://clients.squareeye.net/uploads/dea/documents/BusinessPoll_online_TG.pdf

9 http://www.saltirefoundation.com/

25. While schemes such as the Saltire Foundation send early-career Scots out to experience the world. There already exists another source of exposure to global mindsets that is not currently tapped to a significant extent in any structured way. Scottish Higher Education institutions are very successful in attracting overseas students to come and study in Scotland.

26. We recommend that efforts are made to identify ways to more effectively utilise the presence of the large numbers and great diversity of overseas students in Scotland to help raise the global perspective and cultural diversity awareness of home students.

Case Study 2:

Ian Webster, Saltire Foundation Fellow 2009

2009 was the year that the word 'entrepreneurship' finally made some sense for me. Through the early parts of my career, in corporate Britain, I associated the word with Richard Branson; Dragon's Den; and slightly shady wheeler-dealer types. By the end of my experience as a Saltire Fellow that year, I realised entrepreneurship was about seeing problems in brand new ways, getting stuff to happen regardless of the obstacles that face us, and the buzz of working with teams who are passionate about what they're doing. In fact, I realised this was exactly what I wanted to do with my life.

Prior to the Fellowship, I'd worked for some very large companies, beginning my career working in product and pricing management at Vodafone, and latterly working on developing new products for Halifax Bank of Scotland. These roles gave me a great training in marketing and commercial management, which has definitely stood me in good stead. But they also left me realising that it would be very easy to stay a small cog in a large machine for a long time, and that if I wanted to scratch the itch of wondering what it would be like to be right at the sharp end in a newer business, I would need to do something about it.

Giving up my job and heading to the United States as one of fourteen Saltire Fellows was quite a dramatic way of resolving this question! The programme started with 4 months at Babson College outside Boston, where we tried to get as much knowledge as possible from the professors. These included the CEO of Timberland, the head of the Girl Guides worldwide, and our professor who had sold the IP from his consulting company to the US Department of Defence for a figure confidential to him and his reputed 5 ex-wives. I followed this up with a 3-month project at the US's sixth biggest insurer, Liberty Mutual, working on changing call centre operations in 5 states, before returning to Edinburgh for a 3-month placement with start-up Fanduel, based out of the University of Edinburgh Informatics incubator.

This experience was where it became real to me that there was no reason a small, highly energetic team in Scotland couldn't compete with the big boys. Through carving out a new niche in daily Fantasy Sports, Fanduel now employs people in New York and San Francisco, as well as the core team in Edinburgh, and raised £2m last year to continue its expansion.

After the formal part of the Fellowship ended, I joined Dundee-based brightsolid, a leading light in the online genealogy market, and one of the fastest growing digital media businesses in the UK. One of the most exciting things I'm working on right now is trying to find the key to getting younger audiences interested in finding their past, looking at lessons from Gaming, TV and the humble Doll's House.

This puts me in great company with the other Saltire Fellows, who are answering questions like whether technology to shrink generators could revolutionise the Wind Energy sector; whether the waste products from the Whisky industry could themselves unlock new forms of power; and whether creating one of the world's best facilities for new business can result in a whole new raft of successful companies. All these ideas are being turned into businesses in Scotland which could go on to lead the world.

27. **Equipping early career graduates – a new graduate training scheme.** In most cases, a degree is not intended to be and, therefore, is not a guarantee that a new graduate will hit the ground running and immediately make a substantial contribution in the workplace. In Scotland, a generation ago, new graduates in physical science and engineering typically joined very large companies such as Hewlett Packard, Motorola and Ferranti. These companies had the infrastructure and resources to implement graduate training schemes intended to accelerate the transformation from individual absorber of abstract information in an academic learning environment to valuable member of a team and contributor of ideas in a technical and/or commercial environment.

28. Today the company landscape is much more fragmented with fewer large companies, particularly in Scotland, and many more SMEs and start-up companies seeking to employ graduates. SMEs now account for over 99% of businesses in Scotland and over 53% of employment.[10] Graduates entering the start-up or SME company environment have different, greater and more pressing needs. These companies are less likely to have comprehensive in-house graduate training schemes given the resource and infrastructure requirement to support such schemes. And yet they still require that new employees quickly become productive. A recent Royal Academy of Engineering report noted that: *"Whilst almost 90% of companies with over 500 employees report having graduate training schemes in place, more than half of the SME respondents do not."*

29. We recommend that government consider, after consultation with industry and the professional bodies, encouraging the creation of one or more generic graduate training scheme(s) matched to the needs of companies, including small and start-up companies, that do not have in-house schemes.

Better Equipping the Graduate Workforce – Staff

30. **Career Development for innovative and entrepreneurial academic staff.** As in any other organisation or sector, academics who wish to win promotion or advance their career are driven by the criteria of the promotion system. In academia, despite increased recognition of teaching excellence in recent years and the fact that several HEIs include Knowledge Exchange and Impact in their promotional criteria, the primary driver for career advancement is still predominantly research excellence. This can leave the academic community open to accusations of living in an ivory tower adjacent to but disconnected from the real world.

[10] Scottish Corporate Sector Statistics 2011, Scottish Government, www.scotland.gov.uk/publications/2011/10/SCSS11

31. While in no way wishing to undermine the value of academic research we would wish to see more career advancement opportunities for academics involved primarily in innovation, entrepreneurship and the commercialisation of research (even at the expense of 'excellence' in pure research for that individual). We believe that overall the system would benefit from the additional diversity created as a result. In short, academics should not have to make a stark choice between pursuing conventional career advancement and innovation opportunities.

32. Consideration should be given to defining and implementing promotion criteria, appropriate to individual institutions, that encourage and reward STEM academics who focus, for a period, on innovation or commercialisation associated with the outcomes of excellent research.

33. We recognise that such a route is only likely to be attractive to a relatively small number of academics and that a balance would need to be struck between an Institution pursuing this recommendation and maintaining or enhancing its ability to attract third party research funding. However, a helpful precedent for such an approach is that, in recent years, there have been several appointments to the level of professor based on teaching excellence which are widely recognised to have benefited the relevant institutions.

34. **Broadening horizons for academics and researchers – commercial and industrial-application awareness.** The majority of academic lecturers and post docs have little or no direct commercial or industrial experience. In order to help make the syllabus more immediately relevant to the workplace we need to develop programmes to encourage secondment opportunities for a greater proportion of academics to industry and encourage the interchange of staff as is common in other nations, such as Germany and the USA. Furthermore, there is still a need for many research-led academics to become more aware of the commercial world and the opportunities for their technology in innovative business formation.

35. The Royal Academy of Engineering run a well-regarded Industrial Secondment Scheme[11] that provides an invaluable opportunity for engineering teaching staff in Higher Education Institutions to gain up to date knowledge of current working practices through industrial experience. The secondment also provides the award holder with access to material in order to create new case studies and improve course design with greater industrial relevance. The Scottish Funding Council has also recently recognised the importance of

[11] http://www.raeng.org.uk/research/univ/secondment/default.htm

this area in that an amount of funding for research pooling, to compensate for last year's cut, has been earmarked for placements for early career researchers in industry or public policy organisations.

36. We recommend that, in the tradition of sabbaticals, secondments to or fellowships with relevant companies should be more strongly encouraged for STEM academics.

Increasing Knowledge Transfer Leading to Economic Growth

37. It is widely accepted that innovative new businesses are a vital component of any modern economy. While existing established businesses typically make a much more substantial contribution to the economy at any one time, it is often new and innovative businesses that contribute much to the future growth of high quality employment and export earnings.

38. Robert Solow's Nobel Prize-winning attribution of more than half of all economic growth in America since World War II to technological progress has been echoed by everyone from career academics to the Department of Commerce to the National Academies to the Organisation for Economic Co-operation and Development to the White House.[12]

39. Research published by NESTA in October 2009, 'The Vital 6 per cent',[13] identified innovation as crucial to the formation of such high-growth businesses. Meanwhile, the UK Treasury has reported that almost 50% of Private Sector output in the UK is conducted by Small and Medium Sized Enterprises (SME), and that these represent 14 million jobs.[14] In order to ensure the health of the economy government policy needs to address how to encourage the formation and growth of such companies.

40. **Technology push versus market pull.** Governments and enterprise agencies have often targeted research groups, particularly within HEIs, as suitable sources of innovative companies. Such policies may be misguided because:

- The research work, even if it has commercial possibilities, will often be far ahead of market; will normally require very significant development and marketing expense to turn into a commercial product; and it will often be very difficult to sell products based on such early stage innovation into immature markets.
- Such spin-out companies are often 'technology-driven' and not 'market-led'. Market-led opportunities are much more likely to be successful.

[12] Science Progress (2011)
[13] www.nesta.org.uk/library/documents/Vital-six-per-cent-Nov2010-v3.pdf
[14] Claire Ashton, UK Treasury, in presentation to LINC Conference, Edinburgh, 15th May 2012

41. This is not to imply that we should seek to divert the focus from excellence in research. The very high quality of our research is of great significance in enabling graduates and postgraduates to develop skills and knowledge which allow them to exploit cutting-edge technology from wherever it has been sourced, anywhere in the world.

42. There are a number of facilities and initiatives already in place focused on encouraging and facilitating spin-out and start-up companies in Scotland. The Edinburgh Pre-Incubator Scheme (EPIS) was one such initiative which was established in 2003 by the University of Edinburgh with financial support from Scottish Enterprise and the European Regional Development Fund. The scheme, which was open to graduates from anywhere in the world, gave people with bright ideas for technology-based businesses the time, resources, support and advice to help them bring their plans to market. And retain them. Over the next seven years 66 entrepreneurs were supported by EPIS, leading to the creation of 51 companies. The key aspect of EPIS was that it was targeted at innovative individuals with a good business idea, and not at spinning out technology from research laboratories. Unfortunately, funding support for EPIS was withdrawn in 2010 but we feel that there remains a strong case for the establishment of schemes, similar to EPIS, to be embedded in all of our major research-intensive universities.

43. A similarly successful programme is Informatics Ventures at the University of Edinburgh where some 36 companies are now trading from 'incubator units' on three floors of the Appleton Tower, adjacent to the University's Informatics department. It should be noted that most of these companies are not spin-outs but are based there due to their increased access to quality recruits and exposure to cutting-edge technology trends. The facility for academic researchers and young SMEs to mix readily is enormously important in broadening the cultures of both. New incubator initiatives could learn from this experience (see Case Study 3).

44. The examples given above have tended to be more successful than the existing incubators at Hillington or Alba (Livingston) since the latter are located in 'development areas' to allow access to European funding, and consequently are at some distance from the academic research departments, limiting the potential benefits of close collaboration that develops naturally with proximity.

45. We recommend that further incubator units along the lines of the former EPIS centre at Edinburgh should be set up at research-intensive institutions throughout Scotland.

Case Study 3:

ProspeKT Project

ProspeKT was a 5-year partnership between Scottish Enterprise and the University of Edinburgh, started in July 2006. It focused on looking at ways to gain economic benefit for the School of Informatics and to leverage the academic excellence of the School which is the largest of its type in Europe and the highest rated in its group in the last two Research Assessment Exercises.

The project had its own Director of Commercialisation and a team of 4 Business Development Executives, This meant the project had roughly 4 times the business development staff of a comparable School at Edinburgh. In parallel with the building of the School's new building – the Informatics Forum, 3 floors of space was refurbished in the Appleton Tower just across the road. This space housed the commercialisation team and a community of some 20+ early stage, technology based start-ups.

The governance of the project was through a supervisory board with representatives of all of the stakeholders and a number of industry based members. This gave the Director some latitude to develop and adapt the project direction, subject to board approval. Though the BDE team pursued patenting and licensing as would be standard for a TTO (some 30 licences were signed over the term), a decision was taken early on to pursue generating start-up activity as the best way to maximise impact on the local economy. The structure of Scottish ICT meant that most licences would go to multi-nationals and not be exploited locally. The project produced a record 43 start-ups and spin-outs in 5 years through a period of recession and when the UK university start-up activity was in a decline. The programme cooperated with a number of other initiatives to foster this level of activity: EPIS, the RSE Enterprise Fellowship Scheme, SE's Proof of Concept programme and the UKRC Follow on Funds. An Entrepreneurs in Residence Group was set up to help mentor some of the early stage companies.

The project initiated 2 major annual events. Demofest takes place in the autumn and seeks to encourage research collaborations between industry and the academic community, it is promoted by ScotlandIS, the trade association and SICSA, the research Pool. Engage Invest Exploit is an investor conference held in the Spring to showcase the local start-ups and gets a large attendance of investors both from Scotland and the South with some 35 companies being on show each year.

The Project also raised ERDF funding to set up Informatics Ventures, a national programme to encourage ambitious start-ups in the technology arena. This focused on developing a programme of entrepreneurial education leveraging the links that had been developed with Stanford and MIT. The seminars and CEO Master class workshops within the programme also formed a meeting place for the various elements of the local entrepreneurial community. More community development activities such as the Tech Meet Up groups in Edinburgh, Glasgow and Aberdeen and elevating of the profile of women in Computer Science by working with the Girl Geeks helped raise the start-up profile in the area. A series of bursaries to the MIT EDP programme was also set up to encourage a more globally ambitious approach.

On a wider front the project was involved in a large number of inward investment activities with SDI and UKTI, notable successes being the arrival of Amazon, Avaloq, Virgin Bank and Enstratus. Disney Research and EADS also set up innovation labs in the Appleton Tower community.

46. As well as encouraging new company formation there is also a need to increase the interaction between established businesses and organisations in Scotland with the academic community. An example of a existing initiative in this area is Interface. Interface links companies with issues or problems to appropriate academic expertise. Although relatively small-scale, it is generally considered to be successful. However, Interface is funded by the Scottish Funding Council (SFC) to find solutions from within academia in Scotland and so it could be viewed as primarily serving the academic community rather than the economy.

47. We recommend reconfiguring Interface primarily to serve the Scottish economy.

48. This will require additional resources and could be achieved by:

    i. Allowing Interface to take on the issues of Scottish companies and search for solutions outside Scotland.

    ii. Allowing Interface to take on the issues of Scottish companies and search for solutions outside Academia.

49. In a further significant development in the area of knowledge exchange, the SFC, in partnership with Scottish Enterprise and Highlands and Islands Enterprise, announced in April 2012 that it would be providing funding to establish Scottish Innovation Centres in key sectors of strategic importance to the Scottish economy.[15] It is hoped that the Innovation Centres will act as a focus for direct industry-academia links, help to foster greater entrepreneurialism and serve as a focus for skills training.[16]

50. As well as encouraging new company formation and encouraging greater interaction between the business community and academia there is also a need to increase the commercial and managerial skill base of those individuals keen to start their own businesses. In this context, the Scottish Enterprise/ Royal Society of Edinburgh Enterprise Fellowship scheme has made a useful, albeit relatively limited, contribution of the last few years as has the Industrial Enterprise Fellowships until recently offered by Scottish Enterprise.

[15] http://www.sfc.ac.uk/news_events_circulars/mediacentre/press_releases/2012/PressReleases_SFCPR042012.aspx
[16] http://www.sfc.ac.uk/news_events_circulars/Circulars/2012/SFC0612.aspx

51. The Enterprise Fellowship scheme has been run for many years by the Royal Society of Edinburgh with funding from Scottish Enterprise (see Case Study 4), and a similar programme has been launched by the Royal Academy of Engineering. This is an open competition to postgraduates and post-docs in universities who believe they have a commercialisable project. Successful candidates receive a substantial financial and educational support package which provides one year's salary and training in entrepreneurial skills. The quality of applicants for Enterprise Fellowships has varied widely in recent years and the scheme could benefit from broader exposure; research leaders in universities should be encouraged to promote this opportunity more actively to appropriate candidates.

Case Study 4:

SE/RSE Enterprise Fellowship Scheme

Prof Andrew Mearns Spragg is Founder & Chief Technology Officer of Aquapharm Biodiscovery Ltd, a marine biotechnology company pioneering the development of novel functional ingredients and pharmaceuticals derived from a proprietary collection of marine micro-organisms, an untapped source of new biodiversity.

"I first became aware of the Enterprise Fellowship scheme during the final months of my PhD. My entrepreneurial instincts were encouraged at an early stage in my PhD career through a chance meeting with a biotechnology entrepreneur who helped me to recognise the opportunity and ability of researchers to transition to business leaders through new venture creation. This meeting also gave me the confidence and excitement that my PhD research could lead to the development of a range of novel products/technologies from the untapped potential of marine micro-organisms.

The SE/RSE Enterprise Fellowship scheme was still a relatively young project when I applied and I was thrilled to be awarded a Fellowship in 2000. I was encouraged to apply for the Fellowship programme as it provided me with a relatively risk-free opportunity to develop my concept through provision of a year's salary and the time necessary within a host institution to develop a full business plan and seek investment. An important factor of the programme was the ability to leverage RSE networks to access business mentors, business experts and professional advisors and with the necessary business training to convert my skills as a bench scientist into a commercial leader.

An important aspect of the Fellowship scheme is the provision of business training. During my Fellowship, business training was provided through a number of short courses within the business department of Glasgow Caledonian University. These courses covered the basic principal of new venture creation and covered effective marketing, business strategy planning, IPR management and financial planning (P&L/Balance sheet). I found this an incredibly useful exercise as it a) allowed me to meet and network with other RSE/SE Fellows and b) provided me with a framework understanding of how to build a robust business and generate value.

On completion of my Fellowship, I was able to 'spin-out' Aquapharm and use the business skills and networks gained through the SE/RSE enterprise scheme to strengthen my business knowledge through additional support of Non-Executive director mentorship. With the support of my Co-Founder we were able to build on our knowledge of business best practice to not only secure investment from Angel/VC, but were also able to develop strategies to secure revenues into the business at an early stage of the company's history.

Today, the company has grown into a successful biotechnology business having gone on to secure >£10m private funding and now employing over 20 FTE working on projects with leading commercial players in the industrial biotechnology, cosmetics, consumer care and pharmaceutical industry."

52. Clarke (1998),[17] found evidence of the importance of institutional norms, standards, and culture. Based on a qualitative analysis of five European universities that had outstanding performance in technology transfer, he concluded that the existence of an entrepreneurial culture at those institutions was a critical factor in their success.

53. Lockett and Wright (2005),[18] utilising data from a UK survey of all research universities that are active in spinning-out ventures, found that the presence of sufficient experience and expertise within what are historically non-commercial environments may be central to their ability to generate gains from spin-out ventures. The authors report that both the number of spin-out companies created and the number of spin-out companies created with equity investment are significantly positively correlated with the level of expenditure on intellectual property protection, the business development capabilities of Technology Transfer Offices (TTO) and the royalty regime of the university. In contrast, they find no correlation between the number of start-ups and either the number of TTO staff or the number of years the TTO has been in existence.

54. **Knowledge Transfer (KT) Organisations in Scottish Higher Education Institutes (HEIs).** The large number and variation of KT organisations associated with HEIs (effectively 1 per institution) is often a cause for concern for those wishing to engage with Scotland's scientific research base. The differing mechanisms used for collaborative engagement, spin-out formation and investment are confusing and often very time consuming for outside parties, particularly fledgling teams engaged in the company formation stage. While we would stop short of recommending amalgamation of all the various KT organisations, we do believe there is an urgent need to promote a significantly great degree of harmonisation of processes and approaches.

55. There is an area where significant work is currently ongoing and which has the potential to substantially improve the knowledge exchange landscape in Scotland by better aligning it with the needs of industry sectors. In September 2011, the Scottish Funding Council (SFC) received the following Ministerial guidance:

    "The harmonisation of systems and approaches to establishing linkages between academia and industry across the whole of the sector will help simplify the academic landscape for business, and so I propose that you work with our institutions to deliver this through the establishment of a single 'Knowledge Exchange Office' for the sector within the next two years."

[17] Clarke, B.R., 1998. Creating Entrepreneurial Universities; Organizational Pathways of Transformation. New York: IAU Press

[18] Lockett, A. and Wright, M. (2005). Resources, Capabilities, Risk Capital and the Creation of University Spin-Out Companies, Technology Transfer and Universities' Spin-out Strategies. Research Policy, 34(7), 1043-1057

56. In order to progress this, SFC and Universities Scotland established a joint working group to explore how a single knowledge exchange office for Scotland could be realised. The group published their report earlier this year[19] which was followed by a public consultation on the proposals outlined.[20] SSAC welcomes this increased focus on creating more effective knowledge exchange mechanisms as we believe this is a crucial element to achieving greater economic returns from the excellence in our science base. We do, however, have some concerns as to the practicality of establishing a single knowledge exchange office for the whole of Scotland.

57. **Intellectual Property (IP) Licensing by universities.** Similarly, in terms of IP licensing, we believe there is a need for a greater degree of simplification and harmonisation across the sector in Scotland. In 2008/09, Scottish universities filed 308 patents, equating to approximately 15 per cent of the patents filed by UK universities that year, and granted over 170 non-software licences to business. The revenue to universities from intellectual property in that year was £5.6m.[21] The process of spinning-out and licensing IP from Universities is very variable, often complex and frustrating. Standards should be set so that the vast majority (over 95%) of such deals are simple 'cookie cutter' which require minimum negotiation. In this respect, the Easy Access IP scheme pioneered by the University of Glasgow is to be welcomed (see Case Study 5).

58. We recommend that a more consistent approach towards IP licensing, spin-out formation and investment and neonatal support be developed across the sector in Scotland together with a number of standard 'boilerplate' legal agreements and investment conditions.

19 http://www.sfc.ac.uk/knowledge_exchange/Universities/KnowledgeExchangeUniversities.aspx
20 http://www.sfc.ac.uk/news_events_circulars/Consultations/2012/Consultations_SFC012012C.aspx
21 Universities Scotland, Knowledge Exchange: facts and figures; http://www.universities-scotland.ac.uk/index.php?page=briefing

Case Study 5:

Easy Access IP (EAIP) at the University of Glasgow

Since November 2010 the University of Glasgow have been offering a portfolio of technologies available to licence for free under Easy Access IP, to make it easier for companies to obtain more university IP and put it to use. Building on our initial launch, we won funding from the UK Intellectual Property Office to further develop, promote and roll out the initiative to other institutions.

The aim of Easy Access IP was to lower the barriers to companies engaging with the university and exploiting the knowledge and intellectual assets. Under EAIP the university offers free licences, using simple one page agreements, to organisations that can demonstrate how they will further develop the technologies deliver value to the economy or society. Since the launch, Glasgow has completed 8 Easy Access licences involving organisations of different sizes and sectors. In addition to the licensing activities, we have more widely developed the concept of EAIP and led the sector in shaping how universities managed the exploit their IP portfolios. Overall the feedback of this new innovative process of licensing has been extremely positive. Three of these licences have already supported the development of new technical projects which have either been or are about to be launched by the companies.

Mark Tanner, Vice President of Boulder Nonlinear Systems, completed an Easy Access deal, licensing technology developed within the School of Physics & Astronomy. Mark commented, “The Easy Access IP initiative is a simple and straight-forward approach that focuses on establishing and supporting a relationship to commercialise University developed technology. I have been negotiating contracts for over 25 years and I have never experienced a more streamlined and cooperative approach in negotiating an Agreement. Boulder Nonlinear Systems is honoured to be a part of the Easy Access IP initiative as it truly establishes a cornerstone for us to build and be successful.”

A fourth licence has enabled the General Teaching Council (Scotland) to dramatically improve the student teacher placement programme by the use of more sophisticated matching algorithms and software originally developed by the university. In terms of wider developments, the university is now committing the increasing the portfolio of Easy Access IP available and is exploring a simplified disclosure process for Easy Access Technologies to support this.

Case Study 5: (continued)

Easy Access IP (EAIP) at the University of Glasgow

Impact of Easy Access IP

The launch of EAIP has generated a number of key impacts for the university including:

Significant positive media coverage on an international scale

Increased the number of business enquiries related to our IP portfolio

Developed a reputation as a university that wants to work and collaborate with business and other external agencies, in the simplest ways possible.

A number of new collaborations/relationships have been established, including some direct research funding from the licensees

Helped us developed a strong pipeline for potential future impact case studies

Wider EAIP activities

In March 2011, the university won a prize from the UK intellectual property office to further develop, promote and roll out the EAIP initiative. Since then we have 15 other research organisations (including CERN) have adopted the EAIP approach across the UK, Europe, North America and Australia. We are aware of several other institutions that are also considering using EAIP. In total 20 deals have been completed across the adopting organisations. In addition, all of Scotland's universities are adopting EAIP or developing a similar initiatives and all such technologies are being made available through UT.com

Boosting the Survival and Growth Rates of Young, Knowledge-based Companies

59. Innovative companies will often require to source risk capital in order to fund the development of their product to a marketable state and then build these markets. Sources of risk capital will often include grants (such as Proof of Concept and Smart Awards), personal debt and, crucially, capital raised by issuing equity in the business, normally from Venture Capitalists (VCs) and Angel investors. (Bank lending does not usually figure in this picture as there are normally no tangible assets in the business which can be relied upon as collateral for significant bank loans.)

60. It is widely accepted that supplies of risk capital for early stage, pre-revenue companies from Venture Capital sources has largely dried up. Professional Venture Capital companies in recent years have tended to prefer to invest in later stage opportunities and at a higher level of funding commitment than is normally required by early stage high growth opportunities. (Performance measurements for the variety of Venture Capital stages are documented by the British Venture Capital Association see: http://www.bvca.co.uk/assets/features/show/PMS)

61. With the departure of VCs from this field, most early-stage, pre-revenue companies now look to Angel funding for their initial equity-based risk capital. Angel investors are high net worth individuals who make personal investments in a business in return for shares.

62. Scottish Enterprise's Scottish Investment Bank operates a co-investment fund in Scotland which invests on identical terms to an established commercial investor (whether an Angel Syndicate or, more rarely, a VC). The Co-investment fund has allowed Angel Syndicates to effectively double their financial firepower, encouraging a stronger Angel community to be established in Scotland than might otherwise prevail.

63. The Scottish Co-investment Fund has been highly instrumental in creating a strong Angel community in Scotland. This may, however, have encouraged Scottish start-up companies to lower their ambitions to match the aspirations (and financial capability) of the Scottish Angel community rather than seek larger amounts of Venture Capital required to build substantial international businesses.

64. **A new SDF for 2013 and beyond.** The Scottish Development Finance (SDF) operation within Scottish Enterprise (the pre-curser to the now fully commercial Scottish Equity Partners) was very successful in the 1990s even although it was constrained to only invest in new Scottish technology. It often acted as the Scottish partner in a wider investment syndicate and therefore was successful in attracting substantial additional risk capital from outside Scotland into new Scottish companies.

65. We recommend that one or more SDF funds be re-established to concentrate on new opportunities (e.g. Life Sciences, Green/Alternative Energy etc). We believe that the existence of such funds would have the additional advantage of encouraging investment from outwith Scotland.

66. **Financial support for indigenous job creation.** There are a number of schemes offering support for young, indigenous, high-growth businesses, most notably the Smart Awards, however, we believe there would still be merit in the Scottish Government

giving consideration to additional forms of support. One area that could be very helpful to companies would be assistance with covering the costs of employing highly-qualified recruits for a period. (It was reported by a participant at one of our workshops that 75% of the initial payroll costs of a PhD recruit, and 50% of a MSc recruit, was subsidised by the Catalonian government.) Consideration could be given to devising a job creation support scheme to match that of existing inward investment support for job creation.

67. We recommend that the Scottish Government examine setting up a scheme to encourage postgraduate-level employment in spin-out companies and SMEs based in Scotland.

68. **Smart Procurement.** It is estimated that the public sector in Scotland spends around £8 billion a year on procuring goods and services from the private sector with NHSScotland alone spending in the region of £2 billion.[22] Yet, from our discussion with start-up companies and SMEs based in Scotland, it was frequently claimed that one of the most difficult markets to sell into was their home market.

69. In the medical sector there are several examples of companies which, although having leading edge products and having achieved significant sales overseas, particularly in the USA, have failed to achieve any material penetration into either the UK or Scottish markets. While recognising and acknowledging the need for demonstrable quality and value for money, it would nevertheless seem that more could be done through the public procurement process to encourage the development and adoption of innovative services and products in Scotland.

70. We recommend that a target 10% of public procurement (health service, local authority) be spent on innovative services and products from SMEs and that the procurement process be redesigned to allow (and even encourage) a higher level of risk in taking on new products and services.

[22] 'Review of Public Procurement in Scotland: Report and Recommendations', John McClelland CBE, 2006

Appendix A: Full List of Report Recommendations

1. Recommend that commercial skills be embedded in all STEM courses and that a rigorous and consistent approach be adopted across the sector which would apply to all Scottish STEM graduates irrespective of their institution or subject discipline.

2. Recommend that close attention be given to preparing graduates to operate in and collaborate in a multi-disciplinary environment and suggest that avenues such as cross-disciplinary projects and other activities in the latter years of a degree be explored.

3. Recommend that a series of annual 'entrepreneurship' summer schools is established for self-selecting enthusiastic undergraduates together with a review of the funding allocated for the SIE.

4. Recommend that attention be given to increasing the scope of, and access to, initiatives such as those of the Saltire Foundation that help to enhance the global perspective of graduates.

5. Recommend that efforts are made to identify ways to more effectively utilise the presence of the large numbers and great diversity of overseas students in Scotland to help raise the global perspective and cultural diversity awareness of home students.

6. Recommend that government consider, after consultation with industry and the professional bodies, encouraging the creation of one or more generic graduate training scheme(s) matched to the needs of companies, including small and start-up companies, that do not have in-house schemes.

7. Consideration should be given to defining and implementing promotion criteria, appropriate to individual institutions, that encourage and reward STEM academics who focus, for a period, on innovation or commercialisation associated with the outcomes of excellent research.

8. Recommend that, in the tradition of sabbaticals, secondments or fellowships with relevant companies be strongly encouraged for STEM academics.

9. Recommend that further incubator units along the lines of the former EPIS centre at Edinburgh should be set up at research-intensive institutions throughout Scotland.

10. Recommend reconfiguring Interface primarily to serve the Scottish economy.

11. Recommend that a more consistent approach towards IP licensing, spin-out formation and investment and neonatal support be developed across the sector in Scotland together with a number of standard 'boilerplate' legal agreements and investment conditions.

12. Recommend that one or more SDF funds be re-established to concentrate on new opportunities (e.g. Life Sciences, Green/Alternative Energy etc).

13. Recommend that the Scottish Government examine setting up a scheme to encourage postgraduate-level employment in spin-out companies and SMEs based in Scotland.

14. Recommend that a target 10% of public procurement (health service, local authority) to be spent on innovative services and products from SMEs and that the procurement process be redesigned to allow (and even encourage) a higher level of risk in taking on new products and services.

Appendix B: Methodology

A sub-group of the SSAC was formed to take forward detailed thinking on the topic of innovation. In gathering evidence to support outcomes in the form of workable proposals, the sub-group has:

- gathered and studied published material on innovation and related topics;
- devised and overseen two supporting MBA projects;
- organised a number of workshops; and
- met and discussed the topic with a range of companies, organisations and individuals with an interest in the subject.

The published material provided the broader context and foundation. The projects, workshops and dialogues provided information and opinions that also applied to the local and current circumstances.

A significant input to the project was made over summer 2011 when SSAC organised a number of workshops to explore "*Facilitating Innovation in Scotland*". The purpose of these workshops was to explore relevant issues and to encourage some fresh thinking based on the experiences of the participants and new ideas generated through discussion.

A wide range of participants from industry and industrially connected academia attended the workshops and took part in the discussions. Workshop participants were encouraged

to think constructively about measures that could improve the current situation and increase the delivery of economic value from Scotland's science and engineering base. The outputs of the workshop were drawn together by Innogen, whose staff facilitated the sessions, into a summary report entitled "*Facilitating Innovation in Scotland*".[23] This report provided a useful evidence base on which to progress the project in that it broadly covered company-related issues, university-related issues, the public sector dimension and the current investment landscape. In particular, it identified the perceived barriers to successful innovation or knowledge transfer from the viewpoint of the various participants.

Building on the success of these initial workshops, a more narrowly-focused 'Innovation Solutions' workshop was held in November 2011. Some participants from the previous sessions were invited back to re-engage, along with other participants who were new to the process, in a session focused on creative and constructive thinking to address the problems previously identified. This event was split into two sessions, each looking at an area that had arisen during the earlier workshops. The first session considered the skills and experience of graduates – in that probably the single most important area in which universities can contribute to growing the economy is in the production of graduates whose skills are highly valued and sought after by companies and organisations. The second session considered how to promote the process of knowledge transfer – a key part of innovation. The event finished with an open discussion to capture any additional ideas that did not fall into the previous themed discussion sessions.

[23] Facilitating Innovation in Scotland, Innogen, ESRC Genomics Network (not published)

Abbreviations Used

BERD	Business Enterprise Research and Development
CPD	Continuing Professional Development
EAIP	Easy Access Intellectual Property
EIS	Enterprise Investment Scheme
EPIS	Edinburgh Pre-Incubator Scheme
HEIs	Higher Education Institutes
IP/IPR	Intellectual Property/Rights
KT	Knowledge Transfer
RoUK	The Rest of the UK (excluding Scotland)
RSE	Royal Society of Edinburgh
SDF	Scottish Development Finance
SE	Scottish Enterprise
SFC	Scottish Funding Council
SIE	Scottish Institute for Enterprise
SME	Small or Medium-sized Enterprise
SSAC	Scottish Science Advisory Council
STEM	Science, Technology, Engineering and Mathematics
TTO	Technology Transfer Offices
VC	Venture Capitalists
VCT	Venture Capital Trust