**Scottish Science Advisory Council**

**Science and Engineering in Scotland in the Independence Debate**

**Background**

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 Chief Scientific Adviser for the Scottish Government.

Following the introduction of the Scottish Independence Referendum Bill in Parliament on 21 March 2013, SSAC members felt it was timely to open a dialogue about potential transitional issues for science and engineering prior to the publication of the Scottish Government’s White Paper.

The Co-Chairs contacted a wide range of key stakeholders in the science and engineering community in April 2013 and asked:

*What you would see as key questions and issues for science and engineering in Scotland as a result of the independence debate?*

In total 26 organisations and individuals responded (See Annex A) and this short report seeks to summarise those views submitted. It does not represent the collective view of the SSAC or its members, but seeks to act as a basis for informed discussion. Throughout the report references to science include science and engineering.

**Scottish Science**

Scotland's science and research base is among the best in the world. It ranks first in the world, in terms of the rate its research papers are cited relative to GDP, and second in the world, in terms of impact.[[1]](#footnote-1) The Scottish research base also performs well in terms of attracting significant research funding from the UK Research Councils and major research charities.  Although Scotland has only c. 8.5% of the UK’s population it attracts on average 10.3% of UK Research Council (RCUK) funding, 12% of charitable research funding allocated throughout the UK, and 10% of the UK allocation of EU FP7 research grants and contracts – all on a competitive basis.

It is widely recognised that science, technology and innovation are key drivers of Scotland’s future competitiveness and economic success. It is therefore vital that the nation’s scientific excellence is developed through investment in research within a financial and regulatory environment that attracts, rewards and retains innovative companies and talented researchers.

In this context the Scottish scientific community have indicated they would welcome further discussion and debate in order to prioritise scientific excellence.

**Summary**

Consultation responses identified 15 main issues that can be grouped under five headings as outlined below:

**Funding for Research and Innovation**

1. *Funding mechanisms for scientific research projects and collaborations, which include collaborations with researchers in the rest of the UK.*
2. *Mechanisms and criteria for core scientific research funding.*
3. *Access to charity science funding and mechanisms for any match funding requirements.*
4. *Mechanisms for facilitating and funding collaborations between scientists and government and public sector organisations.*
5. *Status of Technology Strategy Board (TSB) funded centres located in Scotland and participation in TSB funded centres located in the rest of the UK.*
6. *EU scientific research funding.*

**Access to Research Facilities**

1. *Development, sharing and access to science research facilities located in Scotland, to those located in the rest of UK and to those located internationally.*
2. *Development, sharing and access to science datasets based in Scotland, to those based in the rest of UK and to those based internationally.*

**Advisory, Regulatory and Expert Functions**

1. *An advisory and regulatory framework for scientific research, and interactions with such international advisory and regulatory bodies.*
2. *A framework for regulation, monitoring and enforcement of food, plant and animal breeding and disease and interactions with such international regulatory, monitoring and enforcement bodies.*
3. *Provision of expert scientific forecasts, data and advice to the public and private sector.*
4. *Operation of the scientific Learned Societies and professional engineering accreditation.*

**Tax and intellectual property rights**

1. *Taxation and encouragement of science-based commercial research and development activities.*
2. *Scientific intellectual property rights.*

**People**

1. *Attraction, recruitment and retention, nationally and internationally of scientific experts and students to both academia and industry.*

**1. Funding for Research and Innovation**

Funding is inevitably a core interest of the science and engineering community. The majority of funding for basic and applied science is currently secured in the UK through the dual system of public funding for research, which allocates:

i) core funding in Scotland through a Scottish Funding Council (SFC) grant[[2]](#footnote-2) currently based on the Research Assessment Exercise (RAE) and from 2014 on the Research Excellence Framework (REF), which involve peer review rankings of research outputs, environment and impact,

ii) competitively won project funding supported by the UK Research Councils (RCUK) through UK-wide funding opportunities. Projects are won by research teams that may span several universities in the UK. In 2012, Scottish universities won £229m from the Research Councils.

Significant funding is also won from other sources, notably the European Union (EU), UK charities, and the UK Government. For example, in 2012, Scottish research institutions won £121m from UK charities, and since 2007, 427m euro from EU FP7.

***a) Funding from UK research Councils.***

The UK operates as what has been termed a “*single research area*” in which researchers from institutions across the UK can apply for project funding in teams with their proposals being peer reviewed only once. Scottish researchers apply frequently in teams with researchers from elsewhere in the UK and it is widely accepted that the strength of both Scottish and rest of UK research has been influenced positively by such collaborations.

* *A key priority for the science and engineering community is the future of the “single research area”. What arrangements would be put in place to enable Scottish universities to collaborate with the rest of the UK and how would future funding be secured?*

As outlined above, UK public research funding in the future will rely on The Research Excellence Framework (REF) the basic principle of which is - *the allocation of core research funding by internationally benchmarked criteria alone*.

* *Would these criteria underpin any future Scottish public research funding and what would be the position on participation in the UK-wide REF?*

**b) *Funding from UK and International Charities***

As detailed above, UK charities, such as the Wellcome Trust and the Leverhulme Trust, currently play a vital role in funding research in Scotland. The Wellcome Trust alone has, over the past ten years, provided more than £600 million of competitive funding to Scottish based research. Much of this funding is awarded through grants to researchers in Scottish universities reflecting the quality of Scotland’s universities and strength of the research base. Charities primarily fund research that is based in national institutions. In the case of the Republic of Ireland, the Wellcome Trust supports research on the basis of receiving a matched contribution from the Irish Government.

* *How would future funding relationships with national and international charities be developed and what would be the role of match funding?*

**c) *Funding from UK Government Departments***

Currently many research universities/institutes bid successfully for funding from Westminster departments (e.g. DFID, Defra). Current UK Government spend on research (excluding that from Scottish Government) is £2.5bn. In addition, many research applications are currently developed in collaboration with both public (e.g. the MoD) and private (e.g. the Energy Technologies Institute) sector organisations based elsewhere in the UK. These provide a source of funding and most importantly, research collaborations and challenges.

* *How would future funding collaborations between government and both public and private sector organisations be supported?*

**d) *Technology Strategy Board Funding***

Effective application of research also requires support structures and incentives. The Technology Strategy Board (TSB) currently encourages the exploitation of emerging technologies and facilitates knowledge transfer between universities and industry across the whole of the UK. Several TSB funded centres are located in Scotland, e.g. the Advanced Forming Research Centre and the Offshore Renewable Energy Catapult. These are based on collaboration with industry and have attracted significant funding from major UK based companies.

* *A key priority for the science and engineering community is to ensure the continuation of knowledge transfer between universities and industry. Consideration should be given to the potential of the existing TSB funded centres. Would more centres be located in Scotland and how could participation in centres outside of Scotland be supported?*

**e) *European Union Funding***

Since 2007, Scotland has won 427m euro from the European Union FP7.

* *What would be the funding mechanism for Scotland to access EU funding?*

**2. Access to UK and International Research Facilities**

Research groups in Scotland have excellent access to UK and international science research facilities. In the UK, these include the National Nuclear Laboratory, the Diamond Light Source, Rutherford Appleton Laboratory, the Hartree Centre (high performance computing) and Daresbury. Several UK research council funded facilities are located in Scotland, for example HECToR (High End Computing Resource), FloWaveTT (The UK All-Waters Combined Current and Wave Test Facility) and the UK ATC (Astronomy Technology Centre). Also, Scottish Universities use JANET, which is a UK government funded IT network that supports digital communications for academics.

Internationally, access to facilities such as the accelerators at the European Organisation for Nuclear Research (CERN), the telescopes of the European Southern Observatory (ESO), the neutron facilities at Institut Laue-Langevin (ILL) and the space missions of the European Space Agency (ESA), is provided through subscription funding from the UK Research Councils. For example the UK subscription is £100m p.a. for CERN and 300m euro p.a. for ESA. The science community also has access to shared vessels and facilities for marine, polar, atmospheric, and subterranean research.

* *What would be the approach to accessing these facilities in the future?*

The science community also has access and provides data to datasets in areas such as health, climate, environmental, polar and atmospheric research, as exemplified by the Defra funded National Biodiversity Network data, which contains over 800 datasets.

* *How would scientific facilities and datasets be shared across boundaries in future?*

**3. Advisory, Regulatory, Accreditation and Expert Organisations**

1. **Advisory and Regulatory Bodies**

Currently there is in excess of 60 UK-wide scientific advisory committees or councils such as the Committee on Carcinogenicity of Chemicals in Food, Advisory Committee on Pesticides (ACP), Food Standards Agency (FSA), Consumer Products and the Environment (COC), Advisory Committee on Pathogens, Advisory Committee on Releases to the Environment (ACRE), Committee on Toxicity, Medicines Healthcare Products Regulatory Agency (MHRA), and of course the Science Advisory Group for Emergencies (SAGE), which is activated by a lead government department.

In any constitutional settlement, consideration needs to be given to which bodies are required and how they function. Concerning ethical and licensing matters, there could be differences (for example in stem cell research and the use of animals in research) and Scotland would need to consider whose regulatory guidelines an independent Scotland would follow (i.e. European, UK or USA) if it decided not to create its own.

* *What would the landscape of the advisory and regulatory framework of scientific research and the application of science look like and how would Scotland interact with international bodies involved in developing such frameworks?*

The question was also raised as to how Scotland would be represented on international bodies (such as the UN) that deal with specific scientific aspects, such as tree health and plant biosecurity, plant breeding rights, food and agricultural organisations which cross national boundaries, and how the import and export of plants and animals would be regulated, monitored, quarantined and enforced, since many of these functions are currently carried out by the Defra or Health and Safety Executive (HSE) based in Westminster.

* *How would Scotland interact with the international bodies involved in aspects of food, plant and animal breeding and disease and what mechanisms would be necessary to define and enforce import/export regulations?*
1. **Expert Organisations**

There are currently a number of UK wide expert bodies such as the Met Office, Ordnance Survey, British Geological Survey, the National Physical Laboratory, Laboratory of the Government Chemist (LGC), the Forestry Research Centre and the Centre for Ecology and Hydrology, which provide expert advice and data to both Government and commercial organisations. For example, the energy companies make extensive use of forecast data provide by the Met Office in planning their operations while LGC provides contract analytical research and testing services to the pharmaceutical industry.

* *How would such services be provided in an independent Scotland?*
1. **Learned Societies and Professional Accreditation**

The scientific learned societies, for example the Royal Society, Royal Academy of Engineering, Royal Society for Chemistry, Society of Biology, Institute of Physics, Royal Statistical Society and the British Computer Society, are currently UK wide institutions that help to bind the research community together as well as providing expert advice to Government. Respondents were interested to understand the way in which these societies would operate post-independence.

In addition the question arises as to the role of “British” professional institutions in the event of independence and how they will operate. In particular, in the context of science and engineering, there is currently UK wide professional accreditation for chartered and incorporated engineer status e.g. IMechE, IChem, IET which is internationally recognised.

* *How would scientific Learned Societies operate in an independent Scotland?*

**4. Tax and Intellectual property protection**

1. **Tax**

The UK has a tax regime for commercial companies aimed at encouraging research and development. HMRC currently runs two schemes, one for large companies and one for SMEs. Under this scheme SMEs can claim tax relief at 225% of qualifying R&D expenditure. SMEs currently account for 55% private sector employment and 38% private sector turnover in Scotland and many of these companies are active in science and engineering. From 1 April 2013 a new tax relief, referred to as ‘patent box’ relief, introduces a 10% effective tax rate on the total profits made from the sale of products that include a patented piece of technology.

* *How would tax be used to encourage science-based commercial research and development activities in an independent Scotland?*

 b) **Intellectual Property Protection**

Intellectual property rights are currently protected in the UK though the Patent Office based in London.

* *How would intellectual property rights be protected in an independent Scotland?*

**5. People**

Scotland’s strengths in science and engineering depend fundamentally on its human capital, whether recruited in the highly globalised and internationally competitive labour market and/or developed through the supply of talented graduates either into doctoral and post-doctoral training or directly into industry. To maintain a world-leading sector, world leading human capital needs to be maintained and/or nurtured.

* *How would attraction, recruitment and retention of international and national, experts and students to both academia and industry be supported for science in an independent Scotland?*

**Conclusion**

The Co-Chairs of the SSAC Professor Muffy Calder and Chris Masters are grateful to the science and engineering community for supplying responses to the SSAC's call for views and hope that this document will promote further discussion and debate.

**Annex A**

**Organisations that responded**

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| Royal Society of Edinburgh |
| Society of Biology |
| Royal Society of Chemistry  |
| Institute of Physics In Scotland |
| Sir David Carter on behalf of the Board Academic Medicine |
| CBI Scotland |
| Scotland IS |
| Universities Scotland |
| Scottish Council for Development and Industry (SCDI) |
| Scottish Universities Physics Alliance (SUPA) |
| Scottish Universities Life Science Alliance (SULSA) |
| Scottish Alliance for Geoscience Environment and Society (SAGES) |
| Scottish Imaging Network: A platform for Excellence (SINAPSE) |
| Marine Alliance for Science and Technology in Scotland (MASTS) |
| Scottish Consortium for Rural Research (SCRR) |
| James Hutton Institute |
| University of Edinburgh |
| University of Glasgow |
| University of Strathclyde |
| University of Dundee College of Medicine, Dentistry and Nursing and Medical Research Institute |
| University of West Of Scotland |
| Scotland’s Rural College (SRUC) |
| Scottish and Southern Energy |
| Freescale |
| Edinburgh BioQuarter  |
| Renishaw Edinburgh |

1. Report: International Comparative Performance of Scotland’s Research Base November 2009 - <http://www.scotland.gov.uk/Resource/Doc/981/0093770.pdf>. [↑](#footnote-ref-1)
2. SFC provided >300m research monies in 2012/13 [↑](#footnote-ref-2)