KT Scotland: Policy & Practice 2008
A Knowledge Transfer Conference for Scotland’s Researchers, Research Managers and KT Practitioners

GRADskills Conference Report
4th April 2008

Edited by:
Dr MRM Neiland & Professor A Miller
University of St Andrews
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www.st-andrews.ac.uk/GRADskills
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Foreword

Scotland has a long and proud history of achievement in discovery, invention, social development and culture dating back to the Scottish Enlightenment. Major advances in science, medicine, engineering, agriculture, law, economics and the arts, have traditionally been inspired by its convergence of intellectual thinkers and innovators. With some of the oldest universities in the world, Scotland has retained a belief that, when a world class education system is coupled with strong support for research, the quality of life for all its citizens can be enhanced. It is from this enviable background that the “KT agenda” in Scotland continues to develop, potentially opening up a wealth of new opportunities and challenges for its academic researchers - especially those in the early stages of their careers.

Recent UK and Scottish Government reports have placed increasing emphasis on knowledge transfer from the research base (Lambert, Warry, Sainsbury, Science and Innovation Strategy for Scotland, ‘Innovation Nation’) while The Scottish Government’s Economic Strategy and National Performance Framework includes the aspiration that we be “better educated, more skilled and more successful, [and] renowned for our research and innovation”. Scotland has an outstanding record in research, currently being ranked second in the world in terms of the average number of citations per publication. The creation of new funding streams such as “KTG” (the Scottish Funding Council’s ‘Knowledge Transfer Grant’) and of new committees such as “KTIG” (SFC’s ‘Knowledge Transfer and Innovation Group’) are stimulating much more KT to take place by creating incentives for academic researchers to engage in innovation, policy development and outreach. Research in the 21st Century is a global endeavour, of course, and opportunities for knowledge transfer from our universities must be considered in this broader context. We also need much more discussion about how universities can better achieve knowledge exchange with business and industry, thereby stimulating closer ties between the producers and users/employers of research and researchers.

The Knowledge Transfer Scotland: Policy & Practice Conference held in St Andrews on 4th April 2008 was a unique opportunity for early stage researchers to begin to engage with the KT agenda by participating in an event that, for the first time, brought together researchers with research managers, KT practitioners, policy makers and research funders to discuss the scope and potential of KT in Scotland. The programme included speakers from across the Arts-Science, innovation-outreach spectrum of KT and all of the key organisations involved with developing KT policies and strategies in Scotland – notably the Scottish Funding Council, The Scottish Government, DIUS, RCUK and Scottish Enterprise - as well as numerous other KT bodies and experts, including guest speakers from the USA. By highlighting the growing breadth of KT opportunities opening up to early stage researchers, it aimed to inspire our PhD students and Postdoctoral Fellows about the skills they can develop and the
impact they could have through the practice of KT. It also provided a timely forum for all those involved to clarify their understanding of KT, and to make useful contacts with a large network of colleagues from across the Scottish research base.

This Report of the proceedings of the KT conference attempts to capture the main points which were discussed on the day and provide a useful reference document on current KT policy issues and exemplary KT practices in Scotland. It includes a compendium of KT opportunities and funding for early stage researchers; examples of successful KT innovation, outreach and policy development; and details of schemes and organisations set up specifically to encourage researchers to engage in KT. We hope that it will provide not only factual information to assist early career researchers in their career development, but also contribute to the continued debate on how we can best develop the KT agenda for the maximum benefit of Scotland’s research base, research funders and research users.

Prof Alan Miller  
Vice Principal (Research), University of St Andrews  
Member, Scottish Funding Council  
“Research & Knowledge Transfer Committee”  
July 2008
CONFERENCE ORGANISERS

University of St Andrews GRADskills Programme

GRADskills is the University of St Andrews award winning, skills development programme for PhD Students and Postdoctoral Fellows. It aims to support development of personal, professional and career management skills by early stage researchers to improve their research capabilities and future employability. GRADskills recognised that KT could offer researchers the opportunity to develop valuable generic skills, and see their research make an impact on Society by either stimulating economic development, informing public policy or facilitating cultural engagement. Through our membership of Universities Scotland RCC-RT, we were pleased to design and organise this conference for the Scottish research community. We aimed to create an event that would, for the first time, bring together early stage researchers with research managers, KT practitioners, policy makers and research funders to discuss the challenges and potentials offered to researchers by KT.

KT Scotland: Policy & Practice 2008 succeeded in raising awareness amongst the early stage researchers present of “knowledge transfer”, and inspired them about the skills they could develop, the careers they could pursue, and the impact they could have through the practice of KT. They learned about KT schemes and funding, networked with KT organisations and entrepreneurs, and heard first hand about government and funding council ambitions for KT. The conference also created a forum involving early stage researchers for increased dialogue between stakeholders about future KT policy and practice. Planning for KT Scotland 2009 is already underway.

Dr Ruth Neiland, GRADskills Director, University of St Andrews
www.st-andrews.ac.uk/GRADskills - winner of the Times Higher Education Award 2007/8 for “Outstanding Support for Early Career Researchers”

Universities Scotland Research and Commercialisation
Committee Research Training Sub-Committee (RCC-RT)

The Universities Scotland Research Training Sub-Committee exists to enhance the quality, as well as the policy/commercial impacts, of the research activities of member HEIs in Scotland as they deliver excellence in research, individually and collaboratively. Research today operates in a rapidly changing environment and must respond to these external drivers. The RCC-RT focuses on the training and development needs of those engaged in research and commercialisation activities, encompassing knowledge exchange and transfer, within Universities Scotland member institutions.

Activities, information and advice provided aim to be in line with national strategies and policies designed to enhance and improve the quality of research and commercialisation activities. In practice, supporting actions of this sub-committee take the form of the sharing and dissemination of good practice in addressing issues of training in research. One way this is achieved is by collaboratively developing or supporting appropriate events. KT was recognised as an area of interest for the research community whose scope and potential could be usefully explored via a national event. Attendance at the KT conference organised by St Andrews of 250 delegates - representing no fewer than 18 out of Scotland’s 19 HEIs - was a positive indication of just how strong is the level of interest in KT across the Universities Scotland member institutions. HEIs should be the engine room for KT for Scotland’s economic, social and cultural advancement. The Research Training Sub-Committee of Universities Scotland RCC is dedicated to building HEIs’ capacity to provide that engine room, and of supporting capacity-building by researchers for researchers.

Prof Alison McCleery, FRGS, Associate Dean (Research & KT), University of Napier; Convener, Universities Scotland RCC-RT
Scottish Funding Council

Enhancing the knowledge transfer activities of Scottish universities is a key priority for the Council and is central to the Scottish Government’s Economic Strategy. Well trained university postgraduate and post doctoral researchers have an important role to play in translating research and developing innovation for the Scottish economy and wider society. The Council is therefore very pleased to have been able to provide support to this conference which aimed to raise awareness amongst current postgraduate and post doctoral researchers on knowledge exchange and to provide examples of how they can become involved over a wide range of activities. We aspire to empower all of our new researchers with the ability to think creatively about how to apply their new and existing knowledge.

Ms Ann R Millar, Assistant Director of Research Policy and Strategy, Scottish Funding Councils for Further and Higher Education

Scottish Enterprise

The Government Economic Strategy highlights the importance of higher levels of innovation in improving Scotland’s productivity performance. In support of this aim the strategy demands “A clear focus on strengthening the link between Scotland’s research base innovation and addressing low levels of business R&D”. Scottish Enterprise as the Enterprise, Innovation and Investment Agency for Lowland Scotland has a clear role to play in this. The Proof of Concept Programme and the Scottish Enterprise/Royal Society of Edinburgh Enterprise Fellowships are two programmes which are successfully making the link between our strong research base and business. Our sponsorship of Knowledge Transfer Scotland 2008 provided a welcome opportunity to communicate how such programmes address the innovation and commercialisation themes of the conference, and to raise awareness of the opportunities available to the research base to contribute to the growth of the Scottish economy.

Mr Gavin Laird, Innovation and Commercialisation, Scottish Enterprise

UK GRAD

UK GRAD works with Universities throughout the UK to support the personal, professional and career development skills of postgraduate researchers. Our sponsorship of this event reflects the role that involvement in KT activities - whether linked to the commercialisation of research, policy development, or engaging with the public through outreach and the media - can play in the development of these skills. 2008 is a significant year for UK GRAD and the Scotland and Northern Ireland Hub. We will be re-launched as a new programme with a new name, “Vitae”. The remit of the programme has been extended to include early career research staff as well as PhD students. The Hub will continue to be the key point of contact for those in Universities who support researcher development and we will continue to contribute to events throughout Scotland and Northern Ireland. New national networks will also be established for researchers, supervisors and others, whilst new trainer support and incubator units will provide additional resources and innovations.

Dr Jon Turner (Hub Coordinator, Scotland and Northern Ireland), Ms Nicky Franzen-Ashwood (Hub, Networks and Communications Co-ordinator)
University of St Andrews

Founded in the 15th Century, St Andrews is Scotland’s first university and the third oldest in the English speaking world. The University today is a diverse and international community comprising 8500 staff and students from over 75 countries, including nearly 1000 PhD and Postdoctoral researchers. They are distributed across 18 academic schools and 50 Research Centres in Science, Medicine, Social Science, Arts and Humanities. St Andrews is consistently ranked within the top five universities in UK league tables, with high rankings in research, teaching and student satisfaction. It has been honoured with THES awards for Sustainability (2006) and Outstanding Support for Early Career Researchers (2007). Many of its academic staff are involved with knowledge transfer over a diverse spectrum of innovation – outreach activities. A number of spin-out companies have been created in recent years, building on research strengths in lasers, photonics and fuel cells, and the European Research Centre of South African petrochemical multinational, Sasol, has been co-located at St Andrews with the School of Chemistry, resulting in closer links with Industry. The University launched a new Knowledge Transfer Strategy in December 2007 and created a new Knowledge Transfer Office in April 2008.

St Andrews’ development and sponsorship of this first KT conference for Scotland’s researchers, research managers and KT practitioners reflects our strong commitment to both (i) developing the professional and employability skills of our early stage researchers via our GRADskills Programme and (ii) exploring the potential for still closer links between the research base and the users of research via our Research Centres and KT Office. Given the overwhelming success of the first conference, St Andrews has readily agreed to host a follow-on conference in a year’s time. We look forward to again welcoming our colleagues from across Scotland to St Andrews for the 2nd KT Scotland: Policy & Practice Conference in April 2009.

Prof Alan Miller FRSE, Vice Principal Research, University of St Andrews
Acknowledgements

Many colleagues contributed their time, advice and expertise to ensure that the conference was a successful event - either at the planning stage or on the day itself. In addition to all of the key note speakers and panel presenters, we would like to thank:

Conference programme consultants: Mr Mervyn Jones, Chair Scottish Funding Council Knowledge Transfer & Innovation Group; Mr David Lott, Scottish Funding Council; Dr Gill Clark, Knowledge Transfer, The Scottish Government; Dr Alistair Cameron, formerly Scottish Enterprise; Mr Ben Kotovic, UK GRAD Scotland & Northern Ireland Hub; Prof Ian Carradice & Ms Alison Hadfield, University of St Andrews; and members of ‘Universities Scotland Research & Commercialisation Committee’ and its ‘Research Training Sub-Committee’ (US RCC RT).

Exhibitors Institute for Capitalising on Creativity; Interface – The knowledge connection for business; National Endowment for Science Technology & the Arts; Proof of Concept Programme; Research Councils UK; Researchers in Residence Scheme; Royal Society of Edinburgh; School of Management, University of St Andrews; Scottish Enterprise; Scottish Institute for Policing Research; Scottish Universities Physics Alliance; The Scottish Government; and UK GRAD.

Session chairs: Prof David Boxer, University of Dundee; Prof John Caughie, University of Glasgow; Dr Kevin Cullen, University of Glasgow; Prof Allister Ferguson, University of Strathclyde; Prof Peter Holmes, University of Glasgow; Mr Mervyn Jones, SFC Knowledge Transfer & Innovation Group; Ms Ann Millar, Scottish Funding Council; Prof Ian Sanderson, The Scottish Government; Diana Wilkinson, The Scottish Government. Key Note Chair: Mr Quentin Cooper, BBC Radio 4

Rapporteurs Dr Andrew Black, University of Dundee; Prof John Caughie, University of Glasgow; Dr Ewan Chirnside, University of St Andrews; Prof Alison McCleery, University of Napier; Dr Karen Ness, KM Squared Consulting; Dr Alyson Tobin, University of St Andrews.

St Andrews PhD student & Postdoc Conference Assistants: Ms Shu Chen, School of Biology; Ms Yaning Du, School of Management; Mr Lixun Liu, School of Geography & Geosciences; Ms Gladys Mokhawa, School of International Relations; Ms Helen Sharpe, School of Geography & Geosciences; Dr Wenjian Wang, School of Chemistry; Mr Han Xiao, School of Biology; - and The Rusalka Quartet: www.rusalkaquartet.com

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We would also like to thank professional technical writers, Karen and Anthony Haynes, ‘The Professional & Higher Partnership’, for contributing their expertise to the compilation of this Conference Report. www.professionalandhigher.com
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## Plenary Sessions: KT Policy

1. Roger McClure (Scottish Funding Council)  
2. Prof David Gani (Scottish Funding Council)  
3. Prof Ian Sanderson (The Scottish Government)  
4. Mr John Neilson (DIUS)

## Discussion Sessions: KT Practice

1. **Stimulating Economic Development**  
   - Commercialising your research  
   - Innovation in industry and business  
   - University research commercialisation  
     – what can Scotland learn from the US?  
2. **Informing Public Policy**  
   - Research informing government policy development  
   - Policy development in sustainability and conservation  
   - Policy development in health, policing and demography  
3. **Facilitating Cultural Engagement**  
   - Engaging the public with research and researchers  
   - Stimulating cultural development in the Arts in Scotland  
   - Reaching a wider audience through the Media  

Concluding Discussion  
Emerging Themes  
Compendium of KT opportunities and funding  
Conference Comments  
Glossary of Acronyms
Plenary Knowledge Transfer (KT) involves the two-way flow of ideas, skills and people between the research and higher education community and wider users in Society in the public and private sectors. It has become a much more prominent feature of government and funding council policies in the past few years reflecting related aspirations to i) enhance the economic impact of research generated by the knowledge base in universities and research institutes and ii) make the UK a more globally competitive and innovative knowledge-based economy. The plenary sessions featured keynote speeches from senior members of the Scottish Funding Council and both the UK and Scottish Governments, all of whom considered how should we best develop policy and practice to maximise Knowledge Transfer and its benefits in Scotland?

Key Note Speeches:
1. Mr Roger McClure, Chief Executive, Scottish Funding Council
2. Prof David Gani, Director of Research Policy & Strategy, Scottish Funding Council
3. Prof Ian Sanderson, Director, Corporate Analytical Services Directorate, The Scottish Government
4. Mr John Neilson, Director, Research Base, Department for Innovation, Universities and Skills (DIUS)
Plenary

Knowledge Transfer (KT) involves the two-way flow of ideas, skills and people between the research and higher education community and wider users in Society in the public and private sectors. It has become a much more prominent feature of government and funding council policies in the past few years reflecting related aspirations to i) enhance the economic impact of research generated by the knowledge base in universities and research institutes and ii) make the UK a more globally competitive and innovative knowledge-based economy. The plenary sessions featured key note speeches from senior members of the Scottish Funding Council and both the UK and Scottish Governments, all of whom considered how should we best develop policy and practice to maximise Knowledge Transfer and its benefits in Scotland?

Key Note Speeches:

1.  Mr Roger McClure, Chief Executive, Scottish Funding Council

2.  Prof David Gani, Director of Research Policy & Strategy, Scottish Funding Council

3.  Prof Ian Sanderson, Director, Corporate Analytical Services Directorate, The Scottish Government

4.  Mr John Neilson, Director, Research Base, Department for Innovation, Universities and Skills (DIUS)
Key Note 1: Mr Roger McClure, Chief Executive, Scottish Funding Council

The following represents a synopsis of Mr McClure’s speech ‘Scottish Funding Council: supporting KT in Scotland’:

1.1 KT and the Scottish economy
One key aspect of the context for KT in contemporary Scotland is the emphasis given in government policy on higher education to the impacts on the wider society, especially the economy. Fiona Hyslop, Cabinet Secretary for Education and Lifelong Learning, has expressed a desire to see a ‘step change’ in the benefits accruing to society from public investment in higher education. In this context, Scottish HEIs are in many ways performing well. For example, statistics on the costs of creating patents suggest that Scotland is efficient in converting IP into other forms of asset. Similarly, the Scottish Funding Council’s (SFC’s) metrics indicate that the value of KT, as measured by derived income for activities, has been increasing each year. Yet there remains much to do. A former Minister of Enterprise Nicol Stephen, for example, suggested that, although Scotland has a ‘first quartile’ research base, it has a ‘third quartile’ economy. There seems to be a fundamental disconnect here.

1.2 SFC support for research & KT
Over the last six years SFC has strongly increased its support for research and KT. Over that period there has been a sevenfold increase in the KT grant (from £3 million to £23 million). The allocation of funds has been performance driven: institutions that have performed well have seen increases in their allocations. SFC has also engaged with the Economic and Social Research Council (ESRC) in a research programme designed to explore the impact of HEIs on Scotland and its economy. SFC has cast its net more widely by starting to provide capacity-building funding for colleges as well as universities. Colleges, after all, are often much closer to businesses than are universities. SFC also supports collaborations between public, educational, and private organisations involved in KT.

1.3 ‘New’ knowledge and metrics
When discussing ‘knowledge transfer’ we need to ask precisely what it is that we are transferring. There is a temptation to think of KT purely in terms of entirely new knowledge – knowledge that is new to the planet. We need also to include the transfer of knowledge that, though not new to the planet, is new to the recipient. And we need to be careful about what we are monitoring and measuring. For example, we need to improve the way we capture business start-ups by graduates. SFC is planning to review the metrics that it applies to KT.

1.4 Improving KT in Scotland
Much can be done to further improve KT in Scotland. We can encourage greater experimentation: SFC is introducing new funding schemes to encourage this. We can also build on the successful development of research pooling. In addition, SFC (in collaboration with the RCC) is developing an initiative that might well become a forerunner of a Scottish Knowledge Transfer Partnerships scheme. There is also the possibility of making more intellectual property (IP) free where its development is publicly funded. Finally we need to consider how to support the transfer not only of knowledge that is generated within Scotland but also of knowledge generated in the rest of the world.
Key Note 2: Prof David Gani, Director of Research Policy & Strategy, Scottish Funding Council

The following represents a synopsis of Professor Gani’s speech on the theme of ‘Scottish Funding Council: supporting KT in Scotland’:

2.1 SFC’s policy remit
The policy remit for SFC includes research in HEIs and their partners, KT in universities and colleges, and postgraduate researchers’ training and provision. The Council takes forward this remit with advice from the Research and Knowledge Transfer Committee, the Knowledge Transfer and Innovation group, and the Strategic Research Development Grant International Standing Panel.

2.2 Global competition
The context for developing research and KT in Scotland is challenging. Globally, there is increasing competition. The majority of research funders are based outside Scotland. The major OECD countries are much larger than Scotland. There is fierce competition from Asia’s developing economies. UK private investment in research in Scotland is declining (and UK research policies are becoming increasingly diverse). There is an increased emphasis on ensuring that research adds value and that this value can be demonstrated.

2.3 Scotland’s research base
In this context, we need to ensure that Scotland: increases the value of its research base and ensures that it is responsive and flexible; enhances its international competitiveness; effectively utilises its outputs; sustains research evolution, particularly in universities; provides financial security needed for long-term planning; and ensures that HEIs are both autonomous and market informed.

Scotland needs its research base in part to generate new knowledge. At present, Scotland creates about 1.2% of the world’s new knowledge (using the number of international peer-reviewed publications as an index). This is disproportionately high (though the percentage is declining as countries such as China and India become more competitive). But Scotland also needs its research base in order to interpret the 98.8% of knowledge that is created elsewhere. The task is becoming greater as time passes: every year the world becomes more productive in knowledge creation (both in total and per capita).

2.4 A knowledge-based society
An effective research base is needed to help the country raise its game in the international economy. It can do this by improving the rate at which knowledge translates into innovation. Scotland requires a symbiosis between the ‘engine room’ of research, on the one hand, and society as whole on the other. The vision is that of a research base generating knowledge that feeds into an aspiring, empowered, society that in turn will value education sufficiently to invest in it further. The potential benefits of such a symbiosis include modernisation of learning, enhanced creativity and ability to absorb new ideas, greater innovation, an increased ability to recruit the very best staff that the world has to offer, and maximum opportunity to make cutting-edge discoveries.

2.5 Complex KT processes
The processes involved in KT are complex. They are by no means always linear and they are certainly multidimensional: the ways in which KT occurs vary according to discipline, profession, and industry sector. We can improve the rate of KT by bringing together practitioners and researchers as much as possible. Where we do so, we will be able to build capacity, improve our problem-solving abilities, and indeed improve the focus and effectiveness of the research process itself. We can bring the two parties together in a number of ways – through co-location (which used to happen a good deal in corporate laboratories,
but at present happens little in universities), structured networks, and seamless intercommunication structures of various forms.

2.6 Research & KT Funding

We should remember that Council’s public spending accounts for less than one third of investment in research: our universities achieve a high degree of gearing by attracting funds from the UK research councils and the private and voluntary sectors. Research funding has fared well in recent government settlements. Despite tough public spending settlements overall, the key public funds for research (and especially KT) are budgeted to increase. In particular, the KT grant has been increasing by about £3 million per annum and in 2008-09 will total £23 million, a 23% increase on the previous year. This includes £2 million for the new SPIRIT scheme (Strategic Priority Investments in Research and Innovation Translation). There are numerous potential innovations. They include: a new postgraduate studentship scheme to provide each university with 50% funding for two postgraduate students who may be recruited from anywhere in the world; a Masters in Enterprise programme (in which postgraduates will help to solve problems for companies and other organisations outside the university); and BEVI – a Business Engagement Vouchers Innovation scheme.

Mr Roger McClure – Chief Executive, Scottish Funding Council (SFC)

Mr Roger McClure is Chief Executive of SFC, the Council which distributes approximately £1.7 billion of public funding annually to 43 colleges and 20 higher education institutions in Scotland to provide teaching and research. The other functions of the Council include: promoting quality, partnership and collaboration; providing Scottish Ministers with information and advice; and monitoring the financial health of the further and higher education sectors. Previously Roger occupied various roles in the education sector including Pro-Rector of the London Institute; Director of Finance of the Polytechnics and Colleges Funding Council and subsequently the Further Education Funding Council; Financial Advisor to the University Grants Committee; and management consultant with Deloitte Haskins & Sells Management Consultancy Division. He was a visiting Harkness Fellow at the Center for Higher Education Studies at the University of California, Berkeley in 1990/91.

Prof David Gani, FRSE – Director of Research Policy & Strategy, Scottish Funding Council (SFC)

As Director of Research at SFC, Prof David Gani is aspiring to augment the research environment and capabilities of Scottish HEIs and optimise dialogue and interaction between top researchers and research users including government agencies, commerce and industry. He sees the Government’s recognition of the potential of a strong research base to fuel a sustainable economy as providing a whole raft of opportunities for innovative scientists, researchers and lateral thinkers. Knowledge transfer, excellent research training, information access and harnessing innovation are his high ranking priorities. He is a strong advocate of partnership working and resource pooling and believes Scotland is well-positioned to enhance its position to considerable advantage. Before joining SFC, David served on several Research Council Committees, and worked with the OST on the Technology Foresight process. An academic Chemist, David previously worked at the Universities of Sussex, Southampton, Birmingham, and St Andrews.
Key Note 3: Professor Ian Sanderson, Director, Corporate Analytical Services Directorate, The Scottish Government

The following represents a synopsis of Professor Sanderson’s speech ‘Scottish government aims and ambitions for KT’:

3.1 KT and policy development
There is a tradition in Scotland of dialogue between government and academia. It dates back at least to the Enlightenment, when Francis Hutcheson (1694–1746) expressed the desire to make philosophy more accessible and to bring it out of the libraries, schools and colleges and into clubs, assemblies and coffee houses. Today the dialogue takes place through well-established networks linking academic and policy communities. It is now supported by a strong infrastructure. The government employs over 250 professional analysts who play a key role in building bridges between KT and policy development.

3.2 A new performance framework
The government has set out its ambitions for Scotland in a new performance framework, which provides a set of fifteen desired outcomes at national level. The purpose of the framework is to focus government and public services on creating a more successful country with opportunities for all of Scotland to flourish through increasing, sustainable, economic growth. The 2007 Scottish budget review includes a new set of 45 national indicators. They include a measure of KT from research activity in higher education.

3.3 Evidence-based policy making
The outcome-based approach to performance management represents a significant change in the way government works. It puts an emphasis on analysis of evidence in order to assess how well policies are (or are not) working and also to understand better what the impact of new policies is likely to be. This involves an increased emphasis in policy formulation on:

- Evaluation
- Learning
- Improvement
- Experimentation

As the American philosopher, John Dewey, might have said, the approach requires a stronger ‘application of intelligence’ to government. Scotland’s economy, its public services, its social and cultural health, and its ability to create a learning society depend on its ability to draw on KT from the higher education sector.

3.4 Strengthening dialogue between government and universities
The role of the Corporate Analytical Services Directorate within government is, essentially, to help to make policy more evidence-based. It is working closely with ESRC, with which it has developed a concordat, and with SFC to strengthen dialogue between government and universities across Scotland. There is, of course, within academia a degree of scepticism over, and resistance to, the perceived instrumental focus of the new economic impact agenda. We do, however, have an obligation to maximise the social benefit (broadly conceived) from resources devoted to knowledge creation.
Key Note 4: John Neilson, Director, Research Base, Department for Innovation, Universities and Skills (DIUS)

The following represents a synopsis of Mr Neilson’s speech ‘The Importance of KT: a UK Government Perspective’.

4.1 UK investment in research
There has been a commitment on the part of the UK government to long-term investment in the research base. Research Councils’ budgets have doubled in real terms over the last decade. This is reflected most recently in the budget for DIUS in the Comprehensive Spending Review. There is a strong emphasis in Government on the impact of the research base on the economy in general and, in particular, on: business start-ups; innovation and product development by existing businesses; people; public policy and public services; and international mobile investment.

4.2 Aligning research to strategic priorities
The research Councils’ new strategic programmes reflect the Government’s five areas of strategic priority: health care; the demands of an ageing population; energy; the environment; and global security. Emphasis on economic impact does not equate with a preference for applied over fundamental research: indeed, whilst applied research usually produces incremental benefits, it is fundamental research that more often produces the fundamental breakthroughs.

To achieve our objectives we need to ensure that spending is aligned. For example, the Technology Strategy Board is tasked with trying to align spending on research by the Research Councils and economic development agencies. In health it is important to align spending on research by the MRC and NHS.

4.3 Enabling researchers engage in KT
There are a number of factors helping to ensure that the above objectives are achieved. For example, there is research culture – we need to encourage researchers to reflect on the uses and commercial potential of their research; there are innovation platforms and networks designed to link researchers with the users of research (the Technology Strategy Board will be announcing new schemes in this area); Research Councils award some follow-on funds so that research teams can focus on the commercial applications of the research projects they have completed; and there are voucher schemes, often funded by the economic development agencies, designed to enable businesses (especially SMEs) to access research in Higher Education Institutes (HEIs).

4.4 Incentivising KT for Higher Education Institutes
There has been some criticism of HEIs for being too slow and cumbersome in developing collaborative projects with business. It is important to ensure that effective incentives for HEIs, especially in regard to Intellectual Property, are in place. Views differ on what HEIs’ objectives regarding IP should be (maximising their own revenues or raising overall levels of economic activity?), and Paul Wellings (Vice Chancellor of Lancaster) will report on this later in 2008.

In formulating policy on incentives for HEIs, we need to address the need for coherence between the two main elements of funding (block funding through QR and funds from research councils), especially in relation to impact. We also need to ensure that the debate over how to measure research excellence considers the benefits of incentivising research that produces strong economic or public policy impacts.

4.5 The supply of skilled researchers
One of the greatest contributions of the research base is the supply of skilled, highly qualified, people. Certainly there is a demand for their skills. In Scotland, demand for advanced STEM skills is forecast to outstrip
general demand. There are, however, potential problems with the supply of such people. The UK has done well at attracting international talent, but the number of its own young people qualifying in STEM subjects is quite low. The curriculum in these subjects needs to be not only accessible, but also sufficiently challenging for the most able.

4.6 Measuring research impact
It is important not only to produce research with impact but also to be able to demonstrate and measure it. This raises methodological challenges. We need to look not for some single overall figure to act as a measure of the economic impact of the research base, but instead to take account of the breadth of that impact. Certainly we need to measure more than just the number of patents and spinouts. Econometric studies of the impact of particular institutions are promising, as are studies of particular sectors (there has been good work in the area of arthritis, for example). Case studies too (such as measures of the benefits of the Thames barrier) are helpful, especially in the formulation of public policy.

4.7 Future aims
Overall, we need to ensure that the incentives for KT are in place, that the culture and leadership in HE is constructive, and – above all – that we grow the range and number of those in the economy wishing to make use of the research base.

Mr John Neilson – Director, Research Base, Department for Innovation, Universities and Skills (DIUS)
Mr John Neilson has been Director, Research Base at the Department of Innovation, Universities and Skills (formerly the Department of Trade & Industry) since February 2005. He leads the team advising the Director General of Science and Research and Ministers on the £3.5 billion spent in the Science Budget each year, principally through the seven Research Councils, on research in universities and institutes. His team also has responsibility for the sustainability of the research base’s infrastructure, for knowledge transfer from the research base, and for issues of the public’s engagement with science.

For the four previous years John was an Executive Board member at the gas and electricity regulator, Ofgem. There he had specific responsibility for regulation of retail energy markets, enforcement, and social and environmental issues. Prior to that he led teams in the DTI advising on the aerospace and defence industries and on UK telecommunications policy. Earlier in his career he worked on four energy privatisations, before being seconded to the Economic Secretariat of the Cabinet Office and subsequently acting as Principal Private Secretary to John Wakeham, the then Secretary of State for Energy. John started his career at the Department of Energy after graduating with a degree in Mathematics from the University of Cambridge.
Discussion Sessions

A synopsis of each presentation from the Economic Development, Public Policy, and Cultural Engagement discussion sessions is given in the following pages. Please note that the summaries have been compiled retrospectively by the conference team rather than being written by the presenters themselves.

Economic Development Sessions

- Commercialising your research
- Innovation in Industry & Business
- University Research Commercialisation
  – what can Scotland learn from the US?

Public Policy Sessions

- Research informing government policy development
- Policy development in sustainability and conservation
- Policy development in health, policing and demography

Cultural Engagement Sessions

- Engaging the public with research and researchers
- Stimulating cultural development in the Arts in Scotland
- Reaching a wider audience through the media
COMMERCIALISING YOUR RESEARCH

For university-based researchers – particularly doctoral students, postdoctoral fellows and academic staff looking to embark on the next stage of their career – ‘research commercialisation’ should offer an effective way for them to exploit their research findings and capitalise on their innovative and entrepreneurial potential. But how can Scotland’s researchers go about exploring the commercial applications of their research and what initiatives are underway to build Scotland’s R&D capacity amongst its researcher community?

Speakers:
- Prof Ian Underwood  Chief Scientific Adviser, MicroEmissive Displays
- Mr David Creed  Group Chief Executive, ITI Scotland Limited
- Dr Clive Reeves  Manager, Enterprise Fellowships Programme, Scottish Enterprise
- Dr Wendy Hanson  Proof of Concept Programme, Scottish Enterprise

Chair:
- Dr Kevin Cullen  Director, Research & Enterprise, University of Glasgow

Is the spin-out route right for you?
Prof Ian Underwood

‘Technology spin-out’ is a misleading term: it suggests starting with academic research and pushing it out into the commercial world. But successful academic entrepreneurship starts with market ‘pull’, developing the right technology to meet an identified market need. ‘Markets are always much more important than the technology’. To succeed as an academic entrepreneur, a change of mindset is often needed, coupled with a talent for very focussed, problem-solving thinking. Not everyone is suited. Researchers need to think carefully before making the move: they may find it difficult to return to academia if they change their minds.

The processes involved from research stage to volume manufacturing are complex and risky: involving others to fill the gaps in expertise is the key. There is now more help for technology start-ups than ever: the beginnings of a virtuous circle. In the last ten years the building of infrastructure to support entrepreneurs in Scotland has led to a generation of early pioneers in academic entrepreneurship now building on what they have learnt and supporting the next generation.

Be aware too that motivations for taking the spin-out route might change along the way. One needs huge ambition and determination to see it through. An entrepreneur may be driven by the prospect of making a fortune: ten years on, those financial rewards may or may not have fully materialised – though where they have not, there may be other immense satisfactions, such as that of founding a company that employs people in interesting, well-remunerated jobs.

ITI Scotland
Mr David Creed

ITI Scotland Ltd is a company set up in 2003 by Scottish Enterprise with the support of the Scottish Executive to drive Scotland’s ambitious plans to identify and commercialise valuable technology-based intellectual assets across three global market sectors. Its aim is to bridge the gap between publicly-funded early stage research and privately-backed commercial development. ITI Scotland’s operating divisions (Intermediary Technology Institutes) are digital media and communications (‘ITI Techmedia’); life sciences and energy.

ITI Scotland’s aims and choice of market sectors grew out of extensive analysis of the Scottish innovation system. Scotland has a
very strong university base, but corporate R&D investment is only half the UK average. The starting point for ITI’s operating model is market foresighting (3—10 year basis), gaining an excellent understanding of global markets in its chosen sectors and identifying opportunities that the Scottish research base could help to exploit. ITI commissions researchers/organizations via a commercial tender to develop required technology solutions (500 university and company-based researchers have worked on the programmes since inception) and then chooses a partner to take the intellectual property through to commercialisation. This might be a new company (technology spin-out), an existing Scottish company developing the product under licence, or a company from outside Scotland that sets up a local company as a result; other variants are also possible. There are 22 research programmes in progress and 9 completed licensing/commercialisation deals after only 4 years of R&D programme activity. ITI is continually foresighting new areas, publishing market information (it has a membership base) and will fund between 6 to 12 new programmes next year. Involvement in pre-competitive research is open to university researchers and companies alike. The organisation issues call for expressions of interest and commercial tenders to identify and select those interested and able to deliver against our research programme objectives. For more information visit our web site at www.itiscotland.com

**Scottish Enterprise-RSE Enterprise Fellowships**  
**Dr Clive Reeves**

Enterprise Fellowships form an established programme which has accelerated in recent years. The aims of the programme are to increase the commercialisation of the Scottish academic research base, raise understanding of commercialisation throughout Scottish universities and research institutes, and create sustainable companies with high-value jobs. The programme is funded by Scottish Enterprise and delivered by the Royal Society of Edinburgh with the Hunter Centre (Strathclyde University) and Connect Scotland. Successful applicants need to have a business idea designed to meet a market need and the ambition and drive to make it a success. The commercial proposition must be capable of attracting development funding or revenue by the end of the one-year fellowship. The idea must be scaleable: a product-based business rather than a service. Fellows receive a year’s salary, hosted at the university, business training for preparing a viable business plan, and access to networks of mentors, experts and advisors. Up to 60 awards will be available over the next five years. The next round of fellowships will commence around October 2008.

**The Scottish Enterprise Proof of Concept Programme**  
**Dr Wendy Hanson**

The Proof of Concept Programme supports the pre-commercialisation of leading-edge technologies emerging from Scotland’s universities, RIs and NHS Boards. It works in the gap between the academic base and business, when an idea is sufficiently ready for further investment, but its commercial potential is not sufficiently proven to attract business investors. Successful applicants receive a raft of support as well as funding. It is a popular scheme. To date it has funded about one in four applications, which may come from any priority industry sector. Unsuccessful applicants also receive advice (those applying too early may be redirected to research grants, those applying too late in the development process to potential commercial investors). The scheme’s success (500 RAs employed, 40 new high tech companies, 30 licence deals) is linked to:

- its substantial budget
- ongoing support for successful applicants
- strong commercial focus
- focus on projects’ financial control (a pre-requisite for succeeding in business)
- integrated with other Scottish support mechanisms.

**Discussion.** All speakers stressed the imperative of ‘market pull’ rather than ‘technology push’ for research commercialisation to succeed. Not only is it a critical success factor for the immediate project, it also has potential future benefits.

Starting with market need frequently requires teams of people from different disciplines and different organisations to find solutions. The relationships formed from these project teams frequently lead to other innovative collaborations. A second common theme was the culture of support and strength of expertise accompanying the significant financial support available to potential technology entrepreneurs in Scotland’s universities.

**Prof Ian Underwood** is a co-founder of Scottish R&D company, “MicroEmissive Display” and co-inventor of its P-OLED microdisplay technology. He is recognized worldwide as an authority on microdisplay technology, systems and applications, and was named Professor of Electronic Displays at The University of Edinburgh in 2005. www.microemissive.com

**Dr Clive Reeves** manages the Enterprise Fellowship Programme for Scottish Enterprise (SE). The programme, which is funded by SE and delivered by the Royal Society of Edinburgh, helps academic researchers develop spin-out businesses from a science or technology idea. www.royalsoced.org.uk/research_fellowships/enterprise.htm

**Mr David Creed** is Group Chief Executive of ITI Scotland, the organisation whose aim is to identify, develop and commercialise new market driven technologies that can be commercially exploited for the economic benefit of Scotland. www.itiscotland.com

**Dr Wendy Hanson** works for The Proof of Concept Programme which supports pre-commercialisation of leading-edge technologies emerging from Scotland’s Universities, Research Institutes and NHS Boards. It helps researchers to export their ideas and inventions from the lab to the global marketplace. www.scottish-enterprise.com/proofofconcept
INNOVATION IN INDUSTRY & BUSINESS

Across the UK, universities are continuing to work towards delivering economic impact from their research by widening their engagement with end-users in industry and business. At the same time, the demand for research from the university knowledge base is expected to increase in response to the emergence of research-intensive businesses and the adoption by industry of more ‘open-innovation’ R&D systems. Given these drivers to increased KT in the UK, how might further successful education-business partnerships and research collaborations be achieved in the Scottish context? And what opportunities can our early stage researchers access to help them hone their innovation and business skills to widen their employability with industry and business in the future?

Speakers:
- Dr Siobhán Jordan Director, Interface – The knowledge connection for business
- Dr Deborah Buckley-Golder UK Programme Director, Knowledge Transfer Partnerships
- Dr Simon Cutler Innovation Programme Manager, BBSRC
- Dr Rachel Brazil Crucible Programme Director, CONNECT Team, NESTA

Chair:
- Prof David Boxer Vice Principal Research & Enterprise, University of Dundee

Interface – The knowledge connection for business  Dr Siobhán Jordan

It is important to increase the number of businesses, especially SMEs, which work with Scotland’s knowledge base. There are many barriers that might prevent some businesses from approaching HEIs: they may be unsure who to contact or not know what is available; or they may fear the process would be too complicated, expensive, or slow.

Interface, which is hosted by University of Edinburgh but works on behalf of the whole Scottish HE sector, is designed to remedy this situation. In essence it provides a brokering service between businesses and HE in Scotland. It reaches out to businesses and promotes the benefits of collaboration with HE. It helps businesses to diagnose their needs and then to locate the required expertise in Scotland’s HEIs and Research Institutes (27 partners in total). Interface maintains an open mind about the nature of possible engagements: in practice a number of different forms have emerged – not just licensing deals.

Something of the range of engagements can be seen from the following examples:

- Emtell engaged Glasgow Caledonian University to solve the problem of water seeping into the tubing that houses fibre optic cables. This resulted in the development of a new membrane, enabling the company to win a large order from BT
- Taigh na Teud, a Skye-based music publisher, engaged the School of Computing at Napier University in order to develop online lessons in traditional Scottish music
- APMW Ltd has engaged the Department of Design Manufacture and Engineering Management at the University of Strathclyde and the Mackintosh School of Architecture at the University of Glasgow to develop an eco-friendly form of cavity insulation.

Initial short-term engagements – a feasibility study, for example, or a work placement – can lead to longer term collaborations in due course, to the benefit of both parties. Over an 18-month period, 400 expertise searches have been conducted, 80% of them for Scottish businesses (mostly SMEs), 60% of which have never previously worked with Scottish academic institutions.
**Knowledge Transfer Partnerships**

Dr Deborah Buckley-Golder

This scheme has been in existence under various guises for 30 years. Since 2004 it has been known as KTP. It is designed to enhance the competitiveness and performance of businesses. It aims to stimulate innovation, broadly defined to include products and services and also business processes and systems.

Last year about £140 million was committed to new projects across the UK. There are approximately 140 live partnerships in Scotland. All universities have partnerships with businesses under the scheme. In some universities the number of partnerships with businesses runs well into double figures. Last year Heriot-Watt University won awards both for the best KTP and the best example of engineering excellence. In the private sector about 25% of partnerships are with large companies and 75% with SMEs. There are also partnerships with public sector institutions. The UK government has accepted Lord Sainsbury’s recommendation that the scheme should double over the next three years. Increasingly, partnerships are to be found in the areas of arts, humanities and social science, as well as in the traditional STEM disciplines.

KTP helps businesses to identify problems of strategic importance. (It is important that they are strategic: this distinguishes the partnerships from ordinary consultancies.) KTP then helps to locate the necessary research expertise. When a partnership is approved, the business recruits an associate (usually a recent graduate, though sometimes with postgraduate qualifications too). The KTP project is expected to provide a level of challenge at least equivalent to a masters degree. Associates often work towards a management diploma. They can also avoid the dilemma confronting many postgraduates of having to choose between commercial experience and continuing with research in one’s discipline: KTP offers both simultaneously.

**Biotechnology and Biological Sciences Research Council programmes**

Dr Simon Cutler

The Biotechnology and Biological Sciences Research Council (BBSRC) is involved in KT with a wide range of industries including agriculture, food, health, chemicals and pharmaceuticals. It funds first-class bioscience research in the UK to the total amount of around £400M per annum, of which Scotland ‘punches above its weight’, sharing approximately £88 million of research funding across 237 BBSRC grants (‘live grants’ in April 2007). BBSRC’s involvement in KT takes a number of forms. They include:

- collaborative research
- industrial involvement in training
- commercialisation of research and development
- people and knowledge flow.

Initiatives include the Biotechnology Young Entrepreneurs Scheme. This is designed to raise commercial awareness amongst early career researchers. The scheme includes a workshop in Edinburgh.

Collaborative research includes research and technology clubs, two of which have been founded – one in bioprocessing and one in diet and health – with more in the pipeline. The clubs identify generic research challenges and then invite proposals from the academic sector.
One of the ways in which BBSRC supports training is to provide pump-priming money to establish industrially relevant course modules. Here, small amounts of money – says £15,000 per module – can prove effective in de-risking such innovation for the HEIs. BBSRC supports over 100 modules in this way.

The Industry Interchange Scheme enables individuals to move between the industrial and academic sectors, and vice versa, in order to gain access to knowledge, skills, expertise and equipment, fostering KT relationships in the process. A successful example of a company involved with Industry Interchange in Scotland is Tepnel.

**National Endowment for Science, Technology and the Arts**  
Dr Rachel Brazil

The National Endowment for Science, Technology and the Arts (NESTA) supports innovation in three main ways – through its policy unit, its investments (providing venture capital and mentoring to early stage businesses), and programmes that operate across the education, social, academic and business sectors.

Projects include:

- **Design London**: an incubator unit at Imperial College to help new businesses integrate design, engineering and business skills
- **The Procter & Gamble Corporate Open Innovation Challenge**, designed

as a ‘David and Goliath’ scheme that brings together small and large companies to their mutual benefit

- **Starter for Six**: an enterprise-based project in Scotland supporting individuals or teams who have innovative ideas. Support includes mentoring, four days of training, a phone helpline, and seed investment. The project originally focused on the creative industries but has opened up to all industrial sectors.

NESTA has also been piloting Crucible, a development programme for mid-career researchers across the disciplines. It provides training across three weekends covering all aspects of KT including public and commercial engagement, working with the media, and working with each other – removing disciplinary barriers is a central concern of the project. A fourth weekend has been added to allow individuals to develop collaborative ideas with partners and to bid for development grants of up to £20,000 each.

**Discussion**: Between them, the schemes outlined provide a spectrum of programmes to encourage KT – in some cases starting with the academic sector, in others starting with the business or public sectors – from the small or even micro (in terms of size of project or size of business involved) to the very large.

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**Dr Siobhán Jordan** is Director of Interface – the Knowledge connection for business which offers a central point of access for industry to the specialist knowledge and expertise within Scottish universities and research institutes.  
[www.interface-online.org.uk](http://www.interface-online.org.uk)

**Dr Debbie Buckley-Golder** is Director of Knowledge Transfer Partnerships a UK-wide programme to encourage business-knowledge base collaborations. It helps organisations improve their competitiveness and/or productivity through the use of the knowledge, technology and skills that reside within academic institutions.  
[www.ktonline.org.uk](http://www.ktonline.org.uk)

**Dr Simon Cutler** manages BBSRC’s Innovation Programme including the new Industry Interchange Programme which supports the flow of researchers, in either direction, between the science base and industry.  
[www.bbsrc.ac.uk/business/people_information/industry_interchange.html](http://www.bbsrc.ac.uk/business/people_information/industry_interchange.html)

**Dr Rachel Brazil** is Crucible Programme Director for NESTA, the National Endowment for Science, Technology and the Arts, which acts a catalyst to find the most effective ways of encouraging talent and innovation for national benefit.  
[www.nesta.org.uk](http://www.nesta.org.uk)
UNIVERSITY RESEARCH COMMERCIALISATION – WHAT CAN SCOTLAND LEARN FROM THE US?

Innovation and entrepreneurship are widely acknowledged to be central to the US economy, and American knowledge transfer systems supporting the commercialisation of research appear to be well developed and efficient with many inventions and patents being generated by university researchers. As increasing emphasis is being placed on knowledge transfer outputs from UK research, are there models of US research commercialisation and business support that should be considered by the Scottish research community? And how might they enhance the entrepreneurial research climate for our early stage researchers and widen their career prospects?

Speakers:
- Prof Erich Ippen  Massachusetts Institute of Technology
- Prof Eric Van Stryland  University of Central Florida
- Prof David A.B. Miller  University of Stanford
- Mrs Margaret McGarry  Scottish Enterprise

Chair:
- Prof Allister Ferguson  Deputy Principal, University of Starthclyde

Massachusetts Institute of Technology
Prof Erich Ippen

Massachusetts Institute of Technology (MIT) is a private university which derives about 10% of its research volume from private industry. This support is important not only in its own right, but also because it increases faculty interaction with industry colleagues and it is viewed favourably by government funding agencies. The university has twenty academic departments and about 100 laboratories and research centres.

The main university-wide platform for collaboration with industry is the university’s industrial liaison programme. This began sixty years ago with a dozen member companies. It now has about 200. The average corporate membership fee is about $60,000. Companies gain a number of benefits – for example, access to faculty, a supply of pre-prints, and participation in symposia.

Over the years there has been a change in the policy of technology transfer and IP. There has been an increasing emphasis on getting IP into the hands of companies that will actually use it. This produces a stream of royalty income for MIT amounting to about $70 million per annum (around 3% of MIT’s operating revenues, with sponsored research at 45%).

University of Central Florida
Prof Eric Van Stryland

The University of Central Florida began four decades ago and has grown to become the fifth largest university in the US. It has developed a particularly important position in photonics. The Centre for Research and Education in Optics and Lasers (CREOL) which is now part of the new College of Optics and Photonics (first such college in the US) hires both faculty qualified in science and faculty qualified in engineering. This produces a combination of pure and applied expertise that proves very attractive to industry.

The university has been very active in business incubation. It has served over ninety companies and has made a major contribution to Florida’s economy as a result. The university has provided a centre for research jointly funded by industry and government.
The industrial affiliates programme deliberately has a low membership cost (as low as $1000 per company depending on size). This has stimulated partnerships between industry and CREOL that has led to a number of successes (yielding 25% of the centre’s budget) and has provided commercial experience for doctoral students. Much of the funding from industry originates from federal government contractors.

The university also provides a number of capital-intensive facilities for industrial users. This is particularly useful for small companies that would not be able to purchase the equipment themselves. Faculty are sometimes given leave of absence to enable them to help begin companies and then return. The university helps to establish industry clusters, encouraging companies to communicate with each other.

**Stanford University**  
Prof David Miller

Stanford, like MIT, is a private university. It enjoys an intimate connection with Silicon Valley. That relationship is bi-directional. The flow of information from laboratory research findings to product development start-up companies and on to the market is only part of the story: knowledge also needs to flow the other way.

There are numerous mechanisms for KT. They include consultancy, industrially sponsored research, the industrial affiliates programme, and licensing. The membership fees paid by affiliated companies is important not only as a source of revenue for the university, but also because it gives companies a stake in KT and ensures that they interact with Stanford energetically. By far the most important mechanism, however, is simply the production by the university of educated, knowledgeable, graduates.

As at MIT, there is an emphasis on getting IP into companies that will utilise it. None of the licensing income flows into central university funds. Instead the income is split three ways – between inventors, their departments, and their schools. This income is important as a source of revenue for Stanford, though nowhere near as important as donations. Stanford’s main aim, to which KT contributes, is to make people successful: that in turn generates its income from donations.

Silicon Valley’s production is vast (about $360 billion). About 1,000 companies are in some sense spin-offs from Stanford. Many of these are small (with an average revenue of about $250,000 per employee), but they also include some of the region’s largest companies. Intriguingly, only about 1 in 20 of the spin-offs uses Stanford-generated IP at the core of their business.

Stanford, as other universities, contributes to industrial development in numerous ways. The generation of new products from KT is probably the least important way. More important is the university’s function as a reservoir of knowledge and talent and as a magnet for smart, well motivated, people (some of whom remain in the locality).

There are a number of ways in which universities can help to ensure success in KT. It is important to ensure that students gain plenty of exposure to industrial and technological problems. It is also crucial to ensure that there is mutual respect between researchers working in basic research and those involved in applied research – and there must be no gap between the two. One function universities should not try to fulfil is developing products themselves: the culture of universities is not right for that.

**The Edinburgh - Stanford Link**  
Mrs Margaret McGarry

Scottish Enterprise manages a £12 million government-funded scheme for stimulating collaboration between Scottish universities and US partners. Scottish universities were able to bid for the funds. The University of Edinburgh was successful with a bid for an R&D project with Stanford University in a very specialised area, namely speech and language technology.
The project was managed through a dedicated project director, an advisory board, and a management group. There was some tension between academic emphasis on research and Scottish Enterprise’s emphasis on commercialisation. One of the challenges has been to align excellent opportunities for research with opportunities for commercial exploitation. One of the difficulties of such a project is the timescale: the funding was for six years, but commercial benefits typically take longer than that to emerge and cannot be measured on the same timescale as the research.

The scheme has produced a number of benefits. One of the main ones has been the exposure of Scottish researchers to the highly entrepreneurial culture of Silicon Valley. There have been some unforeseen benefits. For example, the University of Edinburgh now runs fully accredited entrepreneurship courses based on Stanford’s model, the ‘Stanford Technology Ventures Program’.

**Prof Erich Ippen** is Elihu Thomson Professor of Electrical Engineering and Professor of Physics at Massachusetts Institute of Technology. His activities include membership of the Materials Processing Centre@MIT which creates partnerships with industry to focus research on industrially relevant issues thereby “making matter meet human needs”.

www.eecs.mit.edu/
http://mpc-web.mit.edu/

**Prof Eric Van Stryland** is Dean of CREOL – The College of Optics and Photonics at the University of Central Florida. It has formed strong bonds with Industry through its Affiliates Program and supports innovation through its Photonics Incubator and Venture Lab, “where the business of technology begins”.

www.creol.ucf.edu/

**Prof David Miller** is W.M.Keck Foundation Professor of Electrical Engineering and Director of the Solid State & Photonics Laboratory at the University of Stanford. He also served as the Director of the E. L. Ginzton Laboratory at Stanford (1997-2006). Currently David is a Co-Director of the Stanford Photonics Research Center which builds strategic partnerships between the Stanford University research community and companies employing optics and photonics in their commercial activities.

http://stanfordphotons.stanford.edu/about.php

**Mrs Margaret McGarry** is the Former Senior Director of Knowledge Transfer at Scottish Enterprise (SE), Scotland’s economic development agency. In 2002 SE awarded the University of Edinburgh a fund of £6 million to develop a 5 year collaborative research and commercialisation programme with Stanford, California called the Edinburgh-Stanford Link.

www.edinburghstanfordlink.org/
RESEARCH INFORMING GOVERNMENT POLICY DEVELOPMENT

Social science research is widely used to help shape public policy development and provide evidence and data which can be used in the delivery of improved public services. In the case of The Scottish Government, strategic research is co-ordinated by Government Analysts drawn from the Government Economic Service, Government Statistical Service and Government Social Research. Building collaborative partnership-working between the academic, policy and practice communities is strongly promoted by research funding bodies such as the Economic & Social Research Council (ESRC). How do they stimulate knowledge exchange across the higher education, governmental, private and public sectors to ensure that the research they fund really does “make a difference to people’s lives”? And what initiatives is The Scottish Government developing to enable researchers to gain experience and understanding of the research and policy-making process?

Speakers:
- Dr David Guy  Head of Knowledge Transfer, ESRC
- Dr Gill Clark  Knowledge Transfer Team, The Scottish Government

Chair:
- Prof Ian Sanderson  Director, Corporate Analytical Services Directorate, The Scottish Government

Economic and Social Research Council

Dr David Guy

Knowledge transfer/exchange is not a new idea, just a new name for processes seen in many cultures. The term ‘knowledge exchange’ has advantages: ‘knowledge transfer’ runs the risk of being seen as a linear process in which research findings are disseminated to audiences irrespective of their interest or capacity to interpret and apply those findings (‘tip it and forget it!’), whereas ‘exchange’ implies real engagement.

ESRC supports over 2,500 research staff and more than 2,000 postgraduate students in the UK. While the UK has a strong research base, it performs less well on innovation. For those working in the social sciences, successful innovation is about the creation and implementation of new processes, products, services and methods of delivery that result in significant improvements in outcomes, efficiency, effectiveness or quality across business, the public and third sectors.

The ESRC Knowledge Transfer Team has three principal roles: knowledge brokering, acting as a conduit between researchers and research users; offering a range of programmes for researchers to engage with stakeholders; and generating impacts from research by working with those who apply it. ESRC offers a life-course approach to knowledge exchange – support for undergraduates with programmes through all stages of academia – with the emphasis on investing in individuals’ personal and career development through opportunities to broaden experience and enhance mobility. One popular initiative, established in 2004, is the series of Getting Research into Practice (GRIP) workshops offered to all ESRC researchers. Descriptions of all ESRC funding schemes (including placements, KTPs and training programmes) can be found at http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Support/knowledge_transfer/benefits/carrying_out_research/index.aspx?ComponentId=8771&SourcePageId=8860#0

The Scottish Government - ESRC collaborative programmes

Dr Gill Clark

KT collaborative activity between ESRC and The Scottish Government (TSG) is well established and there are multiple
opportunities for researchers to engage with policy:

- **ESRC/TSG Public Policy Seminar Series**, which aim to bring the best social science concepts and evidence into the policy arena and to stimulate discussion on how policy can be developed. The goal is to encourage evidence-based policy through an exchange between academic researchers, government analysts, and the policy and practice communities.

- **ESRC/TSG PhD Scheme**: TSG and ESRC have agreed arrangements to jointly fund doctorates on areas of common interest.

- **ESRC/SE Placement Fellow Scheme**, which provides for academics to be appointed as ESRC Placement Fellows to have dedicated time in government departments, government directorates, or other partner organisations to undertake specific tasks.

In addition, ESRC and TSG joint activities includes: piloting a government placement scheme offering ESRC-funded postgraduate students an opportunity to work in Scottish Government Directorates General on work placements for three months; collaboration with ESRC funded centres and units; and exploration of co-funding of research in areas of common interest. The Scottish Government analysts (economists, statisticians and social researchers) can also act as user referees for applications to ESRC for research funding. Liaison with The Scottish Government during preparation of policy-relevant research bids is encouraged. Questions and issues following the presentations included:

- Why does TSG prioritise ESRC for partnership working in their KT schemes: will TSG co-fund with other research funders?

- What support will ESRC and TSG give to interdisciplinary PhDs and support/endorsement for interdisciplinarity?

- Does this kind of activity link to programmes such as RELU?

- What scope is there for TSG to engage in Science and Maths PhDs?

- Is it possible for academics to produce output for an academic audience and more accessible material on their areas of expert knowledge for the policy community?

- The contested nature of knowledge: although TSG presents 'The Scottish Model' as the way ahead for KT, is there scope for reflections on what knowledge is, where power is situated, and what the place of academics is in ‘speaking truth to power’, rather than collaborating with government?

The KT team regularly takes part in focus meetings with Scottish Universities in which these and a wider range of issues about the experience of collaborative work between Government and Universities are discussed. Discussion of the above questions, and an account of the development of 'The Scottish Model' for KT activity is being drafted as a report to follow the 2005 publication on New Directions for Knowledge Transfer and Knowledge Brokerage. The Office of Chief Researcher expects to publish this report before the end of 2008.

**Dr David Guy** is Head of the Knowledge Transfer Team at the Economic & Social Science Research Council (ESRC). As well as managing a variety of KT schemes, the Team offers a knowledge brokering service, acting as a conduit between researchers and research users.

[www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Support/knowledge_transfer/](www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Support/knowledge_transfer/)

**Dr Gill Clark** leads the Knowledge Transfer Team at The Scottish Government (TSG). In addition to providing strategic advice and support on social science KT issues across TSG, the Team co-ordinates the ESRC/TSG Public Policy Seminar Series; oversees the ESRC/TSG PhD Scheme and, in 2008, will be piloting the ESRC-TSG Programme Fellowships and PhD Student Government Placements in Scotland.

[www.scotland.gov.uk/Topics/Research/Fellowships/17534/KnowledgeTransfer](www.scotland.gov.uk/Topics/Research/Fellowships/17534/KnowledgeTransfer)
POLICY DEVELOPMENT IN SUSTAINABILITY & CONSERVATION

Combating the effects of climate change; conserving the natural environment and managing non-renewable resources; reducing energy consumption and promoting carbon neutrality; changing behaviours to encourage more socially responsible sustainable development - these are amongst the biggest challenges facing Society today and are ones where many researchers want to contribute to finding solutions by sharing their skills, expertise and knowledge to inform policy development. But how can early stage researchers begin to engage with policy development and see their work have an impact beyond their discipline through this mechanism?

Speakers:
- Prof Jan Bebbington  Vice-Chair, Sustainable Development Commission
- Prof Maggie Gill  Chief Scientific Advisor for Rural Affairs & Environment, Scottish Government
- Dr Faith Culshaw  Natural Environment Research Council

Chair:
- Ms Ann Millar  Assistant Director, Research Policy & Strategy, Scottish Funding Council

Sustainable Development Commission
Prof Jan Bebbington

Developing evidence-based public policy, involving KT from the academic to the political domain looks, at first sight, simple. But there are three sets of issues that make KT for sustainable development problematic and complex:
- political issues (building trust through relationships)
- knowledge-based (‘wicked problems’, ‘post-normal science’, transdisciplinarity)
- only ‘clumsy solutions’ (implying a need for ‘humility’).

Sustainable development challenges are ‘wicked problems’ that defy the boundaries of disciplinarity and do not respond to ‘tried and tested’ scientific methods. A prime example is Hurricane Katrina’s devastation of New Orleans. Wicked problems, involving high levels of uncertainty and high stakes, need addressing by unique sets of people coming together across disciplines and sectors, working beyond the tools and techniques of ‘normal science’ and bringing in new forms of knowledge via extended peer communities. This way of working generates new sets of transdisciplinary challenges. We should reflect on the importance of academic humility in the face of such complex problems: a concern for ‘expert’ status would only hamper efforts to address the issues.

SG Rural & Environment Research & Analysis Directorate
Prof Maggie Gill

The workings of ‘Policy’ can be confusing: what is policy? how is it generated?; who is involved in policy making processes?; how do research findings influence policy?

In some cases, the effect may not have been anticipated when the research was initiated, e.g., long-term SG-funded research on factors affecting bird populations has direct application to one of Scotland’s environmental performance indicators: an increase the index of abundance of terrestrial breeding birds (http://www.scotland.gov.uk/About/scotPerforms/indicators/breedingBirds), although the initiation of that research pre-dated development of the indicator. In another example, the research may be timely e.g. epidemiological analysis of livestock movements was initiated in 2006 and had direct and immediate benefits in informing Scotland’s response to the 2007 foot and mouth outbreak.

It may not always be obvious how HEI research feeds into policy, either on a long-term or shorter-term basis. In contrast, researchers in European-funded programmes often have long-term impacts on future European policy making. The challenges for
the Rural & Environment Research &
Analysis Directorate are, therefore, two-fold:
to commission integrated research from
different disciplines in order to aid policy
development; and to aid communication of
the policy context to stakeholders (including
scientists) to effect the intended impact of
policies.

Opportunities can be found for early career
researchers to support or influence policy in a
range of settings including HEIs,
government-funded research institutes,
government agencies and non-departmental
public bodies (NDPBs), as well as within
government itself.

Natural Environment Research Council
Dr Faith Culshaw

- How much environmental science is
  relevant to current policy making?
- How do we exchange knowledge between
  scientists and policy makers?
- What is the Natural Environment
  Research Council (NERC) doing to
  improve this process?

Although all environmental science is likely to
be relevant to policy at some point, some
research takes years to have an impact. NERC
requires an annual return from its grant
holders which asks for a subjective judgement
of the work’s relevance to current
environmental policy development. In recent
years around two-thirds of responders have
said that their projects are relevant, one-
quarter reply ‘not relevant’, and the remainder
are ‘don’t knows’. Of the two-thirds
identifying policy relevance, however, only
about a quarter have actually provided advice
to government (by such means as responding
to a consultation, giving a briefing, committee
member). There is a need for more academic
involvement in dissemination.

Legislation is not the only ‘science to policy’
route, though it can often be the most visible
-an oft-cited example being the British
Antarctic Survey (one of NERC’s research
centres) whose work in discovering the hole
in the ozone layer ultimately led to legislation
to ban CFCs. Other routes include the
formulation of new regulations or other plans
of action that lead to change. Knowledge
exchange takes place in a huge variety of ways,
from informal contact between individual
scientist and policy-maker, to commissioned
research to address particular needs.

NERC’s efforts to improve knowledge
exchange processes include:

- initiating ‘Living with environmental
  change’, a research and policy partnership
  of 15 members to tackle environmental
  change
- developing a searchable database of
  science impact case studies
- secondment opportunities for NERC
  PhD students in parliamentary offices
- appointing a science policy facilitator to
  help improve knowledge exchange
  (including between NERC and DEFRA).

New initiatives soon to come into effect are:

- all applicants for responsive mode
  funding being required to include
  knowledge exchange plans
- policy placement scheme for academics
  (3–12 months placement within
government)
- work shadowing opportunities.

Discussion: The complex problems faced in
sustainable development policy-making
require new ways of thinking and
collaborating. The theme of complexity in
policy processes promoted discussion on how
best to identify entry points for influence, for
jobs, for funding of early career researchers.

Presenters’ advice included:

- taking the initiative, showing interest by
  networking, making informal contact at
  events
- being aware of ‘where policy is at’
  (familiarisation with the debate before
designing the experiment!)
- taking part in formal opportunities such
  as research council schemes and events
• aiming to influence NGOs, pressure groups and other stakeholders, not just government.

There are many important and exciting opportunities to engage with policy (whether in a career outside HE or from an academic base) and these are increasing as funding bodies extend initiatives in this area.

Prof Jan Bebbington is Director of the St Andrews Sustainability Institute and Vice-Chair (Scotland) of the Sustainable Development Commission, the Government’s independent watchdog on sustainable development. www.sd-commission.org.uk

Prof Maggie Gill is the Scottish Government’s Chief Scientific Advisor for Rural Affairs and Environment, heading the Rural & Environment Research & Analysis Directorate www.scotland.gov.uk/Topics/Research/15597

Dr Faith Culshaw is Team Leader of Public Sector Liaison and Science into Policy, Knowledge Exchange, Natural Environment Research Council. www.nerc.ac.uk
POLICY DEVELOPMENT IN HEALTH, POLICING AND DEMOGRAPHY

How can academic research best be used to inform public policy development and implementation aimed at improving human health, safety and quality of life? What impacts are University research groups and networks having on Scottish socio-economic improvements through their KT activities? And is the potential for researchers to engage with evidence based policy making increasing in Scotland?

 Speakers:
  * Prof Huw Davies  Director, Social Dimensions of Health Institute
  * Prof Nicholas Fyfe  Director, Scottish Institute for Policing Research
  * Prof Peter McKiernan  Head, School of Management, University of St Andrews
  * Ms Sandra Nutley  University of Edinburgh; Chair, SFC Public Policy Action Group

Chair:
  * Ms Diana Wilkinson  The Scottish Government Chief Researcher

Getting evidence into policy

Prof Huw Davies

Getting social research used, both in political (policy with a large ‘P’) and organisational (policy with a small ‘p’) contexts involves immensely complex processes: ‘Are we, all of us who are knowledge producers, actually having an impact where it matters?’ Policy and research do collide, despite the government’s public commitment (since 1997) to ‘evidence-based’ policy.

There is nothing that a politician likes so little as to be well informed, because it makes decision-making so complex and so difficult.

*John Maynard Keynes*

The traditional linear model of knowledge transfer is ‘too rational, simplistic, asocial, acontextual, and [its based on] an unproblematic view of ‘knowledge”’. Research does not ‘speak for itself’. It needs to be translated, integrated with other sorts of knowledge (including tacit ways of knowing) and people’s values before people can make sense of it. These processes happen in social and highly contextualised ways. While high level policy-making process do sometimes occur (conscious, deliberative processes where policy decisions are made on the basis of sought evidence i.e. consultation), much more often policy making is a messy process. Such policy emerges and accretes over time, influenced as much by ways in which policy is implemented on the ground as by high-level deliberation. In such circumstances, perhaps the most that knowledge producers can hope for is to inform the discourse.

There are three areas of challenge:

1. improving the supply of research and pushing this improved ‘stock’ out into the public domain
2. increasing the demand for research
3. the process of intermediation between (1) and(2).

Scottish Institute for Policing Research

Prof Nicholas Fyfe

The Scottish Institute for Policing Research (SIPR), a consortium of 12 universities, is unusual as a research institute in that it was initiated by research users rather than research providers: it was requested by the Association
of Chief Police Officers in Scotland (ACPOS) in order to bring together the very fragmented, interdisciplinary, group of researchers involved in policing research. This demand for better applied policing research was driven by rapidly changing patterns of crime, political change affecting policing governance and management, and the potential of new technologies for crime investigation.

There has been a strong commitment from ACPOS to working at the mechanisms for knowledge exchange so that research evidence feeds into discussions about policing policy and practice. The management and governance structure of SIPR further enhances a culture of engagement with research users and research providers meeting regularly whether at the level of the steering groups of the research networks or the Executive Committee which coordinates the overall activities of SIPR.

Co-production of knowledge is important – a prime example being SIPR-funded PhD studentships, based on the ESRC CASE model (where research projects are developed in collaboration with the Scottish police service). Another is SIPR’s Practitioner Fellowship scheme, based on partnerships between academic researchers and members of police staff engaged on a piece of research. KE activities such as these build social capital (trust, reciprocity and engagement) leading to better-informed research practice and better understanding of research use in policy development.

**Future of Digital Cities**  
Prof Peter McKiernan

The Future of Digital Cities is a multidisciplinary research that started in 2001, aiming to understand the impact of the Information and Communication Technologies (ICT) on cities. It has developed projects such as ‘Scenarios for the Future of Digital Cities in 2015’ and, in partnership with the e-City Network and funded by the then Department of Trade and Industry, has created the e-City Index, a tool to measure e-readiness, provide competitive intelligence and facilitate strategy creation and implementation within city councils. Its research has also focused on worldwide measurement methods of ICT, long-range planning and social, economic, technological, and policy issues. The method was tested on 6 Scottish cities from 2002 to 2004 and refined subsequently. Since this trialling, Glasgow has gone on to win several major European and World city awards for IT innovation. In addition, enquiries for this Scottish invention have come from all over the globe. For instance, cities in New Zealand are at an advanced stage in implementing the project. The ease with which it can be a linked to contemporary (sustainability) and future (global warming) debates has been the hallmark of its success. It enables cities to see where they stand with regard to a) other cities and b) a virtual city of the future. Such benchmarking can inform current policy and help shape the city context of the future. By visiting the virtual city environment, cities can begin to create exciting visions of where they would like to be positioned in 15, 20 or 25 years time.

**Knowledge Transfer into Public Policy Action Group**  
Prof Sandra Nutley

The Scottish Funding Council’s Knowledge Transfer into Public Policy Action Group (KTPPAG) aims to increase the impact of research on public debate, public policy and public service delivery in Scotland. Sometimes this involves working with government but it is also important to engage in public debate and to critique the system, ‘keeping it honest’. KTPPAG works by promoting awareness of what might be possible, raising the profile of public policy knowledge transfer and exchange, addressing incentives (particularly for researchers) and working with the Scottish Funding Council to fund pilot projects (such as knowledge exchange networks and brokerage activities) and strategic investments in this area. KTPPAG also has an important role in mediating the learning between projects. While many areas of public policy and research in Scotland have begun to
engage, one area of as yet relatively little
dialogue is local government. This will be
addressed later this year by an event looking at
the potential for greater HE/local
government research collaboration.

Discussion: All presenters considered the
limits of the reach of evidence in policy
making. Perhaps the terms ‘evidence-
informied’ or ‘evidence-aware’ provide more
accurate descriptions than ‘evidence-based’.
Building social capital is a key feature of
successful initiatives: for example, the Future
of Digital Cities project got cities talking to
each other and even competing to become
more digitally ready.

Given the challenges, why should early career
researchers bother to engage with policy-
making?

Some real benefits are:

- developing valuable skills, experience and
  contacts
- benefits for research quality through
  practitioner feedback
- enhancing the possibility of gaining future
  funding (now that KT plans are required
  in research council bids)
- helping to grow the university’s
  reputation and increasing the chance of
  greater SFC funding through the KT
  transfer grant. Work is now underway to
develop metrics to capture public policy
impacts and find ways to reward the
researchers producing such benefits.

Prof Huw Davies is Director of the Social Dimensions of Health Institute (SDHI), an interdisciplinary
collaboration between the Universities of St Andrews and Dundee aimed at helping Scotland become a
healthier nation by influencing public health policy. www.sdhi.ac.uk/

Prof Nicholas Fyfe is the founding Director of the Scottish Institute for Policing Research (SIPR), a
consortium of 12 universities and the Association of Chief Police Officers in Scotland which engages in a
range of KT activities in order to strengthen the evidence base on which policing policy and practice are
developed. www.sipr.ac.uk/

Prof Peter McKiernan is Head of the School of Management, University of St Andrews. As part of
multidisciplinary research on The Future of Digital Cities, his group have developed the e-City Index with

Prof Sandra Nutley is Professor of Public Management at the University of Edinburgh, Director of the
Research Unit for Research Utilisation (RURU), and chair of the SFC Public Policy Action Group
www.ruru.ac.uk/
ENGAGING THE PUBLIC WITH RESEARCH & RESEARCHERS

New developments in research can have far-reaching impacts on society and so many funding bodies are actively encouraging researchers to engage more directly with the public in order to stimulate wider interest in research, encourage informed debate about the issues and opportunities it creates, and inspire the next generation of researchers. Who better to connect research with people than researchers themselves, many of whom already seek to communicate their research findings to a wider audience beyond their peers and colleagues?

Speakers:
- Dr Nigel Eady  The British Association for the Advancement of Science
- Miss Lara Crossland  Regional Coordinator, Researchers in Residence Scheme
- Mr Kirk Ramsay  Chief Executive, Glasgow Science Centre
- Prof Mary Bownes  Vice Principal, University of Edinburgh

Chair:
- Prof Peter Holmes  Pro-Vice Principal, University of Glasgow

The British Association for the Advancement of Science
Dr Nigel Eady

The BA (British Association for the Advancement of Science) seeks to advance the public understanding, accessibility, and accountability of the sciences and engineering. The following are examples of programmes organised by the BA:

(1) Each spring, the BA coordinates National Science and Engineering Week. The BA supports event organisers, provides some publicity and awards small grants for schools in challenging circumstances (www.the-ba.net/NSEW). Overall, there are 1500–2000 events in a variety of settings, including schools, universities, theatres and coffee houses, right across the UK.

(2) Each September, the BA organises its Festival of Science (www.the-ba.net/FestivalofScience). This is held in a different city each year. The host for the 2008 Festival is Liverpool. Each Festival is held in partnership with a university. Increasingly, events are being held not only on the university campus, but also in the city centre in order to maximise public participation. At each Festival several hundred leading scientists and science communicators explain recent developments in scientific research to a general audience. The Festivals is very well covered in the national press. Over 150 journalists register for the Festival each year.

(3) The BA Media Fellowships scheme (www.the-ba.net/mediafellows) is designed to develop trust and understanding between scientists and the media. Fellows spend between three and eight weeks working with journalists to produce accurate, well-informed articles about developments in science.

(4) perspectives (www.the-ba.net/perspectives) encourages early career researchers to explore the social and ethical implications of their research. It is designed as a ‘poster session with a difference’, enabling researchers to display their work during the Festival of Science and discuss it with the general public.

Researchers in Residence
Miss Lara Crossland

Researchers in Residence is a UK-wide scheme designed to help secondary school students engage with contemporary research. It provides researchers with 14–24 hours of
contact time in secondary schools. Researchers – whether doctoral students, postdocs, or research fellows – who are funded by one of the research councils or by the Wellcome Trust may apply to join the scheme.

There are three stages for each researcher on the scheme: (1) pre-placement training; (2) school placement, working in partnership with a teacher; and (3) review. The scheme also encourages researchers to continue to participate in public engagement after their placements have finished.

The scheme produces benefits for a variety of stakeholders. For the researchers it can help to develop transferable skills in such areas as communication, organisation, and assertiveness and to refresh their perspectives on their own research. For school pupils it can provide motivation and positive role models, as well as helping to challenge stereotypes about research. For institutions it can stimulate partnerships between HEIs and schools.

Science Centres
Mr Kirk Ramsay

There are four science centres in Scotland – in Aberdeen, Dundee, Edinburgh, and Glasgow – which together receive over 700,000 visitors each year. Glasgow, the biggest, organises about 13,000 activities and reaches over 500,000 members of the public annually. It is one of the leading science centres in the world.

The activities of science centres provide a major means, through a combination of education and entertainment, of overcoming public scepticism regarding science. For example, Glasgow’s science centre runs a ‘Science in the Dock’ programme in which the public can explore ethical issues involved in scientific research. The centre also acts a meeting point for industry, academia, and schools, and has even become a research site itself: four researchers from Stirling University use its audiences at the centre for their research. Glasgow Science Centre participates further in postgraduate education by supporting a Masters course in Science Communication at the University of Glasgow and contributing to teacher training programmes. It also provides a research showcasing facility whereby universities can get their research in front of large audiences of the general public. The other Scottish science centres are currently working to make similar facilities available to enable more KT through public engagement to take place.

Beacons for Public Engagement
Prof Mary Bownes

KT includes engagement with the public. Beacons for Public Engagement is a new scheme that is proving very popular: when it was launched, 84 universities across the UK bid to become one of the six beacons to be funded by the scheme. There was an extraordinary variety of ideas on how to engage the public more with research in higher education.

The University of Edinburgh’s beacon scheme is known as the Edinburgh Beltane. It encourages citizen participation in areas of research – such as health, life sciences, energy and the environment – relevant to public policy. Its aim is to change research culture, encouraging researchers to interact with the public – not only communicating over current research projects, but also providing an opportunity to influence future research. The public tends not to see scientific issues in strictly disciplinary ways. Public engagement on stem cell research, for example, is likely to involve questions of hard science, medicine, ethics, and public policy. The Beltane therefore encourages researchers to move out of the ‘academic silos’ of their own disciplines and work in a multidisciplinary way to engage the public.

The Beltane aims to provide researchers with the necessary training for public engagement. It is working with a number of partners including other universities (Heriot-Watt, Napier, and UHI Millennium Institute), businesses, media contacts, and organisations such as science centres, the botanic gardens,
and the Royal Observatory. It places a strong emphasis on rigorous evaluation of schemes and on selecting appropriate venues (including science centres) and media (podcasting in order to reach young people, for example) in order to engage with a wide range of people.

**Discussion:** One clear conclusion from the session was that research does not speak for itself. Active measures need to be taken to gain attention and respect for research. Researchers benefit from training on, and support for, presenting research to the wider public.

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**Dr Nigel Eady** works as Science in Society Officer for the British Association for the Advancement of Science – the BA. It is a registered charity which exists to advance the public understanding, accessibility and accountability of the sciences and engineering. [www.the-ba.net/the-ba/](http://www.the-ba.net/the-ba/)

**Miss Lara Crossland** is Regional Coordinator for Scotland for the Researcher in Residence Scheme which offers PhD students and Postdocs opportunities to develop research interests of pupils through placements in secondary schools. [www.researcherinresdience.ac.uk/rir](http://www.researcherinresdience.ac.uk/rir)

**Mr Kirk Ramsay** is Chief Executive of Glasgow Science Centre, one of Scotland’s must-see visitor attractions which aims to develop and enhance awareness of educational opportunities surrounding health, science and technology issues. [www.glasgowsciencecentre.org/](http://www.glasgowsciencecentre.org/)

**Prof Mary Bownes**, Vice Principal, University of Edinburgh is leader of the Scottish “Beacon of Public Engagement” called Edinburgh Beltane. It aims to encourage citizen participation and understanding of areas of research relevant to public policy such as health and life sciences, energy and environment. [www.rcuk.ac.uk/sis/beacons.htm](http://www.rcuk.ac.uk/sis/beacons.htm)
STIMULATING CULTURAL DEVELOPMENT IN THE ARTS IN SCOTLAND

Consideration of the Arts in relation to Knowledge Transfer (KT) raises a number of distinctive questions: How can university-based Arts scholars and researchers best undertake KT? How can universities and external agencies work more closely together to exchange knowledge in the Arts and Humanities and contribute towards Scotland's contemporary cultural and creative development? How can early stage researchers develop their skills and knowledge through the practice of cultural engagement? And what can be learnt from prime examples of Arts KT about how scholarship and research can best be disseminated to act as a catalyst for creativity and innovation?

Speakers:
- Ms Celia Duffy  The Royal Scottish Academy of Music and Drama (RSAMD)
- Prof Robert Crawford  School of English, University of St Andrews
- Dr Mark O’Neill  Head of Arts & Museums at Culture & Sport, Glasgow
- Prof John Caughie  University of Glasgow, AHRC panel member

Chair:
- Prof John Caughie  University of Glasgow; Chair, SFC Cultural Engagement Action Group

KT & The Royal Scottish Academy of Music and Drama
Ms Celia Duffy

The Royal Scottish Academy of Music and Drama (RSAMD) is Scotland’s only conservatoire. It is very unlike a university. Its main role is to provide professional training in the Arts. Most staff are part-time, hourly paid professionals. There are almost as many staff as there are students.

KT has been broadly defined in this conference as the two-way flow of ideas, skills and people between the research and higher education community and wider users in society in the public and private sectors. Under this definition, many of RSAMD’s core activities in fact constitute KT. The Academy’s KT users include organisations from the creative industries, such as Scottish Opera. They also include policy users – for example, research in Arts education for the Scottish Arts Council (including a report on workforce development) – and educational and community users: the youth works programme involves 1,500 young people, whilst the Academy has been involved in the development of graded exams for traditional Scottish music. The most important users of all are probably the Academy’s audiences through public performances (including performances by students for assessment).

RSAMD’s KT also includes work with users of the type more traditionally associated with STEM-style KT. For example, one post-doc fellow is a composer working with a manufacturer of cochlear implants, whilst the Digital Film Department is engaged with developing ‘made-for-mobile’ content of interest to mobile phone manufacturers.

An aim for the future is to make the KT more two-way by obtaining a greater flow of information and ideas from users back to the RSAMD.

Poetry and cultural engagement
Prof Robert Crawford

Those working in Higher Education have an ethical obligation to be as intelligible as possible. From that point of view, jargon terms such as ‘KT’ and ‘cultural engagement’ are not helpful. Indeed, it can be damaging to describe poetry, for example, as a ‘cultural industry’.
That said, much work in the field of poetry can be thought of as KT. Take, for example, St Andrews’ poetry festival, which began in 1988 and in which students played a key role. When the festival came to an end, the local community drew on their experience of the festival to start a new one named StANZA. Students came to play a key role in this too.

There is more to be done in Scotland to ‘join the dots’ in the Arts in Higher Education and the wider society. For example, in his own work – preparing a biography of Robert Burns and editions of Scottish poetry – Robert Crawford has received numerous invitations from other countries, but is conscious of being less ‘in the loop’ in Scotland itself. He finds himself, like many students, feeling unsure who to contact to help ‘join the dots’ to participate in cultural engagement in Scotland.

Advice to researchers wanting to engage in cultural engagement includes:

- Researchers should make use of opportunities afforded by festivals (e.g., StAnza in St Andrews or Word at Aberdeen) which are supported by universities, and which often welcome assistance as well as helping to disseminate ideas. It is important for researchers to accept and to create opportunities for their work to be disseminated through, e.g., radio programmes.

- Researchers should encourage universities to work more with local communities in the area of cultural engagement. Often it would help to have a designated person who coordinates a public engagement programme (e.g., through the Festivals Office at Edinburgh University). At St Andrews, the university’s 600th birthday celebrations provide a great opportunity to develop and deepen such cultural engagement locally, nationally, and internationally.

- It is important to find ways to bring together arts and science researchers (e.g., through St Andrews’ Contemporary Poetry and Contemporary Science project, or the James Gregory lecture series) without having to pretend (as the Research Councils sometimes seem to) that ‘we’re all scientists really’.

**Museums and research engagement**

Dr Mark O’Neill

Museums have been intimately engaged with the world of research since their early days. The Arts & Museum Service in Glasgow comprises a staff of 24 curators and five researchers. In addition, it works closely with researchers from Higher Education Institutes. For example, the exploration of Kelvingrove’s archives by Prof Peter Humphrey (University of St Andrews) has identified 40–50 paintings that, once cleaned, will in effect provide the Museum with a new collection of Italian art. The Service has strong links with the Museum Studies Department at St Andrews and hosts two researchers from Edinburgh University. The Service itself provides expertise in audience engagement while offering experts access to audiences.

One key aim is make the collections as research-ready as possible. This involves ensuring that items in the collection are properly inventoried and easy to locate. Another aim is to ensure that the collections are visitor-centred, taking due account of the diversity of visitors. It is crucially important not to treat audiences as blank slates and so museums need to research not only their collections but also their visitors.

**AHRC support for cultural engagement**

Prof John Caughie

Although cultural engagement will never be as significant as economic impact in terms of driving funds, the AHRC has been able to develop a suite of KT programmes. The programmes include:

- partnerships: for example the BBC has been working with researchers from universities in the area of design and computer games
• fellowships to fund projects with specific use value: for example, one medieval historian who studied the network models governing the way that knowledge was concealed and revealed by Cathars and heretic groups has since done some work with a security company

• collaborative studentships: in which research students each have two supervisors, one from an academic institution and one from another organisation (for example, a cultural institution)

More information is available about new AHRC schemes aimed at facilitating Arts KT is available at: www.ahrc.ac.uk/about/ke/knowledge.asp

Discussion: The Arts perhaps enjoy an advantage over Humanities areas such as History and Philosophy in the sense that public engagement has always been an essential ingredient of artistic activity. One methodological point is of note: case studies of the cultural impacts of research projects serve two functions. They not only help to demonstrate those impacts, but also help in the identification and dissemination of good practice and thus help to raise the horizons of the sector as a whole.

The question of how appropriate a conception of KT and its associated funding (derived from STEM subjects) is for Arts and Humanities subjects is problematic. At the very least the meaning of ‘KT’ is refracted by the different nature of Arts and Humanities disciplines: arguably, the term becomes emptied of meaning altogether when applied to Arts research.

Ms Celia Duffy is Director of Academic Development at The Royal Scottish Academy of Music and Drama, and a member of SFC KTIG Cultural Engagement Action Group. www.rsamd.ac.uk/

Prof Robert Crawford is Professor of Modern Scottish Literature, University of St Andrews, founder of the Poetry House and regular contributor to events such as Scotland’s Poetry Festival, STAnZA. www.thepoetryhouse.org

Dr Mark O’Neill is Head of the Arts & Museums Service in Glasgow whose refurbishment of Kelvingrove Art Gallery and Museum has won praise and accolades for the outstanding way it communicates art and culture with its visitors. www.glasgowmuseums.com/

Prof John Caughie, Department of Theatre, Film and Television Studies at the University of Glasgow, is Chair of the Scottish Funding Council’s “Cultural Engagement Action Group”. www.gla.ac.uk/departments/theatrefilmtelevisionstudies/
REACHING A WIDER AUDIENCE THROUGH THE MEDIA

Communicating research to the public is becoming much more a feature of today’s academic environment. Such activity is promoted by funding bodies as a way to inform, enthuse and educate the public about research issues. Liaising with the media can be a highly effective way of engaging with a wider audience, but can be under-employed by researchers who fail to recognise the intrinsic newsworthiness of their research findings, or are wary of their research being misrepresented by the press. As experts in their field, researchers may also be called upon to comment on issues of the day to a lay audience, but can be unsure of how best to respond to media enquiries. Yet, by understanding more about the issues and practicalities around liaising with the media, researchers can go on to develop rewarding interactions with the print and broadcast media as part of their public outreach activity.

Speakers:
- Mr Rob Edwards  Environmental journalist; The Sunday Herald
- Mr Stuart Brown  The Royal Society of Edinburgh
- Prof John Haldane  School of Philosophy, University of St Andrews

Chair:
- Mr Mervyn Jones  Chair of SFC Knowledge Transfer & Innovation Group

When dealing with the media, it helps to understand their concerns. The following points act as indicators of newsworthiness: novelty, originality; quirkiness; human interest (especially sex, death, violence); genuine discovery; exclusivity; tie-in with the audience; topicality; striking photographs; celebrity; ‘real’ people (i.e. not representing lobbies); secrecy; and connection with genuinely important events.

It also helps to understand journalists’ preferences, even when these may conflict with the values of academic research. Journalist tend to prefer: soundbites (as opposed to lectures); black-and-white views (to nuances); events (to issues); personalities (to ideas); a few essential facts (to a wealth of detail); stereotypes (to complexities); conflict (to harmony); bad news (to good); and criticism (to praise).

It is also helpful to understand the broader context in which the media work. Mid-twentieth century BBC-style assumptions about an educated public united by common values have disappeared. The contemporary media are fragmented and audiences are diverse. Relativism (the belief that an expert’s opinion may be no better than anyone else’s) and suspicion (that an expert might merely represent self- or vested interests) are common.

There are several things researchers can do to make them media-friendly. For example:

- Be clear: state the main message in the first two sentences; avoid jargon and acronyms
- Target the specific audience
- Cultivate media contacts patiently and make yourself accessible
- Be helpful: for example, provide background information even if you are not going to be featured yourself.

It pays to prepare carefully wherever possible. For example:

- Ask yourself the purpose of contacting the media (to promote your work, your
institution or group, yourself, or certain ideas or values?

- Be timely (make use of events and anniversaries)
- Clarify to yourself what type of story you are offering (rather like a toddler learning to slot shapes into a shape-sorter): for example, decide whether a story is a science, health, or business story
- Make use of your institution’s press office
- Select the appropriate media (according to whether the research story is wordy or visual, for example)
- Select the best person on your team (where ‘best’ might mean most personable, articulate, or charismatic rather than necessarily most expert)
- When you are being interviewed, brief yourself on the context and the impetus for the story and ask for as many details as possible about the setting, time, structure and format.

**Discussion:**

When researchers are given media training, often what they find most helpful is learning about the need to simplify stories so that they can be easily understood by non-specialist audiences. They also find it helpful to consider how far from their core areas of their expertise they are prepared to venture in discussing issues with the media.

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**Mr Rob Edwards** has been a freelance journalist specialising in environmental issues for over 25 years. Since 1999 he has been the environment editor of the Sunday Herald and a correspondent for New Scientist. [www.robedwards.com/](http://www.robedwards.com/)

**Mr Stuart Brown** is the PR and Communications Manager of the Royal Society of Edinburgh (RSE), Scotland’s National Academy, and facilitates interaction between the RSE and members of the Media. [www.royalsoced.org.uk/](http://www.royalsoced.org.uk/)

**Prof John Haldane** is Professor of Philosophy and Director of the Centre for Ethics, Philosophy and Public Affairs at the University of St Andrews. He is frequently invited to contribute to newspaper articles and radio broadcasts. [www.st-andrews.ac.uk/ceppa/](http://www.st-andrews.ac.uk/ceppa/)
CONCLUDING DISCUSSION

Universities Panel:
- Prof Mary Bownes  Vice Principal, Research Training & Community Relations, Edinburgh
- Prof David Boxer   Vice Principal Research and Enterprise, Dundee
- Prof Allister Ferguson Deputy Principal, Strathclyde
- Prof Gavin Gibson  Deputy Principal Research & Knowledge Transfer, Heriot Watt
- Prof Robin Mackenzie  Vice Principal Research & Knowledge Transfer, Napier
- Prof Alan Miller  Vice Principal Research, St Andrews

Chair:
- Mr Quentin Cooper  Broadcaster and Journalist, BBC Radio 4

In a wide-ranging discussion including such topics as postgraduate research provision and outreach to schools, the panel considered how HEIs can do more to stimulate knowledge transfer. They all agreed that the key was people and the provision of opportunities to learn and experience more about innovation and entrepreneurship at all levels of education. Two themes received particularly strong focus: interdisciplinarity and entrepreneurship.

The panel considered the suggestion that disciplinarity was of use mainly as a way of organising undergraduate courses and was less useful in the research world. The answers were broadly sympathetic. Certainly many of the impacts of research projects tend to be interdisciplinary: similarly they need frequently to be conceived and conducted on an interdisciplinary basis. There is a premium in research on problem-solving skills and ‘Class II’ thinking unconstrained by disciplinary limits. This raises policy and management challenges concerning funding, incentivisation, and career development.

The panel also considered the suggestion that students should be provided with training in entrepreneurship. Again, the responses were broadly sympathetic. Such courses could enhance entrepreneurial talent. Indeed, there were suggestions that such training could be extended to, at one end, secondary schools and, at other, CPD courses for academic staff. There were, though, some caveats: as well as courses, we need researcher-entrepreneurs to act as role models; candidates for such courses tend to be self-selecting and compulsory training seemed undesirable; and the culture around HEIs (as well as within) is extremely important.

Experience suggests that some cultures – America’s, for example – naturally breed more entrepreneurial ambition than Scotland’s. Was this nurtured or was it in their nature? It was noted that entrepreneurship courses offered in UK HEIs can attract a disproportionate number of overseas students.

EMERGING THEMES

In discussions of KT, the phrase ‘not just…’ recurs frequently. There is a danger of stereotyping KT as something that involves only spin-outs from STEM research, always entails cutting-edge research (producing ‘new to the planet’ knowledge) and patents, and produces results of purely economic value.

There are indeed many such examples – but that is not all KT is.

KT, therefore, is not just a matter of:
— ‘new to the planet research’: transferring knowledge that is ‘new to the user’ can also be valuable
— STEM subjects: there are also opportunities in ‘HAS’ subjects (‘HAS’ is a neologism from Quentin Cooper, standing for Humanities, Arts, and Social Science). Indeed, in many of the arts, the notion of ‘audience’ is integral, making such subjects particularly hospitable to KT so long as it is broadly conceived.

— spin-outs: KT can also occur through established businesses – and the discussion above identifies a number of publicly funded schemes designed to facilitate this.

— economic impacts: social and cultural impacts are also important – and impacts include those accruing from public policy-making becoming more ‘evidence-based’, ‘evidence-informed’ or ‘evidence-aware’. This includes both macro and micro changes to policy.

— one-way: it may be better to talk of ‘KE’ (‘knowledge exchange’) since in practice ‘KT’ projects tend to produce a two-way flow of knowledge between researchers and their partners. Moreover, the knowledge gained by researchers through KE can produce benefits to future research in terms of the focus and design of research projects.

— research: HEIs also generate KT through their teaching and through the supply of graduates to society and the economy. Similarly KT involves not only universities and research institutes, but also colleges.

Perhaps most important of all, KT in Scotland is not just a matter of learning how to transfer (or exchange) knowledge generated within Scotland: it is also, crucially, a matter of learning how to make effective use of knowledge generated elsewhere. KT in Scotland today exists in a highly globalised context.

In order to develop KT further, we need to deal with a number of issues. In particular, we need to:

— ensure that the metrics used in the formulation of policy and the allocation of funding capture the important variables accurately

— decide how to incentivise researchers so that KT involvement benefits their careers

— think through the issue of disciplinarity: on the one hand, different disciplines require different models of KT; on the other, KT is often inter-disciplinary in nature. The problems that KT projects are designed to solve do not always come neatly packaged within disciplinary boundaries.

— train researchers: for effective KT, it is not enough simply to produce research that is relevant. Research cannot be left to speak for itself. Researchers need to learn how, through their own skills and through working with partners, research can be articulated, disseminated, and applied

— earn a sense of trust from the public by promoting public awareness and understanding

— educate the potential users of KT so that they become more aware of the benefits and opportunities

— reconcile timescales: political decision-making, for example, sometimes focuses on short term factors, while the benefits from KT projects can take a long time to accrue.

Last, but not least, we need to recognise the value of the adage, ‘You can’t buck the market’. KT is not simply a matter of inventing and developing products – the products need to be ones for which there is a demand. Markets, therefore, are paramount.
A number of recommendations for early career stage researchers emerged from KT Scotland: Policy & Practice. They are:

- analyse yourself. Identify your strengths and weaknesses and your preferences. Consider how to work with other people to harness their skills to your own so that the whole in any partnership becomes more than the sum of the parts.

- inform yourself of the context for KT. Use your research skills to research the academic, commercial, and policy components of the context.

- take advantage of the information, advice, and guidance available – in your own institution and beyond.

- think not only of ‘KT’ (what knowledge you have to transfer to other people) but also ‘KE’ (knowledge exchange). What can you learn from the process?

- consider opportunities across all sectors – private, public, and third sector.

- network, network, and network.

Finally, think strategically about your career path. In considering opportunities, consider (a) your own aims, (b) the timescales involved and (c) what scale of project and involvement is best for you.
A compendium of KT opportunities and funding

Arts and Humanities Research Council  
www.ahrc.ac.uk/about/ke/knowledge.asp

the-BA: The British Association for the Advancement of Science  
www.the-ba.net/the-ba/

Beacons for Public Engagement  
www.rcuk.ac.uk/sis/beacons.htm

Biotechnology and Biological Sciences Research Council  
www.bbsrc.ac.uk

Biotechnology Young Entrepreneurs Scheme  
www.biotechnologyyes.co.uk/index.html

Department for Innovation, Universities and Skills  
www.dius.gov.uk

Economic and Social Research Council  
www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Support/knowledge_transfer

Glasgow Museums  
www.glasgowmuseums.com

Glasgow Science Centre  
www.glasgowsciencecentre.org

Industry Interchange Scheme  
www.bbsrc.ac.uk/business/people_innovation/industry_interchange.html

Interface – the knowledge connection for business  
www.interface-online.org.uk

ITI Scotland Ltd  
www.itiscotland.com

Knowledge Transfer Partnerships  
www.ktponline.org.uk

Media Fellowships Scheme  
www.the-ba.net/mediafellows

Natural Environment Research Council  
www.nerc.ac.uk/publications/corporate/policy.asp

NESTA  
www.nesta.org.uk

Researchers in Residence  
www.researchersinresidence.ac.uk

Royal Society of Edinburgh  
www.royalsoced.org.uk/research_fellowships/enterprise.htm

Scottish Enterprise Proof of Concept Programme  
www.scottish-enterprise.com/proofofconcept

Scottish Institute for Enterprise  
www.sie.ac.uk

The Scottish Government  
- www.scotland.gov.uk/Topics/Research/Research/17534/KnowledgeTransfer  
- www.scotland.gov.uk/Topics/Research/15597

StANZA  
www.stanzapoetry.org/

Scottish Universities Physics Alliance (SUPA)  
www.supa.ac.uk/Knowledge_Transfer/Knowledge_Transfer.php

UK GRAD  
www.grad.ac.uk

Universities Scotland  
www.universities-scotland.ac.uk
What did participants say about KT Scotland: Policy & Practice 2008?

“Gained a lot of enthusiasm to see what possibilities are already there for research-business interactions”

“Finding out more about the knowledge transfer industry, which I didn’t realise existed before!”

“Being exposed to partnerships and schemes available that I will definitely investigate”

“Very worthwhile and a great way of bringing practitioners and early stage researchers together”

“A pertinent and responsive agenda and well informed sessions with a wonderful mix of people”

Visit the KT Conference website to review the 2008 conference presentations and to suggest topics you would like to be included in the 2nd KT Scotland: Policy & Practice Conference which will take place at the University of St Andrews on 3rd April 2009. Booking of conference places will again be on-line via the conference website, and further details will be posted in early 2009.

www.st-andrews.ac.uk/ktconference
## Glossary of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ACPOS</td>
<td>Association of Chief Police Officers in Scotland</td>
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<tr>
<td>AHRC</td>
<td>Arts and Humanities Research Council</td>
</tr>
<tr>
<td>BA</td>
<td>The British Association for the Advancement of Science</td>
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<tr>
<td>BBSRC</td>
<td>Biotechnology and Biological Sciences Research Council</td>
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<td>CASE</td>
<td>Collaborative Award in Science and Engineering</td>
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<td>CPD</td>
<td>continuing professional development</td>
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<tr>
<td>DEFRA</td>
<td>Department for Environment, Food, and Rural Affairs</td>
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<tr>
<td>DIUS</td>
<td>Department for Innovation, Universities and Skills</td>
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<tr>
<td>ESRC</td>
<td>Economic and Social Research Council</td>
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<tr>
<td>HE</td>
<td>higher education</td>
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<tr>
<td>HEI</td>
<td>higher education institution</td>
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<td>ICT</td>
<td>information and communication technology</td>
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<tr>
<td>IP</td>
<td>intellectual property</td>
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<td>KE</td>
<td>knowledge exchange</td>
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<td>KT</td>
<td>knowledge transfer</td>
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<td>KTP</td>
<td>knowledge transfer partnership</td>
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<td>KTTPAG</td>
<td>Knowledge Transfer into Public Policy Action Group</td>
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<td>MRC</td>
<td>Medical Research Council</td>
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<tr>
<td>NDPBs</td>
<td>non-departmental public bodies</td>
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<tr>
<td>NERC</td>
<td>Natural Environment Research Council</td>
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<tr>
<td>NESTA</td>
<td>National Endowment for Science, Technology and the Arts</td>
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<tr>
<td>NGO</td>
<td>non-governmental organisation</td>
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<tr>
<td>NHS</td>
<td>National Health Service</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>QR</td>
<td>quality research</td>
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<tr>
<td>RCC</td>
<td>Research and Commercialisation Committee</td>
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<tr>
<td>RCC-RT</td>
<td>Universities Scotland Research and Commercialisation Committee Research Training Sub-Committee</td>
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<td>RCUK</td>
<td>Research Councils UK</td>
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<tr>
<td>RELU</td>
<td>Rural Economy and Land Use programme</td>
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<tr>
<td>RSAMD</td>
<td>The Royal Scottish Academy of Music and Drama</td>
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<tr>
<td>RSE</td>
<td>Royal Society of Edinburgh</td>
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<tr>
<td>RI</td>
<td>research institute</td>
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<tr>
<td>R&amp;D</td>
<td>research and development</td>
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<tr>
<td>SFC</td>
<td>Scottish Funding Council</td>
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<tr>
<td>SIPR</td>
<td>Scottish Institute for Policing Research</td>
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<tr>
<td>SME</td>
<td>small or medium-sized enterprise</td>
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<tr>
<td>STEM</td>
<td>science, technology, engineering and mathematics</td>
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<tr>
<td>TSB</td>
<td>Technology Strategy Board</td>
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<tr>
<td>UHI</td>
<td>University of the Highlands and Islands</td>
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<tr>
<td>VC</td>
<td>Vice Chancellor</td>
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<tr>
<td>VP</td>
<td>Vice Principal</td>
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