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**CENTRE/GROUP/NETWORK
DIRECTOR'S
ANNUAL REPORT FORM
(Edition 7: September 2004)**

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CENTRE/GROUP/NETWORK DIRECTOR'S ANNUAL REPORT 2004

(This page must be completed by the Case Officer before forwarding to the Director)

Reporting period : **1 January 2004 to 31 December 2004**

Name of Centre/Group/Network : **ESRC Centre for Social and Economic Research
on Innovation in Genomics (INNOGEN)**

Director's name : **Professor Joyce Tait**

Start and End Dates : **1 October 2002 – 30 September 2007**

Year of Operation : **2**

Total budget from ESRC : **£2,137,830.57**

The Director's Annual Report should be completed in accordance with the attached guidelines. It should be sent to the relevant ESRC Case Officer by **31 March 2005** by **email** and in **hardcopy** (original plus three copies, with signed cover letter).

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1. Executive summary

The Innogen Centre's research programme

Innogen's research programme contributes to the development of well founded social science research, engaging critically with the substance of developments in life sciences and we are continuing to enhance our international reputation as leading exponents of interdisciplinary research approaches. Integrating a range of different approaches and perspectives enables us to provide more useful advice to a wider range of stakeholders, as evidenced by the increasing number of engagement opportunities offered to us.

During 2004, we have expanded our research programme beyond the projects funded by the ESRC Centre grant and we now have a well balanced set of research initiatives covering our three main themes, *Science, innovation and knowledge management*, *Policy and regulation*, and *Public and stakeholder engagement*, along with our overall integrative theme, *Globalisation and governance*. The research programme is summarised in Section 5 and the component research projects are outlined in Section 7.

Additional funding in 2004

Funding for this expansion (total £691 in 2004, not including contributions in staff time from the Open University and University of Edinburgh) has come from a variety of sources. Approximately half is from other ESRC research programmes; the rest has come through EC 6th Framework Programme grants, from the Scottish Higher Education Funding Council (SHEFC), Scottish Enterprise, and the Chief Scientist Office at the Scottish Executive. Two small grants, from the UK Office of Science and Technology and the South West Regional Authority, arose from invitations to tender for specific projects from these stakeholders.

Funding from sources other than ESRC has mainly arisen through invitations to join other consortia, of social science academics in the case of EC funding, and of scientists and medical professionals in relation to funding from SHEFC and other sources in Scotland. There is a strong emphasis in Scotland on support for life sciences and the opportunities that can arise from new knowledge in this area, and Innogen now has a good reputation as a Centre that is able to bridge the area between natural and social sciences, while remaining well grounded in social science methodology and constructively critical in our approach.

We see this success as an indication of our intellectual standing as excellent academic researchers, of our ability to engage constructively across this range of academic disciplines, and also of our ability to deliver evidence-based policy advice to a wide range of stakeholders.

Capacity building in developing countries

This research strand is mainly based in the Open University, with important inputs from the University of Edinburgh through one research fellow, now a lecturer, and a range of graduate students. During 2004 its achievements have included a considerable expansion in activities in Africa and Asia, beyond the research programme originally proposed to ESRC, and also participation in a number of very high-profile stakeholder events.

Policy advice and external relations

Innogen staff in general have achieved an excellent record of participation in international conferences, workshops and stakeholder events and in offering policy advice to stakeholders (see section 4). In particular, long-term presence of our staff on over 20 advisory bodies provides us with a major ability to influence policy and practice and also provides us with excellent intelligence of emerging issues in life sciences. However, merely counting the numbers does not do justice to the general overall range, high status and extent of influence of this strand of our activity.

Publications

The number of books (5) and publications in academic refereed journals (31), published or in press in 2004, provides a good indication of our academic standing across the wide range of social science disciplines with which we engage. This is backed up by a further 20 book chapters, 18

Innogen Working Papers, 7 non-academic publications or reports for policy audiences, and 9 unpublished policy briefs or reports.

Staff development and promotions

We place strong emphasis on providing opportunities and support for staff development. During 2004, research fellows organised several Innogen workshops involving academics, policy makers, industry and public group representatives. Research Fellows have also taken a major role in organising sessions at the Innogen conference held in February 2005, requiring them to contact internationally-known speakers from all of Innogen's stakeholder constituencies and to undertake all other aspects of organisation and delivery of their session.

The Open University and Edinburgh University have each indicated their support for Innogen by appointing an additional permanent lectureship in this area, and three Innogen associated staff have been promoted to professorships. Also one of our research fellows has been appointed to a permanent lectureship in the University of Edinburgh and two of our research fellows have been awarded doctorates.

Overall there is daily contact and there are excellent working relations between the two universities, with many joint activities and frequent visits between the two sites. These relations are cemented twice annually by retreat meetings attended by all Innogen staff.

Teaching and Studentships

Masters level course provision continues to expand at both universities and preparation began in 2004 for the launch of a series of professional development courses for managers in industry and government policy makers. In addition the significant influx on new graduate students in 2004 is adding greatly to the intellectual life of the Centre at both locations.

Communications

In addition to publications and contributions to conferences, workshops and advisory bodies, during 2004 we have commissioned the re-design of the Innogen website to make it easier to update and more useful as a general communication tool.

The Genomics Network

Innogen is an active contributor to the Genomics Network as a whole and our staff appreciate the variety of additional perspectives on genomics-related issues which it provides. We have run joint workshops with other Centres, collaborated in the development of the first newsletter, attended workshops and conferences held at other Centres, and given seminars at other Centres. We also engaged two staff members in the Egenis Centre to work on one of our EC-funded projects. We have also provided support, in the early stages of its development, to the Genomics Forum.

Overall

The sum total of our achievement during 2004 has added greatly to the value of the initial ESRC investment in the Innogen Centre.

2. Introduction

Funding for the first phase of the Innogen Centre (Centre for Social and Economic Research on Innovation in Genomics) programme was awarded from October 2002 – September 2007, with the following overall aim:

to build an internationally respected Centre to enable social scientists and ESRC to take a leading role in policy, public and innovation-related debates on life science issues, and to contribute to the shaping of the biotechnology trajectory along with other research councils, from a well informed, evidence-based position.

Innogen's research covers the complex interactions among: public and stakeholder perspectives on genomics-related issues; the science and innovation developments underlying these issues; the policy and regulatory challenges arising from new genomics-based knowledge; and the emerging strategies of the genomics-based industry sectors. Innogen's basic social science research in each of these areas makes an important contribution to the overall outputs of the ESRC Genomics Network. In addition, a distinctive aspect of Innogen's approach is our ability to integrate findings across all these perspectives (science, industry, government, regulatory bodies, public and stakeholder groups) through our detailed consideration of the interactions among the different constituencies and the implications for the global governance of the life sciences.

Our research thus contributes to the development of well founded social science research, engaging critically and incisively with the substance of developments in these areas and we are continuing to enhance our international reputation as leading exponents of interdisciplinary research approaches. Integrating a range of different approaches and perspectives enables us to provide more useful advice to a wider range of stakeholders, as evidenced by the increasing number of engagement opportunities offered to us.

The number of invited contributions of Innogen staff to major international conferences and workshops, and the range of our membership of advisory bodies and contributions to policy fora, often working with scientists and medical practitioners, are also a good indication of our standing in the wider stakeholder community. Our networking, stakeholder engagement and interactions with the science and medical communities, are greatly facilitated by the strong support for life sciences in Scotland, from government and other public bodies.

Throughout 2004, we have continued to attract significant additional external funding. The £183K of additional funding attracted in 2002-3 has now been supplemented by a further £691K, including funding from ESRC and EC programmes. Several projects (value £263K) are funded from non-social science sources and are working in close partnership with scientists and medical practitioners. The ESRC initial award of £2,081,000 has also been supplemented by a further £60,000 to provide additional project management support, along with £15,000 for re-development of the website, both very helpful additions to our funding. The year 2004 has also seen several important promotions for staff involved with the Innogen Centre. The commitment of the HEIs hosting Innogen is demonstrated by several substantial investments with the creation of new posts in the Open University and the University of Edinburgh and the appointment of one of our research fellows to a permanent lectureship in the University of Edinburgh.

Building on the two projects funded under the main Innogen programme, led by researchers in the Open University, the development-related component of Innogen's research programme has continued to expand and now makes a major contribution to our research programme, in terms of attracting additional funding, research outputs and policy and stakeholder impact, including a particularly important engagement with DFID.

We have continued to work with researchers throughout the Genomics Network, developing joint research projects, workshops and seminars, and presenting papers at conferences organised by Cesagen and Egenis. We also provided support for the Genomics Forum during its early development. We have sought additionally to involve colleagues outside the Network in the UK and internationally, where our research and linkages are developing a genuinely global perspective: European, transatlantic, and a world-wide span of newly industrialised and developing economies

3. Objectives

The Innogen Centre's objectives, as amended following the 2002-3 Annual Report, are:

1. To conduct a strong, innovative programme of fundamental and applied social science research

- (i) undertaking empirical research, showing rigour and innovation in research design
- (ii) developing new theoretical insights on important developments
- (iii) ensuring effective dissemination of theoretical and empirical contributions to academic audiences
- (iv) developing the careers of new and outstanding researchers

2. To engage proactively with the scientific community and with stakeholders by:

- (i) linking theoretical and empirical developments to the needs of wider public, policy makers, industry, scientists and other stakeholders
- (ii) ensuring that socio-economic research is scientifically and technically well informed
- (iii) establishing active links with user communities and stakeholder constituencies
- (iv) engaging stakeholders in interpretation of findings, their implications and dissemination

3. To contribute to shaping the socio-technical development of the life science trajectory by:

- (i) monitoring and contributing to public and policy debates on biotechnology-related issues, nationally and internationally
- (ii) contributing to the EC Sixth Framework Programme by active participation in the PRIME Network of Excellence, taking up further opportunities in FP6 as they arise, and contributing actively to planning of the Seventh Framework Programme
- (iii) developing training programmes for stakeholders and user groups, including scientists, industry managers and public groups, based on our integrative approach
- (iv) advising and working with stakeholders (by invitation) to contribute to decision making

4. To develop training programmes for postgraduate students and for in service training of managers, and a visiting fellows programme by:

- (i) developing a masters programme in Genetics and Society within the current Science and Technology Studies programme at the University of Edinburgh
- (ii) developing a doctoral programme in Genetics and Society
- (iii) developing training programmes for stakeholders and user groups, including scientists, industry managers and public groups, based on our integrative approach
- (iv) developing a visiting fellows programme to encourage international exchanges and development of the research programme
- (v) assisting in the development of distance education programmes at the Open University

4. Main outcomes of the year

During 2004, Innogen staff have continued to be very active in research and dissemination activities. We have again attracted additional funding, in several cases through engagement with natural scientists; we have added significantly to our teaching and doctoral programmes; and we have engaged with a wide range of stakeholders from different communities through workshops, seminars, conferences, and formal advisory bodies. Targets in all these areas have been met and in some cases considerably exceeded.

Research Highlight: consolidating and extending the Innogen research programme

We have been very successful in attracting additional funding (total £691 K, supplementing the additional £183 K awarded last year) for research and policy-related projects, as outlined in Section 7 and Appendix 6. Approximately 50% of this additional funding arose from cases where Innogen staff were approached by others in science, innovation and policy communities - an indication of Innogen's reputation as a Centre with an excellent foundation in basic academic research, a good ability to work in an interdisciplinary environment, and the ability to present results effectively to policy makers and other stakeholders. The other 50%, mainly from research council and EC sources, further demonstrates the quality of our credentials in basic academic research.

This success arises from a strategic decision taken early in the life of the Centre, to build a programme of research that will allow us to take an overview of life science-related activities, from three perspectives: 'Science, Innovation and Knowledge Management'; 'Policy and Regulation'; and 'Public and Stakeholder Engagement'; linked by the cross-cutting theme 'Globalisation and Governance' (see also Section 5).

Research Highlight: Capacity building in developing countries

Innogen's research on north-south genomics and the role of biotechnology partnerships in driving research, innovation and development, has expanded rapidly in 2004. From a foundation of excellence in basic research in the Innogen Centre, an international network of researchers is working on a series of linked programme areas, particularly involving vaccine-related projects (HIV/AIDS and Malaria), tuberculosis programmes and agro-biotechnology.

Presentations on this research have involved the UK DFID, Canadian International Development Research Corporation (IDRC) and the New Economic Partnership for African Development (NEPAD). Innogen produced one of two invited papers for a plenary presentation at an international conference on *Partnerships for Building Science and Technology Capacity in Africa*, featuring two case studies from Innogen research. The conference, sponsored by the UK Office of Science and Technology (OST), DFID, the Canadian Foreign Affairs Ministry and IDRC, was attended by over 100 people, including both nations' Chief Science Advisors, and five ministers including Hilary Benn for the UK. It will feed into the Commission for Africa.

The Open University's championing of capacity building initiatives has been rewarded by a major endowment of £2.75m to the OU to support international research and development in Africa, part of which will endow a Chair in Innogen's home department at the OU, to help lead these initiatives.

Communication Highlight: Policy advice and external relations

Innogen staff are contributing to the work of policy makers, nationally and internationally, stimulated by the high profile for the Centre's work. The most important contributions arise from membership of, or long-term engagement with, government or stakeholder advisory bodies. Particularly notable in this context:

- Joyce Tait was invited to join the Scientific and Technical Council of the International Risk Governance Council in Geneva. Her work for the Council is building on Innogen's integrative approach to governance and a draft paper has been prepared for the Council.
- Jane Bower was an out-going member, and Joyce Tait was appointed by the Royal Society of Edinburgh as a new member, of the Scottish Science Advisory Committee, which provides independent advice to Scottish Executive Ministers on scientific issues of strategic importance.

- Joyce Tait has been commissioned, with the active encouragement of ESRC, to join the Foresight team at the Office of Science and Technology, working on risk management related to the Detection and Identification of Infectious Diseases. She will be working with colleagues from Innogen (Catherine Lyall, Laura Meagher and Jonathan Suk) and a team of internationally recognised scientists.

There have also been 20 cases, in addition to the above highlights, where Innogen staff are members of advisory bodies; 9 occasions where staff have given written evidence or prepared policy briefs for stakeholders; and 22 occasions where Innogen staff have given advice to government and other stakeholders, including the World Bank, BBC, Commission for Africa, World Health Organisation, and ESRC itself.

Of particular note, Sarah Parry provided written evidence to the House of Commons Select Committee Inquiry into Human Reproduction and the Law and, on this basis, was invited as an expert witness to the Inquiry on November 10th 2004.

Academic publications

Publications by staff based in the Innogen Centre are now beginning to appear in refereed academic journals with 31 articles either published in 2004 or in press in 2005 and a further 35 in an advanced stage of preparation. Five books are also either published in 2004 or in press.

In addition, 20 book chapters have been produced by Innogen staff, 18 Innogen Working Papers, 7 non-academic publications or reports for practitioners, and 9 unpublished policy briefs or reports.

Two refereed journal Special Issues have been commissioned, one for Journal of International Development for July 2005, the other for Technology Analysis and Strategic Management for May 2006.

Additional dissemination outcomes

No less significant than the above highlights, in terms of total impact, is the large number of occasions where Innogen staff have been invited to give presentations to UK and international conferences, seminars and workshops: 29 invited presentations and 25 offered presentations. Staff also attended 26 such events on behalf of Innogen.

Innogen staff have also organised seven workshops involving social science academics, scientists, medical professionals, policy makers and public groups. One workshop on 'Clusters and Innovation Processes in Genomics' was organised jointly with Cesagen. Innogen also participated in the Egenis-organised event on 'Is Scientific Fact Science Fiction?' held at the BA Festival of Science in Exeter, September 2004, with a paper from Joyce Tait on 'Science and Bias'.

Three important public events were held during 2004. (i) Jointly with the Scottish Stem Cell Network, Innogen organised a session at the Edinburgh International Science Festival on 'Stemming the Tide of Incurable Diseases'. The event which was attended by over 150 people was chaired by Joyce Tait and Baroness Helena Kennedy was one of the speakers. (ii) Innogen organised a Symposium, jointly with the Royal Society of Arts and the Scottish Stem Cell Network, on 'Will Stem Cells be the Solution to Degenerative Diseases: Legal and Ethical Hurdles'. The meeting was chaired by Sir David Carter and Joyce Tait, and Graeme Laurie was one of the speakers. (iii) Innogen also played a prominent part in the annual event, 'Science and the Scottish Parliament' which included a debate on science in Scotland in the new Parliament building.

Staff development and promotions

Innogen staff and associated researchers have received significant recognition for their achievements in the past year.

- Dr. Graeme Laurie has been appointed to the Chair of Medical Jurisprudence in the University of Edinburgh
- In the Open University, Dr. Joanna Chataway has been promoted to a Professorship in Biotechnology and Development, and Dr. Mariana Mazzucato to a Professorship in Economics.

- Dr. James Smith, one of the Innogen research fellows, has been appointed to a permanent lectureship in the School of African Studies in the University of Edinburgh
- PhDs were awarded to Innogen research fellows Dr. James Mittra and Dr. Alessandro Rosiello.
- Dr. Peter Robbins has been appointed to a newly created Innogen-related lectureship in the Open University
- Professor Jane Bower has been elected a fellow of the Royal Society of Edinburgh

Academic, stakeholder and policy networks

Beyond the genomics network itself, we are involved with several academic networks, the most prominent being the EU PRIME Network of Excellence and the network of social and economic researchers working on the life science industry sectors (now over 50 members), initiated by Innogen following the first Innogen Workshop in March 2003.

Excellent engagement with stakeholders relevant to Innogen's research programme also makes an important contribution to our achievements. We have arranged eight joint seminars and public events, and given 10 lectures and seminars to scientists in university departments and research institutes and to meetings organised by science-based bodies and research councils. Also during 2004, Professor Jane Bower completed her term of office on the Scottish Science Advisory Committee, and Professor Joyce Tait was appointed to the Committee for the next two years.

In 5 cases, medical and natural scientists have approached us with a view to joint involvement in research proposals, two of which have already been funded; in other cases where Innogen has initiated the contact we have had a ready and enthusiastic response from scientists.

Teaching and post-graduate research programme

In the University of Edinburgh, under the guidance of Professor Robin Williams, considerable progress has been made in the development of teaching and post graduate research programmes linked to Innogen. A second stream has been added to the masters course on *Genetics, Nature and Society* to complement the module launched in 2003/4 on *Evolution and Dynamics of Biotechnology*. Dr Sarah Parry was appointed last year as lecturer in Sociology to lead these offerings. Six students took each option in 2004/5. At the Open University, Innogen offers two major components on the MSc in Technology Strategy Research. These have four ESRC Innogen students this year from a total of 25 doing the interdisciplinary doctoral programme first year.

Innogen has also continued to be very active in developing doctoral research, with three proposals awarded for ESRC Centre linked studentships in 2003/4 and three submitted in 2004/5. Doctoral researchers in genomics (see Appendix 2) have mutually beneficial interactions with the broader technology studies programmes, and provide opportunities to build additional research collaborations around the Innogen research programme.

Working with the Edinburgh University Innogen Inter-College Advisory Group, arrangements are being made for cross-recognition of the Innogen offerings and postgraduate programmes: in Law (linked to the AHRB Centre for Research into IT Law and Intellectual Property); in Medical Sociology/ Anthropology (Sociology/Social Anthropology); and in Medical Ethics (Public Health/College of Medicine/Veterinary Medicine).

Judged by the growing number of unsolicited requests we receive from graduate students internationally, wishing to study at masters and doctoral levels in the Innogen Centre, the reputation and interest of our research approach is beginning to be widely appreciated.

Courses in Continuing and Professional Development are also being prepared, targeting public policymakers and the commercial sector, supported by a SHEFC Knowledge Transfer Grant. This has been used to build a contacts database (currently over 1500 names) as the basis for marketing CPD activities and other stakeholder engagement. We have also continued our series of lunchtime seminars for policy makers in the Scottish Executive.

5. Progress towards objectives

This section indicates first how we are delivering overall progress towards our objectives and then how these deliverables contribute individually to our overall programme, organised around our main themes (*Science, Innovation and Knowledge Management, Policy and Regulation, and Public and Stakeholder Engagement*), and the cross-cutting theme *Globalisation and Governance*. A more detailed description of progress towards Innogen's objectives is included in the Appendices to this report and descriptions of individual research projects are included in the 'Brief Reports on Research', section 7. Some items are relevant to more than one theme and several publications are jointly authored by researchers working in more than one area. These provide a basis for, and evidence of, the integrated nature of the overall programme.

5.1 Overall Progress Towards Objectives

We are conducting an expanding programme of innovative fundamental and applied social science research, and adding significantly to the value of the initial ESRC investment. We are developing new insights into important developments arising from the generation of new knowledge in the life sciences and we now have a critical mass of excellent researchers who are collaborating well with one another across the main themes and bringing a range of disciplinary perspectives to bear on major issues.

We have also greatly expanded the number and range of our publications and presentations to a wide range of audiences and engage proactively with the scientific community and with stakeholders on a very regular basis.

Through our interactions with policy makers, and with the science and medical communities, particularly in the latter case where we are working jointly on research projects, we are beginning to achieve the objective of shaping the socio-technical development of the life science trajectory. In 2005, the Innogen international conference along with further development of our in service continuing professional development programme for policy makers and company managers will add to this influence.

Our training programmes for post-graduate students have also seen a significant increase in activity in 2004 with a second course being added to the masters degree programme in the University of Edinburgh and a large influx of new PhD students.

5.2 Theme 1. Science, Innovation and Knowledge Management

- Innogen funded project, 'Innovation Processes in Life Science Industries', Dr. James Mittra
- Two Innogen funded projects, 'Exploring the Power of Knowledge and Technology Flows in Developing Countries', Dr James Smith and Aparna Joshi.
- Scottish Enterprise funded project, 'Genomics Innovation in Scotland', Dr. Alessandro Rosiello
- EC Prime Network of Excellence funded project, 'The Role of Venture Capital in Promoting High Tech and Science-Based Growth: a new rationale for European policy making', Shefaly Yogendra
- Open University funded project, 'Issues involved in the diffusion of knowledge through migration of scientific labour', Professors David Wield and Joanna Chataway
- Publication from first Innogen Workshop held in March 2003, *Innovation, Growth and Market Structure in High Tech Industries: the Case of Bio-Pharmaceuticals*, eds. M. Mazzucato and G. Dosi; Cambridge University Press, in press.
- Jane Bower's and Joyce Tait's membership of Scottish Science Advisory Committee
- Joyce Tait's work for Office of Science and Technology Foresight Project 'Detection and Identification of Infectious Diseases'
- Preparation for Innogen's international conference 'Evolution of the Life Science Industry Sectors', February, 2005.

5.3 Theme 2. Policy and Regulation

- Innogen funded project, 'The National and International Policy Environment for Genomics', Dr. Catherine Lyall.
- Innogen funded project, 'Legal and Bio-Ethical Regulatory Mechanisms', Shawn Harmon.
- EC PRIME Network of Excellence funded project, 'Co-operative Management of Intellectual Property Rights', working with Dr. Jane Calvert and Professor Steve Hughes, Egenis Centre.
- Open University Project, 'Regulatory Practices and Challenges of the African Crop Biotechnology Sector', Seife Ayele
- South West Regional Authority funded project on 'Implications for the South West Region of Declaring a GM-free Zone within the EU', Joyce Tait and Shefaly Yogendra.
- European Science and Technology Observatory (ESTO) funded project on to work on 'Animal Cloning and Genetic Modification: a Prospective Study', Ann Bruce, Renate Gertz and Joyce Tait, with Roslin Institute and the Genesis Faraday Partnership.

5.4 Public and Stakeholder Engagement

- Innogen funded project, 'Interests and Values in Risk-related Stakeholder Interactions', Ann Bruce
- ESRC Stem Cells competition funded project, 'The Social Dynamics of Public Engagement in Stem Cell Research, Dr. Fiona Harris.
- SHEFC-funded project to Innogen and the AHRB Research Centre for Studies in Intellectual Property and Technology Law, 'Genetic Health in the 21st Century' (21CGH),. Dr. Gill Haddow, Innogen and Dr. Renate Gertz, AHRB Centre
- Scottish Executive Chief Scientist Office funded project, 'Scottish Family Health Study', Dr. Gill Haddow and one additional researcher to be appointed.
- ESRC Science in Society Programme project, 'Farmers' Understandings of GM Crops within Local Communities' Dr. Sue Oreszczyn

5.5 Globalisation and Governance

As the main integrative theme, outputs in these areas will become more numerous as our research programme matures. However there have already been several relevant outputs during 2004.

- Book initially arising from an ESRC funded Seminar Series, 'The SUPRA Seminars' (1998-2000) and the subsequent series of professional development seminars for Scottish Executive policy staff, 'New Modes of Governance: Developing an Integrated Policy Approach to Science, Technology, Risk and the Environment', Ashgate Publishing Ltd., eds C. Lyall and J., 2005, in press. Five chapters are authored Innogen staff (see Appendix 3).
- Joyce Tait's work developing working papers for the International Risk Governance Council on the governance of new technology-based industry sectors, including biotechnology and nanotechnology.

6. Main issues, problems and action taken during the year

Dr. James Smith, the research fellow working on one of the projects in the international development component of the Innogen programme, was appointed to a permanent lectureship in the School of African Studies in the University of Edinburgh in December 2004. He has completed most of the field work for his project and, as an associated member of staff in the Innogen project, will be able to complete the writing of the work on the project, as well as continuing to supervise students and contract researchers working on additional projects which he has initiated.

Aparna Joshi, who was working on the second development studies project in the Innogen programme, left in October 2004 to concentrate on writing up her PhD thesis. Fieldwork for this project has been completed by Dr. James Smith and Professor Joanna Chataway, who will also be responsible for writing it up, subcontracting various discrete tasks to other Innogen research fellows and graduate students.

Lorna Mitchell, the Innogen secretary, left to take up a post in the private sector and has been replaced by Angela McEwan.

In our report for 2002-3, we noted that we were experiencing difficulty in recruiting graduate students to fill ESRC studentships. Following a very active recruitment effort, we were able to appoint ten graduate students during 2004 and they are now making very significant contributions to the intellectual life of the Centre. Innogen's research programme is now becoming more widely known and we are now contacted regularly by graduates wishing to study with us, including several from other European countries, Canada, the United States, China and Taiwan, some of whom already have their own funding.

During 2003-4, consultants appointed by ESRC made several constructive criticisms of the Innogen website. ESRC awarded funding to re-design our website and this has now been done, the change-over to the new website to take place in early 2005.

7. Brief reports on research

1. ESRC Innogen Project – Dr. James Mittra,

Innovation Processes in Life Science Industries

Life science innovation is restructuring scientific research, as well as its commercial exploitation, in a variety of public and private sector organisations. In the pharmaceutical sector, we are observing new and complex re-alignments of companies and networks (through mergers, acquisitions, strategic alliances & licensing activities) beginning to take shape as companies attempt to extract value from new technologies and approaches to drug discovery, and question their existing strategies in response to both internal and external pressures.

Research Questions

How are the nature, direction and management of life science-based innovations in the pharmaceutical industry changing?

How can we improve understanding of the complex and diverse strategies employed by firms in this diverse sector?

What is their impact on the scientific, technological and industrial landscape?

Methods

Case studies, interviews and documentary analysis

Outcomes

- Comprehensive overview of the pharmaceutical sector, the principal challenges facing different types of company, and analysis of changes in strategic decision-making.
- A taxonomy of existing and emerging technologies to identify innovations that have had the greatest impact on R&D in different types of company.
- Qualitative data from interviews and case studies on changes in the pharmaceutical sector, from science and industry perspectives.
- Evidence-based data to inform Innogen's academic and policy reports and recommendations.

Progress in 2004

- 12 comprehensive pharmaceutical company profiles using data supplied by contacts in the Edinburgh financial sector, company websites and news reports.
- 12 interviews and 2 pharmaceutical company case studies currently being negotiated (3 in-depth interviews conducted and 5 set up) (Access to industry representatives has proved difficult, but we have been successful in getting access to individuals who have recently left big pharma companies.)
- Patent database acquired from colleagues at the Open University will be used to analyse industry strategies.
- Commercial data on the growth of the Central Nervous System disease market currently being analysed
- Private meeting with EBE (Emerging Biopharmaceutical Enterprise) in Brussels to establish links and make contacts in the pharmaceutical industry
- Contacts with the Tufts Centre for Drug Development in the USA will lead to collaborative work.

2. ESRC Innogen Projects – Dr. James Smith and Aparna Joshi

Exploring the Power of Knowledge and Technology Flows in Developing Countries

The central focus of Innogen research in developing countries is on the role partnerships play in driving research, innovation, technology transfer and development embedded within crosscutting themes of governance and globalisation and public engagement with science. This section reports on two projects funded under the Innogen programme, (i) in Africa and (ii) in Asia and Latin America. Several other small projects have also been added in this area:

- Examining partnerships and processes within the International Aids Vaccine Initiative (IAVI) in Kenya, South Africa and Uganda
- Examining institutional change, partnerships and governance within the new Biosciences Initiative for East and Central Africa, a Canadian International Development Agency (CIDA) and New Partnership for African Development (NEPAD) joint initiative
- An ethnographic approach to the dynamics and politics of innovation systems in East Africa. Case studies include tissue culture banana, the East Coast Fever vaccine project, and transgenic sweet potato initiatives
- Xiaobai Shen has carried out case studies of public-private partnerships around GM rice and the development of the SARs vaccine in China, working with colleagues from the Chinese Academy of Sciences.
- Working with Lea Velho from UNU INTECH, two agricultural biotechnology case studies have been conducted in Brazil – one on a partnership between Monsanto and EMPRABA, a major Brazilian state agricultural research institute, the other on Brazilian public-private partnerships working on AIDS/HIV vaccines and their relationship to the major international partnerships working in the same area.

Research questions

- How are research partnerships constructed? What processes of politics and power underpin them? How do they create new knowledges?
- How is R&D capacity being built? What processes and initiatives produce sustainable knowledge and what do not?
- What linkages exist between smallholders, the poor, scientists, institutions and donors? How do these relationships shape innovation and dissemination of products? What discourses define these relationships?

Methods

Our methodology is fieldwork led. In the last year James Smith, Joanna Chataway and Matt Harsh have spent a total of six months in the field in five countries (Kenya, Uganda, Rwanda, South Africa and India). The addition of Matt Harsh, a doctoral student in the Innogen Centre, to the team has increased the amount of fieldwork we have been able to accomplish. We have also made good use of collaborative links with academics in Kenya, Brazil and China.

Methods include in-depth interviews with senior scientists, institutional managers, NGOs, policymakers, farmers and users. We have also used participant observation and other ethnographic techniques when working with smallholder farmers.

Outcomes

Most outcomes in 2004 have developed comparative analyses with Asia, Latin America and Africa around the issue of global health public-private partnerships. We have focused our writing on RAE-rated journals such as *World Development*, *Current Sociology*, *Research Policy*, *Third World Quarterly* and the *Journal of International Development*.

We have successfully fed into several important policymaking fora, advising government departments, NGOs and other policymakers in Africa, North America and Europe and have had

dealings with DFID, the World Bank, IDRC/CIDA and NEPAD amongst others institutions. We have also been active in disseminating our research at international conferences and workshops.

Progress

Progress so far has focused on the health side of biotechnology partnerships in Asia and Latin America, particularly our studies of the International Aids Vaccine Initiative (IAVI). We have also developed a case study of the governance of tissue culture banana projects in Kenya. We have presented these studies at several conferences and workshops and have several articles in press, or under review.

We are diversifying our approach to work on a series of agricultural biotechnology case studies, including a large comparative study of agricultural research institutions in India, Peru and Kenya, and this new focus will enable us to draw out further inter-continental comparisons, as we have already done with our work on health partnerships in 2004. We also plan to make further use of data collected in China and Brazil. In 2005 we also plan further work on the evolution of research institutions in Africa, working with Professor Norman Clark. We will complete one more round of fieldwork, when James Smith will work on an agro-biotechnology project in South Africa. Finally, we will visit New York for follow up interviews with IAVI, the Rockefeller Foundation and other donors.

The main focus in 2005 will be on consolidating our publishing efforts, organising the next Innogen conference, and working on the end of project reviews.

3. ESRC Innogen Project – Shawn Harmon, appointed December 2004

Legal and Bioethical Regulatory Mechanisms

Globalisation of scientific developments has not been matched by 'internationalisation' or 'standardisation' of legal and ethical norms in response to genomics advances. This project will examine the international role of legal and ethical principles in guiding and regulating genetic research, and the mechanisms by which these can take effect nationally. Key features include: the search for a universal bio-ethical code; relationships between national and international advisory and regulatory bodies in regulating scientific developments; and the role of advisory commissions and ethics committees to provide public legitimisation for scientific developments. This project will work in close collaboration with Projects 4 and 5 as outlined below.

Research Questions

Why, how, and how effectively do ethical principles influence legal instruments and regulatory policy in the genomics field at each of the national, regional and international levels?

How do ethics translate to law? For example, why have we started to focus on ethics? Which principles do we rely on (dignity, consent, privacy, etc), and why? In what form do these principles appear in legal documents, and how well do these instruments work? Are there patterns across jurisdictions or in different regions?

Progress

Shawn Harmon has recently been appointed and will complete his research by September 2007

4. ESRC Innogen Project – Dr. Catherine Lyall

The National and International Policy Environment for Genomics

This is a part-time project, 40% fte

This project contributes to the 'Policy and Regulation of Genomics' theme and tries to understand some of the reasons behind different national policy stances by exploring the effects of policy and regulatory instruments on agriculture and food, health and pharmaceutical developments in genomics. The project aims to monitor relevant policies and regulations and study their evolution. By interacting with policy makers in the UK, EU and USA and international regulatory bodies it is exploring policy development processes and the assumptions that underlie them. It is attempting to build a model of policy interactions, classifying policy and regulatory instruments, according to whether they are enabling or constraining, discriminating or indiscriminate in order to explain their impact on industry strategies.

Research questions

- To monitor policy and regulation relevant to genomics-related agriculture, food, health and pharmaceutical developments
- To classify policy and regulatory instruments according to their impact on industry strategies, based on whether they are enabling or constraining, discriminating or indiscriminate
- To monitor documentary evidence of policy evolution through databases and websites and regular communications with senior policy makers
- To interview policy makers in the UK, EU and USA and international regulatory bodies about policy development processes and the assumptions which underlie them

Methods

Documentary analysis (academic journal articles, policy documents and press articles) and in-depth interviews with relevant actors including policy makers in the UK, EU and USA, international regulatory bodies, representative bodies, trade associations and other interest groups engaged in influencing the policy process and industry stakeholders in pharmaceutical and agricultural biotechnology firms.

Progress

Themes around the multi-level, multi actor governance of science and technology have been explored via a number of publications including an edited book. The project is currently exploring whether new technologies (such as genomics) require new policy instruments and examining the links between governance and the creation of regulatory frameworks (including the extent to which the regulatory regime is being updated to take account of technological advances). These issues will be developed further during a one-day workshop involving members of the ESRC Genomics Network and other invited participants from related programmes and centres (such as IGBIS, SATSU, MERIT and Edinburgh's AHRB Centre) who are working on issues linked to the governance of the life sciences.

5. ESRC Innogen Project – Ann Bruce

Interests and values in risk-related stakeholder interactions

This is a part-time project, 40% fte

Distinctions between the 'interests' and 'values' of protagonists in risk debates are important for the understanding, prevention and resolution of conflicts. This project, which contributes to Innogen's 'Public and Stakeholder Engagement' theme, aims to explore the way in which 'values' and 'interests' motivate responses in debates in the genomics area.

Research Questions

- Can we identify 'interest'-based and 'value'-based arguments in a range of genomics applications?
- Are these framings critical in determining the acceptability or not of a genomics application?
- What methods can be used to explore the 'values' and 'interests' dimensions of biotechnology related controversies?
- How are these dimensions reflected in debates around different controversies in genomics, including genetic databases and stem cell therapies?
- How are 'values' and 'interests' incorporated in the innovation and policy processes?

Methods

Case Study methodology, including in-depth interviews with key stakeholders. Focusing particularly on protagonists with different viewpoints on the issue.

Outcomes

Our research will improve decision making and dispute resolution by improving the level of understanding of the 'values' and 'interests' dimensions of disputes.

Progress

During 2004, we have produced a paper analysing the 'values' and 'interests' dimensions of developments in population genetic databases, based on a literature review and informed by interviews with stakeholders. This paper was presented at a key conference in this area. We also held a 2-day workshop for policy makers, industry representatives, scientists and social scientists to engage with the issues of what values come into play when scientists and companies make innovations in biosciences or when policy decisions are made, and how do these reflect or conflict with wider public concerns?. This confidential meeting provided a rich discussion among the participants. A short report from this workshop was written for the Innogen web site and a paper is in preparation stimulated by the workshop. The theme was further developed at the Innogen international conference with a session on ethical and stakeholder pressures on the pharmaceutical industry and how the industry has responded to these pressures.

Investigations have continued in the field of stem cell research where around 20 interviews have been carried out with key stakeholders, including research scientists, patient advocacy groups, policy makers, industrialists and antagonists of stem cell research.

A number of different methodologies has been considered for analysis of these interviews. The conclusion was that Cognitive Mapping will be used for the analysis and a process of familiarisation with the methodology has been started.

6. Scottish Enterprise Funded Project – Dr. Alessandro Rossiello

Genomics Innovation in Scotland

This project is studying support processes for biotechnology innovation in therapeutics and diagnostics companies in Scotland, and the roles played by different organisations, including private firms, public bodies, and research centres. The focus is on evaluating the performance of economic policies supporting the development of the Scottish biotechnology cluster and the value delivered from the Scottish Enterprise (SE) investment in this area, particularly the strategic emphasis on growing competitive core-biotechnology companies and resolving structural inefficiencies.

Research questions

Empirical analysis has aimed to find out:

- whether SE was able to encourage collaborative behaviour and the establishment of networks helping individual firms get access to and employ key assets;
- how important are the links outside Scotland;
- how significant and effective have SE multi-activities been in support of companies' activities;
- what type of support companies had from intermediaries such as lawyers and financial institutions.

Methods

Review of the literature on clusters and systems of innovation, including in-depth examination of theoretical and applied works on geographical agglomeration in high tech industries and on policy measures inspired by the doctrine of the "triple-helix". I have collected evidence on the Scottish, Danish and Swedish systems of innovation and legislative/institutional frameworks.

I have also interviewed managers in 18 core biotechnology companies based in Scotland and 14 based in Sweden and Denmark. The data were analysed in terms of: the impact of the policy framework on firms' location decisions; knowledge creation, use and transfer, the mechanisms of such process and how this affects firms' strategies and behaviour; and the interplay and co-evolution between industrial and innovation trajectories and institutions.

Outcomes

The results are providing useful information on the influence of public policies on the development of effective corporate strategies, and the growth of a significant number of competitive firms in Scotland.

Progress

Dr. Rosiello has attended and presented papers at conferences and workshops in the UK, Italy, Holland, France and USA and expanded his network of connections with industrialists (CEOs of biotech companies), academics in the Copenhagen Business School, University of Toronto, the National Institute of Engineering, Technology and Innovation in Lisbon, and policy makers.

Over the next few months, he will analyse the survey data from Scotland and Medicon Valley (Sweden and Denmark) in preparation for writing the final report and other publications.

He was able to use his contacts developed for this project in the organisation of one of the sessions at the Innogen International Conference in 2005.

7. SHEFC Funded Project - Dr. Gill Haddow

21st Century Genetic Health (21CGH)

This project arose from the *Generation Scotland* funded in 2002-3. The aim is to investigate the interaction of genes and environment in the onset and progression of the serious diseases affecting the Scottish population. 21CGH brings together the parallel, yet different, projects of Generation Scotland and UK Biobank. SHEFC has funded the appointment of Dr. Gill Haddow in Innogen and Dr Rena Gertz in the AHRB Research Centre for Studies in Intellectual Property and Technology Law as Research Fellows for 3 years.

Summary:

21CGH is a multi-Institution, cross-disciplinary collaboration led by the University of Edinburgh, embracing all of the Scottish Medical Schools, other important research institutes and the NHS in Scotland to create a novel consortium based approach to addressing important health priorities in Scotland. It has been funded by the Scottish Higher Education Council (SHEFC) (www.shefc.ac.uk) through their Strategic Research Grant Initiative (Value and duration of award: £1.79 million, October 2003-2007)

21CGH addresses directly Scotland's three health priorities areas - cancer, heart disease / stroke and mental health - and more. 21CGH provides the essential scientific infrastructure and social, ethical and legal framework on which multidisciplinary research can build to identify, evaluate and utilise heritable (genetic) risk factors in early diagnosis, disease monitoring, treatment optimisation, avoidance of adverse drug reactions, healthcare planning and drug discovery. 21CGH will establish an enabling platform for translational application of the new genetic knowledge, backed by a multi-disciplinary and self-sustaining skill network in genetic epidemiology and health informatics.

8. Chief Scientist Office: Scottish Executive - Dr. Gill Haddow**Generation Scotland: The Scottish Family Health Study (SFHS)**

Genetic databases are heralded as the way forward in improving the status of a population's health through the collection of DNA samples, lifestyle questionnaires and prospective medical health care. Following from the 21CGH project (no 7 above) this project is working on the issues of procurement, storage, access and use of bio-information, involving and engaging the public. The project will fund one additional researcher, also to be based in Innogen.

Research Questions

To conduct a public engagement program on SFHS that is interactive and dynamic; engaged 'up-stream'; encourages citizen participation; offers feedback; and provides real commitment to incorporate the findings into organizational development.

- To explore views on recruitment, consent, withdrawal, feedback, confidentiality, patenting/commercialisation and governance.
- To develop and discuss study materials, design, governance and implementation of SFHS with public(s).
- To understand the origins and persistence of concerns about the collection, storage, access and use of bio-information.
- To explore views on whether and why family members would be willing to participate.
- To make serious and consistent attempts to include groups who are typically hard to reach.

Methods

- 1st Phase: Discussion Groups with Tayside NHS Patient Participation Group (PPG)
- 2nd Phase: 40 in-depth interviews with participants/relatives/families
- 3rd Phase: Survey of Tayside Population
- 4th Phase: Exit Questionnaire

Outcomes

Empirically, this research will enrich our understanding of genetic databases and the public's views of, and attitudes to, them. This analysis will provide a solid empirical foundation for future ethical, legal and social debates about genetic databases and contribute further understanding to the concerns around procurement, access, storage and use of bioinformation. Moreover, it will contribute to the little that is known about family dynamics in relation to recruitment to such research. We will also incorporate a more critical approach to public engagement – both as an ideology and a method.

Progress

Allocation of funding is being confirmed as is protocol for MREC ethical approval. Strong links are being made with the other Principal Investigators. Presentations to various government groups, citizen bodies and community groups are being worked up.

9. ESRC Science in Society Programme Funded Project – Dr. Seife Ayele

Institutional Impacts of North-South Partnerships in Agricultural Biotechnology

The study investigated partnership projects formed between agricultural research institutions and non-profit and private sector participants from African countries (south), from developed countries (north) as well as multilateral organisations. The study, with supplementary funding from the Open University, was completed in August 2004, and the project evaluation confirmed that it has fully achieved its objectives.

Methods

The study comprised an in-depth investigation of three case studies: Millet and Sorghum Improvement Initiative in Mali; the Insect Resistant Maize for Africa project in Kenya, and the Agricultural Genetic Engineering Research Institute in Egypt. Data from these case studies were supplemented by data generated through an inventory of public private partnership (PPP) projects and major players.

Outcomes

- A workshop on Technology Based Public Private Partnerships and Innovation Systems in African Agriculture was held on 19th November 2004 in London. The workshop was attended by 30 participants from governments (including one each from three African countries), not-for-profit and private sector representatives.
- The results of this project have had an impact. Presentations were given at international and national forums: David Wield, Joanna Chataway and James Smith gave a paper Partnerships for Building Science and Technology in Africa: Canadian and UK Experience at the Africa-Canada-UK Experience: Building Science and Technology Capacity with African Partners, 30 Jan – 1 Feb 2005 in London. Presentations were also given at World Bank Workshop, Washington (Chataway); and in Cairo/Egypt and at CESAGEN International Conference, London (Ayele), and other presentations made at the Open University.
- Two articles, by Ayele and Wield on Science and Technology Capacity Building and Partnership in the African Agriculture: Perspectives on Mali and Egypt; and Chataway on Creating pro-poor agriculture-related biotechnology: Can it be done? are scheduled for publication in special edition of the Journal of International Development (JID), July 2005 (Ayele and Chataway along with James Smith and Andy Hall are the guest editors of this special edition).
- An article by Ayele on Biotechnology generation, delivery and adoption: the case of Bt biopesticide in Egypt has been submitted to the International Journal of Technology Management and Sustainable Development.
- Smith, Chataway and Ayele have submitted a book proposal to Earthscan entitled Innovating Partnerships: Renegotiating Agricultural Research and Development in Africa.
- Developing research contacts in Africa and collaborations have been one of the impressive aspects of this project, as highlighted by the evaluators of the project. In particular the collaboration with the United Nations University Institute for New Technologies, the Netherlands, has produced a snapshot database on partnership projects in Africa.
- New research ideas have emerged from this project. Chataway, Wield and Ayele have recently been awarded a £46K grant by the ESRC Science in Society Programme to undertake research on the Regulatory practices and challenges of the African crop biotechnology sector. The new study builds on the research just completed and aims to examine practices and emerging developments in the national regulatory systems of crop biotechnology in Egypt, Kenya and South Africa.

10. ESRC Science in Society Research Programme Funded Project – Dr. Sue Oreszczyn Farmers' Understandings of Genetically Modified Crops within Local Communities

Research Questions

This research is investigating the attitudes, intentions and practices of farmers regarding the new technology of GM crops, in relation to their social setting. It will:

- Explore how farmers construct their understandings of genetically modified herbicide tolerant (GMHT) crops through their interactions with others, in particular family members, neighbouring farmers, seed companies, farming advisors and the local community
- Ascertain the acceptability to farmers (both those with experience of GMHT crops and those without) of recommended management practices for GMHT crops used in the UK government farm scale evaluations of GMHT crops
- Develop models of social learning systems appropriate to support individual farmers within informal social settings who decide to adopt contentious new technologies such as GMHT crops

Methods

Interviews with farmers with and without experience of growing GM crops, and workshops with their local community.

Key stakeholders are being involved in the research process from the start of the project. Their advice was sought on the best way to contact farmers and they are advising on the questions that will be put to the farmers involved in the study. It is intended that additional key stakeholders will be drawn in as the project progresses.

Outcomes

The results of these analyses will be used to inform discussions with stakeholders throughout the project on the most appropriate ways to manage a new farming technology where the likely impacts are unclear or contested by different groups. It will also help identify the most important relationships to foster in such social learning systems.

Information about the project is being publicised as it progresses. To date, an additional website for the project has been developed, <http://technology.open.ac.uk/cts/esrcfarmer.htm>; a leaflet has been published in conjunction with the ESRC Genomics Policy and Research Forum. The NFU are also publicising our project to the wider farming audience.

Progress

Key stakeholders have been interviewed and 20 tape recorded telephone interviews have been conducted with farmers. Three working papers are being drafted and two abstracts have been submitted to conferences.

In the next 6 months, we will draft two conference papers and complete the first round of telephone interviews with approximately 30 farmers. The transcripts from the telephone interviews will be sent to the farmers for comments and analysed using cognitive mapping techniques in preparation for face-to-face interviews. Additional key stakeholders will also be identified and contacted for their input and advice.

11. ESRC Stem Cell Programme – Dr. Sarah Parry and Dr. Fiona Harris

The Social Dynamics of Public Engagement in Stem Cell Research

The study builds on prior work of two of the applicants. Cunningham-Burley, with colleagues, has developed interview and focus group research on scientists' and publics' views about genetics. Parry's doctoral research extends their approach to SCR. The proposal was developed collaboratively with Professor Austin Smith and colleagues at Edinburgh's Institute for Stem Cell Research (ISCR), who are actively involved in public debate and science communication (see www.iscr.ed.ac.uk).

Research Questions

The aims of this research project are:

- To investigate views and concerns about Stem Cell Research (SCR), and
- To explore the scope for increasing public engagement in the developing field.

The specific objectives are:

- To examine how diverse groups of publics and scientists view a range of issues surrounding developments in SCR
- To 'situate' people's views in terms of their social identities and locations, and salient wider themes in contemporary culture
- To initiate a range of methods for promoting and researching public engagement in SCR, using the same social groups
- To analyse these efforts for insights into the social processes involved, and to explore practical ways of extending public participation in decision making about SCR.

Progress

Dr. Fiona Harris will begin work on this project in 2005.

12. 6th Framework Programme, New and Emerging Science and Technology (NEST) Support Action – Professor Robin Williams.

Assessment Tools for Breakthrough and Emerging Science and Technology (ATBEST)

This project is led by Professor Arie Rip, University of Twente and Innogen, along with the Research Centre for Social Sciences at the University of Edinburgh is one of two other partners. ATBEST at the University of Edinburgh mainly developed the project component on 'Addressing the challenges of breakthrough science and technology'.

Research questions

The aim of the project is to develop a process, with corresponding tools, for the management of new and emerging science and technology, where uncertainty is great, but hoped-for potential is also great. There is experience with newly emerging science and technology, and recognition of their importance, but these experiences have not developed to a level that one can identify already 'best practices'. The project focuses on the emergence of new fields of enquiry and exploitation at the interstices of existing fields, including nano-technology-related developments and breakthrough technology arising from genomics-related knowledge.

- how do practitioners handle emerging and potentially breakthrough science and technology?
- what divisions of labour occur for the two components of the mix of open/generic and emerging linkages;
- dynamics of evolution of the mix, and how far these are productive.
- which processes lead to productive interaction, and how can these be supported?

Methods

- Literature study and desk research
- Interviews and other interaction with practitioners:
- Practitioner workshop to explore their reaction to the approaches and tools

Outcomes

The approach and related tools may improve the selection and monitoring of projects under NEST and scientists and technologists can improve their strategic reflection and choices.

The outcomes will also contribute to the development of the ERA and other policies relevant to a European knowledge economy through learning processes, restructuring of activities and social relations, and science-society interactions at European level.

Progress

The project was completed in December 2004. A report on 'New and Emerging Science and Technology and their Assessment' has been produced by Spinardi and Williams, and a version is being submitted for publication.

AT-BEST final workshop was held in Rotterdam 14 - 15 Dec 2004

13. PRIME Network of Excellence Funded Project – Shefaly Yogendra, with Professor Joyce Tait, Dr. Julian Sulej and Dr Alessandro Rosiello**The Role of Venture Capital in Promoting High Tech and Science-Based Growth: a new rationale for European policy making.**

Changes in the organisation of science-based Industries is increasingly based on the entry and development of new high tech firms. Venture capital (VC) is considered here as a specific industry whose purpose is to contribute to the technological and financial choices of innovating firms. It is seen as a component of an innovation system whose interactions go beyond financial support so that venture capitalists are part of the selection environment that allow economic systems to change with regard to innovation and growth. This selection function is termed intermediation. Innogen is a partner in this project along with researchers from France, Finland, Italy and Israel.

Research questions

- Are there institutional characteristics of the respective national innovation systems that influence the development of the VC industry in each country?
- To what extent is the development of VC industry sector-specific: the lessons from two industrial areas (ICT and Biotechnology)
- Are some forms of VC intermediation more prone than others to internationalise ? Can we speak of the competitiveness of VC industries?

Methods

Desk based research on 'grey' literature and published papers; analysis of existing databases on the VC industry.

Development of ideas through meetings of PRIME partners in the project

Outcomes

Design of a framework for identifying policy implications and developing policy lessons for the countries participating in the project.

Development of a further proposal for EC funding through the PRIME Network.

Progress

Draft papers have been produced for the mid-term meeting, including 'The Venture Capital Industry in the United Kingdom: A Feasibility Study', Shefaly Yogendra and Joyce Tait.

Two further meetings, and a second report from the Innogen contribution, are planned.

14. PRIME Network of Excellence Funded Project –Dr. Jane Calvert and Professor Steve Hughes, Egenis Centre, with Dr. Xiaobai Shen, Innogen.

Co-operative Management of Intellectual Property Rights

During the last twenty years, intellectual property has been strengthened and extended to basic research and new technologies like software or biotechnologies. Patents and copyrights have played a key role in the recent waves of innovation in these industries where numerous and scattered intellectual property rights (IPRs) may result in a tragedy of “anti-commons” so that hold ups, multiple margins and transaction costs impede innovation and competition. Furthermore, putting IPR at the core of innovative activities, as an economic target and a proxy for innovation performance, has modified the rationale for investing in research.

Innogen is involved in this project with partners from France and Italy and we are working on ‘Patent Platforms in Agricultural Biotechnologies’ with colleagues based in the Egenis Centre.

Research questions

This project aims to understand how collective institutions based on intellectual property rights (CIPR) develop in response to blocking IPRs on cumulative and/or complementary innovations, and to evaluate the performances of these institutions. Its objectives are:

- To converge on a transverse analytic framework on CIPR.
- To provide empirical knowledge of the different forms of CIPR in different industries.

Methods

It builds on research already undertaken by participating members.

It will apply a similar transversal approach to two different industries, Open Source Software and University Patents Platform in Agricultural Biotechnologies, and will develop a rigorous comparison between these 2 forms of CIPR on five analytical axes:

- Actors
- Technologies
- Types of agreement
- Legal and strategic environment
- History of CIPR in each sector

The third methodological step is the evaluation of CIPR.

Outcomes

The project will enable a rigorous comparison, identify the cross sector issues, and promote best practices. The resulting framework should provide a more accurate understanding of how collective institutions can match the features of a given technology. It will also involve innovators so as to promote an efficient use of such IPR collective institutions.

Progress

The first meeting to plan development of the project has been held in Paris.

15. South West Regional Authority Consultancy Contract – Professor Joyce Tait and Shefaly Yogendra

GM Crops – Shaping the Regional Policy Stance

Based on our experience with the GM crops debate in the UK and more widely, Innogen was asked to tender for a contract to advise on the implications for the South West Region of declaring a GM-free zone within the EU. This request arose from our report on Innogen's first international conference, produced in January 2004.

Project questions

In advising on the question of declaring a GM-free zone in SW the following issues were addressed:

- The economic and social implications of making the proposed decisions
- The lessons from the other EU regions in the network of GMO free regions
- Enabling the regions to influence the debate
- Advising on the deliverability of the Regional position

Methods

- Assessing the economic conditions and demographics of the South West to understand their competitive advantage as a predominantly agrarian region
- Identification of key regions in UK and Europe with clear pro- and anti-GM stances
- Identifying arguments on all sides of the debate, paying special attention to the economic and social considerations, and also including environmental and policy perspectives
- A brief analysis of EC policy and regulatory decisions on the setting up of GMO-free regions, transboundary movements of GMOs and co-existence of GMOs with conventional and organic farming
- A consideration of how EC policy and regulatory decisions are being interpreted by the UK government
- An up to date assessment of trends in public opinion on GM crops in the UK and Europe
- Review of academic and practitioner literature addressing similar issues in regional politics and policy making

Information sources included the Innogen Centre's extensive database, its network of contacts, web-based information, additional academic and trade literature, telephone interviews and electronic communications.

Outcomes

The final report, which is confidential to SWRA, presented the implications of various decisions on the declaration of a GM-free zone for SWRA, from a neutral perspective.

Progress

The project was completed in July 2004.

16 European Science and Technology Observatory (ESTO) funded study – Ann Bruce, Dr. Catherine Lyall, Dr. Renate Gertz, AHRB Centre, and Professor Joyce Tait.

Animal Cloning and Genetic Modification: a Prospective Study

Innogen was invited to tender for this study by ESTO, based in the EC Institute for Prospective Technology Studies (IPTS) in Seville. Our ability to link with a team of eminent scientists based in Roslin Institute and the Genesis Faraday Partnership in Roslin, along with the legal expertise of our colleagues in the AHRB Law Centre, were instrumental in our being awarded the contract.

Research questions

- To provide a comprehensive picture of R&D and commercial activities involving animal cloning and/or genetic modification and their products, worldwide
- To provide evidence on the pipeline of products for the next five years
- To identify the potential socio-economic impacts (benefits and risks) and new policy implications of the development of these technologies and of the commercialisation of their products in the EU
- To compare the regulatory frameworks and visions worldwide

Methods

The study will cover applications of the technology, including food production, molecular pharming, xeno-transplantation, the pet sector, sporting animals and endangered species.

Outcomes

The review of the main R&D actors and of the products in the market and in the pipeline will be worldwide in order to anticipate potential safety, trade and competitiveness implications.

Progress

This project was funded in 2004, to begin work early in 2005.

17. Office of Science and Technology funded project – Professor Joyce Tait**Detection and Identification of Infectious Diseases Foresight Project: Risk Work Package.*****Research questions***

This project will draw on the best available evidence to review and compare future risks from infectious diseases using a common set of metrics to: identify the factors driving changes in risk; assess how the size and nature of risks are evolving; and indicate the range of plausible future patterns of risk, taking account of the needs and views of the wider stakeholder community. The work will cover plant, animal and human infectious diseases, in Africa, China and the UK.

Methods

Up to December 2004, the project has:

- Developed a core Innogen team to advise, along with others nominated by OST, on expertise needed to deliver the scientific aspects of the risk work package.
- Constructed the team of leading experts, covering the range of countries and disease targets specified.
- Delivered (along with the scientists involved in the project) the vision of the technical approach and a plan of the scientific analysis to review and compare future risks.
- Developed a management plan for the work package
- Commissioned additional collaborative work between UK and overseas experts as necessary to provide basic information for the project

Outcomes

A model for and management plan for further development of the Risk Work Package, as a component of the overall Foresight Project have been developed and further work will be commissioned by OST during 2005, involving Innogen staff and associates, Dr. Catherine Lyall, Dr. Laura Meagher and Jonathan Suk.

8. Dissemination and engagement strategy

Objectives, principles and key messages

A clear dissemination and engagement strategy lies at the heart of the Innogen Centre and its commitment to communicate and discuss our findings with academic colleagues and diverse stakeholders. This is a challenging goal, cutting across many of the established fora. In implementing this effectively Innogen's approach to communications continues to be responsible, evidence-based, innovative, proactive and opportunistic by:

- Ensuring effective widespread dissemination of our research activities and findings
- Maximising the impact, relevance and uptake of our research
- Encouraging partnerships and networking relevant to Innogen
- Influencing policy and policymakers
- Encouraging constructive engagement of stakeholders and public groups in genomics-related issues
- Raising the profile of Innogen
- Utilising our relationship with the ESRC to enhance our communications and communicate our messages
- Collaborating and consulting with the other centres in the Genomics Network
- Collaborating with the Genomics Forum to augment our communication capabilities

In achieving its communication objectives, Innogen undertook a number of initiatives during 2004. In particular, redevelopment of the Innogen website, production of the Innogen/Genomics Network Newsletter, and pre-conference marketing for the Innogen International Conference 2005, have been very effective at widening our audience, increasing engagement and raising the profile of Innogen and the Genomics Network. The former two also attracted additional funding from the ESRC in the form of a Communications Enhancement Grant. The ESRC Media Training Day was also very successful in increasing awareness among research fellows of the importance of communicating their research findings.

1. Innogen website

The Innogen website is a primary communication tool and is the main interface between Innogen and its users. The website plays a vital role in promoting Innogen, its events and activities, and providing current information on research projects and publications, presentations from workshops, and links to other related material. Redevelopment of the website was outsourced in 2004, after a rigorous and comprehensive tendering process. The main objectives from website redevelopment were:

- improved functionality
- easier to use
- easier to update
- more flexible
- provide a more comprehensive resource for current and future users

The redeveloped website will be launched in Spring 2005.

2. Genomics Network Newsletter

The three research centres, Innogen, Egenis and Cesagen, collaborated to produce the first Genomics Network newsletter, published in September 2004. The newsletter amalgamated activities, research and events from all three centres to produce a high-quality, current, comprehensive and fresh newsletter. Fifteen hundred copies were printed and circulated to Genomics Network contacts. The newsletter raised the profile of the Genomics Network and was a valuable means of distributing news, research findings, discussion points, policy-changes, events and other relevant information using an accessible and easily digested medium. The second issue of the Newsletter is currently being planned and compiled, and it is envisaged that this will be

published in Spring 2005. The Genomics Forum have generously offered to distribute this and subsequent editions of the newsletter.

3. Pre-conference Marketing of the Innogen 2005 Conference

The pre-conference marketing strategy for publicising the conference resulted in a complete overall of the Innogen database which was successfully cleansed and rebuilt as a result of a comprehensive telephone, mail and email campaign. We now have over 1500 directly relevant names from industry, science, academia, and policy and regulation that will provide a strong basis for future dissemination and publicity activities.

4. ESRC Media Training Day

The ESRC Media Training Day for researchers and support staff held in November 2004 proved to be very influential on the communication ethos of Innogen. Research staff, among others, are tasked with implementing the communication strategy, and are undoubtedly extremely important in spreading the Innogen message, however communication with the Media in particular was viewed with scepticism and trepidation. The Media Training Day changed these preconceptions and seemed to inspire an understanding of the benefits of communications in general, not restricted to the Media, and a more wide-ranging acceptance of the importance of incorporating effective communications activities into everyday working practices.

5. Media Recognition

2004 saw an increase in the number of times Innogen staff were asked by journalists to contribute views for a forthcoming article, or where Innogen research was mentioned in the press. Articles or interviews appeared in: Radio 4, BBC News World Edition, The Herald, The Independent, The Scotsman, The Sunday Times, Nature Biotechnology (x2), Research Fortnight. However we see this as an area still requiring considerable further development.

6. Communication Strategy

In general, the elements of Innogen's communication strategy were achieved or surpassed, under the headings: Identity/General PR; Media Relations; Public Affairs; Research Outputs; Publicity Materials; Partnerships and Networks; Advisory Committee; Stakeholder Platform and Events. The strategy will continue to be developed as new opportunities arise. Our relationships with the Genomics Forum and the other centres in the Genomics Network will continue to provide other avenues for advice and dissemination activities.

Areas identified as requiring further work in 2005 are: cultivating more effective contacts with national and local journalists; communicating and publishing on research methods; and involving the Advisory Committee more effectively as advisers on Innogen research projects.

9. Capacity building and research environment

Capacity Building

Innogen continues to build capacity by seeking funding for new projects and posts beyond the ESRC award, and also accepting offers of collaboration with other research centres and units in both natural and social sciences, thus adding to the range of research skills and areas of interest represented. However, we are doing this in a highly targeted manner, based on the Innogen Integrated Policy and Governance Approach, to gather data from each of our major constituencies (science/industry innovation communities; policy makers and regulators; stakeholders and public groups) and to develop an integrated analysis of the interactions among these groups as they respond to new knowledge in life sciences and the innovation opportunities that arise from this knowledge.

Additional Staff

The capacity of the Innogen Centre is being significantly enhanced by the appointment of new lecturers. Also the research recognition for existing staff through promotions, particularly three promotions to professorships, provides encouragement to other staff as well as greater kudos for the Centre itself.

Research Environment

Research fellows are provided with a supportive environment with ready access to all senior staff involved in the Centre. They are encouraged to develop new skills and given training where necessary. They are also encouraged to expand their horizons by mutual interactions and discussions on research issues. The following activities have contributed to capacity building in this sense:

- three day 'retreat'-type residential meetings are held at intervals of six months where all staff involved in Innogen (including visiting fellows) meet to discuss their research projects, how they are evolving, how they fit into the overall Innogen programme, how they contribute to Cross-Cutting Themes, and how the capacity of the Innogen programme as a whole is being developed
- regular research seminars take place at approximately monthly intervals in Edinburgh or the Open University – these are open meetings, widely advertised, and bring in other interested researchers from across the host university and beyond
- the three directors meet at approximately monthly intervals to discuss issues related to management of the Centre and of its research programme, and in addition regular conference telephone calls are held
- research fellows are contributing to teaching on the masters programme
- two training workshops were also provided for research fellows, one on presentation skills and one on media training
- regular 'learning lunches' are provided by Edinburgh University covering topics of particular interest to research fellows, eg., publications strategies, grant applications, etc.
- The University of Edinburgh also provides a range of one-day training courses relevant to research fellows, eg, project management for researchers, career development for contract researchers.
- Prof Williams has been involved in various initiatives to develop policies and practices that will support the intellectual and career development of research staff, within the Research Centre for Social Sciences (e.g. mentoring and appraisal) and the School of Social and Policy Studies (e.g. awards for research development and bridging between contracts) and the College of Humanities and Social Sciences at the University of Edinburgh. Prof David Wield has undertaken similar initiatives with the Open University.

- Innogen research fellows are heavily involved in organizing the Innogen Conference, held in early 2005. Each was responsible for organizing a particular parallel session and took it from conception to delivery single-handedly. This involved sourcing high profile speakers, planning content and format of sessions and ensuring that the administrative details associated with their session ran smoothly.

10. Key performance indicators

Detailed explanation of the various outputs represented by Innogen's Key Performance Indicators, as summarised in Appendix 5, are given in other sections of this report. Here we summarise briefly the main points where actual performance differs from the target.

Research projects

- Excellent progress has been made on the projects already under way that form the core Innogen research programme, funded by ESRC, and Shawn Harmon has been appointed to work on Project 5, Legal and Bio-ethical Regulatory Mechanisms, led by Professor Graeme Laurie.
- A significant number of projects, funded in addition to the core ESRC programme, have begun or been awarded funding during 2004, considerably exceeding the volume of funding proposed as a target for 2004.
- Under the 'Research Collaboration' heading, most of this additional Innogen research involves collaboration with academics based elsewhere (particularly natural scientists) or with stakeholders. We have only counted those where this is a significant element of the research

Teaching and studentships

- One additional lectureship was created at the Open University in 2004 (Dr. Peter Robbins) and Dr. James Smith, an Innogen research fellow, was promoted to a lectureship.
- As Innogen has become more widely known we have found it much easier to attract graduate students and numbers are expanding rapidly.
- Delivery of the main in service training course has been postponed till 2005 so that we can build on the market created by the Innogen conference in February 2005. However, we have continued to present lunchtime training seminars for policy staff at the Scottish Executive.

Management, Administration and Staff

- Several staff change-overs throughout the year, including the employment of several new dedicated and associated research staff, have been managed smoothly.
- We were unable to raise the required funding for two of the proposed visiting fellows during 2004, but hope to have more success in 2005.

Publications

- Feedback from the most recent Troika meeting in September 2004 advised us to give more attention to refereed academic publications, in addition to our already strong focus on stakeholder engagement and external relations. The number of such publications, published or in press in 2004, provides strong evidence of the quality of our academic research base.

External Relations

Again we performed significantly better than predicted in this area, a testament to our emphasis on external engagement and to the quality of our outputs.

Innogen Events

Innogen's plans, having held a conference late in 2003, were to hold the next one in February 2005. All staff were heavily involved in planning for this conference, a major high-profile event held in the Edinburgh International Conference Centre.

11. Scientific representation

Scientific representation forms an important component of Innogen's outputs and activities under all the main headings of this report. Scientific representation on research and engagement aspects of the development studies component of the Innogen programme has been particularly productive in 2004.

To summarise:

- Ten of Innogen's research projects involve active engagement with science communities
- Our staff are involved in a large number of advisory boards, committees and networks requiring close interaction with science communities and science-related issues.
- Scientists are strongly represented on the Innogen Advisory Committee and also on the University of Edinburgh Inter-College Advisory Group.
- We are regularly invited to give presentations at conferences, workshops and seminars involving strong scientific representation, or organised by scientists
- We contribute from a social science perspective to policy decision making about scientific issues.
- We are developing three teaching initiatives jointly with scientists.
- Several of our graduate students were initially trained as scientists, or are engaging directly with scientists during their training and research projects.

12. Forward look

Innogen conference and related activities

A major focus of activity for Innogen in 2005 centres on the conference on 'Evolution of the Life Science Industries' to be held in February in the Edinburgh International Conference Centre. In addition to providing a show-case for Innogen and its programme, it forms an important part of our strategic planning in several ways.

With four parallel streams of presentations there are opportunities to present a varied and interesting programme. This will be based on the primary areas covered by Innogen's research: Industry Perspectives; Science and New Medical Technologies; Policy and Regulation; and Interaction and Integration, forming twelve sessions in all. Each session is being organised by Innogen staff and research fellows and for the latter it makes a contribution to overall staff development.

The conference is also serving several other functions for Innogen. We have invited speakers of international repute (social scientists, natural scientists, policy makers and industry managers) to give presentations at the plenary and parallel sessions. We are forging longer term links with many of them with a view to developing future research and teaching collaborations. We have also expended considerable efforts on publicity for the conference with a view to raising Innogen's profile in a number of areas. We will build on this particularly for two major outputs planned for 2005, raising funding for an endowed chair at the University of Edinburgh, and presenting our first continuing professional development course for genomics-related company managers and policy makers.

Research-related activities

In 2005, we expect to concentrate less on fund-raising for new research projects and more on consolidating work on projects already funded, including the delivery of outputs. However, one area we would like to develop further is a focus on policy and regulation related to stem cells as they approach commercial development.

Publication and dissemination

The increase in publication-related activity outlined in this report will lead to a significant increase in publications in refereed academic journals and elsewhere during 2005 and, as the newly funded projects begin to deliver outputs, we expect a continuing upward trend in articles submitted for publication. Similarly we expect related dissemination and stakeholder engagement activities to continue to increase.

Teaching and studentships

We expect our masters and doctoral level programmes to continue to expand steadily and new offerings in collaboration with the science colleges in the University of Edinburgh to come on stream during 2005.

The longer term.

During 2005 we will be preparing our mid-term review, developing a programme of research and dissemination for the next five years, beyond 2007.

13. Major budget issues

Budget summary

Budget summary for the year, from 1 January to 31 December, is as follows:

Total budget for 2004	£455,273
Total expenditure for 2004	£470,301
Surplus/(deficit)	(£15,028)
% overspend	3.3%

Other budget issues

The original budget for Innogen was £2,061,288. £61,602 were added for extra project manager hours and £15,000 for communications. Therefore the overall cash limit of the project has increased to £2,137,830.

Innogen have asked for a new 5 year budget to be issued from the ESRC so that we are able to track annual spend in accordance with the new budget but as yet, we have not received this. It would be very helpful if the ESRC issued an annual statement detailing annual budget, annual spend and remainder for the rest of the project to help us manage our spend in accordance with the actual ESRC annual budget.

Appendix 1. Highlights

Highlights for Research

1. Development of Innogen overall research programme

We made a strategic decision early in the life of the Centre, to build a programme of research that will allow us to take an overview of life science-related activities, from three perspectives: 'Science, Innovation and Knowledge Management'; 'Policy and Regulation'; and 'Public and Stakeholder Engagement'; linked by the cross-cutting theme 'Globalisation and Governance'. Our previous success in building up this overall framework for organising research and disseminating its outputs in the context of agro-biotechnology made an important contribution to our bid for Centre funding and, thanks to the additional funding raised by Innogen staff, we now have in place a good framework to extend this form of analysis to the much more significant health-related sectors.

We have attracted additional funding (total £691 K, supplementing the £183 K awarded last year) for a wide range of research and policy-related projects. Approximately 50% of this additional funding arose from cases where Innogen staff were approached by others in science, innovation and policy communities. This is an indication of Innogen's reputation as a Centre with an excellent foundation in basic academic research, the ability to work in an interdisciplinary environment and to present results effectively to policy makers and other stakeholders. The other 50%, mainly from research council and EC sources, further demonstrates the quality of our credentials in basic academic research.

We are now in a good position to deliver on our overall aim: *"to build an internationally respected Centre to enable social scientists and ESRC to take a leading role in policy, public and innovation-related debates on life science issues, and to contribute to the shaping of the biotechnology trajectory along with other research councils, from a well informed, evidence-based position"*, alongside the other elements of the Genomics Network.

2. Capacity Building in Developing Countries

Innogen's core and associated research on north-south genomics and the role of biotechnology partnerships in driving research, innovation and development, has expanded rapidly in 2004. From a foundation of excellence in basic research in the Innogen Centre, an international network of researchers is working on a series of linked, high profile programme areas:

- research on the International Aids Vaccine Initiative (IAVI) brings together researchers from China, India, Brazil, Kenya, South Africa, Italy and the Netherlands, and from the WHO and UN INTECH.
- three Workshops (on *Vaccines and the Poor*, *The Indian Pharmaceutical Industry*, and *North-south Public Private Partnerships in African Agro-biotechnology*) brought together over sixty researchers from 12 countries.
- two refereed journal Special Issues (*Journal of International Development*, July 2005, and *Technology Analysis and Strategic Management*, May 2006) will be published from these workshops.

Research papers forthcoming in high profile journals in 2005, will demonstrate our novel approach to analysis of the innovative inter-organisational dynamics of big programme initiatives like IAVI, GAVI, and the global research programmes on malaria and TB. We focus particularly on the significant role of local public research institutes in genetics R&D and innovation, the need for better integration between health delivery systems and innovation systems, and the changing attitude of multinational companies to involvement with these issues.

Our research has been well received by policy makers, and presentations have involved the UK DFID, Canadian International Development Research Corporation (IDRC) and the New Economic Partnership for African Development (NEPAD). Innogen staff have been invited to speak or advise on a wide range of initiatives. For example, Prof Chataway was an invited expert to the Canadian

Program on Genomics and Global Health and gave a plenary talk at their workshop which led to a Special Issue of Nature Biotechnology on *Health Biotechnology Innovation in Developing Countries*.

Innogen also produced one of two invited papers for a plenary presentation at an international conference on *Partnerships for Building Science and Technology Capacity in Africa*, featuring two case studies from Innogen research. The conference, which was sponsored by the UK Office of Science and Technology (OST), DFID, the Canadian Foreign Affairs Ministry and IDRC, was attended by over 100 people, including both nations' Chief Science Advisors, and five ministers including Hilary Benn for the UK. It was designed to feed into the Commission for Africa.

Our research supports those in developing countries who want to collaborate for rapid capacity building. The Open University's championing of capacity building initiatives has been rewarded by a major endowment of £2.75m to the OU to support international research and development in Africa, part of which will endow a Chair in Innogen's home department at the OU, to help lead these initiatives.

Highlights for Communication

Policy advice and external relations

Innogen has very successfully expanded its outputs in these areas in 2004. The following are two examples from the large volume of outputs in this area.

1. International Risk Governance Council (IRGC)

Joyce Tait was invited to join the Scientific and Technical Council of the IRGC during 2004, and has participated in a number of meetings planning an overall approach to risk governance. A family of approaches to risk governance is being developed for the IRGC with active participation of academics, policy makers, regulators and company managers from Europe, the USA, China, Japan and India. Joyce Tait, along with Lutz Cleemann of Allianz, has developed a paper based on the Innogen overall approach to governance which is relevant to innovative technology developments in life sciences and nano-technology. IRGC has funded Jonathan Suk, a PhD student in Innogen, to prepare a working paper illustrating the application of this approach in the context of GM crops in Europe and the USA and a further application is planned for nano-technology.

2. Innogen Public Event – Edinburgh International Science Festival (EISF)

Innogen submitted a successful bid to host a session at the EISF jointly with the Scottish Stem Cell Network. The title of the event, which was attended by over 150 people, was 'Stemming the Tide of Incurable Diseases'. Baroness Helena Kennedy was invited as a speaker by Innogen, the other two speakers being Professor John Clark from Roslin Institute and Dr. Marc Turner from the Scottish Blood Transfusion Service. Joyce Tait chaired the meeting.

The venue for the meeting had a built-in digital voting facility and we used this to ask the audience questions about their attitudes to the use of stem cells. Although the results of this exercise cannot be seen as representative of the general public, they did indicate the expected greater support for the use of human adult stem cells than for embryonic stem cells (94% compared to 74%) and also greater support for some uses of stem cells than for others (61% support for the use of genetically modified human embryonic stem cells to cure genetic diseases, but only 18% support for the pursuit of human perfection if genetic science should make this possible).

Appendix 2. Innogen staff details

Director:	Professor Joyce Tait	100%	From Oct 02
Co-directors:	Professor Robin Williams	40%	From Oct 02
	Professor David Wield	40%	From Oct 02
Academic Staff:			
	Dr Sarah Parry	20%	From Oct 03
	Dr Peter Robbins	15%	From Jun 04
	Dr Sarah Cunningham-Burley	12.5%	From Oct 02
	Dr Wendy Faulkner	12.5%	From Oct 02
	Dr Graeme Laurie	20%	From Oct 02
	Professor David MacKenzie	15%	From Oct 02
	Dr Steve Sturdy	5%	From Oct 02
	Dr Harry Campbell	5%	From Oct 02
	Dr Chris Waelde	5%	From Oct 02
	Dr Janet Carsten	5%	From Oct 02
	Dr Shona Kerr	10%	From Oct 02
	Professor Joanna Chataway	30%	From Oct 02
	Dr Roberto Simonetti	15%	From Oct 02
	Suma Athreye	10%	From Oct 02
	Professor Mariana Mazzucato	10%	From Oct 02
	Dr Xiaobai Shen	5%	From Oct 03
	Professor Veronica van Heyningen	3%	From Oct 03
Innogen Funded Research Fellows:			
	Ann Bruce	40%	From Oct 02
	Aparna Joshi	100%	May 03-Dec 04
	Dr Catherine Lyall	40%	From Oct 02
	Dr James Mittra	100%	From Feb 03
	Dr James Smith	100%	Apr 03-Dec 04
	Shawn Harmon	100%	From Dec 04
Non-Innogen Funded Research Fellows:			
	Dr Gill Haddow	SHEFC funded	100%
			From May 04
	Dr Alessandro Rosiello	Scottish Enterprise funded	100%
			From Jun 03
	Dr Seife Ayele	Science in Society	100%
			From Oct 02
	Dr Susan Oreszczyn	Science in Society	100%
			From Sep 04
Support Team:			
	Julie Hamilton	Project Manager	60%
			Nov 03-Aug 04
			69%
			Aug 04-Oct 04
			80%
			From Nov 04
	Jane Ewins	Research Development Officer	100%
			Feb-Mar 04
			60%
			Aug-Dec 04
	Lorna Mitchell	Secretary	100%
			Jan-Mar 04
	Marlene Gordon	Secretary	50%
			From Oct 03
	Angela McEwan	Administrator and PA	100%
			From May 04
	Eileen Mothersole	Transcription Support	10%
			From Oct 02

Post Graduate Students:

Kalpana Chaturvedi	From Oct 02
Nicolas Cimini	From Oct 04
Andrew Clements	From Oct 04
Rebecca Hanlin	From Oct 04
Matthew Harsh	From Oct 03
Farah Huzair	From Apr 04
Lillian Jensen	From Oct 04
Adele Langlois	From Oct 04
Nicola Marks	From Oct 03
Najib Murad	From Oct 03
Stuart Parris	From Oct 04
Jennifer Spiers	From Oct 03
Cailean Todd	From Oct 04
Karin Boschert	Completed 04
Ann Bruce	Oct 04
Donna Messner	From Oct 04
Jonathan Suk	From Oct 04

Visiting Fellows:

Anthony Arundel (seconded to OECD)
Professor Barry Barnes (Egenis)
Professor Jane Bower (Glasgow Caledonian University)
Dr. Julian Sulej (Glasgow Caledonian University)
Professor Norman Clark (Kabarak University, Kenya)
Dr. Takuji Hara (Kobe University, Japan)
Dr Joseph Murphy (Open University)
Dr. Josep Espluga (Autonomous University of Barcelona, Spain)
Professor Luigi Orsenigo, University of Brescia, Italy
Dr. Andy Hall, United Nations University.

Appendix 3. Publications

Books

Carsten, J (2004) *After Kinship*, Cambridge University Press.

Clark, N, Mugabe, J and Smith, J (2005) *Science and Governance of modern Biotechnology in Saharan Africa*, UNU Press.

Lyall, C and Tait, J (eds) (2005) *New Modes of Governance. Developing an Integrated Policy Approach to Science, Technology, Risk and the Environment*, Aldershot, Ashgate.

Laurie, G (2005) Mason and McCall-Smith's *Law and Medical Ethics*, Seventh Edition, Oxford University Press (7th edition with JK Mason).

Dosi, G. and Mazzucato, M. (2005 in press) *Innovation, Growth and Market Structure in High Tech Industries: the case of Biotech-Pharmaceuticals*. Cambridge: Cambridge University /Press.

Refereed Journal Articles

Ayele, S and Wield, D. (2005, in press) 'Capacity Building and Public-Private Partnership in African Crop Biotechnology'. *Journal of International Development*. Special edition, guest editors, S. Ayele and J. Chataway.

Bower, D J, Barry, N, Reid, M, Norrie, J (2005 in press) 'Designing and Implementing e-Health applications in the UK's National Health Service', *Journal of Health Communication*.

Bower, D J (2005, in press) 'From the 'Rhetoric of Hope' to the 'Patient-Active Paradigm: strategic positioning of Pharmaceutical and Biotechnology Companies', *Technology Analysis and Strategic Management*, 17(1).

Bruce, A, Lyall, C, Tait, J and Williams, R (2004) 'Interdisciplinary Integration in the Fifth Framework Programme', *Futures*, 36/4, pp 457-470.

Chataway, J and Smith, J (2005, in press) 'Making Bioscience Health Related Innovations Work for the Poor: are public private partnerships the answer?' *World Development*.

Chataway, J and Smith, J (2005, in press) 'Public-private partnerships: what are they and how do they bring benefits to the poor?' *World Development*.

Chataway, J, Tait, J and Wield, D (2004) 'Understanding Company R&D Strategies in Agro-biotechnology: Trajectories and Blind Spots'. *Research Policy*, Vol. 33, Issues 6-7, Sept. pp. 1041-1057.

Chataway, J (2005, in press) 'Creating pro-poor agriculture-related biotechnology: Can it be done?', *Journal of International Development*, Special edition, guest editors, S. Ayele and J. Chataway.

Gertz, R (2004) 'Access to environmental information and the German Blue Angel - Lessons to be learned?', *European Environmental Law Review*, 13, pp 268-275.

Gertz, R (2004) 'An analysis of the Icelandic Supreme Court Judgment on the Health Sector Database Act', 1:2SCRIPT-ed @: <<http://www.law.ed.ac.uk/ahrb/script-ed/issue2/iceland.asp>>

Gertz, R (2004) 'Is it 'me' or 'we'? Genetic relations and the meaning of 'personal data' under the Data Protection Directive', *European Journal of Health Law*, (11) 3.

Haddow, G (2005, in press) 'The Phenomenology of Death, Embodiment and Organ Transplantation', *Sociology of Health and Illness*, Vol. 24, No. 6, pp 92-113.

Haddow, G, Cunningham-Burley, S, Parry, S, and Bruce, A (2005, in press) 'Resolving Public Concerns: Why Population Genetic Databases Require an Early Consultative Ear and a Strong Legislative Arm', *Critical Public Health*.

Harsh, M and Smith, J (2005, in press) 'Governing biotechnology in Africa: place, networks and re-imagining African environments', *Journal of International Development*.

Harsh, M (2005, in press) 'Informal governance of biotechnology in Kenya', *Journal of International Development*.

Harsh, M and Smith, J (2005, in press) 'Ethnography, place and informal governance in east Africa', *Development*.

Campbell, H (with Holloway, S, Porteous, M, Cetnarskyj, R, Anderson, E, Rush, R, Fry, A, Gorman, D, Steel, M.) (2004) 'Patient satisfaction with and relative costs of two different models of cancer genetics services in south east Scotland', *British Journal of Cancer*: 90, 582-9.

Laurie, G (2004) 'Patenting Stem Cells of Human Origin' *European Intellectual Property Review*, pp 59-66.

Laurie, G (2004) 'Genetic Databases: Assessing the Benefits and the Impact on Human and Patient Rights – A World Health Organisation Report' 11 *European Journal of Health Law*, pp 79-84.

Lyll, C, Bruce, A, Firn, M and Tait, J (2004) 'Assessing End Use Relevance of Public Sector Research Organisations', *Research Policy*, 33/1, pp 73-87.

Lyll, C and Tait, J (2004) 'Foresight in a Multi-level Governance Structure: Policy Integration and Communication', *Science and Public Policy*, 31/1, pp 27-37.

Mazzucato, M and Tancioni, M (2005, in press) 'Entry, Competence-Destroying Innovations, Volatility, and Growth', *Revue d'Economie Industrielle*.

Robbins, P (2004) 'The Scientists Think and the Public Feels: Expert Perceptions of the Discourse of GM Food' with Cook, G and Pieri, E, *Discourse and Society*, 15 (2).

Robbins, P (2004) 'Global Visions and Globalizing Corporations: An Analysis of Images and Texts from Fortune Global 500 Companies' *Sociological Research Online*, 9 (2). <http://www.socresonline.org.uk/9/2/robbins.html>.

Rosiello, A and Smith J (2005, in press) 'A Sociological Economy of Vaccine partnerships in Africa and India' *Current Sociology*.

Smith, J (2005, in press) 'Context-bound Knowledge Production, Capacity Building and New Product Networks' *Journal of International Development*.

Tait, J and Chataway, J (2005, in press) 'Risk and Uncertainty in Genetically Modified Crop Development: The Industry Perspective' in *Environment and Planning - C*.

Wield, D (with Forbes, N.) (2004) What is R&D and Why Does It Matter?. *Science and Public Policy*, 31, 267-277.

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Bower, D J and Rankin, D (2004) 'Knowledge transfer and policy imperatives : science in a devolved Scotland'. In During, R, Oakey and Kauser (eds) *New Technology-Based Firms in the new Millennium*, Vol 3, Amsterdam, Elsevier, pp 287-300.

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Laurie, G (2004) 'Patenting and the Human Body'. In Grubb, A (ed) *Principles of Medical Law*, Second Edition, Oxford University Press, pp 1079-1101.

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Working paper 3: Bruce A, Lyall C, Tait J, Williams R (June 2003) 'Interdisciplinary Integration in Europe: the case of the Fifth Framework Programme' (paper now published – see above).

Working paper 8: Smith, J (2004) 'Diversity, innovation and poverty: Governance and management of centres of excellence in Africa'.

Working paper 10: Lyall, C and Tait, J (November 2004) 'Shifting Policy Debates and the Implications for Governance' (paper now published as book chapter – see above).

Working Paper 11: Yogendra, S (July 2004). The Food Quality Protection Act in the United States: a review of the dynamics of pesticide regulation and firm responses.

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Working paper 21: Bower, D J and Sulej, J (2004) 'The Indian Challenge: the Evolution of a Successful New Global Strategy in the Pharmaceutical Industry'.

Working paper 22: Campbell, L (2004) 'A history of vaccine development and partnerships in Africa'.

Working paper 23: Chataway, J and Smith, J (2004) 'The International Aids Vaccine Initiative: global partnerships and local capacity building'.

Working paper 24: Gertz, R (Requisitioned book chapter for a book on Anthropologists working together with other disciplines) Marsden, W and Gertz, R 'Great expectations: Law, Anthropology and Genetic Databanks'.

Working paper 25: Laurie, G, Muir, R and Gertz, R 'The need for training in data protection issues amongst RECs and Caldicott Guardians'.

Working paper 26: Marsden, W and Gertz, R 'A legal and anthropological study of family recruitment'.

Working paper 27: Mazzucato, M and Tancioni, M (2004) 'Creative Destruction and Idiosyncratic Risk' Open University Discussion Paper, 50-2004.

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Carsten, J. 'Constitutive Knowledge: Tracing Trajectories of information in New Contexts of Relatedness' *Cultural Anthropology*, under review.

Carsten, J. 'Kinship' *Encyclopaedia Britannica*, submitted.

Chataway, J, Smith, J and Wield, D. 'The changing shape of science and technology capacity building in Sub-Saharan Africa', to be submitted to *World Development*.

Chataway, J, Smith, J and Wield, D. 'Partnerships and capabilities for science, technology, innovation and development in Africa' to be submitted to Research Policy.

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Mitra, J. 'Evolution and Dynamics of European Pharmaceutical Industry' (Planned article for *British Journal of Management*).

Mitra, J. 'Genetic Information, Life Assurance and the Politics of Inclusion: Do Commercial Realities Undermine the Populist Rhetoric of Genetic Discrimination and Social Exclusion', *Science, Technology & Human Values*, forthcoming.

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Mitra, J. 'Politics Without Reason: A Critical Analysis of the UK's Policy Approach to the Issue of Genetics and Insurance', submitted to *Policy & Politics*.

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Mitra, J. 'The Citizens' Jury and its Discontents: How to Rescue a Deliberative Ideal from Flawed Experiments in Participatory Politics', submitted to *Political Studies*.

Parry, S. '(Re)Constructing Embryos in Stem Cell Research: Exploring the Meaning of Embryos in Fertility Support Groups' to be submitted to *Social Science and Medicine*.

Parry, S. 'Embryonic Stem Cell Research and the Teleology of Life: Multiple Understandings of Embryos in Patient Support Groups' to be submitted to *Sociology of Health and Illness*.

Parry, S. 'Separating Therapeutic and Reproductive Cloning: The Role of Discursive Boundaries in the Stem Cell and Cloning Debates' in preparation for submission to *Science, Technology and Human Values*.

Rosiello, A. 'Organisational Choices in the Scottish Biotech Industry', submitted to a special issue of *Technology Analysis and Strategic Management*, based on the conference 'Shifting Boundaries: Governance, Competence and Economic Organisation in the Knowledge Economy'.

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Rosiello, A and Smith, J. 'A sociological economy of vaccine partnerships in Africa and India', *Current Sociology*, forthcoming.

Rosiello, A. 'Genomics Innovation in Scotland' Submitted to *Urban Studies*.

Rosiello, A, Smith, J and Chataway, J. 'The case of the International Aids Vaccine Initiative: a sociological economy of vaccine partnerships in Africa and India', *Research Policy*, under review.

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Smith, J. 'The justice of eating: supply-side and demand-driven Approaches to conceptualising food security in sub-Saharan Africa', *Food Policy*, under review.

Smith, J and Chataway, J. 'Vaccine partnerships, southern capacity and northern initiatives', *Nature Biotech*, under review.

Tait, J, Chataway, J and Wield, D. Governance, Policy and Industry Strategies: Agro-biotechnology and Pharmaceuticals. *Technology Analysis and Strategic Management*. Responding to referees' comments.

Wield, D and Chataway, J. 'The Indian Pharmaceutical Industry and TRIPS' *Technology Analysis and Strategic Management (special issue)* will be published in mid-2006.

Appendix 4. Training and career development

Workshops/Training Days/Seminars

- 11 June 2004: Effective Presentation Skills for Researchers Workshop, University of Edinburgh
- 2 September 2004: Strategies in Qualitative Research Conference, Durham
- 14-15 October 2004: ESRC Getting Research into Practice Workshop, London
- 26 October 2004: Learning Lunch on Publication Strategies, University of Edinburgh
- 24 November 2004: ESRC Media Training Day, Innogen, Edinburgh

Retreats

- 15-17 March, The Burn, nr Montrose, Scotland
- 21-22 October, Cranfield University, UK

Seminars

14 January 2004: *Trading the island laboratory: new geographies of Iceland's genetic heritage*

Beth Greenhough, Research Fellow, Department of Geography, Open University.

16 February 2004: *Corporate dominance and agricultural biotechnology: implications for development*

Dominic Glover, Institute for Development Studies, The University of Sussex.

15 March 2004: *Strange bedfellows and usual suspects: mapping the emergent complexity of 'social movement society' engagement with human genetic technologies*

Dr Alexandra Plows CESAgen, University of Wales Cardiff

8 April 2004: *Edinburgh International Science Festival*

Baroness Helena Kennedy, Chair, Human Genetics Commission

Professor John Clark, Director of Roslin Institute, Edinburgh

Dr Marc Turner, Clinical Director of the Scottish National Blood Transfusion Service

Professor Joyce Tait, Director, ESRC Innogen Centre

26 April 2004: *Collaboration and innovation: the evolution of the UK biotech sector*

Despona Filiou, Doctoral Researcher, School of Management, UMIST

19 May 2004: *Categorisation of GM foods: deference, essentialism and perspective*

Dr Nick Braisby, Lecturer, Psychology, Open University

14 June 2004: *Public databases and privat(ised) property: public perceptions of privacy in relation to human genetic databases*

Sue Weldon, Research Associate, CESAgen

13 October 2004: *The precautionary principle might be used in a practical way when assessing new technologies*

Chaired by Andy Stirling, RSA Forum for Technology, Citizens and the Market, Royal Society for the encouragement of Arts, Manufactures and Commerce, London

18 October 2004: *Get Beck: In Defence of Risk Analysis*

Dr Scott Campbell, Institute for the Study of Genetics, Biorisks and Society (IGBiS), University of Nottingham

28 October 2004: *Perceived risks, benefits and public deliberation: from 'GM Nation?' to Nanotechnology*

Prof Nick Pigeon, Director, Centre for Environmental Risk, University of East Anglia

3 November 2004: *The Development of Genomics Capabilities in the Pharmaceutical Industry - an alternative to the revolution model*

Dr Paul Nightingale, Senior Research Fellow, SPRU (Science and Technology Policy Research), University of Sussex

1 December 2004: *Hierarchy in Organisations: It's Impact on Innovation, Governance and Stakeholder Interactions*

Dr Gerard Fairtlough, Consultant

Career Development

Innogen is committed to the development of staff to enable them to become more effective in their work and is committed to the creation of development opportunities for all categories of staff on a continuing basis.

Innogen is working with The University of Edinburgh, who have already addressed most if not all of the recommendations of the Concordat and more recently those of the Research Careers Initiative, ensuring that a range of training and development and career development support is available to researchers. In the light of further Research Careers Initiative (RCI) developments this work will need to be extended to ensure that research staff, at different stages of their careers, from first post-doc through to Principal Investigator, are provided with appropriate advice to help them maximise their potential in each of these distinctive roles, and to help them manage each of these career transitions effectively. The Open University have also addressed all recommendations of the Concordat and has contract staff representation on all relevant research and career development bodies.

Next known employment destinations

Dr James Smith, Research Fellow: Lecturer in African Studies, University of Edinburgh

Aparna Joshi, Research Fellow: Left to concentrate on writing up PhD

Lorna Mitchell, Innogen Secretary: Private Sector

Appendix 5. Summary of key performance indicators

Group 1:	RESEARCH PROJECTS	Target 2004	Actual 2004	Target 2005
1.1	Research projects commenced	2	1	1
1.2	ESRC core funding	£420,163	£455,273	£453,240
1.3	Funding for projects commencing in 2004	£200,000	£722,781	£200,000
1.4-5	Proposals under evaluation/in preparation	£400,000	£752	£200,000
1.6	Research collaborations	5	10	12
Group 2:	TEACHING AND STUDENTSHIPS			
2.1	Lectureships	1	2	0
2.2	Courses set up and running	2	2	2
2.3	Innogen staff involved in teaching	9	6	6
2.4	Research students/supervisors	2	16/9	20
2.5	In-service training for policy makers and managers	1	0	1
Group 3:	MANAGEMENT, ADMINISTRATION AND STAFF			
3.1	Advisory bodies set up and running	3	3	3
3.2	Management meetings	12	12	12
3.3	Advisory committee meetings	2	2	2
3.3	Dedicated research staff	4.8 FTE	4.8 FTE	3.8 FTE
3.4	Associated research staff	1.0 FTE	4.0 FTE	5.0 FTE
3.5	Support staff	2.4 FTE	2.7 FTE	2.8 FTE
3.6a	UK and EU Visiting fellows	4	2	4
3.6b	International Visiting fellows	4	3	4
3.7	Edinburgh and Open University staff contributing time to Innogen	3.4 FTE	3.5 FTE	3.5 FTE
3.8	Innogen retreats	2	2	2
3.9	Staff development workshops	2	2	2
Group 4:	PUBLICATIONS			
4.1	Refereed journal articles published and in press	8	31	15
4.2	Refereed journal articles submitted/in preparation	8	35	10
4.3	Books	2	5	1
4.4	Book chapters published or in press	5	20	10
4.5	Working papers	8	18	10
4.6	Conference report	NA	NA	1
4.7	Newsletter	1	1	2
Group 5:	EXTERNAL RELATIONS			
5.1	Invited presentations at major conferences or workshops	10	20	20
5.2	Offered presentations	10	22	15
5.3	Participation in policy, advisory and stakeholder groups, policy briefs submitted	10	51	20
5.4	Conferences/meetings attended	20	26	20
5.5	Website developed and updated regularly	NA	NA	NA
5.6	Website redeveloped	1	1	NA
5.7	Number registered on website	100	NA	1000
Group 6:	INNOGEN EVENTS			
6.1	Innogen Launch	NA	NA	NA
6.2	Conferences	0	0	1
6.3	Workshops	6	8	6
6.4	Seminars	12	12	12

Appendix 6. Summary of financial performance

Total budget for 2004	£455,273
Total expenditure for 2004	£470,301
Surplus/(deficit)	(£15,028)
% overspend	3.3%

Total expenditure for the year, split by budget header, was as follows:

	Expenditure (£)	Budget (£)	Variance (£)	% of Budget
Research Staff	204,314.42	213,483.59	-9,169.17	95.71%
Other staff	21,988.63	19,599.75	2,388.88	112.19%
Indirect Costs	104,099.43	107,218.10	-3,118.67	97.09%
Travel (UK)	45,096.41	34,489.52	10,606.89	130.75%
Travel (Overseas)	39,533.05	33,976.52	5,556.53	116.35%
Consumables	14,334.41	7,212.00	7,122.41	198.76%
Exceptional Items	37,478.37	36,201.01	1,277.36	103.53%
Equipment	3,456.32	3,092.99	363.33	111.75%
TOTAL	470,301.04	455,273.48	15,027.56	103.3%

Total co-funding for the year, with sources

University of Edinburgh and the Open University	£199,906
ESRC Science in Society: Farmers' Understandings of Genetically Modified Crops within Local Communities	£131,009
Scottish Executive: Scottish Family Health Study	£127,194
SHEFC: Genetic Health in the 21 st Century	£110,369
ESRC: The Social Dynamics of Public Engagement in Stem Cell Research	£261,452
PRIME: CIPR	£15,360
PRIME: VC Fun	£14,400
Office of Science and Technology: Detection and Identification of Infectious Diseases	£11,050
PRIME: ELSIS network	£6,000
South West Regional Assembly	£4,993
IRDC/DFID: Report -Science and Technology Capacity in Africa	£12,000
NEPAD: Report – Current State of Biotechnology in Africa	\$6,000 (£3,350)
NEPAD: Mapping Centres of Scientific Excellence in Africa	\$10,000 (£5,600)
TOTAL	£890,683

Appendix 7: Policy/process Issues

None