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**CENTRE/GROUP/NETWORK
DIRECTOR'S
ANNUAL REPORT FORM
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CENTRE/GROUP/NETWORK DIRECTOR'S ANNUAL REPORT 2008/09

Reporting period : from 1 April 2008 to 31 March 2009

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

Director's name : Professor David Wield

Start and End Dates : 1st October 2007 to 30th September 2012

Year of Operation : Year 6/7

Total budget from ESRC : £5,214,317 (current award)

1 Introduction

Innogen was established in 2002 to bring together a wide range of relevant disciplines and expertise to undertake social and economic research on innovation in the life sciences and to contribute to the shaping of the life sciences trajectory. We do this through a research programme that focuses on two interacting themes:

1. the understanding of the evolution of the life sciences and industries (such as how and why the life sciences have grown and transformed health and agriculture)
2. the study of the regulation and governance of the life sciences (because these sectors are highly regulated and this strongly influences the innovation process).

Innogen's second five-year research programme is now well established and promising early research results are now emerging, to complement the substantial and expanding results from research begun earlier in the millennium.

Accompanying this research programme has been an extensive range of knowledge transfer activities involving policy and practitioner audiences in the UK and overseas. A key activity in this regard, both in terms of input and impact, was Innogen's co-ordination of the second annual ESRC Genomics Network (EGN) International Conference *Genomics and Society - Re-inventing Life?*

2 Impact and Highlights

Research Progress – Synthetic biology

Innogen is at the international forefront of social science research in and on synthetic biology. We both research, and are a part of the creation of, a new 'inter-discipline' which could profoundly change our understanding of what is 'natural'. This application of engineering principles to biological systems requires cross-disciplinary dialogue between biologists and engineers, who have different value-schemes and assumptions; different approaches to discovery and complexity; and different objectives. The institutionalisation of social scientists in the field, at a very early stage, provides a unique opportunity for authentically interdisciplinary work. Highlights from the past year include: a commissioned workshop and report for the International Risk Governance Council, Geneva; workshops for Synbio 4.0, Hong Kong and BioSynbio, Cambridge; plenary talks (Calvert and Tait) at the prestigious EMBL/EMBO Joint Conference on *Systems and Synthetic Biology: scientific and social implication*, Heidelberg. Our expertise in this area was acknowledged by the selection of Tait and Calvert (as mentor and participant respectively) to be a part of the EPSRC/NSF Sandpit on 'New directions in Synthetic Biology' in Virginia, USA in March 2009.

Research Progress – Limits to governance in the life sciences

Innogen's research has one focus on the evolution of regulatory systems, multi-level governance and its limitations. A forthcoming book *Limits to Governance: the challenge of policy-making for the new life sciences* (eds. Lyall, Papaioannou & Smith) draws together research outputs from ten Innogen colleagues integrated around this common – if contested – theme. The authors argue that, despite the rhetoric about new governance approaches, the state's capacity to control debates about new technology endures. Innogen research demonstrates that the shifting relationship between government and governance is dynamic and evolutionary and is weighted in different ways depending on the context, political system and historical trajectory. By examining the principles and processes of governance with a focus on the people and groups engaged in them, the book goes some way to debunking the

21st century myth that the challenges of policy-making for the new life sciences can be tackled simply by greater consultation.

Academic Impact – Evolution in the life sciences

Innogen's research on innovation in genomics links academic theory on systems and dynamics of innovation with insights into new modes of governance to generate insights into the challenges facing the bio-economy. Our research suggests the need not only for a radical rethink of the systems of innovation themselves, but also of the existing governance system. Our Special Issue of the *International Journal of Biotechnology* (eds. Orsenigo and Tait) includes four papers from Innogen researchers and related research on biotechnology clusters has resulted in a further Special Issue (ed. Rosiello), as well as journal articles in *Regional Studies*, *Industrial and Corporate Change* and *Environment and Planning*. Our results have led to further initiatives, including two significant research grants totalling 1.65m euros.

Academic Impact – Partnerships for life science and development: research and capacity building in and with Africa

We have very strong research collaborations with southern partners in China, India, Latin America and particularly in Africa. This year Innogen's work on sustainable vaccine development and the International Aids Vaccine Initiative was published by the highly regarded Geneva-based Global Forum for Health Research's *Health Partnership Review*. Four Innogen researchers delivered four activities under the theme 'Innogen's work in Africa' to the All-Africa Biotech Congress in Nairobi and we contributed 16 person weeks towards four week-long workshops for African researchers and policy makers, with additional participants from the private and NGO sectors, through our strong and long-standing research and capacity-building partnership with the African Centre for Technology Studies (ACTS), Nairobi, anchored by a Joint Professorial Appointment¹.

Economic and Social Impact – Innovation in the life science industries

Our research on innovation in the life sciences has been taken up by a wide range of agencies. This year, the Organization for Economic Cooperation and Development (OECD) commissioned a report² which was presented to a major meeting in Paris of OECD country and industry representatives. This report also formed the basis of a one-day meeting with the Vice-Presidents for Regulatory Affairs from three major pharmaceutical companies who complimented us on the accuracy of our analysis and sought advice on their future innovation strategy. Tait's involvement in the development of the Scottish Government's Innovation Framework resulted in a letter from the Office of the Minister for Enterprise which says of our research: 'The papers give a clear picture of the issues to be considered, particularly the impact of regulation on the business model. [They] will be useful in furthering our thinking on innovation in the sector. We would welcome your input' Our input continues.

Economic and Social Impact – ESRC Genomics Network Conference

Innogen coordinated the EGN Annual Conference 2008 which, as a result of our long-standing links with industry and policy, attracted a significantly higher number of non-academic participants this year. Of non-EGN participants, 55% were non-academic, coming from business, charities, government and funders. They were attracted by the organisation of more joint panels and dialogues between academic, policy and regulatory agencies. Senior staff spoke from, for example, the MRC and the Human Fertility and Embryology Authority. Press coverage, with excellent Forum press assistance, was also hugely improved, with more than 60 stories around the world, including in *The Times*, *BBC* and *Scientific American*.

¹ Prof. Norman Clark is 50% based at Innogen Open University; and is 50% Research Director, ACTS.

² Health Biotechnology to 2030, www.oecd.org/dataoecd/12/10/40922867.pdf

3 Progress against objectives

Pursuing academic excellence – progress across research themes and objectives

Our research has demonstrated the growing dependence of biotech companies on big pharmaceutical firms as venture capital funds first grew rapidly, then dropped dramatically. One of this year's completed projects, co-funded by the EU PRIME Network of Excellence, of which we are a member, looked at the co-evolution of venture capital and life sciences. It showed that UK venture capital does not play the same 'technology gate-keeper' role as in the US and is more risk-averse. It also showed that policies aimed at regional financial gaps fail if they are not coupled with policies that deal with institutional and capability gaps.

Our research on global health public-private partnerships continues and shows how partnerships help innovation in fragile health systems, playing an important role in capacity building in many developing countries. One project completed this year, co-funded by the British Council and partnered with the Cape Town based Africa Genome Education Institute reported that, in order for genetic science and biotechnology to achieve significant progress in meeting Africa's health and food security needs, it is essential that interdisciplinary, media and public discussion is facilitated. A two-day workshop in Cape Town resulted in a new web-forum for the discussion of genetics and biotechnology as it affects Africa.

Concerning the theme of regulation and governance, we are working on the mismatch between the nature of new life science innovations and the 20th century models of drug development regulation. Current regulation is creating an increasingly unstable situation and our results are increasingly drawn to the issue of 'smart regulation' and what is needed to transform global regulatory systems without increasing risks and uncertainties.

Our research on engagement this year included completion of three key co-funded projects. The ESRC funded project 'Social dynamics of public engagement in stem cells' produced results such as combined citizen and scientist concern about the 'hying-up' of stem cell research in the media and made recommendations on the scope for increasing public engagement in the area. The project produced a role-play activity with colleagues at the MRC Centre for Regenerative Medicine, freely available for download by teachers and students under a Creative Commons licence.. The Generation Scotland: Scottish Family Health Study and related 21st century Genetic Health Study were both brought to fruition with important results. The project's innovative uses of discrete choice experiments found benefit sharing to be more important than gaining consent. Those surveyed felt strongly that benefit sharing was essential if private companies were to be given access to the genetic databases.

This year has seen increasing links with life and medical sciences. Collaboration with Generation Scotland continues and Haddow continues on its Scientific Committee. We began research with the BBSRC Synbiostandards Network, led by the University of Edinburgh, which includes scientists from Cambridge, Glasgow, Newcastle and Imperial. A ESRC CASE Studentship began in October, with funding from the Scottish Stem Cell Network and Scottish Blood Transfusion Service. Innogen was also involved in the successful bid for the 'Wellcome Trust Scottish Translational Medicine and Therapeutics initiative' starting next year. We continue our collaborations with the College of Medicine and Veterinary Medicine, teaching one-third of the Masters in Translational Medicine which is expanding year on year. Collaboration with the International Risk Governance Council will expand next year with a joint programme on 'Appropriate Risk Governance of Innovative Technology'.

We produced over 100 publications during the year, including well over 40 peer reviewed articles, three books, and more than 40 book chapters and other articles. We presented over 50 invited conference papers and organised twenty-two workshops and conference sessions.

One highlight has been our increasing presence at the ‘big conferences’ in our subject areas: Innogen staff presented six papers at the Annual Schumpeter Conference in Rio, eight at the Biennial 4S/EASST conference in Rotterdam, and nine at the EGN Conference.

Managing the investment

Whilst five (all co-funded) projects were completed this year, a major part of our activity was taken up with beginning most of our second phase programme. Innogen attracted direct co-funding of £308,000, including from the EU, Scottish Stem Cell Network/Scottish Blood Transfusion Service, the Research Innovation Network, and an ESRC-SSRC Visitor Scholarship. Further co-funding included an Innogen element within several large programmes funded by the EU and the Wellcome Trust with value almost £500,000.

Working with the ESRC Genomics Network

Network activities have grown and consolidated with the success of the Second Annual Conference and earlier activities (e.g. the six-monthly EGN Newsletter and the *Genomics Society and Policy* journal) continuing. The Network Workstream on ‘Genomics and Identity’ had three successful events, and a book project on ‘Transforming Nature’ has joint editors/contributors from all EGN centres. Calvert continues to work 10% time with Egenis.

Engaging with non-academic audiences

Our work with non-academic audiences increased rapidly this year, with about 20 formal activities, for schools, young scientists, book and science festivals, and a range of well-attended public lectures, including a University of Edinburgh Enlightenment Lecture on *Optimal Diet for 21st century Living* by the world’s top-cited medical scientist Walt Willett from Harvard. Innogen again coordinated the Network’s Festival of Social Science activity and many of our activities have been run with EGN partners. Crossland wrote an article about our activities in the latest edition of *Society Now*. Harmon organised a popular film series: *The social disruption of new technology: treatment of technologies in speculative fiction* and Speirs’ doctoral research is the subject of a student film project.

Contributing to policy and advice

There was an increase in requests for Innogen to give policy advice and a much larger group of Innogen researchers were involved in this work. New appointments include the Nuffield Council on Bioethics (Laurie), the Austrian Academy of Science Institute of Technology Assessment Advisory Council (Tait), and the Secretariat established to link African diaspora and government to develop African Intellectual Property policy (Muraguri). Tait represented the ESRC at an oral session for the House of Lords Inquiry on Genomic Medicine where discussion was based on the RCUK submission to which all EGN members contributed. Innogen also produced a significant submission on gm crops for the Royal Society ‘Consultation on Biological Approaches to Enhance Food Crop Production’. Cunningham-Burley continued her work with the Human Genetics Commission on forensic uses of DNA.

Building Capacity and training the next generation

Innogen is well integrated into teaching programmes. A new Masters in International Development begins in Edinburgh this autumn, with strong Innogen input and a new course on Health Innovation will begin at the OU. We continue teaching on all other programmes, and responded to requests for specialist teaching from Manchester University, the University of Technology, Malaysia and African Centre for Technology Studies. The ESRC-funded Interdisciplinary Masterclasses (Lyall) continue to be oversubscribed, and associated guides are in great demand with RELU circulating a recent one to all its PhD supervisors. This year five students obtained their PhDs (Demirel, Hanlin, Huzair, Langlois, Mugwagwa). and all found employment.

4a Investment Specific Indicators

Innogen has, at present, 36 KPIs, clustered into eight major categories – a full list of KPIs is available at **Annex 1**.

Of the 36 KPIs, all were attained or exceeded this year, including those for academic outputs, external co-funding, staff time dedicated to Innogen, and policy, advisory and non-academic collaboration.

We began eleven new projects spanning our two themes, to add to five on-going projects. We completed six projects on schedule – all co-funded.

Our academic output was better than expected with more than forty refereed articles and altogether well over 100 publications and over fifty invited presentations. Conference attendance (at 37) was significantly below last year (70) because so many more conference attendances were to deliver papers and organise workshops – a total of 97 conference presentations and 22 workshops.

Co-funding held up well in a more competitive period. Seven new co-funded projects were successful, with most funding from the EU and the Wellcome Trust. Profs Laurie and Cunningham-Burley are responsible for social science elements of the large £3.6m Scottish Health Informatics Platform Wellcome award. We have a series of large projects submitted or in development.

The KPIs also show that we paid particular attention to policy and advisory work and to non-academic audiences this year. We have coordinated a wide range of such work for the ESRC Genomics Network during the year.

We were pleased that five more PhD students were successful to add to the seven previous PhDs, all of whom continue in relevant employment. We would be very pleased to increase this capacity building work but this requires more centre-based studentships.

4b ESRC General Indicators for Reporting to Government

<i>Name of investment:</i>	
<i>Indicator</i>	<i>Number</i>
Indicator A: Number of activities and events involving the general public	11
Indicator B: Number of projects attracting co-funding	7
Indicator C: Number of public policy/business orientated seminars and workshops	5
Indicator D: <i>(i) How many non-academic users have worked within the investment on a formal basis to complete a specific programme of work?</i> <i>(ii) How many researchers have the investment placed in user organisations on a formal basis to complete a specific programme of work?</i> <i>NB – placements funded through ESRC placement schemes should not be included.</i>	(i) Number of non-academic users hosted: 1
	(ii) Number of researchers placed in user organisations: 0
Indicator E: Number of non-academic users on the investment's Advisory Committee	(i) Total number of Advisory Committee members: 8 (plus 4 staff members)
	(ii) Total number of non-academic user members: <i>Including:</i> Number of private sector members: 1 Number of public sector members: 2 Number of third sector members: 2

Indicator A: Activities and events involving the general public

For each activity/event please complete the table below:

Title:	Date:	Format: [<i>type of event (e.g. lecture/broadcast ...)</i>]	Number of participants:
Linking health innovation and health systems	Mar 09	Online podcasts	Podcasts on-going. Totals to be confirmed
The Optimal Diet for 21 st Century Living	12.6.08	Public Lecture	400

Biotechnology and why it matters	25.06.08	Radio broadcast	Part of 'Otherwise' radio programme, South African Broadcasting Company. Audience figures not known.
Quick on the draw	11.10.08 – 4.01.09	Art Exhibition	Two month exhibition. Audience figures not known.
The Future of Medicine: Innovation from bench to Bedside	5.03.09, 10.03.09	Interactive workshop for school pupils	50
A Green Future in Bioenergy	3.04.08	Public Lecture & Panel Discussion	200
Body Shoppin'	19.08.08	Public Lecture & Panel Discussion	150
Animal Cloning	12.08	Lecture School pupils	150
Talking About Stem Cell Research	16.04.08	Interactive event: poster session, group discussion, lecture, panel Q&A	90
Stem Cell Research	April 08	Discussion group	6
Stem cells Commercialisation: What role for the private sector	May 08	Multi-stakeholder discussion group. Two events	36

Indicator B: Number of projects attracting co-funding

For each project please complete the table below:

Name of project:	Amount of external funding:	Name of co-funding body/bodies:
Target project on 'Targeted R&D policy'. Innogen's contribution concerns biotechnology R&D and innovation	£130,000	EU Framework Programme 7

policy, including financing.		
Baseline study to collect pharma industry data regarding their involvement in and thoughts on advance market commitments for pneumococcal vaccines	£20,000	Alliance for Vaccines and Immunization (GAVI) in collaboration with the Swiss Tropical Institute
Visiting fellowship for Professor Judith Sutz	£3,000	ESRC and US Social Science research Council
Patient perspectives of insurance templates	£5,400	Genetic Interest Group
Study of the information needs of researchers in the life sciences	£150,000	Research Information Network
Scottish Health Informatics Platform (SHIP)	£87,000 of £3.7m	Wellcome Trust
Finance, Innovation and Growth (FINNOV)	£404,000 of £1.4m	EU Framework 7

Indicator C: Public policy/business orientated seminars and workshops

For each event please complete the table below:

Title:	Date:	Target audience: [<i>private sector/public sector/practitioners/third sector</i>]	Number of participants:
The Risk Governance of Synthetic Biology, Geneva	27th June 2008	Workshop for members of the International Risk Governance Council	25
Health innovation workshops at the Africa Centre for Technology Studies, Nairobi	March 2008, Sept 2008 Oct 2008	Policy makers and practitioners. Four events.	110 total

	and Feb 2009		
Riskbridge Conference Final conference for EUFP6 co- ordination action, Scotland House, Brussels	26-27 March 2009	European policy makers and academic researchers	68
Genomics and Society: Reinventing Life? 2 nd EGN international conference London	27 - 28 Oct 08	Academics, policymakers, industry, NGO and media representatives, citizens' groups	230
Innogen workshop, part of Food security, Biodiversity Conservation and Mitigation of Climate Change through Biotechnology All Africa Congress, Nairobi	22-26 Sept 08	Academics, policy makers	32

Indicator D: Number of (i) non-academic users hosted and (ii) number of researchers placed in user organisations *NB – Placements funded through ESRC placement schemes should not be included.*

For each placement please complete the table below:

Name:	Hosted: <i>[Where from?]</i>	Placed: <i>[Where to?]</i>	Dates/duration:	Purpose: