

**ESRC CENTRE FOR RESEARCH ON INNOVATION  
AND COMPETITION**

**UNIVERSITY OF MANCHESTER**

ANNUAL REPORT TO ESRC

**2005**

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## **CENTRE FOR RESEARCH ON INNOVATION AND COMPETITION**

### **UNIVERSITY OF MANCHESTER AND UMIST**

#### **ANNUAL REPORT TO ESRC**

## **1. Executive Summary**

This Annual Report conforms to the new reporting requirements laid out by the Economic and Social Research Council (ESRC) as circulated in December 2005 document.

The report summarises the main development during the year and identifies key highlights and issues which have been requested by the Research Priorities Board. The Appendix contains the standard, pro forma performance indicators as stipulated by ESRC in its letter dated 21 December 2005.

The mission of ESRC Centre for Research on Innovation and Competition (CRIC) is to be an international, inter-disciplinary research centre in the field of innovation studies and technology management.

ESRC Centre funding ends in September 2006 and CRIC is in the process of migrating from core ESRC Centre support to a more diverse mix of research funding. Total amount of ESRC funding received in 2005 was £784,158.

CRIC in its second five year term of its programme has three main research themes: distributed innovation processes (Section 5.2); competing concepts of competition (Section 5.3); and, consumption and innovation (Section 5.4). In terms of our research highlights one research project associated with health innovation and focused on competing concepts of competition theme and the second on innovation intermediaries relating to our distributed innovation processes (Section 5.2) theme.

The three main areas for improvement that CRIC agreed to focus on for 2005 were: the quality of its publications; the need to reassess and strengthen its dissemination strategy; and, issues surrounding diversifying its income stream in light of failing to win third term funding for the Centre. We believe we have met all three conditions laid down at our last Troika review.

CRIC in 2005 also developed a detailed five year strategy from the financial year 2005-6 onwards and a version of this was presented to Professor Ian Diamond in September 2005.

## **2. Introduction and Objectives**

### **2.1 Mission**

The mission of ESRC Centre for Research on Innovation and Competition (CRIC) is to be an international, inter-disciplinary research centre in the field of innovation studies and technology management. We have become, we believe, over a very short period one of the top three research centres in the world for this type of social science research.

### **2.2 Objectives**

The basic objective of CRIC is to undertake top quality research in the field of innovation research. The programme of work under the Second Phase of CRIC's centre funding is constructed around three main themes: distributed innovation processes (Section 5.2); competing concepts of competition (Section 5.3); and, consumption and innovation (Section 5.4). We have summarised this stage of our work in terms of an analysis of 'Restless Capitalism', namely the capacity of modern economies to transform from within in truly unanticipated ways. This programme of work was evaluated by the ESRC in early 2004 and resulted in the invitation to make a bid for third term funding. The review acknowledged the contributions CRIC had made to understanding the process of innovation and innovative activity<sup>1</sup>, as well as its making a substantial impact on innovation policy making in the United Kingdom (UK)<sup>2</sup>. We are also confident that CRIC has functioned as a high level training institute (Section 7.1) making a significant contribution to UK research capacity<sup>3</sup> and its international recognition by virtue of its position in the international research network of innovation scholars<sup>4</sup>.

### **2.3 Lifecycle Stage**

This report covers the final full calendar year of CRIC as an ESRC Centre. ESRC Centre funding ends in September 2006 and CRIC is in the process of migrating from core ESRC Centre support to a more diverse mix of research funding. A brief outline of this process is provided in Section 10 of this report.

### **2.4 ESRC Funding**

Total amount of ESRC funding received in 2005 was £892,229. This includes £447,782 via direct Centre grant funding and £444,447 through additional response mode and other funding.

Further details of CRIC's funding are provided in Appendix 5 of this report.

## **2.5 Significant Staff Movements**

Sharon Hammond's departure, as CRIC Administrator in October 2004, left a lengthy interregnum for the centre, which was not filled until May 2005 when she was replaced by Siobhan Drugan. Over this time, Sharon managed to provide much of CRIC's administrative and financial support and she was also ably supported by Tricia Dennett, CRIC's Secretary and Joyce Wilson, our finance officer.

Dr. Davide Consoli, formerly a CRIC Research Associate, was awarded a two year Fellowship from Manchester Business School and formally left CRIC in 2005, although he will continue to be closely involved with CRIC's research agenda, especially on services innovation. His employment destination is listed in Appendix A3.3.

A full list of staff employed by CRIC in 2005 is provided in Appendix 2.

### **3. Main Outcomes and Progress**

#### **3.1 Overview**

The last year, 2005, continued to be 'eventful' as CRIC has sought to develop its future programme of research and secure financial stability for its growth and development. Finally, in April 2005, after some twenty months of preparation, starting after we had been exceptionally given the clearance to bid first via the Third Term review, CRIC discovered it had not been selected for further Centre funding. On April 2005 CRIC was therefore informed that it was not to gain any, exceptional further Third Term funding under the ESRC Centre's Bid programme. Although CRIC, was not awarded Third Term funding by ESRC it is worth reiterating what the extended evaluation process revealed about CRIC; namely, that CRIC continues to grow in international reputation and that it is increasingly seen as a pivotal international research partner with other major centres on a European and wider scale.

#### **3.2 Research Highlights**

We have found it difficult to only highlight two pieces of research, but have selected one research project associated with health innovation and focused on Competing Concepts of Competition (Section 5.3) theme and the second on innovation intermediaries relating to our distributed innovation processes (Section 5.2) theme. These are outlined below.

*The Innovative Health Technologies Programme:* Our work on medical innovation processes and systems, part of the Innovative Health Technologies programme. In this project we probed the systemic conditions under which innovations are created and applied. These included the norms of interaction between medical practice, the development of instruments and the accumulation of scientific knowledge and the collaboration and competition between public and private organisations, whose competences are complementary, as they search for effective new treatments. We drew on CRIC's notion of distributed innovation processes and extended the framework to explain long term dynamics of change associated with path-dependent sequences of related scientific and technological problems. We employed new methods to understand the structure and evolution of medical know-how. With respect to the empirical results of the project, our findings undermine any simple minded 'bench to bedside' model of medical innovation as well as a narrowly defined 'national system' models of innovation and this has implications for the appraisal of medical innovation and in particular for medical technology assessment. The research has led us to a radical reformulation of the notion of an innovation system and to distinguish the innovation system from the invention and diffusion systems. In each of the problem areas investigated we uncovered rich innovation ecologies; hospitals, firms, research laboratories and regulators that by themselves do not constitute an innovation system. The innovation systems we found in cardiology and ophthalmology are enormously complex and defy any simple description. Their development extends over many years and over time the relative contribution of hero surgeons and medical supply companies changes, with the latter becoming the dominant source of technical developments once the technological trajectory and perception of the design space has become stabilised. For coronary angioplasty this took two decades, for the intraocular lens, three and for glaucoma a clear resolution of

the design space has yet to be achieved. Finally in respect of policy, the emergent nature of medical innovations, their novelty and unpredictability suggested that we were dealing with a system to develop medical experiments in which it would be unlikely ex ante to be able to pick winners. In all our cases long sequences of problem solving are involved. A first paper from the project (Metcalf, Mina and James) appeared in *Research Policy* 2005 with further papers forthcoming in three other major journals. A further five papers are either under review with journals or are to be published within sets of essays.

*Innovation Intermediaries and Distributed Innovation:* The study originates from two streams of research. The first arises from CRIC's research theme on distributed innovation processes (Section 5.2) and the second is based on a more applied piece of research funded by the ESRC (Grant Number ESRC L700377003), in collaboration with Association of Independent Research and Technology Organisations (AIRTO) and CERAM. The study focused on the role of innovation intermediation and developed a typology and framework of the different roles or functions of intermediaries within the innovation process in the UK. The study has revealed that intermediaries provide a much wider, more varied and holistic role for their clients in the innovation process than has generally been acknowledged. Associated with this, there is also a much wider range of innovation intermediation functions than has been usually considered. There is some evidence, given the caveat noted above, to suggest innovation intermediation has grown over time. Certainly, although organizations providing such intermediation functions tend to remain specialised around particular activities, the range of services being offered does appear to be increasing over time. In addition, the organizations providing intermediation functions do not solely or even wholly restrict themselves to intermediary functions, but also cover more traditional contract research and technical services which involve no third-party type collaboration. The study also highlighted the systemic value that innovation intermediaries may play in policy terms in an innovation system. This is not only in terms of improving connectedness within a system, particularly through bridging ties, but also in its 'animateur' role of creating new possibilities and dynamism within a system. The growth in the number and range of these actors within the system belies the benefits they create to their clients and to the innovation system overall. A paper arising from the project is shortly to be published in *Research Policy*<sup>5</sup>. Interest in the study has been truly international. A presentation of the study and its findings was for example recently made to a high level group of policymakers in Canberra, Australia upon the invitation of the Australian Department of Industry, Tourism and Resources.

### **3.3 Dissemination Highlights**

CRIC's research continues to gain recognition in government and business circles. In 2005 CRIC was responsible for producing two leading reports for government. These were a report for the Department of Trade and Industry on Skills and Innovation and a report on counterfeit goods for the Northern Ireland Office. The details of these two projects are briefly reviewed below.

*Skills and Innovation:* In the first half of 2005 and led by Bruce Tether, CRIC Researchers (Andrea Mina, Davide Consoli and Dimitri Gagliardi) undertook for the Department of Trade and Industry (DTI) a literature review on the relationship

between skills and innovation. The final report, which runs to 123 pages, was published by the DTI in September 2005. The findings of this study were presented at the DTI's 'Working Together' workshop on Skills and Innovation, held at the DTI in London in September, 2005.

*Counterfeiting and Copyright:* During 2005 Jason Rutter completed a project for the Northern Ireland Office on the consumption of counterfeit goods with colleagues at the University of Central Lancashire. The empirical elements of the project included a postal questionnaire of 15,000 consumers (1689 valid responses) and nine focus groups conducted in England and Northern Ireland. The research was supported by a number of trade and government associations including The Organised Crime Task Force (OCTF), Business Software Alliance (BSA), Entertainment Leisure Software Publishers Association (ELSPA), Federation Against Copyright Theft (FACT), the UK Patent Office, and the Alliance Against Counterfeiting & Piracy (AACP). The highlights of the results were published by the OCTF as 'Fake Nation? A study into an everyday crime' with a foreword by Shaun Woodward MP. Copies were distributed to industry representatives by the project board and to every Member of Parliament. The research was reported by the BBC and Lord Sainsbury at his address to the IP Crime Congress.

### **3.4 Targets Achieved**

Discussion with Professor Sue Cox at the last Troika meeting held in 13 May 2005 which discussed CRIC's last Annual Report centred on three themes which CRIC should seek to strengthen over the following year. These were: the quality of its publications; the need to reassess and strengthen its dissemination strategy; and, issues surrounding diversifying its income stream in light of failing to win third term funding for the Centre. The achievement of these targets are discussed in more detail in Section 8 of this report.

### **3.5 Significant Publications**

The last year has seen a successful publication period for CRIC staff in top quality journals (using ISI Web of Science citation impacts):

- 1) three papers published in *Research Policy* (by Consoli; Metcalfe, James and Mina; and Howells); and,
- 2) papers in the *British Journal of Sociology* (Savage, Warde and Devine), *Cambridge Journal of Economics* (Metcalfe, Foster and Ramlogan), *Economy and Society* (Harvey and McMeekin), *Quarterly Review of Economics and Finance* (Metcalfe and Ramlogan) and *Sociological Review* (Southerton and Tomlinson).

#### **4. Main Issues, Problems and Actions**

Although 2005 started on a high note for CRIC, in that CRIC was notified that it had been shortlisted for Centre funding, this was reversed in April 2005 when CRIC was informed that it was not to gain any, exceptional further Third Term funding under the ESRC Centre's Bid programme. Although CRIC, was not awarded Third Term funding by ESRC it is worth reiterating what the extended evaluation process revealed about CRIC; namely, that CRIC continues to grow in international reputation and that it is increasingly seen as a pivotal international research partner with other major centres on a European and wider scale. Moving forward from this, CRIC set about the development of a new Research and Financial Strategy which seeks to outline CRIC's development options and plans over the next five years. A brief overview of this strategy is provided in Section 10, Forward Look and in Section 11, Budget Issues.

The main issue during 2005 has crucially, therefore, been CRIC's ongoing dialogue with ESRC and the University about CRIC's future in light of the Centre bid for Third Term funding. This involved dialogue with Dr. Adrian Alsop, Director of Research for ESRC and Professor Ian Diamond, Chief Executive of ESRC through the latter half of 2005 as well as with discussions with University of Manchester at primarily Faculty, but also School (School of Social Sciences and Manchester Business School) and University (Professor Alan Gilbert, President) level. In this context, there were a number of meetings with Professor Alistair Ulph, the Dean of the Faculty of Humanities, together with Professor Luke Georghiou, Research Dean for the Faculty. CRIC sought to gain, and won, a formal commitment from the Faculty to underwrite CRIC's further research programme over a five year period, together with funding for staff and resources amounting to some £1.4 million. Both the Faculty and the University have therefore continued to be highly supportive of CRIC and we have received particularly useful advice from Professor Alistair Ulph.

CRIC, perhaps in part because of the above underwriting, has not lost any key staff over the year (Section 2.5) and we have therefore been able to continue our second tranche of ESRC funded research without too much detriment to our programme of work.

Finally, CRIC has now migrated all CRIC's current and future financial statements and forecasts into the Full Economic Costing (fEC) framework adopted by ESRC and other UK Research Councils.

## **5. Brief Reports on Research**

### **5.1 Overview**

CRIC in its second five year term of its programme has three main research themes:

- distributed innovation processes (Section 5.2);
- competing concepts of competition (Section 5.3); and,
- consumption and innovation (Section 5.4).

These are outlined in the following pages (one page for each theme).

## 5.2 Distributed Innovation Processes

As our work on medical innovation discussed above demonstrates, CRIC's work on distributed innovation processes shows that innovation is a complex process that unfolds unevenly in time and space. It is often characterised by radical uncertainty and emerges from systems that can transcend geographical, technological or institutional boundaries. These innovation processes are instead very often highly distributed across countries, competences and organisations, including manufacturing and service companies. Aside from the work on medical innovation reported above, we highlight briefly two other areas of CRIC work on distributed innovation processes. The first concerns the role of innovation intermediaries. CRIC's work on the role of intermediaries in innovation systems has revealed that these provide a much wider, more varied and holistic role for their clients in the innovation process than has previously been recognised. Innovation intermediaries include research and technology organizations, including those run by industry associations as well as spin-off companies from larger manufacturing firms. These organizations also provide a much wider range of innovation intermediation functions than has generally been acknowledged, and the role of innovation intermediaries appears to have grown over time, as their range of services has expanded. Many innovation intermediaries do not confine themselves to a knowledge broking role, but also undertake contract research and technical services with no third-party collaborations.

Meanwhile, CRIC's work on genomics and bio-informatics has included analysis and policy considerations for science and technology in the USA, Europe and developing countries within the global context. This demonstrated how innovation processes transcended geographical, sectoral and technological boundaries. A case study of the growth of a bioinformatics firms in Europe and the US explored this process in one way, emphasising especially the creation of global distributed innovation processes in acquiring multiple bio-, chemo-, medico-informatics capabilities. Through these distributed processes, alternative innovation trajectories have opened up. A paper related to this work was published in *Economy and Society* in November 2005<sup>6</sup>. In relation to medical innovation, CRIC has adopted an *empirical network approach* to uncover the fine structures of health innovation systems and the mechanisms through which these, and the knowledge within them, change. We have explored the nature, rate and direction of technical change in selected clinical areas including cardiology and ophthalmology, and have illustrated the evolutionary patterns displayed by the growth of scientific and technical knowledge over long periods of time. We have then complemented the longitudinal study of technological trajectories with detailed analyses of the patterns of geographical agglomeration of research, the patterns of division of labour and the structures of collaborative efforts between public and private organisations with special emphasis on the linkages between firms, universities and research hospitals and on the conditions for cross-institutional entrepreneurship. Amongst other things, our results demonstrate the crucial role of research hospitals as gatekeepers for scientific advance and technology transfers; that these mechanisms of knowledge exchange have an overwhelming international dimension but are also sensitive to the effects of strong local externalities; that firms tend to play more active roles in research where scientific understanding is less ambiguous and that in the presence of growing market opportunities the ranking of potential academic research partners is more important than their proximity<sup>7</sup>.

### 5.3 Competition and Innovation Processes

Our work over the past year has concentrated on gathering together several strands of work on innovation and competition together with a refocusing of part of our activity on questions of innovation, competition and economic development. We have continued to develop our analysis of productivity change and economic evolution and, in particular, we have developed a population approach to the study of productivity change and demonstrated the non uniqueness of many of the productivity change decompositions employed in the literature. Further empirical work on the measurement of service sector productivity is now in train as a result of this more fundamental work. Metcalfe and Ramlogan have also developed the work on knowledge and competition (Futures, 2005) arising from the Nexus programme and on the parallels between competition and economic development (Quarterly Review of Economics and Finance, 2005). As part of this more development oriented focus we have also extended our analysis of innovation systems in developing economies, partly through links with the Globelics network. A total of five papers in edited volumes are forthcoming out of this year's work together with a paper linking evolutionary modelling to aggregate growth dynamics to be published in the *Cambridge Journal of Economics*, 2006. In December, Metcalfe signed a contract with Princeton University Press to deliver a monograph entitled '*Restless Capitalism: The Nature of Economic Evolution*'. This will be a final drawing together of the CRIC research themes of evolution, innovation and competition.

In relation to dissemination, Metcalfe co-organised the third Brisbane Club workshop in July 2005 on 'Evolutionary Macroeconomics' and delivered the 15<sup>th</sup> Colin Clark lecture at the University of Queensland on 'Innovation and the Conditions of Economic Progress'. He also gave keynote addresses to the DRUID conference in June and the Argentine Economic Association conference in November, the latter visit being financed by the Foreign Office. A paper on Innovation Systems and Development was given at the conference on 'Regulation, Competition and Income Distribution' organised by the University of Illinois and the University of Sao Paulo in Brazil. Elements of CRIC's innovation policy work were also presented by Miles and Metcalfe in separate keynote speeches to an international conference on Industrial Technology in Taipei in August and since then, Metcalfe has joined the Expert Group advising the European Commissioner for Research on matters of innovation policy. Metcalfe also presented a paper at the conference on 'Social Sciences and Humanities in Europe', held in Brussels in December. Following the Taipei meeting a group of Taiwanese policy makers visited Manchester in December to further their understanding of CRIC's policy approach. A highlight of the year was an opportunity to organise a small workshop in December honouring the contribution to innovation policy research made by John Barber, a recently retired official at the DTI.

## 5.4 Consumption and Innovation

When applying for a second tranche of funding CRIC identified the relation between consumption and innovation as a key area of study. Over the last five years a significant proportion of research effort has been devoted to it. In the process we have gone a long way to meeting our stated objectives. We have developed our distinctive theoretical approach to the topic. We have always maintained that innovation studies take too little consideration of consumption. A general position paper in 2001 (Harvey et al 2001) made this point, one which has been increasingly widely accepted by other scholars. CRIC's position has now been refined and elaborated in a discussion paper (McMeekin and Southerton, 2006) which outlines a distinctive and considered account of the relationship between research on consumption and innovation. It identifies three components of a viable research programme to understand the role of consumption in innovation. First, one can best examine consumption through the lens of theories of practice, seeing consumption as the appropriation of goods and services in the course of engaging in social practices, rather than as free choice of sovereign individual consumers. Hence, practices should form a focus of research. Second, it is necessary to understand how different modes of provision (markets, state, household and communal) and instituted forms of exchange shape the relationship between innovation and consumption. Third, the role of intermediaries, including enthusiasts, vanguard users, consumer organisations and market research companies, is critical because they are positioned between producers and consumers and themselves affect the nature, design and adoption of innovative products. The empirical research programme of the last five years has been conducted in the light these theoretical considerations. The analysis of practices has been developed in general terms (Warde, 2005) and with specific relation to time-use (Southerton, 2003; Southerton and Tomlinson, 2005). A project in the *ESRC Programme on Cultures of Consumption* applied the theoretical perspective to changes in eating, reading and travelling in five countries using time-use data (Cheng et al, 2006). Another ESRC project under the Sustainable Environment Programme examined the co-evolution of practice, techniques and products in the kitchens and bathrooms of contemporary Britain (Hand et al, 2005). The relationship between production and consumption has been empirically in an Instituted Economic Process (IEPs) framework in the project on the history of the tomato (Harvey et al, 2002). We have written extensively on the matter of economic institutions and markets, including a detailed study of the development of the British market research industry (Randles et al.), one of several studies of intermediaries and intermediation. Another is the on-going research on computer games, identifying ways in which consumers become powerful and active in the re-design of an innovative product. Consumers produce material innovations. An EU funded project '*Trust in Food*', which compared six European countries' changing responses to food, explored the role of consumer activism and consumer associations in altering commercial and regulatory policies (Wales et al, 2006). Other projects on consumption have included accounting for the changing nature of cultural taste in the UK (Gayo-Cal et al, 2006) and the purchasing of products aimed at children (Martens et al, 2005). Our writing on this stream of research has made a significant contribution to turning attention of the innovation studies community towards matters of consumption and also made contributions to the sociology of economic institutions and the sociology of consumption. Representative outputs are currently being compiled in an edited book outlining CRIC's collective contribution to this topic.

## **6. Dissemination and Engagement**

### **6.1 Dissemination Strategy**

CRIC continues to engage with the wider community of academics and users whether in industry or government. As part of our review held in 2005, CRIC has re-examined its dissemination strategy. As part of this CRIC has heavily revised and edited its website (see below) to make it even more accessible and relevant. It has also reviewed its publication series and after a review has decided to discontinue its *Working Paper Series* and *Briefing Reports*. The Working Papers, although successful, were often confused with our *Discussion Paper Series* and it was decided to focus on the latter given its very high reach and dissemination. Our *Briefing Reports* were targeted at policymakers and business users and although they too gained good download rates we found these users to prefer a shorter printed format. This we have now done producing *CRIC Briefings* which are four page 'glossy' publications based around certain research themes, such as medical innovation (*CRIC Briefing* No. 1) and service innovation (*CRIC Briefing* No. 2). These have proved highly popular and we are researching the cost of sending these to each Member of Parliament.

The CRIC website continues to be heavily utilised by outside users. In total CRIC's website recorded two million hits in 2005, with 3,063 downloads of papers. Of these 27% are by non-academic users (government 12%, private enterprise 13%, Non-Governmental Organisations 2%) and a further 15% from students. In total the Centre has recorded 16,746 downloads of its briefing-, working- and discussion- papers since it was established in 1997. All the publications in its paper series are made available electronically and this is now the primary form of distribution. In order to support this, the recent redevelopment of the site has ensured full accessibility to users with special needs in line with international standards. The website has also increasingly been used as an effective tool for conducting research as it has hosted questionnaires and a Delphi survey, as well as hosting discussion sites for specific projects. CRIC has developed its web site in order to facilitate conference, workshop and seminar bookings in addition to handling abstract submission and display of abstracts, presentations and papers. CRIC also runs the well established 'innovation-competition' email list which currently has approximately 540 subscribers.

### **6.2 Engagement Strategy**

Members of CRIC continue to have a wide range of engagements with the research, user and policy communities associated with their research work. Jeremy Howells and Bruce Tether continued in 2005 to participate in the *European Community's Forum for Business Related Services* by making presentations to high level business representatives and policymakers from across Europe and helping to encourage a deeper understanding of innovation in service activities. Bruce Tether also participated on the DTI's Community Innovation Survey (CIS) Users Group panel which brings together government officials and academics. He has made several presentations to this group, mainly in relation to innovation in services and academic-industry links. Stan Metcalfe chaired the recent academic panel contributing to the Sainsbury Review of Science and Technology Policy.

## **7. Capacity Building and Research Environment**

### **7.1 Capacity Building: PhD Programme**

Postgraduate training within CRIC for PhDs in their first year is undertaken in conjunction with the new Faculty of Humanities within the University of Manchester. These courses, which come from both School of Social Sciences and Manchester Business School currently form part of an ESRC recognised postgraduate training outlet (MAN14000) which was further revised and updated in 2005. In 2005, CRIC was also successful in the ESRC Recognition Exercise offering '+3' provision demonstrating the centres commitment to postgraduate research quality and capacity building. CRIC currently has 36 PhD students supervised by the centres Directors and Researchers. The trans-disciplinary nature of CRIC is reflected with 22 students registered with Manchester Business School and 14 with the School of Social Sciences (nine oriented more towards economics and five towards sociology, though multi- and inter-disciplinarity is a feature of most CRIC postgraduate research projects). Five students hold ESRC post-graduate training awards and further 3 were successful in applications to the 2005 Manchester Business School internal competition for bursaries. Another is jointly supervised with the Tyndall Centre for Climate Change with funding from SUPERGEN. The quality of CRIC post-graduate students is reflected in the high proportion gaining competitive awards. To date the completion rate of CRIC PhDs within four years is 100%. In 2005, CRIC invested in postgraduate research development in a number of ways. To aid recruitment a CRIC brochure on post-graduate opportunities was produced and web-links were improved to relevant University, Faculty, and School pages. For the existing pool of students, a database of students, an e-group, and regular (once per semester) meetings were introduced to assist communication within the Postgraduate Research Group, to ensure cross-school cohesion, and to ensure students felt part of the CRIC team and research programme. Lastly here, Dr Shu-Li Cheng was awarded a one-year ESRC Post-Doctoral Fellowship, which allows for further development of time-use data analysis techniques and builds on the experience she gained as Research Associate for the 'Diffusion of Cultures of Consumption' project.

### **7.2 Capacity Building and Developing the Research Environment**

CRIC has also been very successful in hosting Marie Curie Fellowships, making the Institute of Innovation Research the largest host site in Europe for this field of research. Apart from the Marie Curie Fellows, CRIC welcomed the following as visitors to the Centre in 2005: Pekka Sulkunen, University of Helsinki, Finland; Unni Kjaernes, SIFO, Norway; Lorenzo Benussi, University of Turin, Italy; Elena Santanera, Politecnico di Turin, Italy; Rekha Rao, San't Anna School of Advances Studies, Italy; Wissam Alabatran, University of Dauphine, France; Francesco Quatraro, University of Turin, Italy; Paula Zappa, Bicocca University, Italy; Zhang Yongning, University of Petroleum, China; Francesco Vona, Universita 'La Sapienza' di Rome, Italy; Toni Saarivirta, University of Tampere, Finland; Lorenzo Benussi, University of Turin, Italy; and Elena Santanera, Politecnico di Torino, Italy.

CRIC welcomed the opportunity to host a variety of ESRC conferences and seminars. These were five in total for 2005 (Appendix 6).

## 8. Key Performance Indicators

Discussion with Professor Sue Cox at the last Troika meeting held in 13 May 2005 which discussed CRIC's last Annual Report centred on three themes which CRIC should seek to strengthen over the following year. These were: the quality of its publications; the need to reassess and strengthen its dissemination strategy; and, issues surrounding diversifying its income stream in light of failing to win third term funding for the Centre. Each of these themes will be briefly outlined below and cross-referenced with other sections of the report where they are dealt with in more detail.

- 1) In relation to the first issue that CRIC has targeted, on the basis of the comments of its Second Term Review and Troika meetings, has to improve further the quality of the journals it publishes (see Section 3.5 below). In terms of measuring quality of the journals we have used the *ISI Web of Science* citation impacts. We believe that our publication quality is rising further and already we have good stream of forthcoming papers in top quality journals for 2006.
- 2) As regards our second target CRIC has undertaken an extensive review of its dissemination strategy, extensively revising its website, pruning its 'own label' publication offerings and producing a new glossy publication directed at leading public opinion formers and business leaders (Section 6).
- 3) Lastly, in terms of CRIC's research portfolio and financial strategy, CRIC carried out an extensive review of its new Strategy Document that was presented to Professor Ian Diamond, as Chief executive of ESRC, and the University of Manchester 2005. On this basis, the long term financial security of CRIC has been secured (Section 10). CRIC believes it has successfully met all three of these primary targets that were laid down in the previous review of its strategy.

Appendix 4 lists some more specific performance indicators measured across a number of research, capacity building, networking and dissemination indicators.

## **9. Scientific Representation**

CRIC continues to engage with the wider community of academics and users whether in industry or government. Many of our activities also involve international collaboration of one form or another. CRIC staff network extensively at the international level and present papers at overseas meetings on a regular basis. However, there are several other forms of collaboration that are more formal in nature and entail ongoing commitments. The following list covers some recent, illustrative examples. Alan Warde and Dale Southerton have recently hosted on 17 and 18 November 2005 a very successful international conference at Manchester associated with their project in the 'Diffusion of Culture of Consumption' as part of the ESRC Cultures of Consumption programme. On the 23-24<sup>th</sup> November CRIC hosted the annual meeting of the ETE network (Economic Transformation in Europe) on the theme 'Consumption, Markets and Enterprise: Vectors of Economic Change'. Ian Miles has recently finished leading an EU funded project on the future of R&D services (with Lawrence Green and Jeremy Howells) and has continued his hectic conference tour around the world speaking on his futures and foresight work, IT and society and service innovation. Jeremy Howells, Bruce Tether and Ian Miles have also started in 2005 an European Commission funded project on R&D Needs of Business Service R&D. Bruce Tether took part in the CBI/Qinetiq roundtable on innovation, held in London in July 2005. Other invited guests included business leaders, several vice chancellors, and Lord Sainsbury, Minister for Science and Innovation. Sally Randles is continuing to coordinate an international e-group on Industrial Ecology and with Elvira Uyerra has worked on a project developing new economic, social and technological indicators for Manchester Knowledge Capital. Lastly, we continue to be active in international research networks including projects on DIME (European Commission funded), Diffusion of Cultures of Consumption (ESRC funded) and The Uneven Growth of Medical Knowledge (with Columbia University, New York and Universita di Sienna, Italy). Stan Metcalfe gave the Colin Clark lecture at the University of Queensland in August and a keynote lecture to the Argentine Economic Association in November. Ian Miles and Stan Metcalfe also gave keynote addresses to an Innovation conference in Taiwan amongst many of the lectures given by CRIC researchers over the period.

## 10. Forward Look

Following the ESRC decision on third term funding, CRIC has undertaken a major review of its research strengths and strategy. In terms of its existing research strengths, which are internationally recognised<sup>8</sup>, and in terms of developing further capabilities CRIC will focus its future programme on four main areas. These four research areas are centred around the concept of the 'Emerging Innovative Economy' (EIE) which CRIC has and continues to develop. This concept is based on the notion that an important characteristic of modern capitalist economies is their capacity for self-transformation. Crucial among these are the conditions under which innovations can 'invade' the established economic order and the processes of innovation and diffusion of new knowledge of new products and services. Yet, we conjecture, the innovation and diffusion process, the routes by which new knowledge comes to raise standards of living and the quality of life more generally, are also being transformed. We therefore understand innovation in the context of a rapidly changing and complex division of labour. Because of this, attention should now be focused on the intertwining and blurring of four key analytic and institutional boundaries that are shaping the innovation process, namely: 1) interdependent processes of production and consumption; 2) interpenetration between the production and use of goods and services; 3) new partnerships and division of public and private modes of provision; and, 4) new international distributed innovation processes that transcend national boundaries. We postulate the increasing *intertwining* of these formerly distinct activities. In each case, the traditional dichotomy is increasingly *blurred*, as new divisions of innovative labour and organisation reshape the typical extremes of each polarity. Innovation is involved in each intertwining processes and the intertwining and blurring in turn affects the innovation process.

It should also be noted that a deeper understanding of these emergent features of the EIE is central to the formulation of public policy and company strategy in respect of the multiple kinds of innovation that both promise new possibilities and threaten established economic positions, namely in terms of providing a: richer conceptual understanding of innovation; and new policy and strategic insights into innovation processes that avoid a false policy and business dichotomy.

The four main research areas, that we seek to explore these relationships, relate to:

1. service innovation;
2. healthcare research and wider developments in the Bio Economy;
3. consumption and innovation (covering economics, sociology and management of innovation perspectives); and
4. innovation and economic development (again its widest sense from a developing country perspective and tackling poverty to innovation and wealth creation in industrialised economies through to local and regional development).

The first three fields are areas where CRIC has already an international reputation, and substantial accumulated expertise, whilst the fourth is one where CRIC wants to develop its existing research interests in this field more strongly, together with its partners in the Institute of Innovation Research. These four main fields of research will form the main core of CRIC's research activities over the next five years and beyond and are reflected in its intended ESRC and wider funding programmes.

## 11. Budget Issues

The focus of CRIC's 2005 budget has been to plan for the downturn and then the complete disappearance of ESRC's core funding in 2006. As far back as CRIC's 2002 Annual Report it was noted that there was a need for an effective exit strategy associated with CRIC coming off its ESRC's core funding regime.

The strategy that we have proposed in CRIC's five year Research and Financial Strategy document is based on the following two core principles:

- Risk sharing between the University and CRIC over a five year planning horizon.
- A diversified income portfolio from research and teaching to underpin CRIC's long term viability.

The plan outlined a five year strategy from the financial year 2005-6 onwards<sup>9</sup> and a version of this was presented to Professor Ian Diamond in September 2005. In brief, there is a steep 'tailing off' of core ESRC funding for the last financial ESRC funding round of 2005-2006, which partially covers this 2005 reporting period. This is compensated by an increase in the level of non-core funding from ESRC and through income from other research funding bodies. In addition to research funding streams, CRIC also generates a small amount of non-research, direct income, which includes certain teaching incomes and conference and workshop fees.

Looking forward to beyond 2005, CRIC expects to gradually claw back ESRC funding by the period 2007-8 to a level that it was at 2002-3 financial period. Other research income will also be expected to rebound, although we have been parsimonious in our predictions for this funding element, putting this income stream as somewhat below the three year average for the previous period 2003-4 to 2005-6.

It is also clear that the University's contributions will clearly provide an important, stable platform for this research activity, whilst other non-research direct income is also seen to rise over the five year level, albeit from a low level.

## Appendix 1      Staff Employed

<b>Name</b>	<b>Time Spent on Projects</b>	<b>Seniority</b>
Jeremy Howells	20%	Executive Director, Professor
Ian Miles	30%	Director, Professor
Stan Metcalfe	35%	Director, Professor
Alan Warde	40%	Director, Professor
Mark Harvey	100%	Senior Research Fellow
Bruce Tether	40%	Senior Research Fellow
Andrew McMeekin	100%	Senior Research Fellow
Ronnie Ramlogan	100%	Research Fellow
Dale Southerton	80%	Research Fellow
Sally Randles	100%	Research Fellow
Jason Rutter	80%	Research Fellow
Shu Li Cheng	100%	Research Associate
Andrea Mina	85%	Research Associate

## Appendix 2 Publications

We have listed publications from ESRC funded and related activity under our old reporting format, A1 to A7, to retain continuity of comparison.

### A1 Books

Foster, J & Metcalfe, J. S.

*Frontiers of Evolutionary Economics Competition, Self Organisation and Innovation Policy* Higher Education Press, Chinese Edition, 2005.

Metcalfe, J. S.

*Evolutionary Economics and Creative Destruction*, Chinese Edition. 2004

Metcalfe, J. S & Foster, J. (Eds.).

*Organisations, Technology and Complex Adaptive Systems*, Edward Elgar, Cheltenham, 2005

### A2 Book Chapters

Bryce, J & Rutter, J.

‘Gendered Gaming in Gendered Spaces’, in J. Raessens & J. Goldstein (eds) *Handbook of Computer Game Studies*, MIT Press, pp. 301-310. 2005.

Green, L & Miles, I.

‘Applying IST to European Goals - Developing and Deploying Alternative Scenarios’ in Corina Pascu and Florin Gheorghe Filip (eds) *Visions on the Future of Information Society in an Enlarged Europe Bucharest*, Academia Romana, The Publishing House of the Romanian Academy, ISBN: 973-271199-X. pp. 183-201. 2005

Green, L., Popper, R & Miles, I.

‘From Sevilla to Success: IST Success Scenario and Policy Priorities’ in C. Pascu, R. Compano, M. Weber (eds.), *Challenges and Opportunities for IST Research and Applications*, Bucharest, Academia Romana, Publishing House of Romanian Academy of Sciences, ISBN 973-27-1289-9, pp 154 – 187. 2005

Howells, J.

‘Innovation, Consumption & Knowledge: Services & Encapsulation’ in Green, K., Miozzo, M & Dewick, P. (eds.) *Technology Knowledge and the Firm implications for Strategy and Industrial Change* Edward Elgar, pp 51 – 69. 2005.

Metcalfe, J. S.

‘Systems Failure and the Case for Innovation Policy’ in Llerena, P. and Matt, M. *Innovation Policy in a Knowledge Based Economy*, Springer, Berlin. 2005

Metcalfe, J. S., Ramlogan, R & Uyarra, E.

‘Competition, Innovation and Economic Development: The Instituted Connection’ in Cook, P., Kirkpatrick, C., Minogue, M & Parker, D. (Eds.) *Leading Issues in Competition, Regulation and Development*. pp 58 – 91, 2005.

Miles, I.

'Foresight; U Cmino de Largo Alienta' pp 33-35 and 'Coentarios de Cierre' pg 41 in Luis Chang Fun (ed) *Encuentro CAF por la Competitividad Caracas: Corporación Andino de Fomento*, ISBN 980-6810-07-04, 2005

Popper, P & Miles, I.

'IST and Europe's Objectives - a Survey of Expert Opinion' in Corina Pascu and Florin Gheorghe Filip (eds) *Visions on the Future of Information Society in an Enlarged Europe Bucharest, Academia Romana, The Publishing House of the Romanian Academy*, ISBN: 973-271199-X, pp 87-103. 2005

Rutter, J & Smith, G. W. H., IP

'Ethnographic Presence in Nebulous Settings' in Christine Hine (Ed.) *Virtual Methods*, Berg, pp 81-92. 2005.

Southerton, D.

'The Temporal Organisation of Daily Life: Social Constraints, Composite Practices and Allocation', in M. Pantzar & E. Shove (eds.), *Manufacturing Leisure: Innovations in Happiness, Well-Being and Fun*, Helsinki: National Consumer Research Council, pp 78-100. 2005.

Warde, A.

'Consumption' in T Bennett, L Grossberg & M Morris (eds) *New Keywords: A Revised Vocabulary Of Culture And Society*, Blackwell, pp 57 – 59. 2005.

Warde, A., Southerton, D., Olsen, W. & Cheng, S.

'The Changing Organization of Everyday Life in UK: Evidence from Time Use Surveys 1975-2000', in M. Pantzar & E. Shove (eds.) *Manufacturing Leisure: Innovations in Happiness, Well-Being and Fun*, Helsinki: National Consumer Research Council, pp 11- 40. 2005.

### **A3 Refereed Journal Papers (Including major review papers)**

Consoli, D.

'Technological Cooperation and Product Substitution in UK Retail Banking: The Case of Consumer Services' *Information Economics and Policy* 17 (2), 199-216. 2005

Consoli, D.

'The Dynamics of Technological Change in UK Retail Banking Services: An Evolutionary Perspective' *Research Policy* 34, 461-480. 2005

Hand, M., Shove, E & Southerton, D.

'Explaining Showering: A Discussion of the Material, Conventional, and Temporal Dimensions of Practice', *Sociological Research Online*. 2005.

Harvey, M & McMeekin, A.

'Brazilian Genomics and Bioinformatics: Instituting new Innovation Pathways in a Global Context.' *Economy and Society*, 30, 634-658. 2005

Howells, J.

“Innovation and regional economic development: a matter of perspective?” *Research Policy* 34, 1220-1234. 2005.

Metcalf, J. S. & Ramlogan, R.

‘Limits to the Economy of Knowledge and Knowledge of the Economy’, *Futures*, 37, 655-674. 2005

Metcalf, J. S & Ramlogan, R.

‘Competition and the Regulation of Economic Development’, *Quarterly Review of Economics and Finance*, 45, 215-235. 2005

Metcalf, J. S., Mina, A & James, A.

‘Emergent Innovation Systems and the Development of the Intraocular Lens’, *Research Policy*. 34, 1283 – 1304. 2005

Miles, I.

‘Be Here Now’ *INFO* 7 49-71, 2005

Miles, I.

‘UK Foresight: Three Cycles on a Highway’  
*International Journal of Foresight and Innovation Policy* 1, 1 – 34, 2005.

Mina, A., Metcalf, J. S & James, A.

‘Emergent Innovation Systems and the Delivery of Clinical Services: The Case of Intra-Ocular Lenses’, *Research Policy* 34, 1283-1304. 2005

Savage, M., Warde, A & Devine, F.

‘Capitals, Assets and Resources: Some Analytical Points’, *British Journal of Sociology*, 56, 31-47. 2005

Southerton, D & Tomlinson, M.

‘Pressed for Time’ – The Differential Impacts of a ‘Time Squeeze’, *Sociological Review* 53, 215-39. 2005.

Warde, A.

‘Consumption and the Theory of Practice’, *Journal of Consumer Culture*, 5, 131-54. 2005.

Warde, A., Tampubolon, G & Savage, M.

‘Recreation, Informal Social Networks and Social Capital’, *Journal of Leisure Research*, 37, 402-25. 2005.

#### **A4 Non-Refereed Journal Papers**

None

## **A5 Other Publications**

Bennett, T., Savage, M., Silva, E., Warde, A., Gayo-Cal, M & Wright, D.  
'Cultural Capital and the Cultural Field in Contemporary Britain', *CRESC Working Paper on Socio-Cultural Change*, No. 3, University of Manchester and the Open University, , pp 1- 28, 2005.

Harvey, M.  
Review Article. Hughes, G. and Stewart, J. 'Reforming Pensions in Europe. Evolution of Pension Financing and Sources of Retirement Income'. Edward Elgar. Cheltenham. *Relations Industrielles / Industrial Relations*. Vol 6, 3. pp 584 – 586. 2005

Harvey, M.  
Review Article. Shove, E. 'Comfort, Cleanliness and Convenience. The Social Organisation of Normality'. Berg. Oxford., *Journal of Consumer Culture*, 4, 3, pp 419 - 421. 2004.

Savage, M., Gayo-Cal, M., Warde, A & Tampubolon, G.  
'Cultural Capital in the UK: A Preliminary Report Using Correspondence Analysis', *CRESC Working Papers on Socio-Cultural Change*, No. 4, University of Manchester and the Open University, pp 1 – 38. 2005.

## **A6 Working, Discussion And Briefing Papers**

### *Discussion Paper Series*

Consoli, D., McMeekin, A., Ramlogan, R., Mina, A., Tampubolon, G & Metcalfe, J. S.  
'Progress in Medicine: The Structure and Evolution of Know-How for the Treatment of Glaucoma' *CRIC Discussion Paper*. 72, 2005

Harvey, M.  
'Pensions, Retirement and the Historical Formation of Rights over Resources', *CRIC Discussion Paper*, 69. 2005.

Harvey, M & Metcalfe, J. S.  
'The Ordering Of Change: Polanyi, Schumpeter and the Nature Of The Market Mechanism' *CRIC Discussion Paper* 70, 2005

Metcalfe, J. S.  
'Innovation, Competition and Enterprise: Foundations for Economic Evolution in Learning Economies' *CRIC Discussion Paper* 71. 2005.

Metcalfe, J. S., James, A & Mina, A.  
'Emergent Innovation Systems and the Delivery of Clinical Services: The Case of Intra-Ocular Lenses', *CRIC Discussion Paper* 68. December 2004

*Working Paper Series*

Bateira, J.

'A Naturalist of Knowledge', *CRIC Working Paper* 14, June 2005.

*CRIC Briefing Documents*

Compiled from Discussion Paper's 67, 68 & 72.

'Medical Innovation' paper Number 1, pp 1- 4. 2005

**A7 Official and Other Reports**

Bryce, J & Rutter, J.

'*Consumer Engagement with Counterfeit Goods*', Report for Organised Crime Task Force, Northern Ireland Office. 2005.

Miles, I. Howells, J. and Green, L.

*The Future of R&D in Services* funded by Directorate-General for Research, Commission of the European Communities, Brussels. 2005.

Mina, A., Tether, B., Consoli, D & Gagliardi, G.

'*Skills and Innovation*', Report for the Department of Trade and Industry (UK). 2005

Southerton, D.

'*Sustainable Domestic Technologies: Changing Practice, Technology and Convention*', end of project report to the ESRC. 2005.

Warde, A., Harvey, M., Gayo-Cal, M., Martens, L & Wales, C.

'*Aspects of a Comparative Analysis of Trust in Food in Europe*', Preliminary Report Work Package 6, 'Consumer Trust in Food: A European Study of the Social and Institutional Conditions for the Production of Trust', EC Framework V project, [www.trustinfood.com](http://www.trustinfood.com). 2005

### Appendix 3      Training and Career Development

CRIC, as part of the University of Manchester, is now required to undertake both

<b>A3.1 Off the Job Training for Contract Research Staff in Research Skills</b>	
	3
	training days
<b>A3.2 Off the Job Training for Contract Research Staff in Transferable Skills</b>	
	6
	training days
<b>A3.3 Next Known Employment Destination of Leavers</b>	
	1
	left for further research
<b>A3.4 Number of Research Students</b>	
	36
	PhD students

## Appendix 4      Key Performance Indicators

	<b>Selected Performance Indicators</b>	<b>Output</b>
1.	Research leverage: Ratio of ESRC Centre research funding to total research funding, 2005	1 : 2.52
2.	Research leverage: Ratio of total ESRC research funding to total research funding, 2005	1 : 1.26
3.	Publication output: Peer reviewed journal papers	15
4.	Publication output: Book chapters	12
5.	Research capacity: Current PhD students, 2005	36
6.	Research capacity: PhD completion rate	100%
7.	International networking: Percentage of keynote speaker and invited paper presentations overseas (See A6.3)	55.3%
8.	International networking: Numbers of overseas research visitors	14
9.	Dissemination: web downloads of CRIC papers	3,063

## Appendix 5      Budget Information

<b>A5.1 Total ESRC Centre Budget for the Calendar Year 2005</b>	
	£447781.94
<b>A5.2 Budget by Head</b>	
This is broken down into:	
staff	290448.53
overheads	133606.32
travel and subsistence	10252.71
equipment	1216.75
consumables	12257.63
<b>A5.3 Number and Value of Research Contracts from other Research Councils and other non Social Science Funders</b>	
The 6 non ESRC funds were from the	
DTI	41000.00
European Commission (INTERREG)	26571.00
European Commission (RESORE)	39930.00
Jean Monnet seminars	1500.00
DEFRA	113916.00
Manchester Knowledge Capital Indicators	14950.00
<b>Total</b>	<b>237867.00</b>
<b>A5.4 Number and Value of other Research Contracts from ESRC and other Social Science Funders</b>	
4 ESRC projects	
Digiplay	15421.00
Diffusion of cultures and consumption	128444.00
Distributed innovation processes	192511.36
AIM Fellowship	108070.64
<b>Total</b>	<b>444447.00</b>

## Appendix 6 External Engagement and Exploitation

<b>A6.1 Level of Usage of Research Resources Generated</b>	
	N/A
<b>A6.2 Level of Co-Funding by Business and Government</b>	
	21%
<b>A6.3 Number of Interactions/Events: Public Participation and Engagement</b>	
(A9 (old format): number of keynote and invited paper presentations)	47
<b>A6.4 Number of Researchers Trained in Media and Public Engagement Skills</b>	
	1
<b>A6.5 Number of Collaborative ESRC Research Projects</b>	
	1
<b>A6.6 Amount of External Funding for Joint Research</b>	
	£66,501
<b>A6.7 Numbers of Users Placed at Research Centre</b>	
	0
<b>A6.8 Number of Researchers Placed in User Organisations</b>	
	1

## **Appendix 7      Confidential Feedback on Policy/Process Issues**

CRIC has welcomed the opportunity to be involved in ESRC's ongoing discussion on the future challenges of innovation research in the UK which began on 25 November 2005 led by Professor Sue Cox.

## Notes

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<sup>1</sup> As one referee noted in CRIC's latest review "CRIC.....[is] one of [the] institutes in Europe, where serious and creative research on innovation and competition is being undertaken."

<sup>2</sup> As another referee noted "[We] find the work of CRIC highly relevant to the design, implementation and delivery of policies towards Science, Technology and Innovation.....The more theoretical work on the Centre plays a valuable role in underpinning policy analysis and provides the underlying knowledge on which a wide variety of specific policy advice and consultancy can be securely based."

<sup>3</sup> CRIC staff contributed to University of Manchester and UMIST being rated 1<sup>st</sup> in terms of the total number of authors in base journals associated with innovation and technology management; Linton, J. D. (2004) "Ranking Business Schools on the Management of Technology" *Journal of Product Innovation Management* 21, 416-430, p. 420.

<sup>4</sup> CRIC was rated fourth internationally in terms of most networked research centres involved in innovation and technological change – a major achievement for a research unit that had only been in existence for just over five years; see Verspagen, B. and Werker, C. (2003) "The invisible college of the economics of innovation and technological change" *Eindhoven Centre for Innovation Studies Working Paper* No. 03.21, Technische Universiteit Eindhoven.

<sup>5</sup> Howells, J. (2006, forthcoming) "Intermediation and the role of intermediaries in innovation" *Research Policy* 35.

<sup>6</sup> See Harvey, M. and McMeekin A. (2005) Brazilian genomics and bioinformatics: instituting new innovation pathways in a global context, *Economy and Society*, 34.4, pp. 634-658.

<sup>7</sup> See in particular: Ramlogan, R., Mina, A., Tampubolon, G. and J. S. Metcalfe (2006) 'Networks of Knowledge: The Distributed Nature of Medical Innovation', *Scientometrics*, forthcoming. Mina, A. and R. Ramlogan (2006) 'Health Innovation Processes at the Public-Private Interface', in Windrum, P. and P. Koch (eds.), *Innovation in Public Services: Management, Creativity, and Entrepreneurship*, Edward Elgar, Cheltenham, UK, *forthcoming*.

<sup>8</sup> Based on a variety of indicators including referees' comments, citation analysis on Web of Science and CRIC paper downloads.

<sup>9</sup> Using the University of Manchester's financial calendar here.