

# ***Annual Report*** **1997**

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## **1. Director's Introduction and Executive Summary of Progress**

It is my pleasure to present the first report of the ESRC Centre for Research on Innovation and Competition covering the initial nine months of the Centre's operation from the 1<sup>st</sup> January 1997. In this introduction I will cover the main developments during the reporting period together with our progress in meeting the Centre's objectives.

The ESRC Centre for Research on Innovation and Competition has been established in Manchester as a means of creating an outstanding centre of excellence at the interface of management and social science. The Centre is jointly supported by the University of Manchester and the University of Manchester Institute of Science and Technology.

The Centre draws upon the expertise of the Graduate School in Economic, Social and Legal Studies at the University of Manchester, and the developing Federal School of Management which brings together researchers from UMIST, Manchester Business School and the centre for Policy Research into Science and Technology (PREST). The research experience of PREST and CROMTEC (its parallel

organisation in UMIST) provides one platform upon which the new centre will build an extensive programme of research.

The Centre has made substantial progress towards its initial objectives. It has concentrated on carrying through the investments in infrastructure and academic development necessary to ensure the long term viability of its programme of fundamental work. At the same time, it has begun the process of engagement with industry, government and other user agencies.

The Centre has appointed seven research fellows; Mark Harvey, Andy McMeekin, Steve Quilley, Bruce Tether and Mark Tomlinson joined the Centre full-time from January 1997. Jeremy Howells also joined us in January; he is a joint appointment with PREST in the University of Manchester. Birgitte Andersen joined in March 1997 and Richard Hull, who was initially a half-time appointment with CROMTEC at UMIST, joined us full-time in September 1997. The fellows are drawn from a wide range of backgrounds, economics, geography, management and sociology. We were very fortunate to be able to appoint such high quality research staff from a variety of backgrounds.

Sharon Hammond, the Centre Administrator joined the Centre in January 1997 and Deborah Woodman from March 1997. The secretarial staff is completed by Sharon Boardman who is on secondment from the School of

Economic Studies in the University of Manchester.

I am very pleased to report that the Centre will occupy specifically refurbished accommodation in the University of Manchester from November 1997. As well as providing high quality dedicated offices for the research staff and Centre administration there is ample space provided for conference facilities for PhD students and for long-term and short-term visitors.

Much time has been devoted to various important tasks in relation to the future dissemination of CRIC's work. We have decided the publication policy of the Centre which is built around the Working Paper, Discussion Paper and Briefing Paper series. Further details are given in section six below. A web site has been established, the development of which is being co-ordinated effectively by Dr Birgitte Andersen. We shall use this site to encourage dialogue between CRIC staff and the wider community of scholars and users. We hope very much that the latter will use it to express any interests they may have in contributing to or becoming actively engaged in any aspect of the Centre's activities. Finally, but by no means least, the logo and publicity material of the Centre has been developed entirely in-

house and I am particularly grateful to Deborah Woodman for the role that she played as "designer in residence".

The Centre has made a substantial investment in computing facilities and I thank the ESRC for the additional financial support they have provided to enable us to complete our IT investment. I am also grateful to Dr John Smith and colleagues in the Computing Unit of the Faculty of Economic and Social Studies for their assistance in setting up our computer networks.

The Centre has established its internal management structure with an Executive Committee and a Staff Forum which meets monthly. The University of Manchester and UMIST have established a Liaison Committee to oversee the relationship between the Universities and the Centre and to provide a channel through which CRIC's progress can be reported to the host institutions. Professor Coombs has assumed responsibility for the publication activities of the Centre, and Professor Beynon will be responsible for staff development and the development of the Centre's PhD. programme, to which great importance is attached. I am grateful to all my co-Directors and the research staff for their support in establishing CRIC and to Sharon Hammond and her staff for overseeing the

many and complex tasks which arise in the creation of a Centre.

To facilitate its standing in the international community the Centre has appointed an international scientific panel of distinguished scholars whose purpose is to provide a strategic steer to the development of the research programme and to ensure that the research is subject to critical assessment and review. It is intended that the international scientific panel will meet once a year on the occasion of a small conference related to one of the themes of the programme. The initial members of the panel are ; Professor Robert Boyer of EPREMAP, Paris; Professor Fumio Kodama of the University of Tokyo; Professor Bengt-Ake Lundvall of the IKE Group, Aalborg; Professor Richard Nelson of the Public Policy Research Centre, Columbia University, New York and Professor Jim Utterback of the Sloan School of Management, Cambridge Massachusetts

In addition to the international scientific panel the Centre's policy has been to associate with its projects distinguished scholars who will be invited to participate actively in its research programme. At the time of writing 11 associates have been appointed and we will continue to add to the number as our research develops. We are also fortunate to enjoy the active research support of many

colleagues in UMIST and the University of Manchester. They are all making a very important contribution to our research community and I thank them for this. We have also benefited from visits by a number of overseas scholars listed in Section 9. They have been most welcome and have contributed considerably to our work.

The Centre has in place an ambitious programme of fundamental work at the interface between social and management science. For the initial two years of the Centre's activity this work is focused around four thematic pillars and seven projects. The relation between the pillars and projects is summarised in Figure 1 on page 6. The projects are described in more detail in Section 3 below.

It is too early in the research process for the Centre's activity to have had any substantial impact. However, even at this early stage I am pleased to report that my colleagues have presented papers at over thirty conferences, that six conferences and workshops have been held within CRIC and that, at the time of writing, nine discussion, working and briefing papers have been produced and circulated widely. I am particularly pleased to announce that as this report goes to press CRIC will host a major research symposium under the direction

of Dr Mark Harvey, jointly with the ESRC Centre for Micro Social Change and Professor Miriam Glucksmann of the Department of Sociology, Essex University. The symposium, entitled "Rescheduling Time", is one in which leading scholars will explore how the use of time in home and workplace is changing. Not only is this very relevant to the innovation process, it also reflects very strongly CRIC's intention to build bridges between the innovation community and the wider community of scholars whose work can throw important light on innovation and competition. As always the unintended consequences of research can be as enlightening as the intended consequences, and this is why dialogue between disciplines can be so fruitful.

Although CRIC is committed to its principal purpose, which is to carry out fundamental work in relation to its aims and objectives (See Section 2), we are also aware of our responsibility to engage with the user community; not least to demonstrate with confidence how research funded by ESRC can illuminate and assist firms, government and other agencies in their day to day activities. Our user policy is outlined in Section 4 and we have begun the process of engagement at local and national levels with government, industry and trade unions and a range of other organisations.

The Centre benefits greatly from the guidance provided by its Advisory Committee, chaired by Sir Robin Nicholson and with distinguished representatives from industry, government and academia. I am grateful for the very substantial input they have made to establishing the Centre in the past nine months. The members of the Advisory Committee are listed in Section 11 below.

Finally, I wish to thank the University of Manchester and UMIST for the strong support they have jointly provided for the Centre from its foundation.

These are early days in the life of a Centre which I confidently expect will develop substantially over the next few years. I look forward to reporting our progress on this and other fronts in next years report.

J S Metcalfe. Director

Figure 1.

Thematic Pillars				
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
<u>Project Themes</u>				
1	x		x	x
2	x		x	
3		x	x	
4	x			
5			x	
6		x	x	x
7	x	x	x	x

*The projects are:*

1. Innovation Systems and Innovation Policy
2. Foresight
3. Technology Flows and the Service Sector
4. Trajectories of Demand as Influences on Patterns of Innovation
5. New Organisational Structures in Business Firms and their Effect on Innovation Performance
6. Measurement of Innovative Performance
7. The Systemic Context of Innovation and Competitiveness.

*The four thematic pillars are:*

A. New models of competition and their relationship to innovation and public policy

B. Innovation in services

C. New forms of organisation and their relation to innovation and competition

D. The comparative context of innovation and competition

## **2. Aims and Objectives** **of the Centre's** **Research Programme:** **An Overview**

To assist the reader we reproduce here a statement of the aims and objectives of the Centre as first formulated. At this stage in our work there has been no major change to either aims or objectives although we do expect them to evolve as our work develops.

### *The Scientific Programme*

Major advances are expected in these areas:

- ⇒ the study of innovation as a social, economic and managerial process;
- ⇒ the contribution of innovation to the national competitiveness of firms and sectors;
- ⇒ the comparative understanding of national innovation systems and their relationship to processes of globalisation.

It is also expected that in making these advances, the Research Centre will make significant contributions to the following areas:

1. the organisation of economic enterprises;

2. the institutional context of innovative activity; understood through a comparative framework analysis.
3. workplace behaviour, its relation to patterns of organisation and the process of innovation and to the following subject areas:
  - ◆ economics
  - ◆ management science
  - ◆ economic sociology
  - ◆ science and technology policy

### **3. Research Programmes and Progress**

I have referred already in Section 1 to our intention that CRIC will establish itself at the interface between research in management and the social sciences. This requires further comment.

For while the disciplines associated with the study of management and organisation have provided many important advances in our understanding of the behaviour of firms and other institutions, it is the social sciences which are uniquely positioned to comprehend the wider consequences of these individual behaviours, and to judge how they fit together to produce unintended as well as intended outcomes. Consequently, the interface between social science and management science can provide many fruitful insights into our principal research themes. We do not underestimate the magnitude of this task. Particularly in relation to the study of innovation we are faced with phenomena which must be understood qualitatively as well as quantitatively, which deal with many different patterns of change and yet which are of fundamental importance to the increase in the wealth of individuals, regions and nations. In terms of the fundamental

issues we are dealing with the creativity of individuals and organisations and the consequences of that creativity for economic and social affairs.

In the current world of academic research ESRC centres are unique institutions and we have a primary responsibility to focus our efforts upon longer term fundamental and strategic research; research which may provide the underpinning for new insights of practical benefit to a diverse range of users. In developing its own contribution CRIC will draw upon and develop different theoretical approaches, it will draw upon and develop different qualitative and quantitative research methodologies and it will develop databases appropriate to these tasks.

In the light of this the main initial objective of the Centre will be to cast new light on the problem of competitiveness and the role that innovation plays in this. In addressing this fundamental problem, the Centre is designing a programme of work which will, across its life, give serious consideration to the comparative performance of the UK economy, relating this to the process of innovation. This research will be broad-based, considering innovation in its various aspects (technical, organisational, motivational) and organisational contexts.

In developing its research strategy the Centre will build upon existing links with "users" of social science, so as to engage policy makers and senior managers with academics in an informed discussion on the nature of innovation and the prospects for UK competitiveness broadly defined. It has the ambitious aim of achieving a fundamental change in our understanding of the complex issues which underlie competitiveness and innovation.

### **Research Projects**

We turn now to an outline of progress made in our research projects in the nine months to September 1997. We report on conferences where papers were presented and on the published output in relation to each individual project. A complete listing of all the Centre's output is presented in Appendix 1: Performance Indicators.

### **Project One**

#### ***Innovation Systems and Innovation Policy***

##### **Research Team:**

Professor J S Metcalfe  
Dr Birgitte Andersen  
Dr Bruce Tether  
Dr Vivien Walsh  
Ms Kate Barker  
Mr Andrew James  
Professor Peter Dicken  
Mr Denis Loveridge

Dr Mo Yamin

##### **PhD Students:**

Fabio Montobbio  
Nicola De Liso  
Mario Calderini

The central aim of this project is to examine the role of the science and technology structure as a stimulus to innovation in the UK. The research questions are directed at the identification of and modus operandi of the formal and informal institutions which individually and collectively shape the rate and direction of innovation in specific sectoral and national contexts. In so doing we will address a central concern in the study of longrun competitiveness, namely, the connection between national institutional structures, policies, and the generation of competitive advantage in UK located firms.

The systems approach to innovation has provided an important focus for innovation research in the past decade, and it provides a number of important lessons for policy making in advanced and developing countries. None the less, the systemic nature of the concepts employed remains as yet relatively poorly developed and our first and substantial task is to generate a deeper and more comprehensive understanding of what is and what is not systemic about the innovation process. In its first stages the project is investigating contrasts between

different approaches to systems, the boundaries to innovation systems, and the kinds of evidence which can identify systemic effects upon particular innovations. In parallel with this conceptual work we have begun detailed empirical work to identify and understand the operation of the innovation system in two specific sectors, chemicals and air transport (or more precisely airports as providers of logistical and other services). Other candidates for empirical work in subsequent months will include healthcare, telecommunications and the food industry.

### ***Conference Papers***

Andersen H B, Metcalfe J S, Tether B S  
"Thinking about Innovation Systems" 'Collaboration and Competition in R & D', Robinson College, Cambridge, June 1997

Andersen H B, Cantwell J A  
"How Firms Differ in Their Technological Competencies and How it Matters", Conference of the Economic History Society, Australian National University, Canberra, July 1997

Georghiou L, Howells J, James A D, Massini S and Metcalfe J S  
"Design Systems and Inward Investment: An Introduction" Design Council Research Workshop, London, June 1997

James A D, Metcalfe J S, Georghiou L  
"Adaptation and Learning in European Technology Policy" Annual Meeting, American Association for the Advancement of Science, Seattle, February 1997

Metcalfe J S and Georghiou L  
"Evolutionary and Equilibrium Foundations of Technology Policy" OECD Workshop: Best Practice in Technology and Innovation Policy, Vienna, May 1997

Metcalfe J S, Andersen H B, Tether B S  
"Innovations Systems and Economic Adaptation" Symposium on Challenges and Trends in R & D, University of Jerusalem and Jerusalem Institute for Israel Studies, June 1997

Metcalfe J S  
"Microevolutionary Economics of Employment and Endogenous Innovation" 'Society of Italian Labour Economists' Messina May 1997

Metcalfe J S  
"Evolutionary Ideas and Concepts of Competition" 'Developments in Evolutionary Thinking in Economics' Stockholm School Of Economics May 1997

Metcalfe J S  
"Capabilities and Innovation in the Competitiveness Process" Technology Management

Symposium" Cambridge, July 1997

Tether B S and \*Storey D J  
"Smaller Firms and the Development of Europe's High Technology Sectors" ESRC Centre for Business Research. Robinson College Cambridge, June 1997.

Tether B S, \*Storey D S  
"Smaller Firms and the Development of Europe's High Technology Sectors " ESRC Centre for Business Research. Robinson College Cambridge, June 1997

Tether B S, \*Storey D S  
"Smaller Firms and the Development of Europe's High Technology Sectors" ZEW Mannheim, June 1997

Tether B S  
"Smaller Firms and the Development of Europe's High Technology Sectors"  
Manchester Business School Conference on High Technology Small Firms. May 1997

Tether B S  
"Indicators of UK Innovation and Technological Performance"  
DTI, London May 1997

Tether B S  
"Firm Dynamics in High Technology Industries" ZEW Mannheim, June 1997

Yamin M  
"An Evolutionary Analysis of Subsidiary Innovation and 'Reverse' Transfer in Multinational Companies" ASEAT Conference, School of Management Sciences Manchester, September 1997

### ***Publications***

Antonelli G, Di Liso N, Economics of Structural and Technological Change Routledge 1997

Metcalfe J S  
"Science Policy and Technology Policy in a Competitive Economy" International Journal of Social Economics 1997, Vol 24 pp723 -740

Metcalfe J S  
"Technology Systems and Technology Policy in an Evolutionary Framework" in Archibugi D, Michie J, 1997 Technology, Globalisation and Economic Performance CUP

Metcalfe J S  
"Economic Evolution and Technology Strategy" in Antonelli G, De Liso N, Economics of Structural and Technological Change Routledge 1997

Metcalfe J S  
"The Evolutionary Explanation of Total Factor Productivity Growth: Macro Measurement & Micro Process"

CRIC Discussion Paper No 4

Metcalfe J S, Georghiou L  
"Equilibrium and Evolutionary  
Foundations of Technology  
Policy" CRIC Discussion Paper  
No 3

Metcalfe J S, Calderini M  
"Compound Learning, Neural  
Nets and the Competitive  
Process" CRIC Working Paper  
No 1

Tether B S  
'Growth Diversity Amongst  
Innovative New and Small Firms:  
An Interpretation' New  
Technology Work and  
Employment, 12.2, pp 91-107  
1997

Tether B S, \*Smith I J and  
\*Thwaites A T  
"Small Firms and Innovation in  
the UK: The SPRU Innovations  
Database Revisited" Research  
Policy 26.1, 1997 pp 19-32

### ***Other***

Dr Birgitte Andersen was  
awarded her PhD in February  
1997 for a thesis at the University  
of Reading entitled  
'Technological Change and the  
Evolution of Corporate  
Innovation'

Dr Nicola di Liso was awarded  
his PhD in July 1997 at the  
University of Manchester for his  
thesis entitled "Essays on  
Technology Creation:  
Technological Systems,

Paradigms and the Early Italian  
Machine Tool Industry"

## **Project Two**

### ***Foresight***

#### **Research Team:**

Professor Luke Georghiou  
Professor Denis Loveridge  
Professor Ian Miles  
Mr Andrew McMeekin  
Dr Stephen Quilley

PhD Student:  
Mr Michael Keenan

The main focus of this project is  
a study of foresight processes in  
firms. Research is concerned  
with:

- the extent to which firms' innovative activities are influenced by visions of the future in the foresight timeframe;
- how and where in the organisation such visions are formulated;
- whether systematic processes are involved;
- what external sources of knowledge or information are involved (concerning technical, scientific, economic, environmental, social change etc.); and the relation of company foresight to national foresight (in both directions).

The aim of this work is to identify best practice and to develop new approaches. In addition the group is contributing to the continuing development of the UK's national Foresight

Programme. European linkages with leading foresight practitioners are maintained through the Targeted Socio-Economic Research Programme's Advanced Science and Technology Policy and Planning Network and through links with the Institute for Prospective Technological Studies in Seville. Initial work has focused upon identification of practice in selected companies through interviews and invited presentations (Johnson Matthey, 3M, ICI, BASF, GEC (Caswell)). This exploratory work will form the basis of a more systematic study over the next two years, extending to international comparison and methodological development.

In terms of user interaction we have made contacts with the companies mentioned above, held meetings with the Office of Science and Technology and Foresight team, Business Link and organised a conference in Manchester in September 1997.

### ***Conference Papers***

I Miles. Organised and hosted European conference on "*Industrial Application of Foresight, Technology Assessment and Evaluation*", Chancellors Conference Centre, 10th September 1997

Georghiou L  
"Technology Foresight: European Experience", invited

paper for Confederation of EU Rectors' Conferences Workshop on "*The Future of Research in Europe*", Barcelona 14-15 June 1997

Keenan M  
"The UK Foresight Programme", Conference "*Les 6<sup>emes</sup> Entretiens de la Technologie*", L'Ecole Centrale Lille, March 26, 1997

Keenan M  
Evaluation of the Implementation of Foresight", *Workshop on Foresight Impact Assessment*, Royal Academy of Engineering, June 25th 1997

Metcalfe J S, Georghiou L  
"Equilibrium and Evolutionary Foundations of Technology Policy", paper to *OECD Workshop Best Practices in Technology and Innovation Policy*, May 30-31 1997, Bundesministerium fur Wissenschaft und Verkehr, Vienna

Miles I  
'Prospectives: A critical review of approaches and methods" European Commission Institute for Prospective Technology Studies (IPTS), Seville, Spain, September 1997

### ***Publications***

Miles I  
"Foresight: Implications for Social Science"  
CRIC Working Paper no 3

## **Project 3**

### ***Technology Flows and the Service Sector***

#### **Research Team:**

Professor Ian Miles  
Dr Birgitte Andersen  
Dr Jeremy Howells  
Dr Bruce Tether  
Mr Mark Tomlinson

#### **Visiting Researchers**

Christiane Hipp- ISI Karlsruhe  
Germany  
Claudia Werker - Technical  
University, Freiberg Germany

In the first instance, much of the work under this theme has been focused on examining, documenting and applying available tools and data sources. This work overlaps especially with the innovation measurement programme, where services innovation is a top priority, and where available data (both quantitative and qualitative) are also being interrogated. The services work is examining concepts and data developed in the broader field of study of the "services" economy, including the service components of non-service sector firms.

The current activities have consisted mainly of:

- Conceptual work on the role of services in national systems of innovation. This is

supported by analyses of input-output and other data sources to examine contributions of producer services to other sectors, and differences in the location of various service branches in the structure of the economy. These lines of analysis are leading to new approaches to developing typologies of services, which can be applied in examining services' own innovations and their contributions to the broader economy. This line of work also draws upon some analyses of services in Foresight activities.

- Preliminary exploration of IPR issues affecting services, and the implications of IPR systems - patents, copyrights, design rights, etc. - for services innovation. These systems can be approached as factors affecting innovation activities, and may also yield indicators of these activities and their outputs.
- Preliminary exploration of the internalisation-externalisation of technology-related business services, with R&D services in particular under scrutiny in case study work.

#### ***Conference Papers***

Andersen H B, Cantwell J A  
"How Firms Differ in Their Technological Competencies and How it Matters",  
Conference of the Economic

History Society, Australian  
National University, Canberra,  
July 1997

Flanagan K & Miles I  
"New Media and New Markets"  
COST A4 Conference on  
Multimedia, Edinburgh, August  
1997

Metcalfe J S, Andersen H B and  
Tether B S  
"Innovation Systems and  
Economic Adaptation,  
Symposium on Challenges and  
Trends in RTD, University of  
Jerusalem and Institute of Israel  
Studies, June 1997

Andersen B, Metcalfe J S,  
Tether B S  
"Thinking about Innovations  
Systems" Euroconference:  
Collaboration & Competition in  
R&D and Innovation  
Programmes. Cambridge, June  
1997

### ***Publications***

Miles I  
"Cyberspace as Product  
Space" Futures November 1997

Tomlinson M  
"The contribution of services to  
manufacturing industry: Beyond  
the de-industrialisation debate"  
CRIC Discussion Paper No 5

Windrum P, Flanagan K and  
Tomlinson M  
"Recent Patterns of Services  
Innovation in the UK" PREST,  
August 1997 (report to SI4S  
network, a TSER project group)

## **Project 4**

### ***Trajectories of Demand as Influences on Patterns of Innovation***

#### **Research Team:**

Dr Ken Green  
Professor Peter Swann  
Dr Vivien Walsh  
Mr Mark Tomlinson  
Mr Andrew McMeekin  
Professor Ian Miles

#### **Associates:**

Dr Robin Cowan

This project is focused upon one of the major under investigated areas in the study of innovation, namely the role of demand factors in the innovation process and the relation between innovation and the emergence of new markets. Work on the project has involved theoretical advances, empirical studies of the consumption of new commodities and investigation of how firms identify emerging markets. In particular we have begun to understand how waves of demand develop for new commodities and how the development of the demand for household durables develops differently over time for different social groups. Crucial questions to be addressed include the influence of interaction between consumers on the evolution of demand, the role of consumer as innovator and the

development of demand for innovations in prestige markets.

### **Conference Papers**

Swann P  
"Innovation in Consumption and Economic Growth", Conference on Innovation, Co-operation and Growth, Robinson College, June 1997

Swann P  
"Marshall's Consumer as an Innovator" Conference in honour of Brian Loasby, University of Stirling, August 1997

Swann P  
"The Evolution of Consumption" Conference on Evolutionary Theory and Empirical Research, Stockholm School of Economics, October 1997

Swann P  
"Models of Demand with Interaction Between Consumers" London Business School October 1997, also at University of Leeds October 1997

Walsh V, \*Cohen C, \*Richards A  
"Designing Products, Constructing Users: A New Agenda for Designs and Organisations, Design Council Research Workshop, London June 1997

### **Workshops**

CRIC Workshop on Demand Innovation and Consumption September 1997

### **Publications**

\*Cohen C, Walsh V  
"The Net? The Works of Doris: A Praxiological Study of Representations" Actor -Network Theory and After Conference, Keele University, July 1997

\*Cohen C, Walsh V  
"On eliciting knowledge in design practice: artefacts, engineers, users and their interactions" Society for the Social Studies of Science, Arizona October 1997

Swann P, Cowan R, \*Cowan W  
"A Model of Demand With Interaction Between Consumers" International Journal of Industrial Organisation Vol 15 pp711-732. 1997

\*Cohen C, Walsh V, \*Richards A  
"Learning by Designer-User interaction, in L Sanz-Menendez & E Garcia (eds.) Management and Technology, EU (COST A 3 Programme) Brussels

McMeekin A and Tomlinson M  
'The Diffusion of Household Durables in the UK'  
CRIC Discussion Paper no 4

## **Project 5**

### ***Innovation and New Forms of Organisation***

#### **Research Team:**

Professor Rod Coombs  
Professor Huw Beynon  
Dr Mark Harvey  
Mr Richard Hull

#### **Visiting Researcher:**

Mr Paolo Battaglia, University of Bologna

Work on this project is being conducted in two parallel streams based on a pragmatic distinction between organisational issues 'internal' to the business firm and organisational issues concerning relationships between business firms. This separation is provisional and an objective of the project over the next year is to develop new ideas in the theory of the firm which will provide a framework for approaching organisational issues in a more integrated way.

#### ***Interactions between Innovation and Adoption of New 'Internal' Organisational Practices***

This part of the work is concerned with whether or not there are connections between innovativeness and the use of such practices as TQM, BPR, Outsourcing, etc. Is innovation diminished by the 'squeezing out' of knowledge

accumulation and 'excessive' focus on cost and speed? Or, is innovation enhanced by the densification of knowledge flows between functions and between organisations as a result of increased horizontality?

This question is being addressed through a collaborative enterprise with the Sheffield University ESRC Innovation Centre (COIN). They have just completed a survey of over 500 companies concerning their use of the new techniques (BPR etc). They are now embarking on a programme of follow-up interviews with an expert panel of 60-70 people drawn from managers, consultants and academics. Richard Hull from CRIC is participating in this interview programme, and the data will be shared. The interviews are scheduled to be completed towards the end of 1997. This will be an economical way to address this topic, and will provide a basis to consider longer-term collaboration with Sheffield.

In a separate contribution to this strand of work, Paolo Battaglia has conducted an analytical review of the literature on outsourcing.

#### ***Changes in the Inter-Organisational Relations Between Companies In Product Chains***

This work is concerned with how the locus of innovation (both in terms of initiative and resources)

is being re-distributed along supply chains. (How generalisable is the 'Marks and Spencer effect' for example?) . And, if innovative activity is being re-organised along the chain, how does that interact with changes in the other dimensions of the company-to-company relationships, such as alliances, contractual relations, electronic integration, etc?.

Specific categories of **food products** are being researched with the intention of developing a data-base of relevant innovations (including going right back down the chain to food processing, agriculture etc) and linking these to changes in the contractual and physical relations between the various types of company in the chain.

### ***Conference Papers***

Coombs R W, McMeekin A, \*Pybus R  
"Benchmarking Tools for R & D Project Management" Paper presented at the R & D Management Conference, 'Managing R & D into the 21<sup>st</sup> Century, Theory and Practice: The Tools of the Trade' Manchester July 1997

Hull R  
"Actor Network and Conduct: The Conduct and Practices of Knowledge Management", paper presented at 'Actor Network and After Conference,' Centre for Social Theory and

Technology, Keele University, July 1997

### ***Publications***

Coombs R W  
Information Technology and Organisations. Bloomfield B, Coombs R W, Knights D, and Littler D eds. Oxford University Press 1997

Coombs R W  
Technological Collaboration eds. Coombs R W, Green K, Richards, Walsh V. eds. Edward Elgar 1996

Coombs R W  
Large Enterprises: Policies to Promote Best Practice in Cross Functional Technology Management' pp 51-72  
Technology Management and Public Policy in the European Union W Cannell, B Dankbarr. eds. Oxford University Press 1996

Coombs R W  
'Joint Outcomes: The Co-production of IT and Organisational Change' pp 231-256 'Steps to the Future' C Sauer and P W Yetton, J Wiley. eds. 1997.

Coombs R W, Hull R  
'Knowledge Management Practices and Path Dependency in Innovation' paper presented at British Academy of Management, London, September 1997

## Project 6

### *Measurement of Innovation*

#### Research Team:

Professor Rod Coombs  
Professor Ian Miles  
Dr Bruce Tether  
Mr Mark Tomlinson  
Professor Luke Georghiou

#### Visiting Researcher:

Christiane Hipp, ISI - Karlsruhe,  
Germany

Work on this project is currently proceeding on three fronts:

- ◆ The development of concepts and tools for measurement of innovation in services
- ◆ Critical analysis of data from existing innovation surveys
- ◆ Consideration of the scope and character of a possible CRIC innovation survey

Two focused 'mini-projects' have used existing data-sets from innovation surveys as vehicles for exploration of these issues.

The CBI has provided CRIC with the data from its 96 and 97 Innovation Surveys. Mark Tomlinson and Rod Coombs have analysed this data and generated some new insights which go beyond the CBI's own analysis of the surveys. The key findings are:

- ◆ Overseas-owned firms operating in the UK have a more radical and long-term

innovative posture than UK-owned firms.

- ◆ Many service industry sectors are adopting more aggressive innovative postures than manufacturing sectors.
- ◆ The CBI survey could be improved in order to gain better insight into services innovation.
- ◆ Collaborative linkages are strongly associated with radical innovation.

These issues are being taken forward in discussion with the CBI.

Christiane Hipp and Bruce Tether have carried out a new analysis of the innovation survey conducted in Germany by ISI-Karlsruhe and ZEW Mannheim. This work is providing insights into the conceptual problems of designing survey instruments. Some interesting findings have emerged in the sectoral analysis of propensity to innovate. Three sectors stand out as having a high propensity to innovate. These are Software, Financial Services, and Business Services.

### *Publication*

Coombs R and Tomlinson M "New Analysis of the CBI Innovation Survey", CRIC Briefing Paper No 1. October 1997.

## Project 7

### *The Systemic Context of Innovation and Competitiveness*

#### Research Team:

Professor Huw Beynon  
Professor J Stan Metcalfe  
Dr Mark Harvey  
Dr Steve Quilley  
Dr Ken Green  
Professor Peter Dicken

This project is central to the long-term research agenda, and involves developing a comparative approach to innovation and competition. The central focus for research relates to systemic variation in ways in which economic processes are constituted in different social-institutional and national contexts. An original conception of the systemic context of innovation and competition is being constructed by undertaking a theoretical and comparative analysis of market institutions, national varieties of economic exchanges, firm organisation, contractual and legal frameworks, and labour market characteristics. Following previous research on the significance of cultural 'Embeddedness', we are also engaged in refining the conceptual tools necessary to grasp the breadth and significance of these national economic variations.

Additionally, this project has undertaken to develop the necessary data resources both for its own empirical and conceptual research, as well as for the other six CRIC projects. To this end, links have been established with the ESRC Data Archive at the University of Essex, R. Cade at Durham University, the Manchester Business School Library, John Rylands Library, MIDAS, and the Cathy Marsh Centre for Census and Survey Research at University of Manchester. These links will facilitate data access in the long term, for all those participating in CRIC research activity.

At this stage the project is developing along three related pathways:

- ◆ Developing a theoretical framework for the systemic analysis of innovation and competition.
- ◆ Undertaking an empirical analysis of transnational supply chains, interlinked innovations along the length of these chains (processual, technological, organisational), national market configurations, and interfirm relations.
- ◆ In collaboration with the Essex Data Archive and R. Cade, a comparative project is being developed with their collaboration to study the development of European 'societal memory', the

creation of a quasi-market for socio-economic information, and the institutional, organisational and technological innovations in the generation, sharing and management of electronic data across national boundaries.

### ***Publications***

Harvey M  
"Taxation Regimes, Competition and the Transformation of Employment Relations"  
CRIC Working Paper No2

### ***Conference Papers***

Harvey M, Quilley S  
"Varieties of Capitalism: Embeddedness and the "Logic" of the Market" ,Manchester University, June 1997

Harvey M "Taxation Regimes, Competition and the Transformation of Employment Relations. A Case Study of the UK Construction Industry."  
*International Symposium on The Dynamics of Wage Relations in the New Europe*, European Union, Maastricht, May 1997

Harvey M  
"Economies of Time: A Framework for analysing the restructuring of employment relations" *15<sup>th</sup> International Labour Process Conference*, Edinburgh, March 1997

Harvey M  
"Convergence, Divergence or Path Dependency? Reflections on the future of national labour markets in a globally competitive context'  
*International Labour Market Segmentation Working Party*, Porto, Portugal, June 1997

## **4. User Policy**

An important part of CRIC's overall strategy will be to develop policies to disseminate its work to a widespread user community and to interact with that community in whatever way supports the development of the research programme through dialogue and collaboration.

Because of the diversity of potential users of CRIC research there is no single route to effective dissemination and dialogue. We will follow a number of routes to achieve effective engagement with different communities of users. On the one hand we will develop broad communication strategies which do not seek to target any particular audience, while on the other hand more focused strategies will be developed to have maximal impact on specific audiences. In some cases the latter will involve interaction with an audience over an extended time period.

There are four major audiences with whom CRIC needs to interact:

- Public and private companies
- Other private sector agencies including trade unions, professional organisations and pressure groups
- Government agencies

- Media, both general and specialist.

The principal mechanisms through which we will engage with these groups are listed below:

### ***Web Site***

CRIC has established a web page which covers the principal activities and staff profile of the Centre together with information about workshops, seminars and publications. Abstracts of the working and discussion papers of the Centre are also on the site. We will develop the web site so that potential users may express any interest they may have in contributing to or in becoming actively engaged in CRIC research activities. The Web page is being developed by Dr Birgitte Andersen.

### ***Seminars***

The Centre will host seminars on specific aspects of innovation practice which will be marketed to managers and professionals in UK companies and other agencies in the public and private sector. These events will be used to disseminate the practical consequences of recent developments in understanding of the innovation process. In addition Centre staff will be available to speak at conference and seminar events organised by third parties.

### ***Dissemination Clubs***

As and when appropriate, CRIC will develop dissemination clubs, groups of users interested in a particular theme, as a vehicle to communicate CRIC research and to develop research collaboratively within the club. As one example, senior CRIC researchers are closely involved with the Technology Strategy Forum which is attended by over thirty UK companies. CRIC will use the Forum as a platform for disseminating some of its results.

### ***Workshops and Seminars***

To target particular groups of users on a non-continuous basis CRIC will provide workshops and seminars in relation to its research. In particular, companies and agencies which have participated in research will be offered presentations for their internal purposes, both as the research proceeds and when its conclusions have been reached.

### ***Collaborative Research Groups***

CRIC considers that there are strong grounds for developing ESRC and other Research Council submissions in partnership with companies and other users along the lines of the successful CASE award scheme.

### ***Briefing Papers***

CRIC will distil its research results in briefing papers as appropriate. These will be written in a non academic form, published as a series by the Centre and disseminated to different user audiences.

### ***Progress to Date***

CRIC has established working relationships with the CBI and is pursuing the role it can play in relation to the DTI agenda at national and regional level. Some of its work is relevant to the policy needs of trade unions and CRIC has established working relationships with USDAW.

## **5. Working Paper, Discussion Paper and Briefing Paper Series**

The working, discussion and briefing paper series is an important vehicle for CRIC to present its preliminary research results. Discussion Papers are used by the Centre to communicate quickly work in progress to our audiences. Typically these papers will be submitted for publication to academic journals after revision. Working Papers are more finalised pieces of work. They will often relate quite closely to published work but may contain more detail or data than would be appropriate for an academic journal. Some of these papers may be the basis for future monographs. They have an ISBN number. Briefing Papers are prepared for specific, usually non-academic audiences. They provide a concise account of the main conclusions arising from a piece of CRIC research.

The working, discussion and briefing paper series are edited by Professor Coombs. All working and discussion papers are refereed outside of CRIC.

## **Working Papers**

Professor J S Metcalfe, M Calderini  
"Compound Learning, Neural Nets and the Competitive Process"  
CRIC Working Paper no 1 1997

Dr M Harvey  
"Taxation Regimes, Competition and the Transformation of Employment Relations: A Case Study of the UK Construction Industry"  
CRIC Working Paper no 2 1997

Professor I Miles  
"Technology Foresight: Implications for Social Science"  
CRIC Working Paper no 3 1997

## **Discussion Papers**

Professor J S Metcalfe  
"The Evolutionary Explanation of Total Factor Productivity Growth: Macro Measurement and Micro Process"  
CRIC Discussion Paper no 1 1997

Professor R Coombs, R Hull  
"Knowledge Management Practices and Path-Dependency in Innovation"  
CRIC Discussion Paper no 2 1997

Professor J S Metcalfe,  
Professor L Georghiou  
"Equilibrium and Evolutionary Foundations of Technology Policy"  
CRIC Discussion Paper no 3 1997

A McMeekin, M Tomlinson

CRIC Annual Report 1997

"The Diffusion of Household  
Durables in the UK"  
CRIC Discussion Paper no 4 1997

M Tomlinson  
"The Contribution of Services to  
Manufacturing Industry: Beyond  
the Deindustrialisation Debate"  
CRIC Discussion Paper no 5 1997

## **Briefing Papers**

R Coombs and M Tomlinson  
"New Analysis of the CBI  
Innovation Survey"  
CRIC Briefing Paper No 1 1997.

## **6. Seminars and Workshops**

The seminars and workshops provide the Centre with an important vehicle for meeting its interdisciplinary objectives. To date we have held the following events.

### Seminars

***Dr Robin Cowan***  
***University of Western Ontario***  
"A model of demand with interactions among consumers"  
June 1997

***Professor Denise Lievesley***  
***University of Essex***  
"Providing Data Resources for Research and Teaching"  
October 1997

### Workshops

***Dr M Harvey, Dr S Quilley***  
"Varieties of Capitalism" CRIC  
'Cultures of Innovation' Seminar  
in conjunction with the  
Geography Department,  
University of Manchester.  
June 1997

***Professor I Miles***  
TSER project - SI4S "Services in Innovation, Innovation in Services", lead UK team, hosted project meeting in CRIC in  
March 1997

***Professor R Coombs***  
***Joint Workshop CRIC and the National Primary Care Research and Development Centre*** -  
CRIC, June 1997

***Dr Ken Green***  
***CRIC Workshop on Demand Innovation and Consumption***  
Project 2 Foresight  
September 1997

## **7. CRIC Staff**

### **Administration**

#### ***Sharon Hammond*** ***Centre Administrator***

Has a degree in Combined Studies from the University of Manchester, and also read for a degree in modern history and social sciences with the Open University. She has recently been awarded an MA(Econ) from the University of Manchester in Development Studies. Since 1993 she has held a number of administrative posts in the University of Manchester, including Personal Assistant to the Head of the School of Epidemiology and Health Sciences in the Medical School.

### **CRIC Secretaries**

#### ***Deborah Woodman***

Centre Secretary at CRIC. She has a Diploma of Higher Education and a BA(Hons) in History with Social and Economic History from Manchester Polytechnic.

#### ***Sharon Boardman***

Personal Secretary to Professor Metcalfe. She has Diploma in Secretarial Skills at Leigh and Wigan College. She is on secondment from the School of Economic Studies.

### **Directorate**

#### ***Professor Huw Beynon*** ***Director***

Is Professor of Sociology and former Research Dean of the Graduate School in Economic, Social and Legal Studies at the University of Manchester. He has degrees in Economics and Sociology and is a leading expert on the British Coal Industry. In the 1970's he was a visiting research fellow at the Coal Research Centre at the University of Illinois. He returned to Britain in 1976 and set up the Work and Employment Research Unit at the University of Durham. He took up his Chair in Manchester in 1987.

#### ***Professor Rod Coombs*** ***Director***

Is Professor of Technology Management at UMIST. After a physics degree at Kent, he worked in biophysics research at Oxford for two years. An MSc and PhD at Manchester in the economics of innovation converted him into a social scientist. Since then he has developed a broad portfolio of research, teaching and consultancy in the areas of innovation and technology management. He is particularly interested in the organisation of business to achieve innovation, and in the integration of technology into strategy.

***Professor J Stan Metcalfe CBE***  
***Director***

Stanley Jevons Professor of Political Economy and Cobden Lecturer at the University of Manchester. During his career has lectured at the Universities of Manchester and Liverpool. He has been actively involved in the development of science and technology policy in the UK, being a member first of ACARD and subsequently ACOST. He was, until October 1997, a member of the Monopolies and Mergers Commission. His research interests are currently focused upon evolutionary economics and the modelling of evolutionary processes in relation to innovation, competition and economic growth.

***Professor Ian Miles***  
***Director***

Is Research Director of PREST (Policy Research in Engineering, Science and Technology), an Institute of the University of Manchester. Before coming to Manchester in 1990, he was for 18 years a researcher at the Science Policy Research Unit at the University of Sussex; and before then he received a first class honours BSc in Psychology at Manchester. His research interests include: innovation studies; foresight; indicators; service sectors. He has over a hundred publications spanning these areas.

**Research Fellows**

***Dr Birgitte Andersen***  
***Research Fellow***

Has a degree in Economics from the University of Aalborg, Denmark, an MA in Economic Development and International Trade from the University of Reading, an MSc in Technological and Structural Change from the University of Aalborg, and a PhD in Economics from the University of Reading. Her research interests include evolutionary economics, technological paradigms and systems, industry dynamics including the variety of firms, innovation in services as well as innovation diffusion. She is also interested in innovation policy including the economics of intellectual property rights. She has published in the area of technological change, the evolution of corporate innovation, as well as patent statistics.

***Dr Mark Harvey***  
***Research Fellow***

Studied History at Oxford University and obtained a PhD in Sociology at the LSE in 1969. From where he went to study at the International Centre for Genetic Epistemology in Geneva. He had been a lecturer at Brunel University and subsequently spent many years in the construction industry where he was a senior shop steward. His research interests focus on the state and its

significance for influencing competitive environments, and a comparative approach towards varieties of capitalism.

***Dr Jeremy Howells***  
***Senior Research Fellow***

Has a PhD from the University of Cambridge on R & D in innovation and he has worked at the Universities of Oxford and Newcastle upon Tyne before returning to the Judge Institute of Management Studies at Cambridge. In 1996 he moved to PREST where he is a senior research fellow, a post which he holds on a half time basis with his CRIC post. He has written and co-authored five books on research and innovation and is currently completing a book on the dynamics of technological change within the European Community.

***Mr Richard Hull***  
***Research Fellow***

Has a degree in Liberal Studies in Science (Physics) at the University of Manchester which was followed by research on toxicology, at the Science Policy Research Unit, Sussex University 1978. After many years outside academia he gained an MSc in Computation from UMIST in 1993, and has since been a researcher in CROMTEC. Research interests include the history of computing; organisational and expert

practices; and the government and conduct of experts.

***Mr Andrew McMeekin***  
***Research Fellow***

Has a first degree in management and chemical sciences from UMIST and an MSc in Science policy from the Science Policy Research Unit at Sussex University. Since 1993 he has been a research associate at CROMTEC. His current research interests include environmental influences on innovation in UK companies and the influence of expectations about the future upon the innovation process.

***Dr Stephen Quilley***  
***Research Fellow***

Read Social and Political Science at Cambridge before completing an MSc at Birmingham University and a PhD at the University of Manchester. He has held a temporary lecturing position at the Moscow School of Economic and Social Science and has worked on a number of projects on the Manchester economy. His current research interests focus upon globalisation and the social and institutional regulation of local and national economies.

***Dr Bruce Tether***  
***Research Fellow***

Graduated in Geography from the University of Newcastle upon Tyne and has a PhD from the Science Policy Research Unit at the University of Sussex on the topic of smaller firms in the innovation process. In 1995 he joined Warwick Business School, working in the Centre for small and medium size enterprises. His research interests are both theoretical and empirical and include the links between the science-base and industry, the role of small firms in innovation and the regional aspects of innovative activity.

***Mr Mark Tomlinson***  
***Research Fellow***

Began his research career in the Faculty of Economic and Social Studies at Manchester University where he worked on econometric studies of social mobility in India and the sociology and economics of consumer demand. He subsequently spent four years at Nuffield College Oxford where he worked on new models and techniques for studying labour markets in Europe. His current interests include evolutionary economics; complexity theory; the "service sector" and its relationship with manufacturing; consumer demand and the construction of markets; and the measurement of innovation.

## **8. CRIC Project Associates**

*Dr Mo Yamin  
Manchester School of  
Management, UMIST*

CRIC Project Associates are members of the full-time teaching staff of the University of Manchester, UMIST and the Manchester Business School who are actively involved in CRIC projects, sometimes taking on the role of project leader.

*Ms Kate Barker  
PREST, University of Manchester*

*Professor Peter Dicken  
Department of Geography,  
University of Manchester*

*Professor Luke Georghiou  
PREST, University of Manchester*

*Dr Ken Green  
Manchester School of  
Management, UMIST*

*Mr Andrew James  
PREST, University of Manchester*

*Dr Keith Julian  
PREST, University of Manchester*

*Professor Denis Loveridge  
PREST, University of Manchester*

*Professor Alan Pearson  
Manchester Business School*

*Professor Peter Swann  
Manchester Business School*

*Dr Vivien Walsh  
Manchester School of  
Management, UMIST*

## **9. Research Associates and Visiting Fellows**

To further the development of the research programme CRIC will appoint Associate and Visiting Fellows who will work closely with CRIC staff in the development of the research programme.

### ***Associate Fellows***

At the time of writing, the following scholars have been appointed honorary associate fellows with the Centre:

#### ***Professor Cristiano Antonelli***

Professor of Economics,  
University of Torino Italy

#### ***Professor Gilberto Antonelli***

Professor of Economics,  
University of Bologna, Italy

#### ***Dr William Cannell***

Member of the European  
Commission DGXII (Science  
Research and Development)

#### ***Professor Robin Cowan***

Assistant Professor, Department  
of Economics, University of  
Western Ontario

#### ***Professor Xavier Vence Deza***

Director Universidad de  
Santiago de Compostela, Spain

#### ***Professor Dominique Foray***

Directeur de Recherche at the  
Centre National de la  
Recherche Scientifique, at the  
University of Paris-Dauphine,  
France

#### ***Professor John Foster***

Professor of Economics,  
University of Queensland,  
Brisbane.

#### ***Professor Peter Hall***

Professor of Economics and  
Management, University  
College, University of New South  
Wales, ADFA, Canberra

#### ***Professor Steve Klepper***

Professor of Economics and  
Social Sciences, Carnegie  
Mellon University, Pittsburgh, USA

#### ***Professor Morris Teubal***

Professor of Economics, The  
Jerusalem Institute for Israel  
Studies.

#### ***Professor Ulrich Witt***

Professor of Economics and  
Director of Max Planck Institute,  
Jena, Germany

### ***Visiting Fellows***

***Paolo Battaglia*** - University of  
Bologna

***Mario Calderini*** - Politecnico di  
Torino, Italy

***Nicola De Liso*** - IDSE, Milan

***Christane Hipp*** - ISI Karlsruhe,  
Germany

***Oscar Rodil Marzabal*** - Santiago  
de Compostela, Spain

***Francesca Sgobbi*** - University of  
Milan

*Claudia Werker* - Technical  
University of Mining and  
Technology, Freiberg, Germany

## **10. International Scientific Panel**

A panel of internationally distinguished scholars has been appointed to advise on the future development of the research programme and to advise on the relevance of the research plans and outputs. The panel will meet in Manchester once a year on the occasion of an annual conference. The initial members of the panel are ; Professor Robert Boyer of CEPREMAP, Paris; Professor Fumio Kodama of the University of Tokyo, Japan; Professor Bengt-Ake Lundvall of the IKE Group, Aalborg; Professor Richard Nelson of the Public Policy Research Centre, Columbia University, New York and Professor Jim Utterback of the Sloan School of Management, Cambridge Massachusetts.

### ***Professor Robert Boyer***

Born in 1943 in Nice France, Robert Boyer graduated from Ecole Polytechnique, Ecole National des Ponts et Chaussées and Institut d'Études Politiques and studied economics in University Paris-I. He has worked for the Centre of Studies on Incomes and Costs (CERC), and then the Ministry of Finance (Direction de la Prévision). He is now Head of the CNRS research unit on "Regulation, Human Resources and Economic Policies" and an economist at CEPREMAP. His research areas

cover economic history, macroeconomic modelling, labour market international comparisons, according to 'regulation' approaches. His principal publications include

"The Search for Labour Market Flexibility" Oxford, Clarendon Press 1988.

"The Regulation School: A Critical Introduction", Columbia University Press, New York 1990

"States Against Firms: The Limits of Globalisation" (with Daniel Drache eds) Routledge, London, New York 1996.

"Contemporary Capitalism: The Embeddedness of Institutions" (with Roger Hollingsworth eds) CUP, 1997.

### ***Professor Fumio Kodama***

Is Professor of Science Technology and Policy at the Graduate School of Engineering in the University of Tokyo. He is also Director of the Socio-Technological Research Department at Research Centre for Advanced Science and Technology (RCAST). Previously he taught at the Department of Industrial Engineering and Management in Tokyo Institute of Technology (1993) and at the Graduate School of Policy Science in Saitama University (1984-1993).

He was Visiting Professor of the Kennedy School of Government at Harvard University in 1991-

1992 and from 1992-1993 he was Visiting Professor of Mechanical Engineering at Stanford University. In addition he worked as Director in Research of the National Institute of Science and Technology Policy (1988-1991).

He is a graduate of the University of Tokyo with a B.Sc., M.Sc. in Mechanical Engineering and a PhD. in Engineering in 1974. He has been an administrator at MITI in 1964-5, a Research Fellow at the Institute of Systems Research at Heidelberg in 1967-69, and a Fulbright Visiting Professor at Hamilton College, New York in 1978-9.

Dr Kodama is a Board Director of the Engineering Academy of Japan and also serves on several advisory committees for the Japanese government such as MITI, Science and Technology Agency and the Economic Planning Agency.

His publications include "Analysing Japanese High Technology: the techno paradigm shift" Pinter Publishers London 1991. (1991 Sakuzo Yoshino Prize winner)

"Emerging Patterns of Innovation: Sources of Japan's Technological Edge" Harvard Business School Press 1995

### ***Professor Bengt-Ake Lundvall***

Is a professor in economics at the Department for Business Studies at Aalborg University. He

is also a research manager for the nation-wide Danish network, DRUID (Danish Research Unit for Industrial Dynamics) and Project Director for DISKO (a project on the Danish Innovation System in a Comparative Perspective). In 1992 -1995 he was Deputy Director at the Directorate for Science, Technology and Industry, OECD and February to July 1995 he was Visiting Professor at the University Louis Pasteur of Strasbourg. His current work is focused on systems of innovation and the learning economy.

His principal publications include:

"Product Innovation and User - Producer Interaction" Aalborg University Press, 1985.

Freeman C, Lundvall B A eds. "Small Nations Facing the Technological Revolution", Pinter Publishers, London 1988

"National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning" Pinter Publishers, London 1992.

Foray D, Lundvall B A eds "Employment and Growth in the Knowledge Based Economy" OECD, Paris 1996.

***Professor Richard Nelson***

Richard R Nelson is an economist by training. Over his career he has taught at Oberlin College, Carnegie Mellon University, Yale University, and Columbia University, where he is now George Blumenthal Professor of International and Public Affairs, Business, and Law. He also has served as research economist and analyst at the Rand Corporation, and at the Council of Economic Advisors. He was Director of the Institute for Social and Policy Studies at Yale University, and now heads Columbia's Public Policy Doctoral Consortium.

His central interests have been in the long-run economic change. Much of his research has been directed towards understanding technological change and how economic institutions and public policies influence the evolution of technological change and in turn induces economic change more broadly. His work has been both empirical and theoretical. Along with Sidney Winter, he has been a pioneer in developing a formal evolutionary theory of economic change.

Amongst his principal recent publications are:

"An Evolutionary Theory of Economic Change " (with Sid Winter) Harvard University Press. 1984.

His forthcoming book is entitled "National Systems of Innovation" Oxford University Press 1993

"The Sources of Industrial Leadership"

***Professor James M Utterback***

Is Professor of Management and Engineering at the Massachusetts Institute of Technology. From 1983 through 1988, he served as Director of Industrial Liaison at MIT. Since receiving the PhD. in 1968 from the MIT Sloan School of Management, Professor Utterback has held Faculty positions at Indiana University as well as MIT. His research has focused on the process of technological innovation in firms in the United States and in other countries. He is an editor of the journal Research Policy . Among his most recent publications are

The Dynamics of Innovation in Industry Harvard Business School Press in 1994.

He has also published contributions to *IEEE Transactions on Engineering Management, Management Science, Research Policy, Strategic Management Journal Technological Forecasting and Social Change* and the *Sloan Management Review*.

## **11. Advisory Committee**

The Advisory Committee advises the Director on all matters to do with the operation and development of the Centre and on relations between the Centre and the ESRC. As of first of May 1997, it has the following distinguished members:

### ***Sir Robin Nicholson (Chairman)***

Fellow of the Royal Society and the Royal Academy of Engineering. He is Chairman of Pilkington Optronics Ltd and he was Director of Pilkington plc from 1986 until his retirement in 1996. A former chief scientist advising the UK Government, he is also a Non-Executive Director of the British Petroleum Company plc and Rolls-Royce plc, a member of the Government's Council for Science and Technology, and a Director of the BOC Foundation for the Environment.

### ***Professor John Bessant***

Is Professor of Technology Management and Head of the Centre for Research in Innovation Management at the University of Brighton (and part-time Professor at the Science Research Policy Unit at the University of Sussex). Originally trained as a chemical engineer, he received his PhD in 1978 based on research on

innovation management within the chemical industry. Following this he spent four years as a Research Fellow in the Technology Policy Unit at Aston University before moving to Brighton Business School.

### ***Dr Alan Calder CBE***

Graduated from Aberdeen University with a BSc and a PhD in Organic Chemistry in 1968 after which he joined ICI Nobel Division. He held a variety of positions within the company becoming Research Manager, Colours and Fine Chemical in 1987. Until 1996 he was General Manager, Research and Development, for Zeneca Specialities. In 1993 he was appointed Chairman of the SERC (EPSRC) Chemistry Committee and in April 1994 he became Chairman of the UK Chemical Industry Foresight Panel. His involvement with Foresight continues as a member of the new LINK Board.

### ***Lord Garfield Davies***

Was born and bred in South Wales and is General Secretary of USDAW - The Unions of Shop, Distributive and Allied Workers. He took over leadership of USDAW in January 1986 and became a member of the TUC General Council. He is now TUC Spokesperson on International Affairs. He became a full-time USDAW official in 1969, when he was appointed as Area Organiser at Ipswich. Three

years later, he was promoted to Deputy Divisional Officer for the Eastern Division, with special responsibility for co-ordinating recruitment. In 1978, he moved to the Union's Head Office in Manchester on being appointed a National Officer. He holds a number of other positions including the vice-presidency of the Industrial Participation Association and he is a Trustee of the Museum of Labour History. He became Lord Davies of Coity in 1997.

***Professor Ray Hudson***

Is Professor of Geography At the University of Durham. An economic geographer, with particular interests in relationships between economic restructuring, labour market change and territorial development policies. He is Director of the Centre for European Studies of Territorial Development, of the ONS National On-Line Manpower Information System, and of the ESRC Resource Centre for Access to Data on Europe. He has a BA, PhD. and DSc from Bristol University and Honorary DSc from Roskilde University Denmark.

***Mr Alan Hughes***

Is Director of the ESRC Centre for Business Research at the University of Cambridge, and Fellow of St John's College. His research interests include the

financing, growth, innovative behaviour and survival of small firms; take-overs and corporate governance; manufacturing competition, and competition and industrial policy. He has acted as a consultant in these and other areas to the Office of Fair Trading, the Department of Trade and Industry, the World Bank, the United Nations and the European Commission. He is currently a Commissioner with the Commission on Public Policy and British Business.

***Dr Alistair Keddie***

Is Head of DTI's Innovation Unit which he established in 1991. Prior to his current job he was Head of DTI's Single Market Unit. Before that he was Head of the international science and technology branch in DTI's Research and Technology Policy Division, a member of the Policy's Planning Unit; and before moving to DTI Headquarters in 1984 was head of the Air Pollution Division at the then Warren Spring Laboratory.

***Professor William Walker***

Was Director of Research at SPRU, University of Sussex and is now Professor in International Relations, University of St Andrews. His main research has been on issues relating to technology, industry and international security, especially in regard to nuclear energy and weaponry. He has also written

on national systems of innovation, energy technology and defence industries.

## **12. Training**

Training in presentation skills is provided by the ESRC and all CRIC staff will take advantage of the courses available as and when appropriate. CRIC will also collaborate with other ESRC research centres to develop joint dissemination strategies.

Recent attendees to ESRC media training workshops have been:

Professor J S Metcalfe  
Professor I Miles  
Dr H B Andersen  
Dr B Tether

Attendees at the WWW Page Design Course at the University of Manchester have been:

Sharon Hammond  
Deborah Woodman

## **13. PhD Programme**

CRIC places great importance on the establishment of a vigorous PhD programme around its central research themes.

It is in the process of establishing a PhD. Programme in conjunction with the Graduate School of Legal Economic and Social Studies in the Faculty of Economic and Social Studies at the University of Manchester. Mode B recognition is currently being sought from ESRC.

As part of the refurbishment of CRICs accommodation a substantial area has been earmarked as accommodation for PhD. students.

The Director responsible for the development of the PhD Programme is Professor Huw Beynon. All enquiries should be made to the Centre Administrator Sharon Hammond.

## **14. Issues and Problems Arising During the Year**

While the Centre has devoted a substantial amount of time making the investments to underpin its future development there are two aspects of the year where we experienced unanticipated delay.

The first is in relation to periods of illness experienced by two of CRIC's staff. Sharon Hammond spent a short spell in hospital and was convalescing during April, although she was able to carry through her principal administrative duties from home. Professor Huw Beynon had a major operation in July and he will not be returning to CRIC full-time until November 1997 at the earliest. I am pleased to say that both of my colleagues have made a full recovery but it is clear that their absence has led to some small delay in our progress.

The second matter to be reported on relates to the change in our accommodation plans which arose out of University wide changes in available funding for the Federal Business School. It was our original intention that CRIC would in due course occupy a suite of offices which are currently part of Manchester Business School. In May it became clear that this plan was no longer feasible and, after

consultation with the Advisory Committee, it was decided that CRIC would remain in its present location and negotiate a substantial extension to the space it occupies. This negotiation was successfully completed in June and a programme of substantial refurbishment has been planned. CRIC will occupy its enhanced space from November 1997. The total area occupied will be 740 sq. mtrs., there are 15 offices for Directors, research staff and the Centre administration, four open plan offices to accommodate up to ten visitors at any one time, a conference room and two large open plan offices capable of accommodating sixteen PhD students in total. This is a very satisfactory development from CRIC's point of view. We remain located adjacent to the Federal Business School and to Manchester Business School Library.

## **15. Commentary on Performance Indicators**

At this early stage in the life of the Centre, and taking into account normal publication lags, we would not expect our published work to appear in the academic and other literatures until the middle of 1998 at the earliest. Nonetheless I am confident that CRIC researchers are making very good progress. In the period covered by this report they have presented papers at over thirty conferences and, in the period since April 1997, CRIC has published nine working, briefing and discussion papers. What matters at this stage is that colleagues be thinking and writing and on this front I am more than satisfied. The weekly CRIC research meetings are proving a very effective vehicle for presenting, developing and sharing ideas.

We have also begun to develop CRIC as a centre for major workshops. At the time of writing we are hosting a major workshop, in early November, on rescheduling time in early November. One important benefit of this workshop is to introduce CRIC and its agenda to a wider community of social scientists than that normally associated with the study of innovation.

I am also pleased to report that the Centre is receiving an increasing stream of enquiries

from scholars and students from outside Manchester who wish to be associated with its research programme.

A complete list of the performance indicators of the Centre is provided in Appendix 1 by way of summary CRIC has recorded the following levels of activity in terms of selected quantitative indicators.

### PERFORMANCE INDICATOR TOTALS

Group	A	B	C	D
1	5	8	1	12
2	13	1	3	11
3	9	7	0	6
4	0	0	3	0
5	9	9		
6		43		
7		2		
8		1		
9		4		
10		7		
11		11		

## **16. Forward Look**

The research programme of the Centre, until January 1999 is as set out in the original submission to ESRC and we do not anticipate any major changes in that programme. The programme is fully described in Section Three of this report. Our primary target over the next year is to substantially complete this initial programme of work. The specific targets we set ourselves are three:

- A conference on innovation systems and service innovation processes.
- Three major workshops in relation to three of our projects. At this point in time the most likely candidates are...(to be discussed with convenors
- The first conference of the international scientific panel

Beyond this timeframe we anticipate further development in the research programme with new combinations of existing project themes and the formulation of new projects. A major task during the year will be to decide how the programme is to be taken forward into years three and four. We have begun the process with our own internal forward look.

Our final target will be to continue the process of user engagement along the lines indicated in Section 4 above.

## **17. CRIC Staff Contact Details**

All general enquiries to the Centre should be made via Sharon Hammond 0161 275 7368. Fax 0161 275 7361. Sharon.Hammond@man.ac.uk

Professor Huw Beynon

0 161 275 7363

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Professor Rod Coombs

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Professor Ian Miles

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Ian.Miles@man.ac.uk

Professor Stan Metcalfe

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Dr Jeremy Howells

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Mr Richard Hull

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Mr Andrew McMeekin

0161 275 7375

Andrew.McMeekin@Umist.ac.uk

Dr Stephen Quilley

0161 275 7378

Steve.Quilley@man.ac.uk

CRIC Annual Report 1997

Dr Bruce Tether

0161 275 7376

Bruce.Tether@man.ac.uk

Mr Mark Tomlinson

0161 275 7372

Mark.Tomlinson@man.ac.uk

CRIC Secretaries

Miss Sharon Boardman

0161 275 4824/7377

Sharon.Boardman@man.ac.uk

Mrs Deborah Woodman

0161 275 7365

Deborah.Woodman@man.ac.uk

## **Appendix 1.** **Performance Indicators**

### **Group A : Publications and Dissemination**

#### ***Indicator A1: BOOKS***

Antonelli G, De Liso N Economics of Structural and Technological Change Routledge 1997

Coombs R W  
Information Technology and Organisations eds. Bloomfield, Coombs R W, Knights D and Littler D, Oxford University Press 1997

Coombs R W  
Technological Collaboration eds. Coombs R W, Green K, Richards A, Walsh V, Edward Elgar. 1996

Howells J  
Technology, Innovation and Competitiveness eds. Howells J and Michie J Edward Elgar 1997

Metcalfe J S and Vence Deza X  
Wealth from Diversity, Kluwer Academic 1996

#### ***Indicator A 2: BOOK CHAPTERS***

\*Cohen C, Walsh V, \*Richards A  
"Learning by designer-user interaction", in L Sanz-Menendez & E Garcia (eds.) Management and Technology EU (COST A 3 Programme) Brussels DATE

Coombs R W  
Large Enterprises: Policies to Promote Best Practice in Cross Functional Technology Management' Technology Management and Public Policy in the European Union eds. W Cannell, B Dankbarr - Oxford University Press. October 1996 pp 51-72

Coombs R W  
"Joint Outcomes: The Co-production of IT and Organisational Change" Steps to the Future ed by C Sauer and P W Yetton, John Wiley. April 1997. Pp 231-256

Howells J and \*Michie J  
'Technical Competitiveness in an International Arena', in Howells J and Michie J eds. Technology, Innovation and Competitiveness Edward Elgar 1997. Pp 222-228

Howells J and \*Michie J  
'The Globalisation of Technology: Precepts and Prospects' in Howells J and Michie J eds. Technology, Innovation and Competitiveness Edward Elgar 1997 pp 3-10

Howells J and \*Michie J  
'The Globalisation of Research and Technological Innovation : A New Agenda?' in Howells J and Michie J eds. Technology, Innovation and Competitiveness, Edward Elgar 1997 pp 11-36

Howells J  
'Research and Technological Development in the South East'

in Newman I, Geddes M and Atkinson A (eds) Re-making the Regional Economy: Celebrating Achievement, shaping New Policies for the South East, South East Economic Development Strategy, Harlow pp61-93

Howells J  
'European Research and Development: 1996 Review and Analysis' in Directory of European Research and Development Database Bowker-Saur, Reed Reference Publishing, East Grinstead pp 8-21.

Metcalfe J S  
"Technology Systems and Technology Policy in an Evolutionary Framework" in Archibugi D, Michie J, eds. Technology, Globalisation and Economic Performance Cambridge University Press pp 1997

Metcalfe J S  
'Economic Evolution & Technology Strategy', in Economics of Structural and Technological Change, G Antonelli and N de Liso, eds. Routledge 1997 pp51-62

Metcalfe J S 'On Diffusion and the Process of Technological Change', in Economics of Structural and Technological Change, G Antonelli and N de Liso eds., Routledge 1997 pp123-144

Miles I  
'Characteristics and Dynamics of Contemporary Technological

Revolutions' in M R Bahagavan (ed) New Generic Technologies in Developing Countries London, Macmillan DATE and Pages

Quilley S  
'Gay Space and the Entrepreneurial City' in Queers in Space: Landscapes of Marginalised Sexualities and Communities, W. Ingram et al eds, Routledge New York 1997 pages

### ***Indicator A 3: REFEREED JOURNAL PAPERS***

Hull R  
'Governing the Conduct of Computing: Computer Science, the Social Sciences and frameworks of Computing', forthcoming in Accounting, Management and Information Technologies Vol 7(4) pp1-28 November 1997

Hull R  
Review of "Information Technology and Changes in Organisational Work", edited by Orlikowski, Walsham, Jones and DeGross, 1996. Journal of Management Studies Vol 34(1), Jan 1997, pp 164-167

Metcalfe J S  
'Science Policy and Technology  
Policy in a Competitive  
Economy.' International Journal  
of Social Economics - Vol 24  
1997 pp723-740

Metcalfe J S and DeLiso N  
'Progresso Technico e Sistemi  
Technologici', Economia  
Politica, vol 14, 1997 pp 85-119

Miles I "Cyberspace as Product  
Space" Futures Vol 29 pp1997

Tether B S  
'Growth Diversity Amongst  
Innovative New and Small Firms:  
An Interpretation' New  
Technology Work and  
Employment, Vol 12.ii 1997, pp  
91-107

Tether B S, \*Smith I J and  
\*Thwaites A T  
'Small Firms and Innovation in  
the UK: The SPRU Innovations  
Database Revisited' Research  
Policy, Vol 26.i, 1997, pp 19-32

Swann P, Cowan R, \*Cowan W  
"A Model of Demand With  
Interaction Between  
Consumers" International  
Journal of Industrial Organisation  
1997 Vol 15 pp711-732

***Indicator A4: NON-  
REFEREED JOURNAL PAPERS***

Tether B S, \*Storey D J  
'New Technology Based Firms  
and Industrial Renewal:  
Evidence from the United  
Kingdom'. Wirtschaftspolitische

Blatter Vol 44.v, 1997, pp415-  
425

***Indicator A5: OTHER  
PUBLICATIONS***

Andersen H B  
Review of Duysters G. 'The  
Dynamics of Technical  
Innovation: The Evolution and  
Development of Information  
Technology', Business History,  
Vol 39 no 2, April 1997

Hull R  
'The Complexity Fad, Report on  
the conference "Complexity  
and Technology: organising for  
innovation" Futures 1997 vol 29  
no 7, pp689-691

Miles I  
Cost Evaluation PREST and the  
European Commission, DGXII  
Brussels 1997

Miles I  
\*.Reeve N, \*Mahroum S  
"Service Firms and Innovation -  
Telematics and Beyond" Report  
to UNINTECH (Maastricht)

Miles I  
"Foresight Programme:  
Implications for Social Research"  
Report to ESRC PREST & CRIC  
1997,

Miles I  
\*Glanzel W, and \*Schubert A  
"A Bibliometric Approach to  
Outputs of Information  
Technology R & D: Comparative  
analysis of publication activity  
and citation impact of the 15  
member countries of the

European Union, Japan and USA" in Basic and Long Term Research in IT in the European Union, European Commission DGIII Brussels

Miles I  
"Policy and Strategy Task Area" in Basic and Long Term Research in IT in the European Union, European Commission DGIII Brussels.

Quilley S, \*Coates D, \*Tickell A -  
"Relocation in Europe "  
European Parliament, Social Affairs and Monetary Committee. Strasbourg 1997

\*Windrum P, \*Flanagan, K and Tomlinson M  
'Recent Patterns of Services Innovation in the UK', PREST, August 1997

**Group B External Relationships**

***Indicator B1: MEMBERSHIP OF COMMITTEES***

Coombs R W. Member of Advisory Committee of ESRC Business Process Resource Centre, Warwick University.

Coombs R W. Member of Steering Committee of Technology Strategy Forum, London.

Coombs R W. Special Advisor to ESRC , Innovative Manufacturing Initiative.

Metcalfe J S. Member of Monopolies and Mergers Commission until October 1997.

Metcalfe J S. Member of the Scientific Committee and President Elect of the International Joseph A Schumpeter Society.

Metcalfe J S. Member of the Manchester Chamber of Commerce Economics Committee.

Metcalfe J S. Member of the Advisory Board of the ESRC Centre for Business Research, Cambridge.

Metcalfe J S. Member of the Technology

***Indicator B2: MEMBERSHIP OF NETWORKS***

Miles I. Member of TSER Network on Innovation in Services

***Indicator B3: OVERSEAS VISITORS***

***Paolo Battaglia*** - University of Bologna

***Mario Calderini*** - Politecnico di Torino, Italy

***Nicola De Liso*** - IDSE, Milan

***Christane Hipp*** - ISI Karlsruhe, Germany

***Oscar Rodil Marzabal*** - Santiago de Compostela, Spain

***Francesca Sgobbi*** - University of Milan

***Claudia Werker*** - Technical University of Mining and Technology, Freiberg, Germany

***Indicator B4: OVERSEAS VISITING FELLOWS***

None

***Indicator B 5: ADVICE AND CONSULTANCY***

Coombs R W. Member of Scientific Advisory Panel, (Main Board), Smith and Nephew plc, London

Coombs R W. Consultant to Technology Centre, Goodyear Tyre Company, Luxembourg.

Howells J - Consultant to the Ministry of Industry and Trade, Sweden (1997)

Howells J - Consultant to the Directorate General for the Internal market and Industrial Affairs (DGIII), Commission of the European Communities, Brussels (1997)

Howells J - Consultant to Fundacao de Amparo a Pesquisa do Estado de Sao Paulo (FAPESP), Sao Paulo (1997)

Howells J - Consultant to Directorate General for Science, Research and Development (DGXII), Commission of the European Communities, Brussels (1997)

Miles I - Headed COST evaluation for Swedish Government and European Commission 1997

Miles I - Consultant to ESRC on Social Sciences and Foresight 1997

Quilley S, \*Coates D, \*Tickell A - Consultant to the European Parliament, Social Affairs and Monetary Committee. Strasbourg 1997

### ***Indicator B 6: CONFERENCE PAPERS***

Andersen H B , Metcalfe J S, Tether B S "Thinking about Innovation Systems" 'Collaboration and Competition in R & D' Cambridge, June 1997

Andersen H B and \*Cantwell J A "How Firms Differ in Their Technological Competencies and How it Matters" Conference of the Economic History Society, Australian National University, Canberra, July 1997

\*Cohen C, Walsh V "On eliciting knowledge in design practice: artefacts, engineers, users and their interactions" Society for the Social Studies of Science, Arizona October 1997

\*Cohen C, Walsh V "The net? The works of Doris: a praxiological study of representations" Actor -Network Theory and After Conference, Keele University, July 1997

Coombs R W "Knowledge Management Practices and the Innovation Process" Institute for Research on the Dynamics of Economics Systems, CNR Milano. October 1997.

Coombs R W, McMeekin A, \*Pybus R "Benchmarking Tools for R & D Project Management" Paper presented at the R & D

Management Conference,  
Managing R & D into the 21<sup>st</sup>  
Century, Theory and Practice:  
The tools of the trade  
Manchester July 1997

Coombs R W, Hull R  
'Knowledge Management  
Practices and Path  
Dependency in Innovation'  
British Academy of  
Management, London,  
September 1997

\*Flanagan K & Miles I, "New  
Media and New Markets" COST  
A4 conference on multimedia,  
Edinburgh, August 1997

Georghiou L, "Technology  
Foresight: European Experience",  
invited paper for Confederation  
of European Union Rectors'  
Conference Workshop on "The  
Future of Research in Europe",  
Barcelona 14-15 June 1997

Georghiou L, Howells J, James A  
D, Massini S and Metcalfe J S  
Design Systems and Inward  
Investment: An Introduction  
Design Council Research  
Workshop, London, June 1997

Harvey M  
"Economies of Time: A  
Framework for analysing the  
restructuring of employment  
relations" *15<sup>th</sup> International  
Labour Process Conference*,  
Edinburgh, March 1997

Harvey M  
"Convergence, Divergence or  
Path Dependency? Reflections  
on the future of national labour

markets in a globally  
competitive context'  
*International Labour Market  
Segmentatio*, Porto, Portugal,  
June 1997

Harvey M "Taxation Regimes,  
Competition and the  
Transformation of Employment  
Relations: A Case Study of the  
UK Construction Industry",  
International Symposium on The  
Dynamics of Wage Relations in  
the New Europe, European  
Union, Maastricht, May 1997

\*Hauknes J, Pim den \*Hertog  
and Miles I "The Globalising  
Learning Economy - Implications  
for Technology Policy at the  
Regional, National and  
European level" paper  
presented to EC workshop on  
the Fifth Framework Programme  
April 25, Brussels

Howells J 'European Science  
and Technology Programmes:  
Evaluation Experience and  
Practice' presented at the  
Conference on 'Evaluation of  
Science and Technological  
Research' Sao Paulo  
Foundation, Brazil March 1997

Howells J 'International  
Innovation and Technology  
Transfer: Organisational and  
Locational Shaping' presented  
at the 'Innovation, Co-  
operation and Economic  
Progress' Conference, Robinson  
College, Cambridge, June 1997

Howells J 'Research and  
Development Externalisation,

Outsourcing and Contract Research' paper presented at the 'Collaboration and Competition in R&D and Innovation Programmes: Lessons for the Public and Business Sectors' European Community Conference, Human, Capital and Mobility Programme, Brussels. May 1997

Hull R "Actor Network and Conduct: The Conduct and Practices of Knowledge Management " paper presented to the Actor Network and After Conference, Centre for Social Theory and Technology, Keele University, July 1997

Hull R "Conduct: Computing and Knowledge" paper presented at the workshop Understanding Information Technology , Globalisation and Changes in the Nature of Work, Edmonton Canada, July 1997

Hull R "Power and Resistance within Intellectual Activity: The case of the sociology of scientific knowledge" paper presented to the Annual Conference of the British Sociology Association, York, April 1997

James A, Metcalfe J S, Georghiou L "Adaptation and Learning in European Technology Policy" Annual Meeting, American Association for the Advancement of Science, Seattle, February 1997

Keenan M, "Evaluation of the Implementation of Foresight", Workshop on Foresight Impact Assessment, Royal Academy of Engineering, June 25th 1997

Keenan M, "The UK Foresight Programme", Conference "Les 6emes Entretiens de la Technologie", L'Ecole Centrale Lille, March 26, 1997

Metcalfe J S "Employment Productivity and Innovation in the Service Sector: the Development of Telecommunications in Great Britain" Conference on Innovation and Telecommunications, University of Turin. February 1997.

Metcalfe J S "Evolutionary Ideas and Concepts of Competition" 'Developments in Evolutionary Thinking in Economics' Stockholm School Of Economics May 1997

Metcalfe J S "Microevolutionary Economics of Employment and Endogenous Innovation" 'Society of Italian Labour Economists', Messina, May 1997

Metcalfe J S "Capabilities and Innovation in the Competitive Process" Technology Management Symposium, Churchill College, Cambridge, July 1997

Metcalfe J S and Georghiou L "Equilibrium and Evolutionary Foundations of Technology

Policy", paper to OECD Workshop Best Practices in Technology and Innovation Policy, May 30-31 1997, Bundesministerium für Wissenschaft und Verkehr, Vienna.

Metcalfe J S, Andersen H B and Tether B "Innovation Systems and Economic Adaptation Symposium on Challenges and Trends in RTD University of Jerusalem and Jerusalem Institute of Israel Studies, June 1997

Miles I. "Foresight: Implications for Social Science" Human Factors Subgroup of Health and Life Sciences Panel. ESRC January 1997.

Miles I 'Prospectives: A critical review of approaches and methods" European Commission Institute for Prospective Technology Studies (IPTS), Seville, Spain, September 1997.

Quilley S " Beyond the Crisis of the Welfare State" Seminar on Competitiveness, University of Manchester, July 1997

Swann P. "Models of Demand with Interaction Between Consumers" London Business School October 1997, also at University of Leeds October 1997

Swann P "Innovation in Consumption and Economic Growth", Conference on innovation, co-operation and

growth, Robinson College, Cambridge. June 1997

Swann P "Marshall's Consumer as an Innovator" Conference in honour of Brian Loasby, University of Stirling, August 1997

Swann P "The Evolution of Consumption" Conference on Evolutionary Theory and Empirical Research, Stockholm School of Economics, October 1997

Tether B S , \*Storey D S "Smaller Firms and the Development of Europe's High Technology Sectors" "Innovation and Performance of Small and Medium Sized Enterprises" ESRC Centre for Business Research, Robinson College Cambridge, June 1997

Tether B S, \*Storey D S "Smaller Firms and the Development of Europe's High Technology Sectors" Manchester Business School Conference on High Technology Small Firms. May 1997

Tether B S, \*Storey D S "Smaller Firms and the Development of Europe's High Technology Sectors" Workshop of Firm Dynamics in High Technology Industries, ZEW, Mannheim. June 1997

Tomlinson M "The contribution of services to manufacturing industry: Beyond the industrialisation debate" S14S

Project conference, Stockholm  
October 1997.

Walsh V, \*Cohen C, \*Richards A  
"Designing products,  
constructing users: a new  
agenda for designs and  
organisations, Design Council  
Research Workshop, London  
June 1997

Yamin M "An Evolutionary  
Analysis of Subsidiary Innovation  
and 'Reverse' Transfer in  
Multinational Companies" ASEAT  
Conference, School of  
Management Sciences,  
Manchester, September 1997

**Indicator B7:  
MEDIA - Newspapers**

Financial Times March 1997  
'Federal Fillip' Article by Della  
Bradshaw

Gazzetta del Sud 23 May 1997  
Report of Messina Conference  
Paper by *Metcalf, J S*

**Indicator B8:  
MEDIA - Radio / TV**

*Quilley S* - 4 June 1997  
Interview with Toni McDonald of  
Australian ABC for a programme  
about urban change in  
Manchester.

**Indicator B 9: SEMINARS,  
CONFERENCES AND  
WORKSHOPS**

The following meetings were  
organised by CRIC staff.

Harvey M, Quilley S  
Competitvity Seminar  
Manchester University, June.  
1997.

Hull R Governmentality and  
Technical Change Workshop,  
UMIST June 1997

Miles I. European conference  
on "Industrial Application of  
Foresight, Technology  
Assessment and Evaluation",  
Chancellors Conference  
Centre, University of  
Manchester, 10th September  
1997

Green I. CRIC Workshop on  
Demand Innovation and  
Consumption September 1997

**Indicator B10:  
INTERNATIONAL  
COLLABORATIVE RESEARCH  
PROJECTS**

Harvey M - Established a  
research partnership with Dr  
Robert Maier, University of  
Utrecht, The Netherlands for a  
CRIC horizontal research  
programme

Howells J - 'Local Industrial  
Development: Technological  
Transformation and Competitive  
Performance', Collaborative

Project for the Ministry of Industry and Trade, Sweden

Howells J - 'Review of Basic and Long term Research in Information Technologies in the European Union', Collaborative Project for the Directorate General for the Internal Market and industrial Affairs (DGIII), Commission of the European Communities, Brussels

Howells J - 'Strategic Evaluation of Fundacao de Amparo a Pesquisa do Estado de Sao Paulo (FAPESP), Collaborative Project for FAPESP, Sao Paulo, Brazil

Howells J - 'Study of International Scientific and Technological Co-operation', Collaborative Project for Directorate General for Science, Research and Development DGXII), Commission of the European Communities, Brussels

Miles I - Led International COST Evaluation Team

Miles I - Led UK team for study of Basic and Long term IT Research in UK for DGIII, project headed by Smiths System Engineering.

***Indicator B 11:  
CONFERENCES ATTENDED***

The following list covers all conferences attended by CRIC staff at which they did not present a paper. These are

included as one measure of the degree of networking activity of Centre Staff.

Andersen H B  
"Differences in 'Styles' of Technological Innovation"  
Fourth international Conference on Advances in Sociological and Economic Analysis of Technology ASEAT, Manchester School of Management  
September 1997

Andersen H B "Services in Innovation - Innovation in Services (IS4S) Workshop"  
University of Manchester. March 1997.

Andersen H B "Science, Technology and Innovation Policy for the XX1st Century"  
Policy Research on Engineering, Science and Technology  
University of Manchester.  
September 1997.

Harvey M "Fifteenth International Labour Process Conference" Edinburgh 1997

Harvey M "International Labour Market Segmentation" Porto, June 1997

Hull R 'Complexity and Technology: Organising for Innovation' Santa Fe Institute Conference, London March 1997

Hull R 'Knowledge Management Practices'

CRIC Annual Report 1997

Northern Organisational Analysis  
Research Network. June 1997

McMeekin A "Managing R & D  
into the 21<sup>st</sup> Century" R & D  
Management Conference,  
Manchester July 1997

Montobbio F, and Tether B S  
"Workshop on Evolution and  
Economics" International School  
of Economic Research.  
University of Sienna. Italy July  
1997

Tether B S "Indicators of UK  
Innovation and Technological  
Performance" DTI, London May  
1997

Tether B S "Partners in Business:  
The Role of Science, Industry  
and Finance in Promoting Small  
Technology Based Firms (Royal  
Society/Bank of England),  
London, 1997

McMeekin A "Differences in  
'Styles' of Technological  
Innovation" Fourth international  
Conference on Advances in  
Sociological and Economic  
Analysis of Technology ASEAT,  
Manchester School of  
Management September 1997

**Indicator Group C: Financial Resources**

**Indicator C 1: Annual Grant From Centre's Board**

£648,345.00

**Indicator C 2: Other ESRC Funding**

£40,000.00 Additional IT Support.

£3,500.00 ESRC Grant for Symposium Support

£193,559.00 ESRC. Project title "Social Exclusion or Flexible Adaptation: Coal Districts in a Period of Economic Transformation" Grant holders: Professor Huw Beynon and Professor Ray Hudson (Durham). Funding for the year

**Indicator C 3: Funding From Host Institution**

Salary Contribution from host institutions

Professor Huw Beynon 50%

Professor R Coombs 80%

Professor J S Metcalfe 80%

Professor Ian Miles 30%

Total Contribution £ 115,714.00  
(add Rod's salary)

**Indicator C 4: Other Funding**

£176,534.00 from Leverhulme Foundation Project entitled: "The Management of Employment Change" Grant holders Professor Huw Beynon

and Professor Jill Rubery (UMIST). Funding for the year

£131,143.00 EPSRC Project entitled: "Effective Management of Technology in Mergers and Acquisitions" Grant Holders: Professor L Georghiou and Professor J S Metcalfe Funding for the year

£250.00 Economy and Society Workshop Support. Grant Holder R Hull.

**Indicator Group D**  
**Staff Resources**

***Indicator D1: RESEARCH  
STAFF***

1. Professor H Beynon 50%  
University of Manchester
2. Professor R Coombs 80%  
UMIST
3. Professor J S Metcalfe 80%  
University of Manchester
4. Professor I Miles 30%  
University of Manchester
5. Dr B Andersen 100%  
University of Manchester
6. Dr M Harvey 100%  
University of Manchester
7. Dr J Howells 50%  
University of Manchester
8. Mr R Hull 100%  
UMIST
9. Mr A McMeekin 100%  
UMIST
10. Dr S Quilley 100%  
University of Manchester
11. Dr B Tether 100%  
UMIST
12. Mr M Tomlinson 100%  
University of Manchester

*Dr Ken Green*  
*Manchester School of*  
*Management, UMIST*

*Mr Andrew James*  
*PREST, University of Manchester*

*Dr Keith Julian*  
*PREST, University of Manchester*

*Professor Denis Loveridge*  
*PREST, University of Manchester*

*Professor Alan Pearson*  
*Manchester Business School*

*Professor Peter Swann*  
*Manchester Business School*

*Dr Vivien Walsh*  
*Manchester School of*  
*Management, UMIST*

*Dr Mo Yamin*  
*Manchester School of*  
*Management, UMIST*

***Indicator D2 :***  
***ASSOCIATED ACADEMIC***  
***RESEARCH STAFF***

*Ms Kate Barker*  
*PREST, University of Manchester*

*Professor Peter Dicken*  
*Department of Geography,*  
*University of Manchester*

*Professor Luke Georghiou*  
*PREST, University of Manchester*

***Indicator D 3 Support Staff***

1. Sharon Hammond. Centre Administrator 100%
2. Deborah Woodman. Secretary. 100%
3. Sharon Boardman. 60%. Secretary
4. Wendy Walker. 20% Secretary
5. Dr John Smith. Computer support.
6. Janine Ellis. Faculty Accountant

***Indicator D 4 Research Students***

None

***Indicator D 5 Staff Development***

Recent attendees to ESRC media training workshops have been:

Professor J S Metcalfe  
Professor I Miles  
Dr H B Andersen  
Dr B Tether

University of Manchester  
WWW Page Design Course  
Manchester Computer Centre

Sharon Hammond  
Deborah Woodman

## Appendix 2

List of staff employed during the year.

See Appendix 1. Performance Indicators Section D1 and D 3.