



Interdisciplinarity in Interdisciplinary Research Programmes in the UK

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There is something about an interdisciplinary turn of mind that is quite deep in one's being.
(Ludmila Jordonova, in Strathern 2005)

1. Introduction

1.1 Background

This report is concerned with the interdisciplinarity of interdisciplinary research programmes in the UK in 2005-6. In particular it considers how interdisciplinarity, definitions of which shall be discussed below, manifests itself in funded research programmes involving the social sciences and the humanities, and therefore the two research councils in the UK responsible for the funding of such research programmes, namely the Arts and Humanities Research Council (AHRC) and the Economic and Social Research Council (ESRC).

The issue of interdisciplinarity in research has increasingly come to the forefront of both national and international research agendas as researchers and research funders alike have recognized that the challenges we face in the 21st century as well as concerns over international competitiveness and excellence in science – here used in the German sense of *Wissenschaft* - are not necessarily most effectively addressed through traditional disciplines. In its *Green Paper on Innovation* (December 1995), for example, the European Commission identified the 'severe lack of flexibility in the structures of [education and training] establishments and their approach to change' (Pt. 2: 25) which 'prevents them from adjusting and reformulating their programmes' as one of the four handicaps facing Europe in its competitiveness vis-à-vis the USA and Japan in particular. It also pointed to the great diversity of administrative systems in education as a source of rigidity and lack of mobility (Pt. 2: 27), and highlighted the need for 'promoting a general breakdown of barriers between disciplines' ('Route of Action 3', 40). In its 5th and 6th Framework Programmes, the European Union therefore explicitly encouraged both interdisciplinary research and research into interdisciplinarity (e.g. Kuhn and Remøe 2005; Bruce et al 2004), of which this project is one example.

The project is a specific targeted research project (STREP)¹ on 'Changing Knowledge and Disciplinary Boundaries Through Integrative Research Methods in the Social Sciences and Humanities', funded under the European Commission's Framework 6, Priority 7: 'Citizens and Governance in a Knowledge Based Society' (CT-CIT2004-506013, 2004-7), has eight European partner countries: Finland, France, Germany, Hungary, Norway, Spain, Sweden and the UK.² These partners, all of whom are involved in teaching and research in Women's/Gender Studies, have through that focus extensive knowledge of dealing with

¹ See www.hull.ac.uk/researchintegration for further details.

² The universities and senior academics involved are: Finland: Abo Akademi University, Prof. Harriet Silius; France: Université de Toulouse Le Mirail, Prof. Nicky Le Feuvre; Germany: Johann Wolfgang Goethe Universität, Cornelia Goethe Zentrum, Prof Ursula Apitzsch; Hungary: Central European University, Prof. Jasmina Lukic; Norway: Oslo University, Prof. Karin Widerberg; Spain: University of Oviedo, Dr Isabel Carrera Suarez; Sweden: Goeteborg University, Prof. Ulla Holm; UK: University of Hull, Prof. Gabriele Griffin.

interdisciplinarity since Women's/Gender Studies draws on a vast range of disciplines, and not only from the fields of Social Sciences and Humanities, forging synergies and generating new and transformative knowledges. The project explores the issue of interdisciplinarity. In its first year (May 2004-April 2005) it investigated the structural, fiscal, cultural and other barriers that exist in the various European countries which hamper interdisciplinary teaching and research.³ The focus of the second year of this project (May 2005-April 2006) was the question of how interdisciplinarity figures, and is operationalized, in interdisciplinary research programmes involving the Humanities and the Social Sciences. This report presents the findings of that research.

1.2 Literature Review

The context for this research is the growing literature, particularly strong during the 1980s and 1990s, of engagement with the nature of academic disciplines.⁴ This literature, promoted by changes in the public funding of higher education, increasing calls for greater access to such education by more diverse populations, and changes in the regulation of the academy, has focussed on the establishment of classificatory systems which seek to systematize and explain the 'nature' of academic disciplines. In some instances this has been done from a specifically historical perspective.⁵ Daston (1998) for instance, provides a historical analysis of the Berliner Akademie der Wissenschaften, the Paris Académie des Sciences, and the Royal Society (London) in terms of their stances towards specialization and professionalization in the sciences⁶, arguing that their differing positions on these matters which meant that 'by the end of the eighteenth century the Paris Académie des Sciences was both specialized and professionalized, the Royal Society of London was neither specialized nor professionalized, and the Berliner Akademie der Wissenschaften was professionalized but not specialized' (70), had lasting impacts on the specificities of academic disciplines. Pierre Bourdieu's (1984) classic *Homo academicus* blazed the trail for a vast literature - of which Clark (1987) and Becher (1989) are but two other well known examples - which sought to explain disciplinary distinctiveness not merely in epistemological terms but also from wider social and cultural perspectives, arguing that particular disciplines attract people from certain social backgrounds, with identifiable, discipline-specific cultural practices and preferences in their private lives, that nurture specific attitudes to political and social issues and construct disciplinary communities with shared traits that go way beyond their knowledge bases. All suggest that diverse academic disciplines thus attract and generate different kinds of 'capital' - economic, social, cultural, symbolic etc. Clark (1987) described academics from different disciplines as inhabiting different 'small worlds'. Becher (1989) used the anthropological notion of 'tribes' to describe the ways in which disciplines are organized and distinguish themselves from other disciplines. More recently, Ylijoki (2000) has used the expression 'moral order' to describe the 'virtues' and 'vices' into which students in different disciplines are initiated as part of the process of socializing them into a discipline and building discipline loyalty.

³ All reports from this phase are available on the project website www.hull.ac.uk/researchintegration.

⁴ The discussion of the nature and status of disciplines, or the organization of knowledge, goes, of course, back far beyond the 1980s and 1990s, starting with Aristotle, and encompassing figures such as Giambattista Vico, Francis Bacon, Descartes, Immanuel Kant, Wilhelm von Humboldt, Johann Fichte, Friedrich Schiller, and José Ortega y Gasset.

⁵ See for instance R. N. Soffer (1988) 'The Development of Disciplines in the Modern English University', *The Historical Journal* 31/4: 933-46.

⁶ 'Sciences' is here used in the broad sense of *Wissenschaft*, not to mean 'hard sciences' or 'natural sciences' as is often assumed in the Anglophone world.

Common to this literature is the notion of the specificity of the discipline, no matter what the discipline is. Following Kolb and Biglan, Becher (1987) produced a taxonomy of disciplinary groupings with four dimensions: hard, soft, pure and applied. Using these in two-way combinations he established the following disciplinary groupings:

Table 1. Becher's (1987) taxonomy of disciplinary classifications:

Category	Disciplinary Area
Hard pure	Natural sciences
Soft pure	Humanities and social sciences
Hard applied	Science-based professions
Soft applied	Social professions

Source: Becher (1987).

Becher's taxonomy operates at a very general level of differentiation. Social sciences and humanities, for instance, are lumped together in ways that many social scientists and humanities academics would dispute.⁷ However, Becher's taxonomy is indicative of the general tendency in disciplinary research to either operate at a macro level, or, as Best (2001) for instance does it, to address disciplinary issues from within a single discipline, in the latter case, sociology. There is thus, both at macro and at micro level, very little research to explore the disciplinary boundaries between the social sciences and the humanities since they are either lumped together or addressed in a discipline-specific manner. In fact, Becher (1994) himself notes that the tendency in comparative higher education research is to work at the macro level of systems rather than at the disciplinary level and suggests that there is a need for illuminating comparison[s] between particular institutions in different countries' and that 'a cross-national study can tell us interesting things about the differing patterns . . . of academia in different countries and provide concrete and specific data about the common and contrasting factors which shape [academia].' (154) Phase two of this project, which provides comparative reports on the disciplinary boundaries between social sciences and humanities as its first task⁸ therefore offers data focusing explicitly on a comparison between the social sciences and the humanities within a framework of cross-national comparisons in Europe.

Becher (1994) indicates that higher education research tends to ignore disciplinary differences in its discussions of education systems. He also cites Ruscio (1987) to suggest a certain universality regarding disciplinary differences; utilizing biological vocabulary Ruscio argues for a genotype (in a sense an archetype) of a given discipline for which a particular department in a particular university is but its specific expression or the phenotype (that is the particular manifestation of the general phenomenon). The implicit universality of Ruscio's model is reinforced by Huber (1990) who, although mainly concerned to show that disciplines are importantly implicated in implicit and explicit forms of social selection (that is, people from certain classes are more likely to enter certain disciplines, with people from the lower middle and working classes more likely to enter the social sciences for instance than middle-class people who are more likely to go into

⁷ J. Platt and S. Hopper (1997), for instance, provide a view of the fragmentation of sociology in the UK which suggests that that discipline itself is so divided into subcultures of research/interest/expert areas that its status as a single discipline is called into question ('Fragmentation, Social Theory, and Feminism: Sociology in the United Kingdom', *Contemporary Sociology* 26/3: 283-5).

⁸ These reports were completed in May 2005 and are available on the project website www.hull.ac.uk/researchintegration.

medicine, law or the humanities), also proclaims a universality both over time and across cultures regarding the persistence of disciplinary identities.

This universality and, indeed, (the need for) the persistence of disciplinary boundaries has come under question in the last few years, most notably since the late 1990s. Karlqvist (1999), for instance, asserts the importance of cross- and interdisciplinary collaboration with the comment: 'as science moves closer to applications, decision- and policy-making, problems occur that cannot be confined to narrow disciplines or kept within the borders of specific departments.' (379) He attempts to produce a taxonomy of interdisciplinarity consisting of five modes:

Mode 1: unification of knowledge (doing the same thing in different ways)

Mode 2: accumulation of knowledge (doing different things that can be combined)

Mode 3: additional interpretation (combining different things through a third, novel element)

Mode 4: non-compatibility of method (doing things differently)

Mode 5: cognitive non-compatibility (thinking differently)

These modes, as he briefly indicates, impact differentially on different types of scientific collaboration. Karlqvist's assumption that science is moving closer to applications and policy-making, is of course hotly contested within universities in many of which the tradition of autonomous, disinterested, non-applied learning and research still holds sway.⁹ However, as Awbrey and Awbrey (2001) suggest, there is a need for 'an understanding of the interrelationships of knowledge, allowing problems to be reframed and solutions to coalesce in new ways' (269). In a related manner Clark (1998) analyses the 'entrepreneurial responses' universities of the 1990s and twenty-first century have to make to a changing external environment, and Slaughter and Leslie (1997) expound the need to integrate academic, commercial and bureaucratic cultures. Awbrey and Awbrey argue for integration and against the trivializing of integrative approaches, the dissociation of disciplines, and the disconnection of different types of meanings according to disciplinary preferences. Adopting a pragmatic framework they suggest that university education should refocus on inquiry instead of knowledge, and understand that knowledge is the product of inquiry. This entails re-visioning how students should be socialized into academe. Ylijoki (2000) indicates the ways in which students are inaugurated into disciplines. In order to arrive at means of overcoming disciplinary boundaries it is therefore necessary, according to Awbrey and Awbrey (2001) to shift attention from knowledge to the process of inquiry. In this project we do this in phases three and four through an investigation into the interdisciplinary effectivity of interdisciplinary research projects which indeed is the focus of this report; and through the production of an integrated research module which will be useable in social sciences and humanities degrees, and which is the task of the final project year.

The debates about disciplinarity, its merits and demerits, have been partly railroaded in favour of a push towards interdisciplinarity by the European Commission's research frameworks (especially since Framework 5) which significantly require collaboration, frequently across disciplines. Spurred on by these developments, and by the establishment

⁹ See, for instance, V. Lal (2002) 'Unhitching the Disciplines: History and the Social Sciences in the New Millennium', *Futures* 34: 1-14. Lal, in favour of what he describes as an 'ecological plurality of knowledge' (10), memorably quotes S. Viswanathan's line that 'good fences make good neighbors' and argues that 'interdisciplinarity has no critique to offer of the structures of modern disciplinary-based knowledge' (10) which he views as in need of defence from those who would want to erode disciplinary boundaries.

since 2004 of the so-called ERA-Nets,¹⁰ networks of national research programmes funded by the EC to collaborate, exchange information about practices and preferences and move towards joint calls for research which means aligning priorities and working on joint thematic calls, national research councils in some European countries, of which the UK is one, have themselves begun to issue thematically or priority-based calls for research proposals, and to develop interdisciplinary research programmes. These are the focus of this report.

1.3 Methodology

This report centres on an investigation of two interdisciplinary, cross-research council research programmes described in greater detail under sections 2 and 3 of this report. One of these is *Cultures of Consumption*, the first such programme run jointly by the Arts and Humanities Research Council (AHRC) and the Economic and Social Research Council (ESRC) between 2001-7. The second programme, *Designing for the 21st Century*, is run jointly by the AHRC and the Engineering and Physical Sciences Research Council (EPSRC). It was established in 2004 and has a five-year lifespan. Both programmes claim interdisciplinarity (see section 3) as a key criterion.

Since the concern of our research for this report was to establish how interdisciplinarity figures and is operationalized in interdisciplinary research programmes featuring the Humanities and the Social Sciences, we undertook a range of research involving the following methods: document analysis, textual analysis, case studies, and, importantly, qualitative semi-structured interviews with key informants, in this instance the two programme directors leading the research programmes under consideration and eleven researchers from three selected projects, each funded under one of the two programmes.¹¹ We focused on three projects per programme, all of which were still in progress at the time of the interviews which took place between October and December 2005. The projects were selected partly on the basis of the amount of information regarding the projects and their participants available from the programme and project websites which proved to be quite variable (we chose projects with readily available information on partners), partly in terms of the interdisciplinarity they displayed regarding disciplinary mix amongst the researchers, and partly in terms of intrinsic interest – a title such as ‘The Emotional Wardrobe’, the title of one of the projects we investigated, is clearly intriguing in ways in which others might be less so.

In all we conducted thirteen interviews, of which eleven were with researchers, ranging from very junior to very senior, from being the principal investigator (PI) to being a research assistant. All interviews were conducted by telephone. Each lasted between 50 and 90 minutes. All were conducted by the principal investigator in this project, and then transcribed by the junior researchers. The informants were initially contacted via email and/or letter, and asked about their willingness to participate. Once they had indicated such willingness, a time for conducting the telephone interview was agreed, and all interviews were undertaken at that agreed time. As an aside, it was interesting that whereas all the

¹⁰ See www.cordis.lu for details.

¹¹ We would like to thank the following for their generous and informative participation in the interviews: Tom Inns, Frank Trentmann, Andy Adamatzky, Sharon Baurley, Rosie Cox, Liz Dowler, Peter Excell, John Goldthorpe, Hilary Johnson, Mark d’Inverno, Eamonn O’Neill, Lyn Thomas, and Laura Venn.

female researchers who responded (two did not reply at all and are, of course, not part of this sample) immediately and enthusiastically agreed to participate, all the male informants bar one – this excludes the programme directors who were both highly reflective about the issues and readily agreed to discuss them - were more hesitant and required greater negotiation (again, some potential interviewees who were contacted did not reply at all). There was thus a gendered difference in informants’ attitude to agreeing to be interviewed which might warrant further investigation in another context. In all, we conducted five interviews with male researchers, and six interviews with female researchers. All bar one of the male researchers were involved in projects in *Designing for the 21st Century*, two of the female researchers were also involved in that programme, but the other four were involved in projects in the *Cultures of Consumption* programme. The interviewees might be described as follows:

Table 1.1 Professional category of interviewees

Category of interviewee	No. of interviewees
Programme director	2
Researchers	11
Total	13

Table 1.2 Gender of interviewees

Female	6
Male	7
Total	13

Table 1.3 Professional status of interviewees

Professional category	No of interviewees
Programme director	2
Principal researcher	2
Researcher	8
Research assistant	1
Total	13

Table 1.4 Disciplinary spread among interviewees

Disciplinary domain	No of interviewees	Of which female
Social Sciences	6	4
Humanities/Arts	3	2
Engineering/Computing/Maths	4	0
Total	13	6

Although it is possible to put the interviewees into broad disciplinary categories, most of them talked of their professional backgrounds as either multi- or interdisciplinary (see section 4.1 of this report), and the disciplinary categories indicated above therefore have a provisional status since they do not indicate the complexity of the informants’ understanding of their own disciplinary identity. As one of the interviewees, for instance, said: ‘as an individual I’ve been trained in engineering at engineering school and trained in design in an art school context. Throughout my career I’ve always worked across those disciplines. . .’ (TI 1)

Once the interviews had been transcribed, we conducted a content analysis and identified the themes that structure the rest of this report, grounding our readings in the empirical data we had collected. We recognize that these provide non-generalizable information about the operationalization, experiences and perceptions of interdisciplinarity in interdisciplinary research projects but they offer insights into these that, at times, are surprisingly uniform (for instance, as discussed in section 4.9 of this report, regarding the sense that interdisciplinarity is key to the future of research) but also reveal the diversity of implementation and experience of interdisciplinarity that governs current research.

We asked all the participants about anonymizing their identity in using the interview data for our research and publication purposes; only two of the researchers but not, for example, the programme directors, expressed any concern about being identified, and those who expressed concern were not strongly worried. In the interests of preserving confidentiality we have therefore as far as possible anonymized our informants, especially in section 4 of the report which centres on the researchers' views and experiences of interdisciplinarity, and we would like to thank them, once again, for their participation. Where appropriate we have used the following abbreviations for our interviewees:

PD = programme director

R = researcher

We add a figure to each of these abbreviations to distinguish between specific programme directors and researchers, and we have deliberately obscured the different levels of researcher seniority.

The remainder of this report is divided into four main sections focusing on

- The research councils' position (AHRC; ESRC; EPSRC) on interdisciplinary research;
- Interdisciplinarity in interdisciplinary research programmes, centring on 'Cultures of Consumption' and 'Designing for the 21st Century'
- Practicing interdisciplinarity, detailing our findings based on the interviews; and
- Conclusions.

1.4 A word about definitions of interdisciplinarity

Interdisciplinarity has been variously defined, and, as the rest of this report will show, is differentially and not always very strictly either defined or used by those who regard themselves and/or their research as interdisciplinary. In many European countries disciplinarity as such is understood in a variety of ways to refer to coherent bodies of knowledge, methods, methodologies, communities of scholars with attendant infrastructures, and differentiation from other coherent bodies of knowledge regarded as dissimilar. In addition to 'disciplinarity', the terms 'multi-', 'inter-', and 'trans-' 'disciplinarity are in use. It is not surprising, in this terminological jungle, that - coming from an anthropological background - Marilyn Strathern (2004) refused to make analytical distinctions amongst these terms, stating instead: 'I take the distinctions as indigenous classifications.' (70) Nonetheless, for the purposes of this report we use the following definitions:

Multidisciplinarity refers to the parallel existence of discrete bodies of knowledge in proximity to each other. Here, 'multidisciplinarity' is mainly described as an additive process, where different disciplines join, sometimes only administratively.

Interdisciplinarity refers to the integration of discrete bodies of knowledge with each other to create new knowledge syntheses. ‘Interdisciplinarity’ can be described in two ways: one, as a process where elements from different disciplines are integrated, in a crossing of traditional disciplinary lines without an aim to challenge the borders of the disciplines.¹² Two, interdisciplinarity can also be described as a critical position striving to challenge the borders of disciplines – a view that pushes ‘interdisciplinarity’ closer to transdisciplinarity. Interdisciplinarity can be ‘instrumental’ or ‘cognitive’. These two kinds of interdisciplinarity signify two different kinds of knowledge-seeking strategies, where instrumental interdisciplinarity aims at problem solving (often under the banner of ‘applied science’ or ‘multidisciplinarity’) while cognitive interdisciplinarity handles questions of fundamental understanding (often talked about as forms of ‘inter-’ or ‘transdisciplinarity’).¹³ We stress this difference, because of the tendency in the national reports of ministerial policies to focus on instrumental interdisciplinarity, while leaving forms of what we call ‘cognitive interdisciplinarity’ aside.

Transdisciplinarity refers to knowledge (production) beyond the confines of individual disciplines or groups of disciplines. ‘Transdisciplinarity’ is understood as a more critical concept than multi- or interdisciplinarity, demanding a stronger reflexivity on disciplinary perspectives and striving to produce knowledge beyond disciplinary thinking (Widerberg et al 2005: 48, Krebs et al. 2005: 47, Holm and Liinason, 2005: 40).

In our project ‘transdisciplinarity’ was mentioned only once by a researcher; the more common phenomenon was to talk of inter- and/or multi-disciplinarity, often interchangeably, or to talk of ‘crossing boundaries’. When we asked our interviewees about interdisciplinarity (see section 4.3) they produced a variety of definitions relevant to their circumstances. Tom Inns, the programme director of *Designing for the 21st Century* described it as follows:

What do we mean by ‘interdisciplinary’? I think what we mean by that is people from different disciplines coming together with the various research methods, tools, techniques and processes that they know about. . . and doing two things: sharing that knowledge between the disciplines, so there’s a kind of import and export of knowledge between them, but actually bringing those things together to create new tools, research methods, which can be applied to problems that genuinely sit between or problems that disciplines have in common or problems where you need a multi-disciplinary approach to solve them.

Here we see quite a characteristic answer to the question of what ‘interdisciplinarity’ means which takes both disciplines, and anchorage in specific disciplines, as given; which slides between inter- and multi-disciplinarity; and which alludes to both a transformative dimension (the creation of new tools and research methods) and a cumulative approach within a context of problem-solving. As one of the researchers put it: ‘I think what’s crucial are the problems you address, and if you find that you can’t handle these problems without moving outside your discipline, you are ready to, er, to do that. And what you then hope is

¹² This kind of interdisciplinarity is identified in interdisciplinary subjects, successfully disciplinized and recognized as autonomous, such as gender studies in some national contexts, for instance. These are subjects that cross traditional disciplinary borders but have a coherent body of knowledge not belonging to any other discipline. One suggestion of a term for these subjects is ‘neo-disciplines’ (Long 2002: 14).

¹³ In the Swedish context, however, the disparity between instrumental interdisciplinarity and cognitive interdisciplinarity, is identified as a difference between ‘benefit research’, i.e. instrumental interdisciplinarity and ‘curiosity research’ or ‘basic research’, i.e. cognitive interdisciplinarity. The distinction between benefit/curiosity is particularly upheld by the Swedish government (Holm and Liinason 2005: 38).

that you can find someone on the other side of the disciplinary divide who is ready to collaborate with you.’ (R6 2-3)

Thus, however one defines interdisciplinarity at an abstract level, the realities of researchers’ professional lives in the UK in 2006 – as the quote above indicates - are that they are structured into disciplines that they may or may not attempt to cross as part of specific research issues they are engaged with. This in part jars against international research funder policies and agendas which not only require collaboration but often interdisciplinarity as a precondition for funding.

2. The Research Councils’ Position on Interdisciplinary Research

2.1 The Arts and Humanities Research Council (AHRC)

The Arts and Humanities Research Council (AHRC) replaced the Arts and Humanities Research Board (AHRB) in April 2005 and is a non-departmental public body sponsored by the Office of Science and Technology, Department of Trade and Industry as one of eight Research Councils UK (RCUK). It is thus a government-funded research council. Its Mission Statement states that it aims to:

- Support and promote high-quality and innovative research in the arts and humanities
- Support, through programmes in the arts and humanities, the development of skilled people for academic, professional and other employment
- Promote awareness of the importance of arts and humanities research and its role in understanding ourselves, our society, our past and our future, and the world in which we live
- Ensure that the knowledge and understanding generated by arts and humanities research is widely disseminated for the economic, social and cultural benefit of the UK and beyond
- Contribute to the shaping of national policy in relation to the arts and humanities (www.ahrc.ac.uk/about/our_mission, accessed 18/11/05).

These aims address general knowledge domains, i.e. that arts and humanities, rather than specific disciplines, thus allowing for the possibility of interdisciplinarity.

Research Funding

In 2005/6, the AHRB/C received £75.5m funding, a figure which has been increased to £81.6m for 2006/7 and £87.1m for 2007/8 (after deductions for meeting the newly implemented ‘full economic costs’ of research). These increases are welcomed by the council as they will ‘provide a foundation from which to increase its support for responsive mode funding and to begin new initiatives of strategic importance’

(www.ahrc.ac.uk/news/news_pr/2005/announcement_of_increased_funding, accessed

[18/11/05](http://www.ahrc.ac.uk/ahrb/website/images/4_93974)). However, although achieving council status has put the AHRC on a similar footing as the other seven Research Councils, the funds made available to the AHRC are considered to be fairly modest, ‘only c£1900 for each research-active member of staff in the arts and humanities, as compared with an average per capita figure of over £19000 across all current research councils, and of £3500 in the social sciences’ (www.ahrc.ac.uk/ahrb/website/images/4_93974, accessed 18/11/05).

Working in Partnership

In their 2003 document, ‘The Arts and Humanities: Understanding the Research Landscape’, the AHRC makes the following statement regarding the integration of the arts and humanities within the wider UK research framework:

The embedding of arts and humanities research within the framework of research in other disciplines within the UK not only provides an opportunity to extend existing systems of funding to the AHRB and to the arts and humanities research community, though that is to be welcomed. It also enables links to be built across the research councils and the researchers they support in ways which will enable the arts and humanities to enrich knowledge and insight by posing different questions and different ways of understanding

(www.ahrc.ac.uk/news/news_pr/2003/the_arts_and_humanities_understanding_the_research_landscape.asp, accessed 18/11/05).

The AHRC here suggests that their newly acquired council status offers not only the promise of extra funding for arts and humanities research generally, but for cross-council research. This is made more explicit if we consider that one of the challenges for the period of the council’s Strategic Plan is:

The development of relationships with researchers in other disciplines so that the distinctive powers of insight and analysis of the arts and humanities can make essential contributions to the understanding of major research issues that have hitherto been dominated by the sciences.

Thus the council foresees its role as one of building ‘constructive relationships and partnerships with the research community and the universities and colleges in which they work’. The AHRC also recognizes a need to ensure that it ‘sustains and develops its own ethos and modes of operation in supporting and promoting research across the distinctive disciplines, and the cross-cutting subjects and themes, of the arts and humanities’ (www.ahrc.ac.uk/ahrb/website/images/4_93974.pdf, accessed 18/11/05).

Clearly, the council remains committed to those who meet the remit of its research agenda and promotes collaborations across its own knowledge domains. Simultaneously it is supportive of partnerships with the other research councils.

AHRC Support for Interdisciplinary Research

The AHRC supports work that ‘seeks to improve or enhance or develop creativity, insights, knowledge and understanding in the artistic and creative activities, history, languages, literatures and systems of thought and belief of human beings, both past and present’ but also highlights that ‘no precise definition of the subject domain of the arts and humanities is possible. There are inevitable overlaps and border territories that are shared with other award-making bodies, especially the Research Councils’ (www.ahrb.ac.uk, accessed 06.07.04 and cited in Griffin et al, 2005a:19). Although ‘no precise definition’ can be given of its subject domain, amongst the documents available on-line from the AHRC website, their document, *Understanding the Research Landscape*, offers fairly comprehensive outlines of the council’s approach to interdisciplinary research:

In the arts and humanities, as in science and technology, some of the most exciting and cutting-edge research takes place where disciplines and where subjects are reconstituted or newly constituted. This is not simply or even primarily about interdisciplinarity, but about increasing specialisation within and across academic disciplines in both research and teaching. The changing configuration of research in the arts and humanities is often held together by a precise set of cross-cutting characteristics (www.ahrc.ac.uk/news, accessed 16/11/05).

The AHRC thus acknowledges that academic research is part of a continual process of change and suggests that the ‘cross-cutting characteristics’ of its disciplinary base will control and monitor its parameters whilst also making a constructive contribution to the UK research landscape overall. A further reinforcement of its commitment to its own disciplinary base can be found in its document ‘Subject Coverage 2003’, where a simple statement under the heading ‘Interdisciplinarity’ states, ‘the Board’s structure of panels is based on subjects and disciplines that are in some cases grouped together. But it welcomes and is committed to support work that spans the boundaries between the panels’ and, as noted above, the increased funding the council now receives is to be shared between improvements to its disciplinary foundations, and initiatives of strategic importance. It is here in this latter proposal that we can, perhaps, see where the AHRC is supportive of interdisciplinary research as it introduces its Strategic Funding Initiatives which ‘address issues of intellectual and wider cultural, social or economic urgency that the council considers are best supported by concentrated and coherent funding initiatives’, two of which are the programmes under discussion in this report, *The Cultures of Consumption* and *Designing for the 21st Century*. Others include the following:

The Research Networks and Workshops scheme is designed to encourage and enable the discussion and development of ideas by researchers across and between disciplines, either through establishing new research networks or by running a series of workshops, seminars or similar events.

The Landscape and Environment programme will investigate human relationships with the natural and built, rural and urban environments, and their construction and representation.

The Diasporas, Migration and Identities programme explores issues relating to diasporas and migration and their impact on identities and cultures, in order to contribute to a deeper understanding of these critical contemporary themes. The programme will investigate contemporary and past experience, and a diverse range of issues that will include language, religion and culture, and the interrogation of creative and other texts and objects (www.ahrc.ac.uk/apply/research/sfi/ahrc, accessed 16/11/05).

2.2 The Economic and Social Research Council (ESRC)

The Economic and Social Research Council (ESRC), like the AHRC, is a non-departmental public body and receives over £120 million¹⁴ each year in funding from the government via

¹⁴ Year	Allocation in millions £	Approx amount in Euro millions
2005 – 6	£123.265	€182.110
2006 – 7	£142.268	€210.162

the Office of Science and Technology (www.ost.gov.uk). The ESRC is one of eight research councils in the UK all of which come under the joint body Research Councils UK (RCUK www.rcuk.ac.uk). These councils, as mentioned previously, receive different amounts from the OST with the ‘natural’ science councils receiving the greater proportions, although ‘the ESRC is the largest Research Council in terms of the community it serves, accounting for over 25 per cent of those staff returned in the last Research Assessment Exercise across a wide range of disciplines’ (ESRC 2005b: 3). At any one time the ESRC supports 2,000 doctoral students, 700 grants and fellowships, 350 projects within 20-30 managed programmes, and 30 large-scale research and resource centres. During 2004-05 the ESRC invested £77 million in research into economic and social issues and £32 million in training postgraduate students. Demand for ESRC funding is high, with only 35% of applications being successful (www.esrcsocietytoday.ac.uk, Fast Facts accessed 2/11/2005). Unlike similar councils in other countries such as France, the ESRC has no in-house researchers but instead funds research carried out in a variety of research settings but predominantly in universities.

The disciplines covered by the ESRC are Economics, Sociology, Social Policy, Psychology, Political Science and International Relations, Social Anthropology, Education, Human Geography, Environmental Planning, Economic and Social History, Management and Business Studies, Socio-legal Studies, Linguistics, Area Studies, Statistics, Computing and Methodology and Interdisciplinary Studies (in Science, Technology and Innovation). (www.esrcsocietytoday.ac.uk ESRC ORP eRP – Notes for Guidance accessed 2/11/2005)

The Mission Statement of the ESRC describes its role as

- Promot[ing] and support[ing], by any means, high-quality basic, strategic and applied research and related postgraduate training in the social sciences;
- Advance[ing] knowledge and provid[ing] trained social scientists who meet the needs of users and beneficiaries, thereby contributing to the economic competitiveness of the United Kingdom, the effectiveness of public services and policy, and the quality of life;
- Provid[ing] advice on, and disseminat[ing], knowledge; and promot[ing] public understanding of the social sciences. (www.esrcsocietytoday.ac.uk ESRC in Context, accessed 2/11/2005)

The ESRC distributes its funding across the following eleven categories:

Funding Opportunity	Indication of costing (where known)
1. Research Grants – Standard and Small	Standard - £15,000 - £1.5m Small £15,000 - £99,999
2. Research Fellowships	Academic salary 2 – 3 years
3. Research Programmes	£5m for <i>Cultures of Consumption</i>
4. Research Centres	£0.5 - £1m annually
5. Research Seminars	Up to £15,000
6. Resource Centres and Programmes	
7. Priority Networks	10 linked projects, own interest of

2007 – 8	£150.136	€21.785
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(www.esrcsocietytoday.ac.uk Summary of Council’s Strategic Priorities and Funding Allocations accessed 22/09/2005).

	focus
8. First Grants	Up to £400,000
9. Large Grants	£1.5m - £5m
10. Grant Linked Studentships	Cost of PhD
11. International Collaborative Grants	

Source: ESRC 2005a: 4.

In this report we focus on the funding of Research Programmes. The current funding guide states:

Research programmes aim to harness and strengthen the UK social science research capacity in order to address scientific and policy relevant topics of **strategic and national importance**. They also place particular emphasis on **engagement with potential users** of research. By bringing into the field of enquiry the most qualified investigators in a distributed network of co-ordinated research studies, research programmes are able to focus scientific effort on selected topics.

Researchers work independently, though on the same subject, often with the central back-up of programme directors and advisory committees. Through bringing researchers from different disciplinary backgrounds together, research programmes aim to encourage **positive interdisciplinary collaboration**, within and between projects, where this is necessary to secure scientific advances. Programmes are often multidisciplinary, and features of successful programmes include the promotion of cross-fertilisation of ideas and methods, scientific advice and training and the exchange of data. (ESRC, 2005a: 6 original emphases)

Here we see the use of both ‘inter-‘ and ‘multi-‘disciplinarity to suggest cross-fertilization of ideas and methods. Decisions with regard to funding are based on

a number of criteria: quality, timeliness, value for money and in relevant cases, fit to the specification for a particular competition. We are keen to encourage fresh ideas from **new researchers** and appropriate proposals are welcomed from those with **limited research experience**. We particularly encourage **novel research proposals** addressing new concepts and techniques. We also welcome broad ranging research proposals which **cross disciplines**. (ESRC, 2005a: 4 original emphases)

Research funding, particularly for research programmes, increasingly focuses on interdisciplinary ways of working. The Thematic Priorities within which the research programmes are funded are organised in such a way to encourage cross-disciplinary working within a particular theme, rather than within specific disciplines.

The Thematic Priorities are:

- Economic Performance and Development
- Environment and Human Behaviour
- Governance and Citizenship
- Knowledge, Communication and Learning
- Lifecourse, Lifestyles and Health

- Social Stability and Exclusion
- Work and Organisations

This list mirrors fairly closely the thematic priorities of the European Commission under Framework 6, possibly highlighting the fact that the ESRC has been involved in an ERA-Net, an EU-funded network of research councils whose aim is to collaborate more closely, not least by aligning research priorities. The *Cultures of Consumption* programme which is the focus of this report is one of the ESRC research programmes within the ‘Life Course, Lifestyles and Health’ strand.

Up to nine Research Centres are funded by the ESRC under each of its thematic priorities. During the years 2000 – 2005, these seven thematic priorities have been the main strategic driver for the ESRC’s planning and decision-making process, with 65% of the overall budget been allocated to the themes (ESRC, 2000: 2).

Within the thematic priorities interdisciplinarity is referred to in various ways. For example, the *Environment and Human Behaviour* strand states that ‘Interdisciplinary research, particularly between social and natural scientists, together with research that has an international as well as a UK and European focus, are key factors in addressing the issues in this theme’ (ESRC 2000: 6). It is worth noting, as an aside, that ‘international’ is distinguished from ‘European’ here, suggesting that ‘Europe’ is in some way not ‘international’. The *Governance and Citizenship* section states that ‘this theme covers areas which reinforce and supplement important cross-theme issues on identity and participation in civil society’ (ESRC, 2000: 9).

In the new strategic framework of the ESRC, interdisciplinarity continues to be important, with the *ESRC Delivery Plan 2005* stating under ‘Relevant Priority Research Challenges’ that

This will be a major, long term challenge, which will require interdisciplinary work across the science base and especially between social science and medical science. A start to such interdisciplinary collaborations has already been made in partnership with the Medical Research Council (MRC). ... The next step in tackling this ambitious agenda is a need for interdisciplinary work with medical scientists in social neuroscience. ... This would bring together education and social policy, research areas that, with some exceptions, have proceeded separately as well as drawing on the work of some of our existing economics investments (2005: 8).

Not only is the ESRC multi-disciplinary in itself, crossing the whole of the social sciences it is increasingly utilising cross-council programmes such as the major programme on energy and the rural economy and land use. Furthermore, ‘the ESRC will lead in the establishment of two new inter-disciplinary research groups which will provide a focus for UK research on energy consumption and energy markets as well as a collaborative network exploring attitudes to renewable energy developments’ (2005: 9). There is also the development of a programme for ‘undertaking novel inter-disciplinary research on plant and animal disease management. ... Inter-disciplinary research involving social and natural scientists and engineers is required to model and understand changing water systems and their interactions with human activities’ (2005: 9). From this strong base across the ESRC, importantly and extensively focussed on collaboration between the social sciences and the natural and ‘hard’ sciences rather than with the humanities, the ESRC continues to fund

interdisciplinary work in the future and increase the opportunities to apply for funding both in research collaboration across disciplines and as interdisciplinary individuals.

2.3 The Engineering and Physical Sciences Research Council

The Engineering and Physical Sciences Research Council (EPSRC) is the UK's main agency for funding research in engineering and the physical sciences. It is a non-departmental public body funded by the government through the Office of Science and Technology and the Department of Trade and Industry. The EPSRC works collectively with the seven other research councils as part of Research Councils UK (RCUK). The aims set out in the council's Mission Statement are as follows:

Promote and support, by any means, high quality basic, strategic and applied research and related postgraduate training in engineering and the physical sciences. Advance knowledge and technology (including the promotion and support of the exploitation of research outcomes), and provide trained scientists and engineers, which meets the needs of users and beneficiaries (including the chemical, communications, construction, electrical, electronic, energy, engineering, information technology, pharmaceutical, process and other industries), thereby contributing to the economic competitiveness of Our United Kingdom and the quality of life.

In relation to the activities above as engaged in by the Council and in such manner as the Council may see fit:

- To generate public awareness
- To communicate research outcomes
- To encourage public engagement and dialogue
- To disseminate knowledge
- To provide advice

Our five overarching strategic objectives are:

- Supporting world-class research in the engineering and physical sciences, addressing the challenges facing the UK economy and society
 - Developing talented scientists and engineers
 - Supporting the knowledge economy
 - Public engagement with research
 - Effective and efficient operations
- (www.epsrc.ac.uk/AboutEPSRC/MissionStatement accessed 23/08/05).

The EPSRC intends to achieve the aims of its mission via its Strategic Plan 2003-7, which shapes its policies and programmes. The council states that their targets reflect 'priorities which have been identified in consultation with the research community' and as such 'emphasises the importance of ensuring an appropriate breadth of coverage, encouraging adventurous and multidisciplinary research and developing a balanced portfolio that takes full account of the international nature of science'

(www.epsrc.ac.uk/Publications/Corporate?StrategicPlan2003-07 accessed 23.08.05).

Research Funding

A main objective of the EPSRC is to ensure that 'the UK is at the forefront of technological change' and the council states it is working towards the building of a strong economy and ultimately the improvement of life in society. To this end, approximately £500m *per annum* is allocated for research and postgraduate training (www.epsrc.ac.uk/AboutEPSRC/FactsAndFigures accessed 11/10/05). In 2004-5, the EPSRC was allocated 23% of the overall Science R&D Budget and, alongside the Medical Research Council (MRC), was the highest allocation across the RCUK environment (www.epsrc.ac.uk/CMSWeb/Downloads/Publications/Corporate/EPSRC-CorporateBrochure2005.pdf accessed 13.11.05).

This council is the UK's main agency for funding research in the engineering and physical sciences 'from mathematics to materials science, from information technology to structural engineering'. It also collaborates with industry, including defence. The council's programme structure is open, with no rigid boundaries between disciplines or subjects, and joint-funding between programmes is encouraged. It states that it operates 'to meet the needs of industry and society by working in partnership with universities to invest in people and scientific discovery and innovation' (www.epsrc.ac.uk/CMSWeb/Downloads/Publications/Corporate/EPSRC-CorporateBrochure2005.pdf accessed 13.11.05).

Working in partnership

The EPSRC perceives working in partnership as key to the delivery of its core objectives and maintains strong links with the other research councils, universities, research agencies and industry. Indeed, in the latter case, 'almost 45% of EPSRC funded research grants involve partnerships with industry'. Moreover, their links with industrial and commercial organisations are perceived to provide valuable strategies for engagement with public activities. The council claims that its recognition of the 'changing needs of a more informed society' enhances its commitment to fostering engagement with members of the public, stimulating 'greater understanding about the issues and opportunities that arise from research'. Such engagement is believed to engender healthy debate about the role of research in society, and is stated as being an important aspect of the EPSRC's core business (www.epsrc.ac.uk/CMSWeb/Downloads/Publications/Corporate/EPSRC-CorporateBrochure2005.pdf accessed 13/11/05).

EPSRC Support for Interdisciplinary Research

A search on the EPSRC website reveals that more than fifty pieces of content match the criterion 'interdisciplinarity'. There is some overlap if compared with a search for 'multidisciplinarity', which includes documents such as those already cited here. Searches to date have not yet revealed a comprehensive definition of either term. Further scrutiny of a small selection of the 'interdisciplinarity' documents indicates that the council supports work that crosses the boundaries of the disciplines and that cross-council collaborations are widespread. The extent of the council's support can be gauged, to some extent, by focussing on these issues and on the amount of funding interdisciplinary projects receive. Although the latter is not always available on the EPSRC website, the information below gives some indication of funded projects and ongoing funding opportunities:

The New Dynamics of Ageing is a cross-council research programme, aiming to address interdisciplinary challenges in ageing research by motivating scientists to come together across the broad interests of four research councils: the EPSRC; the Economic and social Research Council (ESRC); Biotechnology and Biological Sciences Research Council

(BBSRC); and the Medical Research Council (MRC) (www.epsrc.ac.uk/researchfunding/programmes/infrastructureandenvironment/initiatives accessed 12/10/05).

Discipline Hopping Awards are available for established researchers with track records in either the Mathematical Sciences or Computer Sciences and ‘are intended to be ‘pump-priming’ support that will lead to new avenues of research, new collaborations and follow-on research projects’. In their document, ‘Frequently Asked Questions’, significant contact time is defined thus: ‘more than spending short visits to other researchers/groups. There should be opportunity to learn the ideas and language of the other area’ (www.epsrc.ac.uk/Calls/for/proposals accessed 18/11/05).

The Ideas Factory invites participants to take part in five-day ‘creative research sandpit[s]’, which are individually themed (the current call is ‘Scientific Uncertainty and Decision Making’). 20-30 people are selected to take part from a range of disciplines, including the social sciences, arts and humanities. The aim is to ‘stimulate highly innovative and more risk-accepting research activities’. £1m is awarded to each of the sandpits which are designed to focus on ‘topics that need a new dimension in thinking’ (www.epsrc.ac.uk/ResearchFunding/Programmes/CrossEPSRCActivitiesIDEA accessed 18/11/05).

In their ‘Corporate Brochure 2005’, the EPSRC provides a fuller picture of its aims and objectives, claiming that the research they support needs to address ‘the challenges facing the UK economy and society’ and that research undertaken in the areas of science and industry ‘is vital for economic prosperity and quality of life’. To this end, therefore, they are ‘encouraging an increasingly interdisciplinary and international approach, coupled with greater flexibility to respond to changing requirements and opportunities’. Furthermore, the council states that its work is ‘complementary to other research investors including other research councils, government agencies, industry and the European Union’ and as such, ‘actively engage[s] in and encourage[s] partnerships and collaborations across disciplines, boundaries and the world’. The management of EPSRC research funding allocations is undertaken through a series of Programmes, the process of which relies on independent peer review which is ‘designed to be flexible so that interdisciplinary, multi-disciplinary and collaborative research can be supported’ (www.epsrc.ac.uk/CMSWeb/Downloads/Publications/Corporate/EPSRCCorporateBrochure2005.pdf accessed 13/11/05).

The council’s document ‘Panel Participation’ advises panel members that it is ‘placing increasing emphasis on funding and facilitation of multidisciplinary/interdisciplinary research opportunities’ thus, members may be asked to review ‘proposals which cut across the remit of more than one of the Council’s Programmes’. Panel members are therefore requested to ‘provide comments on the part of the proposal that relates directly to their own area of expertise’ (www.epsrc.ac.uk/ResearchFunding/AssessingProposals/PanelParticipation, accessed 12/11/05). The latter statement implies the council relies on individual disciplinary knowledge bases and subsequently shifts away from encouraging consideration of the integrative quality of interdisciplinary submissions. This is a subject we return to later in this report.

3. Interdisciplinarity in Interdisciplinary Research Programmes: An Overview of Two Programmes

The following section of the report presents an account of what interdisciplinarity means in two interdisciplinary research programmes at programme level. It draws both on document analysis and on the interviews conducted with the programme directors whose identity cannot be anonymized here since the programmes themselves are clearly identified. In addition, an overview of the six projects we focused on in greater depth provides information on the disciplinary backgrounds of the different research teams and the nature of the research of each project.

3.1 Cultures of Consumption

Within the ESRC's overall framework of research programmes, *Cultures of Consumption* is the first one jointly-funded by the ESRC and the AHRC. The programme was awarded £5 million (approx €7.3m); the ESRC is the major funder contributing £4 million with the remaining £1 million provided by the AHRC. The programme runs over a period of six years, ending in 2007. The Programme Director is Dr Frank Trentmann, an historian based at Birkbeck College, University of London (<http://www.consume.bbk.ac.uk/index.htm>). The programme specification states: '*Cultures of Consumption* is a major *multidisciplinary* research programme that seeks to deepen our understanding of consumption and consumers, past and present, and to highlight political, economic and cultural implications for the future.' (emphasis added) It continues:

The second phase is designed to attract high-quality researchers who are interested in playing an active part in this research programme and in developing further its multidisciplinary approach. While the programme will consider applications in all areas, it is particularly keen to push the research agenda further in the areas mentioned above, namely: new theoretical and conceptual approaches to consumption; projects involving the creative and performing arts; and work on important current problems, including (but not limited to) financial services, intergenerational consumption, and the relationship between branding and pricing. (Phase II Specification CofC, ARHB/ESRC: 1, n.d.)

The objectives of the programme are:

To enhance conceptual and empirical knowledge about consumption and the consumer in a comparative and multidisciplinary fashion: this involves study of the changing nature and dynamic of different cultures of consumption (past and present, in Britain and elsewhere), and the development of new theories and modes of analysis that can be applied to prospective contexts;

To identify the commercial, public and social policy implications of the research and to maximise discussion and influence of the findings in relevant fields.

26 projects are funded through this programme, 16 in phase one and ten in phase two. The titles range from *Alternative Hedonism and the Theory and Politics of Consumption* through *Boomers and Beyond: Intergenerational Consumption and the Mature*

*Imagination, The Cappuccino Conquests: A Transnational History of Italian Coffee to Banking on Housing; Spending the Home and New Consumer? Children, Fashion and Consumption.*¹⁵ The £5 million funding awarded to the programme is divided between the projects and the Programme Director for costs associated with running the programme. Projects are funded for between 12 and 48 months with 15 projects running between 24 and 30 months. Funding is awarded either as a Substantive Research Contract or as a Programme Fellowship. Project funding ranges from £66,716 (approx €7,589¹⁶) for *Consuming Services in the Knowledge Society: The Internet and Consumer Culture* to £271,412 (approx €397,008) for *Shopping Routes: Networks of Fashion*, both of which are awarded as Substantive Research Contracts. There are 16 substantive Research Contracts and 8 Programme Fellowships.¹⁷ The average funding for the projects in this programme is £153,801 (approx €224,880). The programme also funds International Visiting Fellowships for a period of three to six months based at Birkbeck College.¹⁸ 23 institutions lead projects. Of these Oxford, Glasgow, Stirling and the Open University lead on two projects each, all others lead on one project only.¹⁹ Of the lead institutions, only the Victoria and Albert Museum is not an institute of higher education. There are also over 30 partner institutions, which range from universities to DrugScope, Anthropology Express, and the British Library National Sound Archive.

Interestingly for a multidisciplinary programme the projects are requested to self-classify on application into subject areas. Of the projects for which there is information this is broken down as follows:

Table 2.1 Disciplinary identity of projects in a multidisciplinary research programme (ESRC) as reported by the principal investigators:

Subject area	No of projects within subject area
Sociology	6
Human Geography	5
Economic/Social History	4
Social Policy	3
Interdisciplinary Studies	2
Management	2
Area Studies	1
Socio/legal Studies	1

This table indicates that the balance of projects was in the disciplines covered by the ESRC rather than by the AHRC.

¹⁵ For a full list of programmes including abstracts see <http://www.consume.bbk.ac.uk/research.html>.

¹⁶ Currency conversions on xe.com on 24/11/2005.

¹⁷ Figures do not add up to 26 as some information is not available.

¹⁸ A full list of International Visiting Fellowships at <http://www.consume.bbk.ac.uk>.

¹⁹ The lead institutions are: Oxford, Open University, Stirling, Victoria and Albert Museum, London School of Economics, Royal Holloway, University College London, Sheffield, Coventry, Glasgow, Keele, Bristol, Hertfordshire, Leicester, King's College, Lancaster, Durham, London Metropolitan, Birkbeck, Manchester, Exeter and Brighton.

The gender breakdown for the projects is as follows: on nine projects the Principal Investigator (PI) is female and on 17 the PI is male. Three projects consist of all-female teams and four are all-male teams. The rest are mixed gender teams. With regards to institutional spread, 13 of the projects are comprised of members from the same university and seven projects are located within the same departments.

For the purposes of this report we decided to focus more closely on the following three projects from within the *Cultures of Consumption* programme:

1 *Reconnecting Consumers, Food and Producers: Exploring 'Alternative' Networks.* This project was awarded £205,890 (approx €300,567) as a Substantive Research Contract within phase I of the funding. The principal investigator is Dr Moya Kneafsey of Coventry University and the subject area is human geography. The team consists of five women and one man. When the project started three of the team were working at the same department in Coventry but they subsequently moved to different institutions. The range of subjects represented by the team covers human geography, business management and food anthropology, sociology and public health nutrition.

2 *Social Status, Lifestyle and Cultural Consumption.* This project was awarded £194,084 (approx €283,360) as a Programme Fellowship within phase II of the funding. The principal investigator is Dr Tak Chan of Oxford University and the subject area is sociology. The team are all male and all sociologists. The research is international and the research team has members in the UK, France, the Netherlands and the United States.

3 *Alternative Hedonism and the Theory and Politics of Consumption.* This project was awarded £85,232 (approx €124,436) as a Programme Fellowship within phase II of the programme funding. The principal investigator is Professor Kate Soper. The project has an all-female research team. The discipline area is interdisciplinary studies and the researchers have backgrounds in philosophy, French, media and cultural studies.

Frank Trentmann, an historian, was employed as the Programme Director for *Cultures of Consumption* in 2002 at the start of the programme. Having done some interdisciplinary work in the past he thinks that the funders were keen to find someone with a background discipline that could act as a 'bridging function' and thinks that 'history is a good bridge for that'. From the beginning of his appointment he has had influence on the shape of the programme. There was a draft specification in place which was then developed initially by a steering group for the programme. This steering group was used to give guidance to the shape and direction of the programme. Its members were also involved in the application process, assessing proposals. The members of the steering group range from academics to business people from both the private and public sector. When considering the composition of this group Trentmann looked for individuals who were not necessarily 'interdisciplinary individuals ... some people I appointed are more interdisciplinary than others, it's more the mix of people'. He particularly looked for people who would be 'open-minded' and who would be 'constructive and open towards participating in a dialogue with many other disciplines'.

Some of those chosen to be invited onto the steering group were already known to the Programme Director, those that were 'closest to [his] own expertise and own disciplinary background'. Others were identified through literature relevant to the programme subject area. 'The third group are non-academics. They were people from the public sector, the commercial world, media. And that was a mix of people I'd run into here and there, instinctive feeling, or suggestions from the research council' (Trentmann). In the selection of the steering group previous knowledge of others and social networking was an important factor. Members of steering groups such as this are important, if somewhat hidden, figures

in academe in the UK as these are the people who, alongside the Programme Director, decide which academics, which research groups and which projects get funding to do interdisciplinary research. Their belief in, and understanding of, interdisciplinary research and ways of working are therefore vital to the future of this type of work.

The assessment of the proposals went through two stages. The applications were initially read by the Programme Director and two or three members selected by him from the steering group. At this stage the Programme Director considered the discipline backgrounds of the steering group and tried to match the applications with a discipline relevant assessor. At the second stage the applications went to independent academic referees. The projects then came back to the whole steering group who discussed the applications in conjunction with the referees' comments.

The application form itself asked, in tick-box format, if the project is interdisciplinary. Responding to this question was obligatory. Applicants were 'encouraged through workshops and other things to think about that quite carefully'. However,

for some applicants that was a box which just needed to be filled in somehow, they could proclaim the wonders of interdisciplinarity but they're not really intending to do very much about it. For others it was a genuine opportunity to think about possible connections with other projects, to think about ways in which they could exploit interdisciplinary opportunities that the programme has. (Trentmann)

Trentmann said that it was hard at the application stage to know just how interdisciplinary any particular project would be, and as 'there are no formal requirements attached to the interdisciplinary pledges', there was no contractual obligation regarding interdisciplinarity which made it difficult for the Programme Director to do more than encourage interdisciplinarity. Tait and Lyall (2001) suggest that this 'ticking a box' approach does not provide

an accurate indication of the researcher's intentions. Some, based on previous experience, did not tick the box, even though they regarded their project as interdisciplinary, because they thought this would disadvantage their project. Others ticked the box because they thought that they would get 'brownie points' for their proposal.

Tait and Lyall recommend that 'a more accurate and effective method is needed to gauge the real intentions of the researchers' (2001: 2). For future programmes Trentmann suggested that in the contract 'you specify outputs ... one piece should be able to reach a different audience. Quite simple, actually you just put it in the contract'.

One of the ways in which Trentmann encouraged interdisciplinarity within the programme was at the level of the projects. The 26 projects were split into research clusters, as follows:

- Knowledge and the Consumer;
- Consumption and Citizenship;

- The Impact of New Technologies on Consumption;
- Changing Boundaries Between Local, Metropolitan, and Transnational Consumer Cultures;
- The Penetration of the Domestic Sphere by Consumer Culture;
- Alternative and Sustainable Consumption.

Clusters might include researchers from a range of disciplines. The ‘cluster on citizenship and consumption bring[s] people together from social work, media studies, law and philosophy’ (Trentmann). The annual programme meetings were used as a starting point for researchers to just meet and talk.

Having observed some of these groups, while I wouldn’t say that it necessarily produced deep new intellectual insights, it was a very important socialising exercise so that people felt at ease talking about their approaches and their ideas in front of like-minded people from other disciplines. And you can see how that is slowly making people much more likely to call up, or share something with a colleague in another discipline in another institution than if it was permanently coming from directives from me. (Trentmann)

This is also recommended by Tait and Lyall (2001, 3) as they suggest: ‘in relation to programme development, there is a need to schedule more time for networking and building in an interdisciplinary element from the outset’. Such time was successfully built into the *Cultures of Consumption* programme. However, Tait and Lyall’s recommendation that ‘developing a checking procedure to ensure that it [interdisciplinarity] is not squeezed out or diluted in the final specification or subsequent stages’ has yet to be addressed.

As a recommendation for the future, Trentmann would like to put this in the contract for projects. The funding councils themselves provide money for interdisciplinary research, but there is no checking procedure of the projects during their lifetime. The Programme Director has to report back to the funding councils by writing an annual report but the projects are not audited for their interdisciplinarity. This was a concern for Trentmann, which he hoped the funding councils would take on board for the future.

Another concern was that

Even within a single research council there aren’t many mechanisms which create interdisciplinary synergies between related funding projects and investments. You can be within the same research council working on related subjects in the same city and not even know of each other’s existence ... what I hear about what is going on, is mainly through academics, the occasional contact, but it’s not that there is an integrated system which would alert you being funded by one research council to developments within that research council, let alone another research council. (Trentmann)

This could be an inherent problem of interdisciplinarity itself and of working across boundaries, whether those boundaries are discipline or research council ones. It is easier to keep track of the developments within a field when working in a discrete area. However, working across a diverse range of subjects or funding bodies makes this more difficult. This issue will be addressed later in the report.

The projects in *Cultures of Consumption* range from being located in a single discipline to being interdisciplinary. One respondent, somewhat surprisingly, said that he had interpreted the call for the programme not to require interdisciplinary working, but merely that researchers from a range of disciplines could apply. This misunderstanding suggests that the meaning of interdisciplinarity needs to be properly defined in future funding rounds if research councils want to ensure that the research they fund is interdisciplinary, rather than just spreading the funding across a particular range of disciplines.

There are a few projects which are interdisciplinary in terms of the set-up, so they have more than, they are not single person projects ... a few projects have people from different disciplines. So that's one group. Another group, they were all from one discipline and ... [what] they were encouraged, or in some cases even required to do, was to build up some connections with other projects from outside their disciplines. In the second phase, short-list of projects I required them to specify what they, what exactly they would do with any other projects they were interested in. Because in the first phase what became clear was that well, some people say interdisciplinarity is wonderful, but when you tried to encourage them to contribute to workshops they retreat into their own little disciplinary hole. (Trentmann)

By being more direct about how interdisciplinarity was to be seen and done the Programme Director was able to encourage stronger interdisciplinarity across the programme. The projects were to 'put into writing a certain working plan on how they would hope to interact with other projects, and to think quite specifically about the practicalities of that. Different projects came up with different ideas and suggestions. Some had informal workshops or reading groups, others had more formal conferences; others again were exploring joint publication plans and so forth.' (Trentmann)

In this way interdisciplinary collaboration between the projects was encouraged and social networks for future collaborations were formed. Trentmann was aware that the funding decisions made for this programme would affect future research collaborations: 'If you invest £5m in *Cultures of Consumption* and you give money away to one group rather than another group, in ten years' time you can still see part of the result, partly because networks are created and so forth.' (Trentmann)

Another way in which Trentmann as Programme Director worked to encourage both interdisciplinarity and expansion of social networks was the involvement of internationally recognised interdisciplinary researchers in various workshops and seminars across the programme. This not only expanded the networks internationally, it also recognised that interdisciplinary work is happening in other countries and becoming increasingly important across the world, not just in the UK.

Tait and Lyall (2001) suggest that co-funding by research councils is more likely to produce interdisciplinarity than separate funding (2001: 3). Although this report states that in 2001 'no evidence [was found] of ESRC practices inhibiting interdisciplinary applications and the successful funding of interdisciplinary research... the main barriers to interdisciplinary research were seen to lie in universities themselves and with the Research Assessment Exercise (RAE), but the ESRC was not seen as being particularly proactive in countering these'. It continues by suggesting that in future the research council might develop 'longer term and more strategic approaches to the promotion of interdisciplinary research based in part on further research.' (Tait and Lyall, 2001: 3) By collaborating with

the AHRC on this project and on future projects with other research funding councils the ESRC seem to be working towards a future where interdisciplinary research is more likely to be funded through them, and researchers are encouraged to do interdisciplinary work within programmes such as this one.

To encourage future interdisciplinary work one of the recommendations from both Trentmann and Tait and Lyall (2001: 4) was that of using examples or case studies to highlight successful interdisciplinary work. However, there will have to be many of these and they will need to be strongly reported to counteract the dominant discourse around interdisciplinarity, that of the barriers, particularly in relation to the RAE.

Cultures of Consumption has run a series of free public lectures with titles ranging from 'Food Wars: Food and the Contradictions of Consumer Culture', the 'Power of Pla\$tic' to 'The Error of our Ways: Historians and the Birth of Consumer Society' and 'Consumer Kids: Competent or Victimized?' There have also been number of workshops, their titles ranging from 'The Politics of Necessity' and 'Restless Interiors' to 'Social Bases of Cultural Consumption' and 'Knowing Consumers: Actors, Images, Identities in Modern History'. A seminar series was also funded in conjunction with King's College, London entitled 'Consuming Space(s) and Place(s): Placing Consumption in Perspective' that ran seminars such as 'Manufacturing Meaning in the Chicken Commodity Chain', 'Mapping the 'Bilbao Effect': A Geography of Architectural Celebrity' and 'Talking about Responsibility: What's Ethical about Ethical Consumption?' As can be seen from these titles the seminars and lectures span a range of disciplines and topics within the theme of consumption. Researchers from the projects found that these seminars contributed to the interdisciplinarity of the programme as a whole.

3.2 Designing for the Twenty-First Century

Designing for the 21st Century is the first collaboration between the EPSRC and the AHRC and was launched in March 2004, to run for five years with a budget of £4-5m. In February 2006 it supported twenty-one research clusters for a period of 12-15 months. The two councils identified three broad and overlapping themes which underpin the research programme as a whole:

- People working in design: to address the problems of communication and culture inherent in any interdisciplinary endeavour
- Understanding creativity: to provide a theoretical and methodological base for the initiative
- Application of design in practice: to draw on the communication-building, theoretical and methodological activities explored through the other two themes and focusing on the development and application of new interactions

The aims of the initiative are to:

- Foster the formation of a new and diverse community, with a common reference framework and shared understanding of theoretical concepts, cultures, methods and languages

- Stimulate new ways of design-thinking, to meet the challenges of designing for the twenty-first century
- Support leading-edge research that is self-reflective, socially aware, economically enterprising and internationally significant

Joint statements inform us that both councils recognise sub-sets of design communities, with their own distinctive cultures, and that have grown out of the varied backgrounds of academics, industrialists and consumers, who have been educated in ‘different ways of thinking’. The intention of the current initiative is to encourage applicants from across the remits of both funding bodies to ‘work collaboratively and foster understanding of different perspectives’ of design research, in order to explore new models of design thinking suitable for the challenges of designing for twenty-first century society. They identify group interaction as key to the creation of the cross-disciplinary dialogue necessary for the success of new research, products, systems and services and are supporting ‘discipline- and sector-crossing’ network activities intending to facilitate the essential ‘cross-fertilisation’ of ideas, concepts, approaches, methods and processes, thus encouraging collaboration between academics across the remits of both funding bodies (www.ahrc.ac.uk/apply/research/sfi/ahrcsi accessed 16/11/06).

The initiative director, Professor Tom Inns, from the School of Design at the University of Dundee, Scotland, UK, has worked extensively both in design research and practice, across a wide range of fields covering the remits of both councils. Supported by an advisory group, he is charged with providing intellectual leadership in developing the *Designing for the 21st Century* programme. Regarding the opportunity to work with both funding bodies, he made the following press statement:

In bringing together designers and other specialists from different academic backgrounds and industry the *Designing for the 21st Century* initiative recognises the multidisciplinary nature of contemporary design (www.ahrc.ac.uk/news accessed 22/05/05).

It would be erroneous to assume that the above statement indicates a conflation of multi-with inter-disciplinary. As earlier joint statements from the two councils highlight, and which Inns’ quote testifies to, the design field is indeed multi-disciplinary in that it contains many disparate and unconnected disciplines. If we couple Professor Inns’ statement with that of the Chief Executive of the EPSRC in their document *Research Priorities and Opportunities*:

Research should never stagnate and needs to retain an exploratory spirit, seeking out new fields of understanding and applying this understanding to real world problems. Researchers must feel able to move to new areas of research and cross boundaries between disciplines. We will do what we can to facilitate such mobility (www.epsrc.ac.uk/Basic accessed 12/10/05).

The aim is clearly to support multi-disciplinary collaborations which the EPSRC perceives will lead to an integration of disciplinary fields and, ultimately, interdisciplinary results. This is further highlighted in the interview. In defining interdisciplinarity, Inns said:

What we mean by [interdisciplinarity] is, people from different disciplines coming together with the various research methods, tools, techniques and processes that

they know about and doing two things: sharing that knowledge between the disciplines, so there's a kind of import and export of knowledge between them, but actually bringing those things together to create new tools, research methods, which can be applied to problems that genuinely sit between, or problems that disciplines have in common or problems where you need a multidisciplinary approach to resolve them.

Interdisciplinarity in the context of *Designing for the 21st Century* is, then, believed to be achievable by the sharing of multi-disciplinary knowledge, followed by the integration of methods and methodologies to create new tools and approaches to research problems. This notion of the transformation of knowledge/ideas through the application of a multidisciplinary viewpoint to a research question or problem is shared by Marion Hersch and Gloria Moss (2004: 9) who argue that 'in disciplinary terms the approaches and perspectives of a number of different disciplines may be required to comprehend the whole picture'. It is worth noting here that continued enrichment of their own disciplinary bases was viewed as an important element by the majority of our participants and that their multi- or inter-disciplinary work was usually not at the expense of disciplines, but rather carried out alongside these.

How different disciplinary selves achieve the kind of integration needed for the future of design research is of paramount importance for the programme. As is common and as part of his role, the programme director organised a series of events during 2005, which brought together research cluster members. Conferences, workshops and seminars provided fora in which participants discussed and explored successful experiences alongside problems they encountered during the lifetime of the individual projects. Inns considered these events to be specifically aimed at promoting interdisciplinarity in that they were 'encouraging people to step outside their discipline and explore a common issue', and were one way of achieving the cross-fertilisation of ideas earlier cited as a goal of this cross-council collaboration. Furthermore he argued that each participant should feel valued for their contribution, regardless of their disciplinary background, as this is vital for the success of collaborations, and described as a key issue 'the importance of finding themes, ideas, areas where there's actually value for each one of the disciplines to be ... working in partnership'. This has obvious implications for individuals from different disciplinary backgrounds and is a thread which runs throughout our report.

As mentioned, the programme director works alongside an advisory group with which he meets to discuss programme issues and structure guidelines for the format of the programme activities. Although he did not have complete autonomy regarding the direction of the programme, he felt that he had been given ample opportunity to influence it. He valued the input of the advisory group which he described as 'very multidisciplinary' in its make-up of individuals from academia, public sector organisations and the design industry. He was confident in the ability of the advisory body to make decisions regarding the future direction of the initiative, and stated: 'they have a surprisingly common understanding, I think, of what's going on and they're quite united in their views on the direction the initiative should take in the future'.

As an example of this, Inns described a recent advisory group meeting, at which discussion regarding the next round of funding raised the concern that the research clusters were not 'forward-looking enough' in their exploration of the future parameters of design-thinking. At the subsequent workshop, participants were then asked to address the issues of 'what

design disciplines might look like in 2020 [and] what new knowledge and understanding they need to underpin design to help it maximise its potential by 2020' (Inns). Through such strategies, workshop participants were given the opportunity to pursue differences of opinion and work towards consensus, an important issue for interdisciplinary teams signalling a 'commitment to multiple perspectives' (Elizabeth Creamer 2005: 39). Such collaborations are also potentially confrontational, and a discussion of conflict amongst cluster participants and the different interpretations of what this can mean for interdisciplinarity itself is discussed below.

The design field is made up of disparate disciplines, and the problem of language differences between the disciplines is one of the barriers to interdisciplinarity identified by Inns, who noted that 'the whole initiative is under the mantel of design, but interpretations of what that actually means, what does design process mean, and so on. There are huge variations on that'. One of the ways the programme is achieving its aims is through a number of activities undertaken by the different projects. These the programme director perceived to have been increasingly beneficial for the goals of the programme as a whole. Inns was enthusiastic regarding the methods utilised by some projects in order to achieve a 'common language':

Where they, um, um, solely confine themselves to talking-shops, if you like, discussion, you can only move so far and one of the things which has been a huge success in some of the projects is, I suppose, synthesis through action. So actually stepping beyond the discussion forum and actually, um, engaging in some activity. People sharing activities, actually working out these differences of language and cultures and methodologies, by actually doing something together

Engendering fruitful exchange between those from multiple disciplines via different activities, thus leading to shared understandings amongst colleagues from the same project and also across the different clusters in the programme, was identified by Inns as one of the successes of the *Designing for the 21st Century* initiative. In describing some of the 'imaginative' cluster activities that utilised methods which have moved them away from a 'talking-shop' scenario to achieve their aims, he stated that such mechanisms 'provide material for reflection and discussion, if you see what I mean. It seems that sharing a common task provides a great conduit for fast-forwarding some of these problems we have in bringing the groups together'.

However, it was not only the opportunity to engage in these 'different' kinds of activities alone that moved cluster members towards a shared understanding. Inns thought that there is 'something about the individual and their outlook and the way they perceive things which is quite important. Which is nothing to do with the discipline, it's just the way they operate in life'. Alongside this he proffered the idea that some groups were united by a 'shared passion' for their topic of research and the conviction that 'the application of their knowledge might make a difference' which provided 'a great platform for building, you know, cross-disciplinary discussion'. Having the appropriate outlook, including the ability to form trusting relationships within the groups quickly was, for Inns, indicative of the fact that some of the projects were working towards interdisciplinarity more easily than others. He stated:

It seems to work really well where people can build trust very quickly. I think trust is an extremely important aspect of this and I think trust-building is probably quite

complicated when you're going across disciplines until you've worked out this common currency.

Although clusters are made up of people who know, or know of, each other in many instances, Inns thought that 'they have to build trust that goes beyond their previous discussions because they're focusing on a new topic' so that, although some participants in these projects may have a history of working together, they nevertheless were required to make a further commitment in their relationships in order to achieve successful interdisciplinary exchanges. We shall return to similar issues as those outlined here, regarding disciplinary languages and interpretations and how these have been experienced by the participants in the different clusters.

In our attempt to assess how interdisciplinary the *Designing for the 21st Century* programme was, Inns was asked for his opinion on the importance of interdisciplinarity to the two research funding bodies:

I think it's hugely important. I had a workshop with the, um, people who are operating these research cluster projects, the programme last week, and part of that workshop, two-day workshop, one of the exercises was to identify potential criteria that might be used in the next research call. So there's a kind of interesting process as well as having peer review of proposals, we've got peer review of criteria which will then go to peer review, if you see what I mean. So they were looking at potential criteria and, um, one of the most, um, one of the key criteria, one of the primary criteria was the need for interdisciplinary input into any project that fits within the initiative.

Although Inns had confidence in the research councils' commitment to interdisciplinary research, he had some reservations regarding their ability to judge or assess it appropriately, and other issues arising from his experience as programme director were related to issues where interdisciplinarity was halted or impeded by the infrastructure in which it operates. One such example was the set-up of the research councils themselves, which he thought were not able to deal adequately with interdisciplinary research even though, as he noted, they are under political pressure to promote it. The main barrier within the councils, he argued, was the system of peer review:

The whole way peer review colleges are structured doesn't really support interdisciplinary working and, in particular, the way peer review colleges are briefed on proposal assessment is totally inadequate for multidisciplinary, sorry, interdisciplinary activity. So there is this huge amount that the research councils have got to do internally in terms of their structures and ways of working to actually make this run smoothly.

Although, as the research councils claim, panels are in place to assess interdisciplinary research projects, Inns stressed that the process of peer review lends itself to mono- rather than inter-disciplinary assessment in that proposals will be read by individuals from the perspective of their own disciplinary background and, as such, 'when those individuals review the proposal I don't think they genuinely review it from an interdisciplinary perspective. I think they review it from the context of their discipline'. Accordingly, judgement on a proposal is made from a disciplinary rather than an interdisciplinary standpoint as panel members are not 'necessarily briefed in what a true interdisciplinary

viewpoint is' (Inns). Similar findings have been reported by Mallard et al (2002a and 2002b). To counteract this obvious stumbling-block, Inns suggested that interdisciplinary workshops should be organised by the councils for participants 'to truly understand what this actually means and what they should really be looking for in proposals' (Inns). As this report and others, have shown, however, reaching consensus on what interdisciplinarity actually is, remains a major difficulty in need of clarification before such workshops could take meaningful effect.

Another major impediment to interdisciplinarity referred to by Inns, was the issue of research assessment and, although he thought that 'increased research quality and so on' was 'undoubtedly a huge benefit' of the Research Assessment Exercise (RAE), he nevertheless also described it as a 'significant barrier' to interdisciplinary work for academics as it 'forces everybody to sit within silos'. In describing what he thought to be the 'profound effect' of the RAE on individuals from academe, he gave the following example of an academic whose work could not readily be accommodated by the RAE:

Somebody described it to me last week, they feel that this is something they're passionate about but it's almost like a hobby, getting involved in this kind of project work, because it doesn't have ... it's not perceived as being as credible, perhaps, as some of their mainstream work, by their peers or by their institution.

Some academics had been discouraged by their institutions from participating in the *Designing for the 21st Century* programme, for example, because their institutions regarded their participation as 'moving them off target for the next RAE'. Inns spoke of the potential damage of such short-sighted approaches, as he reiterated:

The problems that are going to confront the world in the future require an interdisciplinary solution and whilst you've got something like the RAE forcing people into silos they've almost got their hands tied behind their back and I think it's extremely dangerous.

He further added that the RAE was 'really damaging academia's potential to resolve some of the problems that confront society'. This was a recurrent theme throughout our interviewee narratives. We discuss the RAE in more detail in a later section of the report.

4. Practising interdisciplinarity

The following section of the report presents an in-depth account of what interdisciplinarity means in practice to some of those involved. This section is based primarily on our analysis of the qualitative data generated from the telephone interviews we carried out.

4.1 Researchers' professional histories/ experiences of interdisciplinary research

In our study, the professional history of the researcher emerged as an important factor in relation to working in an interdisciplinary way. Many of the respondents told of

backgrounds which could be classed as interdisciplinary or multidisciplinary, or of switching from one discipline to another during the course of their career. This was not always seen as positive in terms of career progression, but most acknowledged that individually they crossed boundaries, sat on edges of disciplines, or inhabited fuzzy disciplinary boundaries.

It was suggested that 'if you come from sociology or geography, you have a higher disposition towards interdisciplinarity.' (PD2) However, many respondents in this study came from a variety of disciplines and commenting on their background shows that it is not only within and across the social sciences that interdisciplinarity occurs, or is made possible.

[I have a] first degree in computing and psychology, Masters in computation, PhD in Human Computer Interaction (HCI) and working in HCI ever since. And that's pretty common. There's four faculty staff here in HCI and two of them, including the head of the computer department, have got first degrees in psychology and PhDs in psychology and the other has a first degree in psychology and a PhD in HCI, I believe. And then there's me. So interdisciplinarity is quite a common thing. (R3)

Another respondent said:

I tend to work very interdisciplinarily. My background is, well, my degrees are in psychology and statistics and computer science is my third discipline. ... My next collaboration will be with somebody who's doing dance. (R5)

Within this group of academics it was more common to have a varied background than a single discipline background. A typical response to the question 'what is your background?' would be as follows, with it being suggested that it was not a straightforward question to answer.

I knew you were going to ask me that, it's a difficult question to answer straightforwardly. My disciplinary background is nutrition, human nutrition and I have a Masters in that. I was in a Human Nutrition Department ... I worked within it for quite a while, but I increasingly felt that I was on the edge really, and was interested in wider issues to do with the food system ... I increasingly applied for jobs within social policy, which linked to my PhD. ... I started in what was then the Department of Social Policy and Social Work, I was in the small Social Policy Group. And then the Social Policy Group, in fact, moved out of that department and moved into the Department of Sociology. So I don't have a sociology background, although I keep discovering a lot of what I've been doing is sociology, that is what I'm told by my colleagues increasingly. So I look as though I'm a sociologist, although I am not strictly. (R8)

Switching from one discipline to another was regularly commented on as a professional history disposing researchers favourably towards interdisciplinarity, as was working across departments.

But my own work has been quite interdisciplinary, has been interdisciplinary, well for a long time, because I'm both in French and in Media and Cultural Studies. So in a sense, my own research project, individual research projects have been interdisciplinary all the way through. (R2)

The issue of social networks in research collaborations will be discussed in the next section but the fact that all collaborators had interdisciplinary backgrounds was felt to be an advantage to the working of an interdisciplinary project.

I think that [interdisciplinarity] has been really helped by the fact that within the team we, kind of, have quite fuzzy disciplinary boundaries as well. For instance, I was in geography and now my post is Lecturer in London Studies so my other job, my main teaching job is entirely interdisciplinary. [name] is a sociologist, wasn't always a sociologist. Her background is that she's a public health nutritionist. And [name] who's our research assistant, her PhD is in geography, but her first degree was in business, and I think her PhD was jointly supervised between geography and business. So I think we were already people who were sitting on edges. (R9)

This sitting on edges and crossing boundaries was not always considered the best career path. One academic was told early in his career that 'you'll be a jack of all trades and a master of none' (R7) and it was suggested that his career, despite having reached the position of professor, had been hampered by his position as an interdisciplinary academic within the hard sciences.

Bruce et al (2004) in their report on interdisciplinary integration suggest that Having an interdisciplinary background could be seen by researchers as either an advantage or a disadvantage in career terms. In universities, it was more often seen as a disadvantage while in industry and many research institutes, it was an advantage. (2004: 464)

This issue of the advantage or otherwise of conducting interdisciplinary research is linked to a variety of factors including the discipline/s within which one works (one respondent from Human-Computer Interaction, for instance, highlighted the fact that HCI by its very nature is interdisciplinary), the point at which one is in one's academic career, and the experiences of interdisciplinary working one has had.

For some respondents these projects were the first time they had worked on interdisciplinary projects with academics from other disciplines: 'But this is the first time I'd done something interdisciplinary with someone else from another discipline if you see what I mean.' (R2) This academic thought that she worked in interdisciplinary ways individually anyway, working as an 'interdisciplinary'. One academic with fuzzy boundaries described herself as a 'difficultologist'. One respondent suggested that the opportunity to work in an interdisciplinary way had originally been coincidental but now she was actively seeking out ways in which to do this. This was helped in her case by her faculty being multidisciplinary, allowing for greater opportunities of crossing disciplines. Joyce Tait (<http://www.esresocietytoday.ac.uk>, accessed 17/10/2005) states that 'taking an interdisciplinary career path can be much more uncertain and more risky than concentrating on a single discipline – you can spend three years working across a range of disciplines while your colleagues have spent the same length of time improving their career prospect by working on much more narrowly focussed research.' However, she goes on to say that 'being married with three young children when I started my academic career, I was less able to move around to find the ideal job for me. Being interdisciplinary allowed me to keep open a wide range of career options.' Having a personal research history which crossed disciplinary boundaries was viewed as quite important for the success of collaborating in interdisciplinary collaborative research.

4.2 Choosing collaborators for interdisciplinary research projects: the meaning of the social in defining research agendas

As Frank Trentmann, Programme Director of the *Cultures of Consumption* programme acknowledged, researchers' social networks within their work contexts are important in decisions on collaboration. This in turn impacts on the shape and outcomes of research since the selection of partners to work with is determined by factors other than strictly disciplinary or research ones so that, ultimately, research agendas as much drive collaborative practices and choices, as choices regarding collaboration determine what research is undertaken.

Most of the respondents in this study suggested that existing networks were important in choosing project partners. Such networks may exist at local or at inter/national level. At local level they were partly a function of the spatial arrangements in a give institution, that is the extent to which proximity in departments and/or buildings enabled opportunities for meeting and thus building up relationships that might in time form the basis for collaboration:

Well, I think having people together in the same institutions, is, is pretty basic, it doesn't mean that interdisciplinary, greater interdisciplinary engagement will follow, but it certainly makes it possible. So I've been very fortunate in that way as I've explained, I've actually been in a setting, where on a daily basis, I did see people from other social science disciplines at least. (R6)

We initially had four people based in the one university, the one institute and it was quite easy. (R2)

Ok, at the time I was working at [university] with [name] and [name], who originally wrote the proposal together. They showed it to me ... I had worked with both of them on other things before although their work was much, they did more work together than I did with either of them. (R9)

I think she'd looked at an article which was in the local magazine, ... and her and I got together for lunch and there was this immediate kind of friendship or trust and since then, [we] have become good friends and that's been the kind of most, the most critical part of how this all started, this kind of trust and the friendship. (R4)

Meetings in corridors and coffee rooms, attending seminars in the same building, and having newsletters detailing colleagues' interests were all ways in which relationships had started. Our respondents were at the same time clear about the fact that different contexts yield different contacts:

If you hold the talk in the computer science department, you're going to get more computer scientists, if you hold it in an art department you're going to get more artists, but what's important is that in giving these talks it helps institutions to, um, possibly break down their barriers to interdisciplinary research. (R4)

This interviewee strongly related the development of working relationships with colleagues from other disciplines to seemingly intangible issues such as trust and asked:

So the biggest problem is, why do you trust someone in another discipline enough to spend the effort getting to a point where you can actually get to a point where you can see if it can work? (R4)

Our research indicated that in many cases ‘recognition’ in terms of friendship, trust or understanding in the first instance made individuals want to put in some effort to see if there was a possibility of working together. Our own experience of interdisciplinary collaboration across projects has also shown that both intellectual and emotional affinities are critical in long-term research networks. These affinities tend to be built along quite specific dimensions such as respect for the other’s ideas and knowledge, trust, reliability, the ability to deliver appropriate work to deadlines, the ability to work in a constructive and conciliatory manner with colleagues from a range of disciplines, intellectual traditions and socio-cultural backgrounds, proactive involvement and active interest in the work undertaken, a cheerful, supportive and appropriately pragmatic disposition, active contributions, and a willingness to compromise and seek shared solutions to issues that arise. This is not only the case with immediate colleagues, but also at the inter/national level where relationships were sometimes built through meetings at conferences or other events, but might also involve cold-calling academics whose work one knows. One interviewee reported that not having used existing contacts for a large project, she then had difficulty in recruiting an interdisciplinary team as she did not know people in the disciplines she was hoping to establish links with. Only when she used existing disciplinary networks did she manage to build the interdisciplinary team she was aiming for. As with any collaborative project some members of the team got on better than others. This affects future collaborations.

I imagine different combinations will arise after the project, certain team members might work together to pursue some of these themes and publish those in different areas. I think that will probably happen. (R1)

This collaboration and future developments were not only considered at project level but also at programme level. In the *Designing for the Twenty First Century* cluster groups the participants were given the opportunity within a workshop to ‘identify potential criteria that might be used in the next research call’ (Inns) thus having potential input to the shape of future research funding. This process was a consultative exercise that enabled researchers to help set research agendas whilst providing funders with input and ideas from the research community.

The last five years have seen an increasing emphasis in universities on collaborative research. Many universities have moved to establish research centres and institutes on particular, often interdisciplinary research areas. This drive to coalesce a critical mass of researchers around certain topics has meant that a number of institutions have given academics both money and space to get to know each other, with the aim of developing interdisciplinary collaborations.

It was a combination of, er, the university giving some support to (...) inter, well, yeah, giving some support to interdisciplinary research, because the remit for the research institute was that they should bring together groups of researchers from different disciplines who would therefore be able to look at questions, big questions, that single disciplines couldn’t, er, resolve, or you know, couldn’t have any real purchase on. ... it came out of the fact that we

were given the space, to talk across disciplines and across departments, and something came out of that. (R2)

In some cases the composition of the teams was very much a snowball effect, with one member suggesting another, and bringing someone on board from their own networks.

Right. Um, long story. Um, we had a broadminded industrial liaison person ... he'd met [name] at an exhibition, I think. And he invited her up here and we had a general chat and, um, and she's obviously a very interesting person ... so I had her in the back of my mind. ... we put together an interesting team and I pulled her in on it and she said, 'why don't you talk to our performing arts people?' and I said, 'ok' and we put [name] in on that and we had our old friends at computer science at Brunel and they said, 'why don't you pull our performing arts people in?' ... we had a few from typography at Reading and Sociology at Stirling and, um, oh design at, um, Bewick Cardiff ... It's a very good interdisciplinary team, I thought. ... Oh, and I'll tell you someone else I drew, was [name] from Edinburgh. (R7)

Even though this team had been unsuccessful in their bid for funding, the networking had created another link into which the interviewee was drawn, and out of which a successful bid had come. This in a sense inadvertent snowballing effect had managed to create a useful network. However, one respondent reported that it had taken some time and effort to engage people from other disciplines with whom she had not had immediate relationships:

the one thing which, at the very beginning, was not as good as it could have been, was that I had difficulty in engaging the artistic community and it took me probably about eight or nine months before I found somebody who was then willing to send out my e-mails to lots and lots of their members, and in the end I ended up with fifteen artists wanting to come to the last workshop. (R5)

In this instance the process had taken much more time and effort than expected and more so than would have been needed to recruit a discipline-based team. This time investment needed for interdisciplinary collaboration is widely reported in the literature (e.g. Bruce et al, 2004, Tait and Lyall, 2001, Creamer, 2005, Hersch and Moss, 2004).

Socialising itself was important for the process of working together and to ensure planned work materialised.

... we had quite a lot of socialising, even with the European project, not because it was fun and kind of kept you on track and made you think, oh yes, I'll do my work for X, because, you know, we had a nice time. I don't think it was that, I think it was a genuine recognition that unless you have some sense of how other people work, it is very hard to write with them. (R8)

The 'social' then is highly significant in research. Whether it is the fact that you work in the same building and have a coffee break and build up a relationship that encourages you to explore possibilities of crossing disciplinary boundaries, or the fact that someone is doing some work on X and they think that input from your perspective would develop the research in a new and exciting way, or that they know you are a reliable partner – all these factors play a role in interdisciplinary research, often to a much greater extent than one might expect, since it is these factors that will at least partly drive what research academics engage in.

4.3 Defining interdisciplinarity in interdisciplinary research projects

One of the striking, if perhaps predictable, traits of interdisciplinary research, whether at programme, or at project level, is the difficulty of defining interdisciplinarity (see also Kuhn and Remoe 2005; Moran 2002). As sections 2 and 3 in this report already indicated, on the whole ‘interdisciplinarity’ tends to be avowed or asserted, rather than defined. In our interviews with both programme directors and project participants we found that the terms interdisciplinarity and multi-disciplinarity tended to be used interchangeably, and that the phrase ‘working across disciplines’ was also fairly commonly employed whilst ‘transdisciplinarity’ was mentioned only in passing and ‘post-disciplinarity’ not at all. One of the programme directors, for instance, described himself as having ‘always worked across. . . disciplines’ and thought that that was one of the reasons why he was chosen to be programme director. The other programme director thought that he had been approached because he had ‘done some interdisciplinary work’ and because he viewed his own discipline, history, as having a bridging function across the humanities and social sciences. Both programme directors had a strong drive to promote interdisciplinarity within their programmes but its implementation at project level was a different matter. Project proposals were required to articulate their interdisciplinarity at the point of application, in the *Cultures of Consumption* programme in the form of a box in which, as the programme director said, ‘they could proclaim the wonders of interdisciplinarity [even if]. . . they’re not really intending to do very much about it.’ (Trentmann) But there were ‘no formal requirements attached to the interdisciplinary pledges.’ (Trentmann) Both programme directors highlighted that engagement with interdisciplinary research projects was connected to personality and disposition:

For some applicants that was a box which just needed to be filled in somehow. . . for others that was a genuine opportunity to think about possible connections with other projects. . . to think about ways in which they could exploit interdisciplinary opportunities that the programme has. (Trentmann)

This type of working attracts a certain sort of personality. . . which is nothing to do with discipline, it’s just the way they operate in life. (Inns)

Within the projects, as section 4.3 in this report demonstrated, views of – as opposed to definitions of – interdisciplinarity varied widely. One interviewee, a senior researcher in the *Cultures of Consumption* programme who defined his project as mainstream sociological, said that in the programme ‘no requirement [had been] indicated that the particular projects under the programme had to be interdisciplinary’ (R6). He focuses on the programme description as multi-disciplinary. As he said: ‘It wasn’t even clear to us in what sense any interdisciplinary activities would be carried out within the programme.’ (R6) He told us that ‘so far as I am aware, issues of interdisciplinarity were never raised with us while the application was being processed. . . interdisciplinarity didn’t figure.’ (R6) In his view, interdisciplinarity was ‘entirely a question of the problems one is addressing’ (R6), and ‘more applied research’ in particular lent itself to an interdisciplinary approach. He had extensive experience of working with people from other - but adjacent - disciplines and noted the ‘“increasing porousness” between disciplines’ in contemporary academe. His approach to his research was entirely problem-centred and instrumentalist in his engagement with other disciplines, based on the specific research concerns he was working on.

This was not dissimilar from other interviewees who also chose to work with people on the basis of 'best fit' for the project at hand. However, that 'fit' was frequently determined by whom one knew or whose work one was familiar with rather than by the strict requirements of the research work at hand. Typically interviewees would say: 'I had worked with both of [the other researchers] on other things before. . .' (R9) This highlights the importance of prior knowledge about other researchers. Strathern (2004) talks of collaboration as 'where what gives people value in one another's eyes is their distinctive (disciplinary) expertise' (82). However, as we found in our research 'what gives people value' is not just their expertise but their disposition (see section 4.2), how *sympathico* they are. This brings up the meaning of the social in research, already referred to in section 4.2 of this report, an under-explored and unarticulated but key aspect of collaborative research which frequently relies on established networks, long-term collaborations arising from having worked in the same institution (either in the past or in the present), and informal contacts. We would argue that there is significant need to carry out research to understand the implications (facilitative, hindering, distortive) that researcher networks have on research carried out and the direction in which research is taken. For, contrary to the notion that research is driven by (public) research agendas, funders' thematic priorities, or some abstract notion of 'disinterested' research or research for research's sake - all of which of course have some bearing on the research conducted - we would suggest that much research is compelled into existence and sustained by the socio-cultural formations around which researchers coalesce, and which give direction and shape to the nature and object of their inquiries.

Only one of our interviewees described a deliberate and structured attempt to bring together a multidisciplinary team made up of people not previously known to her. This attempt involved reading other people's work and identifying potential project participants through extensive research on these people's work. This interviewee stated that 'the world isn't divided into disciplines' (R9) and in her project she had maintained significant focus on process, and continual reflection on the interdisciplinary aspects of the research-in-progress. Thus partners had circulated texts they found relevant and interesting for the project to each other, and in discussions reflexivity played an important role: 'We continually talk about how we approach, just erm, sometimes you know, we'll be having meetings or be talking about something and we'll realize, all of a sudden, that we weren't all talking about the same thing. And then we'll kind of go back a step and talk about what it was each of us was talking about, and then, you know, move on from that to kind of say, ok then, from this what can we do?' (R9) The same interviewee also stated that 'I think that has been really helped by the fact that within the team we, kind of, have quite fuzzy disciplinary boundaries as well.' (R9) Another interviewee made similar comments: 'When you have an interdisciplinary project, it's much less clear what the outcomes are or even how you should manage the process of sustained inquiry between the team. And I think one of the important things is to keep re-negotiating what everyone wants from the project. . . you talk and you share and you work in each other's cultures almost.' (R4)

Such openness and willingness to re-think was quite unlike the experience of partners in some other projects who, if anything, had suffered from the taken-for-grantedness of the research process as an unspoken and un-discussed aspect of their work. Such an attitude then resulted in partners withdrawing into their disciplinary shells, and working in parallel rather than together. As the projects we investigated were under way at the time of the interviews, partners in projects that had not achieved sustained integration sometimes hoped that more collaboration and exchange would occur at a later stage, for example when

the results of the research needed to be written up: ‘that’s where it’s going to be knitted together’, one said hopefully (R2).

Effectively, all of this means that interdisciplinarity emerged as a set of practices and dispositions which were engaged in/with or distanced from to varying degrees in different projects and by different project partners. Insofar as definitions of interdisciplinary working emerged from the interviews, then, they could be divided into four categories of relation, each of which we shall now discuss in turn:

1. the interdisciplinary discipline;
2. adjacent disciplines;
3. affective affinities;
4. ideological affinities.

It must be said that these categories are not necessarily mutually exclusive but they underpinned interdisciplinary dispositions and practices, sometimes overlapping.

4.3.1 The interdisciplinary discipline

One of the striking aspects of our research was that both the programme directors and many of the project participants described themselves as interdisciplinary, or having crossed disciplines. Some, however, went further to suggest that their discipline was of necessity interdisciplinary. A case in point were researchers working in Human-Computer Interaction (HCI) and who participated in the *Designing for the 21st Century* programme. One participant described HCI as ‘fundamentally interdisciplinary’ (R3): ‘we’ve had to draw on all kinds of other disciplines, psychology, sociology, mathematics, electrical engineering, you name it, it’s been used within HCI, and then, you know, creativity. . . within HCI creativity is just following in a tradition of interdisciplinarity.’ (R3) HCI researchers, ‘a reasonably small community but it covers a vast range of approaches and methods and topics’ as one interviewee put it, not dissimilarly to researchers from Women’s Studies, for instance, saw themselves as a marginalized research community whose very interdisciplinarity created problems in educational systems that use disciplinary location as a means of identifying merit. Problems with finding publishing outlets, having funding applications appropriately evaluated etc. were repeatedly mentioned as hindrances to such interdisciplinarity, driving researchers into compromise positions in relation to both their research and the system itself. It was quite clear that a research area which identifies itself as interdisciplinary also saw itself as marginalized and not easily accommodated within current research structures, other than through the thematic.

4.3.2 Adjacent disciplines

At the other end of the interdisciplinarity spectrum from HCI where people from radically different disciplines such as fashion and engineering might collaborate, were those who collaborated across adjacent disciplines; as one programme director put it: ‘the interdisciplinary work that is often produced is between very, very close disciplinary neighbours.’ (PD2) Such collaboration often went together with a sense of cognitive affinity, the notion that one shared common paradigms, methodologies, understandings of research and research questions. Examples of this were researchers working across the social sciences, or with people from other disciplines employing similar methods. As one interviewee said: ‘a lot of my work is highly quantitative and I do have excellent working

relationships with a number of statisticians. Then again, in other work that I'm doing, it is becoming closer and closer to what economists are doing. . . ' (R6) This interviewee's interest in quantitative methods meant that he had a greater sense of kinship or elective affinity with others using the same methods than with those from his own discipline using other methods: 'I do find it much easier to work with economists and statisticians than, well, even with some kinds of sociologists, especially sociologists who[m one might] take as representing what's called the culturalists' turn, or cultural turn in sociology, or postmodernists, or people who follow that direction.' (R6) This interviewee argued strongly, and perhaps surprisingly, that 'there is quite a close similarity between the problems a quantitative sociologist would have tried to make sense of survey data and, say, a historian looking at documents in an archive. I think the same logic of inference operates and there has to be the same concern with the reliability and the validity of the data.' (R6)

People who liked to work with those from adjacent disciplines tended to identify 'adjacent' in terms of mindsets and method/ologies. By the same token, those who had such a preference but found themselves working with people whose mindsets they perceived to be radically different tended to accommodate this through a vocabulary that changed the category of that work from 'scientific' to 'whacky' or 'entertaining' (see also section 4.4.8 in this report). Involved in a *Designing for the 21st Century* project, one interviewee for whom this was the first experience of working with artists, spoke of his own disciplinary base, computer science, as doing 'quite boring stuff' whilst with artists, he argued instrumentally, 'you can make more publicity for your research' (R11). He saw disciplines that he described as 'precise sciences' such as engineering, chemistry, or mathematics, as similar to his own, and therefore argued that collaborating with colleagues from those disciplines was not so interdisciplinary (R11): 'But when you talk to artists then, obviously, it's proper interdisciplinarity because they think differently, they understand the world differently and they have absolutely different backgrounds.' (R11) This meant that he would probably never work with them again because 'our final aims and goals are quite different' (R11), not least because 'they don't need publications in high rated journals, they just need to make installations and are just public, and therefore results produced by artists, they will never be accepted by a scientific community as a fundamental theoretical result, for example.' (R11) Here we see the articulation of a particular scientific paradigm that distinguishes between a specific notion of science, and a different activity, described by this interviewee as 'entertaining' at another point in the interview, and relegated to the position of other, with whom 'proper interdisciplinarity' could be practised but not as a repeat experience.

Comparing the two interviewees' responses set out under the heading 'adjacent disciplines' it is evident that working across different disciplines with similar mindsets, methods, paradigms is viewed differently by these respondents in terms of degree of interdisciplinarity – whilst one was content to view such collaboration as interdisciplinary, the other was not. Especially the latter, interestingly, displayed a very workmanlike attitude towards his research. Much of his time was taken up with writing research proposals and grant applications and submitting and re-submitting these. When asked about how he found collaborators, he said: 'I meet these people at conferences and on the editorial boards of journals. Therefore it's real easy to select necessary partners. . . ' (R11), and he therefore did not feel the need to do much 'social' work around collaboration. This stance was quite different from those who worked on the basis of affective affinities as detailed in the next section.

4.3.3 *Affective affinities*

Liking potential project partners, another dimension of conducting collaborative research, emerged as an important factor in some people's choice of project partner. In one project a partner described the coincidence of a specific disciplinary input into a project and involvement within it:

[the researchers] soon realized they needed a mathematical modeller. [Name] knew about me; I think she looked at an article which was in the local [University] magazine. . . and her and I had lunch together, and there was this immediate kind of friendship or trust and since then [we] have become good friends and that's been the kind of most, the most critical part of how this all started, this kind of trust and the friendship that [name] as an artist and myself as a mathematical computer scientist have. (R4)

This friendship and trust was partly built on straightforward affective affinity ('I like X basically.') and partly on the sense of a real contribution that this interviewee thought he could make to the project and the ways in which he felt taken seriously and validated within the project: 'when she showed me the problems I could see immediately that she needed my help, because there was no way she was going to be able to simulate this model. . . So I could immediately see that there was a role for a mathematical modeller to work with an artist.' (R4) The coincidence of liking someone, which could mean finding them interesting and/or refer to a less well defined feeling of sympathy, and which we here describe as 'affective affinity', was repeatedly mentioned as important in the configuration of interdisciplinary teams. One interviewee, for instance, said of a project partner that prior to conceiving of the project 'we had a general chat and she's obviously a very interesting person. . . but, on the other hand, coming from the sort of garment area. . . so I had her in the back of my mind.' (R7) The first project they then put together did not receive funding. When a subsequent project, initiated by the person from the 'garment area' and into which he was invited, did get funding, he put it down to the fact that the first project 'wasn't whacky enough' (R7).

Here one can observe a snowballing effect in project participation based on affective affinities that are partly professional, partly personal. Once a connection has been established, that connection may be used again and again to move the research on and create further projects. Interviewees working on that basis across disciplines would often say things such as 'she was always kind of on the horizon, she was somebody we really hoped we'd get involved' (R9), and mostly they then did.

4.3.4 *Ideological affinities*

Apart from affective affinities, ideological affinities, by which we mean the sharing of a particular intellectual stance, was an important factor in collaboration. For some this took the form of having a similar stance ('what's essential there is some shared understandings of the sort of basic principles and methodology of social science' R6) which formed the ground for collaboration and also implied that certain differences could not be bridged: 'I'm simply not on the same wavelength as [postmodernists], I've no common ground in method and so on. I also, perhaps for similar reasons, have found it difficult to connect with a lot of social and cultural anthropologists.' (R6)

Ideological affinities might occur as a result of interdisciplinary interaction, following, for instance, affective affinities. One researcher talked of being attracted to his partners' research and their work, and deriving a shared intellectual stance through utilizing their work to transform his own. Another said: 'we're broadly similar and cognate and we're all

travelling in the same direction' (R7) though his narrative was also laced with repeated references to being in the early stages of the project ('we're a load of individuals with different ideas') which suggested that processes of integration had still to be undertaken. The same interviewee said of another project that there the researchers 'all spoke much the same language' with the exception of one who had had a radically different and highly politically invested agenda from which the others had demurred and which eventually led to this person leaving the project since she was ideologically isolated within it: '[that researcher] was very much concerned with this political issue and seemed different from the design questions the rest of us wanted to pursue.' (R7)

Ideological affinities, then, encompassed stances to do with the politics of research, the politics of the research topic, and the intellectual and/or methodological terrain the research occupied. These were either already a given factor prior to the collaboration, or a factor in selecting partners right at the beginning of the collaborative project, or achieved through exchange during the project. Where such stances could not be aligned, partners found it hard to sustain their involvement in the project.

4.4 Issues in interdisciplinary research collaboration

4.4.1 Researcher Personality (open vs closed minds): attitudes to interdisciplinarity

According to Bruce et al (2004) the ideal qualities of an interdisciplinary researcher include

- Curiosity about, and willingness to learn from, other disciplines
- Flexibility and adaptability
- An open mind to ideas coming from other disciplines and experiences
- Creativity
- Good communication and listening skills
- An ability to absorb information and its implications rapidly
- Being a good team worker (2004: 464)

Their research suggests that

There was a common view among survey respondents that personality and attitudes are at least as important as discipline base and specialisation for the successful conduct (and especially co-ordination) of interdisciplinary research. (2004: 465)

The respondents from this research confirmed that view. Most of the qualities above were mentioned during the interviews with the research teams. Many stressed that they were broad-minded people, as were others in their teams, they were curious about the world in general and interested in topics which themselves spanned disciplines.

I suspect that this type of working attracts a certain sort of personality. ... But I think there is something about the individual and their outlook and the way they perceive things, which is quite important. Which is nothing to do with discipline; it's just the way they operate in life. (PD1)

... they have a bigger picture of the world and they're more willing to be educated. (R3)

I hope I've illustrated the way I fire on a lot more cylinders rather than the way engineers are narrow and the way that, um, a lot of the left-brained people, um, are clueless about engineering and cynical about it. So I'm very much a CP Snow *Two Cultures* person, to inform both sides about the strengths of both. (R7)

The principal investigator or driving force particularly needed to be broad minded. This person also needed to be able to motivate others

you need that person there driving it, you need an individual, I think, driving it, otherwise we tend to go back to our own studios and laboratories and whiteboards in my case and just do our own thing, to a certain extent. (R4)

... and the person who was driving it, who was the epidemiologist, had a very wide and eclectic understanding. He wasn't on the whole narrow in his thinking at all. (R8)

The most productive workshops were those where open-mindedness reigned: 'I think the attitude was that people were very open and that they wanted to gain from it.' (R5)

It's very clear already that there are some people from particular disciplines, and I don't know whether that's a personality thing or whether it's the nature of the discipline that they come from, they're already, um, using different terminology and communicating in ways that you didn't see them doing originally. (R5)

I think one of the things which was almost like an unforeseen outcome, coming from different disciplines has been how good it has been on keeping us conceptually open-minded, you know, we haven't at any point closed down avenues of what we might be able to explore. (R9)

You do sometimes wonder whether you're doing the right thing and sometimes people are looking at you to say, well, 'what are we doing this for?' [laughs] you know, particularly the more science-based people, because they're used to doing things with very clearly defined, you know, parameters and outcomes, whereas we've decided to take a very, very open approach. We just, you know, see what happens. (R10)

However, not all people were considered to be as open-minded: 'some people kind of pull back, you feel that some people pull back into their disciplines.' (R2) Overall, though this research has found that the majority of people stressed that they, their teams and others who would be interested in their work were open-minded. This then agrees with the personality traits described by Bruce that for interdisciplinary working people have to be open minded, quick to catch on and be willing to be adaptable: '[laughs] It opened my mind, not in the sense of science but just, well, just in general sense, in philosophical I would say.' (R11)

Generally good interpersonal skills were considered important for interdisciplinary work: 'I think for interdisciplinary research you need quite highly, um, honed interpersonal skills.' (R4):

I've always been very keen on communicating and I'm also a musician so, in a sense, um, I think I had more flexibility anyway, as someone who practised both music and mathematics, both in a professional way and I would say that

communicating mathematical ideas is something I've thought about very much.
(R4)

Some of the respondents discussed how much they liked working in interdisciplinary ways and in interdisciplinary teams. Although they found it difficult to articulate the differences between inter- and multi-disciplinarity, they found it easy to discuss issues of working in this way:

Well, you can probably tell [LAUGHING] that I really enjoy it, it's just a nice productive way to work, erm, but very occasionally I do, kind of, find myself doing stuff that is really, really solid geography and I kind of think, this is terribly comfortable isn't it, it's like a nice cosy pair of slippers, and it's easy.
(R9)

But that ease and comfort is not what everyone aims for.

I'm excited by uncertainty, you know. I'm a jazz musician so when I play the piano the uncertainty's a thing that drives me. I really don't know what I'm going to play next. And it's that, that's the thing that turns me on in life, you know. If I kind of knew what my day was going to be like tomorrow I wouldn't want to do it. I want my day to have unpredictability and conflict and, um, and (regular) issues too, of course ... People who don't like uncertainty in their lives don't make [good] interdisciplinary researchers, I think that's right, or they won't enjoy it so much. If you don't enjoy it, you're probably going to be less good at it. (R4)

Moran (2002) suggests that

Interdisciplinary study represents, above all, a denaturalization of knowledge: it means that people working within established modes of thought have to be permanently aware of the intellectual and institutional constraints within which they are working, and open to different ways of structuring and representing their knowledge of the world.

The respondents in this study did just that. Mostly they were very open to looking for different ways of structuring and representing their knowledge of the world and excited by the challenge of new ways of working. They were also open in the ways that they were willing to share this knowledge. In the words of Sue Jackson, they aimed to transcend boundaries rather than just cross them (2004: 1).

4.4.2 Team dynamics and interpersonal relations

Most of the respondents enjoyed the experience of working in their project teams and attending the larger cluster groups organised by the research programmes: 'I have thoroughly enjoyed the project and the people, the team are great, it's worked very, very well.' (R1) There were many quotes similar to the above. For the most part team dynamics and interpersonal relations were viewed as one of the reasons why the teams had been successful in their research. This supports the findings of Hersch and Moss whose respondents 'universally enjoyed the challenges' (2004: 17). Many respondents were also very aware that they were setting up networks for future research groupings and projects. Social events were an important aspect of the team dynamics.

It's a nice group of people, I think it's a very nice group of people to work with, the very fact that tomorrow we are all going to [place] to have a celebratory lunch to say goodbye to [our research assistant], you know, ... people are

travelling long distances. It is part of the fact that we have worked quite hard to get to know one another, to hear one another, to listen to what we have to say, we respect one another, and to work together. That's partly an interdisciplinary thing, it's partly to do with people, because we didn't know each other terribly well to start with, some of us knew, most people knew one person, but nobody knew everybody, you know. (R8)

However this was not always the case and some had experienced members leaving the team as their ideas were not compatible with the group's *raison d'être*.

There was [name], but she's resigned. She was predominantly concerned with [a particular issue]. Now, I and I think the others, felt that yes, this was very worthy, but it was not the theme we wanted to pursue and it was, um, a separate political issue. (R7)

However, in some groups conflict was seen as a productive process and one group had written a paper on 'Conflict and collaboration in interdisciplinary research'. Even within the team though there were differences of opinion about the level of conflict that had occurred during the collaboration and how that had affected the process.

And I think that, for interdisciplinary teams to work, they have to be a much more emergent and fluid body and they have to be much more aware of kind of understanding the much more sophisticated and potentially conflictual relationships which happen in these relationships. . . We talk about how conflict is a really important thing. We recognise it as a really important theme. We're both British and we can map the, you know, people () but we're both quite strong people, we don't take this personally but () the stem cell biologist had a real cultural problem when he read the paper. He said, 'oh gee guys, we weren't really arguing that much, were we?' He was quite upset on a personal level talking about conflict, whereas we had no problems embracing conflict, it is really exciting. . . The excitement definitely came from the conflict and the misunderstandings. (R4)

Creamer (2005) discusses collaboration and conflict in her case study of an interdisciplinary research team. In terms of conflict she reports that 'When an exchange grows heated, Steven's (the principal researcher) discursive strategy is not to dismiss the differences or try to achieve consensus, but to try to push the exploration of how the multiple angles enrich the interpretation' (2005: 40). This may be one way to resolve differences. However, it has to be noted that not everybody sees the dynamics in a given team in the same way. The principal researcher in Creamer's study described the relationship as co-equal, after a period of master-apprentice mentoring. The researcher Paula, however,

was not prepared to characterize her relationship with Steven as coequal. Laughing at the suggestion that their relationship was coequal, she said that while there is a good deal of respect of ideas and that they go into writing papers with equal status, there are differences in status that are apparent in other aspects of their work. Steven has access to resources, like priority in receiving secretarial support, that Paula does not feel she has (2005: 39).

Even though many stressed that they had looked for, and were attempting to build non-hierarchical relationships with academics across the career spectrum, this type of inequality was reported from several of the working relationships in the projects.

Personal movement also had an effect on the team dynamics. One project had started with the majority of the team working within one university, but because of promotions and job changes this was no longer the case. Obviously this affected the team dynamics of the project and how the work got done, but it was not seen as problematic: 'Also, and [name] and [name] have now got jobs in other places, and that's fine, we manage to keep it going, but it has implications, and now as you may know, [name] has got another job.' (R8) One team had also had to deal with four instances of maternity leave during the project. This had meant that others had to take on work which they had not originally expected to do: 'sometimes it is, sometimes slightly more pragmatic than that, like I'm writing something at the moment because of a maternity leave ... she agreed to do and there was a deadline for it, so somebody had to do it.' (R9)

4.4.3 Young versus experienced researchers

All our respondents expressed views on the differences between young and experienced researchers regarding interdisciplinary work. Since we interviewed only one research assistant (RA), our comments are based predominantly on the experienced researchers' perceptions and are thus of necessity skewed. However, the views expressed were fairly uniform across those experienced researchers and indeed the RA. For the latter, participating in an interdisciplinary research programme for the first time had been 'a steep learning curve' (RA). She herself had a background in two disciplines (business management; geography) but had 'initially [found it] quite difficult to come to terms with some of the terminology that was being employed.' (RA) in a team in which geographers dominated. Throughout the interview it was clear that she had tried to keep both disciplines in focus rather than meld them into one conceptual frame. Thus she wanted to 'hold firm my traditions from the business management theory, but also to accept [geography] and I did a lot of reading initially of undergraduate geography texts, if you like, just to get up to speed.' (RA) This dual mind set was partly underwritten by the way in which the research team itself, from her perspective, continued to operate within disciplinary niches: 'we each have our own research agendas and we like to do different things with the analysis. We've managed to, sort of, divide in that sense.' (RA) The RA in question felt very well supported by the project team, the majority of whom were geographers, but nonetheless remained strongly identified with the disciplinary base that, in fact, set her apart from the team: 'I don't feel that I would now as a result of this project target for instance a geographical journal, I will probably still want to publish in my own sphere of business literature. . . I guess for a comfort zone, I feel happiest still with the business management literature. . . ' (RA). Ambivalent about an academic career at the point when she took the job as RA in the project, this woman in fact left the project before it finished in order to take a job outside academe.

Although this RA's experiences may not be typical, her views chimed with those of a senior researcher who said that she had found that 'some of the people who are not yet very secure in their education, certainly from the people at PhD and RA level, they're very, very defensive about their disciplines.' (R5) She then proceeded to give an example of younger researchers viewing a particular method as the only one to address a specific issue. When the limitations of the method were pointed out, 'they will immediately say, "oh well, they're not using it properly."' (R5) This interviewee was quite clear that 'younger men are more defensive of their disciplines than . . . the older men, and the women have never given any of those views at all.' (R5) Such defensiveness is, of course, a function on the one hand

of how young researchers are acculturated into ‘academic tribes’ (Biglan 1973; Becher 1989), and on the other of how such acculturation is supported by the assessment and other infrastructures of the disciplines.

Aspects of what the RA quoted above said were also reflected in other comments by the senior researchers who all bar one thought that engaging in interdisciplinary work was a precarious business for emerging researchers trying to make a career for themselves in academe:

[It is] much harder for younger staff who are given a much more prescriptive agenda about what they’re expected to achieve. . . I think what you find, a lot of people are like me, middle-aged or maybe even older, who, um, have kind of made it in their own field and are confident enough and have the time and flexibility to just experiment with these wonderful new kind of, um, practices. I think it’s much harder, you know, if I was 24, just doing a PhD, you’d want to get on and get your papers and your grants and all that sort of thing. (R4)

This response was very typical, and tied closely to perceptions of the detrimental effect of the Research Assessment Exercise (discussed further in section 4.7 of this report) on interdisciplinarity, linked to the discipline-specific assessment of publications. As one senior researcher put it: ‘If I publish in [a] journal of physics, for example, I couldn’t submit this result to RAE because, um, I go with electronic engineering or computer science.’ (R11) This was an absolutely standard response among our interviewees all of whom had very clear perceptions of how publications and project dissemination require disciplinary bases if they are to be RAE-able. As the same respondent put it: ‘for career development if you’ve got, for example, young post-docs, um, who want to develop, like chemists and become readers or professors, if they always publish in computer science journals they will kind of close career development in chemistry for themselves.’ (R11) And as one programme director put it: ‘there’s no journals that support these new interdisciplinary activities. Everyone disseminates backwards into their micro-discipline.’ (PD1)

The need to ‘service’ a particular discipline in order either to make a career within academe or to maintain one’s standing in a specific discipline meant that senior researchers, as much as junior ones, had to plough two fields at the same time, their monodisciplinary and their interdisciplinary one. Interdisciplinary work, ‘not perceived as being credible’ relative to ‘mainstream work’ (PD1), meant that some researchers did interdisciplinary work because ‘this is something they are passionate about but it’s almost like a hobby’ (PD1). Research as supposedly passion-based leisure activity is, of course, something that researchers in Women’s Studies are only too familiar with. Such devaluing of interdisciplinary research provides little incentive to pursue it actively. One of our interviewees said: ‘I have colleagues. . . who would consider my work a bit flaky and I think this is a real issue. Theoretical computer scientists will say I’m sure, behind my back, “yeah, [he’s] got a bit flaky recently because he’s doing some biology and some art, I don’t really know what he’s doing and he’s writing in a cluster.”’ (R4)

In this study we found that the potentially detrimental impact of interdisciplinary research on careers depended partly on the nature of the interdisciplinarity in question (see also section 4.3 of this report). The impact was perhaps most detrimental where disciplines – such as in the case of the RA cited above – were radically different, as in geography and

business management. Radically disjunctive disciplines could lead to research participants retreating into their ‘disciplinary silos’ (R3) as one person described it, or to truly interdisciplinary work where researchers left their disciplinary shells behind. However, there were also a range of research scenarios where disciplines existed in a kind of symbiosis, mutually supporting each other, as is the case with disciplines, or research within disciplines, that operate within the same - in the instance of our particular example quantitative – methodological framework. One of the senior researchers we interviewed had longstanding collaborative engagements with statisticians, economists, and sociologists who like him worked quantitatively. Here the methodological proximity and the symbiotic relationship across the disciplines, still described by this interviewee as ‘the other side of the disciplinary divide’ (how far away can you get?), had led to very fruitful collaboration: ‘a lot of my work is highly quantitative and I do have excellent working relationships with a number of statisticians, then again in other work that I’m doing, it is becoming closer and closer to what economists are doing. . .’ (R6) The only interdisciplinary publications this interviewee had done were with statisticians and he had experienced ‘no difficulty of where to publish’ (R6).

The more common experience, however, was – and this no doubt was also a function of the programmes and projects we selected for this study - that researchers were working across fairly disjunctive disciplines. Here the question was more one of the relative novelty or normativity of the collaboration engaged in. The relatively new field of Human-Computer Interaction (HCI), for example, is of necessity interdisciplinary, bringing together people with engineering, computer, computing, and other technologically driven expertise, with people from the arts, design, sociology, etc. Working in an interdisciplinary manner was the norm here but also fraught with problems. As one senior researcher in this field said: ‘When you write papers, when you write research proposals, the reviewers for the most part are impossible to find because it’s so interdisciplinary.’ (R3)

Where interdisciplinary collaboration was a novelty rather than the norm, participants also faced problems, not least, as already mentioned, how to maintain their research position in the discipline in which they were returned for the RAE. One interviewee told us: ‘I am a bit insulated from the RAE because I have a very energetic protégé who’s still in electrical engineering who does traditional communications engineering research and puts my name as a co-author on everything. So I’ve got a pretty kosher electrical engineering record and the university’s decision is that I will be sent to the electrical engineering panel.’ (R7) Such opportunities of safe-guarding one’s disciplinary position through the work of others, in particular younger researchers, is of course less possible in humanities subjects where the ‘lone scholar’ syndrome continues to hold sway and where it is not standard practice to co-author, or for younger staff to be appointed to work on research projects conceptualized, set up and run by senior colleagues.

Overall, our study produced a strong sense that interdisciplinary research was a necessity in some research fields such as HCI and worked well in methodologically related areas but, for the most part and outside these two scenarios, it was perceived to affect academic careers detrimentally and could only be undertaken once one was academically secure and more senior. This was, on the whole, regarded as such not as a function of the intellectual demands of interdisciplinary research but virtually exclusively as a result of the assessment structures surrounding research.

4.4.4 *The continuum of commonality*

As the previous section implied, our interviewees experienced very different degrees of commonality with researchers from other disciplines in their interdisciplinary research projects, from having little in common to feeling completely attuned to the others. Where disciplines were very different, for instance in the case of computing and art, respondents' responses ranged from incomprehension to bemused, sometimes amused, detachment, to a sense of commonality based not on disciplinary affinities but on personal liking. The following comments clearly indicate these different positions:

All this work on creativity was going on in different places and there was absolutely no pulling together of any of it, you know, it was one discipline would use one set of methods and one definition, um, one way, of assessing creativity and in another discipline, nobody knew any of that work at all. There was a complete lack of consistency, understanding, education. . . (R5)

When you talk with artists. . . they think differently, they understand the world differently. . . [but this collaboration] was quite straightforward because [the artists] responded like normal people, quite rational, therefore no surprises. (R11)

There was this immediate trust and friendship. . . the most critical part of how all this started, this kind of trust and the friendship that X as an artist and myself as a mathematician and computer scientist have. . . I think it's a personality thing. . . I thought she was a, um, an artist of integrity. I was able to communicate with her. (R4)

Where commonalities were not immediate or 'given' as in the last instance, they could be achieved through iterative processes of seeking to understand each other, or through agreement to work to everybody's strength by focusing on one's home discipline. As one interviewee put it: 'one of the important things is to keep re-negotiating what everyone wants from the project. . . you talk and you share and you work in each other's cultures almost.' (R4) This could have highly productive and, indeed, long-lasting effects. One interviewee who was very enthusiastic about interdisciplinary research and its educative function across disciplinary divides said of her project:

It was absolutely crucial that we had a multidisciplinary view, um, and that people could educate people from different disciplines about what the particular theories, the principles, the practices were in that discipline. (R5)

In this particular project this learning experience led to transformations among the participants: 'I think that's been one of the big gains, because people have said to me, "oh, I didn't know that work existed." And I mean, we've now got people collaborating on research grants and projects, you know, who met as a result of the cluster.' (R5)

Not only could the experience of commonality, whether 'instant' or achieved, lead to further collaboration; it also resulted in transforming some research participants' work. One interviewee, for instance, reported of another participant: 'he had an article in *Nature* last month, and he uses the language that I use now so he's taken on my language to talk about his work' (R4).

Such transformations required openness on the part of the researchers to other disciplinary cultures. Not every researcher either needed or wanted to have that experience. Some elected to work predominantly with people from adjacent disciplines (see section 4.3). Even there, however, commonality could not entirely be taken for granted as is clear from the following: ‘my initial experience of working with statisticians wasn’t too encouraging because, erm, I found their approach a bit sort of formulaic, they just had fixed ideas about what kind of statistical techniques would be appropriate for what general kind of problem and weren’t too interested in understanding problems’ (R6). In this instance, the issue was resolved by ‘finding statisticians of a higher calibre [who] do take much more interest in your problems and, as it were, try and look at things from your point of view before they, as it were, come down in favour of one particular statistical approach or another.’ (R6)

Overall, the need to collaborate on a project motivated researchers to seek or manufacture commonalities in their research partners and projects in order to achieve positive outcomes. This process was aided by the desire to work collaboratively and with partners from diverse disciplines which had driven the research in the first instance. But, as one of our respondents said: ‘it’s very, very difficult, you know, interdisciplinary practice.’ (R2)

4.4.5 Finding a common language

The pursuit of interdisciplinarity in the context of the research programmes under discussion here is predicated upon collaboration not only between academics from different disciplines but also with others involved in research who come from diverse backgrounds, with their own preoccupations and specialisms, and inevitably, different sets of languages. As we noted earlier in this report, stimulating new ways of thinking across disciplines is a goal of the funding bodies of the two programmes and we discussed how the pursuit of a common language across disciplines is perceived as key to the cross-fertilisation of ideas, leading to the successful outcomes of the research projects involved. We also considered the efforts made on behalf of the programme directors and research councils to engender its achievement. This is an area which has previously promoted academic discussion and, when drawing on their experiences of collaborative work, Jane Prophet and Mark d’Inverno (2004) asserted:

Only once a common language and framework for discussion and discourse was established and both individual and joint goals were clarified and collectively recognised, did the research find the momentum that has sustained the project for over two years. (264)

Here we explore our interviewees’ experiences of working towards a common language with those from diverse disciplines. We outline the circumstances in which this is achieved and ask why this may happen automatically for some participants, whilst others have to work harder towards its achievement. As such, we discuss the realities of working towards a common vocabulary and the implications of this experience on both the individual researcher and the different projects. Ultimately, we explore our respondents’ opinion as to whether encouraging different ways of thinking leads to a common language and shared understandings and ask if this opens up a route to interdisciplinarity.

Some of the projects are made up of partners from different disciplinary backgrounds, whilst others draw on the same or related subject areas. Their experiences of multiple disciplinary perspectives can come from three different sources:

- Previous experience of working across disciplines;
- Working across disciplines within the project;
- Working across different disciplines at programme level.

Respondents were asked how they negotiated the often very different disciplinary terrains with their attendant vocabularies. One respondent thought that consciously shifting away from the use of individual disciplinary rhetoric from the outset had meant that any difficulties in definition were overcome in a fairly efficient and straightforward manner:

The [project] is really new ground for all the traditional disciplines involved so everyone has to explain things and make themselves clear and invent new terms that are commonsense and clear rather than using masses of jargon from an established discipline. (R7)

The development of a 'commonsense' language for use across disciplines is considered here to have resolved any major difficulties around definition, but could also be seen to have stymied efforts towards achieving a deeper understanding of each others' terminologies and, ultimately, their diverse perspectives. Other respondents found that a more thorough exploration of their disciplinary differences of language and definition had brought certain benefits:

Sometimes, you know, we'll be having meetings or be talking about something and we'll realise, all of a sudden, that we weren't all talking about the same thing. And then we'll kind of go back a step and talk about what it was each of us was talking about and then, you know, move on from that to kind of say, ok then, from this what can we do? (R9)

In going back and asking 'from this, what can we do?' this team opened up the possibility of further dialogue and ultimately a deeper understanding of individual perspectives, which had the double reward of enhancing the individual researcher's understanding and moving the topic of research to another level. This kind of negotiation was described by one of our respondents as a way of 'understanding methodologies for working together' (R4). The importance of creating an environment where continuous negotiation was the norm was especially common across projects with a disciplinary mix which included the natural sciences and the arts, where meetings were specifically focused:

To get the language sorted, then you do the sustained inquiry, you talk and you share and you work in each others' cultures almost. You talk about the artwork that comes from the project, you talk about the mathematical model. You talk about how you might change the experiments that are happening in the wet labs. You talk about each others' stuff. (R4)

Disciplinary collaboration also implies, then, that work can be conducted in different disciplinary environments. The opportunities to be gained from immersion in the working culture and environment of others thus offers an insight into the culture and methods associated with research in that discipline and consequently a deeper understanding of its practices. Simultaneously, this can provide a space for reflection on the limitations of a mono-disciplinary perspective and throw into relief how 'thought processes and languages

[can] become entrenched through ... training and background in a particular discipline' (Prophet and d'Inverno, 2004: 264). Certainly amongst our cohort, reflective practice was perceived as a key element in breaking down the barriers between different sets of disciplinary interpretations and meanings.

In groups where researchers had been drawn from the arts disciplines and the natural sciences, terms such as 'understanding the world differently' and 'having a different world view' were often used to describe the approach of their colleagues, indicating perhaps the gulf across these disciplinary fields, which are considered significantly disparate in terms of their positioning and practices within the higher education system. In some such instances, it was seemingly simple terms and phrases that caused initial misunderstandings:

The language thing was a real problem between myself and [biologist], I mean, we had a wonderful example when he was using the word 'on' to talk about a gene, I was modelling it as 'off'. So even words like 'on' and 'off' were ambiguous in the original conversations that we had. (R4)

Meetings across disciplines in order to pursue shared understandings were confirmed to be of benefit by the majority of our respondents as the above quotes testify. One interviewee mentioned the 'similar things' the group discussed, to which they 'were applying different sets of theories and terminology' and indeed, another recurring theme of the interviews was the issue of disciplinary definitions and interpretations:

The difficulties came when we started to talk about what creativity was, and an interesting thing emerged and that was that we could not come up with an actual definition that we agreed to. In fact, it was kind of naïve to think that we ever could. And that we actually liked the fact that it was quite diverse views. (R5)

That the difficulties and misunderstandings are here perceived in positive terms was not unusual amongst our cohort. For many, it was the realisation of such discrepancies which tended to further their ways of thinking around the topic of inquiry and, as such, stretched the intellectual possibilities of their joint contribution towards a shared goal. One interviewee thought that interdisciplinarity had 'really been served, by having lots of other voices ... with different knowledges and preoccupations'. She continued, 'there was a particular, um, like a box that we could break out of in our approach to the topic by involving people who come at it from a different point of view' (R9).

All of our interviews indicated that active engagement with other disciplines to explore different interpretations and perspectives offers not only an extended mutual learning experience but potential for new directions for the research topic. It is inevitable, however, that groups of people engaging in debate from multiple perspectives will have differences of opinion. Some of our cohort thought that such tensions and their attendant discussions were an important factor in broadening the dialogue across disciplinary differences which led to new insights on the topics of research. As Creamer (2004: 42) comments, 'conflict and tension are central to understanding the interpretive process collaborators employ' and conflict was perceived by some of our respondents as a key element in order for interdisciplinary dialogue to take place. Creamer argues: 'a leader can attach positive connotations to conflict by casting it as routine, something that is to be expected, something that is enjoyable, or something that when pursued, has the potential to create

significant new insight' (43). As one of our own respondents, himself a principal investigator, said:

I think that, for interdisciplinary teams to work, they have to be a much more emergent and fluid body and they have to be much more aware of kind of understanding the much more sophisticated and potentially conflictual relationships which happen (R4).

For some respondents, remaining open to the ideas of others was grounded in the fact that they worked from an interdisciplinary standpoint in their home subjects and 'didn't sit perhaps firmly in [their] disciplines in the first place'. As such, the construction of project teams from different disciplines in order to further the intellectual parameters of research inquiry had been achieved more smoothly, with fewer of the language difficulties we have outlined here.

As we discussed earlier, the project teams engaged in workshops, organised within their individual projects and at programme level. As our interviews with programme directors highlighted, the most beneficial format of the workshops was felt to be where participants were involved in shared activities rather than the more usual discussions or 'talking-shops'. All respondents had taken part in activities, either within their own clusters or in programme workshops and the majority valued the opportunities for cross-disciplinary dialogue that these had promoted. For the majority of our participants remaining 'conceptually open-minded' was key to successful cross-disciplinary negotiation and, as the final quote suggests, in their pursuit of a common language shared understandings, expressed through shifts in terminology, had been achieved:

It's very clear already that there are some people from particular disciplines, and I don't know whether that's a personality thing or whether it's the nature of the discipline that they come from, they're already using different terminology and communicating in ways that you didn't see them doing originally. (R5)

4.4.6 Methodological issues

Patrizia Romito (1997) has argued that stepping outside of one's own discipline is necessary in order to reconstruct what is being researched and thereby enhance data analysis. She suggests that 'sometimes one can only break with a prejudice which is deeply rooted in one's own discipline by using theories or data originating from a different area'. She continues:

It can take quite an effort (and quite a lot of courage) to [leave] one's own disciplinary and methodological niche. If one stays within the bounds of one's own speciality, however, there is the risk that our object of research will be poorly and only partially reconstructed. (Romito, 1997: 214)

Romito maintains that retaining a mono-disciplinary approach which restricts methodological practices that can be applied to a research subject, limits the possibilities of outcome and ultimately the production of new and necessary knowledge. She, therefore,

advocates the need for a much broader approach to research problems, as the necessary solutions cannot be found without the application of multiple perspectives. In this section we report on our respondents' comments regarding methodological issues and explore to what extent cross-disciplinary dialogue creates a space for understanding the methods and methodologies of diverse disciplines, if individual methods were transformed as a result of sharing disciplinary practices across groups, and whether consideration of methodological differences creates a space for interdisciplinarity.

Confronting and discussing methodological differences was part of the work of the projects and negotiated over their life time. This was thought to be an important criterion for the success of an interdisciplinary team. As one of our respondents commented: 'the world isn't divided into disciplines'. This view was shared almost universally by our cohort. The following quote is one typical response to our questions regarding their involvement with those from diverse disciplinary backgrounds and the perceived effect of this on the research projects:

I think we knew that having people that weren't coming from that literature, hadn't grown up with the same debates around them, that that would really help us, I don't know [to not] just sort of go down a very predictable path. So I think that was very important in the intellectual approach in this project. (R9)

Looking at a research problem or question in different ways led to learning something new about the topic and extending the way it could be approached. Many of our respondents spoke of the insights they had gained from working collaboratively with those from other disciplines, which had added to their understanding of the topic of research and was, for them, indicative of interdisciplinarity itself. As one respondent commented: 'Interdisciplinarity is about using the, um, sometimes the methodological approaches, sometimes the intellectual insights of different disciplines to apply to an area of intellectual inquiry'. The practicalities involved in searching for the right approach were perceived to offer a route to interdisciplinary ways of working:

You kind of get on with looking at the thing you are interested in looking at in the best way for achieving your aim. Sort of regardless of what disciplines you might be in and what other disciplines might exist. A lot of that for me has been about learning from other people's methodology, um, finding out what other approaches have been taken and what they gathered and didn't, and how you can use that. (R9)

Different ways of reaching across disciplines, other than reliance on verbal exchange, were found to be the most beneficial by many interviewees, who felt that their engagement in activities in individual clusters and the programme meetings had resulted in new ways of approaching research questions and offered them the opportunity to think beyond the methodologies of their own discipline. As our interviews with programme directors indicated, the workshops which involved 'action-by-doing' were popular amongst our cohort and deemed to be most constructive in terms of the production of new methodological ideas:

They were experimental in the tools that they were using to elicit, um, or to explore the territory and then the subsequent issues and problem statements that were being thrown up as a result, because that's what the [programme] is looking for. It's

looking for new thematic priorities and I think if you're doing that, you've got to look at new methods. (R10)

The tools and techniques used in the cluster activities in themselves engendered changed perceptions amongst participants, with the effect of creating shared understandings and new ways of thinking that could be utilised both in research proposals and in the approach to research questions. As a cluster member with a computer science background commented: 'when you talk with artists, obviously it's proper interdisciplinarity because they think differently, they understand the world differently and they have absolutely different backgrounds'. This is also underwritten by the following quote from a respondent from a design background:

Designers have always engaged with science and technology, I guess, but it's the other way around for me. I think that's where design can be quite useful in terms of the methodologies, you know, the network nature of a designer, a true designer, thinks in a network kind of way and I think that's really key to building up these kind of dialogues and working partnerships. (R10)

The remit of both interdisciplinary research programmes is to pull different disciplines together in order to create a dialogue across differences and encourage new synergies and, as we have discussed here, our respondents thought that the opportunity to work with colleagues from different disciplines had enabled the cross-disciplinary dialogue desired by the funding bodies.

Another, perhaps unforeseen, element of this was that the researchers were exposed to similar work taking place in other areas and the realisation that cross-disciplinary collaborations are not only useful for highlighting and reconciling differences in methodologies and approaches but also for the recognition of commonalities across disciplines that were previously hidden because of the disparity of the subject areas. Thus they found that similar work

was going on in different places and there was absolutely no pulling together of any of it, you know, it was that one discipline would use one set of methods and one definition, um, one way of assessing creativity and in another discipline, nobody knew any of that work at all. So there was a complete lack of consistency, understanding, education, um, yes. So what I wanted to do was to try and bring all these disparate people together to see what the overlaps were and whether we could learn from one another. (R5)

Having disciplinary diversity as part of the criteria for thinking about whom to include in a research proposal was of huge importance to the majority of our respondents and was referred to as 'crucial' by one, who claimed a multi-disciplinary perspective was more effective in that 'people could educate people from different disciplines about what the particular theories, the principles, the practices were in that discipline'. A starting point for some projects was for each participant to contribute methods and tools from their own disciplinary base that they felt to be relevant to the research topic under discussion. Other early project sessions were geared towards looking at the similarities and differences between disciplines and discussion of how the different methods and techniques could be used across a number of disciplinary sites:

I think, certainly, what we have been successful at is getting people to understand each others' perspectives and to understand what are the big issues in terms of

defining creativity in the different disciplines and how that might be measured in different ways. (R5)

Although the majority of respondents spoke in positive terms about their involvement in the research clusters, for some this did not necessarily instil the desire for movement from their disciplinary standpoint. Encountering different perspectives can mean disruption of one's knowledge base and as such was considered difficult by some participants, particularly younger researchers and those new to working across disciplines. One interviewee described it as leaving her 'comfort zone' and continued: 'in an academic or theoretical sense you are encountering perhaps different positions, or views or standpoints, perspectives and all those sort of things that it can be quite difficult to get a handle on initially' (R5).

Our aim in this section of the report was to discover to what extent cross-disciplinary dialogue can create a space for understanding the methodologies of diverse academic backgrounds and to consider whether this leads to interdisciplinarity. To conclude this section we discuss what our respondents thought they had accomplished through their exploration of each others' methods and methodological bases in order to highlight their movement towards interdisciplinary ways of working. Some of the cohort working in closely related disciplines, particularly within the social sciences and humanities, thought that their methodological bases were already fairly well aligned. This may have had the effect of masking their achievements and led one respondent to reflect: 'I think the interdisciplinarity is largely subsumed in the way in which we approach the questions. I think the methodological approaches have been common to the disciplines that we are working in' (R8).

In projects working across the arts and natural sciences, a determination to work productively with other disciplines and with research users was established through a belief in an ability to make a contribution in new areas. User-involvement was in fact key to the research approach of some respondents, whereas for others it was not something they would have considered from within their own discipline. The two interview extracts we present below, show how such views were dramatically transformed and working practices and goals subsequently affected by collaboration across disciplines:

At the first meeting they actually sat there and one guy said, quite explicitly, 'I don't understand why you want to talk to users. I'm a user, I know what we want. Let's just build it' and then, months later, he was jumping up and down saying, 'hey we've got to talk to users. We can't just build this. We've got to talk to users'. So, just a complete change in his outlook. (R3)

It's actually affected the way I thought of the models because I want these models to be communicated to a biological audience. Moreover, I want these to be represented in a visualisation because I believe that visualisation is the key for mathematics in biology. So the relationship between the model and the biological science and the model and the simulation and visualisation, if you like, these two things that have, yes, I have changed the way I think about building models because I want these two concerns addressed in my models (R4).

Research project design was enhanced by engagement in cross-disciplinary collaborations. Effective incorporation of disciplinary strengths regarding choice and combination of methods was coupled with a move away from a disciplinary standpoint towards a thematic

and problem-orientated approach, which called for a more processual and emergent dynamic:

The idea is then, that with all of these things together we can make links between them and they can cast light on each other. We haven't got there yet. I hope that does happen. That they will meld together, they will become greater than the sum of their parts. I think that is probably the most important way that the project is interdisciplinary. And certainly in terms of how we go about dealing with our data. We do that by themes and topics rather than within disciplinary boundaries. (R9)

Some groups were working towards submitting proposals for the next round of research council funding. They thought that their engagement in the cluster activities had strengthened and enriched their research design and given them new ways of approaching their topic:

Once we start writing [our project proposals] I think that they [the project team] will realise, as I've just realised, that yes, we did achieve a lot and our proposals will be a lot stronger for it. Although, um, our ideas in terms of the product, if you like, aren't wildly different from the original bid, the way that we would explore them is, and we would never, ever have, um, well, I don't think we would be putting in what I think are very good quality processes and methods, that we'll put in the bid, I don't think we would've got there [without the project activities]. (R10)

If we return to Romito's earlier quote and consider her call for research to traverse its 'disciplinary and methodological niche' then we must conclude here that the majority of our respondents embraced that notion. The 'effort' and 'courage' needed is supported by the current call for interdisciplinarity across the funding councils more generally, and within the research clusters by our respondents' engagement with others willing to perceive the world from a different standpoint.

4.4.7 The timescales of interdisciplinary research

Ann Bruce et al (2004) proclaim that effective interdisciplinary research requires the research team to 'take time to explore a range of dimensions, to test several potential boundaries to a problem (each of which may imply the involvement of different sets of relevant disciplines) until the apparently optimum boundary and set of dimensions has been identified. (465) In their report on interdisciplinary research funding, Joyce Tait and Catherine Lyall (2001) comment: 'effective interdisciplinary integration takes time and this can have an impact on perceived value for money of projects' (31). As Helga Nowotny has also argued: 'if joint problem solving is the aim, then the means must provide for an integration of perspectives in the identification, formulation and resolution of what has to become a shared problem' (www.interdisciplines.org/interdisciplinarity/papers/5 accessed 12/11/05).

Time, then, is an issue within interdisciplinary research, as this call for funding bodies and others to recognise that for the successful outcomes of collaborative work which crosses disciplinary boundaries, more time is needed. The timescales not only of the projects they

were involved in, but with regard to those of collaborative research more generally, were a topic our respondents commented on and which we discuss in this section.

For some of our interviewees, working across disciplines meant that they would often work with a group of people they do not usually work with and whose working practices were 'unknown' to them before they meet on their joint projects. Therefore one of the most labour-intensive elements of each new venture for our respondents was the process of building relationships on both a social and professional basis, in order to create a harmonious and productive working atmosphere:

To have five people in a project means that you have to work even harder than you do if there [are] two of you and you always know each other. All this work of getting to know one another, well, you don't have to necessarily to be literally sociable, and it was true of that European project, I've worked on a number of interdisciplinary projects but just to take those two examples, in both of those, we recognised that it was very important that we got to know one another. (R8)

The same respondent felt that the teams she had worked with recognised the fact that Unless you have some idea of how other people work, it is very hard to write with them. You can't write unless you've done the thinking, and so on. So I think it was a genuine attempt to enable people to know one another, to listen and to respect one another and that takes a lot of time, the more people you have. (R8)

We have discussed the issue of finding a common language and understanding different research methodologies within and between the projects in previous sections of this report. These were issues that persisted over the entire duration of some projects, especially where differences of opinion ran high and methodology and other issues were continually being renegotiated. One respondent commented that 'six months to a year' was an ideal time-frame in which researchers could achieve a shared understanding and consensus before beginning the sustained inquiry, and even then, allowances needed to be made for responding effectively to the tensions that might occur during the lifetime of a project. Allocating interdisciplinary research projects more time for such activities was therefore thought necessary in order to ensure successful outcomes. As Bruce et al (2004: 469) state, 'given that interdisciplinary research requires more time and effort to be put into integrating disciplines, additional resources are needed'. Nowotny et al have also argued:

RAE-type accountability and/or research management mechanisms have encouraged researchers to espouse industry-style production. It is said to be safer to deliver predictable (and second-best?) results on time than ground-breaking research, later (Nowotny et al, 2003: 184).

Participants new to interdisciplinary work commented on their realisation that its success was dependent upon them giving more time to it than they had initially envisaged. Some felt that to 'get up to speed' with the different disciplines they were working with meant that they had to do extra work, for example, reading around the 'new' subject area. One principal investigator, engaged for the first time in interdisciplinary research, commented that 'an awful lot more work' was necessary in order for him to carry out the research efficiently. As he further stated, 'it wasn't just a hobby that I could do a couple of hours a week, it was going to be a major part of my research efforts as a professor of computer science'. This realisation also impacted on a research team itself, as our respondent further commented, 'if that is true for me, then I would expect the same sort of effort from other people' (R4).

Without funding bodies recognising and accommodating the extra time and effort necessary for the successful running of interdisciplinary projects and programmes, experiences in such projects might result in a reluctance to engage in them in the future. Indeed, because of the time-factor, the same principal investigator told us, 'I'm not sure I'd run another cluster' (R4) which implies that interdisciplinary academic engagement could become more difficult to solicit. This became more apparent when consideration of the amount of work involved seemed incommensurate with the financial incentives. This same respondent's comments below effectively summarise the intensity of interdisciplinary work:

you're kick-starting something from nothing. You're starting a new website and a forum for interaction and doing interdisciplinary research itself and understanding it, you're starting from ground zero and I think to get the momentum has been quite hard work. We've got it now and I'm really pleased with it and it may be that this leads to a bigger project, you know, maybe I will get funding through the next initiative, the next call for proposals. I mean, it will be more worthwhile but in terms of the time that I've committed for a £50000 grant, you know, if you were doing Full Economic Costing, I wouldn't be getting anything like that salary. (R4)

From the point of view of putting together a funding proposal for an interdisciplinary project, respondents felt that the timescale given by the funding councils was too short to allow for 'more detailed discussion of methodological issues' (R2) and the limited time allocations for researchers to answer criticisms and make alterations to their project proposals.

Time also becomes important in the context of choosing partners with appropriate skills (levels). In areas requiring technological competence, for example, there was a sense that such competence could not be as easily acquired within the lifetime of a project as skills of sociological interpretation, for instance, leading to interesting questions, not pursued here, of how much researchers can, indeed can be expected, to acquire in terms of knowledge and skills of other disciplines within the lifetime of a given project. In the present instance, judgments regarding the feasibility of certain kinds of skills acquisition within the framework of a specific project led to understandable exclusionary practices, deemed inevitable, regarding whom to invite into a collaborative team:

It's not that some people can't programme or some people can't adopt a sociological approach. I think probably everyone can be educated to do any of them, given enough time. But it's impossible within the constraints of having to get on and do some research in a finite period, which is usually three years, it's impossible to take someone who hasn't got the technical skills and give them the technical skills in enough time to actually get on with some useful work. Whereas, if they already have the technical programming skills to a high level, it is possible to give them an education and an outlook that is more social and human in the time available. (R3)

The timescales of interdisciplinary work also impact on who can in fact participate. Although as discussed in previous sections, the projects under discussion here included researchers at different stages of their academic careers, it was recognised that those more firmly established within academe find it much easier to cross the disciplinary divides and

take part in interdisciplinary ways of working, an issue we have also discussed elsewhere (Griffin et al 2005a; 2005b). Some interviewees acknowledged the ‘privileged’ position that allowed them time to undertake collaborative work outside of their own disciplinary domains. As one such respondent noted, ‘if I was 24, just doing a PhD [I’d] want to get on and get [my] papers and [my] grants and all that sort of thing’ (R4). This interviewee suggested that it is more critical for young researchers to establish themselves within a discipline-specific academic community. From this perspective, interdisciplinary research is not an advantageous route to follow for academics at the beginning of their career. And, indeed, some of the younger researchers we interviewed were quite anxious about the effects that being involved in interdisciplinary research projects might have on their subsequent employability in academe.

4.4.8 ‘Wacky’ vs ‘straight’ research

In this section of the report we discuss our respondents’ descriptions of some of the projects and activities they engaged in during the time of the programmes to explore current attitudes to interdisciplinarity. Interdisciplinary work continues to lack credibility within the UK higher education system, partly because of its lack of fit with assessment and audit practices, which we discuss in section 4.3 of the report, but also because it is not perceived as ‘serious’ research in some quarters. Marion Hersch and Gloria Moss (2004: 17) identified ‘human ignorance’; ‘too many researchers unprepared to “think outside the box”’; and ‘being undermined’ as three examples of the barriers to interdisciplinary work they found in their survey on interdisciplinarity. Our own qualitative data corroborate these findings, as a significant number of our cohort reported many of the same attitudes existed amongst their peers. Such experiences are detrimental to the development of interdisciplinary research within academe, as reluctance to engage in or take seriously such work impedes its potential.

Expressions such as ‘cool’, ‘fun’, ‘wacky’ and the need to ‘suspend disbelief’ were used by our interviewees to describe their experiences of working on the projects. These terms can be interpreted to mean creative or unusual, the issue of creativity being particularly important in the *Designing for the 21st Century* programme. As one respondent put it, ‘this is a way of looking at uncharted water’ and, referring to the titles of some of the clusters, he commented, ‘it’s all well wacky compared with engineering, but even compared with traditional social science it’s pretty wacky. But that seems to be a criteria [*sic*]. We are looking well into the future’ (R7).

As we discussed earlier in the report, programme activities have gone against convention on some occasions. This was considered beneficial in promoting shared understandings, so much so in fact, that one particular cluster was cited for good practice by the programme director, and funding bodies expressed an interest in the group’s techniques: ‘We were very conscious we didn’t want a talking-shop and we didn’t want to get bogged down in rhetorics, so we adopted a thinking-through-doing approach, um, as a way to avoid that and to be experimental.’ (R10) For some participants in the cluster, engagement in such activities was very different from their usual work and because of this seemed to be viewed very much in terms of its entertainment value. An academic from a computer science background informed us, ‘it was quite cool. I liked presentations made by artists and people who do some artistic installations, this kind of stuff, because it was quite entertaining

compare[ed] to standard, boring conferences' (R11). Respondents who had organised such activities were asked to relate why it was that some participants seemed more emboldened to move from their disciplinary base and get involved, whilst others were more hesitant.

The two quotes below may throw some light onto this:

You do sometimes wonder whether you're doing the right thing and sometimes people are looking at you to say, well, 'what are we doing this for?' particularly the more science-based people, because they're used to doing things with very clearly defined parameters and outcomes, whereas we've decided to take a very, very open approach (R10).

Artists, they don't need publications in high rated journals, they just need to make installations and are just public, um, and therefore results produced by artists, they will never be accepted by a scientific community as a fundamental theoretical result (R11).

Both quotes highlight acknowledged differences in view of what different scientific fields require. We now turn to consider what it is about interdisciplinary research involvement that often causes negative reactions from academic peers. Some of our respondents said that they had experienced feelings of marginalisation from some work colleagues and believed that this was an indication of changes that needed to be made to the infrastructure of the higher education system:

Theoretical computer scientists will say, I'm sure, 'yeah [he's] got a bit flaky recently because he's doing some biology and some art, I don't really know what he's doing and he's writing in a cluster'. So that is really interesting and I think something we need to address at an institutional and a cultural level (R4).

Questions of academic credibility can be linked to the publication and dissemination of interdisciplinary research and its lack of status within academe, an issue we discuss below. One of our respondents commented that he felt the project results would appeal to a lay-audience, thus prompting his suggestion 'that she should look around for a publisher who, I would imagine, would be quite keen to publish the stuff, because it's wacky and Joe-public might buy it' (R7). As one of stated aims of the research councils is to promote engagement with society, perhaps the project he referred to is also meeting this call. But underlying these comments was also an anxiety about the scientific appropriateness of the work undertaken.

For some of our respondents, establishing interdisciplinary research as a valid and viable academic pursuit was key to its credibility within higher education institutions in order to prevent 'a lot of hardcore scientists ... look[ing] down their noses at it'. We end this section with just one line from a respondent who outlined what he felt to be a typical attitude of mono-disciplinarians:

Those who can, do; those who can't, do interdisciplinary research (R4).

4.4.9 Divisions of labour: Within or beyond disciplines?

The focus of this section is on how the tasks in a given research team were divided. We found that the teams in our study operated different models of dividing research tasks, sometimes along disciplinary lines, thus making the research multi- rather than interdisciplinary, at other times not. Everybody recognized, in the first instance, the need for dividing tasks, and also that this was unlikely to be a metric exercise.

We didn't fall into any disciplinary space, although obviously saying that I must sound like a geographer [laughing]. (R9)

It isn't at all that if there are five of you that you just do a fifth of the work [LAUGHING]. I think it's more work in some ways. Obviously you can delegate certain things. (R8)

Among those teams that worked along disciplinary lines, some interviewees reported writing to discipline strengths and visiting home discipline conferences. Not all stayed within their comfort zones however and one of the best examples of going beyond disciplines, of transcending rather than visiting other disciplines is that of a mathematician and an artist having a conversation, instead of giving a paper, at a conference which the mathematician described as follows:

One of the issues is that, um, we all talk too much and so at the beginning everyone would speak for twenty minutes and that's not actually that great because that's not interdisciplinary. I think, you know, there is some interdisciplinary work where people come in and it's dressed up as interdisciplinary but really what they're doing is their own thing that's just part of some project. What's really interdisciplinary is where you have real interaction. (R4)

This interviewee took the view that speaking for twenty minutes about one's own topic is not interdisciplinary; his concern was to make not just the research but also its dissemination interdisciplinary. They achieved that by having non-scripted discussions at conferences. This moved on their thinking within the conference setting and let others see the workings of a successful interdisciplinary project in action.

The best talks are people who come on and just talk, these are the most compelling I think and (.) few people can do this. But what [colleague] and I have managed, the two of us particularly, is that (.) we've given about ten presentations so far and we just talk, she () and occasionally we don't follow any kind of pre-planned narrative and I think allowing each other space, listening to what someone said, reacting and responding to it, is the thing that really turns on an audience the most. So that changed. At the beginning we used to do (lists) now we do interaction. (R4)

This interviewee acknowledged that such a presentational method is not possible for everyone. It is worth noting that he was the person who presented himself as a relatively high risk taker, thriving on unpredictability and responsiveness to the moment. As such, he was to some extent unusual among our interviewees, many of whom had more clearly articulated 'comfort zones' and preferred to stay closer to home.

We still employ the people on certain papers who have that background, or feel most comfortably writing about a certain aspect about the project, so we all take a lead on different parts of it, and I think that's a massive bonus for the project. We have come from different backgrounds and whilst we all contribute in some way or other, to the papers that are published from the project, we each have our own research agendas and we'd each like to do

different things with the analysis. We've managed to, sort of, divide it in that sense. (R1)

Even when dividing up the work by discipline it was felt by some that there was tension within the project, both in terms of the status of the partners within a project and in terms of the different methodologies. The partners within this project appear to be doing interdisciplinary work individually under the heading of the project and then attempting to knit it together at a later stage.

There, there, I think there's some (...) some tensions between the two aspects of the research in terms of methods. Erm, and (...) I don't know really, whether the, in some ways, erm, (...) I've tried to conduct a kind of independent study, in a way, I've been trying not to be finding, I didn't want the media studies to be providing evidence for the philosophical inquiry. I also wanted to interrogate the philosophical inquiry, not just the kind of subsidiary that goes out and looks for things that can support the argument if you see what I mean. (R2)

The various projects had different ways of disseminating their results. Some sought to co-write books and articles, whilst others wrote separately. Frequently it was a mixture of the two.

A book will result out of the project, a jointly-written book. It will be mainly [colleague], but I'll probably contribute three chapters. We've also been commissioned to write two articles for *Journal Name*, I'm doing one and she's doing one. And you know, there will be, it will be interesting, they are really quite separate articles so it will be interesting to see how they pan out as well. (R2)

It was clear that how research results were disseminated was closely related to the RAE. Project participants who did not depend on the project outcomes in relation to their RAE submission were more likely to engage in divergent and collaborative dissemination – albeit from the negative position that what they did, did not matter in terms of the RAE – than those who needed the write-ups from the project as part of their RAE submission. As discussed under 4.7, the RAE remains a barrier to innovative and interdisciplinary ways of working.

4.5 Institutional issues

In the practice of interdisciplinarity, the following three institutional issues were raised as key:

- the spatial organization of an institution;
- the institutional support, either at central or at departmental level for interdisciplinary research;
- the gatekeeping that disciplines as 'institutions' operate in relation to their domain.

Spatial proximity to researchers from other disciplines was viewed as a useful context for the promotion of intra-institutional interdisciplinarity. As one researcher said: 'having people together in the same institution is pretty basic. It doesn't mean that greater interdisciplinarity will follow, but certainly it makes it possible. So I've been very

fortunate. . . I've actually been in a setting where on a daily basis I did see people from other social science disciplines at least.' (R6) Other interviewees, too, commented on the importance of easy access to researchers from other disciplines as an opportunity for interdisciplinary cooperation. This suggests not only why advanced institutes of research housing scholars from a range of disciplines such as exist in the USA are effective in generating interdisciplinary thinking and research but also implies that spatially disaggregated institutions, especially where these are divided by discipline, make interdisciplinary research all that more difficult.

Whilst spatial proximity was one factor in intra-institutional interdisciplinary practice, another was the relative support institutions gave to such research. One informant reported that her university had provided funding for researchers to collaborate and build thematic research centres. This had been an incentive to begin an exploration of collaboration with researchers from other disciplines. Such incentivising of the creation of intra-institutional research centres has been a common phenomenon in the UK during the last five years or so, driven initially by the assumption that the Research Assessment Exercise in 2008 would favour critical mass and thematic research cohesion among researchers (Strathern 2004: 68-86). Whilst that assumption has faded away, the notion of research aggregation into research centres for the purposes of generating conditions for critical mass, postgraduate researcher training, and research excellence has persisted, and many universities in the UK now have such centres with varying degrees of integration, interdisciplinarity, and, indeed, research activity. One problem for researchers remains that they tend to be members of various institutional structures that only partially overlap, including faculties, schools, departments, various research centres and research groups, etc. Whilst some of these may be structured around a theme, most will work according to disciplinary lines which militate against interdisciplinarity. As one programme director put it: 'the research councils haven't thought about how they would put their emphasis on interdisciplinarity into practice in universities who don't have an interest in it.' (PD2)

Significantly, the building of thematic research centres has tended to be supported centrally in institutions rather than being conducted from within departments, and also, significantly, departments have, on the whole been less supportive of interdisciplinary research since they are usually based on disciplines and derive their income from discipline-based activities, including the RAE. Unsurprisingly, then, one of the programme directors (see also section 4.7 of this report) indicated that 'some people have actually been positively discouraged by their institution to actually participate in this activity' (PD1), that is an interdisciplinary research programme, and all researchers we interviewed were acutely aware of the negative impact of conducting interdisciplinary research on their individual research profile. It is also the case that, as one research programme director put it, 'within a single research council there aren't many mechanisms which create interdisciplinary synergies between related funding projects and investments. . . you can be within the same research council working on related subjects in the same city and not even know about each other's existence.'

Finally, it should be noted that disciplines themselves function, metaphorically speaking, like institutions through their 'organs' such as journals, associations, etc. and as such operate structures of exclusion and inclusion in relation to interdisciplinary research. As previously mentioned, those working in interdisciplinary fields might find themselves sidelined by discipline-based structures as not fitting into these, or might find that their own structures, for instance interdisciplinary journals, themselves are de-valued for the very

reason of their interdisciplinarity. All this was experienced as highly frustrating by the researchers who ended up trying to serve multiple masters as a way of being able to conduct both interdisciplinary research and continue to be recognized in their 'home' discipline.

4.6 Dissemination of interdisciplinary research results

In this section of the report we discuss the dissemination plans of our cohort and explore the impact of institutional expectations on the academic output of interdisciplinary research results. We have discussed elsewhere (Griffin et al, 2005b: 54) the reinforcement of disciplinization that comes from the difficulty academics encounter when attempting to submit work of an inter- or transdisciplinary nature for publication, which has been further compounded by the Research Assessment Exercise. Here we turn to our empirical data in order to assess the impact of collaborative work on the dissemination of interdisciplinary research results and consider the disciplinary structuring of sites of dissemination.

As our report indicates, the two programmes under discussion here are considered by respondents to have promoted interdisciplinarity through a variety of means, the most referred to being the workshops for cluster members. The funding councils also indicate support for interdisciplinary work in that they have allocated money to these research collaborations and, as our earlier discussion highlighted, their documentation contains much positive discourse to support boundary-crossing research. However, despite this discursive turn towards interdisciplinary endeavours, publishing remains a contentious issue. As we have argued elsewhere (Griffin et al 2005a: 28) 'it is *de facto* very difficult to submit work that covers a range of disciplines, especially methodologically, and every discipline, furthermore, has its canons of prestigious, and less prestigious areas to work in', and as Joyce Tait and Catherine Lyall concur, 'it is difficult to publish in some journals when authors straddle different disciplines' (2001: 24).

The types of difficulties these authors refer to were a recurrent theme in the narratives of our respondents, one of whom commented 'a lot of people say to me, "I'm not sure where to publish this", you know, "where does it fit?"' (R4). Alongside these difficulties, the following interview extract highlights that such strict parameters on publishing can have a coercive effect on an academic's research interests and outlook: 'I do sometimes think to myself, well, if I go off down that avenue, which seems interesting enough to me, I have no clue where I would publish that. And so that does make that avenue less inviting than it would otherwise be' (R9).

Clearly, our respondents were aware of the academic credibility and prestige attached to where they published, for example, 'there's a sort of hierarchy of journals' and 'you're expected to be working on one particular area and these are the best journals for that area'. In some projects it had been decided to divide the work up into its constituent disciplinary parts so that submitting papers to journals or conferences was simplified. As a respondent commented, 'we decided to play along with their game'. The reasoning behind this approach was outlined by one of our respondents:

We still employ the people on certain papers who have that background, or feel most comfortable writing about a certain aspect of the project, so we all take a lead on different parts of it and I think that's a massive bonus for the project. We have come from different backgrounds and whilst we all contribute in some way or another, to the papers that are published from the project, we each have our own research agendas and we each like to do different things with the analysis (R1).

Having experience of where and in what to publish was seen as advantageous by some of our respondents, but could also be perceived as re-shaping the work to fit the discipline and in that way weakening any challenge that could have been made to disciplinary boundaries. As one of our respondents stated: 'I think you go into this research, that you are contributing to the team, but you are always thinking about the individual'. The importance of retaining a personal research agenda in order to feed one's *curriculum vitae* is embedded within this quote and is indicative of the individualisation process inherent in the infrastructure of the UK higher education system, which is supported by assessment and other auditing exercises, a subject we discuss elsewhere in this report.

The issue of authorship was another area which elicited different responses from our cohort. For some, it was important that papers were attributed to individuals as this was perceived, amongst other things, to serve the purposes of the RAE. In most groups, agreements about dissemination had been negotiated and agreed at an early stage of their projects and almost all had produced joint papers, few of which would or could be submitted to the RAE. However, authorship had remained an important aspect of the collaborations. In their study of interdisciplinary research teams, Bruce et al (2004: 468) found a 'tactic for achieving integration was to ensure that each report or publication from the research programme involved most members of the research team' and similarly, joint authorship was considered an essential part of some project publications. However, some disappointment was expressed in some of our interviewee narratives at being 'listed as individuals' which was felt to negate the group input into the work and, as such, diminish the value integration of the team had on outcomes:

We are all listed as individuals on all the papers, which somehow seemed disappointing to me. I had this dream that we should just be called [team name] which is what we call it when we're talking about it, and that we should just publish as the team, not as a group of individuals, because I felt quite strongly that my input into those papers was only possible because of the interaction I was having with the other people. Because it wasn't me as a person who sits alone at my desk, it was me as a member of that team who was doing that. There was no way of reflecting that, this whole thing about, the value being greater than the sum of the parts. But we haven't got around that, so we just play the game and we are listed as individuals (R9)

Conferences were another site of dissemination which all respondents had organised attendance at, and were considered to be useful for disseminating collaborative outputs towards audiences across different disciplinary boundaries. Where conferences were held was seen to determine who would attend and it was felt that universities themselves could be proactive in arranging venues in a variety of sites as a way of engaging with a wider academic population and possibly 'break down their barriers to interdisciplinary research'. One particularly innovative conference style was described as an emergent 'interaction' between the presenters themselves and with audience members from different disciplinary

backgrounds. A shift away from conventional presentation styles was perceived to engender cross-disciplinary exchanges. As our respondent explained: ‘occasionally we don’t follow any pre-planned narrative and I think allowing each other space, listening to what someone said, reacting and responding to it, is the thing really turns an audience the most’ (R4).

Some of our respondents described themselves as coming from inherently interdisciplinary backgrounds and subject areas and commented that working in a non-traditional area had impacted on their professional career. As one interviewee stated, he ‘perennially face[d] the problems of reviewing’. The comment below from the same respondent outlines effectively the difficulties that can be encountered:

Everything you ever produce, either as a paper or a proposal, ends up getting criticised and cannot avoid being criticised because it’s interdisciplinary, because you’re trying to synthesize lots of pieces from other disciplines, and there’s always one reviewer who’s from a discipline you haven’t taken into account, who wants to have their way. You might do a study which involved an experiment then you’ll get a bunch of ethnographers reviewing it saying, “that’s not the right method” or vice versa, you’ll do an ethnography and you’ll get a bunch of psychologists saying, “that’s not the right method” (R3).

The issue of the dissemination of interdisciplinary work is complex, and presented the research teams under discussion here with particular sets of problems, not least the management of the contradictory rhetoric in which they are immersed. On the one hand they are encouraged by research councils to pursue interdisciplinarity, on the other, the potential for the results of their collaborations to reach a wider academic audience are blocked by the infrastructure of UK higher education. As Veronica Boix Mansilla and Howard Gardner remind us, there remains the ‘lingering challenge of assessing interdisciplinary work’ www.interdisciplines.org/interdisciplinarity/papers/6 accessed 12/11/05). We turn to this issue in the following section of the report.

4.7 The Research Assessment Exercise (RAE)

UK HE institutions are significantly dependent upon the results of the Research Assessment Exercise (RAE) for the funding of research. Its process and outcomes consequently determines university research policy and practice. We have discussed elsewhere the effect of the RAE on the work of UK researchers, and argued that its focus on the discipline-based output of individual academics has a detrimental impact on interdisciplinary research opportunities (Griffin et al 2005b: 54-5). As previous sections have highlighted, the development of new insights and methods have been key concerns of the two research programmes, but the majority of our cohort felt that as yet, there is no assessment criterion in place with which to judge such interdisciplinary integration, the rhetoric of the RAE panels notwithstanding. One of the key obstacles to interdisciplinarity our respondents referred to was the Research Assessment Exercise, the sixth of which is due to be conducted nationally in 2008. This section will give a brief overview of the RAE’s current thinking on UK research in an attempt to gauge how interdisciplinary work will be assessed in the 2008 exercise. It may be too obvious a statement to make, but nevertheless, it needs to be noted that every one of our interviewees had some comment to make regarding problems related to the RAE. For example, it was described by one as ‘the

Sword of Damocles hanging over you the whole time' (R8). To this end, in this section we include respondents' perceptions and experiences of the assessment process.

The Research Assessment Exercise: an overview

The main task of the RAE is to 'provide quality profiles of research across all disciplines' (www.rae.ac.uk accessed 19/12/05). It is conducted jointly by the Higher Education Funding Council for England (HEFCE), the Scottish Higher Education Council (SHEFC), the Higher Education Funding Council for Wales (HEFCW) and the Department for Employment and Learning, Northern Ireland. Its management team is based at HEFCE, which acts on behalf of the four UK higher education funding bodies. The RAE invites submissions from all UK higher education institutions to be made to panels of experts in 70 Units of Assessment (UoA). In its document *RAE 2008 Guidance to Panels* January 2005 Ref. RAE 01/2005: 2, Key Point 3 states '[the] RAE 2008 is underpinned by a number of important principles' and Point 3c states 'Ensuring that appropriate measures of excellence are developed which are sufficiently wide as to capture all types of research, including practice-based research, applied research, basic/strategic research, interdisciplinary research' (www.rae.ac.uk/pubs/2005/01/rae0105.doc accessed 19/12/05). It alerts panel members to the fact that all types of research are to be considered on an equal basis.²⁰ In Annex B (p. 28) of the same document, the definition of research used by the RAE 2008 is as follows (with changes in phrasing from 2001 highlighted):

'Research' for the purpose of the RAE is to be understood as original investigation undertaken in order to gain knowledge and understanding. It includes work of direct relevance to the needs of commerce, industry, **and** to the public and voluntary sectors; scholarship*; the invention and generation of ideas, images, performances, artefacts including design, where these lead to new or substantially improved insights; and the use of existing knowledge in experimental development to produce new or substantially improved materials, devices, products and processes, including design and construction. It excludes routine testing and **routine** analysis of materials, components and processes **such as** for the maintenance of national standards, as distinct from the development of new analytical techniques. It also excludes the development of teaching materials that do not embody original research.

* Scholarship for the RAE is defined as the creation, development and maintenance of the intellectual infrastructure of subjects and disciplines, in forms such as dictionaries, scholarly editions, catalogues and contributions to major research databases.

Clearly the RAE definition is, as Nowotny, Scott and Gibbons (2003: 183) attest, 'all-encompassing' and the minor amendments to the 2001 definition do not affect its meaning. As the RAE states, it is 'content that this definition, when taken with panels' elaborations on their methods for recognising and assessing all forms of research against appropriate criteria of excellence, will cover the full range of research activity and outputs that submissions might describe.'

Perceptions and experiences of interdisciplinary research assessment

²⁰ Further references to this document are from the same website address and were accessed on the same date, 19/12/05.

From the latter statement, it would seem that the onus for decision-making over research proposals which stray from mono-disciplinary work is on panel members and peer review, rather than on specific guidelines for the judging of such proposals. Perhaps this is understandable if we consider the comments of Boix Mansilla and Gardner who state that ‘no single set of criteria can do justice to the enormous variation in inquiry aims’ (www.interdisciplines.org/interdisciplinarity/papers/6 accessed 12/11/05). This situation is problematic. Many of our respondents raised concerns regarding the ‘lack of fit’ between interdisciplinary research outputs and the structure of the RAE, where submitting either necessitated a compromise to their work or more seriously, was ‘just not possible’, a situation Nowotny et al describe thus:

Distortions are produced and hierarchies are reinforced by the taxonomy of the assessment process itself, notably by the demarcations between units-of-assessment. Interdisciplinary research has to be clumsily disaggregated, while truly creative research in the borderlands between disciplines is devalued (Nowotny et al, 2003: 184).

The clumsy disaggregation of research which does not fit the units of assessment of the RAE was identifiable in many of the interview narratives, which criticised the fact that, although main panels are made up of members from different disciplines, ie they are multi-disciplinary, they thought that their submissions would receive singular disciplinary judgement on separate sections of their work rather than be accorded any recognition of its disciplinary integration, and that such oversight meant that the work would be devalued and, subsequently, ‘marked down’. As one of our respondents commented, ‘[t]he RAE is geared up as very subject and discipline specific’. She described this as a ‘tricky situation’ because of the ‘issue of measurement, because you cross so many territories, um, how do you measure the work, you know?’ This is an issue we have discussed elsewhere when we explored how interdisciplinary involvement impacts on academic identity and reputation when both are dependent on disciplinarily demarcated lines of assessment and evaluation. We argued that this ‘raises the question of how the integration of disciplines can be measured, and who will be given credit for it in current systems of assessment’ (Griffin et al, 2005b: 35).

When asked which aspects of their work resulting from the projects would be submitted to the RAE, one interviewee simply responded, ‘none’, and when asked to expand, his justification for this decision was, ‘I don’t trust the RAE mechanisms to make a judgement on the quality of our work together’ (R4). Thus knowledge and experience of the assessment exercise has resulted in researchers being unwilling or unable to submit interdisciplinary work. We have also discussed this elsewhere, and argue that those involved in interdisciplinary work are often working a ‘double-shift’ in that the work they submit for the RAE comes from their disciplinary base and interdisciplinary work is undertaken on top of their ‘regular’ work, therefore ‘academics working outside traditional disciplines have to keep up a research record that runs parallel to the work they do in the not-recognized discipline in order to be or remain submissible in one traditional discipline’ (Griffin et al, 2005a: 28). One respondent explained first-hand for us how this affected an academic from the inherently interdisciplinary subject area of Human-Computer Interaction (HCI), ‘a psychologist in a psychology department has to have two careers. One that’s reportable to the psychology RAE and another one that goes to computer science’ (R5).

However, although this was the case for the majority of our respondents, some also commented that their interdisciplinary work might have an impact on the way the assessment exercise would progress in the future. One interviewee described her project as ‘putting in building blocks for beyond the RAE, you know, so maybe after this current RAE, that’s something they will take into account’. This same respondent considered that the current support for interdisciplinary work is in recognition of the ‘sea-change’ that is occurring across the academia more generally and suggested that ‘if fashion does converge towards, you know, information technology, then maybe that [will become] a factor in itself, in fact I’m sure it will do’ (R10).

Nowotny et al suggest that ‘no measurement system, however scrupulously used, can fail to affect the behaviour of that which it seeks to measure’ (2003: 184). They further comment on the influence the assessment exercise has had on practices within higher education at all levels. Concern over this was something our respondents told us that had been discussed at great length during programme workshops. Membership of some of the project teams included RAE panel members. They made attempts to reassure colleagues of their ability to judge interdisciplinary work: “I bridge two, possibly three disciplines in my own personal background and therefore I do believe that I can adequately judge things which fall between particular disciplines” (R5) and perhaps this is so. However, institutional changes in policy and practice regarding RAE outcomes are, by definition, undertaken in hindsight and, although support may have shifted rhetorically at least towards interdisciplinary work, university departments are nevertheless eager to score well and are likely to base their preparations on previous RAE outcomes. As Tait and Lyall (2001: 25) comment, ‘there is a danger that these two trends will pass one another going in opposite directions and within universities this trend will take time to be reversed’.

Overall, our interview responses showed that the RAE remains a major issue in the context of conducting interdisciplinary research and, it is worth noting, that in the 2006 budget the British government announced the abolition of the RAE after 2008 in favour of a new, supposedly radically simplified research-funding system, the effects of which on interdisciplinary research remain to be seen.

4.8 The interdisciplinary research programme experience

In this section of the report, we comment on researchers’ perceptions of how interdisciplinarity was encouraged or facilitated at programme, as opposed to project, level. Our findings here therefore relate to programme activities rather than to what occurred in the projects. All the researchers we interviewed bar one who had not noticed (and in any event did not read ‘interdisciplinary’ to mean anything other than ‘from all disciplines’) agreed that the programmes in which their projects were housed had offered opportunities for disciplinary expansion, interrogation and crossing as part of the programme level activities organized by the programme directors, mainly conferences, workshops and seminars, designed to facilitate exchange of information and ideas between projects.

From the programme directors’ viewpoint, these programme activities had varying degrees of success and depended on participants’ disposition towards interdisciplinarity. One of the directors had found for instance that ‘some people say interdisciplinarity is wonderful but when you tried to encourage them to contribute to workshops they retreat into their own little disciplinary hole.’ He attempted to counteract this by requesting workplans from

participants in which they had to indicate ‘what exactly they would do with the other projects they were interested in’. This resulted in a range of interactions across projects including ‘informal workshops, reading groups. . . more formal conferences. . . joint publications plans etc.’ and as such clearly had some effect. The same programme director also ran thematic workshops with the projects, as well as trying to extend the framework to a more international base by inviting people from abroad to participate, thus, as he put it, ‘appealing to academics’ wonderful sense of status and importance.’ Splitting projects into thematic clusters was viewed by this programme director as one of the most fruitful measures he had taken; he had also given the clusters money ‘for follow-up meetings, just to share ideas, literature they’d come across. . .’

In his view one of the problems is that ‘academics have not been very well trained to be aware of different, call it conversational styles’ and that academics have to learn to be at ease talking about their work and methods across disciplinary divides. His key concern was therefore to encourage academics from different disciplines to engage in exchanges with each other – a rather basic activity with a clearly educative function which he considered necessary in order to establish a basis for future collaborative, interdisciplinary research.

This need was recognized by researchers participating in the programme. One, for instance, said: ‘[At programme level] we’ve had conferences and seminars and things like that. Sometimes the distance across which we are speaking, because not only do you have disciplinary differences, but also topic differences [across projects], because it is such a huge programme, it is so broad.’ (R9) Another researcher similarly commented: ‘[Interdisciplinary practice] is really difficult. . . there are moments of great alienation because people are trying to talk to each other across disciplines, and it’s so difficult. . . academia is structured in a way that encourages people to get into a narrow specialism and to stay there, and not to look outside it, just in order to be. . . to succeed in a traditional university-type career you really need to be on top of a narrow field. . . people are very acculturated into their fields. It’s really hard to talk another language. . .’ (R2) Despite this assessment, this researcher had found the programme participation ‘quite an enriching experience’ (R2). Another researcher said that ‘[the programme director] has made quite conscious efforts, it seems to me, to enable people from different disciplinary backgrounds to work together on common activities.’ (R8) Overall, the interviews gave the impression that those for whom cross-disciplinary activity had worked well within the project, such activity had also worked well within the programme, whereas those who had struggled across divides in their projects also tended to struggle more within the programme.

The researchers in the *Designing for the 21st Century* programme whom we interviewed had, on the whole, an altogether more optimistic view of the interdisciplinary experiences in their programme. This may be because they often worked across radically different fields which necessitated both a disposition to make things work and a stronger need to work towards commonality. The programme director strongly highlighted the need to find a common language (see section 4.4.5 of this report) as key for the working of the projects, and, further, reported: ‘where people confine themselves to talking-shops, if you like, discussion, you can only move so far and one of the things that has been a huge success in some of the projects is, I suppose, is synthesis through action. So actually stepping beyond the discussion forum and actually engaging in some activity. . .’ He argued that ‘sharing a common task provides a great conduit for fast-forwarding some of these problems that we have in bringing the groups together’. This programme director organized workshops across projects where researchers worked through a series of activities, ‘shared activities

with a common purpose' as a way of 'encouraging people to step outside their discipline and explore a sort of common issue.' As a consequence of those activities, some researchers on this programme also reported coming together with others to begin to engage in further joint activities.

All this occurred in a context where there was relatively little further input from the research councils in terms of accounting for interdisciplinary activity, a process itself fraught with difficulties and at present without contours (see Strathern, 2004: 68-86). One programme director noted the very different cultures of the research councils, being for instance more or less bureaucratic. But neither programme director could intervene where projects were failing or blatantly not performing. As one programme director put it: 'I think the research councils themselves are simply not set up for dealing with interdisciplinary working. They're under huge pressure to sort of promote it and get more of it going. . . But the way they're set up does not really support that type of activity. . . The whole way peer review colleges are structured doesn't really support interdisciplinary working. . . and in particular the way peer review colleges are briefed on proposal assessment is totally inadequate for multidisciplinary, sorry, interdisciplinary activity.' (PD1) The mismatch between structures of accountability and what is supposed to be accounted for is here made very evident.

This, however, does not detract from the fact that the researchers on the whole thought that they had been furnished with good opportunities in the programmes to work in an interdisciplinary manner.

4.9 Interdisciplinarity as the future of/for research

All our respondents agreed that interdisciplinarity was one key to the future of research, making comments such as 'It's very important. . . in future we will have Renaissance scientists again.' (R11) and '[Interdisciplinarity is important] because what you get far too much of is reinventing the wheel and if there were more interdisciplinarity there might be a bit less of that. . . Because of the current segregation of people into disciplines, there's far too much parallel redundant work going on.' (R3) When asked whether he felt that interdisciplinarity was key to future research, one programme director replied that although mono-disciplinary research is 'required to deepen understanding of disciplines', from a design context he 'perceive[d] problems that confront society that can only really be resolved, we can only generate the new knowledge and understanding to help resolve them, by engaging in interdisciplinary research'.

The general agreement about the importance of interdisciplinarity went hand in hand with questions of how it might be encouraged, and diverse positions on that. Some were adamant that a top-down approach by research funders was inappropriate because it was a matter of the problem to be addressed and not something that could be forced. This attitude does not recognize that structures impact on the research conducted and that how funding is organized and research is assessed, for instance, plays a role in the kind of research one conducts. Others, acculturated as all interviewees were into particular disciplines, found it hard to envisage life outside the disciplinary constraints. They thought interdisciplinarity was important 'but I can see the problems. I can recall going way back, you know, I was told, "you'll be a jack of all trades and master of none", and indeed I suppose my career's been rather hampered. If I'd been more focused I would've got away from a dump like [my

current university] but *c'est la vie.*' (R7) This researcher linked that issue to 'the limits of the capacity of the human being' in terms of how much knowledge we can absorb and generate. Underlying this was a continuing sense of the importance of disciplines that derives from certain forms of academic acculturation regarding knowledge that have, of course, been significantly challenged in the past few years (see Knorr Cetina 1999; Nowotny et al 2001). But this researcher, and he was not alone, could not envisage academic life unordered by disciplines.

To overcome the problem of over-identification with traditional disciplines, one researcher said: 'one issue is education and training. The reason most people are in their little silos is because they've been trained into them. So right from undergraduate level, we need to train people to have interdisciplinary systemic views of the world.' (R3) This research was not sure if such a change in education required action at institutional, regional or national level, but he advocated a radical reform of researcher training. Another researcher, from abroad, commented on the narrowness of the British education system (the lack of taking a range of compulsory subjects even in schools, leading to a very limited understanding of different knowledge paradigms. Yet another researcher said, 'sometimes you become aware of these chasms in knowledge which result from the absence of interdisciplinarity in contemporary academia.' (R2) This person suggested that 'a more detailed discussion of methodologies' might be critical to developing greater openness towards new ways of thinking and researching. As another researcher put it: 'A lot for me has been about learning from other people's methodology. . . finding out what other approaches have been taken and what they gathered and didn't, and how you can use that.' (R9) The recognition of methods and methodologies being a key issue in interdisciplinary research was articulated by a number of the researchers who saw changes in education on methods and methodologies as key to stimulating interdisciplinarity: 'Interdisciplinarity is the name of the game. . .what [young researchers] expect to have is a portfolio of skills and perspectives which they can take to different places.' (R8)

5. Conclusions

This report examined how interdisciplinarity figured in two interdisciplinary, cross-research council research programmes described in greater detail under sections 2 and 3 of this report, *Cultures of Consumption*, run jointly by the Arts and Humanities Research Council (AHRC) and the Economic and Social Research Council (ESRC) between 2001-7, and *Designing for the 21st Century*, run by the AHRC and the Engineering and Physical Sciences Research Council (EPSRC). It drew on a range of research methods including document analysis, textual analysis, case studies, and, importantly, qualitative semi-structured interviews with key informants, in this instance the two programme directors leading the research programmes under consideration and eleven researchers involved in project in the two programmes. We found the following:

1. Interdisciplinarity is not clearly defined either by the research councils or by the research programmes; instead, the term tends to be used in a declarative manner, often interchangeably with multi-disciplinarity. Both among researchers and among the research councils it was common to talk about 'crossing disciplinary boundaries', and neither 'trans-' nor 'post'-disciplinarity were much in use.

2. Interdisciplinary research was closely linked to collaborative research.
3. The research councils in the UK are organized around knowledge domains (eg arts and humanities; economic and social sciences etc) which impact on the research for which they consider themselves accountable, and on how they assess research.
4. Research is for the most part both at proposal and at evaluation level assessed in disciplinary terms since the councils operate through disciplinary panels. This constitutes a structural impediment to interdisciplinarity.
5. The research councils we considered promote interdisciplinarity in their policy documents.
6. The research councils operationalize interdisciplinarity through thematic priorities which are closely aligned to international research agendas such as those of the European Commission, thus indicating the impact of the building of the European Research Area networks on national research agendas.
7. The consideration of users, the issue of raising public awareness and of engaging with wider society are viewed as part of the new (interdisciplinary) research regimes.
8. Post-award auditing of research projects, particularly for their interdisciplinary dimension, is not yet developed by the research councils, thus making the demand for interdisciplinarity a matter of researcher preference and potentially nothing but a paper exercise.
9. The programme directors for both programmes under consideration were highly supportive of interdisciplinary research and sought to foster it in their programmes through arranging joint activities for programme participants including seminars, workshops, reading groups, clustering activities. These activities operated at the level of 'familiarization exercises' since programme participants had to engage with other researchers from different disciplines and working on different themes.
10. The researchers experienced the programmes as fostering interdisciplinarity but it was also clear to both researchers and programme directors that the take-up of what the programmes had to offer was a matter of individual researcher disposition, enthusiastically embraced by some and rejected by others.
11. A lack of coordination of synergy between programmes and projects, even within single research councils, was noted as leading to researchers' reinventing the wheel or working in parallel rather than collaborating.
12. The researchers indicated that interdisciplinary work did not supersede but ran in parallel with their home-discipline-based research.
13. The researchers could be divided between those who saw themselves as working in a new interdisciplinary field such as Human-Computer-Interaction (HCI) and those who did interdisciplinary research in addition to being in a traditional discipline. Both sets of researchers reported the same issues: lack of recognition of their work; lack of fit with

research related infrastructures such as journals, funding and assessment mechanisms (RAE), institutional structures, peer review.

14. The desire to work in an interdisciplinary way with others occurred in the following four contexts which were not necessarily mutually exclusive: within interdisciplinary disciplines; in adjacent disciplines; due to affective affinities; and due to ideological affinities.
15. Prior working relationships were in most cases key to the establishment of interdisciplinary research teams. The importance of the social (personal and professional connections) as a source for research decisions remains under-researched.
16. Those who undertook interdisciplinary research were characterized by: careers that had involved moving across disciplines; an open disposition towards other disciplines, their terminologies, methods, and ways of thinking; previous histories of interdisciplinary collaboration; locations that enabled cross-disciplinary working; having networks across a range of disciplines; a willingness to communicate across disciplinary divides; a certain independence from career-oriented thinking and working (e.g. not having to use the research for RAE purposes); being more senior in their fields.
17. Young researchers, recently and not yet fully socialized into particular disciplines, were most anxious about the impact of conducting interdisciplinary research on their careers.
18. Senior researchers thought that their history of interdisciplinary research had impeded their career.
19. Interdisciplinary research was viewed by all as not conducive to one's academic career – academic careers required uncompromising embedding in a single discipline.
20. Proximity to other disciplines within institutions, and networks across disciplines outside institutions were regarded as vital for creating the conditions for interdisciplinary research. This is an argument for interdisciplinary research institutes and centres.
21. The attempt to conduct interdisciplinary research within research structures that are predominantly disciplinary, led to strategic divisions of labour within interdisciplinary research projects which frequently meant that researchers stayed in their disciplinary niche, worked in parallel, and published separately. Here interdisciplinarity never went beyond sharing knowledge and methods.
22. Where researchers did not divide the tasks along disciplinary boundaries and co-published, such research was usually conducted on top of another, discipline-based existence, possible because the researchers had discounted the usefulness of their work in terms of their RAE return.
23. Interdisciplinary research was viewed by many as lacking scientific credibility and therefore being seen as undesirable.
24. To conduct interdisciplinary research effectively, researchers were thought to need good interpersonal skills, good communication skills, openness towards others'

methods and terminology, a willingness to work towards developing a common language.

25. Interdisciplinary research requires more time than discipline-based research and a greater degree of process as opposed to product orientation.
26. The researchers in the projects saw interdisciplinarity as important for future research but recognized that institutional research structures, funding and assessment will have to change significantly to enable effective interdisciplinary research.
27. Researchers were divided regarding the need for a top-down approach to interdisciplinarity as opposed to a bottom-up one. They were clearer about the detrimental effects of current research infrastructures for interdisciplinary research than they were about how changes to those infrastructures might actually facilitate such research.
28. The researchers recognized that research methods cement researchers into disciplinary dispositions and that these can be overcome by a greater understanding of a range of research methods.
29. The researchers experienced those interdisciplinary research projects and programmes as most effective where they had been intellectually challenged, learnt about new methods and modes of thinking, and entered new knowledge domains.

6. Bibliography

Awbrey, S., and J. Awbrey (2001) 'Conceptual Barriers to Creating Integrative Universities', *Organization* 8/2: 269-84.

Becher, T. (1987) 'The Disciplinary Shaping of the Profession', in B.R. Clark, ed. *The Academic Profession*. Berkeley, CA: University of California Press.

Becher, T. (1989) *Academic Tribes and Territories – Intellectual Enquiry and the Cultures of the Disciplines*. Milton Keynes: Open University Press.

Becher, T. (1994) 'The Significance of Disciplinary Differences', *Studies in Higher Education* 19/2: 151-62.

Best, J. (2001) 'Giving It Away: The Ironies of Sociology's Place in Academia', *The American Sociologist* 32/1: 107-13.

Biglan, A. (1973) 'The Characteristics of Subject Matter in Different Academic Areas', *Journal of Applied Psychology* 57/3: 204-13.

Boix Mansilla, Veronica and Howard Gardner, 'Assessing Interdisciplinary Work at the Frontier: An Empirical Exploration of "Symptoms of Quality"', at www.interdisciplines.org/interdisciplinarity/papers/6, accessed 12/11/05.

Bourdieu, P. (1984) *Homo academicus*. Paris: Minuit.

Bruce, Ann, Lyall, Catherine, Tait, Joyce and Robin Williams (2004) 'Interdisciplinary Integration in Europe: The Case of the Fifth Framework programme', *Futures* 36: 457-70.

Clark, B. R. (1987) *The Academic Life – Small Worlds, Different Worlds*. Princeton: Carnegie Foundation.

Clark, B. R. (1998) *Creating Entrepreneurial Universities*. Guildford: IAU Press and Pergamon.

Creamer, Elizabeth (2005) 'Insight from Multi-Disciplinary Angles: A Case Study of an Interdisciplinary Research Team', *New Directions for Teaching and Learning* 102: 37-44.

Daston, L. (1998) 'The Academies and the Unity of Knowledge: Disciplining the Disciplines', *differences: A Journal of Feminist Cultural Studies* 10/2: 70-86.

D'Inverno, Mark and Jane Prophet (2004) 'Creative conflict in interdisciplinary collaboration: Interpretation, scale and emergence', in Ernest Edmonds and Ross Gibson, eds., *Interaction: Systems, Theory and Practice* London: ACM. 251-270.

Griffin, Gabriele with Medhurst, Pam and Trish Green (2005) *Disciplinary Boundaries between the Social Sciences and Humanities: National Report on the UK* www.hull.ac.uk/researchintegration.

Griffin, Gabriele, Green, Trish and Pam Medhurst (2005) *The Relationship between the Process of Professionalization in Academe and Interdisciplinarity: A Comparative Study of Eight European Countries*. www.hull.ac.uk/researchintegration.

Hersch, Marion and Gloria Moss (2004) 'Heresy and Orthodoxy: Challenging Established Paradigms and Disciplines', *Journal of International Women's Studies* 5,3: 6-21.

Holm, Ulla and Mia Liinason (2005) *Disciplinary Boundaries between the Social Sciences and Humanities: National Report on Sweden*. www.hull.ac.uk/researchintegration.

Huber, L. (1990) 'Disciplinary Cultures and social reproduction', *European Journal of Education* 25/3: 241-61.

Jackson, Sue (2004) 'Crossing Boundaries', *Journal of International Women's Studies* 5, 2: 1-5.

Karlqvist, A. (1999) 'Going beyond Disciplines: The Meanings of Interdisciplinarity', *Policy Sciences* 32: 379-83.

Kolb, D. A. (1985) 'Learning Styles and Disciplinary Differences', in A. Chickering, ed. *The Modern American College*. San Francisco: Jossey-Bass Publishers.

Knorr-Cetina, K. (1999) *Epistemic Cultures: How the Sciences Make Knowledge*. Cambridge, MA: Harvard UP.

Krebs, Rebecca, Siouti, Irini, Apitzsch, Ursula and Silke Wenk (2005) *Disciplinary Boundaries between the Social Sciences and Humanities: National Report on Germany*. www.hull.ac.uk/researchintegration.

Kuhn, Michael and Svend Otto Remøe, eds. (2005) *Building the European Research Area*. New York: Peter Lang.

Mallard, G., Lamont, M., and J. Guetzkow (2002a) 'The Pragmatics of Evaluation: Beyond Disciplinary Wars in the Assessment of Fellowship Proposals in the Social Sciences and Humanities', paper presented at the American Sociological Association, Chicago.

Mallard, G., Lamont, M., and J. Guetzkow (2002b) 'Epistemological Standpoints and Peer Review in the Social Sciences and Humanities', draft paper.

Moran, Joe (2002) *Interdisciplinarity*. London: Routledge.

Nowotny, H. 'The Potential of Transdisciplinarity', www.interdisciplines.org/interdisciplinarity/papers/5.

Nowotny, H., Scott, P. and M. Gibbons (2003) 'Introduction 'Mode 2' Revisited: The New Production of Knowledge', *Minerva* 41: 179-94.

Prophet, J. and M. d'Inverno (2004) 'Creative Conflict in Interdisciplinary Collaboration: Interpretation, Scale and Emergence', in E. Edmonds and R. Gibson (eds.) *Interaction: Systems, Theory and Practice*. ACM. 251-70. www.interdisciplinary.co.uk/content.

Romito, R. (1997) 'Studying Work, Motherhood and Women's Well-being: A Few Notes about the Construction of Knowledge', *Journal of Reproductive and Infant Psychology* (Aug-Nov) 15 (3/4): 209-21.

Ruscio, K. P. (1987) 'Many sectors, many professions', in B.R. Clark, ed. *The Academic Profession*. Berkeley, CA: University of California Press.

Slaughter, S., and I. Leslie (1997) *Academic Capitalism*. Baltimore and London: The Johns Hopkins University Press.

Strathern, Marilyn (2004) *Commons and Borderlands: Working Papers on Interdisciplinarity, Accountability and the Flow of Knowledge*. Wantage: Sean Kingston Publishing.

Strathern, Marilyn (2005) 'Anthropology and Interdisciplinarity', *Arts and Humanities in Higher Education* 4/2: 125-136.

Tait, Joyce and Catherine Lyall (2001) *Final Report: Investigation into ESRC Funded Interdisciplinary Research*. SUPRA.

Widerberg, Karin, Braaten, Eva Sigrid and Ida Hjelde (2005) *Disciplinary Boundaries between the Social sciences and Humanities: National Report on Norway*. www.hull.ac.uk/researchintegration.

Ylijoki, O. –H. (2000) 'Disciplinary Cultures and the Moral Order of Studying – A Case-Study of four Finnish University Departments', *Higher Education* 39: 339-62.

Websites

www.ahrc.ac.uk

www.consume.bbk.ac.uk/index.htm

www.corporate.coventry.ac.uk

www.emotionalwardrobe.com

www.epsrc.ac.uk

www.epsrc.ac.uk/ResearchFunding/AssessingProposals/PanelParticipation

www.epsrcsocietytoday.ac.uk

www.esrc.ac.uk

www.interdisciplinary.co.uk

www.londonmet.ac.uk/index.cfm

www.ost.gov.uk

www.rae.ac.uk

www.rae.ac.uk/pubs/2005/01/rae0105.doc

www.rcuk.ac.uk

www.sociology.ox.ac.uk/people/chan.html

www.creativityindesign.org.uk