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Promoting multi-disciplinary and inter-disciplinary ageing research in the United Kingdom

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ABSTRACT
Multi-disciplinary and inter-disciplinary working has for long been advocated in gerontology, and sometimes contested. Although collaboration between disciplines is common practice in many areas of ageing research, much remains to be done to develop and support such work. Internationally, funding agencies, scientific associations and other stakeholders in ageing research are actively involved in establishing the methods and means to promote cross-disciplinary co-operation in the field. In the United Kingdom (UK) since the late 1990s, the statutory Research Councils with key interests in ageing and older people have been actively pursuing research programmes that feature multi-disciplinarity and inter-disciplinarity. The National Collaboration on Ageing Research (NCAR), a partnership among four of the Research Councils to stimulate cross-disciplinary collaboration, worked with scientists, funding bodies, and research users to develop approaches to multi- and inter-disciplinary research, and their work informed the New Dynamics of Ageing (NDA) Programme, a major cross-Research Council programme of multi-disciplinary research which spans the social, medical, biological and engineering sciences and the arts and humanities. Drawing on the authors' participation in these activities, this article reviews key developments in the promotion of multi-disciplinary science on ageing in the UK and highlights how this is being pursued in the NDA Programme.

KEY WORDS – science policy, research development, multi-disciplinarity, inter-disciplinarity.

Background

The need for explicit multi-disciplinary and inter-disciplinary approaches in the study of later life has been advanced by scientists and other research stakeholders in the field of ageing for some time (Alkema and Alley 2006; Clair and Allman 2000). Given that ageing is a multi-dimensional

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developmental process, it is widely accepted that its understanding requires multi-disciplinary or inter-disciplinary scholarship that involves multiple levels and domains of analysis (Huyck 2003; Settersten 2003).[1] Kendig (2003) suggested that the field of environmental gerontology is a model of multi-disciplinarity; it has developed at the intersection of psychology, geography and related disciplines to understand ageing individuals in micro-environments as well as 'greying' populations and macro-environments. The advocacy for multi-disciplinary and inter-disciplinary research on ageing is driven by the recognition that a comprehensive understanding of complicated phenomena like ageing is best achieved through the contributions of different disciplines. One exemplar is the Nun Study in the United States of America (USA), a continuing longitudinal investigation of ageing and Alzheimer's disease among the members of a Catholic religious order that has enlisted the perspectives and methods of genetics, neuroscience, nutrition, psycho-linguistics and archival science (Patzwald and Wildt 2004; Riley and Snowdon 2000; Snowdon *et al.* 1996, 2007; Stein *et al.* 2007).

Recent efforts to strengthen multi-disciplinarity and inter-disciplinarity in ageing research are evinced in the current strategic plan of the Gerontological Society of America, and reflected in the themes of the featured symposia at its annual scientific meetings, *e.g.* 'The economics, culture and biology of intergenerational transfers'. Other manifestations are the promotion of the emerging inter-disciplinary field of social neuroscience with reference to ageing by both the United Kingdom (UK) Economic and Social Research Council (ESRC) and the US National Institute on Aging (NIA), one of the National Institutes of Health (NIH). In addition to the aim of creating a wider scientific lens on the ageing process, multi-disciplinary partnerships are being promoted by the pragmatic need to maximise funding resources for research on later life and to avoid duplicative research or 'reinventing the wheel' (Beans 1999).

Many substantial barriers to inter-disciplinary collaboration in research on ageing persist – among them ideological differences in approaches to knowledge, the lack of training and of dedicated funding for inter-disciplinary research, academic and other disincentives, and inadequate peer review (Giacomini 2004; Lynch 2006; Pellmar and Eisenberg 2000). Given these barriers, government and other research funding bodies worldwide are reviewing and developing methods and means for stimulating multi-disciplinary innovation and sponsoring cross-disciplinary working among researchers in ageing. In the USA, there is a NIH-wide 'roadmap' action plan to guide federal research funding in priority areas that require inter-disciplinary collaboration (Hodes 2003). Among the action plan's specific initiatives are support for meetings and networks to

develop the methodologies for inter-disciplinary research, funding for inter-disciplinary training and curriculum development, and exploratory centres for inter-disciplinary research. The priorities for research training in the NIA's Behavioral and Social Research Program include, for example, the 'new disciplines' of bio-demography, social neuroscience and neuro-economics. Some major US research foundations have also promoted cross-disciplinary collaboration in ageing research. The MacArthur Foundation, for example, during the late 1980s constituted an inter-disciplinary network of scientists around a major ten-year research programme on 'successful ageing' (Rowe and Kahn 1998).

Another notable example of the national promotion of cross-disciplinary science on ageing is that since the 1980s the Academy of Finland has funded two successive multi-disciplinary programmes of ageing research, the most recent involving disciplines as disparate as neuroscience and architecture (Academy of Finland 2003; Bruun, Hukkinen and Klein 2005). Against this international backdrop, this article reviews key developments in the promotion of multi-disciplinary science on ageing in the UK, including the approach to inter-disciplinarity that underlies the New Dynamics of Ageing (NDA) Programme, the largest research initiative on ageing to date in the country. Examples of research initiatives from the NDA Programme are used to illustrate its promotion of multi-disciplinary and inter-disciplinary working.

Towards multi-disciplinary collaboration

Multi-disciplinary research on ageing in the UK is by no means new, especially in areas such as epidemiology that customarily has drawn from various knowledge bases (Ebrahim 2006). Until recently, however, cross-disciplinary approaches to ageing research have arisen largely as a result of organic developments between scientists and institutions. The establishment of the Age Concern Institute of Gerontology at King's College London in 1986 was a pioneering multi-disciplinary venture in this country, and several others followed (Warnes 1989). The 1990s saw the establishment of multi-disciplinary research centres on ageing at, for example, the Institute for the Health of the Elderly (IHE) (Newcastle University), the Sheffield Institute for Studies on Ageing (Sheffield University), the Cambridge Interdisciplinary Research Centre on Ageing (Cambridge University), the Centre for Ageing and Public Health (London School of Hygiene and Tropical Medicine), and the MRC Health Services Research Collaboration (centred at Bristol University with collaborators at seven other universities). Since the late 1990s, there have been more

TABLE 1. *United Kingdom Research Council programmes and initiatives on ageing*

Research Council	Programmes and initiatives
BBSRC	The *Science of Ageing* (*SAGE*) *programme* (1998–2001) focused on normal ageing including cellular senescence, the biochemistry of stress, ageing in biological systems, and the ageing population and evolution. The *Experimental Research on Ageing* (*ERA*) *programme* (2001–2007) supported research on the basic biology of normal ageing including genetic and other dietary, pharmaceutical and environmental factors that affect ageing.
ESRC	The *Growing Older programme* (1999–2005) investigated older persons' quality of life (QOL) in six areas: defining and measuring QOL; inequalities in QOL; technology and the built environment; healthy and active ageing; family and support networks; participation and activity in later life.
EPSRC	The *EQUAL programme* (1998–2011) has supported four cycles of funding for research in the areas of the built environment, universal design, rehabilitation, and prolonging independence in old age. The *KT-EQUAL consortium* (2009–13) aims to take forward into implementation the EPSRC's investment in ageing and disability research through knowledge transfer partnerships involving researchers and users of research.
MRC	The MRC research portfolio on ageing includes basic and clinical studies on healthy ageing and on the causes, prevention and treatment of a wide range of conditions that affect older people. The MRC-led *Integrated Approaches to Healthy Ageing programme* (1995–2000) was a government LINK scheme to promote collaboration between academia and industry.

Notes: BBSRC: Biotechnology and Biological Sciences Research Council. EPSRC: Engineering and Physical Sciences Research Council. ESRC: Economic and Social Research Council. MRC: Medical Research Council.

concerted efforts, by both national agencies and professional bodies, to promote multi-disciplinary collaboration in science on ageing. The impetus for a science policy that encourages sustained support for ageing research across the disciplines was provided by the government's Technology Foresight Initiative (1994/95) and the EQUAL (Extend QUAlity Life) initiative (1995), both of which aimed to stimulate research programmes into issues related to population ageing. The profound impact of the latter stemmed not from the allocation of new resources to the Research Councils (RCs) – it was a 'virtual initiative', but from the strength of the Department of Trade and Industry's accompanying injunction. Four of the UK's scientific RCs; the Biotechnology and Biological Sciences Research Council (BBSRC), the Economic and Social Research Council (ESRC), the Engineering and Physical Sciences Research Council (EPSRC), and the Medical Research Council (MRC); each subsequently developed initiatives related to ageing, most of which included a multi-disciplinary focus (Table 1).

Also significant at this time was the development of the English Longitudinal Study on Ageing (ELSA), a prospective cohort investigation

co-funded by a consortium of UK government departments and the US NIA. Modelled on the NIA-sponsored Health and Retirement Study in the USA, ELSA was launched in 2002 as an inter-disciplinary data resource to address the full range of topics involved in understanding the economic, social, psychological and health elements of the ageing process. In spite of these developments, the RCs recognised that the UK, which has some of the world's foremost researchers in the field of ageing, could obtain added value from existing research through improved working across the disciplines, better co-ordination between different research funders, and more consistent links between researchers and key research-user groups, particularly policy makers and practitioners. An early step towards garnering collaboration among key funding bodies and stakeholder organisations was the AgeNet project (1997–2000). Funded by the MRC with government, non-governmental organisation and industry partners, it aimed 'to stimulate multi-disciplinary and multi-sector research partnerships relevant to academia, industry and the National Health Service which would have a beneficial outcome for the health and quality of life of older people' (United Kingdom House of Commons Select Committee on Science and Technology 2000). AgeNet convened themed workshops to bring together researchers, users of research findings and policy makers towards achieving this aim (*e.g.* for a report on the workshop on cellular senescence, *see* Kill 1998). It also performed the valuable task of producing a detailed inventory of more than 50 existing longitudinal datasets on ageing from UK studies with potential for multi-disciplinary secondary analysis (Huppert *et al.* 2000). Its promotion of the sharing of knowledge, resources and best practice helped set the stage for a number of subsequent collaborations involving multiple RCs that supported cross-disciplinary ageing research (Table 2).

The first of these partnerships was the National Collaboration on Ageing Research (NCAR) that was specifically created to generate a cross-RC approach to ageing research and to encourage multi-disciplinary applications to the RCs (Walker and Hennessy 2002). The NCAR was not a research funding programme but rather intended as a vehicle for facilitating the structural and intellectual collaboration on which subsequent cross-RC funding streams for ageing research were to be based. The objectives of the NCAR included:

- *Stimulating new multi-disciplinary research groups in the field of ageing* through working with existing ageing research networks (*i.e.* the EPSRC's EQUAL network and the ESRC's Growing Older programme) and fostering new networks through scientific workshops and consultations with researchers in the field of ageing.

TABLE 2. *Cross-Research Council initiatives on ageing*

Research Councils	Initiatives
MRC, EPSRC, ESRC, BBSRC	*National Collaboration on Ageing Research* (*NCAR*) (2001–04) aimed to develop consensus among researchers/research end users regarding priorities for inter-disciplinary research collaboration and the means and methods for reducing barriers to this collaboration; worked with the sponsoring Research Councils to develop innovations in the joint sponsorship and funding of inter-disciplinary research on ageing.
EPSRC, BBSRC	*Strategic Promotion of Ageing Research Capacity* (*SPARC*) (2005–08) established to stimulate ageing research through showcasing the latest research findings from design, engineering and biology; lobbying policy makers regarding the application of research in needs of older people; and providing pump-priming funds to newcomers to ageing research.
ESRC, EPSRC, MRC, BBSRC, AHRC	*The New Dynamics of Ageing* (*NDA*) *Programme* (2005–12) encourages and supports the development of innovative multi-disciplinary research groups and methods to advance the understanding of the dynamic forces which influence ageing well and to provide a sound evidence base for policy and practice relevant to older people's quality of life.
MRC, BBSRC, EPSRC, ESRC, AHRC	*Lifelong Health and Wellbeing* (*LLHW*) (2007–16) developed to strengthen multi-disciplinary and collaborative research into lifelong health and wellbeing within the UK in the areas of the ageing brain, frailty, and health-related quality of life.

Notes: AHRC: Arts and Humanities Research Council. BBSRC: Biotechnology and Biological Sciences Research Council. EPSRC: Engineering and Physical Sciences Research Council. ESRC: Economic and Social Research Council. MRC: Medical Research Council.

- *Promoting co-ordination among the research funding bodies* through working with the Cross-Council Co-ordination Committee on Ageing Research that had members from the sponsoring RCs, and participating in a Funders' Forum for Research on Ageing and Older People with representation from the RCs, the Department of Health and various UK research charities with interest or commitment to research on ageing or age-associated diseases. These activities aimed to identify areas in which joint working would have the maximum impact and to reduce the organisational barriers to inter-disciplinary working through the development of joint strategies for sponsoring and funding research on ageing.
- *Encouraging stronger links between research and policy and practice in the ageing field* through consultation with end-users of research including government bodies, non-governmental organisations and charities with interests relevant to ageing and older people.
- *Developing the European dimension of ageing research in the UK* through participation in and leadership of the European Research Area on Ageing (ERA-AGE) project (2004–09) funded by the European Commission to

conduct parallel research development activities with European partners in nine countries (Geyer 2005).

Since the conclusion of the NCAR in 2004, the RCs have launched the three major co-sponsored research programmes, namely Strategic Promotion of Ageing Research Capacity (SPARC), New Dynamics of Ageing, and Lifelong Health and Well-Being (Table 2). Collectively these initiatives provide broad coverage of topics relevant to the conditions, influences and supports for quality of later life and actively encourage work at the intersection of disciplines. The remainder of this article focuses on one of these programmes, NDA, and the underpinning approach to multi-disciplinarity and inter-disciplinarity that was developed through the NCAR.

Defining an approach to inter-disciplinarity

The NCAR's approach to promoting inter-disciplinarity had both 'bottom-up' and 'top-down' elements, that is it worked both with the scientific and research-user communities and with research funders, to identify and address barriers and facilitators to cross-disciplinary collaboration in the UK. This strategy was formed in direct response to a view expressed by scientists at the NCAR launch conference in 2001, that although lip service is paid to the value of multi-disciplinary and inter-disciplinary research projects on later life, there were few examples and, moreover, little practical guidance and many formidable barriers to their formation. The NCAR approach recognised that funding organisations wishing to support inter-disciplinary research face special challenges, including exceptional risks, administrative complexity and the time required for consensus building (Committee on Facilitating Interdisciplinary Research, National Academy of Sciences 2004).

As the participating RCs had little experience in the joint sponsorship of multi-disciplinary programmes in the field of ageing, they needed to learn how to create new means and mechanisms to support such research. Griffin, Medhurst and Green's (2006) study of how inter-disciplinarity was operationalised in two major cross-RC-funded programmes (not on ageing)[2] demonstrated, for example, that although the RCs advocated multi-disciplinarity and inter-disciplinarity in their policy documents, it was not clearly defined by either the RCs or by the research programmes. The study also revealed that few if any mechanisms were in place to create synergy between multi-disciplinary and inter-disciplinary programmes and other funded projects. For these reasons, the NCAR approach to

promoting such programmes also incorporated Bruun, Hukkinen and Klein's view that 'funding agencies have much to improve [if they are successfully] to tackle the complexity, contingency and emergent discovery and novelty that characterizes much of interdisciplinary research today' (2005: 10).

The first substantial step in establishing the NCAR approach was a series of scientific workshops that were designed, among other things, to facilitate the sharing of knowledge and practice among researchers from various disciplines, to prioritise research needs in specific fields of ageing, and to encourage new forms of inter-disciplinary collaboration. The participants' recommendations for an inter-disciplinary research agenda and the practical requirements for stimulating cross-disciplinary collaboration were summarised in workshop reports that were disseminated through NCAR's website. Scientific workshops were convened on topics identified through consultation with UK researchers in ageing and research users on which inter-disciplinary studies were likely to bring substantial advances in knowledge and were highly relevant for policy and practice. A workshop on the determinants of cognitive ageing, as one example, brought together experimental scientists with those working on longitudinal studies and explored the potential for collaboration between psychologists, neurologists and clinical researchers.

The first workshop, 'Multidisciplinary perspectives and approaches in ageing research', focused on challenges to and facilitators of the development of multi-disciplinary science in ageing and outlined processes through which diverse disciplines can develop research collaborations across disciplinary boundaries. Among the participants was Norman Anderson of Harvard University, who during the mid-1990s was the founding Director of the Office of Behavioral and Social Sciences Research (OBSSR) at the NIH, where he was charged with integrating behavioural and social sciences research across the biomedical and health research agenda of the then 24 Centers and Institutes of the NIH. Anderson's workshop presentation and further consultation with the NCAR provided many valuable insights about the conditions and structures necessary for the development of successful cross-agency-sponsored inter-disciplinary research initiatives.

Several of the main planks in the NCAR approach to inter-disciplinarity emerged from this meeting. First and foremost was the underlying principle that the research problem should always be the prime driver of inter-disciplinary collaboration (Pellmar and Eisenberg 2000; Rowe 2003). In other words, it was recognised that some research questions are best addressed by a single discipline, and inappropriate projects should not be created solely for the sake of multi-disciplinarity.

Indiscriminate support for such research has prompted some gerontologists, such as Daatland (2002), to question what the 'cage of inter-disciplinarity' has to offer for the contributing parent disciplines, and incited Grimley Evans's charge that 'multidisciplinary research provides employment for social scientists but has no other inevitable value' (although he added that 'its relevance depends on the question being asked') (2002: 94). Bass (2006) also expressed concern that multi-disciplinarity and inter-disciplinarity in gerontology has often meant the unconsidered 'piling on' of additional disciplinary perspectives without achieving conceptual integration or theory building. Cross-disciplinary working must therefore be non-prescriptive, fit for purpose and formed of projects that make a contribution that is 'larger than the sum of its parts'.

The second plank in the approach was the incorporation of Anderson's (1998) conceptual framework for advancing inter-disciplinary research. Compared to multi-disciplinary collaborations in which the separate disciplinary approaches are brought to bear on a research question, inter-disciplinary working is inherently more complicated, for it requires shared models, concepts and terms. According to Anderson (1998), inter-disciplinary research is therefore best approached through a process in which the initial studies in an area typically involve cognate disciplines in bridging adjacent 'levels of analysis' (*e.g.* the psychological and the social), and later proceed to investigations that link less closely related levels (*e.g.* the genetic and the environmental) and fields.[3] Although studies may be highly inter-disciplinary by design from the outset, this type of research more often results through convergent working among the team members and by drawing on the strengths and understanding of the various disciplines to create new integrative terminologies, approaches and methodologies (Bracken and Oughten 2006; Marmot and Steptoe 2007; Rosenfield and Kessel 2003). Inter-disciplinary research on the effects of social status and perceived stress on cell senescence (Cherkas *et al.* 2006; Epel *et al.* 2004), for example, combines well-established psychological theories about stress and coping with known mechanisms of cellular ageing to posit pathways by which social factors 'get under the skin' to affect the course of ageing. Thus, the scope of aspired inter-disciplinarity should recognise that 'narrow inter-disciplinarity' involving neighbouring disciplines is easier to achieve and may be a sensible first step towards 'broad inter-disciplinarity' that brings together very different epistemologies, concepts, theories and methods (Bruun, Hukkinen and Klein 2005).

Finally, the third plank of the approach is to identify and address challenges to and facilitators of inter-disciplinary research collaboration. Many and diverse barriers to inter-disciplinary working have been recognised. Bruun, Hukkinen and Klein (2005), for example, identified

TABLE 3. *Examples of perceived barriers to inter-disciplinarity in research on ageing*

- The RAE (Research Assessment Exercise) process through which the quality of academic departments is rated in the UK is based on criteria that are a significant disincentive to inter-disciplinary research collaboration.
- Multi-disciplinary research is typically complex and more time-consuming to orchestrate than single discipline research. Pressures to obtain funding work against developing inter-disciplinary partnerships.
- Ideological differences between academic disciplines which maintain preferences and status distinctions in approaches to knowledge (*e.g.* the implied superiority of approaches based on the experimental paradigm *versus* phenomenological approaches; the devaluation of inter-disciplinary research as a 'pseudo-discipline') are an important barrier to cross-disciplinary working.
- The lack of specific funding designated for inter-disciplinary research, the paucity of inter-disciplinary academic programmes and of opportunities for multi-disciplinary 'cross-training' of established scientists are all additional barriers to this type of research.
- The current peer review system for research proposals in which referees are perceived as often unqualified to assess submissions outside their own disciplines is inadequate for evaluating complex inter-disciplinary study protocols.
- The current structure of Research Council funding is perceived to be risk-averse in relation to inter-disciplinary proposals with traditional methodologies (*e.g.* randomised controlled trials) being favoured to the exclusion of other innovative approaches (*e.g.* mixed qualitative/quantitative methods) required for examining complex research questions related to ageing.
- Research funders are typically unwilling to cover the costs of co-ordination necessitated by inter-disciplinary collaboration.

seven: *structural impediments* (the organisation of science and associated incentives), *lack of knowledge* (unfamiliarity with other disciplines and of a vision of their potential contributions), *cultural obstacles* (differing accepted understandings, practices, values and language), *epistemological differences* (divergent disciplinary world views), *methodological differences* (varying styles of enquiry), *psychological factors* (attitudes and disciplinary identity), and *reluctant reception* (lack of understanding of the value of inter-disciplinary research by non-scientific audiences). As shown in Table 3, various barriers to inter-disciplinary collaboration were highlighted by participants in the NCAR workshops.

The workshop participants also nominated some priorities for the RCs and NCAR to reduce these barriers, many of which reflect recognised 'success factors' for cross-disciplinary working (Committee on Facilitating Interdisciplinary Research, National Academy of Sciences 2004; Rowe 2003). These included, for example, regular workshops for scientists from different disciplines, more dedicated funding for inter-disciplinary research, 'discipline-hopping' fellowships for inter-disciplinary training, and improving access to sources such as longitudinal datasets and established research panel populations.

Implementing the approach: the NDA Programme

The NCAR's emphasis on multi-disciplinary and inter-disciplinary collaboration combined with relevance to policy and practice, research-user engagement and a focus on quality of life for older people were all key strands in the subsequent development of the NDA, the largest programme of research on ageing mounted to date in the UK. Jointly funded by the ESRC, EPSRC, MRC, BBSRC, and the Arts and Humanities Research Council (AHRC), the seven-year programme was launched in 2006 with a budget of over £20 million. The content of NDA was developed in consultation with the UK ageing research community through a workshop organised by the NCAR for the ESRC in December 2002 titled Ageing Research: The Next Step?, and an associated internet consultation to establish priority areas. The resulting research agenda has the following principal questions: What are the new dynamics of ageing? What are the influences shaping them (behavioural, biological, clinical, cultural, historical, social and technological)? How can their consequences be managed to achieve the maximum benefits for older people? The two major themes of the programme address *ageing well across the lifecourse* (through sub-themes of active ageing; autonomy and independence; later life transitions; the oldest old), and *ageing and its environment* (under sub-themes of resources for ageing; locality, place and participation; the built and technological environment; and the global dynamics of ageing).

In addition to these substantive themes, the programme also has the generic objective of supporting innovative multi-disciplinary and inter-disciplinary research groups and methods that will benefit ageing research and improve the quality of life of older people. This objective encompasses previous recommendations including, for example, for the analysis of existing data sources from an inter-disciplinary perspective, the formulation of eclectic multi-disciplinary teams and hybrid methodologies, and the integration of research with product development. The remit of the NDA Programme thus offers a greatly expanded scope for pursuing many areas of the inter-disciplinary research agenda identified in the NCAR workshops and in previous and current assessments of the state of ageing research in the UK (Franco *et al.* 2007; Harper 2000). Support for doctoral training of inter-disciplinary researchers in ageing is also incorporated. Research projects are required to cross the areas covered by at least two of the participating RCs, and applicants must specify how a project will involve the collaboration of multiple disciplines and the inter-disciplinarity nature of the investigation, including innovative methodologies and potential contributions to theory.

In the four rounds of commissioning to date, the NDA Programme has supported three types of projects: *Collaborative Research Projects* (CRPs), large-scale investigations typically involving several interconnected sub-studies around a multi- or inter-disciplinary theme; individual *Programme Grants*, which are smaller, stand-alone projects that do not necessarily have to follow the multi-disciplinary requirements of CRPs (but most have in fact done so); and *Preparatory Networks*, which provided short-term funding for research teams to develop CRP applications. The following section illustrates how the Preparatory Networks innovation pursued multi-disciplinarity and inter-disciplinarity.

The NDA preparatory networks: incubating inter-disciplinarity

One of the principal barriers to achieving inter-disciplinary collaboration are the resources required to support the extended planning period which characterises this type of research, especially between disciplines with little previous history of intellectual partnership. Time and seed-corn money are recognised as invaluable for accomplishing key tasks in the planning phase, such as recruiting appropriate team members, creating liaisons between the research team and appropriate constituencies, lining up potential consultants, space and facilities, and conducting scoping reviews of relevant conceptual models and literatures (Klein 1990; Tait and Lyall 2001). In order to support the planning tasks necessary for the 'incubation' of multi-disciplinary and inter-disciplinary teams to develop CRP bids, following an open competition, in 2006 the NDA funded 11 Preparatory Networks for periods of up to one year. Examples of topics covered by the Preparatory Networks ranged from 'A life course approach to healthy ageing, frailty and capability' (Kuh and the New Dynamics of Ageing Preparatory Network 2007), to 'Older people's experiences and uses of technology', and 'The involvement of older people in rural civic society' (Hennessy and the New Dynamics of Ageing Preparatory Network 2008).

Each network was provided with around £20,000 to facilitate its key function of developing an application in response to the second call for CRPs in the autumn of 2007. In practice, the networks used the seed-corn funding creatively in various ways, including the identification of datasets for secondary analysis, literature reviews, working with research-user groups, forming reference panels of older people and mounting away days and 'sandpits',[4] as well as supporting regular meetings of the network and their secretarial and administrative costs. Apart from the responsible stewardship of public money, the only requirements were to

submit a proposal in response to the CRP call after around one year and to produce a short report. It was expected also that the Principal Investigators would have a continuing dialogue with the NDA Programme and its Director during the period of award and that recommendations from the latter on additional expertise required by the network would be taken on board.

It is too early to assess how successful this initiative has been in stimulating high-quality multi-disciplinary and inter-disciplinary research. We must wait to see the outcomes of the CRPs that were eventually funded, but by their own assessments the networks were highly successful. All the reports have been extremely positive about the value of the initiative in forging multi-disciplinary research teams, and there was only one negative comment on the Preparatory Networks approach-from one Principal Investigator about the delay it caused to their project's start. Almost all wanted to continue working as a network beyond the 12 months but the terms of the seed-corn funding prevented that. All 11 Networks submitted a proposal to the second CRP call and all were innovative in part or entirely: ten were short-listed by the multi-disciplinary commissioning panel in January 2008. Of the six CRPs selected following peer review for funding in June 2008, five were from Preparatory Networks. Moreover the unfunded alpha-rated proposals were all network applications. In addition to these major outcomes, the Preparatory Network reports point to five specific benefits of this innovation by the UK RCs.

First, they facilitated new multi-disciplinary collaborations, chiefly by providing room and scope for joint learning. The following extracts from the reports by the Preparatory Network co-ordinators indicate the benefits of the innovative ways of working:[5]

> The funding mechanism has been … a powerful learning vehicle in relation to multi-disciplinary working. It has enabled the sharing of language, values and goals, and has encouraged the respect for other people's contributions through gaining appreciation of other, different frames of reference. Achieving recognition that multidisciplinary working is not becoming 'jack of all trades' but about understanding how to use the outputs of others' research processes requires focused effort in the face of fears about losing intellectual property and in the competitive climate that is endemic to academic culture.

> Having funds to support the network activity and having a period of 12 months to develop the research agenda allowed the network to systematically scope the issue … establish a multi-centred, multidisciplinary research agenda developed through partnership and consultation with end users of research, and to flesh out a comprehensive dissemination strategy.

> Methods such as the 'knowledge café' and the 'sandpit' enabled a greater understanding of research group members' knowledge, viewpoints, language,

beliefs and values to be appreciated far more successfully than traditional approaches to joint bid writing.[6]

Secondly, the Preparatory Networks expanded research capacity in the ageing field and most of their final reports emphasise this contribution. As one co-ordinator wrote, 'The grant has been extremely valuable, in that it was awarded when the research was at an early stage and the investigators had limited personal track records. It has been effective in enabling us to establish this activity as a research area within our respective groups'. Thirdly, this funding mechanism stimulated new research networks and collaborations. Thus all of the networks grew and developed over 12 months, some after prompts about the need to encompass disciplines not fully represented in the NDA Programme, but mostly through organic growth. Fourthly, there is evidence that the networks expanded the individual research portfolios of some of their members and there was reference to long-lasting benefits. As one co-ordinator wrote, 'The academic and collaborating partners developed excellent working relationships which, we suspect, will be sustained for the remainder of our working lives'. Fifthly, the Preparatory Network investment embedded user engagement and did so among a broad range of private, voluntary and public organisations. As well as over 130 academic participants in the 11 networks, there were more than 80 representatives from non-academic research-user organisations.

In addition to these key benefits, there were other spin-offs including: a range of knowledge transfer and dissemination activities; co-funding, including with universities and other initiatives such as SPARC; the generation of research funding applications beyond the NDA; and the opportunities for the Programme Director to influence the research portfolio. In sum, the Preparatory Networks initiative contributed substantially to the aims and objectives of the NDA Programme, particularly with regard to the promotion of multi-disciplinarity and inter-disciplinarity, ageing research capacity building and user engagement. Although it was not the original intention, several of the networks see themselves as long-term collaborations and the idea of a 'network of networks' has been raised to bring together those with a shared interest in enhancing the quality of life of older people.

The evidence to date thus suggests that the support of Preparatory Networks with seed-corn funding is an effective way of developing multi-disciplinary and inter-disciplinary collaboration. What more is needed? Funding is obviously critical and the RCs need to ensure that they react appropriately to multi-disciplinary applications through the responsive mode, for which the experience of the NDA Programme with commissioning panels and peer review should be helpful. It is also important

to promote multi-disciplinarity in research training, which the present administrative separation of research and training at the postgraduate level militates against – the UK lacks a postdoctoral programme in ageing research. The model provided by the ERA-AGE-supported FLARE (Future Leaders of Ageing Research in Europe) programme, which entails both cross-disciplinary and cross-national mobility, should be examined closely. Such measures would assist in the development of multi-disciplinary ageing research and create a basis for inter-disciplinary working, which again we emphasise is not intended to replace disciplines but to augment them where appropriate.

Conclusions

Multi-disciplinarity and inter-disciplinarity are advocated in gerontology as a means of encouraging different views, gaining fresh insights and opening up new areas at the intersection of disciplinary territories, all to enhance our understanding of the ageing process and to promote older people's quality of life. The extensive literature on conducting multi-disciplinary and inter-disciplinary research addresses its history, success stories, common barriers, facilitators and incentives, the characteristics of inter-disciplinary researchers, forms of collaboration, practice and outcomes (Klein 1990). Little of the literature, however, has documented or explained how multi-disciplinary and inter-disciplinary research has been realised on the ground in the field of ageing. While there are many examples in the UK of high-quality inter-disciplinary ageing research, the systematic development of programmes of support by public funding bodies for this type of work is comparatively recent. This article has provided an overview of some of the key programmatic developments in the promotion of multi-disciplinary and inter-disciplinary research in the UK and the rationale behind these initiatives. Drilling down into one of them, the NDA Programme, it has provided an inside account of a novel approach to the incubation of multi-disciplinary and inter-disciplinary collaborations. On the basis of this account it serves as a potential model for other research funders.

NOTES

1 Several terms for research involving different disciplines exist (*i.e.* multi-disciplinary, inter-disciplinary, cross-disciplinary, pluri-disciplinary and trans-disciplinary) and are frequently used interchangeably despite various formal definitions for these terms. In general, we will use 'multi-disciplinary' to refer to research in which multiple

disciplines collaborate without significant cross-fertilisation of theories, methodologies and epistemologies (Lamont and Guetzkow 2000), and 'inter-disciplinary' to denote research incorporating explicit integration of disciplinary perspectives and methods (Rosenfield and Kessel 2003).

2 These programmes were the 'Cultures of Consumption' (an ESRC/AHRC collaboration) and 'Designing for the 21st Century' (the first EPSRC/AHRC collaboration).

3 Although Anderson's framework describes research on health outcomes, it also has broader utility for ageing research which brings disciplines together in areas outside health.

4 'Sandpits are intensive discussion forums that bring together a highly multidisciplinary mix of participants to scope and explore a research problem domain using creative and innovative thinking techniques. As used by the UK Research Councils, this method typically involves a residential workshop held over several days with between 20 and 30 researchers and research end users taking part. The sandpit is led by the research programme director who facilitates discussions at the event' (Engineering and Physical Sciences Research Council 2009).

5 These quotations taken from the reports are used with the permission of the authors.

6 The 'knowledge café' is a form of deliberative discussion for progressing knowledge development based on small group conversations with the aim of sharing collective knowledge, ideas and insights and gaining a more in-depth understanding of the topic under consideration. Like the 'sandpit', the knowledge café format is used by the UK RCs for problem scoping and development.

References

Academy of Finland 2003. *Finnish Research Programme on Ageing 2000–2002: Evaluation Report*. Academy of Finland, Helsinki.

Alkema, G. E. and Alley, D. E. 2006. Gerontology's future: an integrative model for disciplinary advancement. *The Gerontologist*, **46**, 5, 574–82.

Anderson, N. B. 1998. Levels of analysis in health science: a framework for integrating sociobehavioral and biomedical research. *Annals of the New York Academy of Sciences*, **840**, 563–76.

Bass, S. A. 2006. Gerontological theory: the search for the Holy Grail. *The Gerontologist*, **46**, 1, 139–44.

Beans, B. E. 1999. Multidisciplinary partnerships are offering more bang for federal research dollars. *APA Monitor Online*, **30**, 3, 1–3.

Bracken, L. J. and Oughton, E. A. 2006. What do you mean? The importance of language in developing interdisciplinary research. *Transactions of the Institute of British Geographers*, **31**, 3, 371–82.

Bruun, H., Hukkinen, J. and Klein, J. T. 2005. *Promoting Interdisciplinary Research: The Case of the Academy of Finland*. Series #8/05, Academy of Finland, Helsinki.

Cherkas, L. F., Aviv, A., Valdes, A. M., Hunkin, J. L., Gardner, J. P., Surdulescu, G. L., Kimura, M. and Spector, T. D. 2006. The effects of social status on biological aging as measured by white-blood-cell telomere length. *Aging Cell*, **5**, 5, 361–5.

Clair, J. M. and Allman, R. M. 2000. *The Gerontological Prism: Developing Interdisciplinary Bridges*. Baywood, New York.

Committee on Facilitating Interdisciplinary Research, National Academy of Sciences 2004. *Facilitating Interdisciplinary Research*. National Academies Press, Washington DC.

Daatland, S. O. 2002. Time to pay back? Is there something for psychology and sociology in gerontology? In Andersson, L. (ed.), *Cultural Gerontology*. Auburn House, Westport, Connecticut, 1–12.

Ebrahim, S. 2006. Entelechy, citation indexes, and the association of ideas. *International Journal of Epidemiology*, **35**, 5, 1117–8.

Engineering and Physical Sciences Research Council (EPSRC) 2009. *What is a Sandpit?* EPSRC, Swindon, UK. Available online at http://www.epsrc.ac.uk/ResearchFunding/Opportunities/Networking/IDEASFactory/WhatIsASandpit.htm [Accessed 30 December 2009].

Epel, E. S., Blackburn, E. H., Lin, J., Dhabhar, F. S., Adler, N. E., Morrow, J. D. and Cawthon, R. M. 2004. Accelerated telomere shortening in response to life stress. *Proceedings of the National Academy of Sciences of the United States of America*, **101**, 49, 17312–5.

Franco, O. H., Kirkwood, T. B. L., Powell, J. R., Catt, M., Goodwin, J., Ordovas, J. M. and van der Ouderaa, F. 2007. Ten commandments for the future of ageing research in the UK: a vision for action. *BMC Geriatrics*, **7**, 10.

Geyer, G. 2005. Establishing the European Research Area in Ageing: a network of national research programmes. *Experimental Gerontology*, **40**, 10, 759–62.

Giacomini, M. 2004. Interdisciplinarity in health services research: dreams and nightmares, maladies and remedies. *Journal of Health Services Research and Policy*, **9**, 3, 177–83.

Griffin, G., Medhurst, P. and Green, T. 2006. *Interdisciplinarity in Interdisciplinary Research Programmes in the UK*. University of Hull, Hull, UK. Available online at www.york.ac.uk/res/researchintegration/Interdisciplinarity_UK.pdf [Accessed 1 May 2008].

Grimley Evans, J. 2002. National initiatives in ageing research in the United Kingdom. *Age and Ageing*, **31**, 2, 93–5.

Harper, S. 2000. Ageing 2000: questions for the 21st century. *Ageing & Society*, **20**, 1, 111–22.

Hennessy, C. and the New Dynamics of Ageing Preparatory Network 2008. Developing interdisciplinarity: the experience of a preparatory network in the New Dynamics of Ageing Programme. Paper presented at the 37th annual meeting of the British Society of Gerontology, Bristol, UK, 4–7 September.

Hodes, R. 2003. NIA Symposium: research initiatives, funding and training opportunities at the National Institute on Aging. Paper presented at the 56th Annual Scientific Meeting of the Gerontological Society of America, San Diego, California.

Huppert, F. A., Brayne, C., Jagger, C. and Metz, D. 2000. Longitudinal studies in ageing: a key role in the evidence base for improving health and quality of life in older adults. *Age and Ageing*, **29**, 6, 485–6.

Huyck, M. H. 2003. Is gerontology the Cheshire cat? *The Gerontologist*, **43**, 1, 132–6.

Kendig, H. 2003. Directions in environmental gerontology: a multidisciplinary field. *The Gerontologist*, **43**, 5, 611–4.

Kill, I. R. 1998. Ageing research in the UK: plenty of proliferative potential. *Molecular Medicine Today*, **4**, 11, 466–7.

Klein, J. T. 1990. *Interdisciplinarity: History, Theory and Practice*. Wayne State University Press, Detroit, Michigan.

Kuh, D. and the New Dynamics of Ageing Preparatory Network 2007. A life course approach to healthy ageing, frailty and capability. *Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, **62**, 7, 7–21.

Lamont, M. and Guetzkow, J. 2000. No title. In Wissoker, K., Anderson, L., Appadurai, A., Bender, T., Goldfarb, J., Lamont, M. and Guetzkow, J. (eds), *Negotiating a Passage Between Disciplinary Borders: A Symposium. Items and Issues*, **1**, 3–4, 12–3.

Lynch, J. 2006. It's not easy being interdisciplinary. *International Journal of Epidemiology*, **35**, 5, 1119–22.

Marmot, M. and Steptoe, A. 2007. Whitehall II and ELSA: integrating epidemiological and psychobiological approaches to the assessment of biological indicators. In Weinstein, M., Vaupel, J. W. and Wachter, K. W. (eds), *Biosocial Surveys*. National Academies Press, Washington DC, 42–59.

Patzwald, G. A. and Wildt, C. M. 2004. The use of convent archival records in medical research: the School Sisters of Notre Dame archives and the Nun Study. *American Archivist*, **67**, 1, 86–106.

Pellmar, T. C. and Eisenberg, L. (eds) 2000. *Bridging Disciplines in the Brain, Behavioral, and Clinical Sciences*. Institute of Medicine, National Academy Press, Washington DC.

Riley, K. P. and Snowdon, D. A. 2000. The challenges and successes of aging: findings from the Nun Study. *Advances in Medical Psychotherapy*, **10**, 1, 1–12.

Rosenfield, P. and Kessel, F. 2003. Closing commentary. Fostering interdisciplinary research: the way forward. In Kessel, F., Rosenfield, P. L. and Anderson, N. B. (eds), *Expanding the Boundaries of Health and Social Science: Case Studies in Interdisciplinary Innovation*. Oxford University Press, Oxford, 378–413.

Rowe, J. W. 2003. Introduction: Approaching interdisciplinary research. In Kessel, F., Rosenfield, P. L. and Anderson, N. B. (eds), *Expanding the Boundaries of Health and Social Science: Case Studies in Interdisciplinary Innovation*. Oxford University Press, Oxford, 3–12.

Rowe, J. W. and Kahn, R. L. 1998. *Successful Aging*. Pantheon, New York.

Settersten, R. A. Jr 2003. *Invitation to the Life Course: Toward New Understandings of Later Life*. Baywood, Amityville, New Jersey.

Snowdon, D. A., Kemper, S. J., Mortimer, J. A., Greiner, L. H., Wekstein, D. R. and Markesbery, W. R. 1996. Linguistic ability in early life and cognitive function and Alzheimer's disease in late life: findings from the Nun Study. *Journal of the American Medical Association*, **275**, 7, 528–32.

Snowdon, D. A., Tully, C. L., Smith, C. D., Riley, K. P. and Markesbery, W. R. 2007. Serum folate and the severity of atrophy of the neocortex in Alzheimer disease: findings from the Nun Study. *American Journal of Clinical Nutrition*, **71**, 4, 993–8.

Stein, P. S., Desrosiers, M., Donegan, S. J., Yepes, J. F. and Kryscio, R. J. 2007. Tooth loss, dementia and neuropathology in the Nun Study. *Journal of the American Dental Association*, **138**, 10, 1314–22.

Tait, J. and Lyall, C. 2001. *Investigation into ESRC Funded Interdisciplinary Research*. Final Report, Scottish Universities Policy Research and Advice Network, Edinburgh.

United Kingdom House of Commons Select Committee on Science and Technology (HC SCST) 2000. *Memorandum Submitted by AgeNet*. Minutes of Evidence, 22 March, HC SCST, Parliament, London. Available online at http://www.publications.parliament.uk/pa/cm199900/cmselect/cmsctech/245/0030102.htm [Accessed 21 July 2010].

Walker, A. and Hennessy, C. H. 2002. The UK National Collaboration on Ageing Research. *Lifespan: Journal of the British Society for Research on Ageing*, **11**, 1.

Warnes, A. 1989. Responding to the challenge of ageing. In Warnes, A. (ed.), *Human Ageing and Later Life*. Edward Arnold, London, 192–208.

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