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## Scientific labour markets, networks and regional innovation systems

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**Scientific labour markets, networks and regional innovation systems**

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5 SCIENTIFIC LABOUR MARKETS, NETWORKS AND REGIONAL  
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7 INNOVATION SYSTEMS  
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31 ABSTRACT

32  
33 While quality of the labour force in a locality is the single most important component  
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35 of local competitiveness (SIMMIE et al 2002), the RIS literature has relatively  
36  
37 neglected processes of labour force development. This paper addresses two questions  
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39 (i) what is the role of labour markets in the making of regions as innovative systems  
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41 and (ii) what is the role of labour markets in Regional Innovation Systems. The labour  
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43 market and specifically the networks that exist between highly skilled workers are  
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45 positioned at the centre of the analysis, using evidence from the UK high technology  
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47 economies of Cambridgeshire and Oxfordshire.  
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53 Keywords: scientific labour markets, regional innovation systems, Oxfordshire and  
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55 Cambridgeshire  
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58 JEL Code 031  
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## INTRODUCTION

While quality of the labour force in a locality is the single most important component of local competitiveness (SIMMIE et al 2002), the systems of innovation literature, including the regional innovation systems (RIS) literature, has devoted relatively little attention to processes of labour force development (see for example the neglect of labour by COOKE 1998, CASPAR and VAN WAARDEN (eds) 2005, ASHEIM et al (eds) 2003). Yet a long line of studies dating back to KEEBLE 1989, ANGEL 1991, through to SIMMIE et al 2002, BERCOVITZ and FELDMAN 2006 and SAXENIAN 2006) have focused both on cumulative, hence systemic processes, whereby the highly skilled are attracted to particular locations by the presence of other professionals whose movement between employers is a crucial factor in transferring technology within regions or localities. The argument is that the absorptive capacity (COHEN and LEVINTHAL 1990) of the highly skilled is crucial in drawing in, assimilating and translating new knowledge and applying it commercially, with the 'embodiment' of knowledge in the regional labour force being one of the primary mechanisms through which such localization occurs (HOLMEN and DOLEREUX 2003, 15-16).

As such concentrations of expertise develop greater demands for coordination within labour markets arise. Studies have shown that at the early stages of new concentrations self-organising processes emerge whereby informal institutions develop that help reinforce the impact of labour as a key component of the innovation process (see GARNSEY 1998). Later there is a demand for more formal initiatives designed to coordinate the supply and demand of skills, for example to ensure that there is a matching process between the career needs of individuals and the skill needs of firms. Under some conditions the former include the development of communities

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3 of practice (BROWN and DUGUID 2000a) and ‘learning communities’ (BENNER  
4 2003), while the latter might be skill specific training programmes. Therefore, if  
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6 somewhere has a localised expert labour market system it is likely that there will be  
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8 evidence of institutions, social as well as economic, which collectively comprise a  
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10 system of governance within the localised component of a more geographically  
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12 extensive highly-skilled local labour market.  
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18 Such fundamental issues of skill accumulation and the labour market mobility which  
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20 lead to innovation through the transfer of knowledge are relatively neglected in the  
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22 RIS literature. Taking coordination within localised labour markets as its theme this  
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24 paper argues labour markets deliver innovation in particular places, driving regional  
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26 innovation systems to a far greater extent than institutional arrangements – which  
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28 rather than being instrumental in setting the climate for innovation, are reinforcing  
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30 effects (see GARNSEY 1998).  
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36 The paper addresses two questions (i) what is the role of labour markets in the making  
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38 of regions as innovative systems and (ii) what is the role of labour markets in regional  
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40 innovation systems. In particular, in relation to both questions, we are interested in  
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42 how flows of people (and knowledge) through (local) space are coordinated.  
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44 Processes of coordination, we argue, are fundamental to understanding how regional  
45  
46 labour markets contribute to knowledge transfer and learning. In this paper, we  
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48 position the labour market and specifically the networks that exist between highly  
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50 skilled workers at the centre of the analysis. We examine flows of people and  
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52 knowledge through geographical space within local labour market for the highly  
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54 skilled, using evidence from the high technology local economies of Cambridgeshire  
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56 and Oxfordshire in the UK.  
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3 The remainder of the paper is in three sections. In the first, the justification for the  
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6 prioritisation of the role labour markets in RIS is reviewed. The second introduces  
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9 evidence from a study of labour market mobility in the high-technology local  
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12 economies of Oxfordshire and Cambridgeshire. The third draws some conclusions.  
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15 We argue that localised RIS in Oxfordshire and Cambridgeshire can be observed in  
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18 patterns of intra and inter-regional mobility but that evidence of the localisation of  
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21 national and global innovation systems is stronger.

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### CONCEPTUAL FRAMEWORK

Recent literature has focused on the interdependence of intra and inter-firm learning processes in firms (MAKINEN 2002), in collective learning at the local/regional scale (LUNDVALL 1988, STORPER 1995, LAWSON 1997) and in the institutions which emerge to sustain both (GARNSEY 1998, BENNER 2003, ISAKSEN 2005). It is only recently that how labour markets contribute to both and hence to regional innovation systems has become the focus of attention. In part one of the literature review we consider the key concepts of regional innovation systems in order to identify where labour might fit into definitions of RIS, which we discuss in part two.

#### (i) Regional Innovation Systems

Regional innovation systems are extremely varied in form and as systems in process (see COOKE 1998). HOWELLS (1999) for example, points to three dimensions of RIS: regional structure – administrative, legal, constitutional and institutional arrangements; the long-term evolution and development of regional industry specialisation, and the additional core/periphery differences in industrial structure and innovative performance. The last relates to higher order versus lower order functions and activities and patterns of government expenditure. He also argues that RIS are

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3 crucial arenas for localised learning and tacit know-how sharing – the informal links  
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5 between key personnel. In spite of this variety, definitions of RIS have at least three  
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7 points in common: they all stress boundaries, governance, and industrial  
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9 specialization/clustering and associated interactive learning processes. We next  
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11 discuss these points drawing on studies which have emphasized different aspects of  
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13 each, to develop understanding of the RIS concept, in general and then specifically in  
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15 relation to labour markets.  
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21 One of the most difficult issues in identifying the existence of an RIS as opposed to an  
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23 administratively defined area, is that of whether the system can be seen to have  
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25 distinct features. For EDQUIST (2004) (in ROPER et al 2006), like HOWELLS,  
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27 boundaries, functions and co-ordination are the identifiers of the existence of an RIS.  
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29 EDQUIST suggests that there are three criteria that must be met if an innovation  
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31 system is said to exist in an area: coherence – demonstrated by feedback loops,  
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33 common developmental trajectories and complementary competencies between  
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35 agenda; unified function where there are identifiable objectives or aims to which all  
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37 elements of the system contribute; and being bounded – creating the possibility of  
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39 discriminating between the system and the rest of the world.  
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46 ASHEIM and GERTLER (2005) address the issue of coherence from a rather  
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48 different perspective on clustering and interactive learning, to the standard discussions  
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50 of types of cluster specialisation (see for example the discussion in Martin and Sunley  
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52 2003.) In their categorisation of industries and their industrial contexts they  
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54 distinguish those with an *analytical* knowledge base (most closely akin to high-tech  
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56 sectors) or those with a *synthetic* knowledge base, the key features are presented in  
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58 Table 1 below. The former are those industries that rely on scientific knowledge such  
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3 as IT and biotech, where the production process draws on sources of knowledge, and  
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5 tend to draw upon research results from universities or national laboratories.  
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8 Universities, whose contributions to the labour market are underplayed in regional  
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10 innovation literature, therefore, might be expected to play an initial role in diffusing  
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12 technological knowledge through graduate recruitment. In the latter the innovation  
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14 process involves the application of existing sources of knowledge or new  
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16 combinations of knowledge. This often occurs in response to the need to find  
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18 technical responses to specific problems that emerge from interactions between clients  
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20 and suppliers. In these conditions, labour market processes might be more interesting  
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22 in the synthetic model as there is less reliance on codified knowledge, which is more  
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24 important in the analytic model where universities might be expected to play a more  
25  
26 downstream role (ASHEIM and COENEN, 2006).  
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33 The distinction between analytic and synthetic clearly relates to boundaries,  
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35 governance and industrial clustering and specialisation and the associated aspects  
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37 interactive learning as it includes the recognition of the different research and  
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39 institutional structures required to support the knowledge base in the cluster (WOLFE  
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41 et al 2005). Thus in regional innovation systems based on analytical knowledge (high-  
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43 tech economies) there will be different processes of coordination between the various  
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45 actors compared to those based on synthetic knowledge, in which the operation of  
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47 labour markets will in turn differ in their significance.  
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9 Governance is a key element in the RIS concept as it is that which defines how a  
10 system is formally organized to overcome market (MALERBA 2002) and or system  
11 failures (WOOLHUIS et al 2005). It is expressed as both government and non-  
12 governmental activities (STOKER 2000). With respect to scientific labour markets,  
13 formal policy structures include private sector organisations such as branches of  
14 industry associations and chambers of commerce which have responsibilities for  
15 addressing skills issues, and public organisations such as universities and  
16 polytechnics, regional ministries and skills councils with devolved powers concerning  
17 enterprise and innovation support, particularly for small and medium-sized enterprises  
18 (SMEs).  
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33 Universities' contribution to local labour markets, which might be expected to be  
34 pivotal in sustaining localised innovation systems, is problematic if the evidence from  
35 an OECD is accepted. This finds that although there is a positive correlation between  
36 secondary and tertiary educational attainment and economic performance, it is much  
37 stronger for secondary education, while 'university education makes a relatively  
38 modest contribution' (OECD 2001, 96). HOMMEN and DOLEREUX (2003, 18)  
39 comment, 'These results hardly bear out the expectation that 'elite' labour and higher  
40 education are vital for 'learning regions'. Further reference is therefore made to case  
41 study evidence on the importance of 'industry structure, the curriculum of [a region's]  
42 universities, and the degree of co-ordination between education and industry'.  
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48 Moreover, while universities teach codified knowledge to students, there is no  
49 guarantee of a match between teaching and the kinds of students required by the firms  
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3 in the hinterland of the university – they are not necessarily mutually reinforcing.  
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5 Hence there is potentially a difference between universities with a regional mission  
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7 (such as Newcastle University) and those without (such as Oxford University) and the  
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9 types of universities needed in core and peripheral areas (BENNEWORTH, 2005). In  
10  
11 addition, there is no a priori assumption that the highly skilled will absorb the kinds of  
12  
13 knowledge that have practical applications in the regional economy. Therefore  
14  
15 universities do not easily sit into universal assumptions about the elements of a well-  
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17 functioning RIS because of their lack of consistency in impact in any or all of  
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19 boundaries, governance and industrial specialisation/clustering.  
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26 (ii) Labour markets processes in RIS

27 Labour markets have tended to be omitted from discussion about RIS in economic  
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29 geography. Yet labour markets are central to understanding how systems develop.  
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31 Knowledge transfers cannot occur without stocks and flows of highly skilled people  
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33 and their networks (see SCOTT 2006, earlier identified by SIMMIE et al, 2002) in  
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35 explanations of clustering behaviour and economic development (BERRY and  
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37 GLAESER 2005) and informal and formal governance structures. Attention on the  
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39 highly-skilled is long overdue, especially as the general trend in Europe and the US is  
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41 for an increase in the number of jobs requiring science and engineering (S&E) skills.  
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43 As with RIS, interdependent effects are at work. Here we identify four dimensions  
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45 which relate to the general literature on RIS: stocks, flows, networks and informal and  
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47 formal governance systems.  
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54 The first of these are stocks of creative and educated people in a region. It is they who  
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56 have the capacity to absorb and process knowledge (DANKBAAR, 2004). Firms gain  
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58 from an increase in the overall stock of the highly skilled, both in the size and quality  
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60 of the workforce. Regional or local growth depends on developing special types of

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3 incentive strategies that build on the ways in which tertiary education and other  
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5 institutions influence innovation through human capital formation and development.  
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8 These are the recruitment of graduates and post-grad students, and increasingly  
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10 important foreign students; placement schemes; continuing professional development  
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12 and extension programmes; vocational courses and public access to lectures and  
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14 libraries, museums, galleries and sporting facilities. Both technical and business skills  
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16 are required for firm competitiveness. While universities and other colleges are  
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18 sources of skills, national laboratories also have an educational role, training both the  
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20 highly skilled in science and engineering disciplines and technical experts such as  
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22 technicians and laboratory assistants. SCOTT (2006) while recognising FLORIDA'S  
23  
24 (2002) argument that creative people are a key element of the contemporary creative  
25  
26 city, argues that the production system is at the heart of understanding the system of  
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28 employment which will attract, employ and train such people over any reasonably  
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30 long run period. This complements HOWELL'S (1999) point about regional  
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32 industrial specialisation as a feature of innovation systems.  
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40 Second, flows refer to both mobility of personnel within as well as into and out of a  
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42 region. Both have implications for firms' organisational strategies and individual's  
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44 career development (GREEN and CANNY 2003) as well as the human capital  
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46 resources in particular cities and regions (CHAMPION and COOMBES 2005). Intra  
47  
48 region mobility is both a competitive process and form of coordination of knowledge  
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50 flows, both contributing to the creation of an RIS. MASSEY (1995) for example,  
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52 argues that a better understanding of processes can be obtained by examining  
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54 collective activity within high-technology labour markets. She describes how in such  
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56 highly differentiated labour markets, a dynamic of competition is created in which it  
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58 is necessary for both employers and employees to have a detailed knowledge of the  
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3 market. Like ANGEL (1991) MASSEY finds that scientific workers change jobs  
4 frequently. She also finds that they belong to a professional community which extends  
5 beyond and cuts across the confines of the firms that employ them. The professional  
6 labour market does not operate in terms of simple supply and demand, nor does it  
7 operate in terms of cost. MASSEY (1995, 138) argues it is a 'very individualistic  
8 labour market' in which particular people are sought, singled out by their possession  
9 of knowledge, a monopoly, she argues, they have developed through the separation of  
10 conception from execution. She notes that scientists are highly mobile, and that to a  
11 large extent they choose their employers, so that work follows them and not vice  
12 versa. MASSEY argues that the clustering effect caused by the locational preferences,  
13 for example of electronic engineers (citing KEEBLE 1976) is reinforced by the way  
14 in which the labour market for their skills operates. The labour market is able to  
15 operate in this fashion due to the nature of the electronics product market; firms  
16 compete through quality, innovation and new products at least as much as through  
17 cost so that 'what is being bought on the labour market is not just labour power but  
18 scientific knowledge'.

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42 Scientific knowledge is also transferred through recruitment by industry of graduates  
43 and employees from universities and other research institutions. In this respect, the  
44 scientific labour market can be seen as a 'bridging institution' between academia and  
45 industry for the co-production and transfer of knowledge and competences  
46 (LANCIANO-MORANDAT and NOHARA 2002.) Yet as MICHIE and SHEEHAN  
47 (2003) find, high commitment organisations or transformed workplaces are positively  
48 correlated with innovation (in ASHEIM and COENEN 2006). Thus barriers to  
49 technology transfer (LAWTON SMITH 1998) may be overcome by labour mobility.  
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KEEBLE *et al* (1998, 20) emphasise the importance of the movement of the highly

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3 skilled between local employers arguing that the 'local inter-firm movement of skilled  
4 staff plays an important role in the intra-regional transmission of expertise and  
5 fostering of inter-firm links'. While HENRY and PINCH (2000) suggests that the  
6 *place* is important, KEEBLE 1989 and SEGAL QUINCE (1985) show that it is  
7 through *people* that the place keeps ahead. With regard to the success of its high  
8 technology economy SEGAL QUINCE (1985, 33) noted that 'Cambridge is not only a  
9 good place in which to recruit, but of greater significance, also in which to recruit  
10 outstanding people' .  
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23 Flows of people into a region (and out of a region) are an important component on the  
24 making of a RIS, but as GREEN (2006) points out, is less well researched. This is  
25 particularly so with respect to international mobility within Europe, possibly because  
26 international mobility between European countries has not yet become a major  
27 pattern, the trend is still one of outflows to the US (MASON 2000). More important is  
28 mobility between regions. As FLORIDA (2002) argues, the key to economic growth  
29 lies not only in the ability to attract the creative class, but also to translate that  
30 underlying advantage into creative economic outcomes in the form of new ideas, new  
31 high-tech businesses and regional growth. Other evidence while not wholly  
32 supporting FLORIDA's thesis, has identified that the tendency of initially skilled  
33 places to become more skilled over time (BERRY and GLAESER 2005) as more  
34 individuals become entrepreneurial and others move into a region. Supporting  
35 SCOTT's argument, BERRY and GLAESER find that if skilled people are more  
36 likely to become entrepreneurs (who are relatively immobile) and innovate in ways  
37 that employ other skilled people, then this creates an agglomeration economy where  
38 skilled people want to be around each other. This has a reinforcing, circular causation  
39 effect identified long ago by MYRDAL (1957) and indeed by MARSHALL (1922)  
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3 who emphasised the quality, mobility and flexibility of the labour market as being key  
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5 to transferring ideas within industrial districts.  
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9 The attraction of various types of talent (students, researchers, IT specialists, research  
10  
11 scientists etc.) is now a formal governance agenda. Measures include tax incentives,  
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13 repatriation schemes and improving the attractiveness of academic careers (OECD  
14  
15 2004). BACHTLER (2004) proposes that attracting star academics, researchers and  
16  
17 highly skilled knowledge workers is increasingly replacing inward investment as a  
18  
19 key role for regional development agencies. He cites Quebec, where the government  
20  
21 is offering five-year income tax holidays to attract foreign academics in IT,  
22  
23 engineering, health science and finance to take employment in the region's  
24  
25 universities. In Finland, Nokia invests in the cultural adaptation of foreign IT workers  
26  
27 as a way to improve productivity but also to help to retain this 'talent' (OECD 2004).  
28  
29 Therefore, mobility is central to understanding co-ordination within the innovation  
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31 process. Due to the fact that key industry clusters tend to be territorially based, talent  
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33 attraction initiatives may be best designed by city and regional bodies that have strong  
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35 industrial connections and a good knowledge of the local labour market (BACHTLER  
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37 2004).  
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46 Thirdly, networks are a key co-ordinating mechanism of information flows  
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48 (LAMBOOY 2004). LAMBOOY argues that networks fulfil two functions: the first is  
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50 facilitating the co-ordination of decisions made by separate entities (or nodes) of the  
51  
52 networks and the second is the transformation of data, information and knowledge by  
53  
54 using or making connections. These take the form of 'communities of practice' and  
55  
56 'learning communities; in local and regional settings (e.g. BROWN and DUGUID  
57  
58 2000b; SCHOENBERGER 1999; BENNER 2004).  
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3 Finally, formal governance systems sit along-side informal system of coordination  
4 through networks. Shortages of skills which arise when clusters become established  
5 create a demand for governance systems in the form of training and financial systems  
6 etc and so on. These present particular policy problems resulting from Myrdal-type  
7 polarisation effects whereby the rich get richer. Such policy implications are  
8 addressed by FLYNN (1988) in HOMMEN and DOLEREUX (2003). He emphasised  
9 the importance of adopting a life cycle framework in human resource planning  
10 arguing that institutional factors such as the mix and characteristics of firms and  
11 human resources, and the timing of adjustment to avoid shortages and surpluses of  
12 labour and of anticipating institutional conflicts and problems in education and  
13 training policy need to be taken into account. HOMMEN and DOLEREUX argue that  
14 such an approach is particularly needed as regional or local policy makers may  
15 underestimate the difficulties in developing cooperative governance structures. Such  
16 problems stem from macro-economic conditions and national state policies which  
17 influence regional or local labour markets.

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40 The policy dilemma at the local level is that graduate recruitment and retention means  
41 both finding local jobs for people from the universities and recruiting new students  
42 from the local population into the region's universities. Particular problems lie in  
43 matching supply to the demand for skills. While some parts of an economy may have  
44 a high demand for graduates and technicians such as high-tech SMEs and research  
45 institutions, other firms, particularly low-tech small firms, are not able to meet the  
46 challenges presented by new technologies. In the UK for example, a general weakness  
47 of SMEs is insufficient training and graduate recruitment. Nationally, between 30 per  
48 cent and 40 per cent of firms employ no graduates (CURDS 2000). Thus there is a  
49 role of governance in co-ordinating appropriate responses to this problem by  
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3 facilitating the provision of the better training of undergraduates, graduates, and other  
4 employees in industry – necessary if SMEs are to recruit graduates and make the best  
5 use of them. Such intervention could strengthen the links between further and higher  
6 education sectors and the local economy and ensure a strong value chain of skills.  
7  
8 Central to these activities are (i) the identification of where Higher Education  
9 Institutes (HEIs) jointly can offer training and (ii) an intelligence gathering role about  
10 vacancies and availability of personnel which span the city-region and its hinterland.  
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15 In conclusion, the selection of the empirical material which follows is based on the  
16 key points made above. These are that RIS are constructed through labour market  
17 processes in which stocks of highly-skilled labour are accumulated and flows of  
18 knowledge are facilitated through career mobility, networks and interactive learning.  
19  
20 These comprise informal systems of governance and which may create a demand for  
21 intervention by formal institutions. This paper now explores these aspects of RIS  
22 development, focusing particularly on stocks and flows of the highly-skilled,  
23 particularly with respect to career mobility and the means by which this is facilitated.  
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#### 41 THE CASE STUDIES: OXFORDSHIRE AND CAMBRIDGESHIRE

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43 The two counties, although not the largest concentrations of high-tech activity in the  
44 UK, are among the fastest growing centres and have dense populations of research  
45 activity and highly skilled people in high-tech SMEs and research institutions. They  
46 are both exemplars of foci of analytic knowledge-based systems and interactive RIS.  
47  
48 Their importance in the UK's 'knowledge-economy' as a whole and in particular  
49 sectors such as bioscience has been recognised by central government (see for  
50 example SAINSBURY 1999; TRENDS BUSINESS RESEARCH for the DTI 2001  
51 and the LAMBERT REVIEW 2003).  
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3 The two counties are both located about 50 miles from London, Cambridgeshire to the  
4 North and Oxfordshire to the West. They are similar in size and population.  
5  
6 Cambridgeshire covers 1300 square miles and has a population of 684,000;  
7  
8 Oxfordshire's area is 1000 square miles with a population of 598,000. Both have  
9  
10 historic and influential universities and the residential attractions of cultural centres.  
11  
12 Scientific and technological resources are concentrated in their university and  
13  
14 government laboratories, providing centres of knowledge capable of supporting high-  
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16 tech commercial activity.  
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23 Comparisons of levels of extent of entrepreneurship in high-tech economies depend  
24  
25 on the definition of high-tech. For example CHADWICK ET AL (2003), using the  
26  
27 Eurostat definition finds that Oxfordshire has 54,600 employees in 1,936 firms in  
28  
29 2002. However, using a more realistic and narrower Butchart-based approach using  
30  
31 official statistics – for example excluding motor vehicle manufacture, but including  
32  
33 Motorsport, 36,682 were employed in 1,400 firms, accounting for 12 per cent of  
34  
35 employment in the county. Using their own broad definition but based on Eurostat,  
36  
37 the estimate for Cambridgeshire for the end of 2001 was 48,300, about 13 per cent of  
38  
39 employment in an estimated 1,526 'establishments'. The method of selecting firms on  
40  
41 a case-by-case basis and non basic sectors such as wholesale and retail are discarded  
42  
43 hence the Eurostat definition is not followed exactly (Personal communication  
44  
45 Cambridgeshire County Council 2002). CHADWICK ET AL (2003) using the  
46  
47 second approach demonstrate that a difference between the two counties was in the  
48  
49 rate of growth. Oxfordshire had the highest percentage rate of growth in high-tech  
50  
51 employees of all English counties in the period 1991-2000 (141 per cent) compared to  
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53 Cambridgeshire which was eighth with an increase of 53 per cent.  
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3 Each county therefore has high and growing concentrations of indigenous high-tech  
4 firms formed by local, often academic, entrepreneurs in diverse sectors. In particular  
5  
6 both are leading growth centres for the UK's biotechnology industry. CHADWICK  
7  
8 ET AL (2003) show that the number of firms and employment in key high-tech  
9  
10 sectors in Oxfordshire in descending order is Software, Web/internet and other  
11  
12 computer Services (635 firms employing 7,900), Other R&D activities (44, 5,900),  
13  
14 Instruments, Medical and Optical Equipment (112, 5,000), Biotech, Pharmaceuticals  
15  
16 & Medical Diagnostics, (73, 3,300) and Technical Consultancy and Testing (317,  
17  
18 3,300). Similarly the IT sector is the predominant sector in the Cambridge Cluster  
19  
20 (160, 4,200), with Biotechnology (153, 5,300) and Electronic Equipment &  
21  
22 Instruments (106 3,000) the second and third largest number of firms (LIBRARY  
23  
24 HOUSE 2003). Hence both locations are dominated by  
25  
26 computing/physics/engineering/chemical skills and illustrate BERRY and  
27  
28 GLAESER's (2005) point about increasing agglomeration economies, whereby  
29  
30 initially skilled places become more skilled over time (see also Table 2).  
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40 They differ in that there is a higher proportion of small firms in the Cambridge region  
41  
42 and a higher proportion of larger firms in Oxfordshire; Cambridge is more service-  
43  
44 orientated while Oxford has a greater orientation to manufacturing and Cambridge has  
45  
46 a concentration of technical consultancies while there are none in Oxford. Cambridge  
47  
48 has retained the position it held in the 1970s and early 1980s as a leading centre for  
49  
50 the personal computer and software sectors (KEEBLE and KELLY, 1986), although  
51  
52 Oxfordshire is home to the largest UK manufacturer of educational computers  
53  
54 (Research Machines). With regard to the research base, Oxfordshire has a greater  
55  
56 density of public sector research laboratories, for example in atomic energy (UKAEA  
57  
58 Culham) and scientific research (CCLRC, Council for Central laboratories of the  
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3 Research Councils Rutherford Appleton Laboratory. Since 2007 the CCLRC has  
4 become the Science and Technology Facilities Council, STFC) while Cambridge has  
5 a higher number of multinational research laboratories than Oxford. In Cambridge  
6 they include Schlumberger, SmithKline Beecham, Toshiba, Sony and Microsoft, and  
7 in Oxford, Sharp, Dow Elanco and Esso (GARNSEY and LAWTON SMITH 1998).  
8 Given this mix of institutes and small firms, both counties can be classified as  
9 'interactive RIS' (COOKE 1998) (i.e. degree of 'associationalism' higher than  
10 average, mixture of large and small firms and public and private R&D)  
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### 23 Stocks of human capital

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28 Both Oxfordshire and Cambridgeshire have high proportions of well-qualified  
29 residents compared to the rest of England & Wales. Table 2 shows that 27 per cent of  
30 Oxfordshire residents and 25 per cent of Cambridgeshire residents are qualified to  
31 degree level (National Vocational Qualification (NVQ) level 4+) to rank as the 2<sup>nd</sup>  
32 and 6<sup>th</sup> most qualified counties respectively in England and Wales. These figures  
33 mask the range of performance recorded for the local authorities that make up the  
34 counties. Cambridge City is the strongest performer with 41 per cent of residents  
35 qualified to degree level to rank 8<sup>th</sup> of the 376 local authorities of England and Wales  
36 while in Oxford City the proportion is 36.8 per cent to rank 12<sup>th</sup>.  
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53 Table 2 here  
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58 Outside the cities, South Cambridgeshire, which surrounds Cambridge City, also has a  
59 highly qualified workforce ranking 29<sup>th</sup> in England and Wales with 29.8 per cent of  
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3 residents holding degree level qualifications, East Cambridgeshire is the next  
4  
5 strongest performer in the county with a national ranking of 136<sup>th</sup>. In Oxfordshire, the  
6  
7 fall is not so sharp between districts, with all of the counties' local authorities scoring  
8  
9 above the national figure. Oxford City and Cambridge City rank respectively 1<sup>st</sup> and  
10  
11 2<sup>nd</sup> in England and Wales for the proportion of residents qualified to NVQ level 3  
12  
13 with 19.0 per cent and 18.0 per cent respectively.  
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18 Although the proportions show the bias in favour of 'knowledge workers', it is  
19  
20 important to put these proportions into perspective. The actual numbers are less  
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22 impressive than the proportions but are a truer reflection of scale. Other counties such  
23  
24 as Berkshire, Hampshire and the London region have more very highly skilled people.  
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28 Table 3 shows the occupational structure of the two counties based on Standard  
29  
30 Occupational Classifications (SOC)<sup>1</sup>. The counties of Oxfordshire and  
31  
32 Cambridgeshire rank 2<sup>nd</sup> and 3<sup>rd</sup> respectively of the 42 NUTS 2 regions in England  
33  
34 and Wales behind Inner London, while the cities of Oxford and Cambridge rank  
35  
36 respectively 3<sup>rd</sup> and 2<sup>nd</sup> of the 376 local authorities in England and Wales with 28.0  
37  
38 per cent and 23.4 per cent of residents respectively employed in professional  
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40 occupations (SOC2) compared to the national average of 11.2 per cent. Table 3 does  
41  
42 however highlight the relative shortage of associate professional and technical  
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44 workers in both local economies.  
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53 Table 3 here  
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<sup>1</sup> For a full explanation see [www.statistics.gov.uk/methods\\_quality/soc/structure.asp](http://www.statistics.gov.uk/methods_quality/soc/structure.asp)

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5 Rates of turnover exhibited in the UK labour market as a whole.

6 The pace of employment turnover in the UK overall is increasing. In their study of  
7 job tenure, GREGG and WADSWORTH (1999) found that the average job in Britain  
8 lasts for a little over 5 years. They additionally found that the average new job lasts  
9 for 15 months – that is to say that workers can be expected to continue to move  
10 between jobs before finding an appropriate job match. More recently, the Chartered  
11 Institute of Professional Development (CIPD) Labour Turnover Survey for 2000  
12 (CIPD, 2001) recorded an average overall turnover rate for full time workers of 21 per  
13 cent (giving an average job tenure of 4.6 years). A comparison of average job tenures  
14 from recent studies is presented in Table 4 below.  
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36 In IT and high-technology sectors CIPD data gives an average job tenure of 5.1 years.  
37 The CIPD data therefore shows job tenures in the UK's high technology and IT sector  
38 to be longer than for professionals as a whole. In Motorsport Valley, a sectorally  
39 specialised cluster which includes Oxfordshire, the level of turnover is the highest  
40 recorded suggesting that there are important sectoral variations (PINCH and HENRY  
41 2000) and possibly that skills are more easily transferred between very similar firms  
42 than between co-located firms even though they might have similarly well qualified  
43 workforces. In this sense, the networks that develop provide a means of coordinating  
44 knowledge flows within labour markets.  
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## METHODOLOGY

Data was collected from three postal surveys of the highly skilled between November 2000 and August 2001. Questionnaires were sent to the members of the Institute of Electrical Engineers (IEE), the Institute of Physics (IOP) and the Royal Society of Chemists (RSC) in the two case study areas. These three institutes represent the scientists and engineers of the case study areas. As far as we were able to ascertain, a biological sciences institute does not exist and as much of the science behind biological sciences is chemistry-based, for example bio-chemistry, many working in that field belong to the RSC. A total of 6,099 questionnaires were sent out to institute members in Oxfordshire and Cambridgeshire yielding 831 usable responses. The returns by institute and case study are presented in Table 5 below.

Table 5 here

The response rate of 14 per cent is typical for this type of survey providing sufficiently large samples for both case study areas and institute membership to allow analysis by both place and branch of science and compares favourably with previous studies of high-technology local economies. For example, ANGEL's 1991 study of Silicon Valley was based on a postal survey of 67 firms (representing a 14 per cent response rate), SEGAL QUINCE WICKSTEED'S (2000) update to the Cambridge Phenomenon was based on a study of 12 firms, while HENRY & PINCH (2000) based their study on the careers of 100 engineers employed in Motorsport Valley.

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3 THE HIGHLY SKILLED IN THE OXFORDSHIRE AND CAMBRIDGESHIRE  
4 REGIONAL INNOVATION SYSTEMS  
5

6 The agglomeration of science and engineering employers in both Oxfordshire and  
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The agglomeration of science and engineering employers in both Oxfordshire and  
Cambridgeshire and associated world class research bases could be expected to lock  
people into the local labour markets, where high quality jobs in a number of firms can  
allow movement between companies where skills are transferable, and facilitated by  
the local social networks associated with specialist and confined labour markets.

In their study of *Motor Sport Valley* in the UK – which includes Oxfordshire –  
HENRY and PINCH (2000, 128) note that:

"Motor Sport Valley acts as the epicentre of a global, yet highly spatially  
defined labour market ... As an individual in motor sport, it is rare that you  
do not at some point in your career, spend some time within Motor Sport  
Valley ... essentially this is about joining the knowledge community of  
motor sport production. Yet opportunities exist in this highly mobile  
industry to sell your knowledge elsewhere and many do so ... Thus few stray  
away from the Valley for long, returning once more to reconfigure their  
position within the community of knowledge".

In the case of the motor sport industry then, Motor Sport Valley is clearly the world's  
most important location, whereby workers who leave must return to work in the  
cluster if they are to keep fully abreast of technological developments and to ensure  
the currency of their networks. The Oxfordshire and Cambridgeshire innovation  
systems are not so tightly defined, operating across a number of high-technology  
industry sectors, nevertheless the comments selected from our survey presented in  
Box 1, demonstrate that Oxfordshire in particular is a technologically glamorous

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3 location. However in contrast to Motor Sport Valley, the optimum place of work is  
4 likely to be a particular organisation rather than the cluster itself.  
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9 The survey of the highly skilled mapped the career trajectories of respondents. In  
10 both case studies it was most common for those currently employed to have  
11 previously worked elsewhere and to have subsequently moved into the areas. This  
12 was true for all three institutes. Although no statistics exist for the population of the  
13 UK as a whole, this situation is not unexpected, but does have implications for  
14 organisational strategies, where decisions to expand or remain may be affected by the  
15 propensity of individuals to move into the locality and the career development of  
16 individuals (cf GREEN and CANNY 2003).  
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28 The findings presented in Table 6 below offer limited support for making the case that  
29 Oxfordshire and Cambridgeshire are important world centres of scientific expertise.  
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31 The proportion of the sample which had moved in and out of the respective local  
32 economies was highest in each of the institutes in Cambridgeshire than in Oxfordshire  
33 reflecting the smaller firm size in Cambridgeshire, and the large internal labour  
34 markets therefore available in Oxfordshire, and the shorter average job tenure  
35 (LAWTON SMITH and WATERS, 2005). The table tells us who is there at the  
36 moment. 'One way' refers to moving into either Oxford or Cambridge, in and out  
37 means that they have taken a job outside the area and then returned. 'First job' means  
38 that this is their first career move. This provides some support for the BERRY and  
39 GLAESER (2005) argument about the reinforcing effects of entrepreneurship on  
40 cluster development.  
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58 Table 6 here  
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3 Although there are no IEE respondents who have conducted all their careers in either  
4 Oxfordshire or Cambridgeshire sizeable minorities in both Oxfordshire and  
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Although there are no IEE respondents who have conducted all their careers in either Oxfordshire or Cambridgeshire sizeable minorities in both Oxfordshire and Cambridgeshire had begun careers in that location and not left – ranging from 14 per cent for Oxfordshire physicists to 20 per cent for the county’s chemists. This is in addition to the numbers who are still in their first job – regardless of time in that position which was 37 years in the case of one Cambridgeshire chemist. The IEE is the least qualified profile of the three institutes and so may not be in such global demand as for the physicist and chemists. But for the most highly qualified, Oxford and Cambridge are the places to be.

Validation for these findings is provided by the analysis of the 2001 UK Census presented in Table 7 below. This shows that the cities of Oxford and Cambridge respectively have the least and second least settled populations of all English local authorities and the 6th and 4th highest proportion of the present population to have been living outside the UK a year previously (at 3.8 and 4.1 per cent respectively). Their respective labour markets for the highly skilled can therefore be seen to be located within counties used to exceptionally high levels of migration. Just under a fifth (17.4 per cent) of survey respondents had over the course of their careers previously worked abroad. The proportion varied by discipline ranging from 8 per cent of electrical engineers in Oxfordshire to 23 per cent for the same county’s physicists.

Table 7 here

These findings are interesting when considered in conjunction with analysis of the results of where respondents would look for their next job. Where respondents would

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2  
3 look overseas, their previous job histories suggest that these answers are not entirely  
4 aspirational, rather they reflect a realisation of their worth in the wider high-  
5 technology labour market. However, the proportion of respondents who would look  
6 locally is notable given the previous geography of their employment, perhaps  
7 reflecting the need to consider family and the practicalities of repeated moves for  
8 homeowners may be reflected in the high proportion of respondents who would look  
9 locally, reflecting the quasi-immobility (CAMAGNI, 1991) of the highly skilled  
10 despite the global demand for their labour. The results of the analysis by location are  
11 presented in Chart 1 below.  
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25 Respondents from the IEE were the most likely to only look for their next position  
26 within their own county, and accordingly the least likely to consider continuing their  
27 career overseas – with the US as the most common overseas choice, but recording  
28 only eight per cent of the stated locations. The table shows a UK focused labour  
29 market.  
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41 Chart 1 here  
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46 The advantages of carrying out a career in the Oxfordshire and Cambridgeshire as  
47 recorded by the survey of the highly skilled are presented in Chart 2 below. The  
48 effect of family ties is demonstrated by the response ‘it is home’ being the most  
49 common response in Oxfordshire and the second most common in Cambridgeshire.  
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51 However, ‘career possibilities’ and access to university research’ were the other most  
52 popular responses, followed by ‘ease of finding work’, all of which suggest the  
53 presence of agglomeration economies within each regional innovation system (cf  
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3 BERRY and GLAESER 2005). Other results from the survey included an  
4 appreciation of the natural and built environment. This suggests evidence of  
5 coordination, through the local knowledge of career opportunities and scientific  
6 networks which link university research to the high-tech cluster.  
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16 Chart 2 here  
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21 Chart 3 below presents the means by which the highly skilled in Oxfordshire and  
22 Cambridgeshire found their current job. Despite the clustering effects noted above, it  
23 is the printed advertisement that is overwhelmingly the most common way to have  
24 found employment, ahead of word of mouth in both case studies. Hence on this  
25 indicator, networks are not a major source of coordination within the labour markets,  
26 and that the interactive RIS model of associationalism is limited in this respect at  
27 least.  
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38 When the stage of career is considered different findings emerge. For those in their  
39 first job formal methods of job searching – printed advertisements and particularly  
40 direct applications to companies – are the most common forms, however the informal  
41 mechanisms we would expect to be visible in regional innovation systems are still  
42 prevalent, suggesting a strong link between the education institutes of Oxfordshire  
43 and Cambridgeshire and their local high technology local markets. With the  
44 exception of the Oxfordshire's electrical engineers respondents in their first jobs had  
45 made found their current positions by being contacted by their employers directly or  
46 through the use of employment agencies, highlighting the importance of the networks  
47 developed by individual scientists and engineers through work.  
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3 Charts 3 and 4 here  
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## 8 CONCLUSIONS 9

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11 In this paper we set out to address two questions (i) what is the role of labour markets  
12 in the making of regions as innovative systems and (ii) what is the role of labour  
13 markets in regional innovation systems. We argue that that the coordinating role of  
14 labour markets is key to understanding both. The framework for analysing regional  
15 innovation systems from this perspective identified three common elements,  
16 boundaries, and industrial specialization/clustering and interactive learning, and  
17 governance, while the review of the literature on the role of labour markets identified  
18 four interrelated elements: stocks and flows of labour, networks, and informal and  
19 formal governance systems. Evidence from the two case studies has been used to  
20 explore these themes.  
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35 Defining the boundaries of RIS, industrial specialisations and clustering using labour  
36 market data of stocks of skills as indicators is always inexact. Instead, it maybe  
37 enough to point to the centre of labour markets, recognising that distance decay  
38 effects and centripetal forces draw in skilled people to and from particular locations,  
39 effects which contribute to the operation of regional innovation systems. We focus on  
40 industrial structures, using the distinction made by ASHEIM and COENEN (2006) of  
41 analytic and synthetic knowledge, arguing that Oxfordshire and Cambridgeshire are  
42 exemplars of the former. Here we show that the stocks of the highly-skilled  
43 (scientifically qualified and professionals) in each county marks them out as  
44 distinctively different to other locations, particularly in the cities of Oxford and  
45 Cambridge and show evidence of specialised clustering and the reinforcing effects  
46 identified by BERRY and GLAESER (2005). Both locations appear to be focal points  
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3 of UK-wide labour markets for chemists and physicists. It is also shown that the RIS  
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5 what appear to be very similar locations have differing characteristics. This is because  
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7 their hinterlands are different. Cambridge as more of a stand-alone city-type  
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9 innovation system whereas in Oxfordshire there is more evidence of a more  
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11 geographically unified scientific/professional labour market, with generally stronger  
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13 patterns of in-mobility.  
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18 Here we are interested in how flows of people (and knowledge) through (local) space  
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20 which give rise to interactive learning and networks are coordinated. Mobility as a  
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22 means of facilitating knowledge transfer, within and between spatial scales we argue,  
23  
24 is essential in understanding how regional labour markets contribute to knowledge  
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26 transfer and learning. The evidence points to considerable mobility into each region,  
27  
28 supporting the argument that the agglomeration of skills (BERRY and GLAESER  
29  
30 2005) is the key component of the making of regional innovation systems. We show  
31  
32 how the two counties – places which started with higher levels of human capital than  
33  
34 most of the rest of the UK have attracted more skilled people over the last two  
35  
36 decades, created by local entrepreneurs (Box 1 and Table 6), thus creating RIS of  
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38 particular kinds – analytic knowledge in both cases with strong accumulations of  
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40 codified knowledge. This is supported by evidence in Chart 1 which shows  
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42 considerable reinforcing effects of a disinclination of the respondents to leave their  
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44 county and region as a whole because of the career prospects.  
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53 In answer to the second question, what is the contribution of labour in RIS – we  
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55 suggest labour markets are critical to coordination of economic activity, through the  
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57 career mobility of individuals and the networks that they take with them. Chart 2  
58  
59 illustrates the advantages of current location for individuals, particularly career  
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3 possibilities, backed up by ease of finding work – as well as it being home. This  
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5 study, however, gives less support to the claims of the over-riding importance of  
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7 networks as a key coordinating function. Chart 3 shows that the printed  
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9 advertisement, particularly in Oxfordshire was considerably more important than  
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11 word of mouth as a method of finding current employment.  
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16 In sum, we suggest that more attention is paid to how labour markets operate in  
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18 understanding how regional innovation systems function. The findings also have  
19  
20 important policy implications because the case studies highlight that even in such RIS  
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22 as these that are characterised by the highly-skilled, that relative shortages in  
23  
24 supporting skills may be inhibiting factors in the further success of local and regional  
25  
26 economies.  
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31 ACKNOWLEDGEMENTS: We thank the two referees for their constructive  
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33 comments on an earlier version of this paper.  
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**Box 1: Selected comments from survey respondents****Oxfordshire Physicist A**

'One of the problems of becoming a specialist is that the number of posts available is automatically narrowed. In my area of expertise there are probably 200 relevant jobs world wide. About ten of them are probably in Southern England but that is almost a fluke. Having got a job that fits me this well, I am very unlikely to voluntarily change my post'.

**Oxfordshire Physicist B**

'Mobility is limited because when (a) one strives to be the best in one's research and (b) one is at the strongest UK university for one's research, why should one move? Only the US would represent a step up for me. Nowhere else in the UK is sufficiently attractive'.

**Cambridge Engineer A**

'Interesting point about Cambridge - I believe many skilled engineers live in the area despite no ties and not particularly liking the area - its the career prospects and access to starting companies that keep us here'.

**Cambridge Engineer B**

'Telecoms is a very incestuous market. The same faces keep appearing on projects around the world. It has a very specific skill set and a global market so skilled people can choose where they work and how much they get paid to do so'.

Table 1: Characteristics of synthetic and analytic knowledge bases

	Knowledge Base	
	Analytic	Synthetic
Overview	Industrial settings where scientific knowledge is highly important and knowledge creation is often based on cognitive and rational processes or on formal models.	Industrial settings where innovation takes place mainly through the application of existing knowledge. Often in response to the need to solve specific problems.
Examples	Genetics, biotechnology, IT and basic and applied research.	Plant engineering, specialised advanced industrial machinery, shipbuilding. Products are often one-off or small batch.
Knowledge inputs and outputs	Codified predominates.	Tacit predominates.
Knowledge inputs	Reviews of existing studies.	R&D is less important but university-industry links are relevant, particularly with regard to applied problems.
Knowledge generation	Based on application of scientific principles and methods.	An inductive process of testing, experimentation, computer based simulation and practical work.
Knowledge processes	Formal (eg in R&D departments).	Utilises know-how and craft and practical skill - can be provided by training.
Outcomes	Documented in reports, files and patent descriptions.	Modification to products and processes.
Knowledge applications	New products or services (including new firms and spin off companies - sometimes based on radically new inventions).	Produces an incremental way of innovation, dominated by the modification of existing products and processes - spin offs are not common.

Source: Asheim and Coenen, 2006

Table 2: Educational Attainment in Oxfordshire and Cambridgeshire

	Percentage				Total			
	NVQ Level 3	NVQ Level 3 (Rank of 376)	NVQ Level 4+	NVQ Level 4+ (Rank of 376)	NVQ Level 3	NVQ Level 3 (Rank of 376)	NVQ Level 4+	NVQ Level 4+ (Rank of 376)
<b>East of England</b>	<b>7,9</b>	<b>4 (of 9)</b>	<b>18,1</b>	<b>4</b>	<b>308.581</b>	<b>4 (of 9)</b>	<b>704.743</b>	<b>4</b>
<b>Cambridgeshire</b>	<b>9,5</b>	<b>4 (of 42)</b>	<b>25,2</b>	<b>6</b>	<b>38.458</b>	<b>21 (of 42)</b>	<b>102.528</b>	<b>17</b>
Cambridge East	18,0	2	41,2	8	<b>15.324</b>	40	<b>35.145</b>	45
Cambridgeshire	7,2	210	20,2	136	<b>3.842</b>	313	<b>10.712</b>	278
Fenland	5,0	370	9,5	370	<b>3.014</b>	339	<b>5.681</b>	358
Huntingdonshire	8,0	142	20,0	140	<b>9.096</b>	111	<b>22.726</b>	98
South Cambridgeshire	7,6	175	29,8	29	<b>7.182</b>	152	<b>28.264</b>	67
<b>South East</b>	<b>9,2</b>	<b>2 (of 9)</b>	<b>21,8</b>	<b>2</b>	<b>530.682</b>	<b>1 (of 9)</b>	<b>1.253.917</b>	<b>2</b>
<b>Oxfordshire</b>	<b>10,8</b>	<b>1 (of 42)</b>	<b>27,7</b>	<b>2</b>	<b>48.177</b>	<b>15 (of 42)</b>	<b>123.323</b>	<b>14</b>
Cherwell	7,7	169	20,0	139	<b>7.329</b>	147	<b>19.169</b>	128
Oxford	19,0	1	36,9	12	<b>19.763</b>	21	<b>38.301</b>	38
South Oxfordshire	8,9	94	28,3	39	<b>8.222</b>	129	<b>26.261</b>	76
Vale of White Horse	8,7	106	28,2	41	<b>7.234</b>	151	<b>23.576</b>	87
West Oxfordshire	8,2	130	23,3	79	<b>5.629</b>	213	<b>16.016</b>	169
<b>England</b>	<b>8,3</b>	<b>-</b>	<b>19,9</b>	<b>-</b>	<b>2.962.282</b>	<b>-</b>	<b>7.072.052</b>	<b>-</b>
<b>England and Wales</b>	<b>8,3</b>	<b>-</b>	<b>19,8</b>	<b>-</b>	<b>3.110.135</b>	<b>-</b>	<b>7.432.962</b>	<b>-</b>

Source: Census, ONS, 2001

Table 3: Managerial, Professional and Technical Workers in Oxfordshire and Cambridgeshire (% of respondents)

	SOC1		SOC2		SOC3		SOCs 1-3	
	%	Rank	%	Rank	%	Rank	%	Rank
<b>East of England</b>	<b>16,3</b>	<b>3 (of 9)</b>	<b>10,8</b>	<b>3 (of 9)</b>	<b>13,6</b>	<b>4 (of 9)</b>	<b>40,6</b>	<b>3 (of 9)</b>
<b>Cambridgeshire</b>	<b>16,4</b>	<b>15 (of 42)</b>	<b>14,7</b>	<b>3 (of 42)</b>	<b>13,8</b>	<b>14 (of 42)</b>	<b>44,9</b>	<b>7 (of 42)</b>
Cambridge	13,2	275	28,0	2	14,2	116	55,3	15
East Cambridgeshire	17,3	93	10,9	156	12,7	223	40,9	140
Fenland	12,8	285	6,7	355	10,8	349	30,3	348
Huntingdonshire	18,1	70	10,5	169	14,7	94	43,2	113
South Cambridgeshire	18,2	68	16,6	21	14,9	87	49,7	42
<b>South East</b>	<b>17,4</b>	<b>2 (of 9)</b>	<b>12,1</b>	<b>2 (of 9)</b>	<b>14,6</b>	<b>2 (of 9)</b>	<b>44,2</b>	<b>2 (of 9)</b>
<b>Oxfordshire</b>	<b>17,4</b>	<b>7 (of 42)</b>	<b>15,0</b>	<b>2 (of 42)</b>	<b>15,2</b>	<b>6 (of 42)</b>	<b>47,5</b>	<b>4 (of 42)</b>
Cherwell	17,0	103	10,3	182	14,4	101	41,7	127
Oxford	12,8	284	23,4	3	15,8	50	52,0	31
South Oxfordshire	20,8	24	14,3	49	15,4	63	50,6	35
Vale of White Horse	18,6	64	15,6	31	14,3	107	48,5	48
West Oxfordshire	17,4	87	11,4	137	16,0	43	44,8	86
<b>England</b>	<b>15,3</b>	<b>-</b>	<b>11,2</b>	<b>-</b>	<b>13,8</b>	<b>-</b>	<b>40,3</b>	<b>-</b>
<b>England and Wales</b>	<b>15,1</b>	<b>-</b>	<b>11,2</b>	<b>-</b>	<b>13,8</b>	<b>-</b>	<b>40,1</b>	<b>-</b>

Source: Census, ONS, 2001

Table 4: Comparative mean job tenure

Territory	Average Job Tenure (Years)
UK overall (2001)	6,7
UK SOC 2	4,6
UK IT & high technology	5,1
Motorsport Valley (UK, 2000)	3,7

Source: CBI, 2002, CIPD, 2001, HENRY and PINCH, 2000

Table 5: Responses to the survey of the highly skilled

	IEE	IOP	RSC	Total
Oxfordshire	62	282	83	427
Cambridgeshire	105	182	115	402
Total	167	464	198	829

Source: Authors' survey



Table 6: Overview of the careers of the highly skilled

	IEE	IOP	RSC
<b>Cambridgeshire</b>			
All in Cambridgeshire	-	19,2	19,0
In & Out	12,1	11,6	9,5
One Way	62,6	46,6	52,4
First Job	25,2	22,6	19,0
<b>Oxfordshire</b>			
All in Oxfordshire	-	15,8	23,3
In & Out	8,1	8,5	6,8
One Way	75,8	50,6	56,2
First Job	16,1	25,1	13,7

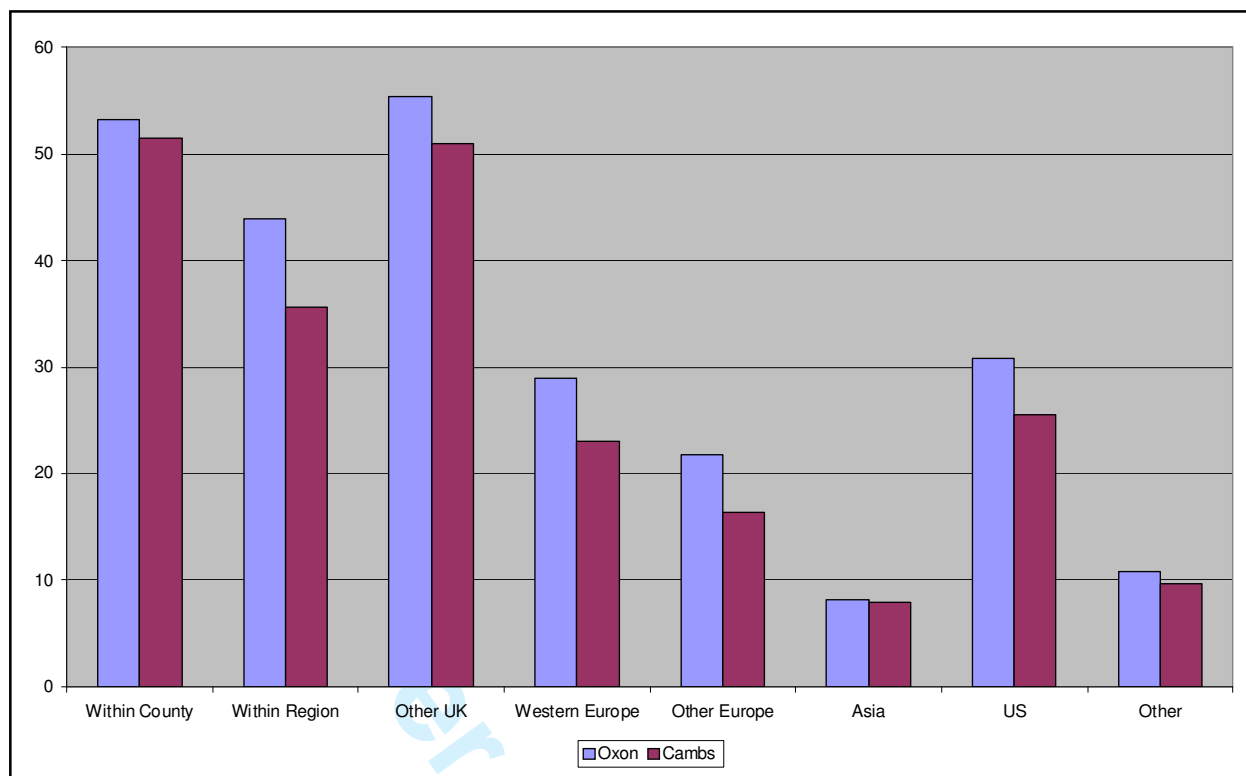
Source: Authors' survey

Table 7: Migration in Oxfordshire and Cambridgeshire

	Lived at same address one year ago			Lived elsewhere - outside the UK		
	No.	%	Rank (of 376)	No.	%	Rank (of 376)
<b>East</b>	<b>4.764.140</b>	<b>88,4</b>	<b>5 (of 10)</b>	<b>36.577</b>	<b>0,7</b>	<b>3 (of 10)</b>
<b>Cambridgeshire</b>	<b>472.471</b>	<b>85,5</b>	<b>33 (of 34)</b>	<b>7.894</b>	<b>1,4</b>	<b>2 (of 34)</b>
Cambridge	81.810	75,1	375	4.423	4,1	4
East						
Cambridgeshire	64.373	87,9	251	705	1,0	74
Fenland	73.683	88,2	233	186	0,2	321
Huntingdonshire	137.985	87,9	252	1.287	0,8	87
South						
Cambridgeshire	114.620	88,1	239	1.293	1,0	68
<b>South East</b>	<b>6.984.762</b>	<b>87,3</b>	<b>8 (of 10)</b>	<b>71.285</b>	<b>0,9</b>	<b>8 (of 10)</b>
<b>Oxfordshire</b>	<b>512.874</b>	<b>84,7</b>	<b>34 (of 34)</b>	<b>9.675</b>	<b>1,6</b>	<b>1 (of 34)</b>
Cherwell	114.972	87,2	284	977	0,7	99
Oxford	100.144	74,6	376	5.158	3,8	6
South Oxfordshire	112.451	87,7	268	1.130	0,9	79
Vale of White Horse	100.842	87,2	288	1.714	1,5	29
West Oxfordshire	84.465	88,3	220	696	0,7	102
<b>England</b>	<b>43.124.923</b>	<b>87,8</b>	<b>-</b>	<b>360.511</b>	<b>0,7</b>	<b>-</b>
<b>England and Wales</b>	<b>45.703.875</b>	<b>87,8</b>	<b>-</b>	<b>370.430</b>	<b>0,7</b>	<b>-</b>

Source: Census, ONS, 2001

Chart 1: Where Oxfordshire and Cambridgeshire scientists will look for their next position



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Chart 2: Advantages of current location by case study

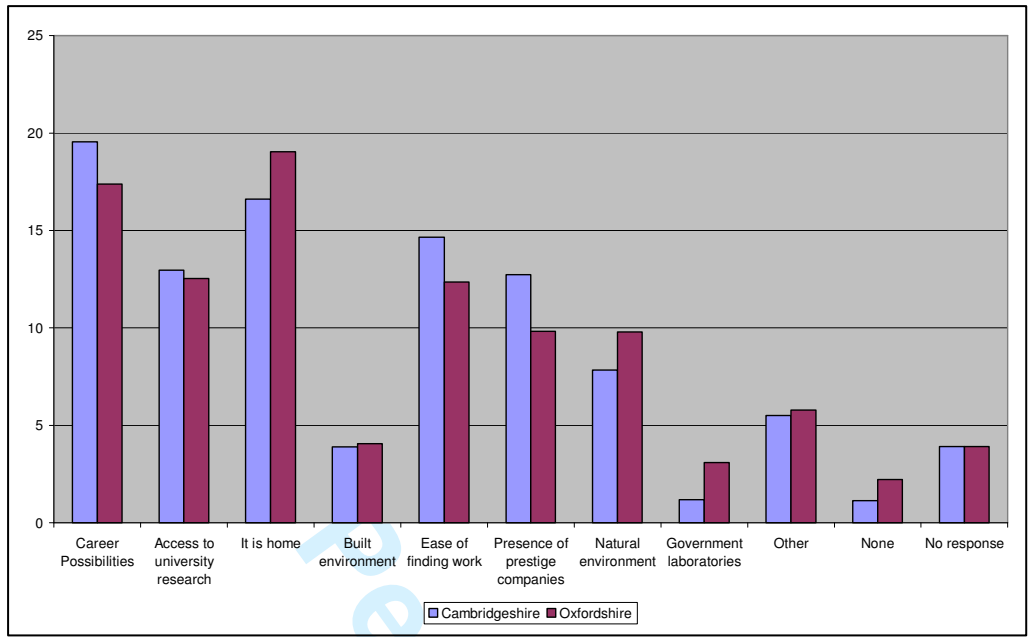


Chart 3: Method of finding current employment

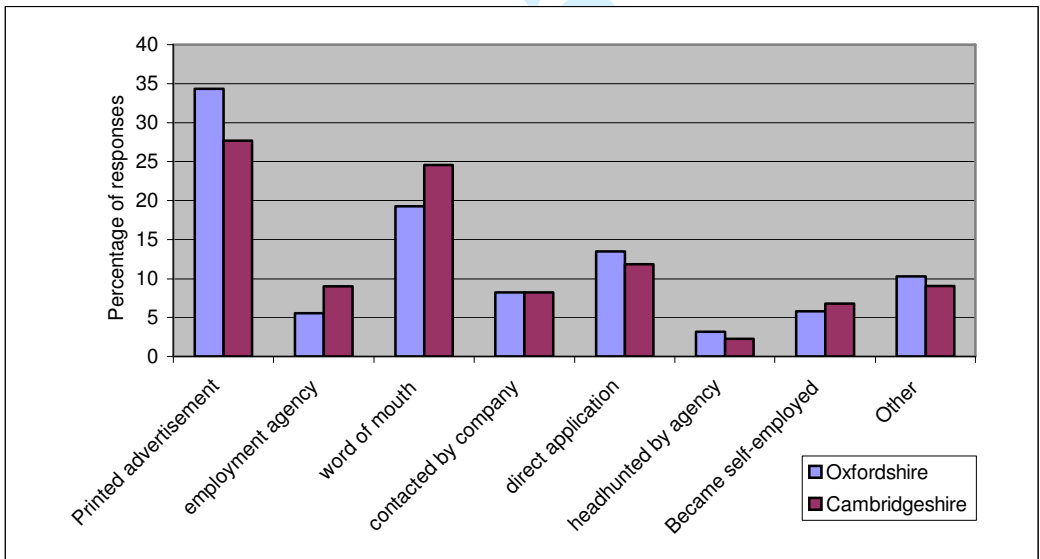


Chart 4: Method of finding current employment by number of jobs (per cent)

