



MAPPING THE POPULATION, CAREERS,  
MOBILITIES AND IMPACTS OF ADVANCED DEGREE  
GRADUATES IN THE SOCIAL SCIENCES AND  
HUMANITIES (POCARIM)

Policy Report 8

Interdisciplinarity in the Social Sciences and  
Humanities

Chris Coey  
University of Salford, UK

University of  
**Salford**  
MANCHESTER



© The University of Salford (2014)

The text of this document may be reproduced free of charge in any format or medium providing that it is reproduced accurately and not in a misleading context. The material must be acknowledged as CERIS CNR and University of Salford copyright and the document title specified. Where third party material has been identified, permission from the respective copyright holder must be sought.

The POCARIM project is funded by the European Commission under the Framework 7 Programme. Any views represented in this report are those of the authors.

Enquiries regarding this publication should be sent to:

Dr Chris Coey: [c.t.a.coey@salford.ac.uk](mailto:c.t.a.coey@salford.ac.uk)

## Contents

<b>Background: The POCARIM Project</b> .....	<b>4</b>
<b>Methods</b> .....	<b>4</b>
<b>Interdisciplinarity in SSH theory, policy and practice</b> .....	<b>5</b>
Interdisciplinarity in theory.....	5
Interdisciplinarity in policy.....	6
Measuring interdisciplinarity .....	7
<b>The POCARIM findings</b> .....	<b>7</b>
Practising and understanding interdisciplinarity .....	7
Enabling interdisciplinarity .....	11
Motivations for Interdisciplinarity .....	11
The challenges of interdisciplinarity .....	13
The positive outcomes of interdisciplinarity .....	18
Interdisciplinarity in practice .....	21
Interdisciplinarity, intersectorality and international mobility: a note .....	21
<b>Conclusions</b> .....	<b>22</b>
<b>Recommendations</b> .....	<b>23</b>
<b>References</b> .....	<b>23</b>

## Tables

1	Respondents by impact instrument/activity and experience of working across disciplines	19
---	--	----

## Figures

1	Bushaway's typology of cross-disciplinary work	6
2	Interdisciplinary activity by country	8
3	Respondents by PhD broad discipline and experience of working across disciplines	9

## **Background: The POCARIM Project**

Between 2011 and 2014 a multinational team of academics and researchers collaborated on a research project funded by the European Commission under the Framework 7 Programme: Mapping the Population, Careers, Mobilities and Impacts of Advanced Research Degree Graduates in the Social Sciences and Humanities (POCARIM).<sup>1</sup>

One aim of the project was to explore the extent and nature of cross-disciplinary mobility and collaborative research activity in the POCARIM social science and humanities (SSH) population. Specifically, we wanted to understand the motivations and outcomes of this activity in terms of careers, knowledge transfer and innovation.

In this policy report we present the project's key findings on interdisciplinarity. Our findings are based on original work carried out in each of the POCARIM countries and which includes: a review of the literature, policy and existing data, as well as original empirical survey and interview research. In the conclusion we draw out the implications of our findings for policymakers.

## **Methods**

The project consisted of two core phases. Each phase was coordinated by a key partner and carried out across the 13 countries by all partners.

Phase one of the research consisted of:

- A review of over 350 studies on the themes of: employment trends, career paths and graduate destinations; and impact, engagement and the contribution of SSH research (Gustafsson and Hansen, 2013).
- A review of policy approaches to interdisciplinarity, doctoral education as the first phase of an academic career, and responses to the economic crisis in terms of funding of doctoral education (Bitusikova, 2013).
- A review of existing statistical data sources on the population of social science and humanities researchers in the POCARIM countries and beyond (Canibano *et al.*, 2013).

Phase two consisted of:

- An online survey of 2,723 SSH doctoral graduates which asked a number of questions on the key themes of the project. These included the perceived impacts of respondents' work, and their international, intersectoral and interdisciplinary mobilities. Survey data was cleaned and analysed in SPSS and EXCEL (Kupiszewska *et al.*, 2013).
- In-depth, qualitative interviews with 25 respondents in each of the thirteen POCARIM countries. Each interview was transcribed, translated into English if necessary, and entered into a single NVIVO project file for analysis.

---

<sup>1</sup> The countries in which the study was carried out were: France, Germany, Hungary, Italy, Latvia, Norway, Poland, Portugal, Slovakia, Spain, Switzerland, Turkey and the UK. For further details of the project see <http://www.salford.ac.uk/nmsw/research/research-projects/pocarim-home>.

## Interdisciplinarity in SSH theory, policy and practice

### *Interdisciplinarity in theory*

One of the key aims of the POCARIM research was to explore the nature and degree of cross-disciplinary mobility and engagement amongst SSH researchers. The intermingling of ideas and people from different disciplinary backgrounds is seen to be an important element in knowledge transfer and innovation in the context of new modes of knowledge production and the knowledge-based economy.<sup>2</sup>

It is not entirely clear exactly how innovation emerges from interdisciplinarity; neither is there a single typology of the forms that interdisciplinarity takes. For one thing, disciplines themselves are not stable entities, they do not universally share the same defining characteristics, and their boundaries are not clearly drawn. Viewing disciplines, as Klein (2000) does, as 'relative concentrations of interests' leads to a potentially broad view of what could be counted as 'interdisciplinarity'.

We recognise that there are a range of perspectives on interdisciplinarity which account for both the depth and type of engagement, and the disciplinary distance between collaborators.<sup>3</sup> Here we present Bushaway's (2003) three-fold typology (figure 1). Collaborative activity can include:

*Interdisciplinary research* – research carried out at the interface between two or more single disciplines in a collaborative way.

*Multidisciplinary research* – research which brings together two or more single disciplines in a collaborative way but draws down research from the core of those disciplines.

*Transdisciplinary or cross-disciplinary research* – research which applies the findings or techniques from one or more disciplines to another

(Bushaway, 2003, p. 26).

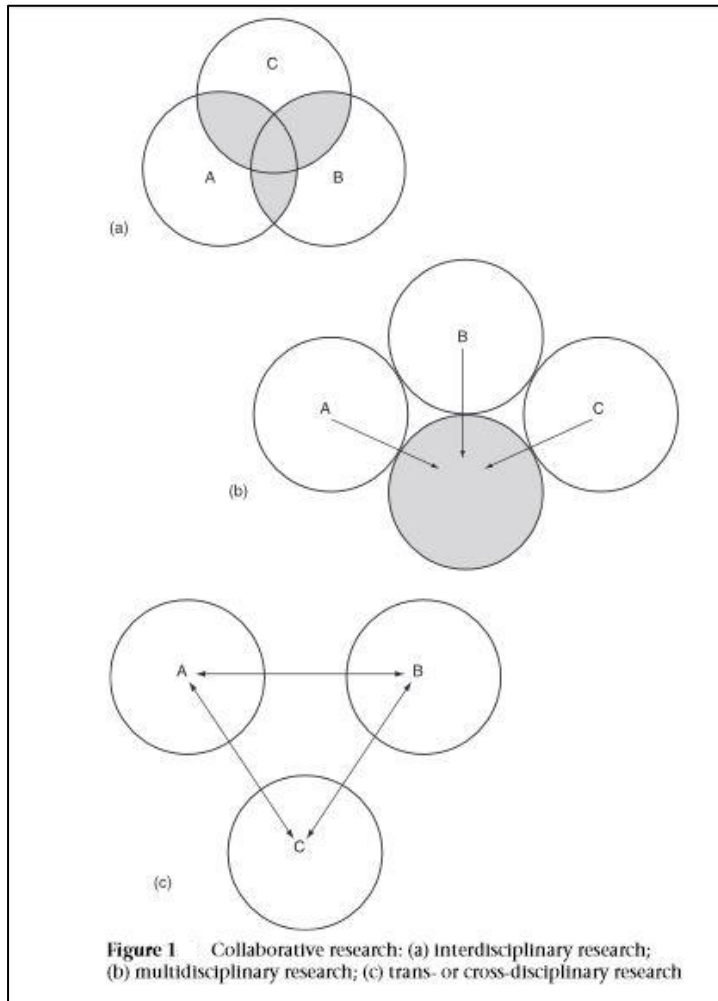
Bushaway's typology offers a concise and practical analytical frame. In practice, however, and following the example of other researchers, we did not impose a single understanding of collaboration, instead using the term 'interdisciplinarity' to refer to any cross-disciplinary interactions (Strathern, 2007). Moreover, we did not assume that cross-disciplinarity was necessarily collaborative, but that it could also be seen in the work of a single scholar (Latucca, 2003). This approach allowed us to explore both the meanings and the practices of interdisciplinarity in our research.

---

<sup>2</sup> Primarily we are referring here to Gibbons *et al.*'s (1994) notion of the shift from Mode 1 to Mode 2 knowledge production, that is, from a largely academic and disciplinary pursuit of basic knowledge to a collaborative approach involving partners from across disciplines and sectors in the pursuit of solutions to real-world problems. In such a context, interdisciplinarity becomes, in Peter Weingart's (2000) view, 'in effect, a discourse on innovation in knowledge production' (p. 30).

<sup>3</sup> An early and influential definition and typology of interdisciplinarity was produced by the OECD (see Apostel 1972), whilst the work of Julie Thompson Klein (1990, 2000, 2007) provides an historical perspective and an overview of the development of theoretical and empirical work in this area.

Figure 1: Bushaway's typology of cross-disciplinary work



Source: Bushaway (2003)

### *Interdisciplinarity in policy*

There is an important role for policy in structuring interdisciplinary activity (Lyall *et al.*, 2013). The value of interdisciplinarity is strongly seen at policy level.<sup>4</sup> The European Commission's commitment to the development of interdisciplinarity in doctoral training and research funding is a core strategy for addressing the societal problems Europe faces.<sup>5</sup> Notably, the Communication 'Delivering on the Modernisation Agenda for Universities' (2006) asserts the need for a shift in research from disciplinary organisation, practices and goals to a problem-oriented, cross-disciplinary model. Universities, it argues,

*...should be able to reconfigure their teaching and research agendas to seize the opportunities offered by new developments in existing fields and by new emerging lines of scientific inquiry. This requires focusing less on scientific disciplines and more on research domains (e.g. green energy, nanotechnology), associating them more closely with related or complementary fields (including humanities, social sciences, entrepreneurial and management skills) and fostering interaction between students, researchers and research*

<sup>4</sup> For full coverage of this issue see Bitusikova (2013)

<sup>5</sup> This is evident in particular in the Salzburg Principles (2005) for doctoral training, and funding programmes from FP5 to the most recent Horizon 2020.

*teams through greater mobility between disciplines, sectors and research settings. All this necessitates new institutional and organisational approaches to staff management, evaluation and funding criteria, teaching and curricula and, above all, to research and research training. The implications of inter- and trans-disciplinarity need to be acknowledged and taken on board not only by universities and Member States, but also by professional bodies and funding councils, which still rely mostly on traditional, single-discipline evaluations, structures and funding mechanisms (European Commission, 2006).*

The POCARIM survey of policies at national level found a good deal of awareness of European-level perspectives on interdisciplinarity. Evidence for this was both explicit in policies and discourses that named interdisciplinarity as a goal, and implicit in policies and discourses that referred to the need for collaboration on cross-cutting problems. An important distinction that emerged between countries was the degree to which interdisciplinarity was supported in practice through structural initiatives or funding. On the one hand, we found that Germany, France, UK, and Switzerland had funding and structures in place. For example, Research Councils UK invested almost £1.4 billion in interdisciplinary projects between 2008 and 2011 (Lyll *et al.*, 2011). On the other hand, in Portugal, Italy and Spain we found discourses only, but no specific policies.

#### *Measuring interdisciplinarity*

Although the number of researchers engaged in interdisciplinary activity can evidently decline as well as grow,<sup>6</sup> recent trends in the social sciences point to an increase in cross-disciplinary activity (UNESCO, 2020). This must be seen in the context of other research that suggests SSH researchers are both less likely to be interdisciplinary than those in the natural sciences, and less likely to engage in collaborative activity with colleagues from non-cognate disciplines outside SSH (ICCR Foundation, 2010; European Commission, 2009).

The recently completed MORE2 project on research and researcher careers across all disciplines found that on average, 9% of researchers engage in interdisciplinarity across the EU27 but with much variation between countries. The proportion of respondents reporting interdisciplinary activity from Latvia, for example was 19%. Figures from the Netherlands (14%), Slovakia (14%) and Hungary (13%) were similarly low, whilst Italy and Spain reported levels of interdisciplinarity which were among the lowest in the E27 (IDEA Consult, 2013).

#### **The POCARIM findings**

##### *Practising and understanding interdisciplinarity*

In sharp contrast to the above, in the POCARIM countries as a whole almost half (53.3%) of the survey respondents indicated that interdisciplinary work was important in their current job (figure 2). In Poland (68.9%), Norway (62.8%) and Germany (62.5%) this response was most frequent, whilst in Italy, (39.2%), Spain (45.5%) Latvia (45.7%), and France (45.9%) it was least frequent.

The survey also explored the degree to which respondents applied theories, methods, tools or data from other disciplines in their work on cross-disciplinary issues. This was the case for just over half (52.4%) the respondents to the survey, though again it was indicated most frequently by respondents from Poland (61.3%), with Portuguese (61.1%), Turkish (61.1%) and German (60.9%) responses at similar levels. It was least commonly reported in France (40.2%) and Italy (43.5%), with the remaining countries all falling in within a fairly narrow range of between 48.1% (Switzerland) and 52.8% (Slovakia).

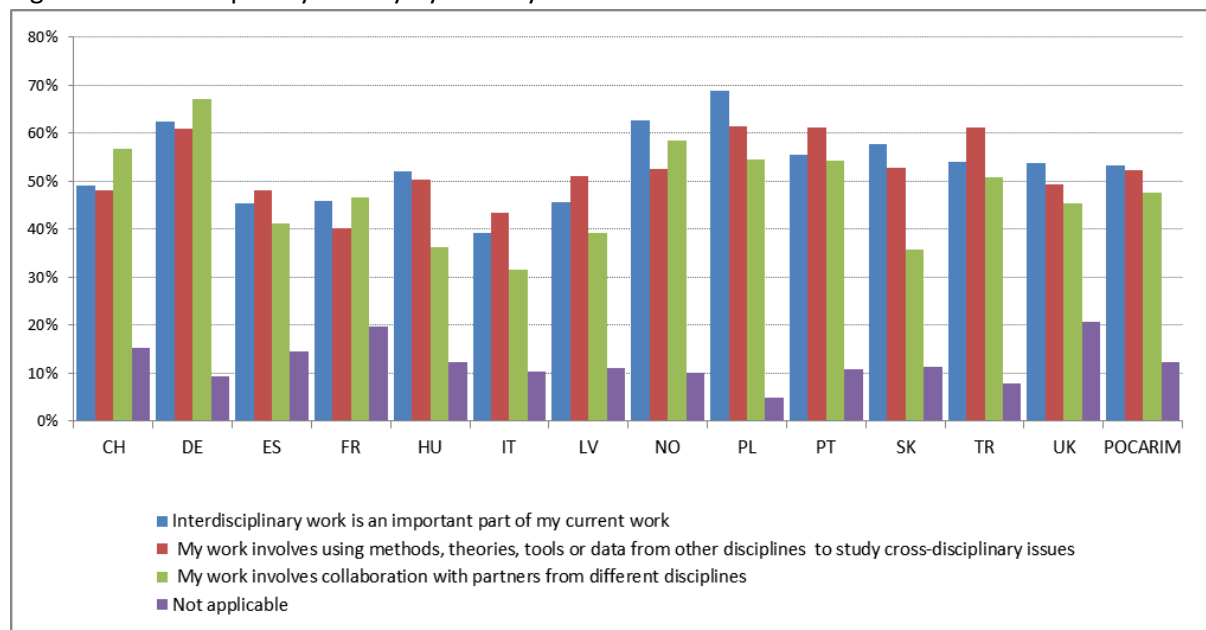
---

<sup>6</sup> An OECD study on interdisciplinarity, conducted almost 15 years after its first one, revealed a decline in interdisciplinary activity (Levin and Lind 1985).

Finally, 67.2% of respondents from Germany reported collaborations with partners from other disciplines, a significantly higher proportion than from Norway (58.4%) and Switzerland (56.7%). In contrast, only 31.6% of respondents from Italy, 35.8% from Slovakia and 36.4% from Hungary indicated this kind of cross-disciplinary collaboration. In total, 47.6% of respondents in all countries reported cross-disciplinary collaborative activity.

Only 12.3% of respondents indicated that cross-disciplinary activity was not applicable to them, which we can interpret to mean they are not engaged in this kind of work. For this question the proportion of respondents again varied across national contexts, from only 5% in Poland to as high as 19.7% in France and 20.8% in the UK.

Figure 2. Interdisciplinary activity by country



Source: Kupiszewska, D., for POCARIM

As the data shows, Poland, Germany and Norway emerge as the countries with the highest degree of interdisciplinary SSH activity among the POCARIM countries, whilst Italy, Spain, France and Latvia as having the least. Due to the nature of the sampling across the countries<sup>7</sup> the conclusions we draw here can only be tentative. For example, there appears to be some degree of correlation between the survey data and the findings of the policy review, but only insofar as the policy review revealed a lack of investment and concrete strategies to encourage interdisciplinarity in countries such as Italy, Latvia, Hungary and Spain. Respondents from Poland appear to be surprisingly active in interdisciplinary work relative to the other countries, particularly given the fairly recent policy shifts in this direction. The UK, on the other hand, sits close to the POCARIM averages on all questions despite the relatively stronger and long standing policy commitments to interdisciplinarity in that country.

The qualitative interviewees reflected these national differences in interdisciplinarity. One Hungarian respondent, for example, voiced her perception that interdisciplinarity in practice 'is more characteristic in Western Europe or in the US' [HU05]. This was confirmed by one of the

<sup>7</sup> Kupiszewska *et al.* (2013).

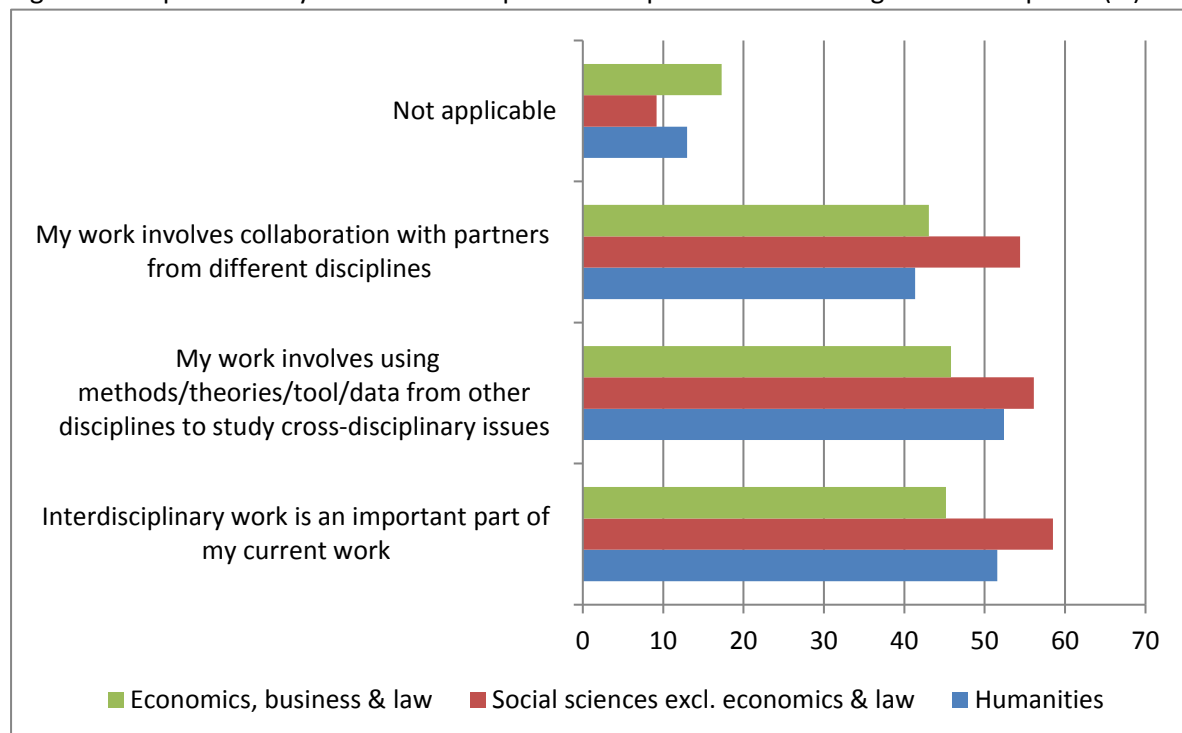


Italians, who commented that, compared to Italy, the model for undergraduate education in Germany involves ‘more cooperation between the disciplines, among different fields’ [IT04].

We can also look at the data on cross-disciplinary activity from a broadly disciplinary perspective, grouping together firstly the humanities, secondly the social sciences, and thirdly economics, business and law (figure 3). Again we find evidence of significant interdisciplinarity, with between 40% and 60% of respondents in all groups indicating the existence and importance of this kind of activity. Our survey reveals that respondents from the social sciences (excluding economics, business and law) were most likely to indicate that interdisciplinarity was important to their current work (58.4%); that they used methods, theories, tools and/or data from other disciplines in their work (54.1%); and that their work involved collaboration with partners from other disciplines (54.4%).

Respondents from economics, business and law were least likely to report the importance of interdisciplinarity (45.2%) and least likely to report the use of methods, theories, tools and/or data from other disciplines in their work (45.8%). There were slightly more likely than respondents from the humanities to report interdisciplinary collaborations (43.1% in economics business and law compared to 41.4% in the humanities).

Figure 3: Respondents by PhD broad discipline and experience of working across disciplines (%)



Source: Kupiszewska, D., for POCARIM

In part these differences can be explained by disciplinary practices and the perspectives within disciplines as to what constitutes interdisciplinarity. It could be, for example, that the strong disciplinary identity of economics encompasses a range of approaches which might count as interdisciplinarity for respondents in other disciplines. Sociologists, on the other hand, might consider work across a variety of sub-disciplines as interdisciplinary. In our interviews we found that it was common for geographers to regard their work as interdisciplinary.

Whilst in practice interdisciplinary work tended to be limited to collaborations within the social sciences, it was not so in all cases. One Spanish geographer [ES14] reported a link between the social

and the natural sciences in her work on biogeography, whilst the following Portuguese psychologist reported drawing on work from

*...neurology, neuroscience, sociology, political science and history. It involves psychology, behavioural areas, cognitive areas and also the clinic area. Also, it involves education sciences, didactic pedagogy [PT20].*

The sense that interdisciplinarity could be a matter of degrees was reflected in a comment of this Hungarian economist:

*[My work is] not interdisciplinary in the sense that I do not work with botanists or with doctors. It's certainly interdisciplinary in the fields that are related to business [HU13].*

Similarly, this German interview, whose work was grounded in both linguistics and sociology, exhibited a hint of scepticism about how far his work was truly interdisciplinary,

*...it's a little bit arbitrary to say that certain people coming from certain fields are interdisciplinary because one is called a sociolinguist and one is called a sociologist of knowledge [DE04].*

Overall, there was a consensus that working across disciplines was a matter of incorporating multiple perspectives in one's work. The following quotation captures this:

*[Interdisciplinarity is] to manage to read a subject, rather an object [...] by taking the prism of different disciplines. To read that object or that area with a view that comes from different disciplines, either yourself by doing a tour like a butterfly, or to go further by asking experts from different disciplines. The object is always the same [FR14].*

A final point to make here is that there is a distinction between collaborative interdisciplinarity and individual interdisciplinarity. This can be seen in figure 2 most clearly in the humanities, where 52.4% of respondents to the survey reported drawing from other disciplines to address interdisciplinary problems, whilst only 41.4% reported collaborating with partners from other disciplines. Many interviewees spoke of the ways in which their academic backgrounds – as students and after – had involved moves between different disciplines. In such cases interdisciplinary professional profiles were the outcome of changing practices, interests and experiences over a career. The following Norwegian interviewee described the ways in which her journey from the humanities to media and technology had resulted in her own profile being multidisciplinary:<sup>8</sup>

*I have indeed shifted disciplines during my academic career. I was originally into humanities and art history. I feel myself multidisciplinary. I can talk across art history and combine this with the science background. There is an added value in this ability to connect different disciplines and at the same time introduce perspectives on learning and interdisciplinary studies. Learning sciences is my key discipline, but I can use many ideas from my art history studies [NO11].*

Many interviewees reported interdisciplinarity of a collaborative nature. This could emerge informally as a result of shared interests, or strategically in response to funding directed towards specific problems. Whilst in some cases interdisciplinarity was a formal requirement of grant awards, there was a general perception, articulated by the following psychologist, that diverse teams added value to a project:

---

<sup>8</sup> Lyall *et al.* (2011) observe that academics and researchers move in and out of disciplinary engagements and activities throughout their careers.

*...this international project gathered people with different knowledges, namely people from economics, who are vital for us to understand the economic impact of the quality of the context in which children live. I think there are enough reasons to do interdisciplinary work because that gives added value to our work and strengthens the issues that we can formulate and answer [PT16].*

However, the strength of disciplinary identities – and perhaps also national disciplinary cultures – clearly influenced the perception of collaborative work in some cases, as evident in the comment of this French anthropologist:

*I'm not interdisciplinary. I'm an anthropologist, but I always work with other disciplines [FR23].*

#### *Enabling interdisciplinarity*

The role of both policymakers and institutions in enabling interdisciplinarity has been reported.<sup>9</sup> The experiences of the POCARIM interviewees point to two main ways in which this can happen. The first is in the physical structure of an institution. Traditionally, university faculties and departments have reflected the organisation of fields of knowledge into disciplines. Such institutional structures can limit interactions between researchers in different fields and therefore constitute a barrier to interdisciplinarity. The development of interdisciplinary doctoral training schools, research centres and groups emerges from our study as an important enabler of interdisciplinary activity.

A workplace rich in encounters between researchers of different backgrounds is fertile ground for interdisciplinarity. The following Swiss historian reported the ways in which his workplace gave him multiple opportunities for repeated, informal and chance interactions with colleagues from different fields:

*I don't like to be isolated in my discipline [even] geographically. To be in a beehive like that with different social scientists, it's the way I like to work. So kind of like I get up, I walk and I went to go to the... I talk with the sociology of economics professors and then we have more things [to] discuss, maybe just the work of people in my department or something, and you know that's the way I work. So always crossing things, meeting people by kind of like [asking] 'what are you working on' and not the methodology, or to feel like I don't care [CH16].*

The second way in which interdisciplinarity can be facilitated is through planned 'moments' of interaction, for example through conferences, workshops and symposia which bring people of diverse disciplinary backgrounds together in the same place. The following Swiss interviewee, who works in the field of development studies, spoke of her involvement in interdisciplinary events and the strategic way she managed them:

*There are very different disciplines and it's up to me to organise workshops to bring the different disciplines together, to speak together and to bring up common ground. It's also up to me to add to the content and to make the links between the different disciplines [CH02].*

#### *Motivations for Interdisciplinarity*

Previous research into interdisciplinary research practices has found a range of motivations. In Bruce *et al.*'s (2003) assessment of interdisciplinarity in FP6-funded research the authors identified five key motivations: the nature of the study was interdisciplinary; the desire to transfer information from a laboratory to the real world; the research was user driven (real world and applied); the research was

---

<sup>9</sup> See Lyall *et al.* (2013) on the role of policy. For an institutional perspective, see Taylor's (2013) report on the approaches of US universities to encouraging and rewarding interdisciplinarity amongst their faculty.

policy relevant and only could be addressed by drawing on multiple disciplines; and that single discipline approaches had reached 'a bottleneck'. Elsewhere, Blackmore and Kandiko (2011) proposed three categories of motivation for interdisciplinarity: intrinsic and personal; external; and departmental and disciplinary.

In our analysis we have identified two broad sets of motivations. The first is extrinsic, that is, related to a research problem or context, or a working or career environment. The second set is intrinsic, in other words primarily driven by personal agendas. The extrinsic motivations include:

- the need for different perspectives on a problem
- that the problem itself demands interdisciplinary approaches
- the demands of funding bodies, institutional structures and reward systems
- and the demands of employability

The first two motivations are closely linked and are prominent in the accounts of POCARIM interviewees. It was a commonly expressed opinion, for example, that the multifaceted nature of many contemporary problems simply make interdisciplinarity a necessity. The following quotation is representative of many of the comments which noted the limitations of single-discipline approaches:

*I think there are many solutions to problems we haven't solved yet that we're still trying to solve the wrong way by looking at only one part of the... one perspective of the problem and not realizing that the problem is more complex [CH11].*

For many problems, therefore, multiple disciplinary perspectives can be fruitfully brought to bear:

*Well, I think it is important because, for example, if you are searching one factor, if you are studying something, one point, whether there are different factors which explain it, it will be psychological, sociological, economical, demographical and I did not know why multi-disciplinarity or interdisciplinarity can be interesting. We can get a bigger picture, we can understand better what you are studying basically [FR19].*

Structures of research funding, work and careers are increasingly demanding interdisciplinarity, hence this was reported as becoming a major motivation. A few interviewees articulated a sense that funding requirements for interdisciplinarity could lead to strategic rather than optimal collaborations, or that it might be the only motivation in some cases. One French respondent commented:

*Nowadays, only interdisciplinary research projects get financial support. Thus we are involved in interdisciplinary research. It's a necessity [FR24].*

However, linking interdisciplinarity to funding was more often seen as a positive way to encourage researchers to venture away from the 'automatic' single disciplinary, 'lone scholar' model:

*If there is like chance, like you only get some money for [showing] that you have an interdisciplinary team or if you follow interdisciplinary approach, I think that's a good thing. Because in the other direction to work as a discipline alone that's something that happens almost automatically. If you don't really force yourself to kind of go out to others and try other approaches [CH19].*

Having a mixed disciplinary identity was not always regarded as a benefit (as is discussed in the following section). However, in a few cases interviewees reported that their work in multiple areas had created opportunities for work. One spoke of this as the 'necessity of employment' [NO18], suggesting that interdisciplinarity is a basic requirement rather than something that adds value.

Others saw it more positively as a quality of their professional profiles that opened up opportunities that would otherwise have remained closed to them:

*I earned money both being a psychologist and having studied in the management department. Having an interdisciplinary point of view helped me a lot, really. Because people were inviting me just as a psychologist; sometimes inviting me as an academician or organisational behaviour specialist. So it always helped me being in two disciplines [TR01].*

Intrinsic motivations for interdisciplinarity were both personal and work related, and included:

- an interest in other fields and collaborative work
- the influence of mentors and peers
- the desire for methodological or theoretical innovation
- preparing the ground for future work

Many spoke of the ways in which working across disciplines or in collaborative teams provided enjoyable professional experiences. One Polish respondent [PL01] spoke of the 'great fun' she had combining political science and history in her work. Another, Hungarian interviewee, reported on the pleasures of collaborative work:

*[Interviewer: To what extent did you work with people from other academic backgrounds?] Almost always. It was always like that. I loved working with sociologists. I had always thought of doing that after university. I worked with geographers and sociologists [HU03].*

For some an interest in interdisciplinary work was encouraged or demonstrated through the example of colleagues and peers who themselves were interdisciplinary in some way. One interviewee, for example, spoke of how his supervisor had been actively interdisciplinary, which had 'opened my mind to this' [FR22]. The following Swiss interviewee mentioned the social dimension of interdisciplinarity, of finding people that it would be interesting to work with:

*A lot of these travels between disciplines started with interpersonal relationships. So like somebody knowing somebody in a different field and then they are like, 'yeah you should go there'. It's not necessary, so it really depends on the person you were talking to and how they view research and whether or not they appreciate the value of working with people in slightly different fields [FR15].*

The generation not just of new knowledge but of methodological or conceptual innovation was an important motivation for some interviewees. One Portuguese art historian reported that encouraging researchers to engage in collaborative cross-discipline work through funding had helped 'many researchers realize that partnership work is more productive with that interdisciplinary approach' [PT18]. Moreover, experiences of interdisciplinarity prepare researchers for further such work.

*I think it helps to understand different academic cultures and backgrounds in the university. I think it's quite important as it helps to find the right language to approach people of different academic backgrounds. So I think this background helps to do my job properly [DE11].*

#### *The challenges of interdisciplinarity*

Many of the challenges of interdisciplinary work stem from the fact that career structures continue to reflect and sustain disciplinary distinctions. For example, the issues identified by Lyall *et al.* (2011) include the fact that career structures within institutions are built around disciplines, that early

career positions tend to require teaching on discipline-focused introductory courses, that promotion criteria are disciplinary, and that evaluation of research bids favours disciplinary approaches.

These factors generate a number of social and psychological challenges: there is a risk of a lack of a community of peers and identity, there is a risk of isolation, stress and depression, extra effort is required to 'reach out' to colleagues, and there is a need to have the confidence to develop and promote an 'interdisciplinary persona' (Lyll et al., 2011).

Many of these same concerns were reported by POCARIM interviewees. Here we divide them into two broad categories. The first set of issues centres on the practices of interdisciplinary research. The second set relates to the problematic outcomes that interdisciplinary researchers in SSH experience. Whilst many may seem severe, it should be noted that in all but a few cases the broader contexts in fact led to a generally positive perception of interdisciplinarity.

On the one hand, the challenges of undertaking interdisciplinary work included:

- the additional effort required
- a lack of support for interdisciplinarity at institutional and policy levels
- the attitudes and perceptions of researchers themselves

By far the most commonly reported difficulty of interdisciplinary research concerned the separation of researchers into disciplinary 'silos'. These silos in one sense take shape in the formal organisation of knowledge in institutions:

*In everyday life, we generally stay separate – we're also physically separate in the different campus buildings. This makes collaboration more difficult. We tend more to have personal contacts [HU19].*

The silo problem is also a result of specific disciplinary theoretical and conceptual approaches, cultures and languages. The intellectual distance between disciplines was reported as a key problem in collaborative work, often requiring a good deal of translation. The following comment addresses the implications of some of these fundamental differences:

*This [interdisciplinarity] is not easy, because we are not at all on the same wavelength. We seem to be speaking two different languages, which causes a lot of misunderstandings [HU18].*

Interdisciplinarity can therefore involve significant additional work for those who engage in it. One interviewee noted in particular 'the creativity that is required at the very beginning of this kind of interdisciplinary work' [CH21]. For others the difficulty was in finding suitable partners 'who share your interest or who would also like to sacrifice time to do interdisciplinary research' [DE05]. Another respondent spoke of the burden of acquiring knowledge of multiple literatures with the comment that 'unfortunately it means that I have to read a lot' [HU15]. Another went into the process in more depth:

*[...] you'll certainly gain from trying different approaches. I think for my side it's very difficult. I mean you have to invest a lot to gain the skills in one discipline, one field and then it's very hard. If you want to do it in another field as well you have to get the skills, you have to invest so much; that is very difficult and this should not hinder oneself to collaborate with other disciplines [CH19].*

One final issue to mention here is the fact that collaborative interdisciplinary work demands the coordination of a variety of personal and professional interests and agendas. This problem can be seen in the following comment that:

*[Interdisciplinarity is] usually reduced to collaboration between two labs or two chairs from different faculties but each one having its own agenda and its own network and its own journals where they want to publish the results at the end [CH11].*

**Laurent [FR01]: the challenges of interdisciplinarity**

Laurent holds both Swiss and Spanish nationality. He took his doctorate across two institutions, one French and the other Swiss, with two supervisors from different disciplines, one from anthropology and one from communications. He is interdisciplinary both in terms of his broad teaching remit and his core research, which centres on religion and faith in the public sphere. He enjoys the collaborative work he does with biologists, linguists and theologians and sees definite value in it: 'I think my work couldn't be as accurate as it is without working with them'.

However, Laurent acknowledges the challenges of interdisciplinary work. These challenges include fundamental questions about the nature of science and what it means to do science, to know or prove something, and even how to describe something.

*The methodologies we use in social sciences, especially in qualitative approaches, are quite difficult for hard scientists like biologists or criminologists to get. They are quite difficult because they are used to experimental methods and statistics a lot. So we have to show them that enquiry isn't restricted to labs, isn't restricted to counting.*

The second set of disincentives to interdisciplinarity for some POCARIM respondents were connected to the institutional and policy contexts in which they worked. Many comments on this theme related to a perceived lack of understanding of, and support for, interdisciplinarity. This was felt to reflect and reinforce the separateness spoken of above. The following interviewee reported the 'many barriers and obstacles' that had turned her against interdisciplinarity in the future:

*[...] my university says everywhere that interdisciplinary courses are our, whatever, we like it. But from the point of doing really interdisciplinary foundational courses or work, I would guess it is really difficult to find your feet there. Because the structures are not supporting you, at the moment at least. I mean we have been restructured three times in recent times. So to find people who will sacrifice their time beyond their discipline and say, 'OK this is not heading anywhere, let's open up and get other ideas and approaches', you don't find these people so often. With me I would sometimes like to, but my energy is limited and interdisciplinary things are very rewarding but also very time consuming, and sometimes you really have to fight [to get] them through and get energy for it [DE05].*

Others reported their perception that institutions and funding bodies found interdisciplinarity difficult to deal with, either because it was 'risky' or because they had no frame of reference with which to evaluate its worth:

*[...] when our research project, interdisciplinary research project on environmental studies was refused, when we saw the reason why [was] because you don't have a clue on how they are going to evaluate it, because they don't know how to evaluate interdisciplinarity [CH12].*

A third challenge to the practice of interdisciplinarity is found in interviewees' comments about individual's attitudes to this kind of work. There may be a generational dimension, as the following comment suggests:

*[...] there are also older professors who take a somewhat more conservative approach and have some reservations, saying that you shouldn't mix things and everyone should remain in their own fields of expertise [HU20].*

As our analysis of the survey reports above, the disinclination to interdisciplinarity can be more strongly associated with particular disciplines. This finding is supported by the interviews, as the following quotations indicate:

*It really depends on people or on thought or on culture. For example, I found that here in [institution X], psychiatry, like, the field of psychiatry, is really closed and not open to this kind of dialogue [CH08].*

*So I was changing practices from historical practices to technology development. There was not support at the department of history towards my interests. This was very discouraging. So I had to leave the humanities, and find some people interested in this kind of research myself [NO11].*

In other remarks, interviewees highlighted the role that the perception of hierarchies played in limiting interdisciplinarity. This emerged as an issue for human geographers occupying the same broad and interdisciplinary space as physical geographers:

*Well, all of us, those who were in the department of human geography, we all were, well, we were reminded frequently that we, well, I don't know how to say it, well, that we are almost parasitising, hanging on, living at the expense of the status of a natural science [LV03].*

Another dimension to this is the 'imperialism' of certain disciplines. One interviewee spoke of the way practitioners in his own discipline, economics, tended to stick rather dogmatically to their own methodological approaches:

*I think, actually, economic methods, the methods economists use, are a bit imperialist; so I have the impression that our methods are considered in some way better, or better policy at the institute. So that makes it a bit that those methods are used more and we have a tendency to work with those methods. And then there is no interdisciplinary left, right? [DE14].*

Ultimately, many of these challenges were exacerbated when interdisciplinary collaborations were felt to be contrived. The following quotation highlights the difficulty of a process in which researchers from different disciplinary backgrounds work in parallel but not in synthesis:

*It was a bit difficult really to involve everyone [in the project] because, let's say the faculty was subdivided in two sectors – archaeology and art history – so let's say the work went in this sense, in this parallel route in reality; so the seminars too, the congresses, always had this double aspect, even if it was just a courtesy in part, basically in part as a formality, for an attitude of solidarity with the other colleagues, that we would also participate in seminars outside of our own specific subjects - more a formality than something of substance [IT07].*

The second set of challenges concern the outcomes of interdisciplinarity on researcher's work and career opportunities. They include:

- a lack of mechanisms for the assessment of the quality of interdisciplinary work
- increase risk and insecurity in the labour market
- managing professional networks
- the risk of producing poor quality work



The first two of these problems can be considered together, because the lack of mechanisms for assessing interdisciplinary work can lead to problems in the labour market. Essentially the problem stems from the fact that career progression is largely based on the evaluation of one's work by senior peers whose own careers have followed traditionally disciplinary paths. There is therefore anxiety about how far it is possible for interdisciplinary work to be evaluated on its own merits rather than against the standards of a single discipline.

There are three circumstances in which this problem manifests: publishing, research evaluation, and funding bids. Interviewees, spoke, for example, of the fact that many of the most highly regarded journals had a single-discipline focus. Finding an appropriate outlet for research could therefore be problematic, as the comment of the following Swiss business studies academic demonstrates:

*[...] if we want to publish something we need to choose a journal to publish in and this journal will either be a management journal or a social science journal; and we will have to relate to either the management framework to publish in the management journal, or the social science frameworks and theories and authors. So we realised that there is no space, actually, in the academic world for interdisciplinary research [CH11].*

It must be noted, however, that finding a good journal to publish in was not a problem for all, especially for respondents working in fields that were fairly established in their interdisciplinarity. One linguistics scholar, for example, commented that:

*[...] there are opportunities, but it's not really the problem because I work on fields that are well represented. So it's not really a problem to find solutions to publish [CH23].*

In some countries these disciplinary traditions in publishing create further problems when it comes to the evaluation of research by national funding bodies. The UK's Research Evaluation Framework, for example, requires the submission and ranking of work according to disciplinary categories. A similar issue was reported in France by the following management researcher:

*I think that interdisciplinarity is not well recognised [...] in management. You are evaluated by CNRS and in competition by your peers, and rankings are for my discipline clearly in economics and management [FR04].*

As a result of the problems noted here, interdisciplinarity was perceived as a risk in the academic and research labour market, in particular amongst early career researchers. One way that this was expressed was in terms of the lack of a distinct professional identity. The sense of being lost between disciplines is evident in this comment by a French Sociologist:

*When I was a student, I was really completely convinced that this [interdisciplinarity] is a good thing. This was important and then in my PhD I had a lot of literature coming also from economics [...] But then I saw with all this you get lost, and already the literature in sociology of work and organisation is already that huge, and then if we go into economics you open new things and the problem is then profiling yourself somewhere [FR22].*

Somewhat later in his career, and with an established interdisciplinary profile across ancient history and archaeology, the following UK interview spoke of his experiences looking for a position in a labour market which tends to place value on deeply disciplinary identities:

*I do ancient history, I do archaeology, but what you tend to [find] advertise[d] is it's an archaeology job and someone who could [...] maybe help with a little bit of ancient history, and likewise as an ancient historian; ancient historians don't [have a] particularly high regard of archaeologists. So whilst I tried to present myself as both, I'm not brilliant at either. I'm solid good, I'm not outstanding. So I, you know, I suffer for that [UK13].*

Amongst interviewees whose disciplinary profiles had changed over time, there appeared to be some sense that network building and maintenance required more work than might have been the case had they remained in only one discipline. This was mentioned only by a few, and it was not necessarily perceived to be a problem; perhaps because of the way networks change over a career as interests develop in any case. Hence one reported that 'I think I did [lose my networks when I changed field]. But now it's not important anymore, so yeah, as I mentioned this contact in London, I lost them now because they are not interested in what I do now' [DE10]. For another it was important to have a disciplinary home 'because then it is quite easy to establish links' [DE16].

Finally, and mentioned only by a few, there was a feeling that interdisciplinarity carried with it a risk of producing substandard work. This would be the result of attempting to incorporate unfamiliar concepts from other disciplines. One Hungarian spoke of it in the following way:

*What you have to watch out for, though, is that you can't be a real expert in two things at once, so one or the other of the two becomes superficial, which is of course objectionable. Insofar as this superficiality can be avoided, then it will work. I've seen a book by a political scientist who wrote very superficially and often inaccurately about institutional and constitutional law issues [HU20].*

Overall, we find a strong sense amongst many of the POCARIM interviewees of the 'paradox of interdisciplinarity'<sup>10</sup>, in other words, the tension between traditionally disciplinary structures of reputation, reward and careers on the one hand and policy level agendas which promote interdisciplinarity on the other hand. The following respondent sums up her perception of this in the Swiss context:

*[...] the paradox is that the institution encourages you to work interdisciplinary but then afterwards when it comes to permanent positions the message is conservative and traditional privileging more established fields and disciplinary perspectives [CH23].*

#### *The positive outcomes of interdisciplinarity*

Analysis of the POCARIM survey data above revealed a perception of the value interdisciplinarity. We have also been able to identify the ways in which that value is realised across a range of 'impact activities' (table 1). In all categories, those who indicated that 'interdisciplinary work is an important part of my current work' were more likely to report having taken part in each activity than those who indicated no interdisciplinarity. Most significantly, those reporting interdisciplinarity were three times more likely to report that they had developed innovative products, over two and a half times more likely to have been involved in NGO work, and almost twice as likely to report media activity (1.9 times more frequent), work on societal or political committees (x1.8), project management experience (x1.8) or advising policymakers (x1.9). The least impact is seen in activities which are traditionally part of academic work: teaching, publishing and conference participation.

---

<sup>10</sup> In Weingart's (2000) view this paradox primarily concerns the fact that, whilst interdisciplinarity is viewed as the most promising approach to the generation of new, applied knowledge, it is through ever more detailed and discipline-specific knowledge innovations that careers are built.

Table 1. Respondents by impact instrument/activity and experience of working across disciplines (%)

Impact activity	“Interdisciplinary work is an important part of my current work” (a)	None of the 3 options of interdisciplinarity is applicable (b)	(a)/(b) ratio
Developed innovative products	28	9	3.0
Been a board member/volunteer/advisor in an NGO	33	12	2.6
Been a board member in a company	14	7	1.9
Given interviews in media (radio, TV, newspapers)	60	34	1.8
Have participated in societal or political committees	40	23	1.8
Have managed/coordinated projects	74	42	1.8
Have advised to policy-actors on the local, regional, national or international level	41	25	1.7
Have taken part in in knowledge transfer activities	73	46	1.6
Have supervised graduate or PhD students	69	46	1.5
Have participated in policy-relevant conferences or events	66	50	1.3
Have taught students	91	79	1.1
Have published textbooks, monographs, articles, books	91	81	1.1

Note: Percentages do not sum to 100 as more than one answer could be selected (Source: Kupiszewska, D., for POCARIM)

The POCARIM interviewees also showed broad agreement that interdisciplinarity has real value. Although some spoke specifically about the way interdisciplinarity contributed to the success of events, papers, articles and books, most reported the advantages in broad terms. The main benefits related to three areas:

- addressing complex, real-world problems
- developing new languages, concepts, approaches and identifying new problems
- career benefits

The key benefit of interdisciplinary work for the POCARIM interviewees was the way it enabled them to address complex problems, in particular those with real-world implications, from a ‘plurality of scientific positions’ [FR15]. This point can be made briefly, though it is significant in both its power and the frequency with which it was noted amongst the interviewees. The following interviewee is typical of those that reported the fact that, through the application of a range of disciplinary perspectives, a more complete understanding of a problem or range of possible approaches could be achieved:

*I just think each discipline has something to offer but never really the whole picture. So for me this is basically putting pieces of the puzzle together, this is what interdisciplinary means [DE19].*

In order to address problems of concern across disciplinary boundaries, interviewees reported the need to develop new languages, concepts and approaches. One interviewee, for example, spoke specifically of the benefits of working with people from other disciplines as ‘an advantage for the development of methodological instruments and the design of projects’ [DE25]. Several others

explicitly commented on the different disciplinary languages and concepts they had learned and which facilitated cross-disciplinary communication within their work:

*I have integrated in my work concepts and approaches from other disciplines from these [interdisciplinary] collaborations. This allows me to discuss with people from economics, history, management, and computer bibliometrics, but this is not easy [FR31].*

A final positive outcome in terms of innovation was the identification of new problems, and new areas of study. In the following quotation, the interviewee speaks of the value of the 'crossroads' between disciplines at which interdisciplinary researchers find themselves:

*[...] the most important challenges in ethics are now often overlooked because they come at the crossroads of different disciplines. It's when we combine two views that we can identify the problems and modernity has built a specialized approach with this idea that the specialist is always more efficient than the general person [CH11].*

**Audrey [CH15]: interdisciplinarity and innovation**

Audrey studied sociology and psychology before moving into criminology. Her PhD, in law and psychology, focused on issues of violence against women. She completed her doctoral studies in Switzerland and is currently a postdoc research fellow in a psychiatry department in the USA.

Her disciplinary journey is closely tied up with the opportunities she had to go abroad to study and to explore a range of courses not available in her home institution. She has also collaborated on projects with stakeholders in law enforcement who had very different cultures, assumptions and expectations.

Interdisciplinarity has been important to Audrey. The multiple perspectives of different disciplines, she says, produces more interesting results: '[We study] very complex problems and I think the more we can look at them from different perspectives, the better it is'. Her interdisciplinary work tends to emerge from her networks, through which she makes contact with people whose interests are complimentary and who value collaborations.

The professional risks of interdisciplinarity have been discussed above. At the same time, however, some positive career outcomes were also reported. For one thing, which is implicit in the previous comment, engaging in interdisciplinary activities contributes to the building of broad networks and extends the range of potential future collaborations. The following economist commented on the possibilities, issues and rewards that interdisciplinarity afforded him to collaborate with colleagues from very different disciplinary backgrounds:

*[Interdisciplinarity] gives me maybe opportunities to, yeah, to make what I like to do and to, try to collaborate with physicians, engineers and, so this is hard work because we don't understand each other very well so we have to try to build a common language, common ground, on which we can work and speak together. But I think it's very fascinating and interesting [CH19].*

A sense of enhanced employability was noted by the following Latvian interviewee in terms of teaching:

*[Interdisciplinarity] has given me an opportunity to broaden my competitiveness: I can offer course programs in wide variety of fields. In each of those I am more or less a professional. On Master's level I can teach only a narrow course: the one that I am specialised in. On Bachelor's level I have a very wide variety of topics, in which I could make a basic course; I think that I can orientate myself more freely there, and it has helped me [LV24].*

For others, interdisciplinarity contributed to an increase in professional visibility. This is evident in the following comment:

*The benefit is the professional recognition in a wider community than my disciplinary community [FR10].*

#### *Interdisciplinarity in practice*

It is important to think about interdisciplinarity as a process rather than as an outcome or as an assemblage of researchers. This enables us to look at the ways in which different bodies of disciplinary thought come together in practice. The following interviewee outlined the way in which disciplinary positions converge on a problem and lead to new approaches:

*There is a unity of several strands of scientific areas. Eventually they end up flowing into the study in a very positive way and allow the opening of very different analytical prisms [PT21].*

For many, an important element of the creativity of interdisciplinarity stemmed from the ways in which it challenged them to think outside their traditional boundaries. In one sense this was a question of undertaking a 'journey' between two disciplines:

*So I really like working at this crossroad and being forced, also, to question the traditional frameworks, discipline frameworks, also, the societal structured frameworks [CH11].*

In another sense, it was a personal, internalised process:

*I think it is still interesting just to decentre yourself to have new ideas, to not be always in your same ideas [FR22].*

Ultimately, the creative potential of interdisciplinarity can be realised through either collaborative activity, or the journey of a single scholar between disciplines. In practice, both are features of most cross-disciplinary activity.

#### *Interdisciplinarity, intersectorality and international mobility: a note*

Other forms of mobility – sectoral and international – imply cross-disciplinary mobility to some degree. Moving between countries, for example, could be part of a strategy to bring disciplinary innovations from elsewhere to a new context, or perhaps just the product of a move between nationally specific disciplinary traditions. The differences in such cases might be quite small, but nevertheless can lead to knowledge exchange and innovation.

When researchers move not just out of their disciplines but into other sectors, in many cases the applied nature of the work they undertake demands a broad range of disciplinary and other collaborators. One interviewee spoke of her experience of working with a law enforcement agency on a domestic violence project, in which it was necessary for her to accommodate a very different set of expectations:

*They had very clear goals so that my research was directly related to their activities. There were not necessarily the exact same goals that I have, but I thought that by improving their policies on domestic violence I was also working towards making the situation a little bit better [CH15].*

### **Viktors [LV05]: the international dimension of interdisciplinarity**

Latvian national Viktors completed his PhD in sociology around three years ago and has held a position in a university in Riga since shortly thereafter. Viktors specialises in bioethics, and strongly identifies as an interdisciplinary scholar. His field, he says, 'has difficulty defining itself', crossing as it does disciplinary boundaries between medicine, biology, philosophy, and theology.

Bioethics is a relatively new field in Latvia though well-developed in Europe and the USA. Viktors benefitted greatly from a period of study in the US, and has been able to apply the knowledge of bioethics he gained there to his work at home. He has a number of important roles advising health and education committees on bioethics. In this sense Viktors is playing an important role in developing his field in Latvia.

*I feel clearly that with my European and American education, I am bringing in standards from there which till now have been little developed.*

### **Conclusions**

To recap, we understand interdisciplinarity broadly as any cross-disciplinary activity conducted collaboratively or individually. We make no assumptions about the nature of interdisciplinary exchange, which could include methods, concepts or subject knowledge; nor do we make any assumptions about the degree of difference between two disciplines or sub-disciplines. This view of interdisciplinarity enables us to identify a wide range of activities in which respondents undertake a degree of mobility between disciplinary communities which entails adaptation, learning and creativity.

We present the following findings as key outcomes of the POCARIM study vis-à-vis interdisciplinarity:

- SSH researchers in the POCARIM population are highly interdisciplinary, far more so than suggested in other research. However, most interdisciplinary activity is conducted between fairly closely related disciplines. There are also some significant differences between interdisciplinary activities according to both national and disciplinary location. In addition, our survey suggest that the proportion of SSH researchers who incorporate elements of another discipline in their work is greater than the proportion who is engaged in formally collaborative interdisciplinary work.
- Funding strategies are a major incentive to interdisciplinarity. However, there is some risk that this can lead to strategic assemblages of researchers with limited added value. Interdisciplinary activity also emerges from planned 'moments' such as conferences, or through repeated encounters in faculties and departments in which researchers from a variety of backgrounds work side by side.
- Research career structures, funding and evaluation in SSH remain strongly disciplinary in nature, and this is a disincentive to interdisciplinarity. The two main risks associated with interdisciplinarity are, firstly, that the value of interdisciplinary work will not be recognised in terms of publications, grant applications or system level evaluations. Secondly, there is a perception that researchers, in particular those at early career stages, could be less employable if they develop an interdisciplinary identity, largely because of the importance of teaching a range of discipline-specific undergraduate courses at these stages.
- Interdisciplinary work places greater demands of time and effort upon researchers. This includes reading up on unfamiliar concepts and methodologies, and developing a mutually comprehensive vocabulary through which to engage across disciplines.
- Nevertheless, the value of interdisciplinarity is reported widely across the POCARIM study. The value is reported most emphatically insofar as it enables researchers to bring a range of

perspectives of bear on a complex problem, build a fuller picture of the issue under study, and devise novel ways to approach and address it.

- Interdisciplinary activity can expand the intellectual resources available to a researcher, as well as contribute to the development of broader and more varied networks and, consequently, opportunities. This finding lies in tension with the anxieties about employability which were also evident.

### Recommendations

1. Interdisciplinary activity has clear value and should be supported by institutional leaders and policymakers.
2. Interdisciplinarity amongst SSH researchers tends to be within related fields. Nevertheless, it is important to recognise the value of the outcomes of such practices as contributing to a broad understanding of specific issues. There may be limited utility in encouraging SSH researchers to collaborate with distant disciplines as a point of principle.
3. Career and reward structures need to adapt to reflect the demands of policymakers for greater cross-discipline engagement. Currently, excellence metrics privilege single discipline outputs.
  - a. At institutional level, recruitment, reward and progression systems need to reflect the increasing number of researchers engaged in interdisciplinarity or who aspire to work across disciplines.
  - b. Funders and policymakers need to put in place mechanisms which recognise the value of interdisciplinarity in individuals and in projects.
4. Alternatively, institutions and policymakers should recognise the need for identifiably disciplinary professional profiles at early career stages, and instead support the development of cross-disciplinary activity at later stages.
5. Effective interdisciplinary collaborations emerge from environments and activities – or interdisciplinary ‘space’ and ‘moments’ – in which opportunities for interaction are plentiful, and individuals find intrinsic motivation through shared interests.
  - a. Institutions and policymakers should facilitate these encounters through interdisciplinary centres, departments and faculties, as well as ‘seeding’ events at which a mix of researchers explore the possibilities for collaboration.
  - b. Policymakers could host workshops or conferences that focus on problems of interest and which enable new alignments of researchers to emerge. Groups that emerge could be encouraged to bid for funding.
6. Interdisciplinarity involves greater time and effort than single discipline work. Policymakers and institutions should recognise this through, for example, allowing relatively more research or writing time for researchers acknowledged to be working across disciplines.

### References

- Apostel, L., et al., Eds. (1972). *Interdisciplinarity: Problems of Teaching and Research in Universities*. Paris, Organisation of Economic Co-operation and Development (OECD).
- Bitusikova, A., (2013) *Work Package 2: Policy Analysis*. POCARIM. Available at: [http://www.salford.ac.uk/data/assets/pdf\\_file/0012/399576/Policy\\_analysis\\_WP2.pdf](http://www.salford.ac.uk/data/assets/pdf_file/0012/399576/Policy_analysis_WP2.pdf)
- Blackmore, P. and C. B. Kandiko (2011). Interdisciplinarity within an Academic Career. *Research in Post-Compulsory Education* 16(1): 123-134.
- Bruce, A., et al. (2004). Interdisciplinary Integration in Europe: the Case of the Fifth Framework Programme. *Futures* 36(4): 457-470.
- Bushaway, R. W. (2003). *Managing Research*. Maidenhead, McGraw-Hill.

- COMMUNICATION FROM THE COMMISSION (COM(2006) 208): *Delivering on the Modernisation Agenda for Universities: Education, Research and Innovation*
- Canibano, C., E. Castro-Martínez, A. García-Aracil, F. Ortega-Colomer, J. Otamendi and R. Woolley (2013) Work Package 3: Secondary Data Analysis. POCARIM. Available at: [http://www.salford.ac.uk/data/assets/pdf\\_file/0005/399596/Data\\_review\\_WP3.pdf](http://www.salford.ac.uk/data/assets/pdf_file/0005/399596/Data_review_WP3.pdf)
- European Commission (2009). *Emerging Trends in Socio-economic Sciences and Humanities in Europe: the METRIS Report*. Brussels, Directorate-General for Research Socio-economic Sciences and Humanities.
- European University Association (2005). *Salzburg Principles*. Brussels, European University Association.
- Gustafsson, M. and Hansen, T. (2013) *Work Package 1: Research Review*. POCARIM. Available at: [http://www.salford.ac.uk/data/assets/pdf\\_file/0011/399575/WP1\\_Literature\\_Review\\_final.pdf](http://www.salford.ac.uk/data/assets/pdf_file/0011/399575/WP1_Literature_Review_final.pdf)
- Kupiszewski *et al.* (2013) *Work Package 3: Survey Report*. POCARIM. Available at: [http://www.salford.ac.uk/data/assets/pdf\\_file/0004/399577/WP4\\_Survey\\_report.pdf](http://www.salford.ac.uk/data/assets/pdf_file/0004/399577/WP4_Survey_report.pdf)
- Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). *The New Production of Knowledge: the Dynamics of Science and Research in Contemporary Societies*. SAGE: London
- ICCR Foundation (2010). *Social Sciences and Humanities Futures: Social Sciences and Humanities for Europe. Synthesis report*. Vienna, ICCR Foundation.
- IDEA Consult (2013). *Higher Education Sector Report MORE2: Support for Continued Data Collection and Analysis Concerning Mobility Patterns and Career Paths of Researchers*. Brussels, European Commission
- Klein, J. T. (1990). *Interdisciplinarity: History, Theory, and Practice*. Detroit, Wayne State University Press
- Klein, J. T. (2000). A Conceptual Vocabulary of Interdisciplinary Science. In *Practising Interdisciplinarity*. P. Weingart and N. Stehr. Toronto, University of Toronto Press: 1-24.
- Klein, J. T. (2007). Interdisciplinary Approaches in Social Science. *The SAGE Handbook of Social Science Methodology*. W. Outhwaite and S. P. Turner. London, SAGE: 32-49.
- Lattuca, L. R. (2003). Creating Interdisciplinarity: Grounded Definitions from College and University Faculty. *History of Intellectual Culture* 3(1): 1-20.
- Levin, L. and I. Lind, Eds. (1985). *Inter-Disciplinarity Revisited: Re-Assessing the Concept in the Light of Institutional Experience*. Stockholm, OECD
- Lyll, C., A. Bruce, W. Marsden, L. Meagher (2013). The Role of Funding Agencies in Creating Interdisciplinary Knowledge. *Science & Public Policy* 40(1): 62-71.
- Lyll, C., A. Bruce, J. Tait, L. Meagher Eds. (2011). *Interdisciplinary Research Journeys: Practical Strategies for Capturing Creativity*. London, Bloomsbury.
- Weingart, P. (2000). Interdisciplinarity: the Paradoxical Discourse. In *Practising Interdisciplinarity*. P. Weingart and N. Stehr. Toronto, University of Toronto Press: 25-42.
- Strathern, M. (2007). Interdisciplinarity: Some Models from the Human Sciences. *Interdisciplinary Science Reviews* 32(2): 123-134.
- Taylor, J. (2013). *Leading Interdisciplinarity: Creating Environments for Success*. London, Leadership Foundation for Higher Education.
- UNESCO (2010) *World Social Science Report*. Paris.