

Shaping the Integration of Arts, Humanities and Social Sciences in Interdisciplinary and Transdisciplinary Research

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Introduction

Despite widespread policy interest in integrating the arts, humanities and social sciences (AHSS) into interdisciplinary research (IDR) and transdisciplinary research (TDR), tokenism is widely recognised as an unsatisfactory reality of many such integration efforts. In collaborative projects, AHSS researchers are often limited to playing instrumental and subordinate roles in relation to science and technological fields. So, why are we still struggling to meet this challenge and what needs to change?

With the aim of improving pathways for AHSS involvement in IDR/TDR, the project ‘Shaping Interdisciplinary Practices in Europe’ (SHAPE-ID)¹ addressed the challenge of better integrating AHSS including with STEM² fields. Using this framework, we undertook a significant evidence-scanning exercise to explore the features of IDR/TDR and AHSS integration in different thematic contexts, covering scientific papers, reports and internal documents from funding agencies and research organisations. We identified a set of factors from the academic literature and further compared them to factors elaborated in the policy literature. Here, we relate these factors to the experiences of a smaller number of researchers working on large-scale European IDR/TDR projects in which AHSS disciplines play a leading role. We analyse four factors: (1) lack of appropriate research funding; (2) the extended time required to conduct good quality IDR/TDR; (3) existing academic career structures; and (4) institutional structures. Comparison with the examples extracted from IDR/TDR projects helps to explain what is actually experienced and what is reported in the literature, particularly the policy literature.

We present evidence that factors influencing the success of IDR/TDR are interrelated, context-dependent and dynamic. They depend on contextual features including the understanding of interdisciplinarity (ID) and transdisciplinarity (TD) within a project, the phase a project is at, the roles assigned to different partners, the logics and motivations underpinning the work, and (mis)conceptions about the disciplines and actors involved. In addition, we found that the same factors can often act as either a hindrance or an enabler for IDR/TDR.

The chapter is organised as follows: first, we look at definitions of ID and TD and present the challenges that AHSS disciplines currently face. More specifically, we analyse the implications of such challenges for AHSS integration in collaborative research. We then detail the factors that help or hinder AHSS integration according to the academic literature. We characterise these factors and relate them to those identified in the policy literature. Next, we provide examples from European IDR/TDR research projects and

describe four factors influencing their practice. We conclude with some recommendations for policy makers, funders, universities and researchers on how to integrate AHSS into broader collaborations with STEM.

The Challenge of AHSS Integration in Inter- and Transdisciplinary Research

Plural Understandings of Inter- and Transdisciplinarity

Interdisciplinarity and transdisciplinarity are widely used terms, particularly as part of present efforts to transform the relations between academic research and other sectors of society, such as the economy, policy and socio-cultural areas. When defining these terms, the academic literature shows plurality, heterogeneity and sometimes overlapping definitions (Vienni-Baptista et al. 2020a). The most widely used schema for defining these types of collaborative research (i.e., multidisciplinary, interdisciplinary, transdisciplinary) derives from a typology presented at an international conference in 1970 (OECD 1972). Most generally, but not exclusively as we show below, ID is understood as:

a mode of research [. . .] that integrates data, tools [. . .] perspectives, concepts, and/or theories from two or more disciplines to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline. (National Academy of Sciences 2005: 2)

The term ‘transdisciplinarity’ is often used in German-speaking countries, the Netherlands and some Nordic countries (Pohl 2008) to describe a reflexive, integrative, method-driven scientific principle, which emphasises solving societal problems by integrating various scientific and social bodies of knowledge (Hirsch Hadorn et al. 2008).

Beyond these understandings, other definitions co-exist within the academic literature (Vienni-Baptista et al. 2019). Since Gibbons et al. (1994) and Nowotny et al. (2001) introduced the concept of ‘Mode 2’ knowledge production to describe transdisciplinary knowledge, the literature has provided multiple definitions of ID and TD. Nevertheless, several authors (e.g., Barry and Born 2013; Klein 2010; Lury 2018; Lyall 2019) conclude that these concepts still represent contested discourses. Efforts to conceptualise and categorise the processes and outcomes of collaborative research depend fundamentally on an array of interrelations and negotiations between disciplines, and between academic disciplines and bodies of knowledge contained in programmatic statements, policy interventions, institutional forms, theoretical statements, instruments, materials and research practices (Barry and Born 2013). This means that it is necessary to find connections among existing conceptualisations rather than develop new definitions for ID and TD.

The challenge, therefore, is not to arrive at a single understanding that obscures the differences between models and practices of ID/TD, but to build dialogue between them. Three discourses summarise the implications of differing conceptualisations (based on Klein 2004; Osborne 2015). This summary usefully clarifies their different perspectives, and especially their implications for the role of AHSS disciplines in ID/TD:

- the philosophical or transcendence discourse, that aims at unity of knowledge, transcending the narrowness of disciplinary worldviews and practices;

- the problem-solving discourse, that is oriented to instrumental needs, specifically to cope with complex problems;
- the critique or transgression discourse, that interrogates the other two perspectives and emerges out of a fundamental critique of the system of knowledge and education, and also relates to discourses on the democratisation of knowledge.

As these three perspectives highlight, not all inter- and transdisciplinary initiatives are the same. ID and TD entail activities ranging from individual borrowing from another discipline to large-scale team-based initiatives, such as the ones that we analyse in this chapter. The purpose of IDR/TDR varies depending on the aims of the research and the specific questions it addresses; both determine the scope that any synthesising process may achieve. For instance, Klein (2010) and Lyall et al. (2011) describe how nuances in working processes and scope lead to a range of different forms of collaboration. Lyall et al. (2011) identify two types of ID: academically oriented and problem focused. In a related fashion, Mäki (2016) contrasts managerial top-down ID with practitioner bottom-up ID.

A primary feature that all definitions share is the important role that integration plays in IDR/TDR. Integration is a process enabling scientists to combine and/or attune different concepts, methods, perspectives or theories between several disciplines at different stages of the research process. It entails:

[. . .] not only the integration of approaches but also the creation of fundamentally new conceptual frameworks, hypotheses, and research strategies that synthesize diverse approaches and ultimately extend beyond them to transcend preexisting disciplinary boundaries [. . .] the distinctive focus of transdisciplinary approaches on translating scientific outcomes into practical applications leads to unique team compositions and outcomes. (Stokols et al. 2013: 5)

There is no universal model of integration because, as we have outlined above, ID and TD vary in purpose, and scope, depending on the problems and questions at hand, the expertise of the research team and other participating stakeholders, and the type of project (Klein 2010). Integration, as the basis for building a collaborative endeavour, also needs to be guided and supported using different methods and tools (Pohl and Wuelser 2019).

Challenges of AHSS Integration in Inter- and Transdisciplinary Research

The AHSS-STEMM gap remains a significant challenge in practice and policy (Stamm 2019). The academic literature shows little dialogue between AHSS and STEMM disciplines and few suggestions for bridging the gap, although the necessity to build bridges is widely acknowledged (see Irish Research Council 2018). The academic and policy literatures show successful examples of what AHSS integration in IDR/TDR should look like, but there are few concrete ideas about how this integration can actually be achieved (Fletcher and Lyall 2020, Vienni-Baptista).

A multitude of science policy actors, such as research funders, policy makers, journal editors, think tanks and research lobby organizations, all seem to agree that the future of science is to be found outside of firm disciplinary boundaries (Stamm 2019: 376). Why then is it more difficult for AHSS researchers than those from other disciplines to work

in IDR/TDR? Here, we describe the specific challenges that arts and humanities (AH) face in the process of integrating into IDR/TDR. The aim is to deconstruct a problem that affects not only arts and humanities (AH) roles in the scientific domain but also the impact of ID and TD in science (Lyll and King 2013).

One of the main challenges that AH currently face is related to how disciplines are grouped under the labels used to refer collectively to the arts, humanities and social sciences – ‘AHSS’, ‘SSH’ and ‘SSHA’. These labels obscure important differences between disciplines that bear on the different ways they position themselves in relation to doing IDR/TDR and to interactions with other disciplines (AH, social sciences and STEM) (Vienni-Baptista et al. 2019). The label AHSS (or SSH) needs to be problematised as it does not constitute a homogenous corpus of knowledge, and the ways in which each field can contribute to IDR/TDR needs to be separately analysed. Arts and humanities, as shown in the following examples, demand a place of their own in IDR/TDR:

- Researchers from AHSS may be concerned with how STEM researchers adopt and co-opt the vocabulary and methods developed by AHSS researchers without integration taking place. Lau and Pasquini (2004) give an example from geography, where STEM researchers learn methods and adapt them to their needs with no real interaction with geographers.
- Some AHSS fields position themselves as providers of questions and new insights in IDR and TDR, such as philosophy or science and technology studies (STS). This ranges from borrowing methods to mapping ontologies and epistemologies in an interdisciplinary team (O’Rourke et al. 2016) to the construction of subdisciplines such as the Philosophy of Interdisciplinarity (Mäki 2016).
- The role of the visual and performing arts has not received much attention in the literature related to IDR/TDR, but some references acknowledge that they are seen as using a different language to other fields in inter- or transdisciplinary settings. The question of how the problem is interpreted and framed is often posed to the audience in the arts, not given in advance, while most other researchers delineate a research question as the initial step in the research process (Rust 2007; Crossick and Kaszynska 2016).

Together with the problem of how each AHSS discipline responds to IDR/TDR, we identify further challenges for their integration (based on Vienni-Baptista et al., 2020a):

Legitimacy of IDR/TDR as modes of knowledge production: IDR/TDR are not yet mainstream, and both are questioned by institutions and researchers alike. They are rendered invisible in many academic spheres and their outcomes are not always taken into consideration by research institutions, policy makers and funders. This challenge implies that systematising the features of ID/TD in different contexts is an intricate task, as scientific papers, reports and internal documents from funding agencies and research organisations randomly and selectively promote the advantages of IDR/TDR.

Interdisciplinary and transdisciplinary communities: IDR and TDR have long traditions in Europe, but countries differ in the way they institutionalise ID and TD and develop funding policies and research practices. Researchers who want to engage in ID or TD – both senior and early career – often have difficulties locating and participating in communities of practice, including inter- and transdisciplinary associations and networks. Publication is also more difficult for inter- and transdisciplinary researchers because it is harder to find adequate journals that satisfy all participating disciplines. Gaps in the literature, widely dispersed findings and scattered literature are key challenges in IDR/TDR.

Lack of policy learning about how to facilitate IDR/TDR: The same recommendations have been made repeatedly in the academic and policy literatures. This points to a lack of policy learning about how to facilitate IDR/TDR, and results from the weak links between academic and policy literature. For example, there are important gaps in the policy literature on AHSS and IDR/TDR as it consists of three largely separate literatures focusing on: (1) European AHSS; (2) IDR/TDR; or (3) AHSS integration within European Commission framework funding programmes for research and innovation (Vienni-Baptista et al. 2022).

AHSS legitimacy and relationship with STEM: Different authors have studied the need to defend the established territory of the AHSS (e.g., Klein 2005; Quan-Haase et al. 2015; Snow 1964; Wallerstein et al. 1996, to name a few). This literature discusses attempts to bridge AHSS and STEM disciplines and to overcome the lack of perceived legitimacy of AHSS values (Irish Research Council 2018). This lack of legitimacy is reproduced when trying to integrate AH disciplines in IDR/TDR. AH disciplines are invisible in some realms and their contributions to IDR/TDR differ according to country, context of application and division of academic fields. While policy reports frequently advocate for the contribution AHSS disciplines can make to solving societal challenges, the academic literature suggests that there is often a perception that humanities researchers have little to offer and their contributions are difficult to understand and integrate (Callard and Fitzgerald 2015; Fitzgerald et al. 2014; Robinson et al. 2016). Following Snow (1964), Robinson et al. (2016) argue that the lack of interdisciplinary interaction between scientists and humanists is less about hostility and more about mutual ignorance.

These challenges underpin the current state of AHSS integration in IDR/TDR and demand further investigation. In this chapter, we approach them in a constructive manner, attempting to bridge some of the gaps in knowledge about IDR/TDR and understand the ways in which AHSS researchers can participate in such research on equal terms.

Factors Influencing AHSS Integration in Inter- and Transdisciplinary Research

Committing to IDR/TDR poses different risks and benefits for researchers. This can be understood in terms of a balance of transaction costs and collaborative benefits (Feng and Kirkley 2020). Researchers' motivation to participate in IDR/TDR is therefore highly dependent on their evaluation of these risks and rewards. These aspects are what we describe as 'factors' that hinder or help the integration of different bodies of knowledge in IDR/TDR.³ Increasing attention is being paid to understanding the factors driving collaborations among researchers (Vienni-Baptista et al. 2020a). Nevertheless, further research is still needed to explore their influence on the success of research collaborations in IDR/TDR (Feng and Kirkley 2020) and specifically AHSS integration, on which this section focuses. This section builds on a systematic literature review of academic and policy literatures (Vienni-Baptista 2019, 2020a).

Factors as Described in the Academic Literature

For AHSS in particular, many factors that hinder integration are associated with what C. P. Snow (1964) defined as the 'two cultures' split between the sciences and humanities in western society. It is important to add that Snow was only referring to one particular

practice in literary studies when talking about ‘the humanities’. However, the idea of ‘two cultures’ has become a metaphor for a larger set of cultural differences and many other authors have taken it as a basis for their own work (Furedi et al. 2009; Lee and Wallerstein 2004, to name a few). In such accounts and elsewhere, disciplines are treated uncritically as monolithic constructs (Klein 2005), resulting in a mismatch between the costs and benefits of interdisciplinary collaboration and those inherent to disciplinary research.

According to the academic literature review the SHAPE-ID project performed (Vienni-Baptista et al. 2019, 2020a), factors influencing IDR/TDR encompass three dimensions (Boix Mansilla et al. 2016): cognitive, emotional, and interactional. While notionally distinct, in practice these dimensions are deeply entangled, structuring each other. For instance, Lindvig and Hillersdal (2019) argue that unclear definitions of ID hinder research practices. Differences between ideal descriptions of interdisciplinary collaboration and the daily practices of IDR, together with how the incentives (policy agendas, funding calls and evaluation practices) are defined by management, having negative effects on local practices (Fitzgerald et al. 2014).

Factors affecting IDR/TDR are dynamic. They are changing aspects whose effects can vary across different phases of a project. They have negative or positive effects on research depending on the disciplines and fields of knowledge associated with the research process. Whether they hinder or help IDR and TDR or constitute vectors for success or failure is also associated with the type of disciplines that participate in the research project (Vienni-Baptista et al. 2019). The academic literature presents a plethora of factors that influence IDR/TDR, which we have organised under the labels in Table 2.1 (Vienni-Baptista et al. 2019, 2020a).

Table 2.1 Factors influencing the successor failure of IDR/TDR and AHSS integration

Academic tribalism	Dealing with complexity	Mutual ignorance on
Assumptions about other disciplines	Division of scientific labour	collaboration
Career path	Dynamics of power	Non-epistemological values
Change	Emotional	Objectivity/subjectivity
Collaboration	Epistemological	Ontological
Cognitive	Ethical	Qualities of inter- and
Communicative	Evaluation	transdisciplinary researchers
Community building/identity	Institutional	Societal
Current policies	Interactional	
	Motivations for IDR/TDR	

Factors as Described in the Policy Literature

In this section we discuss findings from our analysis of policy literature on IDR/TDR as it pertains to AHSS research. In this context, policy literature consists of sources such as guidance notes, position statements, press releases and a range of reports from learned and professional societies and research funders (Fletcher and Lyall 2020). While the policy literature on ID/TD is informed by research findings, its authors make different arguments from those we found in the academic literature about both the reasons for conducting such research and the factors that promote or hinder AHSS integration in IDR/TDR.

The policy literature in English describes collaborative research that crosses different disciplines as ‘interdisciplinary’. The term ‘transdisciplinary’ is used much less frequently,

usually to describe the specialised case of academic interdisciplinary research which also includes representatives of other groups outside academia, such as industry or members of the public. However, both terms are widely used but rarely defined in any kind of detail (Vienni-Baptista et al. 2019). This means that multiple definitions of ID and TD circulate, and it becomes difficult to maintain the distinction between them (INTREPID 2017: 4). In what follows we will discuss ID and TD together, since many of the barriers and drivers operate in a similar fashion across all kinds of collaborative research.

In the policy literature, stated rationales for IDR/TDR primarily involve the need either to solve complex societal issues or to promote innovation. This motivation is often expressed in terms of ‘grand challenges’ or more recently ‘mission-oriented’ research:

Interdisciplinary research projects are seen to be vital in addressing society’s grand challenges, highly complex (or wicked) problems that are beyond the boundaries of one discipline, or national strategic research priorities. (ESRC 2011: 3)

These arguments are not new (e.g., OECD 1972) but recently have been further developed to make the case for the benefits of the integration of AHSS research into IDR/TDR within the context of European funding. In our review of the policy literature (Fletcher and Lyall 2020), we found that many authors argue that the inclusion of AHSS research can both provide richer understandings of key topics (such as health, ageing and climate change) and improve the effectiveness of potential interventions:

The social sciences and humanities are indispensable to understanding and addressing contemporary global challenges and to grasping emerging opportunities. Every challenge the world faces has a human dimension, and no solution can be achieved without enlisting the support and efforts of individuals, communities and societies. The social sciences and humanities cultivate knowledge about human expression, behaviour and social life that is essential to understanding the human context of these challenges and crafting viable solutions to them. (AAU et al. 2014: 1)

These models of IDR/TDR prioritise external drivers – solving societal problems and driving innovation. In the last ten to fifteen years, demands for academic research to be more cost-effective or socially engaged have led to this very pragmatic approach to research funding which highlights the potential roles IDR/TDR can play in developing technological innovation and solving important policy issues, e.g., anti-microbial resistance and plastic pollution. However, there are also significant internal drivers to research, which may seek to broaden and deepen existing knowledge frameworks. Within IDR/TDR, research strategies can focus on practical goals or knowledge goals or a combination of the two (Lyall et al. 2011). In many AHSS disciplines, knowledge goals may be viewed as more intellectually motivating than practical goals. Moreover, narrowly pragmatic research questions (such as the ones highlighted in the policy literature on IDR/TDR) may typically be seen within AHSS as less challenging and less likely to further personal intellectual agendas. This (often unspoken) difference in research priorities is a key obstacle to AHSS integration in IDR/TDR.

Four Key Factors Influencing AHSS Integration in IDR/TDR

We looked for factors that might help as well as hinder IDR/TDR, but, in these documents, discussions largely focused on the conditions that hindered the successful conduct

of IDR/TDR. The following sections focus on the four factors most often identified in policy literature sources and based on those described in the academic literature (Table 2.1). In order of importance, these are: (1) lack of appropriate research funding; (2) the extended time required to conduct good quality IDR/TDR; (3) existing academic career structures; and (4) institutional structures (the organisation of universities and funding bodies).

Lack of Appropriate Research Funding

Lack of appropriate funding was the most commonly mentioned factor affecting the outcome of IDR/TDR. This was seen to have two main aspects. First, it was argued that there is insufficient funding specifically allocated or targeted towards IDR/TDR:

Existing efforts by funding organisations still fall short of providing adequate support for interdisciplinary and multidisciplinary work. National funding schemes still tend to be highly discipline-based and obtaining funding for emerging areas of research can be challenging. (British Academy 2013: 17)

Second, it was argued that there is a lack of funding for AHSS disciplines compared to the STEM disciplines with which they are expected to collaborate in IDR/TDR:⁴

A different kind of funding barrier related to the ability of the humanities and social sciences to contribute to joint projects with the science, technology, engineering and mathematics sector. Some of those consulted argued that the former receive much less funding, limiting their ability to make innovative and independent contributions and to ‘resist the undertow’ that the science sector generates. (ACOLA 2012: 22)

Other funding-related issues highlighted within the policy literature include inconsistency in funding priorities which makes long-term funding of certain projects hard to maintain (British Academy 2013: 2), and the inflexibility of funding schemes that do not make allowance for certain features of IDR/TDR, such as the longer times required (see below). Inter- and transdisciplinary research proposals are also thought less likely to be funded if they are evaluated using discipline-based criteria (Technopolis 2016: 11). This is related to the institutional structures of funding bodies (discussed further below); in particular, evaluations by monodisciplinary researchers who do not have sufficient expertise to identify the characteristics of good quality IDR/TDR (Strang and McLeish 2015). Several authors (e.g., INTREPID 2017; STIS 2011) have argued that the evaluation of IDR/TDR proposals should be undertaken as a rule by panels including those with expertise in ID/TD.

The Extended Timescale Required to Conduct Good-Quality IDR/TDR

Precisely because they cross disciplinary and institutional boundaries, inter- and transdisciplinary projects take longer to set up and to produce results. Fruitful collaborations require trust and good communication between the members of a research team and these working relationships take time to develop; they often involve meeting frequently and regularly to discuss the progress of research:

One of the most common hindrances to engage more in interdisciplinary research seems not the lack of will among researchers, but the pressures to produce outcomes in relatively short times versus the effort it takes to get acquainted with methods, viewpoints and concepts from other participating disciplines. It must be stressed that one should have enough time to build small interdisciplinary communities of researchers who truly can benefit from and supplement to each other's approaches to the common problems. (ALLEA 2013: 25)

However, IDR/TDR projects can often be larger and more complex than monodisciplinary projects. This complexity increases the length of time needed to conduct good-quality research:

Interdisciplinary research projects were seen to be bigger than disciplinary ones: 'they require more people doing more things, putting in more structures and so on in place to make it all work'. This was recognised to have cost implications, in one case referred to as 'frictional costs', brought about because time is needed for relationship building and 'everything goes a bit slower because you've got to talk to one another all the time, if you get beyond a certain point you may be talking about needing a project manager'. (DICE 2015: 61)

Existing Academic Career Structures

Within higher education systems, evaluation and peer-reviewed publication and undergraduate teaching are still largely structured around existing disciplines. Existing academic career structures can therefore negatively impact the opportunities to do IDR/TDR. With academic reward structures based on the assumption of a monodisciplinary career, it may be harder for individual academics to establish successful careers specialising in ID/TD.

Because of this, undertaking IDR/TDR is still seen as a 'risky career move' (Lyall et al. 2011; Lyall 2019), especially for early career researchers:

The emergence of good interdisciplinary work is currently impaired by the structure of incentives in academia: top academic journals remain disciplinary journals, which tend to motivate researchers to remain within a disciplinary framework, while interdisciplinary work or publications do not generate rewards within professional hierarchies. Universities largely remain organised around disciplines and deliver discipline-based curricula, and researchers, educated in such structures, unsurprisingly continue to recognise disciplines as their 'academic tribes'. (European Commission 2009: 34)

As this quote demonstrates, this factor is closely related to (and often reinforces) our final key factor, namely the effects of university and funding bodies' discipline-based administrative and financial structures.

Institutional Structures

Universities have traditionally been organised around disciplines. These structures include the physical organisation of space and administrative structures, such as departmental budgets. Organising research across different administrative systems tends to be problematic:

Institutional infrastructures often fail to support IDR projects: different departmental/faculty/college structures, and variable levels of support, hinder IDR, often at a practical level from budgetary issues to finding the right institutional expertise. (ESRC 2011: 4)

As university buildings have historically been organised by traditional, subject-based departments, there can also be issues around physical space. Lack of shared spaces reduces opportunities for researchers to meet those from other disciplines, which challenges projects and institutions to find appropriate spaces for inter- and transdisciplinary researchers.

As we have highlighted above, these four factors are closely interconnected. IDR/TDR requires more funding because it takes longer to produce good-quality results, partly because of the extra labour involved in working within existing and often inflexible institutional structures. Existing career structures and institutions are still usually based on a model of single-discipline research, which makes it more difficult to get IDR/TDR projects funded, publish the results, and therefore establish inter- and transdisciplinary careers.

Practising IDR/TDR: How to Build and Maintain a Balanced Research Team

As we discussed in the previous sections, since the practices of inter- and transdisciplinary projects are context-dependent and thus very diverse, we conducted a survey among researchers working in European IDR/TDR projects (see Spaapen et al. 2020). We asked researchers two main questions: (1) what are the difficulties they encounter building a good research team to conduct IDR/TDR, e.g., (a) how they balance the various interests and goals of different participants; and (b) what mechanisms they use to do this; and (2) what are the key factors that need to be considered when trying to integrate AHSS in larger IDR/TDR projects in Europe.

In doing so, we did not make a sharp distinction between inter- and transdisciplinary projects. First, as we explain above, because there is no single generally accepted definition for IDR/TDR (see Vienni-Baptista et al. 2019: 18). Second, projects that start as inter-disciplinary often evolve into what might be understood as transdisciplinary forms when stakeholders start participating (Spaapen et al. 2020). We were primarily interested in how researchers from different fields dealt with certain topics that might hinder or stimulate collaboration, including interdependence of participants, cooperative labour, and the orientation towards shared purposes (Castán Broto et al. 2009; Callard and Fitzgerald 2015; Klein 1996).

Here, we look at a limited number of cases from our survey in more detail,⁵ in particular focusing on how AH are integrated in the research process. We selected cases in which AHSS have engaged meaningfully in projects that researched a wide range of issues of both scientific and societal importance. We chose six research projects based on the following criteria: (1) AHSS disciplines in a leading role compared to STEMM disciplines; (2) variation in academic content and disciplines included; (3) issues of AHSS integration, hindrances and resolutions; and (4) the level of inter- and transdisciplinary expertise within the team. They concern topics that allow for a proactive participation and leadership of AHSS researchers, namely: (1) better workplace environments in the context of urban sustainability transitions; (2) energy transitions through societal transformation; (3) historical and cultural challenges of migration; (4) medical humanities approaches; (5) science communication, public engagement and participation; and

(6) eco-innovative, sustainable and safe seafood production and management.⁶ These projects provide examples of how researchers performing IDR/TDR perceive that different aspects either frustrate or stimulate collaboration between different disciplines, fields and non-academic partners. These examples are valuable as they emerge directly from research experiences developed in different European countries.

To interpret these cases further, we analyse them in light of the four major factors elaborated in the previous sections: (1) lack of appropriate research funding; (2) the extended time required to conduct good-quality IDR/TDR; (3) existing academic career structures; and (4) institutional structures.

Lack of Appropriate Research Funding

Overall, lack of funding is one of the factors most commonly mentioned in the survey we conducted as well as in the policy literature. There are nuances however, since this is less of a hindrance at the level of the European Commission than it is at the country and institutional levels. The most striking figure at the European level is that while in Framework Programme 7, thirty-six projects described as interdisciplinary and four described as transdisciplinary were funded. In Horizon 2020 this increased to 2,050 projects described as interdisciplinary and 167 described as transdisciplinary⁷ (Spaapen et al. 2020). However, as noted above, AHSS partners, especially partners from the arts and humanities, do not often play a leading role in these projects, and monitoring efforts (Kania et al. 2019) show that even where AHSS participation is increasing, this is heavily weighted towards a number of social sciences disciplines such as economics, political science/public administration and business/marketing, with little substantial engagement from the arts or humanities.

At the national level, funding in most countries still mainly favours discipline-based research even though both research councils and universities seem to be increasingly open to IDR/TDR – for example in the Netherlands with top sector policy (since 2012), THE National Research Agenda (since 2018) and various institutional programmes.⁸ Scattered across Europe, universities can be found to put substantial effort in developing inter- and transdisciplinary programmes, for instance in Ireland, the UK, Germany, Austria, Spain, and more. However, in many institutions, attention to ID/TD is still marginal, as is shown in this quote from one of our cases:

My university has an annual award for inter- and transdisciplinary projects but as far as I know not many candidates are applying for it. (SHAPE-ID Survey 17, 2019)

A related issue that emerged from our cases is that according to some respondents, policy makers at different levels (institutional, national, EU) tend to favour research that results in practical advice, which they expect to come more from STEMM than from AHSS fields. These respondents see this as a disadvantage for AHSS because a lot of their research is oriented to problems and challenges that involve human interaction (behaviour, ideas, expressions, attitudes) and the different choices that can be made to improve situations. To address questions in that area, practical solutions can be offered sometimes, but more often research results in broader analysis and offers different options for policy makers on how to proceed.

Researchers also seem to take this view in their recommendations, at least partially, as the following advice to funders and policy makers illustrates:

Be problem or solution oriented from the beginning and ask each discipline to contribute to this task in their own language and with their specific expertise and theoretical approaches. Once the suggestions are on the table, one can start to make sure that each participating individual and each group shares the same understanding and understand[s] the differences in approaches. (SHAPE-ID Survey 8, 2019)

As a step towards overcoming these difficulties, we consider that funding structures and incentives should permit the allocation of resources within IDR/TDR projects to enable time and space for aligning the different inter- and transdisciplinary perspectives (AHSS, STEMM, societal participants), which would enlarge the development of a common understanding of the specific societal challenge one is addressing. They also should adopt methodological approaches that include evaluators with solid experience in IDR/TDR.

Extended Time Required to Conduct Good-Quality IDR/TDR

What becomes clear from all data we gathered, both from the literature and the survey, is the extra time needed to organise IDR/TDR compared to monodisciplinary projects. Most successful inter- and transdisciplinary projects had a history before the actual project started, in which people from different disciplines had the time to get to know each other, learn about their interests in the issues at hand, their different perspectives and disciplinary specificities.

While there are many ways IDR/TDR projects get started – from an individual initiative, from long-standing informal relations, or from building a new coalition from scratch – most survey respondents indicated that it is a complex process to respond to a European call. Obstacles range from finding the right partners, negotiating with their institution and those of other potential partners inside and outside academia, to potential partners leaving the project for whatever reason, or others wanting to step in. Good support from institutions is essential but is not always available.

The following quote shows that especially for major societal challenges an extended time frame is essential to build fruitful collaboration among different stakeholders. This requires an extensive effort to consolidate a team that represents the multiple dimensions of a problem:

Supplying the European seafood industry with different innovative solutions validated from different angles (e.g. technical, social, economic and environmental) is a challenging task, and requires a transdisciplinary team of professionals among which chemists, biotechnologists, modellers, ecologists, aquatic physiologists, social scientists, economists, fishers, food specialists, fish/shellfish farmers and seafood processors, working in conjunction with managers and consumers. (SHAPE-ID Survey 39, 2019)

One of our survey respondents advised other researchers to give themselves ‘at least a year to [allow] people from different disciplines and different domains get familiar with each other’ (SHAPE-ID Survey 8, 2019). Some thought even more time was necessary.

To better support IDR/TDR, funding programmes should include extra time and money for participants in inter- and transdisciplinary projects to get to know each other and formulate a research plan that does justice to their different interests.

Existing Academic Career Structures

This factor is clearly narrowly related to institutional conditions (our fourth factor) since they both represent to a different extent disciplinary norms and values that have dominated the academic world for a long time (Hammarfelt and de Rijcke 2015). Disciplines have been and still are a major point of orientation for academics, whether they participate in multi- or monodisciplinary projects.

To further their careers, researchers – early career researchers in particular – look at others in their field and communicate with them through publication in journals, preferably those with high impact factors. Traditionally, this is the way to gain a reputation and raise their chances of getting funded, or even employed. For institutions to change the characteristics of the current reward systems is risky since they feel the pressure of international competition. But in the last few decades policy pressure is mounting on institutions to look at different reward structures and make room for research that is less oriented towards disciplines and more towards wider issues. That puts them at a crossroads between the pressures of international scientific and institutional competition and those of societal demands (van den Akker and Spaapen 2017). Most universities are trying to find a balance between the two pressures but find it difficult to make a turn to IDR/TDR, mainly because they fear incentives to conduct IDR/TDR will mean that it remains a ‘risky career move’ (Lyall 2019), especially for early career researchers. The following quote is telling about such attitudes and experiences:

[even though] many strategical documents emphasise the need [for] IDR/TDR research [...] those of us that want to work in this way still have to fight against many barriers and difficulties. (SHAPE-ID Survey 17, 2019)

Nevertheless, most of our survey respondents urged their institutions to invest more in IDR/TDR to enable them to address the major challenges in society, and to take some necessary steps to support IDR/TDR careers, especially for early career researchers. Instead of marginal programmes to stimulate IDR/TDR, such programmes should be moved more to the centre of academic life.

Institutional Structures

Although there are parts of higher education institutions that have deliberately bid goodbye to disciplinary modes, most universities are still organised through disciplinary structures. This means that it is always more difficult to set up IDR/TDR than monodisciplinary projects. It is not surprising that governmental and institutional policies are often mentioned as major hindrances in developing IDR/TDR. One of our survey respondents expressed this very clearly:

All major interdisciplinary projects should be accompanied by internal restructuring of HEIs. Regrettably, this happens only very seldom. (SHAPE-ID Survey 9, 2019)

Survey respondents consider that inter- and transdisciplinary proposals are also less likely to be funded since there is no established evaluation structure including people with experience in IDR/TDR, or appropriate criteria and indicators, whether quantitative or qualitative.

It would help if universities would establish an independent evaluation structure that can address questions of IDR/TDR; meaning, independent of the common evaluation structures that are primarily oriented towards publications in international journals and dominated by bibliometrics.

Conclusions

As we have shown, IDR and TDR are widely used terms in research policy and have a long history in different fields of research. Both are relevant in the European Framework Programmes which are fostering collaborative research between academic and non-academic stakeholders in order to tackle societal challenges. Nevertheless, despite being in high demand, the practice of IDR and TDR is still not well understood. The question we are particularly interested in is why the integration of AHSS into larger inter- and transdisciplinary projects remains so difficult. This question is all the more pressing after the COVID-19 pandemic, which forces countries all over the world to rethink globalisation and their role in it, a process where AHSS knowledge is vital.

Using a range of empirical data, we provide a baseline of information that can be used to overcome commonly experienced obstacles to IDR/TDR for the AHSS. From this analysis, three major points and recommendations to support AHSS integration in IDR/TDR emerged (based on Fletcher and Lyall 2020):

Development of call texts and appropriate evaluation processes for IDR/TDR: The aim of inter- and transdisciplinary research calls should be to attract proposals in which AHSS researchers are equal partners with those from other disciplines. This can be done by making explicit that AHSS input into funded projects is welcome and that interdisciplinary and transdisciplinary proposals in which AHSS-relevant questions are the driving force are eligible and encouraged. Without specific provisions regarding the scientific framing of the calls, AHSS integration is often minimal, and this is particularly a problem for the arts and humanities. Funding calls asking for innovation and creativity must encourage more ‘disruptive’ research on the human and social factors in all global challenges. There is also a strong consensus between researchers and policy makers on the need to modify peer-review procedures to ensure they are better suited for IDR/TDR purposes and this is a key area where funders could provide better leadership.

Capacity building and institutional incentives: In order to stimulate better integration, successful interdisciplinary and intersectoral projects should be showcased and rewarded. This could take different forms, such as awarding individual prizes both for projects that have successfully integrated AHSS and STEMM researcher pairings, and for AHSS communities that have ‘reimagined’ their research or roles through collaboration. We should also improve our readiness to learn from fields with experience of interdisciplinary research and teaching, such as science and technology studies, classics and archaeology (Allmendinger et al. 2014: 4). Adequate national support for AHSS communities is also essential. We need to recognise that many arts and humanities and some social sciences disciplines start from a lower knowledge base regarding collaborative research (Mayer et al. 2013). In the context of the EC’s SSH integration monitoring efforts, concern has been raised about the relative absence of humanities disciplines, which may provide a long-term perspective on societal problems. Efforts must be made to increase contributions from disciplines that are currently underrepresented.

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sitates interdisciplinary training and education, and not simply focused on the AHSS disciplines. In order to strengthen a culture of IDR/TDR, such training should link interdisciplinary research and education and provide early educational and training opportunities at all levels (undergraduates, graduate students and postdoctoral scholars), faculty team-teaching credit, IDR management training including designing and reviewing proposals for funding and evaluating the impact of interdisciplinary research (e.g., EURAB 2004).

Perhaps the biggest challenge for AHSS disciplines is to fight prejudice and misconceptions, among both researchers and policy makers (Spaapen et al. 2020). Our findings show that the subordinate roles and functions commonly assigned to AHSS disciplines discourage their greater involvement with STEMM disciplines in IDR/TDR. Finding a way out of this and turning a problem into an opportunity has two aspects. On the one hand, AHSS researchers have a responsibility to show more willingness to collaborate with other disciplines. On the other hand, proactive funders and policy makers also have a responsibility to re-evaluate and revise their practices to better support AHSS integration in IDR/TDR (Vienni-Baptista et al. 2020b).

Inter- and transdisciplinarity are neither the only nor the best future for AHSS researchers, but they do constitute an important and rewarding pathway with the potential for both scholarly and societal impact. If we really want to support the participation of AHSS researchers in collaborative research addressing and framing the complex socio-technical problems the world is facing today, we need better pathways to IDR/TDR for researchers in these disciplines. To achieve this, change is needed urgently in research institutions, funding mechanisms and policy measures. These recommendations have been made many times before and our research has confirmed some of the most relevant and pressing recommendations that can be taken locally at the institutional level as well as by national and international policy makers and funders. The moment has finally come to implement them.

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Notes

1. This chapter is based on research undertaken by the project 'Shaping Interdisciplinary Practices in Europe' (SHAPE-ID), which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 822705. A substantial part of the results of four project deliverables is quoted here and references are included. See <https://www.shapeid.eu> for more details.
2. Science, technology, engineering, mathematics and medicine.
3. The term 'factor' defines a condition that actively contributes to the production of a situation, namely an agent (Vienni Baptista et al. 2019). As our study shows, the term is associated with

condition, challenge, principle, incentive and guide (based on S. Hoffmann 2019). We use it as an umbrella term that helps us to identify and systematise the conditions under which IDR/TDR are performed.

4. This was also confirmed by the empirical data systematised from the CORDIS database, since we found relatively few funded research projects integrating AHSS into IDR/TDR. We found 247 projects where AHSS disciplines played a leading role. We found a total of 2,050 interdisciplinary and 167 transdisciplinary projects, which means that AHSS disciplines played a leading role in around 11 per cent of the total number of inter- and transdisciplinary projects.
5. Sources for the selection of projects to survey were: the EU H2020 projects database (CORDIS), accessed in September 2019; the DG-RI 4th monitoring report 'Integration of Social Sciences and Humanities in Horizon 2020' (Kania et al. 2019); the LERU policy brief 'SSH and Interdisciplinary Research, a Showcase of Excellent Research Projects from LERU Universities' (LERU 2014); and the LERU position paper 'Interdisciplinarity and the 21st-Century Research-intensive University' (LERU 2016).
6. We do not include the names of these projects as all survey participants have been anonymised.
7. We used *interdisc** and *transdisc** as search keys for both databases in CORDIS, which we accessed in July 2019.
8. In the Netherlands inter- and transdisciplinary research programmes were developed at the national level as early as 2012 with the top sector policy, forcing the National Research Council NWO to redirect half of its budget from basic research to transdisciplinary projects between academia, industry and society (<https://www.topsectoren.nl/>). Later the so-called National Research Agenda followed, which aimed at connecting questions felt to be important in society with academic research (<https://wetenschapsagenda.nl/>).

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