

# ***Evaluating Interdisciplinary Research: a practical guide***

**Professor Veronica Strang**

Executive Director, Institute of Advanced Study, Professor of Anthropology

**Professor Tom McLeish FRS**

former Pro-Vice-Chancellor-Research, Professor of Physics



*Prebends Bridge, Durham.*

---



*Sanctuary knocker, Durham Cathedral.*

## **CONTENTS**

Summary	3
Introduction	4
Section 1. Overview	5
Section 2. Foundational Principles for Interdisciplinary Research and Evaluation	6
Section 3. Assessing Interdisciplinary Funding Proposals	8
Section 4. Assessing Interdisciplinary Outputs	12
Section 5. Assisting Interdisciplinary Careers	13
Section 6. Assessing Interdisciplinary Institutes and Centres	15
Section 7. Assessing IDR in National Performance Exercises	16
Conclusion	17
References and Related Literature	18

## **Acknowledgements**

A number of experts in interdisciplinary research, from UK and EU funding organisations and from a number of British Universities, kindly took the time to participate in the workshop through which we initiated this project in March 2015. Some of the participants – and other helpful souls – also provided thoughtful feedback on early drafts of the report. We would like to thank all of them warmly for their generosity in sharing their ideas and views with us. We should note that the material in this report represents the contributors' personal opinions, not the official policies of their organisations. However, there was broad consensus and we hope all will find it useful.

We would also like to thank Linda Crowe, the IAS Administrator, for her invaluable organisational support throughout this project.

## **Contributors**

Contributors to the project include:

Professor Rob Barton, Co-Director, Institute of Advanced Study (Social Sciences and Health), Durham University

Dr Anne-Marie Coriat, Medical Research Council and Chair of RCUK Research Group

Mr Alan Cross, Deputy Head of Unit (Horizon 2020 Policy), European Research Council

Dr Justine Daniels, Head of Research Development, University of Sheffield

Professor Barbara Graziosi, Co-Director, Institute of Advanced Study (Arts and Humanities), Durham University

Dr Steven Hill, Head of the Research Policy, Higher Education Funding Council for England

Professor Julian Hiscox, Chair in Infection and Global Health, University of Liverpool

Professor David Hogg, Pro-Vice-Chancellor for Research and Innovation, University of Leeds

Professor Mark Llewellyn, Director of Research, Arts and Humanities Research Council

Dr Richard Malham, Policy Manager (Careers), the Academy of Medical Sciences

Professor Tom McLeish, Department of Physics, Durham University

Dr Fiona Polack, Department of Computer Science, University of York

Dr Beverley Sherbon, Evaluation Programme Manager, Medical Research Council

Professor Veronica Strang, Executive Director, Institute of Advanced Study, Durham University

Professor Martin Ward, Co-Director, Institute of Advanced Study (Sciences), Durham University

Professor Claire Warwick, Pro Vice Chancellor Research, Durham University

Professor Roger Whitaker, Dean for Research for the College of Physical Sciences and Engineering, Cardiff University

Professor Rebecca Hoyle, Department of Applied Mathematics, Southampton University

Professor Catherine Lyall, School of Social and Political Science, Edinburgh University

## **Valuing and Evaluating Interdisciplinary Research**

### **Summary**

This report employs the following definition of Interdisciplinary Research throughout:

*Interdisciplinary research (IDR) is a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or field of research practice. (Land 2011: 7, citing Giddens 1991).*

The report is concerned with the evaluation of interdisciplinarity at each stage in the research process: in research development, in funding proposals, and in research projects and outputs. It considers issues of evaluation at the level of individuals, teams, institutions and national strategy. Its summary findings are:

- Interdisciplinary research (IDR) is foundational rather than merely additive to academic practice and can contribute usefully to discipline-based research as well. Its value lies in this potential as much as in its capacity to address complex problems and to integrate research creatively.
- Evaluating IDR encounters difficulties when approaches based in single disciplines are applied to it. It requires fresh criteria, developed within an interdisciplinary context.
- Successful IDR plans and supports research practices and outputs greater than the sum of their constituent disciplinary parts.
- Leadership and participation in IDR needs personal development and recognition of 'academic hospitality', as well as the development of new standards of credit in HEIs.
- IDR benefits from structures within HEIs that provide training and resources. Links to external partnerships can complement institutional and disciplinary support.
- Effective evaluation of IDR at individual, project and institutional levels requires the judgement of researchers who are experienced in high quality IDR.
- There is a need to expand the range of outlets for academic publication that value and recognise high quality IDR.
- National research evaluations now recognise and accommodate IDR, and have demonstrated its essential role in relation to impact. Future such exercises would benefit from additional measures to evaluate IDR.

The guidelines are aimed at a range of audiences: research funding organisations and their advisors (nationally and internationally); journal editors; peer reviewers assessing work for book publishers, journals and other media; research users (for example policy makers); reviewers in University internal programmes (for example promotions committees).

## Introduction

What constitutes high quality interdisciplinary research? Funding bodies, government bodies, and leading researchers in many disciplines recognise the significance of interdisciplinarity in the production of innovative research outcomes, and most particularly in research that addresses complex issues requiring multiple disciplinary perspectives. Funding councils, nationally and internationally, have increasingly encouraged interdisciplinary research (IDR), and there is growing pressure to provide advanced training in this area in post-graduate teaching. Yet, across the academy, within research funders, and more widely, there is little clear consensus about how to undertake objective evaluations of this work (National Academies of Science 2010:166 and 2015, Frodeman *et al* 2012:309).

The approaches employed by funding organisations are diverse, and there is a potential gap between discipline-based models of peer review, and the methods of evaluation addressing the particular characteristics of IDR and its capacities to provide additional value to the research process. Interdisciplinary funding proposals sent to single discipline specialists with little cross-disciplinary experience can be disadvantaged, and there are few established criteria defining what constitutes a successful IDR proposal. Similar problems attend the assessment of research outputs by many publishers and journals, and resurface, in turn, in research quality assessments, whether these are of individuals, interdisciplinary units within Universities or Universities themselves.

Yet there are many examples of good practice in IDR in UK Universities, and these have generated some useful knowledge about how to evaluate interdisciplinary endeavours. The research councils themselves have begun to make considerable efforts to compose processes and methods for this purpose. The MRC and ESRC have made an initial foray into this area in the context of PhD programmes;<sup>1</sup> the British Academy, the Academy of Medical Sciences<sup>2</sup> and the European Commission<sup>3</sup> are also considering how to address the evaluation of interdisciplinary work. So it seems that this project is timely.

Observing the need to bring this emergent expertise together, the Institute of Advanced Study (IAS) at Durham University, in March 2015, organised a collaborative workshop with representatives of the UK and European funding councils, the Royal Society and the British Academy, along with some Russell Group Pro Vice-Chancellors (Research) to compare their methods of assessment and the criteria that they apply, and to discuss how best to address the challenges of evaluating IDR. The following guidelines are the product of this workshop and subsequent collaborative discussions, and it is hoped that it will contribute to the wider conversations currently taking place about the valorisation and evaluation of interdisciplinary research.

---

<sup>1</sup> [http://www.esrc.ac.uk/\\_images/Evaluation-of-ESRC-MRC-interdisciplinary-studentship-and-pdf-scheme\\_tcm8-24165.pdf](http://www.esrc.ac.uk/_images/Evaluation-of-ESRC-MRC-interdisciplinary-studentship-and-pdf-scheme_tcm8-24165.pdf)

<sup>2</sup> <http://www.acmedsci.ac.uk/policy/policy-projects/team-science/>

<sup>3</sup> See Science Europe's Life, Environmental and Geo Sciences Scientific Committee on 'Career Paths in Multidisciplinary Research': <http://www.scienceurope.org/downloads>



*Durham University Institute of Advanced Study.*

## **Section 1. Overview**

The criteria for evaluating interdisciplinary research are not fundamentally different from those applied to disciplinary-based work, but the work reported here found that the process requires an additional dimension that engages analytically with the complex challenges of diverse collaborative exercises, and seeks to understand whether (and how) these have produced outcomes that are genuinely ‘more than the sum of their parts’. It highlighted the need to ensure recognition and credit for the diverse contributions people make to IDR including, for example, vital work in facilitating collaboration. It also suggested that articulating the criteria for valuing and evaluating interdisciplinary research may provide a useful opportunity for fresh thinking about more disciplinary-oriented processes of review.

We suggest that interdisciplinary research is best considered not as a form of superstructure built onto disciplinary specialisms – a way of knitting these together to tackle complex problems – but as the foundation of the disciplines: the ground from which they have grown and flourished. As Marilyn Strathern notes, disciplines can differentiate themselves and ‘multiply their positions... precisely because they have common origins’ (Strathern 2008: 18). Or, with a different metaphor to move from origins to the present, Nicholas Lash writes: ‘Notwithstanding the accelerated fragments of specialised academic activities, we trample in each other’s territory, sing each other’s songs, whether we want to or not’ (1996).

Focusing on the underlying connections in the academy draws attention to the reality that a great deal of interdisciplinary work is done by individual researchers who choose to go beyond their disciplinary boundaries to draw on other areas. Though the emphasis of these guidelines is on collaborative IDR, many of the questions and recommendations are equally applicable to the evaluation of interdisciplinary research by individuals.

A view of interdisciplinarity as foundational to the academy underlines its capacity to feed into and reintegrate disciplinary thinking, sometimes with transformational effects (McLeish and Strang 2014). In this sense, interdisciplinarity may be said not only to enhance disciplinary strengths but also to provide a cosmopolitan grasp of ‘other’ knowledges. The extension of knowledge beyond disciplinary boundaries extends the capacity of research to address much broader kinds of questions, and in particular to tackle larger, more intractable problems. For example, in the last national research evaluation exercise in Britain (the



Research Excellence Framework (REF)), nearly two-thirds of the case studies indicated a high degree of interdisciplinarity in the research underpinning the impact case studies.

Interdisciplinarity therefore has multiple forms of value: it serves to reunite the academy and strengthen its collective intellectual foundations; it has the capacity to address complex issues; and it can expand the impact of research. To fulfil these potentials, though, there is a need for a clear vision of the underlying principles that are required to make interdisciplinarity work; what it requires in terms of structural and cultural support; and of course robust and coherent methods of evaluating the quality of research proposals and outcomes.

## **Section 2. Foundational Principles for Interdisciplinary Research and Evaluation**

Drawing on the experience of its participants in carrying out, leading and supporting IDR, the workshop hosted by the IAS in Durham produced a list of underlying principles that it was agreed would be expected to characterise high-quality research. Articulating these helped to generate the questions posed in each of the four categories of evaluation below.

With the recognition that IDR represents a foundation, rather than a superstructure, in the organisation of knowledge (for a historical perspective see Weingart in Frodeman *et al* 2012), it is evident that:

- Principles that guide good interdisciplinary research can also serve as guidelines for good disciplinary research.
- Approaches to evaluation that work well for IDR may usefully inform evaluations of single disciplinary research.

This does not work reciprocally. When the starting point for evaluation is that of single discipline research, attempts to add special 'bolt-on' criteria for IDR can be awkward. But if a holistic, interdisciplinary, perspective is assumed from the beginning, then there is no point at which special criteria need to be inserted into an evaluatory scheme. Starting with a more robust evaluation scheme both addresses IDR and has the potential for strengthening the evaluation of single discipline research. So all research projects, programmes and their outputs should reflect and demonstrate the following principles:

### **2.1 More than a sum of its parts**

The research must show that it has created or synthesised new insights, knowledge, theory or practice from the elements of which it is composed. It is not sufficient simply to put different narratives, disciplines, or observations into parallel activities, even if there is communication between these. The ingredients need to 'react' and combine to contribute to the research results. They also need to be sufficiently comprehensive of the necessary knowledge and expertise. Even in more ostensibly 'linear' IDR projects, such as those taking fundamental research into clinical outcomes, the contributions of disciplines need to engage reflexively, if all are to benefit intellectually from the innovation.

## 2.2 Leadership structure

In a team project, the leadership structure should be characterised by inclusivity, transparency of roles and an equality of contributing disciplines in terms of voice and status. It should provide for the facilitation of interdisciplinary dialogue, and to bring the strands together into an emergent whole.

## 2.3 Resources and time

Both the material and temporal requirements of each of the contributing aspects of the research need to be met realistically. It is also essential to plan sufficient time (and thus resources) for dialogue, co-learning and integration between the contributing disciplines or for single interdisciplinary researchers to encompass plural fields. This should be actively facilitated if necessary.

## 2.4 Recursive benefit

It should be clear how each of the contributing parts or disciplines in a project will benefit from the effort of integration into the whole. In some cases this can be transformational.

## 2.5 'Hospitality'

It should be evident that the project welcomes disciplinary members and their contributions to the research on equal terms avoiding, for example, explicit or implicit disciplinary hierarchies. We define this as interdisciplinary 'hospitality', manifested in inclusive activities and in open exchanges of knowledge between project members. Intellectual cosmopolitanism should be encouraged through mutual learning and teaching. A similarly generous intellectual welcome may need to be extended to partners from outside the academy.

## 2.6 Social cohesion

There should be some indication that the project team has thought about building communication, mutual understanding and trust. Institutional structures that support IDR may assist here, as well as inter-institutional networks.

## 2.7 Scales

The different scales – spatial, temporal and conceptual – in a project need to be identified and related. This is true of models as well as objects of study. Appropriate information flow between scales should be identified and supported.

## 2.8 Data and objects of study

The data and objects of study accessed and generated by the project, both quantitative and qualitative, need to be identified and brought together coherently. Structures for translating between them need to be in place.

## 2.9 Training and development

The project should recognise where there are specific opportunities and needs for development, for example training in shared methodologies, or introductions to new areas of knowledge.



## 2.10 Openness and flexibility

A good IDR project needs to demonstrate awareness that new knowledge may generate new research questions or challenges, and should contain plans for such eventualities.

## 2.11. 'Service' disciplines

There may be instances when it is appropriate for particular disciplines or team members simply to provide services (such as data production) rather than being directly involved in the research, but it should be evident that this is a considered choice, rather than the product of any assumptions about disciplinary roles.

There are also practices and structures to avoid within research projects, and especially IDR projects, in particular:

- Generating hierarchies of disciplines or members contributing to the research.
- Non-convergent 'parallel' progress of project components or contributing disciplines.
- Exclusive framing of research questions or the over-dominance of a single perspective.
- Over-dominant or determining project leadership.
- Tokenism or 'non-inclusive inclusion' of a component or discipline.

## Section 3. Assessing Interdisciplinary Funding Proposals

The articulation of some key foundational principles for IDR allows us to formulate a series of questions probing how these are manifested in the overall approach of a research project, and in its various components. While not all may be applicable to every IDR research project, their consideration will assist in clarifying the overall shape and intent of proposals and evaluating their quality.

### 3.1 Overall approach

- a) Is the proposal clearly a product of genuine collaborative development?
- b) Does the proposal articulate a clear concept of added value? Does it present an explicit view of how it will gain 'more than the sum of its parts' from the interdisciplinary collaboration?
- c) Does it contain an explicit statement about underlying principles for collaboration and/or the 'ground rules' for the project?
- d) Is it evident that the proponents have formed a workable grouping of disciplines/people?
- e) Is the proposal formulated in a way that integrates aims and objectives, theory, data collection and analysis, and outputs?
- f) Does the host institution have in place structures and mechanisms appropriate for supporting interdisciplinary research?
- g) Does the proposal take into account the need to disrupt inward disciplinary thinking?

- h) Is there evidence of location in larger intellectual networks (eg. international collaborators) and does the project support interaction with these?
- i) Are there other funders/partners indicative of diverse disciplinary or societal support for the project?
- j) Are there international partners suggesting that the research may have interest beyond national boundaries?

### 3.2 Project development

- a) Is there a common goal? Does the project have high level/broader questions of common interest across the disciplinary areas involved? Is this reflected in the summary and in the more in-depth narratives of the proposal?
- b) Have appropriate participating disciplinary areas been included? Are there possible gains from including other areas? Has an open call been made, or some other mechanism used to explore wider possibilities? Have all disciplinary participants been included realistically (rather than tokenistically)?
- c) Does the formulation of research questions suggest more than a single or overriding disciplinary perspective? Is there evidence of intellectual inclusivity and 'hospitality' in the project design?
- d) Is disciplinary equality evident in a collective development of the research questions, aims and objectives? Are the research questions situated in wider national and international debates?
- e) What are the 'objects of study' and are they the purview of all of the disciplinary areas represented?
- f) Does the project traverse diverse scales of analysis successfully at each stage?
- g) As well as addressing shared issues, do the research questions have the potential for useful – and possibly transformational – recursive feedback into disciplinary thinking?
- h) Does the proposal contain a clear vision of interdisciplinary aims and objectives, while also retaining some openness and flexibility? Are there plans for maintaining continuity and progression in the research over time?

### 3.3 Structure and leadership of IDR teams

- a) Do the proponents – or at least some contributors to the project – have a track record in leading collaborative and ideally interdisciplinary research? If not, have they described how they will access best practice in managing IDR? How will their leadership experience and vision be communicated?
- b) Is the intellectual leadership and its disciplinary expertise appropriate to the needs of the project (rather than being defined by status or access to resources)?
- c) What arrangements are in place to ensure that divisions of intellectual and fiscal responsibilities are workable? (For example, there might be some separation between overall project management/ fiscal accountability and intellectual leadership).
- d) Does the project structure demonstrate the application of principles of disciplinary equality and the avoidance of assumed hierarchies? Is this apparent, for example, in the leadership of sub-themes? In the allocation of resources?

- e) Are the workstreams themselves structured in an interdisciplinary way, or do they merely constitute parallel disciplinary streams?
- f) Has thought been given to an appropriate demographic balance of participants (for example, senior and junior members, post-docs, PhD studentships)?
- g) Are the roles within the project – and their benefits to the participants – clearly explained? For example, if some disciplinary areas have only a ‘service’ role in providing technical support, basic analysis or facilitation, is this transparent? And is does such a role make the most of their potential contribution?
- h) Have the participants’ respective responsibilities in the production of outputs been clearly laid out, and are these plans reflective of principles of equality between disciplines?
- i) Is there evidence that credit for work has been negotiated in a fair and transparent manner? Is this presented in a way amenable to public research data reporting instruments (e.g. Researchfish etc.)?
- j) Does the proposal include mechanisms for keeping the project on track over the whole period of research?

### 3.4 Communication and integration

- a) Does the project have a realistic allocation of time and resource for enabling the epistemological exchange necessary to enable collective analysis?
- b) How will knowledge exchange between participants be facilitated (including with external partners)? Is there a need for a facilitator to support this, or do project leaders have sufficient time/resource to provide such facilitation?
- c) Is there provision for training to support interdisciplinary exchanges of knowledge, for example in relation to theory or method (this may be for project participants or more particularly for students)?
- d) Does the proposal suggest recognition of the need for supporting social relationships and effective collaborative networks across disciplinary boundaries both within and beyond the institutional location of the research?
- e) What provision has been made for wider community engagement, if this is appropriate?

### 3.5 Theory and methods

- a) Is the theoretical background, literature etc. interdisciplinary – is there evidence of egalitarian openness and ‘hospitality’ in the formulation of theory and in the framing of research questions?
- b) Has the theoretical design of the project recognised the different scales of the research questions, and the information flow between them?
- c) Is there provision for theoretical contribution over and above disciplinary specialisms?
- d) Is there potential for the theoretical contributions of the project to illuminate specific disciplinary areas as well as providing a ‘more than the sum of the parts’ outcome?
- e) Does the project employ integrative methods (alongside those necessary for each disciplinary contribution)?

- f) Is there provision for training in the employment of shared methods of data collection and analysis?

### 3.6 Data, material and analysis

- a) Have the proponents recognised and encompassed diversity in forms of data/material in the component disciplinary areas?
- b) Does the project design demonstrate effective ways of integrating diverse data/material and differences in scale?
- c) Are the data/materials that are not restricted for ethical or commercial purposes available openly?
- d) Are the proposed analytic methods integrative of diverse disciplinary data/materials?
- e) Has effective provision been made for collaborative analysis of datasets, etc.?

### 3.7 Outputs

- a) Are the proposed joint outputs inclusive of all of the disciplinary areas and workstreams actively involved in the project?
- b) Are there suitably diverse forms of output to enable contributions to academic fields as well as public impact?
- c) Are diverse forms of output treated equally (for example, are qualitative outputs fully included as more than just 'background')?
- d) Is there a suitable balance between individual and joint outputs, and do the outputs, collectively, reflect the interdisciplinary aims of the project?
- e) Is there a plan for joint interdisciplinary outputs?
- f) Will support also be given to outputs aimed to feed back into specific disciplinary areas?
- g) Is the plan for outputs 'hospitable' in ensuring that these are accessible to a range of disciplinary areas?
- h) Are at least some of the outputs appropriate for the engagement of other audiences? Are non-academic readers intentionally included in the knowledge exchange community?

### 3.8 Timetable

- a) Is the project timetable sufficient to support a period of integrative knowledge exchange?
- b) Have the different temporal needs of disciplines been realistically accommodated in each stage of the project (for example, in time needed for data collection and analysis, or in the production of outputs)?
- c) Do the proposed milestones for events and outputs reflect the realities of supporting interdisciplinary collaboration? Are there appropriate short and long term milestones?
- d) Has consideration been given to risk management/the potential for alternative research questions and challenges to arise as the research develops?

## Section 4. Assessing Interdisciplinary Outputs

There are potential gains and risks for researchers in committing time to producing interdisciplinary outputs. Obviously – in presenting new and exciting ideas gained from collaborative research – these have considerable potential to enhance careers and carry research findings to wider audiences. However, individual researchers also express concern about maintaining disciplinary identity and successful career paths. They note practical difficulties in finding appropriate publishers and journals; getting submissions reviewed by peers experienced in interdisciplinarity (and able to discern its particular merits); and issues around career progression in relation to institutional and national evaluations of performance.

The intrinsic value of IDR is becoming increasingly apparent, not only as an essential requirement in addressing complex global challenges, but also in maintaining a strong central foundation in the academy. There is thus a need for interdisciplinary research to be re-valued by the academy and its institutions, and for more consistent peer review of interdisciplinary outcomes.

What constitutes a high quality interdisciplinary publication or output? Individual examples may require evaluation against their own more restrictive criteria (such as an account of the novel applicability of a single technique from one discipline to the questions of another). However, some general evaluative questions, reflective of the foundational principles and questions relating to proposals above, and supporting a vision of the wider benefits of IDR include:

### 4.1 Content

- a) Does the output constitute ‘more than the sum of’ the specific disciplinary inputs?
- b) Are the research questions and/or hypotheses clearly a new product of an interdisciplinary collaboration?
- c) Is the background information indicative of an interdisciplinary perspective?
- d) Does the output draw, in a sufficiently balanced manner, on literature/material from the various disciplines involved (for example via citations).

### 4.2 Methodology

- a) Do the theoretical discussions/contributions reflect interdisciplinary exchange and synthesis of knowledge?
- b) Does the output draw on data/materials, methods and forms of analysis of the various disciplines involved?
- c) Does the output create novelty by the integration of established knowledge within disciplines? (and has the evaluation methodology avoided the trap of insisting on necessary novelty *within* each discipline?)
- d) Have the different scales and objects of study of the participating disciplines been successfully connected and/or integrated?
- e) Has each contributing discipline been valued equally?

### 4.3 Communication

- a) Does the output incorporate different disciplinary 'voices' and ideas? If there is a lead 'voice' does it override or enable/support others?
- b) Is the output accessible to different disciplinary perspectives and (where relevant) wider audiences? Is the output accessible to other audiences? Does it include research user communities in an exchange of knowledge?
- c) Does the output have potential to provide transformative feedback into specific disciplinary areas?
- d) Does the output address issues of impact?
- e) Is authorship and disciplinary contribution credited transparently?

## Section 5. Assisting Interdisciplinary Careers

Given the importance of IDR to the future of an international academy, and the societal benefits that it brings, it is important that individual researchers' choices are not influenced by a perception of differential value as research moves away from core disciplinary concerns and approaches. How can researchers incorporate interdisciplinarity into their careers successfully? The support of IDR, and the communication of its value to researchers at all stages in their careers, is, of course, linked to the robust evaluation of IDR in research proposals and outputs (sections 2 and 3 above). However, there are specific measures that institutions can take to support people who want to engage in interdisciplinary projects either as individual researchers, or as part of collaborative research teams.

### 5.1 Employer policy measures

- a) Recruitment, Probation and Promotion criteria should make explicit mention of IDR value, and clarify the mechanisms through which it is evaluated.
- b) Researchers should be assured that interdisciplinary work, whether produced by individuals or collaborative teams, will be evaluated and valued equally with discipline-based projects and outputs.
- c) In team-based IDR projects, the role of co-investigators (Co-I) supervising junior staff *and* integrating one or more workstreams into the overall project, should be acknowledged as carrying at least as much weight as the role of a single principle-investigator (PI) within a typical single-disciplinary project. This acknowledges the deployment of integrative skills between disciplines, as well as the leadership of workstreams within a larger project.
- d) Evaluation of a contribution to project leadership should be unrelated to the assignment of financial resources to each aspect of an IDR project.
- e) Training in IDR practice and methodology should be available at all career levels, including active support in setting up IDR projects and teams and in project management.
- f) Mentoring in career planning from senior academics with experience in IDR should be available to early career researchers.
- g) Support for engagement with research users and external partners is, in many cases, central to the successful development of a career in IDR.



- h) Creating and resourcing centres and institutes directly supporting IDR enhances the effectiveness of the delivery of all of the above, and also sends a strong message about institutional values.

## 5.2 Publishers

- a) Publishers need to adhere to the evaluative principles in section 3 above, and make use of mechanisms to identify the potential added value of multi-discipline, multi-author outputs.
- b) Publishers should be encouraged to include clear statements on author contributions to multi-authored papers, in an agreed standard format.<sup>4</sup>
- c) There is a need for 'general interest' publications to support genuine IDR rather than merely bundling single-discipline outputs.
- d) Publishers should provide clear criteria about how they value and evaluate IDR.

## 5.3 Research funders

- a) Funders should embed good practice in IDR and its evaluation in relevant funding calls, and communicate this clearly to applicants.
- b) They should sponsor 'sandpit', mentoring and other development activities for fundable ECRs, drawing on experienced researchers in IDR.
- c) There is a need to communicate good IDR practice to evaluation panels and embed this in their structure.
- d) In assessing projects, it is important to recognise the additional skills required of a Co-I in a large project as in 5.1 above. This may also entail recognising the value of a collective leadership model.

## Section 6. Assessing Interdisciplinary Institutes and Centres

Given the additional complexity of conducting interdisciplinary research, realistic institutional mechanisms and environments are necessary to support successful interdisciplinary collaborations. These are both structural and cultural in form. In the Universities that make explicit provision for IDR, it is often supported *via* identified 'research institutes' and 'centres'. There are multiple ways of organising these: some are independent cost centres; others funnel research and resources directly back into disciplinary-based departments. Only a few institutions have dissolved disciplinary or faculty boundaries completely, although schools that coalesce disciplinary clusters are more common. The provision of designated physical space to house IDR activities, outside departmentally designated areas, while not essential to their good functioning, can significantly encourage the important supporting virtues of section 2 above (Frodeman 2012). There are, however, some general questions to consider in evaluating whether an institutional environment is genuinely supportive of IDR.

---

<sup>4</sup> There are good guidelines available from the CREDIT project <http://credit.casrai.org/>

## 6.1 The institution

- a) Does it have established cross-cutting structural mechanisms designed to support interdisciplinary collaboration?
- b) Are such structural mechanisms provided with resourcing realistic to this purpose (i.e. academic staff time and administrative support)?
- c) Do such structures contain sufficient expertise in co-ordinating interdisciplinary research?
- d) Is the research located in (or does it have access to) independent/neutral physical space, or, if not, how is creative interdisciplinarity encouraged?
- e) Does the institution involved have cultural discourses, narratives and representations that are supportive of involvement in IDR?
- f) Does the institution provide seedcorn funding or support staff in investing time in IDR development?
- g) Does the institution reward researchers who invest time in interdisciplinary work (for example, in promotion processes, inclusion in national performance exercises)?
- h) Does the institution have the capacity to support networked links with researchers in other institutions nationally and internationally?
- i) Does the institution have partnerships with external organisations to support interdisciplinary impacts beyond the academy?

## 6.2 Institutes and centres

In evaluating the performance of institutes and centres themselves, the following questions have proved useful:

- a) Does the institute or centre bring together people with the necessary expertise and experience in IDR, and do they have sufficient time and resources to enable them to assist each of the various stages of IDR development?
- b) Has the institute or centre established connectivity and communication with the relevant disciplinary units within the institution? Has it articulated the added value of engagement for researchers within these?
- c) Is there evidence of the creation of new and sustained interdisciplinary dialogue from which novel, integrated research questions have arisen?
- d) Are there mature projects including, where appropriate, externally funded projects arising from the work of the institute or centre?
- e) Have external collaborators/research users been identified and welcomed into the research programmes? Have appropriate pathways to impact been identified and supported?
- f) Has the institute or centre facilitated or otherwise ensured that researchers participating in its programmes receive adequate development and training in IDR, and support in leading/co-leading research projects and/or grant proposals?
- g) Has the institute or centre generated appropriate international engagement with its programmes?
- h) Is the institute or centre in communication with relevant research funders?
- i) Has the institute or centre been given appropriate opportunity to contribute to the developing research and learning strategies of its institution?

## Section 7. Assessing IDR in National Performance Exercises

At the highest level of research evaluation research communities in many countries undergo some kind of national evaluation exercise. In the UK this process was called the Research Assessment Exercise (RAE) until 2002, and then became the Research Excellence Framework (REF). The fundamental structure of these exercises is typically composed of a disciplinary 'Unit of Assessment', together with associated panels of expert readers and assessors, and sets of discipline-based evaluation criteria and guidelines. At first sight this creates immediate issues for the evaluation of IDR. How are the fundamental principles of IDR (section 1.) to be evaluated within such a structure?

In the UK REF, some measures aimed at addressing the evaluation of IDR have been included, such as introducing an IDR 'flag' against outputs; making cross-referencing between panels simple and direct; and allowing for panel members with expertise in IDR to be co-opted if necessary after the submission of outputs. Yet, although REF statistics show that outputs with the IDR flag are judged to have the same quality profile as those without, many individual researchers still say that they were discouraged by the REF process from undergoing or submitting IDR outputs<sup>5</sup>. It is essential to reverse this: the intellectual value of IDR should be embedded in such exercises and, more pragmatically, the REF 2014 exercise indicated that research referenced in the new category of 'Impact' was interdisciplinary to a high degree (see section 1 above). With the introduction of the evaluative measure of impact, and its resultant rewards, this observation constitutes a new incentive for institutions to develop good practice in IDR.

What kinds of structures might better assist the assessment of IDR, and encourage its submission in national performance exercises? At this point these are suggestions for discussion and perhaps experimental adoption<sup>6</sup>. Some are deliberately radical. Some operate on a larger scale than others. Some possible changes include:

- a) Enhancing the criteria in the 'Environment' section of evaluation to specify that support of IDR by high-quality internal structures and training is valued.
- b) Continuing research into the rich datasets provided by REF and other exercises to detect their behavioural effect on IDR (e.g. HEFCE could compare REF profile with UK-wide research outputs in total).
- c) In the case of cross-referenced IDR outputs, ensuring that they are evaluated in as many cases as possible by readers experienced in IDR and its integrated outcomes.
- d) Experimenting with the option of submission to inherently interdisciplinary panels in selected topics (e.g. Energy, Biophysical Sciences, Global Policy...).
- e) Creating a pool of experienced interdisciplinary researchers to include at least one on each panel, while also networking them into a cross-cutting moderation panel for IDR.
- f) Develop the value and evaluation of IDR within the impact segment of the exercise.

---

<sup>5</sup> HEFCE/Elsevier contextual analysis of REF2014 reported research. <http://www.hefce.ac.uk/rsrch/REFreview/Interdisciplinarity/>

<sup>6</sup> We note that, although it was represented within the collaboration producing this report, these guidelines do not constitute measures officially endorsed by HEFCE.

- g) Reinforce the emphasis on output quality rather than measures of journal ranking or citations.
- h) Examining corresponding processes in other countries.

## **Conclusion**

The collaborative group of representatives of universities, research funders and evaluators that pooled their joint experience to produce these suggested values and evaluatory criteria found that it needed to listen to its own advice in the very process of creating them. So the exercise of mutual hospitality; listening to different perspectives without privilege; individual openness to learning and teaching, and above all the emergence of a synthesis greater than the constituent parts, represent not only the logic, but also the experience, of these findings.

We hope that this report and its suggestions will contribute to a wider conversation about interdisciplinarity, and will form a useful part of the complex of related projects that have recently emerged to address the need for effective evaluation of IDR. There is widespread recognition that we need to understand and support interdisciplinary research better: this means being able to recognise good practice, and helping to improve it further.

The project has also taught us fresh, surprising and nonlinear ways in which Universities can work in research partnerships with other public and private bodies, to their mutual benefit. This, too, reminds us how interdisciplinarity lies at the heart of academic practice.

---

## References and Related Literature

Barry, A. and Born, G. (eds.) 2013. *Interdisciplinarity: reconfigurations of the social and natural sciences*. London and New York: Routledge.

Brewer, G, and Stern, P. (eds) 2005. *Decision Making for the Environment: social and behavioral science research priorities*. Washington, DC: National Academies Press.

Callard, F., Fitzgerald, D. and Woods, A. 2015. *Interdisciplinary Collaboration in Action: tracking the signal, tracing the noise*, review article, Palgrave Communications.

Frodeman, R., Klein, J.T and Mitcham, C. (eds) 2012. *The Oxford Handbook of Interdisciplinarity*, Oxford, New York: Oxford University Press.

Gasper, D. 2001. *Interdisciplinarity: building bridges and nurturing a complex ecology of ideas*. Working Paper No 331. The Hague, The Netherlands: Institute of Social Studies. —2010. 'Interdisciplinary and Transdisciplinarity, Diverse Purposes of Research: theory-oriented, situation-oriented, policy-oriented', in P. Thomson and M. Walker (eds) *The Routledge Doctoral Student's Companion*, London, New York: Routledge.

Land, R. 2011. 'Crossing Tribal Boundaries: Interdisciplinarity as a Threshold Concept' in Becher, T., Trowler, P., Bamber, V. and Saunders, M. (eds) *Academic Tribes and Territories: Intellectual Enquiry and the Culture of Disciplines*. 3rd edition. Buckingham: Society for Research into Higher Education and Open University Press.

Lash, N. 1996. Contemplation, Metaphor and Real Knowledge in Lash, N., *The Beginning and End of Religion*. Cambridge: Cambridge University Press.

Leach, J. 2005. 'Being In-Between: art-science collaborations in a technological culture', in *Social Analysis*, 49: 141-160.

Lee, R., Wallerstein, I, and Aytar, V. 2004. *Overcoming the Two Cultures: science versus the humanities in the modern world-system*, Boulder, Colorado; London: Paradigm Publishers.

Lyall, C. (co-ordinating author), Bruce, A., Tait, J. and Meagher, L., 2011. *Interdisciplinary Research Journeys. Practical Strategies for Capturing Creativity*, London: Bloomsbury Academic.

Lyall, C., and Fletcher, I., 2013. 'Experiments in interdisciplinary capacity building: the successes and challenges of large-scale interdisciplinary investments', in *Science and Public Policy*, Volume 40, Issue 1, pp. 1-7, doi:10.1093/scipol/scs113

Marzano, M., Carss, D, and Bell, S. 2006. 'Working to Make Interdisciplinarity Work: investing in communication and interpersonal Relationships' *Journal of Agricultural Economics* 57(2): 185-197.

McLeish, T. and Strang, V. 2014. *Leading Interdisciplinary Research: transforming the academic landscape*, Stimulus Paper, The Leadership Foundation for Higher Education.

McLeish, T. and Strang, V. 2014. *Interdisciplinary Research needs to be at the Heart of the Academy*, TheConversation UK.

Meyer, J. and Land, R. 2003. 'Threshold Concepts and Troublesome Knowledges: linkages to ways of thinking and practising' in C. Rust (ed) *Improving Student Learning: ten years on*, Oxford: OCSLD.

National Academies of Science, USA. 2010. *Facilitating Interdisciplinary Research*, Washington DC: National Academies Press;  
—2015. *Enhancing the Effectiveness of Team Science*.  
<http://www.nap.edu/catalog/19007/enhancing-the-effectiveness-of-team-science>

Perkins, D. 2006. 'Constructivism and Troublesome Knowledge' in J. Meyer and R. Land (eds) *Overcoming Barriers to Student Understanding: threshold concepts and troublesome knowledge*, London, New York: Routledge.

Research Evaluation 2006. Special Issue on IDR assessment, *Research Evaluation*, 15(1).

Schweitzer, F. (ed) 2002. *Modeling Complexity in Economic and Social Systems*, New Jersey: World Scientific.  
—2003. *Brownian Agents and Active particles: collective dynamics in the natural and social sciences*. Berlin, London: Springer.

Somerville, M. and Rapport, D.(eds). 2000. *Transdisciplinarity: recreating integrated knowledge*. Oxford: EOLSS.

Strang, V. and Bell, S. 2012. *Navigating Interdisciplinarity*, Institute of Advanced Study, Durham University.

Strang, V. 2009 [2007]. 'Integrating the Social and Natural Sciences in Environmental Research: a discussion paper', in *Journal of Environment, Development and Sustainability*, 11, (1) pp 1-18.

Strathern, M. 2004. *Commons and Borderlands: working papers on interdisciplinarity, accountability and the flow of knowledge*, Wantage: Sean Kingston.  
—2005a. 'Experiments in Interdisciplinarity', in *Social Anthropology*, 13(1): 75-90.  
—2005b. 'Anthropology and Interdisciplinarity', in *Arts and Humanities in Higher Education*, 4: 125-135.  
—2008. 'Knowledge Identities', in R. Barnett and R. Di Napoli (eds) *Changing Identities in Higher Education: voicing perspectives*, London, New York: Routledge. pp 12-21.

Weingart, P. 2012. 'A Short History of Knowledge Formations', in R. Frodeman, J.T. Klein and C. Mitcham (eds), *The Oxford Handbook of Interdisciplinarity*, Oxford, New York: Oxford University Press. pp 3-14.



## The Institute of Advanced Study

Launched in 2006, Durham's Institute of Advanced Study (IAS) encourages new thinking on key ideas and challenges by promoting and supporting interdisciplinary collaboration. The Institute brings together communities of researchers, including distinguished international Fellows, to engage in research organised around broad annual themes of major academic, public and policy significance. Previous themes have included *Modelling, Being Human, Water, Time, Light and Emergence*. These annual themes regularly generate new streams of interdisciplinary research.

The IAS also supports interdisciplinary research in Durham more broadly and, through workshops and other activities, facilitates the development of IDR across all three Faculties. It is currently fostering a wide range of interdisciplinary projects. Collectively, these involve researchers from every department in the University as well as a number of external partners.



Further information about the IAS is available at <http://www.dur.ac.uk/ias/>

## CONTACT DETAILS

Professor Veronica Strang  
Executive Director,  
Institute of Advanced Study,  
Durham University,  
Cosin's Hall,  
Palace Green,  
Durham,  
DH1 3RL

Tel: +44 (0)191 334 4684  
Fax: +44 (0)191 334 4699  
Email: [veronica.strang@durham.ac.uk](mailto:veronica.strang@durham.ac.uk)

Professor Tom McLeish FRS  
Professor of Physics,  
Durham University,  
Department of Physics,  
South Road,  
Durham,  
DH1 3LE, UK

Tel +44 (0) 191 33 43642  
Email: [t.c.b.mcleish@durham.ac.uk](mailto:t.c.b.mcleish@durham.ac.uk)

---