

# Key success factors in the quest for interdisciplinary knowledge

Dr Catherine Lyall, Dr Ann Bruce, Dr Wendy Marsden, Dr Laura Meagher

The ESRC Innogen Centre has just completed a yearlong study focused on four UK interdisciplinary research programmes to capture the lessons learned about the mechanisms and practices of interdisciplinarity within these large-scale interdisciplinary investments. There is a growing emphasis, nationally and internationally, on interdisciplinary research to address increasingly complex social and global problems in an integrated way.

This brief summarises the key factors for successful interdisciplinary research and provides recommendations on how truly integrated interdisciplinary research can be achieved.

Interdisciplinarity can be a goal and an endpoint but it is also a process that takes place over time. Funders and leaders of interdisciplinary research ignore this at their peril. Interdisciplinarity rarely happens spontaneously or in a short time frame: it has to be actively sought and managed from the outset. Interdisciplinary integration has to be catalysed, planned and continuously revisited: it is unrealistic to postpone integration until the end of a project or programme because researchers within the team will have been asking different questions in different ways.



**Interdisciplinary research occurs when contributions from various disciplines are integrated to provide holistic or systemic outcomes. Interdisciplinary research can be within social, natural or life sciences or between combinations of any or all of these.**

Successful interdisciplinary programmes are mindful of this process and build capacity by allowing for evolution through successive funding phases and by incorporating mechanisms for self-reflection and learning.

The UK Research Councils are responsible for investing public money in research to advance knowledge and generate

new ideas which lead to a productive economy, healthy society and contribute to a sustainable world. Innogen's research project – funded by the Natural Environment Research Council (NERC) – was based on case studies of interdisciplinary environmental initiatives (Quantifying and Understanding the Earth System, Rural Economy and Land Use Programme, the Tyndall Centre and UK Energy Research Centre), each representing multi-million pound, multi-discipline and multi-centre investments by the UK Research Councils. These case studies were complemented by an international perspective provided by the amalgamation of brief overviews from several programmes in both Europe and the US.

The project addressed two key objectives:

1. To develop multiple case studies in order to learn lessons from various sources including mechanisms and experiences of UK and international initiatives
2. To promote organisational learning and generate benefits broadly applicable across the long-term future of various UK research efforts to tackle complex, multidimensional challenges, by drawing transferable lessons of relevance to new programmes, and delivering guidance for funders and leaders of future initiatives in a readily utilisable form

Analysis of the lessons captured across this set of case studies led to the identification of five key success factors for interdisciplinary programmes and the development of recommendations for how interdisciplinary success can be achieved.

## FIVE KEY SUCCESS FACTORS FOR INTERDISCIPLINARY PROGRAMMES

### LOCUS OF INTERDISCIPLINARITY

In designing an interdisciplinary programme, it is important to identify the locus of interdisciplinarity (e.g. at the level of the individual researcher, project, theme, programme) and to think through the implications of which level(s) are to be the chief platform for interdisciplinarity. This requires an examination of the foundational and existing knowledge involved, focusing on where individuals within the programme draw their assumptions from, and how this will impact on the locus of interdisciplinarity. For example, in the case of environmental research, there may be particular tensions between universal and contextualised knowledge, between global and local scale, and between cultural differences where research is conducted on an international level or with non-academic stakeholders.

### CATALYSIS

Interdisciplinarity takes place over time and proceeds through different stages. It is highly unlikely that integration will occur

spontaneously if it has been left to the end of a project or programme. Deliberate steps have to be taken throughout to achieve integration and coherence. Consider how best to tailor the design and implementation of such activities to a particular programme, whether, for example, seed-corn funding for small starter projects, early workshops and/or other activities might help to consolidate collaborations.

### VISIONARY LEADERSHIP

Researchers need to be motivated, supported and engaged if they are to give of their best in what is, by definition, an unconventional, risk-taking endeavour. Consider the source of interdisciplinary leadership, whether it is provided by funders or by the programme director, or by a team of individuals in charge of component projects, and also how to use external advisory boards to best effect. Leadership is required to inspire diverse individuals on a continuing basis so that their motivations align with a common goal while simultaneously managing expectations to match feasible interdisciplinary outcomes.

### ACTIVE MANAGEMENT

It is important to recognise the demands posed by the process of achieving genuine interdisciplinary integration, and to identify responsibilities for various aspects of active management so that this is developed and maintained throughout the life of the grant. Management skills are not routinely taught to academics:

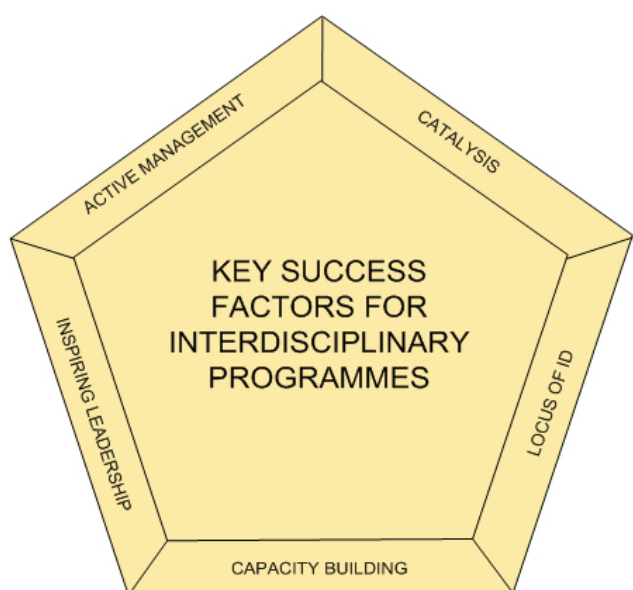


while this issue may seem mundane in a monodisciplinary context, this skills deficit is attenuated when faced with the challenges of an interdisciplinary programme. The nature of this active management will vary depending on the locus of interdisciplinarity. Other questions to consider include whether one person or a team will manage the integration, and who (at what level of seniority) plays these roles at which points in the programme's development. Funders' support for active management is critical to achieving the potential added-value of interdisciplinarity.

### LEARNING AND CONTINUITY

Capacity-building – including the development of knowledge and strengthening of skills, competencies and abilities of people, networks and the research community – is critical to the growth and longevity of interdisciplinary research in the UK. This poses challenges for funders and research leaders to ensure that learning from past experiences of interdisciplinary investments becomes embedded within collective organisational memory.

This requires greater continuity – of research networks and communities but also of research careers so that future career options are available for interdisciplinary Early Career Researchers and their expertise is not lost at the end of a programme. This is not to imply that individual interdisciplinary investments should be funded in perpetuity but Research Councils do need to develop more realistic expectations of the time frames within which major change can be achieved: a five-year interdisciplinary programme alone cannot provide the silver bullet to solving complex issues. This requires continuity of funding for multiple interdisciplinary investments – appropriately reviewed – over the long term.



1. At the design stage of a large scale, interdisciplinary investment, consider the ramifications of interdisciplinarity if it is sought at the level of the individual researcher, a component project, a theme and/ or at broad programme/ investment level. Pay due attention to contexts created by different institutions, cultures and funders.
2. Research Councils constitute important drivers of interdisciplinarity and may wish to assess how their own structures and procedures reflect good practice, especially when interdisciplinary programmes require cross-council collaboration.
3. Develop early “warm-up” activities to lay the foundations for mutual understanding, communication, trust and sharing of responsibilities.
4. To ensure development of integration, support opportunities for interaction throughout the course of the grant. This may require additional funding and time for integrative activities and personnel.
5. Research Councils play an important role in shaping investments and on their longer term impacts. This requires an approach that balances focus and flexibility and a realistic understanding of what can be achieved within the timescales of a grant-funded programme. The effective and appropriate evaluation of interdisciplinary investments is a key area where funders could provide better leadership.
6. All directors of interdisciplinary investments should be supported through a peer-mentoring network with a particular focus on translating the vision into the practical reality of tackling the challenges of interdisciplinary initiatives.
7. Active management needs to be emphasised to research teams as vital for success and supported accordingly, for example by sharing organisational learning and providing funding for community-building activities.
8. Some form of ongoing evaluation should be encouraged for all larger investments to promote self-reflection and the appropriate evolution and development of research. Giving the director discretion to disburse funds in phases during the course of the grant can allow adjustments to be made and facilitate the development of interdisciplinarity.
9. Research Councils should continue to provide strategic funding for interdisciplinary research. This funding should be structured appropriately over time in order both to build interdisciplinary capacity over the course of a particular programme and to ensure continuity of funding for interdisciplinarity across the research community. This requires appropriate review of interdisciplinary funding strategies at regular intervals.
10. A new vision is required to promote organisational learning for interdisciplinarity within and across the Research Councils. RCUK might consider:
  - i. the establishment of an interdisciplinary reviewers’ college (consisting of individuals expert in a range of interdisciplinary areas) to address the common challenge of finding reviewers who are sympathetic to interdisciplinary research and understand how to evaluate it both rigorously and appropriately
  - ii. establishing shared administrative resources for interdisciplinary investments with dedicated administrators experienced in the particular requirements of interdisciplinary research and research training
  - iii. facilitating the development of a cadre of early career and more senior interdisciplinary researchers by hosting community-building events across different interdisciplinary capacity-building schemes and investments. An Interdisciplinary Funders Forum similar to the Environmental Research Funders Forum (now part of LWEC) or the UK Strategic Forum for the Social Sciences could promote shared learning
  - iv. developing an Interdisciplinary Portal analogous to the current RCUK Knowledge Transfer Portal to co-ordinate and consolidate access by the research community to information about funding, training and other forms of support dedicated to interdisciplinarity.



## INTERDISCIPLINARY CAPACITY BUILDING

*Interdisciplinary capacity building is one of a broad range of approaches developed by Innogen that are useful not only in the life sciences, but more broadly in the social sciences.*

*Drawing on their collective expertise in interdisciplinary research across the life sciences and beyond, Dr Catherine Lyall, Dr Ann Bruce, Dr Wendy Marsden and Dr Laura Meagher have shared their skills in the conduct, management and evaluation of interdisciplinary research with the wider research community.*

*Capacity building has been achieved through the QUEST project, as well as through a series of Interdisciplinary Masterclasses: training events set up to develop a cadre of students, researchers and research managers who are better able to tackle the challenges of interdisciplinary research across a range of domains.*

*The Masterclasses have acted as an important catalyst for a wide range of other capacity-building activities which have consolidated Innogen's position as an international leader in the field of interdisciplinary research spanning the social and natural sciences.*

*This same team has also produced the widely applicable, practical guidebook, 'Interdisciplinary Research Journeys', published by Bloomsbury Academic.*



## REFERENCES AND FURTHER READING:

QUEST: Capturing lessons for interdisciplinarity

NERC grant reference: NE/H012001/1

### PROJECT PUBLICATIONS

All publications are available from [www.tinyurl.com/idwiki](http://www.tinyurl.com/idwiki)

1. Lyall C, Bruce A, Tait J and Meagher L (2011), *Interdisciplinary Research Journeys: Practical Strategies for Capturing Creativity*, Bloomsbury Academic.
2. *Identifying Key Success Factors in the Quest for Interdisciplinary Knowledge: Final Report* (2011), Lyall C, Bruce A, Tait J and Meagher L.
3. *Short Guide to Developing Interdisciplinary Research Proposals* (2007), Tait J and Lyall C.
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6. *Short Guide to Supervising Interdisciplinary PhDs* (2008), Lyall C, Meagher L and Tait J.
7. *Short Guide to Troubleshooting Interdisciplinary Research Management Challenges* (2008), Lyall C and Meagher L.
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11. *Short Guide to Evaluating Interdisciplinary Research* (2011), Lyall C, Joyce T, Meagher L, Bruce A and Marsden W.
12. *Short Guide to Leading Interdisciplinary Initiatives* (2011), Meagher L, Lyall C, Bruce A and Marsden W.

### Contact authors:

Dr Catherine Lyall, Dr Ann Bruce, Dr Wendy Marsden  
ESRC Innogen Centre, University of Edinburgh, Old Surgeons Hall, High School Yards,  
Edinburgh, EH1 1LZ, UK

t - +44 131 650 9113 e - [c.lyall@ed.ac.uk](mailto:c.lyall@ed.ac.uk)

Dr Laura Meagher

Technology Development Group, Edengrove House, Fife, KY15 4RP, UK

t - +44 133 487 0640 e - [laura.meagher@btinternet.com](mailto:laura.meagher@btinternet.com)

### Contact centre:

Innogen: ESRC Centre for Social and Economic Research on Innovation in Genomics  
[www.genomicsnetwork.ac.uk/innogen](http://www.genomicsnetwork.ac.uk/innogen)

Innogen at the University of Edinburgh

t - +44 131 650 9113 e - [Innogen@genomicsnetwork.ac.uk](mailto:Innogen@genomicsnetwork.ac.uk)



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