



Short Interdisciplinary Guide 5

Troubleshooting some common interdisciplinary research management challenges

Introduction

An “interdisciplinary researcher” may either be an individual who spans a number of disciplinary domains in their own personal research or, perhaps more commonly, a researcher who works as part of an interdisciplinary team. As their career advances they may, in time, lead such research teams. The ability to anticipate potential challenges and troubleshoot problems early may help such project leaders to manage interdisciplinary research successfully.

An effective interdisciplinary manager needs not only to exhibit leadership and possess research expertise but also be able to negotiate the collaboration from its earliest beginnings throughout the project. This requires the ability to identify connections and build bridges; to translate between partners by articulating roles, responsibilities, expectations; and, finally, to ensure a well-integrated product. Intellectual empathy and open-mindedness need to be balanced with drive and focus. An interdisciplinary manager thus has to play many roles: broker, matchmaker, facilitator, organiser, troubleshooter, risk-taker, therapist, referee....

Good interpersonal and team-building skills and the ability to engage proactively with research partners are key skills for any research leader but are absolutely vital for an interdisciplinary research manager. Building a successful interdisciplinary team not only entails an understanding of the research problem but requires the project leader to select an appropriate group of collaborators and to distribute, and manage, responsibilities appropriately within that team. A good interdisciplinary research leader is likely to have an interdisciplinary background themselves, be willing to learn from others and be interested in, and have a respect for, other disciplines.

There will undoubtedly be barriers to overcome along the way and there are several important issues likely to arise from interdisciplinary research that may require careful management or ‘troubleshooting’. Here we reflect briefly on just three: managing an interdisciplinary career, negotiating interdisciplinary collaborations and supervising interdisciplinary students.

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Managing an interdisciplinary research career

An effective interdisciplinary manager needs to be aware that it will not always be straightforward for team members to develop careers based on continuous interdisciplinary research. Organisational cultures may not favour interdisciplinary research which often cuts across the traditional discipline-based academic structures and systems of reward and resource allocation found in most universities.

People working in academia often regard interdisciplinary research as a risky career move. Interdisciplinary researchers may be considered less productive because good interdisciplinary research often takes a long time. Also, finding high status outlets for interdisciplinary publications can be a challenge as interdisciplinary papers may be perceived as having a lower 'value' (e.g. as a result of publication in lower impact journals).

A permanent, tenured university position (and subsequent promotion) still usually depends on a track record in a single discipline. Interdisciplinary researchers often have a shifting peer group over time, depending on the current focus of their research. Furthermore, reviewers of publications, grant applications and promotions boards may lack interdisciplinary expertise themselves¹. Thus, many advise keeping one foot in a 'parent discipline' to provide a more secure means of career advancement in the early stages of a university career.

So what advice can a research manager offer to more junior staff seeking to pursue a successful interdisciplinary career?

- developing a diversified portfolio of publications is a sensible strategy. This may mean linking up with disciplinary experts for papers in highly-rated monodisciplinary journals while also publishing in interdisciplinary journals
- keeping up to date with developments in a main discipline as well as maintaining broader interdisciplinary interests can provide reassurance for conventional academic decision-makers
- mentoring by a senior or more experienced colleague may help the researcher to negotiate any institutional barriers to promotion. (The research manager may be able to help identify a mentor.)
- networking with a broad range of peers in associated disciplines as well as with related interdisciplinary contacts can help to open up opportunities and "communities" (The research manager can facilitate this activity.)

Negotiating interdisciplinary collaborations

Research managers, like all good interdisciplinary collaborators, are likely to be openminded, willing to learn from other disciplines, and have a broad appreciation for the languages, research methods and cultures of different disciplines. It is often said that personality can be a more significant factor than discipline base and interdisciplinary collaborations need to be based on trust and knowledge of the collaborating partners.

There is no single model for success and interdisciplinary collaborations can fail because of a lack of understanding, or unrealistic over-expectations, of what an interdisciplinary approach can deliver. Interdisciplinary research is not a homogeneous approach and does not represent a single research method. Different kinds of interdisciplinarity have different goals and challenges.

In broad terms, interdisciplinary research can be geared towards advancing the knowledge base or tackling practical problem solving. These different approaches will vary in terms of what

¹See Note 2 *A Short Guide to Reviewing Interdisciplinary Research Proposals*.

motivates the researchers undertaking the work and will have different intended outcomes. The former model of collaboration is driven by intrinsic, knowledge creation goals (of access to particular tools, techniques and data). The inputs and outputs – and thus the benefits of collaboration – can be relatively well-defined at the outset. This kind of collaboration is intrinsically motivated in terms of the immediately visible knowledge benefits, e.g. A needs the data that will be provided by B. Similar knowledge-related motivations may be present in relation to the emergence of new scientific domains. However, in the case of complex (e.g. societal) problems, where the goals or outcomes may be rather more open-ended and involve a broadening of existing knowledge frameworks, there may be greater uncertainty about the process and the end point.

Whatever the motivations, it is important to reach a shared understanding of the purpose and goals of the research amongst the team and to identify agreed project milestones. When negotiating the collaboration, the project leader will need to conduct an honest assessment of the skills and roles within the team in order to ensure a fair division of labour: not every team member needs to contribute equally but they must be able to contribute appropriately – and accountably. The research manager will need to agree a plan for how the team will communicate and the frequency of meetings (either face to face or by other means) as this is crucial for an interdisciplinary team, which may well take longer to ‘gel’². As with any team, it is also helpful to explore some of the ‘what if’ questions at an early stage, for example, what if there is a change in staff before the project is completed. At the same time it is still a good idea to build in flexibility to cope with any unexpected outcomes wherever possible (it is, after all these unpredicted outcomes that are among the potential benefits from interdisciplinary research). Depending on the nature of the research, it may be appropriate to negotiate intellectual property rights before the project commences. Even if patenting is not an issue, research managers should ensure that the team considers, at the outset, issues such as the ownership of any data and the thorny issue of authorship.

Ten questions to discuss before starting a collaboration

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| 1) What do we expect to get out of this? | 6) How will we decide when to publish? |
| 2) Who is going to do what and by when? | 7) Who owns the intellectual property? |
| 3) Who will have access to our data? | 8) Will we share our reagents with other labs? |
| 4) Who will give public presentations, and how much data will they reveal? | 9) What happens if one of us leaves the project? |
| 5) How will we assign authorship? | 10) What happens if one of us wants to form a separate, but related, collaboration? |

Adapted from: NIH Office of Ombudsman³

Supervising an interdisciplinary PhD

Interdisciplinary research managers may well have oversight of postgraduates in their team so it is important to be aware of some of the challenges they face. By definition, interdisciplinary students will not be specialists in their subject but they should not therefore feel as if they are failing: they cannot afford to yield to the temptation of trying to become experts in all fields involved. Interdisciplinary students can often feel that they are a “jack of all trades and master of none” and may feel that they are more open to challenge (e.g. when presenting their work at a seminar) than their single discipline peers.

²See Note 1 A Short Guide to Developing Interdisciplinary Research Proposals.

³Ledford, H. (2008) “With all good intentions”, *Nature*, vol. 452 (10 April 2008), pp. 682-684.

Open-mindedness is critical to effective interdisciplinary studentships; students need to listen to others' perspectives, talk informally with other students, attend a variety of seminars and learn about the foundations of, and follow developments in, the contributing disciplines. But, at the same time, students must for their survival stay focused, knowing what part of which disciplines they will use to answer which research questions. More planning may well be needed for interdisciplinary projects as, in many cases, undertaking an interdisciplinary PhD requires more work: the student is likely to be reading across more than one literature, possibly learning more than one methodology, and certainly grappling with how to integrate it all. Moreover, different disciplines have quite different conceptions of what constitutes a PhD thesis and students need to be given early guidance as to which approach to follow.

We have addressed some of these challenges in more detail in another note⁴ but, in general, if required to give guidance to supervisors of such students, the interdisciplinary research manager may wish to consider the following:

- how appropriate is the supervisory team (e.g. has the team agreed a hierarchy of roles and responsibility; who is lead supervisor/ department)?
- have the supervisors all met together to agree the scope and the focus of the PhD with the student?
- has the team reached agreement on the student's work programme, e.g. the frequency of meetings (jointly or individually) with the student?
- are the training and resources appropriate across contributing departments/institutions – should the student be relocated?
- does the student need help to identify a project community/community of practice and to access appropriate conferences and meetings?

⁴*A Short Guide for Supervisors of Interdisciplinary PhDs.*

Discussions with participants at the ISSTI Interdisciplinary Masterclass,
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