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## **Team Science**

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**Institute of Physics response to Academy of Medical Sciences Working Group  
call for evidence on Team Science and career progression**

**A full list of the Institute's submissions to consultations and inquiries can be  
viewed at [www.iop.org](http://www.iop.org)**

**11 November 2014**

## 1. What are the drivers for the increasing importance and growth of 'team science'?

The rising importance and growth of 'team science' projects is inexorably linked to the increasing prevalence of cross-disciplinary and inter-disciplinary research.

Some fields, for example biological physics, are highly interdisciplinary by their very nature and as such much of the work will involve collaboration and projects that can be deemed 'team science', others, such as climate change, energy and healthcare all require input from a number of different fields. Such research naturally requires overlapping expertise. In many areas one discipline, one lab or one individual may not have all the expertise or training in all the techniques relevant to solving a specific problem and as such, may require joint expertise. Additionally, in many subject areas, for example in astronomy and particle physics, the very nature of work is collaborative rather than competitive.

## 2. What are the barriers to the further growth of 'team science'?

The main practical limitations centre on exploring collaborators and ensuring expertise. For many researchers, it may be difficult, particularly outside of a particular discipline, to know where to find the right people to collaborate with and how to contact them.

There may also be some remaining barriers in funding structures, due to perceptions about the walls between disciplines in UK Research Councils (RCUK). It is rare for example, for an interdisciplinary collaboration to be 'excellent' in all the disciplines involved, such that research that could be regarded as 'excellent' overall may be seen as weak in one of the disciplines. This evaluation may affect the chances of the research receiving funding as it received a lower score when evaluated. However, it must be noted that in recent years RCUK have taken steps to address this barrier, particularly with the development of the Cross-Council Funding Agreement (CCFA) which presents a process to address projects which may fall between the remits of one or more funding councils. Some projects, for example *Metabolomics for monitoring dietary exposure* at Aberystwyth University have even successfully received funding from three separate Research Councils. Nonetheless, the process still presents an additional set of administrative hurdles for researchers to address and run through, which may reduce the chances of some projects taking place.

The challenges inherent in wider collaboration may also apply. Differences in culture and limitations in communication due to language between disciplines may act as disincentives or practical limitations themselves in fostering a wider collaborative culture of team science.

This is not to discount the value of single disciplinary research, and training researchers an individual discipline. Attempts to remove barriers to team science must not be at the cost of structures that support single disciplinary work.

### **3. What are the incentives and disincentives for the broad research community in fostering and developing 'team science'?**

#### **3a. Incentives**

Many of the most obvious incentives for the research community are similar to those behind the growth of team science in general. For example the ability to promote novel, exciting and interesting research that can solve many of the questions, such as climate change, that are not easily solvable within a single discipline. Again, more can potentially be achieved by working with a wider set of individuals by broadening the expertise available. Working with researchers from different backgrounds can also be positive in and of itself, giving researchers insights into colleagues from different cultures, and shedding light on new practices and methods.

In general, team science may also create further possibilities of developing new research methodologies and promotes the opportunity for scientists to be at the forefront of novel and new ideas.

#### **3b. Disincentives**

Many of the disincentives are borrowed from the barriers described above. In particular, the institutional and funding structures play a large part in deterring some researchers from exploring team science projects as it may not be a process they want to struggle with, or risk their chances of QR-funding over.

### **4. What are the incentives and disincentives for the individual researcher in taking part in 'team science'?**

#### **4a. Incentives**

Once again, opportunities to take advantage of novel research opportunities and explore new ideas in collaboration are likely to be big incentives for individual researchers. While there are many potential risks, team science presents many opportunities to develop new research potential and undertake ground-breaking research in areas which may be unavailable within a single discipline. Researchers may also benefit from working with others from different cultural and disciplinary backgrounds, and learn from exposure to methods to which they may not have been previously familiar.

#### **4b. Disincentives**

Like the wider research community, researchers may have concerns over the ownership of the research output of team science projects, particularly how this research is counted when being assessed - many researchers may perceive that a risk exists that work outside of pure disciplinary research will not be valued in and of itself.

There is also a perception, connected with the value set on team-science outputs by both journals and promotion/appointment committees, that engaging in teams-science is less effective in career-progression than single-discipline work.

The time required to pursue serious interdisciplinary work and engage with the broader research community may also serve to put researchers off pursuing team science projects. With time a precious commodity for most researchers, particularly those at the earlier stages of their careers, finding the time to explore opportunities to collaborate outside of their specific discipline, and then finding the time to actively work on these areas, may be seen as a challenge. This challenge will be particularly acute for researchers who work flexible hours or have caring responsibilities. Childcare and flexible working continue to be major barriers to career progression in science, particularly for women. A childcare survey of the IOP's members found that 80% of respondents, both men and women, reported that they found it difficult to make additional childcare arrangements outside of working hours. However, there was a significant difference between men and women, with women significantly more likely to find it "very difficult" or "difficult" compared to men. Without systematically addressing these limitations and problems of access, many researchers will be put off from taking on projects which will likely place additional burdens on their time, and this will include team science projects.

*We have identified four key stakeholder groups in which we seek to influence policy and practices: researchers, publishers, employers and funders - including those funders undertaking research assessment exercises.*

**5. Please select all of the stakeholder groups below that apply to you as you provide this response.**

Individual researcher / Publisher

***Please answer the questions below based on the stakeholder group(s) you selected, and then proceed to questions 6 and 7.***

***If you selected 'None of these groups', please proceed directly to questions 6 and 7.***

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Questions for Publishers.

**5P1. Does your organisation have policies whereby author contribution statements are requested or mandated for publication in any of your journals?**

No, this is currently not the norm within physics. Publishers can accept the statements and publish with the article if authors submit them but we have received very few to date and it is not common practice.

**5P2. If your organisation has such policies in place:**

- How were they developed?
- How were (and are) they implemented?
- How are the policies communicated to authors?
- How have you evaluated the impact they have had?

- How could they be improved? What more could be done?

**5P3. If you are not aware of any such policies in your organisation, what are the barriers to their development?**

The main barrier is changing the publishing habits of the research communities and understanding the impact on the authors. It has to be something that the author feels is driven by researchers and has a benefit for them, not just an additional administrative burden imposed by the funding agency or the publisher. Any statement needs to be standard for all journals and ideally a format that is recognisable across all scientific disciplines for an author's contributions to be easily recognised by someone outside of the research field. It also has to work internationally.

**5P4. What improvements could feasibly be made in scientific publishing to improve the recognition of individual researchers' contributions to 'team science'?**

Any statement or other ways adopted to recognise an author's contribution should ideally be included in the metadata associated with the article. Linking to standard IDs such as ORCID could help in linking to an author's publication record and would tie in with current developments in publishing.

Other options to explore could be ways to tag authors in the metadata within an agreed field but this would be technically more complex than attaching a statement and may not offer the flexibility required among the different research fields.

**5P5. Do you have any additional comments?**

**6a. As stated before, we identified four key stakeholder groups in which we seek to influence policy and practice: researchers, publishers, employers and funders including those funders undertaking research assessment exercises.**

**Would you exclude any of these groups, or include any others?**

These groups are all relevant and appropriate and should naturally be included. Some thought should perhaps be given in addition to including industry, which derives huge benefits from interdisciplinary/team science research and may be a willing partner in efforts to reduce barriers.

Further consideration may also be given to science communication organisations (e.g. Sense about Science) that may be able to give an insight as to how team science might help to build trust in science. It would be useful to engage equality and diversity committees (Athena SWAN and Juno committees) to explore where existing issues can be overcome with regards to under-represented groups that will open up their access to team science.

**6b. Can you list these groups (and any that you have added) in order of priority (highest to lowest)?**

***Please answer the questions below in accordance with the guidance at the start of each question.***

- 7a. ***If you are a researcher and therefore have already answered questions 5R1-9, do not answer this question:*** What is being done by researchers to assist themselves to gain appropriate recognition for their contributions to 'team science' projects? What more do you think they could reasonably do?

Researchers could actively list their contributions when writing papers, giving talks on their research and presenting conference papers. Presenting jointly with colleagues could help make roles clearer.

Researchers participating in peer review would also benefit from developing a greater understanding and recognition the value of team science and interdisciplinary research as they undertake peer review, which would lend encouragement to others when publishing their work. As above, professional societies such as the IOP may have a role here in helping to support best practice and engender a more open approach to team science and interdisciplinary projects.

- 7b. ***If you are a funder and therefore have already answered questions 5F1-6, do not answer this question:*** What is being done by funders to assist individual researchers to gain appropriate recognition for their contributions to 'team science' projects? What more do you think they could reasonably do?

With a lot of team science work interdisciplinary, Research Councils should continue to work closely together within RCUK and maintain progress on the CCFA to ensure that interdisciplinary projects don't fall through the gaps between councils and reduce any unnecessary hurdles for researchers to access funding. This is particularly important as they often issue calls for research in priority areas which require aspects of team science. They should also promote greater recognition of team science and interdisciplinary research within the peer review process. Addressing the issue that funders usually only have contact with the Principal Investigator would also be important, as within larger collaborative projects they may not be the expert or the right person to speak to on certain techniques and in certain areas. Issuing guidelines for funding committees would be one way of going about this.

Issues in the recognition of individuals within team science should also be fed into the response to the evaluation of research quality, particularly with the results of the REF being released soon. The REF debriefs will provide an excellent opportunity for ensuring that issues in team science, particularly recognition, are addressed.

- 7c. ***If you are a publisher and therefore have already answered questions 5P1-5, do not answer this question:*** What is being done by publishers to assist individual researchers to gain appropriate recognition for their contributions to 'team science' projects? What more do you think they could reasonably do?

Publishers themselves provide a wide range of options themselves which vary depending on the subject areas. There are options available for an author to promote their work through social media, new services such as Kudos and functionality like video abstracts and general summaries on some publications.

- 7d. ***If you are an employer of researchers and therefore have already answered questions 5E1-6, do not answer this question:*** What is being done by employers to assist individual researchers to gain appropriate recognition for their contributions to 'team science' projects? What more do you think they could reasonably do?

Promotion and reward needs to recognise team science outputs as of high value. Promotion panels should be more aware of different research sub-cultures. For example in terms of publications and the quality of different journals - a well-respected journal in one subject area may be unheard of in another. It is also essential that members of promotion and appointment committees are assisted not to "filter" team-science outputs through the lens of purely their own discipline, but are able to evaluate the resultant sum of the effort and extra skills required to engage in fruitful team-science.

Employers should also do more to engage with equality and diversity committees to address challenges felt by under-represented groups, particularly with regards to those that face limitations on their time – e.g. those with caring responsibilities. They need to come up with novel and effective solutions to open up access to areas which will enhance careers, such as team science projects, particularly by eliminating barriers and creating incentives that enable researchers who are time-poor to participate.

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