THE FOUNDATION FOR SCIENCE AND TECHNOLOGY

ROUND TABLE DISCUSSION SUMMARY

Improving the career paths for Masters and PhD students, and Post-docs

Held at Christ's College, Cambridge on 17th October, 2013

The Foundation is grateful to the Cambridge University Science and Policy Exchange and the Cambridge Centre for Science and Policy for help in organising this discussion.

The hashtag for this debate is #fstresearchcareers .

Chair: **The Earl of Selborne GBE FRS**
Chairman, The Foundation for Science and Technology

Speakers: **Dr Steven Hill**
Head of Research Policy, Higher Education Funding Council for England
Harry Armstrong
PhD Student, Babraham Institute, Cambridge
Dr Helen Ewles
Research Associate, Department of Pathology, University of Cambridge

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DR STEVEN HILL pointed to evidence from the most recently published postgraduate experience survey demonstrating the gap between the aspirations of PhD students and postdocs and their actual prospects of a career path in academia. 46% of PhD students were targeting an academic career; and 40% of research staff aspired to a career in academia and 35% thought they would follow such a career.

However, a recent paper in Nature[1] had shown that in the USA there were seven times more PhD graduates than there were academic posts. A similar disparity between the number of PhD students and the number of academic jobs available could be observed in the UK. This raised the question of whether there were simply too many PhD students; but a policy of controlling numbers, or the number of publicly funded posts, was questionable, not least because a growing number of PhDs were self-funded or funded from other sources and because the volume of research was in part driven by demand.

A more promising line of approach was to shift perceptions so that academic training was more widely recognised as useful for a wide range of careers, outside academia as well as inside. That pointed to the need for better and more useful careers information and for the provision of high quality support for PhD students and postdocs in developing and repackaging their skills for a wider job market. These were issues for universities to tackle, but with support from funders and prospective employers, for example in relation to opportunities for placements.

HARRY ARMSTRONG said he was entering the final year of his PHD but would be leaving academia when he had finished it, contrary to his initial expectations. He was not alone in that shift. One third of former PhD students at the Sanger Institute in Cambridge left academia after completion of their PhD.

All the non-academic jobs that people had gone to – including those in science related jobs – required skills and expertise that were not emphasised, encouraged, or possibly even needed for the purposes of completing a PhD. There was a welcome, growing emphasis on 'transferable skills', but more needed to be done to make a PhD a more rounded qualification.

Steps could be taken to improve working conditions for researchers (better pay and security and stronger workers' rights for example), which would make the academic career path more attractive. But in the end there are simply not enough academic jobs to go round.

Leaving academia was not easy. It often felt like, and was made to feel like, a failure - abandoning the "noble and righteous" vocation. But these ingrained perceptions - and the stigma associated with leaving academia - had to be broken down. PhD students and postdocs should be supported

[1] Schillebeeckx, M, Maricque B and Lewis C, *Nature Biotechnology* 31, 938–941 (2013)

into career pathways outside academia - and, as important, welcomed back, armed with different experiences and fresh ideas.

DR HELEN EWLES argued for stronger definition of the role of the postdoc researcher: not a one size fits all straightjacket, but a clearer, more transparent set of expectations, agreed from the outset, covering issues such as independence, commitments relating to teaching, laboratory management, and supervision, and the level of support that could be expected. There were lifestyle issues to be addressed: current levels of weekend working were not solely attributable to a self-imposed drive to work all hours; and short term contracts and the insecurity they engendered did not necessarily support a strong science base.

The quality of management by Personal Investigators (PIs) was highly variable, not least in respect of discussions relating to career prospects. There should be training for PIs in this role, reinforced by more structured expectations and annual reviews of performance. It required more than a passive, tick box exercise, defined by the over-narrow expectations and experience of many PIs (which made it difficult, for example, to raise non-academic career pathways with them). A more radical approach was needed.

A number of contributions in the subsequent discussion stressed the rich range of opportunities that existed for research scientists outside academia. Some posts in industry and in the public service, offered, if anything, better prospects for full-time laboratory based research than academia; demand for PhD level data scientists was growing globally; the range of scientific posts in Government and the NGOs was often under estimated (by universities as much as by students and post docs).

All this reinforced the arguments, raised by the opening speakers, about the need for a more positive, open and interactive approach to career advice and support for PhD students and postdocs, with more exchanges and placements with a wider range of sponsors and organisations, and for a stronger emphasis on supporting students and researchers to develop and package their skills for the external job market. One example cited was research scientists coming to work in central government who did not hit the ground running because of significant skill gaps in awareness of the constitutional context and, more pertinently, in the epistemology and philosophy of science.

There was a general acknowledgement that careers advice and skills development for prospective PHD students needed to begin at undergraduate and masters level. The use of the term 'transferable skills' might not itself be helpful. .Skills development should not be seen as an 'add on' to a PhD or postdoc research but aligned to it – whether it was in terms of communication skills, management training and experience, inter-personal skills or awareness of the external operating environment.
Where experience of working in a different environment – in industry or government for example – was required, that was better achieved through a more structured approach to placements or secondments. For the rest, it was much more a matter of drawing out and developing skills learned from and applied in the normal routines of research. This required a full map of the skills exercised by researchers and a more positive approach to recognising and discussing them. (Research management was, for example, in many ways analogous to running a small business). But academics rarely discussed these wider aspects of their skills set. That needed to change.

There was survey evidence that PIs acknowledged the importance of their managerial role, but felt it was insufficiently recognised and rewarded. This raised the question of whether there was a disconnect between organisational aspirations and the perceptions and practice at the frontline.

Some participants argued that peer group pressure within universities would always lead PIs to steer researchers towards the academic pathway. A more interventionist approach - for example changing incentives through the Research Evaluation Framework (REF) calculations – might be needed to shift the culture.

Or it might be necessary to create new channels of support and advice for areas such as career coaching. The model of using professional mentors alongside but independent from line managers, deployed in parts of industry and central government, was also advocated. Positive and promising examples of new approaches were cited and welcomed.

One Department at Cambridge had, for example, developed a 'contract' to support the management of its researchers. This could not guarantee jobs; but properly applied it could be used to manage expectations and, through a system of mentoring, and other approaches, to develop better all-round academic scientists. In engineering there were well established links with industry and postdocs moved easily from one post to another.

It was important to recognise that teaching PhD students and postdocs to be research scientists was the primary role of their supervisors. It was argued that most supervisors took that responsibility very seriously. But postdocs in particular were not there to be spoon-fed; they should be learning how to become independent by carving out responsibility for themselves.

On one view this was an issue of organisational culture. Science in the university environment could be constructed on more Civil Service like lines, with more structure, in which case some aspects of the current working environment,

including the pressure to work extended hours and at weekends, could feel oppressive.

Alternatively science could be portrayed as working at the frontiers: learning where the frontiers are at undergraduate and masters levels; venturing into the border territories at PhD level; and, as a postdoc, learning to operate with raiding parties, with the PI as the 'war lord'. A more entrepreneurial model such as this was more likely to appeal to researchers who saw its demands in terms of hours and some elements of insecurity as challenges to be embraced.

However, some of the postdocs present questioned not only the lifestyle implications of the current model, but its efficiency and its impact on the quality of science being carried out. Turnover was rapid; and the effective length of two year contracts was shorter than it appeared as people began to search much earlier for the next appointment.

The issue of gender differences in expectations and experience needed to be considered. The proportion of women at PhD and immediate postdoc levels held up. After that a chasm opened up and the system haemorrhaged talent. Even if researchers were prepared to go through an attritional period in their career development – on the basis they would eventually make it – there was a risk that this, arguably unacceptable, game was getting harder. There was general assent to the principle that postdocs had to take responsibility for managing their own careers. But there was clearly an appetite, particularly from the PhD students and postdocs present to see some rationalisation of the current contracting process, alongside some of the other changes under discussion.

Another strand of the discussion related to the length of PhDs. There was general scepticism about the case for extending the length of PhDs beyond three to four years, particularly for individuals who did not end up following an academic career path. This was an international debate; and some of the benchmarks could be misleading. For example, PhDs in the US tended to be significantly longer overall; but the period of effective research activity was usually no more than three to four years because of course work obligations.

Extending PhDs as a matter of routine could lead to funding issues and pressure to cut the overall number. The nature of the research activity was clearly relevant: the need to get results in laboratory based research, or research leading to a teaching pathway might drive a more extended period.

But longer PhDs were not needed for more contained research topics. A key objective should be to ensure that the system provided 'off ramps' and 'on ramps' for university based researchers to come in and out of the system, as a counter to the tendency to lock people into ever extending PhDs and recurring postdoc contracts.

Overall, the picture was complex. There were differences between disciplines, between self-funding (which raised questions about the equity and quality) and public funding. There was a clarion call for research as an end in itself, not as a mark of achievement on a CV, and concern that too great an emphasis on 'relevance' and producer sponsored research might inhibit creative, open-ended research of the kind that brought its own rewards and really broke new ground.

The emphasis should be on education, not training, encouraging PhD students and postdocs to "play in the sandpit of knowledge". There was no single model. The system needed to produce star researchers and able teachers of the future; but it also needed to evolve and produce more who crossed disciplines (increasingly important in areas such as climate change or food security) and more well trained technicians.

Re-structuring was inevitable; and fresh thinking about career progression for new pathways in science, inside and outside academia, was necessary. That, combined with the (at best) static market in academic jobs, would require: a stronger focus from undergraduate level onwards on encouraging students and postdocs to identify and harness the skills they were learning from their work as researchers – skills that would be necessary for a successful career in academia or outside; and increasingly sophisticated support systems – for example, skills mapping, coaching and mentoring, placements, secondments and 'on' and 'off' "ramps" - to help researchers help themselves in making career choices, free from stigma.

Sir Hugh Taylor KCB

Useful links:

Centre for Science and Policy, University of Cambridge
www.csap.cam.ac.uk

CUSPE – Cambridge University Science and Policy Exchange
www.cuspe.org

The Foundation for Science and Technology
www.foundation.org.uk

Higher Education Funding Council for England
www.hefce.ac.uk/whatwedo/crosscutting/pg/

University of Cambridge Careers Services
www.careers.cam.ac.uk

University of Manchester: An Academic Career
www.academiccareer.manchester.ac.uk/foryou/

Vitae
www.vitae.ac.uk

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