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Science must prepare for impact

To maintain public support, researchers need to be able to adapt to the rapidly changing needs of society and politicians, warns **Guy Poppy**.

What do scientists do for society? Some researchers may resent the increasing calls for them to demonstrate 'impact', but my time seconded to the UK Food Standards Agency as chief scientific adviser has convinced me that such pressure will only increase. Policymakers are no longer willing to hand over billions of pounds of taxpayers' money to scientists in exchange for a vague promise that something good will come from it.

What politicians and society expect from science is changing rapidly, and science must change with it, or risk losing public support. Academics and leaders of the scientific community must realize that the system is failing to prepare researchers to meet wider society's requirements.

At present, the metrics of scientific success used by most universities — citations, publications and grant money — encourage a linear career path from postgraduate studies to a tenured position. The bottleneck in this process — the oversupply of PhD students that cannot be found full-time jobs in academia — has received much attention. (Although in many ways it is good for society that most of these people do not pursue academic careers.) But we need more awareness of a second problem, which affects those who do continue into academic jobs. This linear track creates successive generations of scientists who are unable or unwilling to demonstrate the kind of societal impact that policymakers demand, industry requires or society needs.

When pressed to provide examples of impact, most senior researchers can do so. The latest Research Excellence Framework assessment of universities in the United Kingdom, for example, provided hundreds of case studies, including of start-up companies and of policy that has informed research. But as the demands for impact increase, we need more early-career scientists who are able to spend time working across academia, industry and policy.

Under the present system, researchers who frequently swap between academia, industry and policy are rare. They tend to have pursued such careers by chance and determination, rather than by design. That is my story: although my career was advancing on many fronts — agro-ecological research, industrial collaboration and policy relevance — my performance was typically measured using the standard academic metrics.

I made it, but I fear others may not. This route is not attractive to many, so it limits the supply of people into this important and growing job profile, which in turn is not good for society.

Already a super-competitive career path, it will become even harder for young scientists to dare to step from the tenure track — for a secondment to a policy think tank for example. Although natural selection may allow some individuals to succeed in this rapidly evolving research environment, it might narrow the 'phenotype' and so reduce the diversity of people and styles, which is important for a resilient workforce.

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A similar dynamic holds back interdisciplinary research. Many young academics are excited by the idea but fearful of moving from a discipline-based assessment and reward system. Interestingly, the rapidly growing demand for interdisciplinary research is largely in response to the need to address the grand challenges facing society or to deliver a knowledge-based economy.

How can nonlinear career tracks be encouraged? PhD training is leading the way. There are industrial PhDs, and professional internships are now common in doctoral training partnerships.

But once a scientist starts off in an academic career, the incentives dwindle. More universities need to develop metrics to assess and reward performance in areas other than grants and papers. Increased tuition fees for students in the United Kingdom have already focused attention on teaching ability. Case studies of impact should also be measured and rewarded. Some land-grant universities in the United States already measure how their agricultural researchers contribute to the state economy.

Industry and policymakers should welcome academics' attempts to engage in applied research that has impact. And academics must drop the snobbery that holds back work on such topics.

Frequent exchange of people and ideas will show academics how to ensure that their research has impact, and will allow those not in universities to access and use the knowledge created in them. And as such interactions increase, those who lecture students and prepare them for the workplace will start to obtain a better understanding of what is required.

It is not just the scientific community that can change to encourage a new breed of scientists who are comfortable with regular transitions between job types. I know from experience that it is often hard to achieve progression and promotion within the UK scientific civil service. Perhaps schemes that encourage more-permeable walls between academia, industry and policy could help to recruit and retain scientists in government roles, too. Together with colleagues, I am working on improving links between the civil service and universities.

We have made progress with interdisciplinary research, although not enough. Postgraduates have more opportunities, and it is now time to improve the career options for academics. Science is complex, and so are knowledge and solutions. It is no longer realistic — or sustainable — to insist that scientific careers be simple to manage and judge. ■

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