

► and teamwork. Non-academic employers also value work experience — sometimes more than academic credentials — and trainees who are interested in non-academic careers should gain this experience early on to avoid the common PhD catch-22 of being labelled simultaneously over- and under-qualified.

For the sake of future scientists, information about the current and projected state of the job market should be regularly collected, analysed and disseminated. Universities should curate data about former trainees. For academics, that information should include their grant, publication and teaching records as well as outreach and mentoring activities, and the criteria that academic hiring committees use to evaluate candidates. For non-academics, data should include the training, internships and work experience that led to employment.

The US National Postdoctoral Association in Washington DC is collecting data about postdocs' career paths as well as about institutional compensation, benefits and career services (see page 122). The NSF this winter launched an Early Career Doctorates survey that will gather in-depth information about postdocs and others who have earned their doctorates within the past ten years. The NIH's newly created Division of Biomedical Research Workforce in Washington DC may become the ideal organization for gathering and disseminating data about PhD graduates in the biomedical sciences.

These data will help funding agencies to craft policies that encourage institutions to give people with PhDs options for careers in non-faculty positions. One way to do this is to provide diverse education and training to PhD trainees so they can pursue careers in industry, consulting, entrepreneurship, science policy, writing and editing, administration or management. Federal funding agencies must find ways to ease pressure on trainees to work day and night for publications and grants, and instead foster ways to gain work experience and explore non-academic career paths while still in training.

These long-term solutions will not help current graduate students and postdocs, who must seek professional-development counselling, develop transferable skills and network within and outside academia. Ultimately, the careers of hundreds of thousands of future PhD holders depend on access to career information that will help to better match supply with demand. ■

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POSTGRADUATE CAREERS

The hunt for the elusive alumni

New efforts aim to track the careers of postgraduates.

BY PAUL SMAGLIK

Finding a job after finishing a PhD can be a tough slog. But a handful of US- and UK-based data-gathering initiatives could help science PhD holders to make more-informed decisions about their career options.

Previous efforts to track post-PhD career outcomes have focused mainly on one-off surveys, which usually offer little information beyond broad trends. Many also exclude postdoctoral researchers, who are difficult to follow if they work under a principal investigator's grant or are employed under a different job title.

In January, the US Council of Graduate Schools (CGS) in Washington DC published a report, *Understanding PhD Career Pathways for Program Improvement*, that calls for better measurement of postgraduate career outcomes. It estimates that about half of PhD graduates in science, technology, engineering and maths (STEM) find their first jobs outside academic institutions, but little other information is available. "We do not know the specifics of their careers: the nature and kinds of work produced and their long-term trajectories," the report says. It asks member institutions to use social media to locate and to conduct surveys of alumni.

Some US institutions, including Vanderbilt University in Nashville, Tennessee, have already initiated alumni-tracking schemes. Roger Chalkley, who heads Vanderbilt's biomedical research education and training programme, has started tracking the career paths of postdocs and graduate students using publication records and LinkedIn, among other social-media sites.

Vanderbilt's tracking results broadly mirror the trends reported by the CGS. About half of the university's STEM alumni stay in academic positions, although only about 20% land tenure-track jobs.

The other PhD graduates take on teaching, administration or laboratory-management positions, says Chalkley. "There's been an increasing flow of postdocs going to non-tenure research tracks."

Social-media sites are a key component of a global tracking venture launched by Vitae, a UK-based careers-support organization for researchers. Rather than seeking quantitative data about careers — the percentage of scientists who go into academic, industrial or



government positions, for example — Vitae is gathering information about the career paths of specific individuals.

This approach is useful, says Vitae head Janet Metcalfe, because the biggest information gap is in what junior scientists do after their postdoctoral research — particularly if they do not land an academic position. "That's what people really want to know — if I don't make it on the academic route, what are my prospects?" she says.

The venture's first phase drew around 600 respondents: half were from the United Kingdom and the rest came from all over the world. Vitae will publish its results this month, although it has already posted several dozen stories of respondents' career paths online; these stories show that scientists can find professional fulfilment outside academic institutions, Metcalfe says. A second phase is under way: the results will be released this summer.

Longitudinal studies that follow large groups of scientists over time can present a clear picture of career progression, says Patrick Mulvey, a statistician at the American Institute of Physics in College Park, Maryland.

This winter, the US National Science Foundation launched just such a study, which will follow a cohort of scientists who earned their doctorates in the past decade. The study aims to bridge the gap between conventional surveys, which use rigorous sampling, and more-qualitative surveys, which emphasize individual stories.

When it delivers its results in 2016, the study should provide a cohesive picture of why each participant made their career choices and how they feel about them. But for now, the hunt for the elusive alumni continues. ■

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