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Postdoctoral Career Paths 2.0:

The Golden Triangle of Competitive Junior Investigators, Adequate Academic Systems, and Successful Careers

Proceedings of the 7th Forum on the Internationalization of Sciences and Humanities

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SPECIAL duz

CONTENTS

The 7th Forum on the Internationalization of Sciences and Humanities

Inside the IAB

Preface

Helmut Schwarz
President
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Peter Chen
Chair
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Dear reader,

The young generation of scientists and scholars is an essential driving force behind innovative research around the world. At the same time young researchers often have to navigate numerous obstacles in their nascent careers, and relatively few manage to find appropriate positions in academia after completing their postdoctoral appointments. However, the academic sector also fulfills its role in the wider innovation system if a substantial number of very talented junior researchers eventually turn to other, non-academic, careers. It is imperative that we tap the full potential of promising early-career investigators – not least because science and innovation are crucial for the future development of many economies.

To shed light on the outlook for today's postdoctoral researchers, and to discuss some of those alternative career options, the International Advisory Board of the Alexander von Humboldt Foundation convened the 7th Forum on the Internationalization of Sciences and Humanities in November 2013 entitled "Postdoctoral Career Paths 2.0: The Golden Triangle of Competitive Junior Investigators, Adequate Academic Systems, and Successful Careers".

Forum participants addressed the following key questions: What is the current situation of internationally mobile early-career investigators in different countries in terms of career perspectives? What are their needs and demands? And what are the demands of stakeholders and employers in academia, industry, and other sectors with regard to such internationally trained, highly qualified early-career researchers?

As in previous years, the Forum featured a wide array of perspectives, presented and discussed by its high-profile participants, including established academics, mid-career researchers, representatives from both developed and developing countries, as well as administrative stakeholders on the national, European and global level.

The purpose of this special supplement is to document these discussions and make them available to a wider audience in Germany and beyond. By providing this overview of the facts, viewpoints, and recommendations presented at the Forum, we hope to contribute to increased awareness and broader recognition of the many challenges confronting young investigators.

Sincerely,

Helmut Schwarz

Peter Chen

Central Points of Discussion

A Subjective Summary by Enno Aufderheide and Barbara Sheldon

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The Forum on the Internationalization of Sciences and Humanities aimed to identify current career options for junior researchers worldwide and to achieve a better understanding of the needs of young academics, as well as the demands of academia, the public sector, and industry. High-level experts in science policy and funding from around the world participated in the conference.

1. **There is a global increase in numbers of postdocs.** While some see a situation of oversupply and saturation, others believe the numbers meet the demands of science and society as a whole, and that society benefits when well-trained postdocs can fill leadership positions outside academia. While it is clear that the growing number of postdocs has increased the challenges and potential problems associated with postdoctoral careers, it remains debatable whether this is a societal problem or a problem of science. Is society as a whole responsible for addressing these challenges, or should it be addressed and resolved within the scientific community?

2. **There is no clear definition of postdocs.** Postdocs have no generally recognized status, no representation, and usually no transparent career development. This situation is prevalent not only in Germany, but to varying degrees also elsewhere in the world. In many countries there is a lack of information on the number of postdocs (by contrast, much more information is available on the number of PhD candidates). It is clear, however, that postdoctoral research is an international enterprise.

3. **There is a disconnect between the expectations of postdocs and the reality.** Most postdocs hope to receive tenure in academia, but few will. There is a lack of mentoring for postdoctoral researchers with regard to career planning (by contrast, mentoring is available for PhD candidates).

4. **A new culture of postdoctoral career paths must be established, which values non-academic careers as much as academic careers.** Reaching this goal will require a mentoring system which provides postdocs with support in making career decisions; networks must also be made available to postdocs. Greater transparency with regard to career paths and opportunities needs to become part of the system. Senior scientists, policy bodies and funding agencies play a crucial role in establishing such a culture. Wherever possible, aspects of mentoring should be integrated into the system and rewarded.

Michael Gallagher

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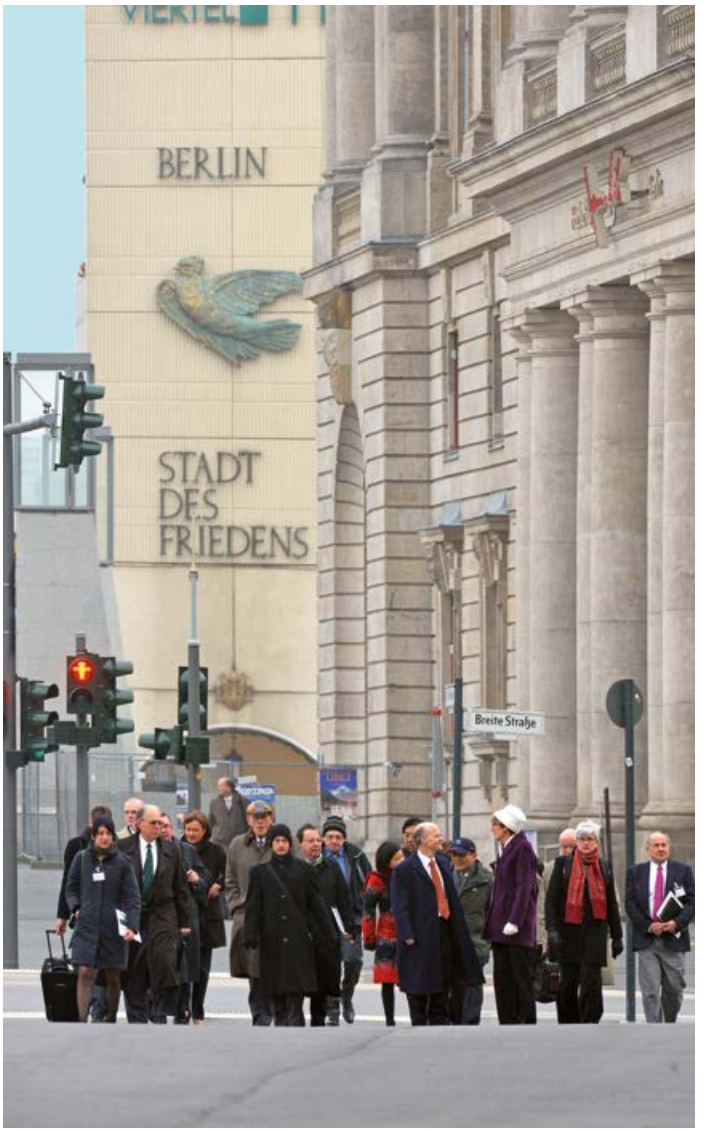
Postdocs and Changing Researcher Career Paths

Although nobody knows how many postdoctoral researchers there are worldwide, it is clear that their numbers are rising. Postdocs now work in a large variety of roles, and their career paths are becoming increasingly diverse. In order to improve the situation of postdoctoral researchers we need more clarity about the purpose of the postdoc as a career stage. | by Michael Gallagher



In 1947 the American Chemical Society suggested that postdocs needed improved mentoring to avoid narrow specialisation, and to better prepare them for careers in industry. Sixty years later, the first Humboldt Forum on postdoctoral career paths, held in Washington in 2007, noted, inter alia, that:

- Highly skilled people are now highly mobile.
- Countries are increasingly implementing policy measures to attract foreign and expatriate researchers, and competition among nations is intensifying.
- There is an increase in return flows of foreign-trained researchers to their home countries.
- Power asymmetries among nations could skew the mobility of talent.
- Mobility does not substitute for building research capacities at a local or national level.

Now six years further on, what are the pertinent observations to be made?
I will outline five sets for your consideration: (i) changing contexts of scale and purpose; (ii) increasing international mobility but with shifts in directional flows and greater mobility internal to Asia; (iii) diversification of career paths, within academe and beyond it; (iv) mismatches on multiple levels; and (v) professionalisation of services for postdocs in places of best practice. The focus of these observations is on the underlying drivers and unfolding implications rather than on current descriptors. Some challenging questions arise.

I. Changing contexts

There are probably in excess of 200,000 postdocs currently around the world,[1] possibly many more – differences in definitions and data deficiencies make it impossible to know the dimensions. The fact that no one knows how many postdocs there are, is itself a key issue that will have to be addressed in order to inform any serious, concerted effort to address problems and respond to changing needs.

Nevertheless, we do know that in an increasing number of countries, postdocs are growing in absolute numbers and as a share of all doctoral graduates. And in several advanced economies, the duration of postdocs has been increasing, with a reported range of between 1 and 12 years.

For several reasons, we can expect that postdocs will remain a permanent component of the researcher workforce and that their numbers will continue to rise.

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- **First**, PhD graduate production is escalating year on year. In 2006, more than 350,000 PhDs in science and engineering were awarded worldwide, and annual output is rising in the humanities and social sciences, too. If we project to 2013 (say 400,000 PhD graduates) and assume 25% transitioning via postdocs for four years on average then we could be looking at a stock of some 400,000 postdocs.
- **Second**, changes in the nature of knowledge including complexity of many contemporary research questions, often involving interdisciplinary approaches, require stronger, multi-skilled teams working on a sustained basis over time.
- **Third**, the scale of research infrastructure in an instrumented world, and the scope of data and related collection and processing technologies, call for larger concentrations of researchers and analysts in order to make efficient use of the large capital investments and obtain payoffs from them.
- **Fourth**, changes in the nature of academic work involve a reduction of the integrated academic core, and growth in a range of specialist roles and workforce structures in unbundled research, teaching and support functions which can blend academic and professional roles. Postdocs have become key components of the academic workforce, its cheapest part and a ready means of lifting academic productivity.
- **Fifth**, the postdoc has become the PhD+, the de facto terminal credential supplanting the PhD (Sample, 1993), and in a growing number of fields is an essential if not mandatory prerequisite and screening process for formal academic employment, although not a guaranteed path to employment security.
- **Sixth**, the intensifying quest for a competitive edge in the global knowledge economy, and the fear of being left behind in knowledge advancement, is causing more nations and regions to concentrate their investment in research capabilities (talent + facilities + networks), not only in universities but in enterprises and other institutions, often in collaboration and clustering with universities. Postdocs aged in their thirties are the most mobile group of advanced talent (Van Noorden, 2012).
- **Seventh**, the associated albeit spurious world rankings of universities and ratings of other knowledge- and innovation-oriented institutions, particularly their high use of metrics for research capacity and output, is driving them to provide inducements for attracting and retaining promising and proven talent.

"Most of this growth in higher education demand is occurring in the developing economies of Asia, Africa, the Middle East and Latin America, where there is a need to build supply capacity, including a more qualified academic workforce."

Irene Friesenhahn (Global Young Academy, Germany)

Putting these seven factors together, we can observe continuing expansion in the quantity of postdocs. Within a decade you can envisage that we will have more than one million postdocs worldwide. This is a simple derivative of the global growth of higher education participation from some 150 million students in 2007 (Altbach et al, 2010) to some 260 million in 2025 (Bjarnason et al, 2009).

Most of this growth in higher education demand is occurring in the developing economies of Asia, Africa, the Middle East and Latin America, where there is a need to build supply capacity, including a more qualified academic workforce. At the same time, more countries are seeking to build their capacity for innovation through capturing local applications of global knowledge advances and creating their own bases for breakthroughs – and this necessitates a build-up of research-trained workers.

Thus there is a rising, not falling, demand for postdocs – at least on a global basis if not for all countries. There are some indications of declining interest on the part of the citizens of some nations, and questions are being asked whether foreigners are crowding out locals.

II. International mobility

The mobility of researchers and scholars is important in the creation and diffusion of knowledge, both codified and tacit (OECD, 2008). We have long tended to understand student and researcher mobility as largely unidirectional from East to West. Foreign postdocs account for some 65% of the US postdoc workforce, 40% in the EU, 1% in China and less than 1% in Japan.

Now we are seeing more two-way flows with growth in West to East movements and increasing mobility within the Asia region.

China's rapid increase in research capacity and performance would not have been possible without the contributions of academics trained in the top institutions of other nations, whether the US, UK, Russia, Japan, Germany, France, Canada or Australia. For some time, though, concerns have been raised in China about the outflow of excellent students to developed countries to do doctorates and postdocs. Interestingly, the line of response has not been to limit the outflow but rather to attract good students from other developing countries and encourage overseas-trained Chinese nationals to return home. This is seen to require improving the graduate education and

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postdoctoral employment and training systems rather than simply attracting more foreign talent. The low salary and low employment expectancy mean most good Chinese PhD students would not choose to do postdocs in China at this stage.

The number of people commencing in-country postdocs in China each year has risen from 212 in 1992, to 2,217 in 2002, to 12,511 in 2012. Over 1985-2012 there have been 2,703 'moving stations' (mostly universities) and 2,129 'work stations' (involving business enterprises) approved as registered establishments for enrolling postdocs. Over the last two decades China has trained some 80,000 postdocs internally.

China has largely completed the task of staffing up its universities and colleges. It is now giving attention to producing doctoral graduates with skills sets and orientations more closely aligned with the needs of enterprises, such as through professional doctorates. Concurrently, it is shifting the locus for applied R&D to industry and giving greater attention to basic research in universities where it sees the need for long-term investment oriented to knowledge breakthroughs of the type made by Nobel Laureates, which it is determined to achieve.

III. Diversification of pathways

Postdocs have morphed since their inception just under a century ago. Initially they were a special investment in the cultivation of exceptional talent to transform the nature of learning in universities, which were themselves embracing a Humboldt-style research mission (Geiger, 1993). Then they became a stepping stone along an academic career path. They formed a holding pattern for contracted workers – neither students nor faculty – awaiting access to permanent academic appointment. As that waiting time has extended, they have become an integral part of the new division of academic labour, less by design than by default. The curious twist is that except for developing economies where there is a need to build capacity in the academic sector, the large bulk of postdocs

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"The curious twist is that except for developing economies where there is a need to build capacity in the academic sector, the large bulk of postdocs gain employment in non-academic areas."

gain employment in non-academic areas. The result is that many people are being held in positions doing work that benefits their institutions and sponsoring PIs but which adds little to their own longer-term career prospects whether inside or outside the academic labour market.

On the one hand, the spillover of postdocs into non-academic labour markets is accidental, and may be regarded as a second-best outcome for those whose aspirations have been set on an academic career. Arguably, accidental job outcomes that fall below expectations are suboptimal also in representing both an under-utilisation of acquired skills and an under-development of required skills for the jobs that postdocs do obtain. This is not to suggest simply that the non-academic labour market is a dumping ground for those not good enough to cut the academic mustard. There are multiple reasons for not persisting with academic careers and some of the brightest people make this choice. Rather it is to suggest that the system of postdoc formation has not been responsive to changes in the system-operating environment, neither changes in the scale and nature of postdoc participants, nor changes in the labour markets for postdocs. Consequently, an increasing number of postdocs are being let down and some exploited.

On the other hand, hundreds of global companies are offering postdoc positions in well-equipped labs with attractive conditions and good career prospects. Clearly, some enterprises value highly-trained researchers, seek them out and invest in them. They are not in the market for the discards. They want the top talent, and are direct competitors with universities in the talent market. They are also clients of the university graduate production system, and as they absorb more doctoral graduates they become understandably more demanding about graduate fitness to industry requirements. Yet the postdoc policy discourse remains largely university-centric and may be blind to wider trends, such as in the organisation of enterprises, work and workers in the mainstream economy. A major dimension of growth in academic staffing

"This trend to greater diversity of postdoc supply coincides with the greater differentiation of the academic workforce with diverse work patterns and career trajectories."

over the last two decades has been the expansion of 'sessional' appointments, the casualisation or adjunctification of the academic workforce via short-term contracts, or without contracts, ranging from students through to emeritus faculty.

Some see international postdocs as part of the growing contingency of academic labour, not so much a period of advanced training but more a form of academic wage labour (Cantwell, 2011), part of the trend to academic 'piece work'. Others suggest that we are seeing a form of 'free trade in minds' (Hawkins, 2012) and that attracting intellectual talent is starting to look like the buying and selling of football players (Wood, 2013).

This trend to greater diversity of postdoc supply coincides with the greater differentiation of the academic workforce with diverse work patterns and career trajectories (Cummings & Finkelstein, 2012). The pathways in the academic labour market are increasingly non-linear and not always progressively upwards. Within academic labour markets, individuals move up, sideways and down, including across blended roles (Coates & Goedeburre, 2010). The key point is that it is far too limiting to conceive of the postdoc as preparation for the traditional integrated academic role, even for the minority of postdocs who stay in the academic sector. Some may lament these developments as breaking down traditional academic norms, and interpret international mobility trends as aiding and abetting this breakdown, and seek to protect conventional academic roles and/or oppose open international academic mobility.

IV. Mismatches on multiple levels

The postdoc, which has been seen mostly as a temporary period of transition from being a student to being a faculty member, has become a permanent structural feature of contemporary higher education and research systems. For developing economies, the international postdoc is a passport to academic appointment. In advanced economies, the postdoc now functions in default mode as a transitioning means much more for non-academic than academic employment purposes. It may well be that it is also becoming, at least for some, an end point in itself – a career of multiple short-term placements that can be rewarding and convenient in the context of personal life choices. That development may be appreciated as aligning academic employment opportunities with those available in other labour markets.

On the balance of available evidence, the postdoc works well for many but not for all, and the current approach is especially hard on women. Clearly there is room for improvement. Importantly, the concerns that have been raised about postdocs in the West need to be addressed not only to satisfy western participants but also to ensure that what has become the hub of the global postdoc production system performs efficiently and effectively. The emergence around the world of rival sites for postdoc formation may be a fillip to an improvement effort, although its impact is likely to be dampened by the sheer growth in the scale of demand.

One of the main concerns is the gap between doctoral graduates' expectations and their realistic prospects. There are two dimensions to this concern. First is the quality of the postdoc experience, which can too often be the luck of the draw. In some big labs a postdoc can get lost or neglected or exploited and have to sink or swim in what can be a ruthlessly competitive race to publish reputable work. This can drive postdocs to more conservative research projects rather than the higher-risk topics with potential to advance scientific discoveries (NRC, 2005).

Second, it is about outcomes. Some 60% of postdocs expect academic tenure but only about 20% achieve it. Thus there has been a plethora of reports about

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postdocs as 'the ugly underbelly of academia', 'postdocalypse now', the 'buffer pool' in a 'holding pattern' until the balance between academic sector demand and supply equilibrates (and the baby-boomer professors actually retire!). These two matters can be seen as a breakdown of the implicit contract between universities and young researchers over low-paid temporary work now for secure, well-paid, well-regarded and satisfying work later.

Another set of concerns relates to relevance and effectiveness of postdoc training. This is the gap between preparation and requirement, notably for the 80% plus who do not progress to academic appointments. Here the argument is about postdocs having transferable cognitive and organisational skills, which are often undervalued by industry, but not having the 'soft skills' that industry values highly: team work, working with clients, and managing projects, people and budgets (Anderson & Mulvey, 2013).

Of course, this aspect of the debate accepts, without much question, a major leap in purpose logic: it assumes that the postdoc, which was designed entirely within academe and exclusively for internal academic reproduction, must now serve the needs of external organisations that employ postdocs because of the oversupply of doctoral-qualified graduates. There should at least be some discussion of the risk that, in reorienting the postdoc to suit the needs of what has become (arguably through lack of transparency, rigour and coherence within the academy) the majority postdoc population and the industry end-users of the supply surplus, the original purpose-value of the postdoc may well be undermined.

Also little discussed is the balance of postdoc training for research and academic teaching roles, when those roles are being unbundled, and the integrated academic core is shrinking. Perhaps notions of academic career options need to be refreshed. The great growth in higher education participation brings with it much greater diversity in students' abilities, backgrounds, needs and interests, and will require far-reaching innovations in teaching and learning. It is not self-evident that the postdoc is an adequate basis for developing the skills and understanding that will be needed for responsive teaching.

In several advanced economies the serial temporary postdoc has become a treadmill that can be frustrating and futile. There are many other more attractive prospects out there in the world of cloud computing and mobile devices for those with the skill and will to seize them. Thus if postdocs are too protracted, insecure, and relatively poorly remunerated, it may not be the brightest that do postdocs, but the most dogged and desperate of the local candidates. Some suggest that longer, multiple postdocs improve prospects of academic employment. Others contend that chances of securing a tenured position decline with each new postdoc contract (Edwards, 2009). Nevertheless, given the sheer scale of growth, there ought still to be an adequate supply of high-quality people available, if not from one country then from others. The question arises as to the extent to which international or 'foreign' talent displaces or discourages locally-available 'national' talent and whether it matters if it does. This question may well be more difficult for nations with less reliance on immigration (than say, Australia, Canada, the UK and the USA) for societal formation.

With the massification of the PhD and wider variance in the quality of doctoral graduates, there are pressures to lower the standard of postdoc quality. The lengthening of postdoc duration may reflect, in part, variability in quality, amid the obvious issue of quantitative oversupply. There is some indication of a stratifying effect through the progress of postdocs through multiple temporary engagements, with foreign postdocs gaining more prestigious appointments than local postdocs (Su, 2013).

The main threat to quality arises from the potential of governments to respond to local political pressure to preference their own nationals against foreign talent in postdoc and formal academic positions. Recently Singapore tightened up recruitment of foreign talent in response to local citizens' calls for 'Singapore for Singaporeans'. It would be self-defeating to concede to this pressure, for it would condemn a nation to rely in future on relative mediocrity and weaken the global capacity to employ all best efforts to solve problems that all nations share.

What are the enduring effects of postdoc expansion and mobility? Consider a country like Italy or Japan. It may have a largely insular system of academic workforce formation, where its professoriat is a product of its own institutions, including some whose entire career is within a single institution. It is hard to see such a system being globally competitive in the future.

Consider now country A and the different trajectories that individuals might follow from that country. A person may go from country A to country B to undertake a PhD and postdoc. There are then several permutations after the postdoc: first, the person stays in country B; second, the person returns to country A; third, the person moves to country C, either to do another postdoc or take up a job; fourth, fifth and sixth, the person either stays in country C or moves to another country D or returns to country A after a longer period away.

Sarah Stroumsa (The Hebrew University of Jerusalem, Israel) and Konrad Samwer (University of Göttingen, Germany)

What's in it for the person, and for countries A, B, C and D? For the person, assuming all goes well, there is the prospect of personal liberation from their limited circumstances, challenging research that can make a difference in solving important problems while broadening and deepening skills, a job outcome, higher income, a better life, and a wider set of professional and social networks.

For country A, there is a loss of talent if the person does not return but the possibility of ties being maintained between country A and country B (and possibly countries C and D). If the person returns, then country A gains the benefits of: a person with more advanced skills, broader experience and wider outlook; access to new knowledge, ideas and know-how; and links with country B. Importantly, country A, unless it has sent the person out on a scholarship from its own funds, gets these benefits without cost. The practical benefits depend on the extent that it can well integrate and make good use of the postdoc. For country B the costs of training are offset by the output that postdocs produce, their creative energy and contributions to productivity, and the goodwill they generate by speaking well of their host country. That is, the costs and benefits are shared, although not evenly, between countries A and B, while countries C and D experience only benefits.

Do foreigners crowd out locals? On the one hand, limited job opportunities and visa restrictions make low-paid postdoc positions more attractive to immigrants than to citizens and permanent residents (Lan 2012). On the other hand, the addition of foreign talent frees local citizens to pursue their interests and respond to market opportunities without net loss of capacity.

V. Professionalisation of postdoc services

Since the 2007 Humboldt Forum on this topic, there have been three main developments: (i) the establishment of postdoc associations and, in some universities, dedicated postdoc offices; (ii) improved tracking of postdocs; and (iii) more structured mentoring and job search assistance, including individual development plans.

Nevertheless, an evaluation in 2013 found that unrealistic expectations persisted and that the rate of progress may have plateaued. It was suggested that further progress "may require deeper cultural shifts, as opposed to more effective provision of information and implementation of human resources development policies and practices" (Vitae, 2013). One of the cultural issues identified was that of the priority of PIs to get research done and published, and the reluctance in that context of postdocs to ask for time to do a training course or an internship elsewhere. This is a caution against letting the area become process-driven, and it causes us to think how the postdoc might interpret well-meaning interventions by others in their adult lives. When mentoring is perceived by the mentee as a check on their performance it can act as a brake on their progress, a check on creativity, a limitation of the freedom that the postdoc has been promised. The best postdocs make great use of the freedom to experiment. There is a risk that the short durations of each postdoc amid a frantic push to publish, under the watch of mentoring, could be counterproductive, at least for those who can be and want to be independent.

What to do about postdocs?

Suggestions for what to do about postdocs range from cutting back on PhD numbers, discouraging postdoc take-up, capping postdoc durations, redirecting part of research project funding to early researcher career development, forming industry-specific postdocs, establishing the postdoc as a career end-point, providing pathway guarantees, and further professionalising postdoc support. The very diversity of such proposals reflects a confused sense of what postdocs are now for. Some of the suggestions also whistle in the wind against global growth, rising aspirations and associated credential inflation, alongside the pressures on universities to grow income and increase output at lower cost, and in that context for PIs to extract from postdocs the maximum contributions they can.

Four suggestions

Let me conclude with four suggestions:

- **First**, there is a need to consider whether it is appropriate to divide postdocs into two streams: one, the large majority, for jobs in the mainstream economy; and the other, a more elite group, for longer-term academic careers. There are perverse effects associated with prolonged postdocs, not least declining productivity. A few move reasonably quickly to an academic appointment in a reputable institution. Others hang on, or are held onto, with some gaining appointment to less reputable institutions,

Irene Friesenhahn (Global Young Academy, Germany) and Stefan Marcinowski (Max Planck Society, Germany)

while others resort to a different type of job for which their postdoc has not prepared them well, if at all. There should be ways of spotting early those who are likely to succeed and those who will struggle in the academic environment.

- **Second**, the structure of the postdoc itself needs attention, not only the job destinations for which it prepares individuals. This is to see the postdoc itself as a component part of the workforce structure, but a relatively rigid part. Many individuals could benefit from a more flexible approach to the postdoc being available part-time and via job-sharing, on a temporary and continuing basis, on the model of permanent part-time work found in other economic sectors.

- **Third**, we can see some common challenges across the quite different cultural and economic circumstances of nations. One challenge for parts of Europe as for parts of Asia and elsewhere is to achieve a shift from patronage and parochial approaches to meritocratic and cosmopolitan orientations. These are profound matters and political, too, both in the national political arena and in the internal politics of universities, but they are significant framing factors in any effort to open up the free movement of people and their effective functioning in different parts of the world.

- **Finally**, I think there is a shared responsibility to extend the professionalisation of postdoc information and services. There ought to be some internationally agreed definitions and data reference points, perhaps some joint information base, a set of protocols about transparent, fair and proper conduct, and benchmarking of good practice for the purposes of performance improvement. We have seen how the rise of postdoc associations have given a voice to Dr Invisible, how the academies, funding agencies and other bodies in the US gathered and published information and set conditions on receipt of funding, and the UK stakeholders developed the Concordat. These actions have been for the global public good. It is time to bring them together and build on them.

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Remarks

[1] This is a ballpark guestimate, assuming broadly the following composition: US= 80,000; Canada= 8,000; UK= 38,000; Europe (excl UK)=45,000; China= 30,000; Taiwan= 1,000; Hong Kong= 1,000; Australia= 6,000; Scandinavia= 1,000; Israel= 1,000; Singapore= 1,000; Japan= 1,000; NZ= 1,000; South Africa= 500; Latin America= 500.

Der-Tsai Lee

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Reviving Globally Stagnant Postdoctoral Careers

The serious postdoc glut in Taiwan is symptomatic of a larger imbalance – a disconnect between academic career development and the realities of the market. Restoring balance will require a collaborative, cross-sector effort to realign the PhD system with the demands of the global market, and may require universities to redefine their concept of academic excellence. | by Der-Tsai Lee

"We need to weave a deeper linkage between employers in need of high quality R&D human resources and young scholars through new programs or reforms in our PhD systems."

Young internationally mobile investigators currently face grim and ever more difficult challenges in Asia and the world. Overexpansion of PhD programs in Taiwan and Japan, for example, has produced a number of PhDs far exceeding the number of positions available in academia, government, and industry. Not only has the oversupply of PhDs caused a prolonged postdoctoral life, but more serious issues emerge, which triggered us to re-think the PhD system and the future careers of the postdoctorates it generates.

Supply to exceed demand

According to an article published in 2010 by The Economist[1], the US produced just under a third of the world's university students and half of its science and technology PhDs by 1970, while comprising only 6% of the global population. Since then America's annual output of PhDs has doubled to 64,000. The production of PhDs in other countries is also increasing, e.g. by 40% in OECD countries between 1998 and 2006, compared with 22% in the US.

In Japan, the government decided to boost R&D capacity by reforming higher education in the 1990s, which resulted in an increase from 320 graduate schools in 1991 to roughly 600 in 2007. The number of graduate students increased from 100,000 to 260,000 within 16 years. This overexpansion through government funding instead of market demand brought about an overproduction of doctorates.

In Taiwan additional factors affect higher education: an ageing population and a declining birth rate. Taiwan had a birth rate of 8.3 births per 1,000 in 2010, among the world's lowest, and the number of newborn babies declined from 342,000 in 1988 to 166,000 in 2010.[2] Though the birth rate climbed up to 8.61 in 2012 due to the effect of the Year of the Dragon, the overall downward trend has serious implications for the future. High schools are closing due to lack of students. Three years from now, this wave will hit universities. The demand for teachers is dwindling, causing unemployment or making PhD holders take positions at levels unmatched to their skills. Universities are beginning to face financial challenges and will be forced to adjust their PhD programs. Globalization further exacerbates the problem. For example, locally trained PhDs in Taiwan, whose number has grown in the last five years, have faced even tougher competition than their international peers. Like in many countries where internationalization is used as a key performance indicator (KPI) of excellence of higher education, universities in Taiwan prefer to hire foreign PhDs, as they bring more international perspectives (and a positive KPI score). According to a 2009 study[3], among the 380 university faculty members in the social sciences, 70% hold a foreign PhD, 70% of whom obtained their degrees in the US. This is an indication of the international mobility of postdocs, moving from economically well-positioned countries to less developed ones. This outflow of PhDs is particularly conspicuous during times of worldwide economic recession. Facing global competition, locally trained PhDs remain postdocs longer before finding an academic position.

The situation in Taiwan is not uncommon, and it may well serve as an example to watch for other fast-developing countries, like Brazil and China. They now seem short of PhDs and are trying to catch up, as many other countries did years ago, but will face such problems in the future.

Questioning the value of the PhD

The 2010 report "Doctoral degrees: The disposable academic"[4] by The Economist examined whether a PhD degree is worth pursuing from a career perspective. It compared the history of the higher education industry, its qualitative and quantitative impact, and the cost-performance ratio of a PhD degree versus a Master's from the labor perspective and concluded that completing a PhD is often a waste of time. A special issue of Nature in 2011[5] also addressed problems of the PhD system and called for change.

It was observed that traditional PhD training practices were not directly helpful or attractive to prospective employers in government or industry. PhDs were trained to do research in their specialized fields, of interest only to their own disciplines, and to help supervise graduate students in the lab and staff undergraduate or graduate courses for their faculty advisors. However, they are evaluated only by the research publications produced along the way. The experiences from doing administrative tasks in the lab or duties in classes may not be relevant if they want to seek non-academic jobs. We need to weave a deeper linkage between employers in need of high quality R&D human resources and young scholars through new programs or reforms in our PhD systems.

Solutions call for new priorities

A pragmatic in-situ solution for reviving the stagnant careers of postdocs is to redesign the hierarchical system in academia. Through deep and careful understanding of the domain's culture, creating a new position on the career ladder for postdocs, e.g. a lab head position in the life sciences, could help retain talented and more experienced postdocs, and maintain research continuity and competitive edge.[6] Academia Sinica in Taiwan has gone through such a revolution in the

Cathleen S. Fisher (American Friends of the Humboldt Foundation, USA) and Jeffrey Peck (City University of New York, USA)

past decade, creating a 'research engineer/specialist' tier for more experienced postdocs, so they can help PIs carry out research projects and manage turn-around research assistants in the lab.[7]

Other changes to the PhD system should be considered, for example offering training courses in communication and teamwork to build up soft skills useful for the labor market. Collaborating with industry to strengthen postdocs' employability provides yet another avenue. Globally and collectively speaking, support for post-doctoral research is a national investment in science and technology development. But resource allocation needs to be redesigned to reflect global societal and academic changes. Could we adopt a "Keynesianism" of global higher education policy, and would it help?

We need to remake the PhD program. Do away with rankings that use the number of PhDs as an indicator of academic excellence. Where these PhDs are placed after graduation and how they perform in the job market is much more important than pure numbers. Re-examine the PhD system in terms of purpose and make necessary changes, considering the well-being of PhD students and postdocs from their perspective, rather than from that of those who already hold a position in academia.

A problem only the global community can solve

A solution to the stagnant problem of internationally mobile postdocs might depend on the collaboration of all stakeholders, nationally and/or internationally, moulding a new generation of scholars through creative training and pragmatic, diversified task assignments. At the national level, new training programs could be initiated with coordination across sectors, e.g. organizing structured seminars on communication, business basics, and public policy for scientific PhDs, preparing them for jobs in government, industry, or non-profit sectors other than academia, or even to start up new businesses. At the international level, we could set up a coalition among developed or developing countries to jointly train PhD students and postdocs, like the International Research Training Group program of the DFG, Germany. Ultimately we must address this problem collectively from the view of the global academic community, crossing national and geographical boundaries. But we shall not fall into the trap of past failures of blind uncoordinated efforts without adequate planning.

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Postdoctoral Career Paths 2.0:

The Golden Triangle of Competitive Junior Investigators, Adequate Academic Systems, and Successful Careers

Peter Chen (ETH Zürich, Switzerland) and Debra W. Stewart (Council of Graduate Schools, USA)

On November 15 and 16, 2013, the International Advisory Board of the Alexander von Humboldt Foundation convened the 7th Forum on the Internationalization of Sciences and Humanities. The meeting took place at the Staatsratsgebäude in Berlin, former seat of the council governing the German Democratic Republic and now home to the ESMT – European School of Management and Technology.

The Forum saw distinguished researchers in various career stages as well as top-level science administrators and industry leaders come together to discuss "Postdoctoral Career Paths 2.0: The Golden Triangle of Competitive Junior Investigators, Adequate Academic Systems, and Successful Careers".

In order to add an international dimension to the ongoing debate about postdoctoral careers in and outside of Germany, the Humboldt Foundation brought together speakers from across the globe, incorporating perspectives from various countries and research systems, including Australia, Sénégal, Switzerland, Taiwan and the US.

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Debra W. Stewart

President, Council of Graduate Schools

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Postdoctoral Scholars in the United States: Challenges and Opportunities

Helping PhD graduates make more informed choices about what a postdoc will mean (and not mean) for their careers will go a long way towards improving the postdoctoral experience. Although we know precious little today about where scholars go and what they do following their postdoctoral work, we have taken the first steps towards building a postdoc "career tracker" knowledge base. | by Debra W. Stewart

In the United States postdoctoral scholars play a critical role in the scientific research enterprise and the demand for them remains strong. However, much work needs to be done to rationalize that system by improving information available to PhD graduates about career pathways and outcomes associated with the postdoctoral experience. Collecting comprehensive data on the postdoctoral experience and sharing those data with doctoral students to inform their post-graduation choices would significantly improve career systems for postdoctoral scholars in the United States.

The number of postdoctoral researchers has grown considerably over the past 40 years. Since the economic downturn in 2008, "postdocs" are more ubiquitous than ever, even in humanities fields, where postdoctoral appointments have been rare in the past. The number of international postdocs has grown rapidly in the sciences and in engineering, and since 1998, the percentage of international postdocs in these fields has increased at a higher rate than their domestic counterparts. Today over 50% of the postdoctoral scholars in STEM fields are non-US citizens.

Postdocs under the radar

Although we can spot the trends toward an increasing number of postdoctoral appointments and increasing internationalization, concrete information on this population is sorely lacking. Because each university classifies postdocs differently (sometimes as "staff," "faculty," or "other"), it is unclear exactly how many postdoctoral researchers are working in the United States at any given time. The National Science Foundation estimates the national number between 43,000 and 89,000.[1] Given this lack of even basic data, it comes as no surprise that we have little information on the international mobility and career trajectories of postdoctoral researchers. Before we can discuss what support postdocs need to launch their careers, therefore, it is essential that we systematically track the careers of postdocs.

Base wages for advanced degrees

While the postdoctoral position in the US offers PhDs the opportunity to pursue additional training, postdocs experience a wide range of work conditions. A small proportion of postdoctoral scholars work in national laboratories or corporate research laboratories where the salaries are strong and the career paths clear, but the vast majority of postdoctoral scholars holds their appointments in universities. Within this university environment, most postdocs are "hired" by principal investigators to provide research assistance on grants and contracts. It is this component of the postdoctoral scholar population that is most in need of attention. Critics charge that many postdocs in this

category suffer low pay and inadequate mentorship, sometimes even going unacknowledged as authors on scholarly publications resulting from their work. Others argue that low-wage postdoctoral researchers have become necessary to the practice of scientific research in the US because they artificially keep research costs low. Encouragingly, still others point to an emerging commitment, often from the graduate dean's office, to take institutional responsibility for professional and career development opportunities for all postdoctoral scholars. Indeed, we can point to many examples of strong programs currently underway. But in the final analysis two things need to happen. First, we must improve our capacity to collect accurate information on work conditions and career outcomes for all postdoctoral scholars. Second, we must be completely transparent with young scholars about career pathways available to a PhD.

Tracking postdocs

Two current studies promise to significantly advance the discussion about best practices with respect to young researchers in the United States. The first is a feasibility study launched in December by the Council of Graduate Schools designed to illuminate career pathways for PhD graduates across a broad range of PhD fields. This is essential to give students at this stage of receiving their doctorates adequate information about career options. The second is a study of the post-doctoral experience forthcoming in 2014 from the National Research Council designed to update the report on post-doctoral education issued by the academies in 2000.

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Reinhard Jahn

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Postdocs – A Neglected Group in the German Academic System

The uncertain status of PhDs and postdocs in Germany makes reliable career planning for young scientists nearly impossible. This has real consequences, including a net loss of valuable talent for Germany. Efforts are being made to remedy the situation, but real change will require revamping the German system from the bottom up, beginning with highly ingrained academic traditions and attitudes. | by Reinhard Jahn

"Considering the resistance such reform plans are presently facing from the academic establishment, I am not overly optimistic about the chance of success."

In contrast to most other countries there is no recognized postdoctoral status in Germany. Rather, postdocs comprise a diverse group of scientists, such as those holding salaried staff positions, recipients of various fellowships, and free-lancing researchers (in the humanities) who work on their second book and barely make a living from short-term teaching contracts. The only common denominator is that these scientists have completed their PhD, usually work in research under supervision, and do not have permanent contracts or a career track with transparent criteria for remaining in the academic system. There are no rules as to how to acquire a postdoc position, how postdocs are paid, how long typical contracts should last, and what exactly the jobs involve. In contrast to data on other recognized status groups we lack reliable statistics about postdocs in Germany. According to small sample studies, considerably less than 20% of them have a statistical chance to obtain a stable academic position during their career, which means that the vast majority will need to find jobs outside the academic system. On the other hand, academic careers in many disciplines require postdoctoral training as a prerequisite. However, the career steps after the postdoc phase are diverse and frequently lack clarity, making reliable planning of a scientific career in the German system exceedingly difficult.

Brain drain

Fundamental changes are overdue. Under the present conditions many scientific talents are wasted, resulting in frustrated career terminations at an age of up to 50 years. Furthermore, the system deters highly qualified scientists from pursuing an academic career, particularly women, who cannot combine family-planning with short-term contracts, frequent relocations, and uncertain perspectives. Also, many more excellent young scientists leave than enter Germany, as shown by the alarming migration statistics of the European Research Council.

Hope in junior academic positions

Various efforts have been made to remedy the situation. The implementation of junior research groups (junior group leaders, junior professors, etc.) as entry positions towards a professorial career was a milestone that has had a major influence on the academic landscape. These positions provide scientific independence at an early career stage, are usually competitively filled, are reasonably well-paid, and frequently include additional funds for establishing independent research activities. While most of these positions are time-limited with no perspective for permanency at the host institution, some universities and organizations have introduced tenure-track systems (most notably the TU München). Furthermore, a few universities have granted faculty status to such young group leaders, a privilege that traditionally is limited to permanently employed professors.

Fundamental reform – a Herculean task

Despite such positive developments we are still far away from system-wide changes. Indeed, the problems are almost insurmountable because both structures and cultural traditions need to change. The German university system is fragmented by 16 different state laws, each having its own regulations. In addition, the downside of an increasing institutional autonomy is that there is little coordination between the different organizations and universities, resulting in an almost impenetrable diversity of academic positions between the PhD and the permanently employed professor. Most notably, there is no consensus about the status of principal investigators, largely owing to the authoritarian roots of the system, resulting in scientists being dependent on senior professors sometimes for decades after completing the PhD. Reforms require coordination, legal changes, and above all a change in attitude. A Herculean task, and considering the resistance such reform plans are presently facing from the academic establishment, I am not overly optimistic about the chance of success.

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Challenges for Postdocs in Germany and Beyond: A Personal Perspective

When considering the oversupply of PhDs in Germany, and the resulting job insecurity, a comparative look at the Australian system offers some useful hints for improving the postdoctoral experience in Germany. | by Joern Fischer

Postdocs face a wide array of challenges, both in Germany, and in a range of other settings. My own background is that I studied in Australia, and also did my PhD and postdoc there. I then moved to Germany, where I have been a professor since late 2010. I currently work closely with several postdocs. My analysis of the challenges facing postdocs is an attempt to provide a bottom-up perspective – based both on my own experience in the (not so distant) past, as well as on my interactions with the postdocs I currently work with.

There are five specific challenges that I believe deserve consideration. First, high job insecurity is a key problem for postdocs. To a large extent, this results from an oversupply in postdocs relative to more senior academic positions. Of course, in some disciplines, industry provides viable alternative career paths. In others, most people doing postdocs will do so because they are seeking academic appointments – though statistically, only few will succeed in this endeavor. In Germany, the oversupply of postdocs results at least in part from the incentives for professors to build large (rather than excellent) research groups. The subsequent creation of postdoc positions serves the needs of a given professor, but does not necessarily help the oversupply of postdocs.

Creating a postdoc career ladder

Second, gradual promotion opportunities would be beneficial for postdocs. Here, I draw on my experience in both Australia and Germany, where contractual situations of postdocs are quite different. In Australia, the academic system has academic levels, from A to E. Postdocs are level A (sometimes B). In principle, if they are good, postdocs can be promoted to levels B or C. This does not guarantee them a lifetime appointment, but it provides a gradual career trajectory and a sense of direction.

Third, in Australia, postdocs are considered fully-fledged "academic staff" with both the right and responsibility to contribute to the development of their departments. By contrast many postdocs in Germany remain "assistants" to "their" professors. They are often not on the same email lists, and lack basic rights, such as the right to supervise PhD students. A particularly problematic situation in Germany is that many postdocs are not eligible to apply independently for many kinds of research funding. As a result, professors are often needed to officially head such applications, even if they are written by a postdoc.

> "In Australia, postdocs are considered fully-fledged 'academic staff' with both the right and responsibility to contribute to the development of their departments. By contrast many postdocs in Germany remain 'assistants' to 'their' professors."

Challenging conventional wisdom

The fourth problem is more general. Mobility is often considered to be a key issue in the postdoctoral career phase. On this issue, I would simply like to highlight that mobility should be the means to facilitate professional development and the generation of new insights – but mobility is not a meaningful end in its own right. This needs to be considered in postdoctoral programs. Some graduates stay where they were trained and do very good research; others move around the world and do very bad research. Mobility, on average, probably helps to get new ideas and perspectives, but it is not a meaningful goal worth funding in its own right.

Finally, I would like to emphasize that a diversity of approaches to career development and research excellence needs to be valued. Many postdocs are in their early to mid-thirties and many have children. Many would welcome part-time appointments. My own experience is that individuals with young families are often particularly efficient at work. Rather than working long hours, they make sure they reach their goals within whatever time budget they set for themselves. Part-time work, therefore, does not necessarily hinder research excellence.

The following five points should be considered in designing successful and enjoyable postdoctoral career paths:

1. Oversupply needs to be minimized.
2. Gradual promotion opportunities are preferable to all-or-nothing systems.
3. Postdocs should be treated as qualified academic staff, with the right to apply for funding and supervise PhD students.
4. Mobility during the postdoctoral stage can be helpful, but should not be considered an end in its own right.
5. Flexible work arrangements, including the option for part-time work, would be desirable for many postdocs.

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The "Animal Spirits" of Frontier Research

Forum participants considered ways to preserve the balance between postdoc autonomy and structured institutional support, while blazing new career trails outside the bounds of academia. | by Brandon Dotson

"Postdocs are like an 'underground economy' that, by virtue of a lack of regulation, enhances the circulation of people and ideas."

The 7th Forum on the Internationalization of Sciences and Humanities was one of those occasions where a group of experts, many with strongly held opinions, are content to acknowledge the complexity of a problem and avoid the pitfalls of imposing a hasty prescription. Among the points on which there appeared to be a broad consensus was the call to view postdoctoral fellowships as a career stage with many possible outcomes, rather than solely as a prelude to an academic career. Many contended that the success of the postdoctoral career stage should not be judged on whether or not someone continues on in academia. Indeed the simple arithmetic of available permanent academic jobs and the rising number of postdoctoral fellows indicates that only a very few will find themselves in professorial positions. One speaker, Walter Riess, even compared the situation to a corporate postdoc's chances of becoming president of his or her corporation.

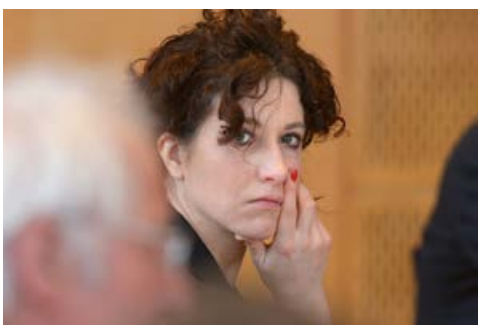
Degree inflation

Economic analogies were also fruitful for discussing the increase of postdoctoral fellows within universities. In the first place, Michael Gallagher discussed the emerging status of the postdoctoral fellowship as a "PhD plus" that essentially supplants the PhD as a terminal degree. In the context of internationalization, and Debra Stewart's discussion of numbers of postdocs in the United States, the devaluation of the PhD is reminiscent of what some economists openly refer to as an ongoing currency war, in which the US Federal Reserve, European Central Bank, and the central banks of China, Japan, the UK, and other nations use all means at their disposal to weaken their currencies in order to boost exports. In the context of PhDs, the US would seem to be losing the academic devaluation war, since it retains a solid PhD degree in comparison to the three-or-four-year model adopted in Europe through the Bologna Process.

Regulation versus risk-taking

On the regulation and integration of postdoctoral fellows within universities, a spectrum of opinions ranged from calls for firmer regulations concerning hiring practices, and clear information concerning a fellow's rights and duties vis-à-vis his or her institution, to a valorization of the comparatively deregulated environment in which postdoctoral fellows operate. Howard Alper made a compelling case – based in large part on the successes he has played no small part in achieving in Canada and elsewhere – for accurately registering postdoctoral fellows and incorporating them with the training programs and facilities normally available to faculty and students. Choon Fong Shih made an intriguing, somewhat countervailing point with recourse to an economic analogy: postdocs are like an "underground economy" that, by virtue of a lack of regulation, enhances the circulation of people and ideas. Choon Fong Shih also made the further, more specific point that decisions taken by committee, either for the appointment of faculty or for the acceptance of a student, tend to gravitate toward the mean, whereas a principal investigator is more likely to take on risk in hand-picking his or her team members. These are intriguing observations, and they do not necessarily contradict Alper's model of integration and mentoring; an "adequate academic system" – or perhaps an ideal one – might preserve the frontier ingenuity of devolving power to a PI while also integrating postdoctoral fellows into the university and granting them access to training and services.

This structural creativity, built on a dynamic combination of autonomy and support, succeeds at the level of institutional application. In this, it mirrors and supports the postdoctoral stage at the level of the individual, which, depending on the individual's application of himself or herself, is either a holding pattern for what comes next, or a proving ground for dynamic research.



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The Current Situation of Young Academics in Sénégal

Along with the familiar challenges faced by postdocs around the world – low job security, low wages and unclear career prospects – young academics in Sénégal must also overcome gender imbalance, lack of mobility, and an overdependence on private-sector funding, among other hurdles. Tapping the full potential of Sénégal's best young minds will require new research institutions, new policies, and new, more diversified funding mechanisms.[1] | by Mouhamed Moustapha Fall

"Research agendas and opportunities are restricted by the private sector and international donors"

According to a study conducted by the "Centre de Recherche sur les Politiques Sociales" (CREPOS), young academics and researchers in Sénégal generally "are proud of their profession and their motivations are mostly: their passion for research, scientific curiosity, thirst for knowledge, and the wish to participate in knowledge production for national development" (WARC/CREPOS 2011: 5). Yet, their situation is rather unfavourable. Following a number of university reforms introduced by the state over the past 20 years, partly under donor influence, access to higher education, PhD programs and professional positions has increased for young researchers, but their current environment does not favour productivity and mobility. The reforms did not change structural conditions. The above-mentioned study concludes that without further reforms "the research environment and system are unable to address the challenges and goals for local and national development [. . .] even more so than the latest reforms of the higher education sector left aside much of the problem of the governance of research" (WARC/CREPOS 2011: 4).

The problems that remain …

No indication of change in researcher mobility in Sénégalese universities: Despite international collaboration and significant donor support, PhD students and young scholars have limited access to international mobility programs, partly due to lack of information and funding. Despite increased access to PhD programs, postdoctoral programs and employment in universities, posts are mostly part-time and precariously paid. PhD students have to spend too much time on lecturing and consulting work, limiting scientific productivity.

Lack of research funding: The research department in the Ministry of Higher Education and Research is poorly attended, and in universities less than 1% of the budget is allocated to research. At the University of Dakar, there is no budget line for research in the budgetary nomenclature.

Research agendas and opportunities are restricted by the private sector and international donors: "the support of private organisations and international partners to research is quite real and concrete on the ground. However, researchers still blame them for orienting research agendas through their policy preferences and interests which are not often cross-cutting with national needs in the domain of research" (WARC/CREPOS op. cit.: 4).

Research is often ineffective for two main reasons: recruitment of junior researchers is often "bureaucratic, non transparent, archaic and most of the times clientelistic" (Ibid.: 4). Second, young academics have also condemned "the poor level and sometimes the absence of scientific animation due to the behaviour of senior researchers who run the research groups and laboratories" (Ibid.).

Gender imbalances prevail: Although the rate of enrolment of women at Sénégalese universities is higher than that of males,"women are poorly represented in the field of research" (Ibid.: 3), due to social constraints, marriage, stereotypes of young female academics or students who are married or mothers. At the same time, the few women researchers acknowledge that being female poses no particular challenge to their efficiency or job (Ibid.: 6). Gender imbalances are rooted in the weak level of admission of women in the HES. In 2007 the average percentage of women entering universities was 34%, with strong disparities between faculties and departments: in the medical sciences it was 38%, compared to 17% in science and technology, while in private universities we are close to parity with 11,154 women and 12,164 men (SENCAMPUS 2010: 2).

Poor general research conditions: there is a lack of quality control and of information (insufficient internet access, insufficient information about international research programs, etc.).

Career opportunities

One of the main strategic goals of the Programme Decennial de l'Education et de la Formation[2] was to quickly achieve "correspondence between training and employment" (PDEF 2003: 108). However, the reality on the ground remains different and presents many interrelated challenges.

Unemployment among young PhD holders and academics is high, and many live under precarious conditions. The development of private higher education absorbs some as teachers. According to the

"Improvements could be achieved by creating high quality research institutions which are independent from universities and financially less dependent on the state."

Ministry of Higher Education, there were 23,318 students in private universities between 2007 and 2008, representing 22% of the total 91,359. However, the absence of research in most private universities prevents these young academics from pursuing research careers. Consulting also helps absorb young academics and researchers but could become more sustainable through better organization and democratization.

Incapacity and lack of genuine commitment among higher education and research institutions requires self-funding strategies for research, despite a growing understanding that research programs are needed for the labor market in general and the private sector in particular.

Improvements could be achieved by creating high quality research institutions which are independent from universities and financially less dependent on the state, with competitive staff recruitment and wages at international standards. Such centers should be continuously evaluated and monitored by independent experts. Examples: African Institute of Mathematical Sciences (AIMS) Sénégal, Institute of Security Studies (ISS). This would also encourage return policies aimed at limiting brain drain from Africa.

Pressing challenges

The science and research system in Sénégal faces two types of pressing challenges: institutional and financial. With regard to institutions, the following reforms need to be tackled:

- Reframing existing research institutions in and outside universities with a focus on their proper functioning
- Developing new domains of research training that take into account recent advances in research in order to attract foreign researchers
- Improving governance, in particular accountability of service delivery and financial management
- Monitoring and evaluation of quality management in universities
- Reviewing the secondary and high school education system to allow young academics early specialization in relevant fields
- Reviewing evaluation systems of international organizations like CAMES,[3] which are mainly based on quantity (years of teaching, number of publications, etc.), not quality (citations, journal impact factors, etc.).

There are many donors and financed projects in Africa, particularly in politically stable Sénégal. Since the 2008 crisis, funds have decreased, but the Humboldt Foundation, the German Academic Exchange Service, the International Development Research Center, the World Bank, UNESCO-BREDA and others are still present. A few challenges to overcome in the near future:

- Obtaining increased funding for existing research institutions; but also creating new research institutions to serve not only as locomotives to existing institutions, but also as templates to foster competition.
- Diversifying the sources for funding: The **state** should not only provide traditional public funding, which is increasing but still limited, but also funding for additional service delivery. The state should prepare to take over funding of relevant research projects initially funded by donors, usually for a limited time.

  Higher education research institutions should look at self-funding and consulting (with more control and accountability) and develop research and teaching programs in collaboration with companies.

  The **private sector should** consider funding of research programs in collaboration with academic institutions: this requires the ability of academic institutions and the state to create offers and deals attractive to the private sector.

  The focus of **donors** needs to shift to accountability to enable a more rational use of additional and contracted funding.

Remarks

[1] The author would like to thank Professor Souleymane Bachir Diagne (Columbia University, New York, USA) and Dr. Aboubakr Tandia (University of Bayreuth, Germany) for their valuable comments on this paper.

[2] Ten-Year Program of Education and Training between 1998-2008. www.gouv.sn/Programme-decennal-de-l-education.html

[3] Conseil Africain et Malgache pour l'Enseignement Supérieur

Annette Schmidtmann (German Research Foundation (DFG), Germany), Gerhard Casper (Stanford University, USA), Katharina Boele-Woelki (Utrecht University, Netherlands), Sarah Stroumsa (The Hebrew University of Jerusalem, Israel)

Conclusions

In order to improve the situation of young academics in Sénégal, the following steps should be taken:

- Newly created institutions such as doctoral schools and commissions need to be made more functional and accountable through sound governance monitoring, evaluation, and more financial resources.
- New endowment funds for PhDs and young academics should be financed by higher registration fees. These funds should be dedicated to increasing the quality of training and access to literature for PhD students and lecturers, as well as research fieldwork, conference and workshop participation, etc.

The recent National Consultation for Higher Education, approved in 2013 by the Presidential Council on Higher Education, recommends increasing the percentage of university research budgets by:

- Increasing endowment funds through additional state contribution and through increased registration fees, starting from the academic year 2013-2014
- Increasing budgets for research groups and laboratories
- Self-funding services to sustain existing professional training programs (courses, consulting, etc.), and create new ones that target the needs of the market and the state for development purposes more precisely.
- New policies are needed that address the economic integration of young academics and PhD holders, the majority of which are jobless or precariously employed.
- Young academics and researchers could be employed by current projects, still under scrutiny within the Higher Education and Research Ministry, for the creation of a National Centre of Scientific Research and a Centre for Research and Testing.

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"Roads Grow Out of Going Them" Franz Kafka

While Germany has made progress in supporting postdoc researchers, improvements must still be made to encourage scientific independence and risk-taking – and to create the structures and transparency necessary for steady progress along the career development path. | by Iryna Gurevych

Target group: In discussing postdoctoral career paths, we have to define the term "postdoc" and the target group more clearly. Are postdocs young researchers who have completed their PhDs no more than two years ago? Or do we mean the whole time period between PhD and attaining a faculty position? Support measures for postdoctoral researchers differ for different populations within this larger group

Postdoc programs: In the last ten years Germany has established a set of programs to support postdoctoral researchers. I have had excellent personal experience with the Emmy Noether program of the German Research Foundation and the Lichtenberg Program of the Volkswagen Foundation. Also, the European Research Council has started a program called ERC Starting Grants. Please note that the programs are similar but still differ regarding their specific conditions.

"PhD student supervision also requires leadership skills such as conflict management."

How to determine scientific excellence: The ERC's major selection criterion is scientific excellence. But how does one define scientific excellence? The answer may be highly dependent on the research field and on the views of the individual reviewers. Journal publications, for example, may be unusual in some subfields of computer science. The impact factor of publications may also depend on the size of the target research community. A smaller community or non-mainstream topics are a disadvantage for young researchers. Moreover, academic achievements are highly relative to the "scientific age" within the range of 2-6 years since PhD completion.

Scientific independence: Senior postdoctoral researchers need the right to supervise PhD students. This may require reforms and organizational adjustments at the host institution. PhD student supervision, however, also requires leadership skills beyond pure research skills, such as conflict management. Especially in a foreign university system, the postdoc may benefit from having a mentor. Many young independent group leaders struggle to attract high-quality staff, since their personal situation is still unstable and established groups are often preferred over young groups. The performance of the group leader should be subject to evaluation, since things may evolve differently to the ideal scenario for group leaders, too.

Mobility: In many fields, young researchers are expected to demonstrate high mobility. However, the postdoctoral phase is also the time for many young people to start their families, which is often incompatible with high mobility. Thus, it is necessary to define alternative paths of acquiring international experience, e.g. within the so-called "sandwich projects" performed in collaboration with partners abroad.

Teaching experience: For a career in academics, PhDs must demonstrate success as researchers, but being a professor also requires teaching experience. It is crucial for postdoctoral researchers to be able to teach and acquire experience in working with younger students. Thus, being affiliated to a university is important, even if the postdoc is located at a research institute.

Heterogeneity of postdoc career paths: In recent years, a variety of national and international programs have been established. They differ regarding their requirements, application procedures and funding conditions. For an individual, they are not easy to assess and compare. The EU would benefit from having a centralized entity that could advise postdoctoral researchers on possible career paths and the necessary career development steps, including writing successful grant applications. Alternatively, such entities can be established at the individual universities, similar to existing entities for advising doctoral students.

> "The EU would benefit from having a centralized entity that could advise postdoctoral researchers on possible career paths."

Interdisciplinary topics: Postdoctoral researchers working on an interdisciplinary topic may need additional support. Mainstream research is often preferred due to the discipline-specific reviewing system. It is much harder to position an interdisciplinary project that breaks new ground and works at the intersection of different fields. Because of the increased importance of interdisciplinary research, special measures are needed so that this research can be evaluated differently from mainstream, discipline-specific research, and so postdoctoral researchers are encouraged to pursue this more risky career path.

Dietmar Gross

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Fostering Exchange between Academia and Industry

Collaboration is the key to preparing postdocs for strategy-driven research. | by Dietmar Gross

Research-focused pharmaceutical companies offer, to a certain extent, postdoctoral positions and programs. These research activities are focused within the research strategy of the respective company. How can academic research institutions prepare postdocs for careers beyond academic research?

Close collaboration of academic institutions with industry will foster exchange between researchers to get a better understanding of the respective strategic research areas. International experience in the respective area as well as experience beyond the research performed in the PhD thesis seems to be a prerequisite. Previous work with widely accepted research groups in the respective field is seen as an advantage for a postdoctoral fellowship in industry.

The expectation is to provide talents with the experience to drive innovative research approaches within the respective company and in collaboration with partners in academia.

Walter Riess

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Prerequisites for Successful Careers in Academia and Beyond – A Personal Account

Today's postdocs must assume responsibility for planning and creating their own career success. But academic and industrial institutions must share the burden of this responsibility so that society benefits from what these young talents have to offer. | by Walter Riess

The invitation to the Humboldt Forum on Postdoctoral Careers made me reflect on my professional journey and in particular the circumstances which have been crucial for my career. The career roadmap from postdoctoral fellow to employment in industry, as an R&D staff scientist or a university professor, is today both similar and vastly different today than it was when I studied at the University of Bayreuth in the late 1980s. The important components of having a successful career, however, have remained the same.

During my habilitation (I wanted to become a professor) it was a requirement to do a postdoctoral fellowship. I was offered a few opportunities. From a scientific perspective I was not particularly interested in any of them, but at that point I had no better alternatives. One day my supervisor told me that, by accident, he had opened up an opportunity for me during his his visit to the IBM Zurich Research Laboratory in Rüschlikon (they were very interested in our research). I accepted their offer and, despite attractive offers from academia, I am still at the IBM Research Lab today.

Success today requires planning

In general, the postdoctoral fellowship can be decisive for the entire career. In my case it definitely was. Did I plan my postdoctoral fellowship strategically? No, I didn't. However, and this is very important, I had an excellent mentor and advisor, my professor; I had a return ticket to my home institution after my postdoctoral fellowship, I had a research topic which was highly attractive for both industry and academia, and perhaps most importantly: I was lucky. I was in the right place at the right time. However, you should not count solely on luck. Because the scientific and industrial environment has become so competitive, strategic thinking and planning is the key to a successful career for postdoctoral researchers today! Before starting a postdoctoral fellowship it is important to ask yourself the following questions: Why am I doing a postdoc? Where (academia or industry) and at which institution would I like to do it? And most importantly: What comes after that?

Wolfgang A. Herrmann

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Tapping the Postdoc Talent Pool: Tenure Track and Alternative Career Channels

To get the most out of Germany's tremendous human resources in the sciences and research, TUM is creating new academic career tracks and finding ways to prepare postdocs for new and different career opportunities. | by Wolfgang A. Herrmann

> "Before starting a postdoctoral fellowship it is important to ask yourself the following questions: Why am I doing a postdoc? Where would I like to do it? And most importantly: What comes after that?"

In preparation for the Humboldt Forum I met with the postdoctoral fellows in my department. We discussed their expectations regarding a postdoctoral fellowship in industry, their challenges in the new environment, and what they would like to achieve with their research. I asked them a modified version of the simple questions above:

- Why are you doing a postdoctoral fellowship?
- Why are you doing it in Switzerland?
- Why at IBM Research - Zurich?

What's next?

All of them had conclusive answers to all three questions. However, although I had had regular discussions with my postdocs about their future plans, I had not been fully aware of their lack of attention to strategic planning with regard to the next steps after their postdoctoral fellowship. I also realized that some of them were clearly interested in continuing their career in academia, but had not yet been in regular contact with academia, and had no real mentors or supporters in academia. Others, who were interested in an industrial career, had started looking for industrial job opportunities very late.

Institutions have an obligation

Of course, we can argue that we are all architects of our own future. However, our society cannot afford to let these highly-skilled talents fail in their careers. It is not only the postdoctoral fellow who should do the homework, it is also the responsibility of the academic institution, of the mentor(s) and the host institution to advise, provide guidance, and provide an environment conducive to successful research, which, in turn, will pave the road for a successful career beyond the postdoctoral fellowship.

"In Germany a very rigid hiring system prevails in higher education. Few positions are available, and these are typically filled by more senior researchers."

Today highly-skilled personnel are in short supply in Germany, with one striking exception: in academia, every advertised position or grant for a postdoctoral researcher ("postdoc") draws a large number of applications, and competition is fierce. Opening new channels between this brimming talent pool and the strong job market could benefit both sides – young scientists and employers alike.

Over the course of his or her career, a single professor or laboratory head trains dozens of qualified candidates for equivalent positions, while the (small) pool of permanent positions at universities and research institutes grows at a much slower rate. Does this mean that outstanding university graduates should be discouraged from pursuing a PhD? Not at all! But changes are needed on two fronts, in the system itself and in postdocs' willingness to consider and explore a wider variety of career paths.

In Germany a very rigid hiring system prevails in higher education. Few positions are available, and these are typically filled by more senior researchers. At TUM a Faculty Tenure Track (unique in Germany) has been established as the foundation of a rigorous performance-oriented Recruitment- and Career-System, promoting young scientists along the full academic ladder and creating real opportunities for talented young researchers to remain in academia. Furthermore, TUM fosters the independence and autonomy of excellent postdocs as TUM Junior Fellows, who have the right to award PhD degrees and participate actively in the governing of academic departments.

Special university-wide programs for postdocs shape the mindset of the academic community with regard to the importance of this group. As part of the Research Opportunities Week, 50 postdocs per year spend five days at TUM – an event that is fully funded by TUM with the Postdoc Mobility Travel Grant. The candidates have the opportunity to meet exceptional academics, explore the research facilities at TUM, and talk with experts in their field. The most talented participants are offered a TUM University Foundation Fellowship to spend one year as a postdoc at TUM.

When talking about the postdoctoral phase, one has to recognize that different fields of expertise have different cultures and different timetables. In the natural sciences, for example, the doctoral phase is typically shorter (three to four years); in engineering it typically takes more than six years and does not really foster a postdoctoral phase.

Further career options can be found in industry or entrepreneurship, as well as in areas such as research support and grant administration, science policy, technology transfer, and intellectual property. Given that many career paths, especially outside academia, demand skills beyond being extremely knowledgeable in one research field, universities need to offer their young talents courses in transferable skills, as well as career counseling services. TUM provides these services, for instance, with the extensive qualification program offered by the TUM Graduate School, including courses in communication, leadership and management. Most postdocs are very innovative, internationally savvy, hard-working, meticulous, and capable of analyzing and interpreting complex results – characteristics prized by many employers in diverse fields. For science policy makers and research funding agencies, postdocs can provide valuable hands-on experience and insider perspectives.

Helmut Schwarz and Enno Aufderheide (Alexander von Humboldt Foundation, Germany)

Nowadays, due to enhanced student mobility and research exchange programs, the postdoc period is no longer the first experience abroad for young scientists. Nevertheless, competing for a postdoc-level grant or position at a foreign university often requires gathering detailed information concerning the host group and writing an ambitious research proposal on a level far beyond university-sponsored exchange programs and supervisor-supported cooperations during the PhD period. Young scientists become increasingly self-reliant before and during the postdoc experience, and they certainly offer "added value" for future employers in both the public and the private sectors.

Cathleen S. Fisher
President, American Friends of the Alexander von Humboldt Foundation, Washington, DC, USA

Beyond Basic Reform: A US Perspective on Building Scientific Talent for the Future

In the US, individual fixes to the "postdoc problem" have begun improving the postdoctoral experience for some. But the root causes of the supply-demand imbalance – our economic dependence on cheap and abundant research, ingrained value systems within the Academy, and the larger forces of globalization – remain considerably more difficult to address, much less change. | by Cathleen S. Fisher

"The projected explosion in the number of postdocs worldwide is already a reality in the United States."

The hopes, expectations, and professional trajectories of early career researchers are critical to the continued vitality of the scientific enterprise in the United States and around the world. Following over a decade of debate, US funding agencies, research institutions and individual researchers have taken some basic steps to improve our understanding of the postdoc population and to meet the needs of early career researchers. Much remains to be done, however, to adapt scientific training to fundamental changes in higher education and research and the emergence of truly global career paths.

Discouraging numbers

The projected explosion in the number of postdocs worldwide is already a reality in the United States. Precise data on the total number of US postdocs in all fields is still lacking, leading to wide variations in estimates of the overall postdoc population. Recent improvements in methods of data collection and reporting are yielding more accurate estimates in the sciences, however. For example, according to the most recent data available in the annual Survey of Graduate Students and Postdoctorates in Science and Engineering sponsored by the US National Science Foundation (NSF) and National Institutes of Health (NIH), the number of postdocs in academic institutions in sciences, engineering, and health has more than tripled in recent decades, rising to nearly 63,000 in 2011. Though solid data is still lacking for the humanities, here too, the number of postdocs has reportedly increased in the last 15-20 years as well. A concomitant stagnation in the academic job market has helped transform the postdoctoral fellowship from an opportunity to gain valuable training on the way to an academic position, to a waiting room for young researchers who have been unable to secure one of the dwindling numbers of full-time, tenure-track appointments.

"Though the systemic dimension of the problem has not been addressed, significant progress has been made toward solving some of the basic problems, including the 'data gap' and the status and compensation of postdocs."

As in other countries, the majority of postdocs in the United States will pursue non-academic careers – roughly 80%, according to most estimates. In the biomedical field, for example, the NIH projects that only 26% of PhDs will secure tenured or tenure-track faculty positions, in contrast to 34% in 1993. Prospects are little different in other scientific disciplines and downright grim in the humanities.

Early reforms and signs of progress

Fortunately, awareness of the changing prospects and needs of early career researchers in the United States has also grown over the last decade, propelled by funding agencies, research institutions, and postdocs themselves. Though the systemic dimension of the problem has not been addressed, significant progress has been made, particularly at top-tier research institutions, toward solving some of the basic problems discussed at the 2013 Forum, including the "data gap" and the status and compensation of postdocs.

Reforms to the way that US funding agencies and research institutions collect and/or report data on graduate students and postdocs have improved estimates of the overall postdoc population and enhanced understanding of its characteristics. Following revisions to survey methods, the bi-annual NSF-NIH survey provides information on postdocs by field, gender, race/ethnicity, and nationality or citizenship. While the survey continues to underreport the actual number of postdocs, many US research institutions now have a much better sense of the size and profile of their postdoc populations. Important gaps remain, however. Information on outcomes, i.e. where graduate students and postdocs eventually end up, is piecemeal

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or nonexistent at many institutions, highlighting the need for the comprehensive study of graduate outcomes, as cited by Deborah Stewart of the Council of Graduate Schools.

A consensus is also emerging on the institutional status of postdocs, as well as basic standards for compensation and benefits. The NSF and NIH have agreed on the definition of a postdoc as "a temporary and defined period of mentored advanced training to enhance the professional skills and research independence needed to pursue his or her chosen path." Over the last several decades, the National Academy of Sciences, the NIH, and the NSF have all proposed changes in the treatment and training of postdocs. For example, in its report on Enhancing the Postdoctoral Experience for Scientists and Engineers (2000), the National Academies' Committee on Science, Engineering, and Public Policy (COSEPUP) recommended policies related to the recognition, standing, compensation and training of postdocs in the United States. A much anticipated update on the report is expected in 2014.

The NIH has played an influential role in encouraging change at the research institutions that benefit from federal research grants in the biomedical sciences, including minimum pay standards. Building on previous reports, in 2012 the NIH's Biomedical Research Workforce Working Group recommended diverse training experience, including project management, teaching, and business entrepreneurship skills, and underscored the need to expose postdocs to a variety of career paths.

Last, but not least, postdocs themselves have helped to define and articulate their needs and to champion policy reforms. Founded in 2003, the National Postdoc Association (NPA) partners with professional associations, funding agencies and research institutions to improve the postdoc experience. Among the recommendations the NPA has advanced are the establishment of postdoc offices at research institutions, the adoption of policies to define postdocs' status, clear and fair terms of employment, and guaranteed access to campus resources, including health services and expanded career and professional development services. Most recently, the NPA has championed changes in training to provide postdocs certain "core competencies" in preparation for a wider range of careers. Critically, in the highly fractionated US system, the NPA helps to disseminate best practices across individual institutions and disciplines.

The efforts of the NPA, as well as recommendations of the funding agencies and other advocates for change, have borne fruit. Top-tier US research institutions have established postdoctoral offices and implemented some of the recommendations related to institutional status, minimum pay and benefits, and enhanced career training and guidance. In the University of California system, for example, postdocs are now unionized, have recognized status, and enjoy access to health insurance and other campus services. At some campuses in the UC system, services include career and professional development programs previously available only to graduate students and, for foreign postdocs, additional language training and assistance on visa issues.

"The US debate on postdocs has shifted to the fundamental question raised at the 2013 Forum, namely, the need for a new culture of multiple career paths beyond the postdoctoral phase."

Seeds of a culture change

With questions of basic status now on their way to being resolved (at least at leading institutions), the US debate on postdocs has shifted to the fundamental question raised at the 2013 Forum, namely, the need for a new culture of multiple career paths beyond the postdoctoral phase.

The life sciences are again playing a prominent role in this respect. In September 2013, the NIH announced $3.7 million in awards to ten institutions for programs aimed at "Broadening Experience in Scientific Training" (BEST). The BEST awards will support "bold and innovative approaches to increase student and trainee exposure to multiple research and research-related career options." Among the key components of successful proposals are effective measures to evaluate the success of the programs and concepts that can be scaled and adopted by other institutions.

New York University's Medical Center and the University of California San Francisco are among the recipients of the first round of BEST awards. At NYU, the ten-week program for early career researchers includes: self-assessment exercises; sessions with biomedical researchers who are engaged in diverse occupations, including university administration, science writing, industry research and management, science policy, and nonprofit management; and creation of an individual plan to develop the requisite skills and networks to succeed in one's chosen field. At the University of California San Francisco, the "MIND" initiative, short for "Motivating Informed Decisions," similarly aims to fill the knowledge gaps that graduate students and postdocs have about non-academic careers. Like the NYU program, the MIND initiative will leverage the institution's networks to expose participants to different career options; additionally, graduate students and postdocs will receive assistance in drafting an individual development plan and complete coursework designed to help them move toward their defined goals. Both initiatives are collecting data to advance understanding of postdocs' expectations and outcomes. By gathering information, in particular, on postdocs' outcomes, both institutions hope to contribute to a "culture change" such that academic and non-academic career paths are valued more equally.

"The scientific enterprise, including funding agencies, research institutions and individual investigators, has become dependent upon well-educated and cheap labor."

Scientific and professional societies, even beyond the sciences, are also taking the reality of "multiple careers" seriously. At their annual meetings, both the Modern Language Society (MLA) and the American Historical Association (AHA) have organized sessions on "alt-ac" careers. In December 2012, the Andrew W. Mellon Foundation awarded grants to both the MLA and AHA to support their efforts to help prepare humanities PhDs for careers outside of academia.

Digging down to the root

Though significant progress has been made, reform is still piecemeal. Institutional, structural, and cultural impediments to large-scale change remain. As many participants in the 2013 Forum concluded, ultimately, the "solution" to the challenges facing early career researchers in the United States and elsewhere will be multidimensional and complex – and difficult. Beyond the reforms already in place or contemplated, three fundamental issues merit further debate.

First, as noted by several participants, we need to recognize – and act upon – the fact that individual early career researchers do not bear full responsibility for the challenges they face. The "postdoc issue" is part of a much larger context and debate. The origins of the problem are to be found in the emergence of mass higher education and the increasing dependence of modern societies and economies on research and innovation as guarantors of jobs, prosperity, and growth – all of which has contributed to an explosion in the number of PhDs and postdocs. The scientific enterprise, including funding agencies, research institutions and individual investigators, has become dependent upon well-educated and cheap labor. Postdocs, in other words, are an essential part of a status quo that benefits many. Without

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tackling these structural issues, it will be difficult to move beyond piecemeal programs that place the primary responsibility for solutions and positive outcomes on individuals. As the problem is partly systemic in nature, so, too, must be the solution.

The second great challenge relates to a dominant culture that favors academic careers. "Exposure" to multiple career options and better information may help individual postdocs make more optimal decisions. But even with better information, choices will still be influenced by the values and often subtle messaging of advisors and mentors within the system, who still tend to favor academic careers. The success of the BEST grants or other initiatives may depend on whether they can, in fact, affect a sea change in thinking, such that all career options are equally valued. That remains a monumental task.

Finally, the highly international and mobile character of the postdoc population in the United States and other countries will complicate efforts to prepare young researchers for careers outside of academe. Within the Academy, university systems around the world have grown more similar at the PhD and postdoc level, as reflected in the increased mobility of junior researchers. Beyond the postdoc level, the process for securing tenure and advancement is more variable. Non-academic career paths, however, vary even more significantly by country or discipline. While career paths in industry may be more "international" in character, the private sector cannot absorb all "excess" PhDs and postdocs in the system. Opportunities in other fields – university administration, science policy, science writing and journalism, or non-profit management – will vary significantly depending on the field and country. If foreign postdocs in the United States desire to return to their country or region of origin, will they be able to apply the lessons learned from career and professional development programs that necessarily focus on US options, networks, and requirements? Is it possible to prepare postdocs for alternative careers in hundreds of graduate disciplines or for a global job search? In other words, how compatible are calls for greater transparency and more information on non-academic career paths, with the growing international mobility of graduate students and postdocs?

Testing the boundaries

As many participants concluded, there will not be a single solution – either globally or in any country. In the highly fragmented US system, many experiments are already underway to improve postdoctoral training and prospects within the existing boundaries of the system. Looking forward, the most interesting experiments will be those to test the systemic boundaries, including the dependence of science on the postdoc status quo, the value proposition embedded in academic training, and the challenges inherent in preparing mobile researchers for multiple career tracks in multiple countries.

The International Advisory Board

The Alexander von Humboldt Foundation is a non-profit foundation established by the Federal Republic of Germany for the promotion of international research cooperation. It enables highly qualified scholars resident outside of Germany to conduct extended periods of research in Germany and supports subsequent academic contacts. The Humboldt Foundation promotes an active, world-wide network of scholars. Providing individual sponsorship during periods spent in Germany and fostering the resulting longstanding contacts have been hallmarks of the foundation's work since 1953.

The International Advisory Board of the Alexander von Humboldt Foundation is an independent, international expert group which meets once a year to discuss strategic issues relating to the global mobility of researchers and the internationalization of research. The Board provides a forum for debate on global developments in science and academia, science policy, and science administration.

History and mission

The International Advisory Board was established in 2007 in response to an increasing demand for expertise in questions concerning the internationalization of science and scholarship. It is a successor to the Advisory Board of the Foundation's Transatlantic Science and Humanities Program (TSHP), which was established in 2001 with the aim of creating a binational network of experienced leaders from German and North American academia, science administration, and science policy.

The International Advisory Board supports the Foundation's strategic planning. As an independent expert group, it addresses current developments in global academic markets and identifies topics of special strategic concern for the Foundation and its partners in Germany, the United States, and beyond.

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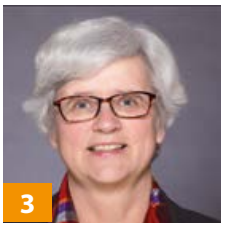
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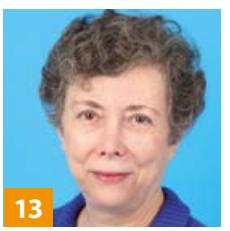
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14

Forum on the Internationalization of Sciences and Humanities

The International Advisory Board hosts an annual Forum on the Internationalization of Sciences and Humanities, opening its discussions to a select group of leading international experts and top management officials representing the Humboldt Foundation's partner organizations. Each Forum provides an opportunity for eminent international experts to hold an open exchange of views in a private setting. Important minutes of the proceedings and recommendations are published for the benefit of a wider audience.

Forum topics

2001	The Role of the TSHP Advisory Board in the Transatlantic Dialogue
2002	Trends in American & German Higher Education
2003	The Impact of the New Developments within the European Research Area for Transatlantic Scientific Co-operations
2004	What Factors Impact the Internationalization of Scholarship in the Humanities and Social Sciences?
2005	Bi-national Programs on Shifting Grounds?
2006	The Advancement of Excellence
2007	Postdoctoral Career Paths
2008	Strategies to Win the Best: German Approaches in International Perspective
2009	Cultures of Creativity: The Challenge of Scientific Innovation in Transnational Perspective
2010	Crossing Boundaries: Capacity Building in Global Perspective
2011	The Globalization of Knowledge and the Principles of Governance in Higher Education and Research
2012	Networks of Trust: Will the New Social Media Change Global Science?
2013	Postdoctoral Career Paths 2.0: The Golden Triangle of Competitive Junior Investigators, Adequate Academic Systems, and Successful Careers

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