# Learning from each other

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**An industry academic liaison officer and a university technology-transfer professional in the UK canvass their peers to provide some pointers for how to streamline the technology-transfer process between companies and academia.**

The interface between the drug industry and academia presents both challenges and rewards. While there is much to gain from working together, differences in the culture and priorities of companies and universities can create tensions, misunderstandings and frustrations when negotiating terms and conditions or managing post-deal relationships. On the basis of our experience and the opinions solicited from representatives of pharmaceutical, biotech and academic institutions in the UK, we outline below the key issues most commonly encountered in industry-academia technology-transfer collaborations and provide some suggestions for making the interface work more effectively (**Table 1**).

## Increasing collaboration

Creativity and inventiveness are essential characteristics of academic and industrial research. New ideas or discoveries from academic 'applied' research often form the basis of new commercially relevant technologies and therapeutics, but usually the expertise and experience of industry are required to develop and commercialize these ideas successfully[1–3].

In today's academic funding research environment, it is increasingly difficult to secure grant money, and contributions from industry can make the difference in enabling a program to commence or complete, especially for new and less well-established academic researchers[4]. What's more, companies and academic institutions are working together with increasing frequency to leverage new sources of funding for R&D, such as those available through the the Medical Research Council, the Biotechnology and Biological Sciences Research Council, Engineering and Physical Sciences Research Council, and Praxis.

And yet, although technology-transfer offices have been established in academic institutions for many years, there is a great deal of variation in the extent of success of collaborations from one institution to the next, and licensing negotiations can often pose several challenges to both academic technology-transfer managers (TTMs) and industry-academia liaisons (IALs) in companies.

## Different mindsets, different priorities?

One problem facing people working in a commercial environment and those working in a research or correct nonprofit institution is the 'mentality gap'. As Andrew Gottschalk of Group AG (London) put it: "…the parties have very different perceptions and judgements about organizational structures, decision-making processes and time scales. The requirement for risk-assessment procedures is a corporate fact of life that is virtually meaningless to the entrepreneurial scientist."[5] Gottschalk believes that vital assistance can come from the TTMs working in technology-transfer offices as "they can act as guides, mentors, shop stewards and midwifes to the deal," and he also recommends not starting partnerships without them because then "rational negotiation is less likely." Most UK research institutions have a technology-transfer office—many newer universities have them as a result of the drive of the present UK government to enhance competitiveness and make the country a 'knowledge-based nation'.

TTMs are indeed mandated to bridge the gap between the academic and commercial worlds, making sure that knowledge is widely disseminated for the advantage of society and for economic benefit. Yet a real challenge lies in ensuring that both parties appreciate the different needs of their organizations and can adapt their approaches accordingly. The best way to understand the key issues is to have worked within that sector. However, the career profiles for an IAL or a TTM tend to have evolved differently (**Box 1**).

Ironically, TTMs are sometimes viewed by both academic inventors and industry professionals as an 'obstacle' to the negotiation rather than a facilitator. Part of this perception problem arises from the dual roles TTMs have in the academic enterprise. Two tasks for technology-transfer offices are protecting intellectual property (IP) and facilitating the transfer of technology and knowledge to businesses, therefore encouraging collaborations and interactions with companies. Another, no less important part of their role, however, is assisting in achieving their university's economic goals while also protecting academic freedom. Balancing the right of an academic to publish and continue pursuing his or her scientific interests in the future with the need to commercialize research is difficult enough, especially as these different aspects of the role can pull in different directions.

Indeed, there are examples from the past, when technology-transfer offices had not long been established, in which inventors signed away the rights to any further development of their research without understanding the full implications. The naivety that caused such events is illustrated by a comment from a participant at the Collaborative Computational Project Number 4 in Protein Crystallography Study Weekend held in January 2001 in York. Commenting on a licensing agreement signed by a fellow scientist, the individual recalled that his colleague "signed but didn't really *read* the contract…and even if legally [it was] right I think that enforcing the contract is morally

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**Table 1 Some general pointers for industry-academia liaisons and technology-transfer managers**

| Group | Dos | Don'ts |
|---|---|---|
| Industry-academia liaisons and technology-transfer managers | Know and develop relationships with key contacts<br>Understand the strategy and priorities of key contacts<br>Provide targeted information<br>Facilitate dialog between industrial scientists and academics<br>Leverage funding for academic research | Fail to respond to queries<br>Provide non-targeted information about licensing interests or technology developments<br>Adhere to the traditional models of engagement—instead think creatively for deal structures |
| Industry-academia liaisons | Provide timely and constructive feedback to academics<br>Manage financial expectations<br>Understand the need to publish and the existence of funding constraints | Hinder publication of research<br>Provide general contact information (info@...) |
| Technology-transfer managers | Allow and facilitate direct access to academics<br>Work with realistic valuations and deal terms<br>Provide concise summaries of technology offerings | Send impersonal e-mails with nontargeted information<br>Allow scientists to reveal information without sufficient intellectual property protection<br>Demand confidentiality and disclosure agreements or deal terms upfront |

wrong." Researchers who sign contracts with little thought for the legal and disclosure implications are relatively rare nowadays, but this example illustrates why, in the recent past, some technology-transfer offices have perhaps placed too great an emphasis on protecting and retaining ownership of their IP at all costs, even if that meant not signing a deal or not making any money out of the discovery. This tends to irritate industry, but encouragingly, the environment appears to be changing.

At the annual meeting of the Association of University Technology Managers (Deerfield, Illinois), held in 2006 in San Francisco, a senior executive from a biotech company highlighted the root of the problem in many industries—university interactions. He stated that he would rather work with his direct competitors than with a technology-transfer office because "I know their priorities and we work on similar timelines." A rather irate audience took umbrage at his comments. But the idea that a commercial organization would rather work with its competitors than with a technology-transfer office is significant because it shows, in this specific case, a lack of trust, but also different timescale priorities. And trust is a key ingredient to any successful relationship, along with a better understanding of both sides' points of view. Knowing each other's priorities can expedite the negotiating process. The priorities of industry are usually obvious, but the focus of a technology-transfer office can be less clear. On the other hand, from the viewpoint of a research institution, the reason(s) why a promising project is sidelined or abandoned by industry can be difficult to determine or understand. There are anecdotal examples in which technologies have been licensed out and, as a result of subsequent mergers, acquisitions, restructuring or deprioritization activities in industry, the technology has later become less valuable to the acquirer. This can be difficult to accept, particularly for the inventor, but it is a reality in the commercial world.

## Finding the right contact

Navigating through all the different UK universities and research institutions is another difficulty encountered by IALs looking for a specific technology or a partner. As many colleges and research institutions are based in London, several colleagues whom we spoke to while preparing this article suggested that a single technology-transfer office could be created for the capital; such an arrangement could also work for other regional clusters of universities.

Having fewer, more specifically qualified and experienced TTMs—covering either a therapeutic area or departments linking directly with key accounts at pharmaceutical and biotech companies—would simplify the interaction between academia and industry and provide granularity in discussions. Conversely, for TTMs looking for industrial partners, navigating the myriad biotech and pharmaceutical companies in the UK and elsewhere to find the right person to talk to can also be difficult and time consuming. Although some IALs would view having one technology-transfer office for London as a solution to their problem in finding their way around, others see this as less of an issue. Companies with R&D activities can exploit the connections made directly by internal scientists with academics at local and national universities. Some London Universities (e.g. King's College and Imperial College) have pharmaceutical-dedicated TTMs who act as a first point of contact for any query.

Although having a single first point of contact can facilitate the initial stage of the search, it necessarily leads to another issue. TTMs and IALs are often generalists, as they can be experts in only one or two subjects but are responsible for wide areas of research and licensing activity. Until scientists get involved from both sides, key scientific issues may not get addressed. At this stage, the roles of the TTM and IAL may move to those of facilitator and/or negotiator.

Other factors also contribute to the successful development of a relationship. Time in a post is important for both TTMs and IALs, as is developing and nurturing the relationship between the academic institution and the company. Ultimately, people do the deals. The belief that there is relatively high turnover in technology-transfer offices was borne out by the people we talked to in preparing this article. Turnover is thus clearly a factor that hampers the successful development of contacts with industry. There is a perception that

### Box 1 Career paths in technology transfer

The initial phase of education for industry-academia liaisons (IALs) and technology-transfer managers (TTMs) often shares common points (both often have a PhD and relevant scientific profile). However, subsequent to their postgraduate work, TTMs frequently go straight to the technology-transfer office (although exceptions can be found), where they are trained to focus on intellectual property and legal issues. In contrast, IALs usually spend time working in the industry research environment, gaining direct experience of drug discovery, before transitioning into the liason role. Exceptions can be found for both, but these different career paths provide divergent experiences and expertise.

remuneration is lower in technology transfer than in industry, a factor that may contribute to higher turnover of staff in technology-transfer offices. Also, part of the problem may be the emergence of career opportunities for TTMs to move between institutions and progress to more senior positions.

For industrial partners, turnover of IALs does occur, but not to the same extent. It is revealing that one option for career progression for TTMs is into the biotech and pharmaceutical industry (often as IALs or into business-development positions), whereas the reverse happens less frequently, although there are signs this may be changing.

### Financial issues

Pricing a collaborative research project seems to be another point where negotiation can slow down, more specifically on the total cost of overheads that need to be added to the bare expenses of running a project. On the one hand, it is understandable that an organization that provides a specific amount of money to a research institution would like to see all of that money used on the project. On the other hand, it is also reasonable that part of the budget must cover overhead, such as maintenance of the infrastructure, where such a project is carried out.

The UK government has issued guidelines that aim to prevent higher education institutes from supporting companies by running research projects at cost prices. For example, the financial memorandum between the Higher Education Funding Council for England (London) and institutions states that "institutions should seek to recover the full economic costs of all their activities, whether pricing is determined by reference to those full economic costs or by reference to prevailing market conditions. Although there may be cases where individual projects or activities should be priced below their full economic costs, this should be done as a conscious decision, within the context of strategic objectives"[6]. This raises the question of whether the UK is pricing its research out of the market at a time when emerging economic forces, such as India, China and Eastern Europe, are able to provide ostensibly high-quality research at lower prices. Sponsoring a postdoctoral student (and owning the IP arising from their work) in the UK costs ~£80,000 per year ($158,600 per year; average figure for a relatively straightforward contract to employ a fairly experienced postdoctoral research assistant, including all direct and indirect costs of the research). Little data are available that highlights the costs of employing postdoctoral or PhD students in India and China. Full-time equivalent (FTE) costs in industry in the US and Europe are around $250,000–$300,000 per year, whereas sourcing FTEs in India costs around half this rate[7]. It is thus cheaper to collaborate with Indian and Chinese scientists. In fact, other European countries offer schemes to support collaborative activities, such as the support provided by Enterprise Ireland (http://www.enterprise-ireland.com/), which makes working with scientists in Ireland cheaper than working with those in the UK. The cost factor is relevant to deciding on the location of collaborative research.

In many fields of research, UK academia has a globally competitive edge arising from the excellent quality of research and from research policies that have encouraged bright scientists from all over the world to gather in the UK. However, is it possible that a reduced appetite from industry for collaboration with academia because of increased costs may in a small way contribute to an erosion of this competitive edge? To encourage industry and UK academia to collaborate, costing needs to be transparent and fair to both sides. There is also a challenge to academia to offer excellence in research and in delivery to attract commercial partners. An example of this is the Joint Clinical Trials Office that has been created as a partnership between King's College London and the National Health Service Trusts of Guy's and St. Thomas's and King's College Hospital. The office has 18 staff members, many of whom have been recruited directly from industry. The aim of the partnership is not to compete on price with overseas markets but to compete on quality and delivery of clinical trials to commercial partners. Industry is moving elements of its own R&D to India and China as well as expanding collaborative activities in these countries both to capitalize on the quality and low cost of research and to facilitate the opening up of Asian markets to Western medicines. This trend is set to continue, and UK academia needs to ensure that potential barriers to collaboration, such as higher costs, do not detract from collaboration in the UK. To justify higher costs, there would need to be higher quality, not merely equal quality.

### Going it alone?

University research is often considered 'too early stage' to license direct to industry. This fact, in conjunction with the pressure put recently on research institutions to exploit their IP, is leading UK research institutions to try and add value to their technology before licensing[8,9]. One example of this is the development of drug discovery facilities within research institutions[10,11] (http://www.mrctechnology.org/FI_DDG.htm). The rationale for these facilities is to use chemical tools and other technologies to advance internally discovered compounds further along the lead optimization pathway so that the research is more attractive to industry to in-license or to collaborate around.

Such translational facilities are expensive to set up and need to be staffed with people who have considerable industry experience. The latter is particularly important given that certain academic translational initiatives have been criticized by the venture capitalist community and industry for expending research efforts to develop chemical series that are simply not suitable for further development in humans, thus wasting resources and time (**Box 2**).

### Box 2 An independent clearing house for UK drug discovery?

Academic institutions focusing on translational research require a continual flow of high-quality, early-stage projects to justify the level of investment required—something many institutions, at least in the UK, may find difficult. Even so, schemes set up to develop more commercially relevant science have been established by the major UK funding bodies, such as the Medical Research Council Technology's Drug Discovery Group and The Wellcome Trust's Seeding Drug Discovery Initiative, both based in London. In either case, monies are invested in identifying targets and developing compounds or tools to further validate the early-stage research[13] (http://www.mrctechnology.org/CO_DD.htm). The Wellcome Trust scheme is a competitive one that is open to academics and companies.

Another means of encouraging translational research would be to develop a single UK 'drug discovery facility' under the management of an independent committee of industry and academic scientists accessible to all UK research institutions. This would be a high-quality resource perhaps modeled upon synchrotron facilities in operation in Europe, where beamline time is dispensed to users upon application. With improved validation comes increased industry interest. If the UK is serious about developing commercially attractive propositions, it would be interesting to explore the use of commercially available contract research organizations to further develop compounds and technologies, perhaps funded through a central pool of government money.

## Conclusions

The key take-home message from our informal survey in technology transfer is that a better understanding of the working practices of both IALs and TTMs should enhance the chances for successful collaborations. There are a variety of networks that enable IALs and TTMs to spend more time together. In the UK, the London Technology Network is an example that brings together academics, company scientists and the relevant TTMs and IALs around a particular technology focus through specific specialized meetings (http://www.ltnetwork.org/). One variation on this theme is scientists in companies spending time in academic research institutions. Examples are the entrepreneur-in-residence schemes operating between Eli Lilly's Neuroscience Research Centre (Erl Wood, UK) and several London universities[12]. We the authors have also worked together on an IAL and TTM exchange between Merck and King's College London and believe that this type of secondment should be expanded.

Furthermore, we believe that industry-experienced people should more often be employed in technology-transfer offices. During the past few years, there has been a slight change in this trend as a few senior scientists and senior managers with commercial experience have decided to move 'back' to academia, and their impact has been very beneficial. This needs to happen more, and remuneration may need to be addressed to attract more industry-experienced people into technology transfer.

In conclusion, for the transfer of the fruits of academic research to the commercial sector to reach its full potential, working relationships between IALs and TTMs will need to be strengthened and nurtured. The fact that industry-academia partnerships are likely to increase even more in the coming years underscores the importance of both sides taking the time to understand one another a little better.

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