

Spin-outs: business built on chemistry

Graham Richards, former head of chemistry at the University of Oxford, shares some of the lessons learned from spinning out companies based on good novel chemistry

One of the few attractive options for helping countries out of the current economic downturn is the development of new companies and industries from university research. In the UK, this extra emphasis can only accelerate what was already becoming a significant trend: the creation of spin-out companies based on university intellectual property. The government clearly recognises this with Lord Drayson recently increasing the University Seed Fund from £250 000 to £500 000, and even the Royal Society setting up an enterprise fund to make investments in early-stage businesses.

Teaching and research must remain the most important functions of universities, but the attitude towards commercialisation has changed dramatically over the past 20 years. My recent book on spin-out companies (see p60) is dedicated to Margaret Thatcher because she was responsible for two innovations which led to the change of attitude and practice in the UK. Firstly she changed the tax regime so as to introduce venture capital to the country in the early 1980s, but more importantly in 1987 she gave the ownership of intellectual property derived from government-sponsored research in academia to the universities, providing they set up mechanisms to facilitate their

exploitation. This followed the failure to patent monoclonal antibodies by the responsible agency, the British Technology Group (BTG) – which had itself been set up following the non-patenting of the UK inventions of radar, the jet engine and penicillin, albeit for strategic military reasons during the war, but at a commercial loss of hundreds of billions of pounds to the country.

Of all disciplines, chemistry has proved to be the most fruitful in terms of the founding of spin-out companies, perhaps because the subject spans areas from physical science through to biology. At the University of Oxford, 14 companies have emerged from the chemistry department over the past 20 years (see box). Of these spin-outs, five have become public companies, four of the latter remaining on the alternative investment market (AIM), while one had a full London stock exchange listing.

The benefit to the central university is best measured in financial terms. In the case of Oxford, the chemistry department alone has contributed over £80 million to the university – £40 million in straight,

unearmarked cash. Of the balance, £20 million represents the value of the university's holdings in publicly quoted companies, and a further £20 million is an estimate of the value of the shares held by the university in companies which as yet remain in private hands.

Fair share

When the companies are first formed there has to be an agreement on the relative equity, or shares, to be held by the three relevant parties: the funders who provide the essential cash to get the business going; the university, which contributes the intellectual property, usually as a licence; and thirdly the academic or academics whose involvement is essential for the company to succeed. The only rule is that the respective share holdings must add up to 100 per cent – surprisingly, not all academics appreciate this and often over-value their contribution. Typically the split would be 40 per cent for the funders, 10 per cent retained for the

'Chemistry has proved to be the most fruitful discipline for founding spin-outs'



management, and 25 per cent each to the university and to the academics.

One firm lesson learned from the Oxford experience is that things work best if the leading academic remains in the university doing his or her normal job, but perhaps acts as a non-executive director or chairs the international scientific advisory panel. More often it is the post-doctoral researchers who actually join the start-up company in technical roles.

Oxford has probably produced more companies than most universities because of the existence of IP Group, which grew out of the deal struck by the chemistry department with the then London stockbrokers, Beeson Gregory, to help fund their new £64 million research laboratory (which was built at zero cost to the university). A significant portion of the funds for that building came from the deal, whereby for a fixed sum of money upfront, the company received half of the university equity in chemistry spin-outs. This deal led Beeson Gregory to found a new company, initially known as IP2IPO and later as IP Group, which is listed on the London stock exchange and now has partnerships with some 10 UK universities and activity in continental Europe too. What it can provide is help in setting up spin-out companies, sources of management and above all access to funding.

Although quite often start-up companies begin inside academic departments, things seem to progress much faster if as soon as possible they move out to industrial sites, albeit remaining close enough to the university to maintain collaborations. Very often the new companies can provide research funds to their former laboratories – as in the case of Oxford Nanopore (see *Chemistry World*, June 2009, p56) – and this potential benefit should be added to the simple financial return.

Essential elements

Three things are essential for the success of a spin-out company. These are: some good novel and protected science; suitable management; and sufficient start-up funds. Over the last few years it has usually been one of these facets which has caused a problem for emerging companies. Initially there were difficulties in finding suitable pieces of scientific work, but this is now the least of the problems. What is more, universities are now much more professional

in protecting inventions by means of patents than was formerly the case, while at the same time avoiding significant delays in open publication. The importance of patents to spin-out companies cannot be overstressed (see p54).

Much more troublesome has been the sourcing of appropriate management, especially chief executive officers (CEOs), who need to understand the science, but above all need to be able to present to potential investors. Best of all is to find an individual who has done this before, but this has not always been possible because it took a number of years for a pool of such people to emerge. One positive feature of the recent downsizing undertaken by some of the major pharmaceutical companies is the fact that this is providing some well trained and suitable CEOs for university spin-outs.

The all-important provision of finance tends to be cyclical. There was a period when this was not particularly troublesome, and business angels were keen to furnish start-up funds while venture capitalists were more prone to provide second or further rounds of funding. It was also the case that AIM provided an alternative approach – to float the company at a very early stage and to use shareholders' funds to finance the company. Some of the Oxford chemistry companies managed to raise millions of pounds in this way long before they had a chance of becoming profitable.

Now, in the present economic

In short

- **Spin-out companies can generate significant funds for their parent university**
- **Spin-outs progress best if the lead academic remains in their university post, and if the company quickly moves to a local industrial site**
- **Three things are essential for a successful spin-out: good science; suitable management; and sufficient start-up funds**

gloom, things are very different. AIM has essentially shut – it is very difficult to float a new company and there is precious little liquidity or trading on that market. Some sectors seem particularly unpopular – biotechnology and especially early drug discovery companies are finding it very difficult to raise cash. IP Group has created over 70 companies, of which almost 60 remain private. Most of these are doing fine in the sense that they are sticking to their original business plans and meeting milestones, but they will require more cash. This is where the current difficulty lies. Venture capitalists are more interested in bigger companies. What cash is available seems more likely to be attracted to amalgamating small companies into more viable units or to buying companies which are in distress for very low prices.

The credit crunch has hit this world of spin-outs, but there are some optimistic signs. In particular a number of the major pharmaceutical companies have established venture funds, including Merck Serono, GlaxoSmithKline, Roche, Pfizer and Novartis. They will, however, be operating in a buyers' market.

For the academic tempted to explore this path it must be accepted that this does involve a lot of extra work and time, but it is both rewarding and a lot of fun.

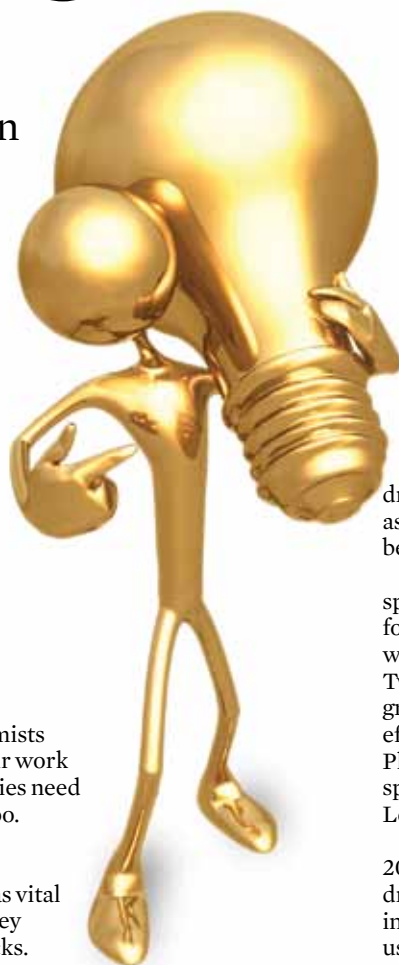
Graham Richards is the author of Spin-outs: Creating businesses from university intellectual property, Harriman House, 2009 (see p60)

Oxford's chemistry spin-outs

Date	Company	Lead academic	Comment
1987	Medisense	Allen Hill	Now part of Abbott
1989	Oxford Molecular	Graham Richards	IPO 1994; now US owned
1992	Oxford Asymmetry	Steve Davies	IPO 1998; now part of Evotec
2001	Inhibox	Graham Richards	Based on screensaver project
2002	Glycoform	Ben Davis	Sugar chemistry
2002	Zyentia	Chris Dobson	Protein misfolding
2002	Pharminox	Gordon Lowe	Now centred in Nottingham
2002	ReOx	Chris Schofield	Major deal with Amgen
2003	Summit	Steve Davies	IPO 2004
2004	Oxford Medical Diagnostics	Gus Hancock	Acquired by Avacta
2005	Oxford Catalysts	Malcolm Green	IPO 2006
2005	Oxford Nanopore	Hagan Bayley	Major investment from Illumina
2006	Oxford Advanced Surfaces	Mark Moloney	Reverse takeover of Kanyon
2006	OxTox	Richard Compton	Electrochemical detection

Spin-outs: protecting your assets

Patents are crucial for any spin-out to thrive, say patent attorneys Bob Pidgeon and Jennifer Delaney



Spin-outs require, above all, technology which can perform a valuable function (see p52). If that technology can be easily copied its value is generally much reduced, and may not even be viable. Investors are unlikely to invest resources in a spin-out whose technology is on a plate for others to copy.

Spin-out companies have two main options when trying to keep technology exclusive to themselves – confidentiality, and patents.

Confidential technical information, or ‘know-how’, is clearly important – but has limitations. Some technology cannot be kept confidential in the long run because it will be evident in a product which is sold. With all technology, confidentiality can be lost through inadvertent leaks of information, or if people move

jobs and don’t observe the continuing confidentiality provisions of their previous contract.

Alternatively, a rival research-based company might simply arrive at the same technology themselves. And finally, confidentiality means chemists miss out on publishing their work – and the spin-out companies need that scientific credibility too.

Patents don’t suffer the limitations of confidential information, and are seen as vital for spin-outs – although they do have their own drawbacks. They have to include a detailed written description of the technology – which will be published – and they cost money. They also absorb the valuable time of management and inventors to

draw up, and are not quite as ‘solid’ as they sometimes seem – they can be challenged, and they can fail.

Despite these limitations, few spin-outs would have a realistic path forward without a patent position which protects their technology. Two examples of companies whose growth has been supported by effective patent protection are Photopharmica and Perachem, both spun out from the University of Leeds, UK.

Photopharmica was formed in 2001 to develop light-sensitive drugs for indications such as infection control. Their technology uses photosensitisers that are activated by light to kill diseased tissue or unwanted bacteria – an approach known as photodynamic therapy (PDT). The technology can also be used for disease detection and imaging techniques.

0 months: First filing

The date on which you file your first patent application in any country (usually the UK for a UK originating invention) sets the priority date for your invention

Ongoing improvements

If you make any significant improvements during the first 12 months, you could file an additional patent application

12 months: International phase

Any foreign applications must be filed within 12 months of the priority date. A single application can be filed for countries party to the Patent Cooperation Treaty (PCT)

18 months: Publication

Your application will be published, along with the Patent Office search report.

The company protected its technical developments by patent filings wherever possible, which helped it to successfully secure funding, to grow, and to put its products through clinical trials. Investors have included university research commercialisation companies, and, increasingly, major blue chip investment and asset management companies.

Perachem is a younger company, spun out of Leeds' department of colour science in 2004 to develop chemicals with an enhanced safety and environmental profile without compromising performance or cost-competitiveness. The company, a fully-owned subsidiary of Green Chemicals, has developed a wide range of products from industrial

In short

- **Virtually all chemistry spin-outs need an effective patent position to protect their technology and bring it to market**
- **The patent system is not as complex as most people believe**

chemicals to personal care compositions.

Perachem's initial patent application, relating to activated bleaches, has now been granted in most territories, and the company's subsequent applications have included novel wool treatment methods, flame retardants, hair dyes and hair bleaching methods. Their intellectual property was instrumental in securing significant investment following a reverse takeover in 2007. The company recently made their first sales, of a durable flame retardant composition.

Managers and chemists in spin-outs need to equip themselves with a reasonable working knowledge of the patent system. Misconceptions abound, and the patent system is

often seen as being very complex. Although we cannot overcome the cost or time limitations of patents, we hope that by answering some of the more commonly asked questions (see box) and by drawing out the key features of a typical patent procedure (see timeline), we can address these common misconceptions and challenge the idea that the patent system is very complicated. Chemists who become familiar with the patent system will be better placed to protect their intellectual property effectively.

Bob Pidgeon and Jennifer Delaney are European Patent Attorneys at Appleyard Lees, Halifax and Manchester, UK

Patent law: questions & answers

I don't agree with patents. I want anyone to be able to use the technology freely.

Good luck – it may never see the light of day. Who will invest to develop and market the technology if others can just copy? It is a paradox, but patents can make it more likely that good technology will progress.

Is filing a patent application always the best thing, though?

No! For some technology – some processes for example – it may be better to try to keep it confidential. But bear in mind that information can leak out. Take advice on this.

I've shown my invention in a poster display. I want now to file my first patent application. Is that OK?

You have a problem. In most countries, including in Europe, an invention must be new compared to everything that has been previously made public (the 'prior art'), to be patentable. This includes anything that you have made public yourself. However, if there is a special feature

of your invention not clear from the poster display, you may be able to obtain a patent. Also you could still get a patent in the US under their special rules, if the poster display was less than a year ago.

I want to patent my invention but keep it secret.

Not possible. Patent applications are published after 18 months of secrecy. However, with care it is sometimes possible to file a patent application with sufficient technical information and with some information kept back as 'know-how'.

We understand our technology best. We'll save money – we'll write the patent.

A risky approach. A patent is ultimately a legal document. The quality of the first application is crucial and your venture may turn on it – if there are defects it may be difficult or impossible to correct them later. The most important step in the patent process is filing a good first application.

I've only made a small change – but with a good effect. Surely I can't patent that?

You may well be able to, if your small change goes against the trend in the prior art. 'Small' does not equate to 'non-inventive'. You may even be able to patent newly recognised technical effects of known substances.

I want an international patent.

There is no such thing – granted patents exist country by country. However, there is an international patent filing procedure (the Patent Cooperation Treaty, or PCT), under which an umbrella patent application covers all 140-plus countries of the PCT, for up to 2.5 years – valuable time to weigh up the commercial and legal prospects before you decide which countries you wish to go forward in.

My granted patent can't be challenged – right?

Wrong. Anyone can challenge the validity of your patent at any time during its life. A common time for

a challenge is in the nine months after grant of a European patent. During this period, third parties can file a central opposition.

I have found a patent which covers part of what we want to do. Do we have to abandon our plans?

Not necessarily. It might be a published patent application which might not be granted. It might not be for a relevant country. It might be challengeable. It might not even be in force.

Now I've got my patent granted I'm safe from infringement risk, right?

Wrong. A patent gives you the right to stop other people from using your invention as defined by the claims. It does not give you the right to use your invention. If you want to do something which falls within somebody else's patent, you must still get their permission. Having your own patent can, however, be very useful when negotiating an agreement – maybe they like your invention and you can do a deal.

30 months: National phase

After this deadline, international phase ends and national phase is entered by 'activating' in the countries you chose. In Europe, a single regional application can be taken forward. In other countries, entry requirements vary, and may require translations, which can be expensive

Grant

On each individual patent application, negotiation with the Patent Office may be needed to establish the scope of protection. Even after being granted, patents can be challenged

Renewals

Renewal fees must be paid to keep a patent in force. The maximum term is 20 years from filing date or 21 years from priority date