Demolishing the ivory towers

Successfully commercialising intellectual property and bringing technology from university laboratories into the market-place is all about melding entrepreneurship with academia, as well as instilling the benefits of collaborative thinking. All this is reflected in the strategies of the world's most successful university tech-transfer initiatives. By ***Nigel Page***

Ken Morse, senior lecturer and managing director of the MIT Entrepreneurship Center, is characteristically forthright when asked about the challenges facing university technology transfer: "What I'd like to see is more passion and less envy: more passion for delivering valuable solutions to customers and less envy of those who have been successful in this long, arduous and risky process." And, he believes, that makes teamwork vital. "Whenever and wherever business and marketing people are viewed as lower life-forms by academics and engineers, then there is going to be a real problem. All our studies show that teamwork between scientists, universities and companies is the key to success in commercialising new technologies."

> "Accessing seed funding should be made conditional on having researched the potential for collaborations"

Cultural tensions

Morse addresses his comments in particular to the European and, specifically, to the UK university culture – but they resonate on both sides of the Atlantic. Bringing academia and entrepreneurship together is fraught with cultural tensions, as Stuart Henderson, head of life sciences for Europe at Deloitte & Touche, emphasises. "It still depresses me that companies are being formed that have not yet undergone thorough collaborative reviews of fruitful tie-ups for their technologies. The soft answer is that it's hard to track down synergies. But the real answer is that academics are often arrogant and unwilling to share their ideas… Accessing seed funding should be made conditional on having researched the potential for collaborations," he says.

Born in the USA

When tech-transfer works, it is a hugely successful mechanism for introducing new technologies to the marketplace, as well as for enriching university research capabilities (and budgets). The US is a long way down this route. Just one example, the $200 million generated by New York's Columbia University via commercial licence agreements and research funding in 2002, dwarfs revenues generated by all UK universities over the same period. And this commanding lead is no accident. A combination of factors – legislative, cultural and economic – mean that technology transfer has been on the US agenda for over 20 years.

Riding the revolution

This was, of course, not always the case. In the 1970s, biologists in particular were still contemptuous of academic disciplines with links to commerce. That began to change, however, as scientists started to isolate and produce hormones, antibodies and enzymes that represented real potential as therapies. This was, in effect, the beginning of the biotech revolution – and scientists in this field had to decide whether to work in isolation or partner with industry. Some universities, Columbia and MIT included, were quick off the mark, establishing policies that protected their researchers' academic freedoms, while nurturing profitable tech-transfer deals. Others were more cautious. In one 1980 incident, Harvard faculty declined to take a stake in one of the state's first biotech firms (being developed by two of its professors) – a stake that would have been worth a substantial amount a few years later. Times change and by 2001 Harvard's new president, Lawrence H Summers (himself an MIT graduate), was stressing the key role that Harvard hoped to play in the development of a

new biomedical Silicon Valley in the Kendall Square/Boston area.

Kickstarted by law

The passage of the Bayh-Dole Act by Congress in 1980 really started research universities in the business of patenting and licensing their basic research. In essence, the Act ensured that universities retained ownership of any patents developed using federal funds, while the US government retained an interest in the intellectual property. The government interest included a "march-in" right (the right to terminate a university's patent rights and those of any licensee) if the technology was not adequately commercialised. At the same time, the Act granted government a royalty-free licence to develop the technology for government purposes. Because the majority of all US university research is government-funded ($20billion of the total $32billion spent by universities on R&D in 2002 came from the federal government), Bayh-Dole affected (and continues to affect) the majority of university-industry initiatives in the US. Dr Mike Cleare, executive director of Science & Technology Ventures at Columbia University, explains: "Pre-Bayh Dole, government funding agencies held title, so inventors had to queue up to commercialise IP. The Act effectively unblocked the pipeline."

Thriving on the culture

Spurred on by Bayh-Dole, US universities embarked on a programme of IP commercialisation that thrived in a culture which preached entrepreneurship. Tech transfer quickly became a cornerstone of ongoing research activity and a major factor in the mindsets of the scientists involved. An October 2002 survey by 3i in association with the Economist Intelligence Unit, *Moneyspinners: global commercialisation of R&D spinouts*, addressed the influence of location on spinout activity and the benefit of being in the US, pointing out: "The US was built by risk-taking pioneers who wove key entrepreneurial traits into the nation's very fabric. Failure is widely considered a necessary step on the US road to success…The regulatory, intellectual property and tax environment is also critical. Government-required paperwork for a US start-up is nothing compared to the never-ending labyrinth of bureaucratic filings required to found and keep a spinout going in France, for example."

Of course, another basic ingredient is capital availability. And regardless of the burgeoning European private equity industry, the US has maintained its dominance of the global venture market. According to *Money for Growth* a PricewaterhouseCoopers report on the venture capital industry produced in association with the European Venture Capital Association (EVCA), European technology venture capital investments in 2002, at just under €3.6 billion ($4.24 billion), were around five times lower than US technology sector investments of €18.7 billion ($22.05 billion). European venture activity may be catching up (in 2000, US investment was nine times higher), but the US is still a real powerhouse, current economic pressures notwithstanding.

Restoring VC confidence

The attitudes of start-up teams and investors have, understandably, been impacted by the market slump and, to an extent, these will need to change before the necessary capital investment is available to spinouts. Andrew Fraser, a director at 3i, emphasises that investor focus is, of necessity, more on products and revenue streams flowing from the IP, rather than on the IP *per se*: 'The investment community is, for the most part, focused on later-stage deals right now – moving away from the inherent risk of early-stage. There are few purely strategic IP investments being made. We want a revenue stream." Fraser's views are reflected by Crispin Kirkman, immediate past chief executive of the Bioindustry Association in the UK: "Many investors are suffering from a post-boom confidence problem. With their heads they know where they went wrong last time round. But now they lack the confidence to trust their judgement. Bringing them back into the market will be tough." Nevertheless, says Morse, "several impressive teams on both sides of the pond are bravely and quietly moving forward with exciting new technologies and products. They are backed by a few, very special and savvy early-stage VCs including Amadeus Capital Partners and Polytechnos in Europe and Strategic Partners and Vanguard Ventures in the US."

Entrepreneurial ecosystems

Also crucial to a fertile technology transfer environment is the interplay between culture, regulation and finance. Once locations attract a critical mass of investors and self-starters they develop into what the 3i report dubs "entrepreneurial ecosystems" – clusters of knowledge, capital and flair that create virtuous circles, breeding follow-on investment and spinout activity. The benefits of these clusters are abundantly obvious on the east and west coasts of the US, where the vast majority of university technology transfer and IP commercialisation continues to take place, as

University/business collaborations – myths and realities

Myths

- Royalties are a significant source of revenue for the university – industrial sponsors are convinced that technology licensing revenue provides major funding to the university and makes its inventors wealthy.
- Companies expect a quick return on technology transfer investment – just license the technology and wait for the royalty cheques to come flooding in.
- Companies are eager to accept new technology from universities – universities are full of great product inventions that simply need to be manufactured and brought to market.
- Universities should broadcast availability of technology for licensing – why can't they put all their inventions up on the website?
- The technology transfer office easily finds licensees – it's just a matter of picking up the phone and calling the obvious companies.

Realities

- With the exception of the very successful blockbuster (eg Cohen/Boyer and Yamaha from UCSF-Stanford; Gatorade from University of Florida; vitamin D and Warfarin from Wisconsin), university licensing revenues are small.
- Don't expect product royalties for eight to 10 years – technologies are embryonic, they take time to develop and gain market acceptance.
- Most companies (and especially VCs) want quick time-to-market.
- Publishing lists of available technology is not effective; a targeted approach works much better, avoiding unqualified inquiries – appropriate licensees need to be found and convinced; companies come looking for specific technologies and are more receptive and, crucially, the inventor needs to be involved in this process.
- The inventor is usually the best source of leads – over 50% of the time at MIT, the inventor identifies the licensee.

Source: MIT Entrepreneurship Center, with thanks to Steve Brown, technology licensing officer, Technology Licensing Office, Massachusetts Institute of Technology

Dealing with the financials: the MIT approach

Incentivising the parties

The MIT royalty policy is designed to incentivise. Royalty distribution is managed as follows:

1 First, deduct 15% to cover Technology Licensing Office (TLO) operating expenses.
2 Then deduct out-of-pocket expenses, usually patent costs.
3 Distribute one-third of what's left to inventors (equally, unless agreed otherwise).
4 Adjust the remainder with respect to TLO actual operating expenses.
5 Subtract out-of-pocket expenses for unmarketable patents (write off bad inventory).
6 Divide remainder equally – half to MIT department (eg mechanical engineering etc) and half to MIT General Fund.

Start-up equity terms

In a nutshell, MIT seeks a single digit percentage of equity, with that same percentage maintained through the fundraising process from $5 million to $10 million. Thereafter, there will be proportional anti-dilution of its stake, with future participation rights.

Typical start-up costs, from MIT's perspective, are:

- Issue fees – $5,000 to $50,000
- Maintenance fees – around 50% of expected rate of return
- Diligence – ongoing
- Royalty as percentage of sales – 1% to 8%
- Patent costs – $25,000 to $200,000
- Research sponsorship – not required
- Discovered products – variable

Source: MIT Entrepreneurship Center, with thanks to Steve Brown, technology licensing officer, Technology Licensing Office, Massachusetts Institute of Technology

Joyce Brinton, director of Harvard University's office for technology and trademark licensing, makes plain: "Almost every US university now has an established tech transfer programme but whether they have the research base to generate IP is another matter. So too is whether their geographical location actually favours spinout activity. The east and west coast universities are well placed, having attracted the financial infrastructure they need to support this activity."

East coast achievement

Figures released by AUTM, the US-based Association of University Technology Managers, in its *AUTM Licensing Survey: FY 2001*, underline just how successful North American universities have been to date. During FY 2001, 494 companies based on academic discoveries were formed, 84% of them in the state/province of the institution where the technology was created (since 1980, at least 3,870 new companies have been formed). In 1999, academic technology transfer added more than $40 billion to the US economy, supporting over 270,000 jobs.

Zooming in on the east coast, a recent report *Engines of Economic Growth*, showed that Greater Boston's eight research universities have continued to play a key role in that region's economic recovery. Assessing the economic and social impact in 2000 and 2002 of Boston College, Boston University, Brandeis University, Harvard University, Massachusetts Institute of Technology (MIT), Northeast University, Tufts University and University of Massachusetts Boston, the report states that in 2000 alone, these universities provided a $7.4 billion boost to the regional economy – equivalent to hosting the Olympic Games. International companies, including Amgen, Cisco, Merck, Novartis and Sun Microsystems have all located major facilities in the area to gain access to the university-linked research activity.

Meanwhile, at Columbia, $1billion has been generated by Science & Technology Ventures, the university's tech-transfer arm, since it was launched in 1982. As Mike Cleare goes on to say: "What's happening in the US, and more widely, is that the core mission of universities has changed in the last 30 years. They have moved from being ivory towers, solely concerned with pushing back the frontiers of academic research, to feeling that they have a responsibility to push valuable research-based products out into the world. Royalties are fine, and they do help universities to finance new research, new facilities and regenerate the surrounding area, but the wider benefits of pushing products out into the market as quickly and as smoothly as possible are the key benefits to society."

The MIT approach

MIT is recognised worldwide as one of the key engines of this growth, having already established a formidable track record in tech-transfer. Stressing that, first and foremost, MIT's primary objective is the advancement and practical application of science, Ken Morse goes on to say: "Supporting spinoffs at MIT is not about money. But it is about the passion we have for getting our technologies out into the market. The creation and dissemination of knowledge is the primary goal – tech-transfer and company start-ups are secondary to that. When these conflict, academic goals take precedence."

That said, financial returns (licensing and exit-based) along with spinout activity and patent registrations are a commonplace measure of tech transfer capability and, in this respect, MIT's statistics are impressive. In fiscal year 2002, MIT's Technology Licensing Office (TLO) had gross revenues of $33.52 million (of which $28.05 million derived from royalties); there were 484 invention disclosures and 245 patents filed. In each of the last five years, the TLO has had over 100 US patents issued, as well as signing between 60 and 100 option and licence agreements; around 160 of its start-ups are extant – and it retains equity in approximately 60 of them. According to a BankBoston report, MIT-related companies employed 1.1 million people and produced annual world sales of $232 billion by the late 1990s.

For MIT, spinouts make sense – frequently as a first choice, as Morse explains: "The vehicle of choice for IP commercialisation is frequently creating a new company, rather than doing a licensing deal with a going concern." All too often, he explains, large existing businesses will focus their energies on trying to prove why a technology won't work, rather than passionately pursuing new opportunities. "There are times when working with a large company can and does engender the necessary level of passion, but unfortunately big companies are often not passionate enough about new technologies. And passion counts for a lot in innovation," Morse says.

Thinking commercially

MIT's scientists have a reputation for successful commercialisation. One of them, Robert Langer, is regarded as one of the most influential forces in global biotech (receiving the Charles Stark Draper Award in 2002). Langer, whose patents are now licensed to over 100 companies, first started working with

industry in the 1980s, since when he has launched at least 12 biotech start-ups and licensed patents to almost 100 companies. His laboratory alone brings in $7 million in funding each year (of which around $2 million comes from industry) and, crucially, his students have disseminated his attitudes widely throughout corporate and academic forums. Their ability to think commercially, and their willingness to collaborate, are MIT hallmarks and fundamental to its IP commercialisation track record. Concludes Morse: "IP ownership? Let's get on with it – I hope this debate ends with mutual respect and admiration between scientists and industry. But at the same time, scientists have got to start seeing themselves as part of a continuum, instead of as the centres of the universe. That means being more collaborative at the right time. It makes sense, perhaps on day one, for scientists to own more than 50% of the company, but as time goes on and the company adds product development and sales staff to the team, they will own a lot less."

Instilling commercial attitudes in its scientists is high up the MIT agenda. The Entrepreneurship Center exists to do just that, as Morse stresses: "Genius inventions are not enough. The job is not done until a new technology is reduced to practice, effectively commercialised and evangelised until it becomes a global standard." The Center preaches teamwork – ramming home the message that 80% to 95% of purely technical spinouts fail, while 80% to 95% of MIT teams which combine marketing, business and technical skills succeed. Talented managers are core to successful spinouts, and the annual MIT Entrepreneurship Development Program sets out to create them. At the same time, the MIT $50K (the annual business plan competition, judged by entrepreneurs, VCs and lawyers) has proved to be a successful means of encouraging entrepreneurship in the MIT student and research community. In its 14 years, it has attracted $275 million in venture funding, creating 59 firms (including Nasdaq-quoted Akamai, C-Bridge and Direct Hit, the Internet search software sold to AskJeeves for $507 million in 2000).

Collaborating for success

Collaboration between university tech transfer departments and faculty members is essential, so is academic/industry sector collaboration – and, increasingly, inter-university collaboration. IP commercialisation can happen much quicker, more efficiently, and more cheaply, where academics and tech transfer officers agree to share effort and exchange ideas with rival institutions. Academic rivalries initially made this a hard sell but a string of well-publicised initiatives suggest that these have now been overcome. Columbia's Mike Cleare, commenting on the tripartite tie-up between London's Imperial College, Columbia and Singapore's Exploit Technologies, puts the case for collaboration: "As IP and product development becomes increasingly complex, the idea that any one research institution will hold all the parts of the puzzle it needs to launch a new product is a bit of a stretch. We believe in collaboration and we're happy to work with other universities to improve our IP…we're very happy to throw our slice of IP into the pot to come up with a winner."

The Oxford University/Princeton tie-up is another collaborative venture, and a third is the relationship between Edinburgh and Stanford. But, mainly by virtue of UK Chancellor Gordon Brown's championship (and the small matter of £65 million ($108.5 million) in government funding), it has been the transatlantic tie-up between MIT and Cambridge University that has grabbed most headlines.

The Cambridge effect

Galvanised by a 1998 holiday in Martha's Vineyard and side-outing to MIT, Chancellor Brown returned to the UK determined to kickstart the same US-style entrepreneurial hub. The Cambridge-MIT Institute (CMI) is the result. Initially something of a hate symbol amongst the wider UK academic fraternity (mainly because of perceived funding favouritism), CMI is poised to make its presence felt. Board director Professor Michael Kelly has said that he feels CMI is currently making just 1% of its potential long-term impact, and there are indications that expectation management will be higher up the agenda from now on. In terms of initial achievements, CMI can point to Praxis (which provides training for tech transfer), the one-year placements for students (with full academic credits) and KICs (knowledge integration communities), bringing together graduates, academics, other universities, companies, suppliers, start-ups and government agencies, all focusing on specific knowledge transfer projects. Where inventions are spun out of these relationships (or other CMI-linked activity), CMI owns the intellectual property in them.

Professor Michael Scott Morton, MIT's programme director for the National Competitiveness Network (set up to link UK universities and improve the UK's record in competitiveness, entrepreneurship and productivity), is excited by CMI's progress to date – and its potential to deliver in future:

University technology development: It takes a village and entrepreneurship
Edward A Kahn, President, EKMS Inc

In comparing UK to US university-to-industry tech-transfer practices, one should be very careful to separate conventional wisdom from objective reality. For example, the Annual AUTM (Association of University Technology Managers) Survey is often held out as the gold standard for measuring US university licensing success. In my 17 years of licensing, I have yet to see analysis of royalty dollars received measured against profitability – that is, REVENUE AFTER the cost of non-industry reimbursed patent costs are deducted.

Second, when looking at the most famous winning programmes, particularly Stanford, what happens to the ROI when a Cohen-Boyer is taken out of the equation? The same could also be said for Columbia's Mammalian Monoclonal Antibody patent.

It has only been 15 years since the sleepy Society of University Patent Administrators morphed into AUTM and exploded in size, efficacy, sophistication and results. Many US schools, both public and private, still wrestle with issues of ethics, equity (in licensed companies), and the balance between 'pure' science and profit. It is both amusing and ironic to attend US-Canada LES meetings today where industry licensing professionals will complain about the lack of real commercial understanding on the part of their university counterparts, while almost in the same breath complaining about their aggressive demands for funds.

Those who believe that European university-industry tech-transfer can learn from the US, should not neglect the UK. As Hilary Clinton famously intoned: "It takes a village." The Cambridge, UK, university-economic incubator is, I believe, unrivalled. When economic development leaders in government look for models, they should realise that university researchers and willing industry licensees provide only a small part of critical mass.

With the benefit of hindsight, always 20x20, the old Crown British Technology Group might have been the perfect vehicle for the launch of the British biotech industry. Today, it is the presence of a scientist-entrepreneur pool of individuals, coupled with venture money, that has to be added to the mix. The soft reach of a Stanford in forming Silicon Valley, or MIT shaping Route 128, is much greater than one can actually measure via the hard reach of the specific measurable licence grants from those schools. The atmosphere that is created has

led to unprecedented development that swirls in and out and back again from academic to entrepreneurial lab bench.

A small proof of that point in the US is the formation of ARCH Ventures in Chicago. Executives coming out of the University of Chicago (then ARCH Development when University of Chicago was conjoint with Argonne National Labs licensing operations) knew that there was an insufficient VC base in the Windy City to pull invention out of the academic lab and into commercial viability. They knew they had to encourage a VC community to grow of its own volition. Similar efforts, often state government-inspired, pop up frequently in places like New Mexico.

Having been involved in some two dozen teaching hospital and university engagements, I believe the past model must be carefully checked before it is copied like a dress pattern. In thinking globally for IAM magazine, I turn local in conclusion.

MIT university-inspired technology business creation, under Lita Nelsen, and her predecessor, John Preston, practises one technique which remains a best practice, actually worthy of emulation. They always consider a reduction in cash and/or royalty percentage rate when licensing to a start-up. If their licensed patent fails, for example in clinical trials, but the company succeeds, their investment has been diversified. Simple, but very powerful.

But even the cobbler's children sometimes go without shoes. Many MIT technology-inspired start-ups flounder under the leadership of an academic who comes out of the ivy-covered halls to play entrepreneur. Even MIT's astute licensing professionals cannot control business skill and leadership. Academic institutions will continue to resist becoming some sort of R&D lab for industry as large companies rush to dismantle the costs of (inefficient) corporate R&D. Society needs desperately for pure 'R' to continue. Outside of the defence sector, if it is not going to be private industry, and increasingly not government-run, we will still need US and European universities to remain, if not Caesar's wife, then at least as honest as Caesar's girlfriend.

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"Cambridge is probably as different from the rest of Europe as MIT is from the rest of the US. There are obviously other places doing a good job but tech transfer outflow is just one part of the puzzle. For this to work, you also need a supporting local infrastructure, a thriving alumni network and a receptive venture capital community. Cambridge and MIT have all three."

CMI's brief, to improve the UK's entrepreneurship relative to the rest of Europe, has clear benefits for Cambridge but what about MIT? Professor Scott Morton explains: "We picked Cambridge – they had the best bandwidth fit with our strengths in engineering and science. Our primary reason for getting involved was the undergraduate exchange programme, which now has 50 students going each way each year. Once ours return to MIT, they act like little viruses, infecting colleagues with new ideas, new ways of approaching problems and so on. That's a very positive benefit for our intellectual capital. Overall, we can accomplish more by getting together than we can individually."

UK tech-transfer – investing in the future

That the UK still lags US university/industry tech-transfer is not in dispute. David Norwood is chairman and CEO of IP2IPO, the university IP commercialisation specialist which recently hit the headlines when it signed a joint venture with Europe's largest medical research centre and the birth place of DNA, King's College, London. The deal gave the company a 20% stake in future spinouts and licensing revenues from Kings in return for financial backing and links to investors. Says Norwood: "We've come a long way in the last 10 years, as UK academics have come to terms with the fact that research and commerce are not mutually exclusive…but the US is clearly streets ahead in terms of appreciating the value of research and understanding that commercialisation is essential to move the research process forward."

Norwood acknowledges the mix of factors now in place to boost entrepreneurship in the UK, but bemoans the underlying problems that threaten to undo much of the progress being made: "At the same time as the government is pouring loads of money in, we have academics being too scared to start companies in case they incur a massive tax bill." For spinouts to thrive, he continues, what are important are world-class research, management skills, funding and supportive government and university-level cultures. The UK lacks none of these but what is still missing is a benign legislative and regulatory environment which encourages deals to get done. "Right now, it is still much easier to launch a company in the US than it is here. I see this as almost the last of the great privatisations; and where the UK is at in 20 years time all depends on how well we manage to exploit and commercialise our IP from now on," says Norwood.

Columbia's Cleare goes on to point out how, while great advances have been made by some UK universities in this field: "The spirit of what's being done there needs to free up – it's time to let the market do its thing." Because most tech-transfer in the UK is still effected via spinouts (with limited licensing activity), there is a tendency for some companies to get formed without proper market testing. The downside for government (which has often supplied the funding through the University Challenge Fund) is that the IP gets lost forever (because the university will have transferred title) – by contrast, in the US, where universities do retain title, there is more opportunity for flexibility, as well as

Imperial ambitions

London's Imperial College is another UK university that has been in the news recently with some interesting IP-based investment initiatives. Historically closely linked with industry, Imperial has been at the forefront of UK university commercialisation – most notably under its current rector, Sir Richard Sykes (former chairman of GlaxoSmithKline). Since Sykes joined Imperial in 2001, the university has tied up three pioneering investment deals: first with the Fleming family; then with Nikko Principal Investments Ltd; and most recently, with BioScience Managers Ltd, the specialist bioscience fund manager.

Dealing with each in turn, the Nikko deal, announced in April 2002, saw Nikko Principal Investments Ltd (NPIL, the European principal investment arm of Nikko Cordial Corporation) setting up a new investment company, NPI Ventures Ltd to work with Imperial College Innovations building a portfolio of investments in early-stage research and technology-derived spinouts. Under the agreement, NPIL intends to invest £20 million of capital, with an initial tranche of £10 million, investing alongside the Imperial College University Challenge Seed Fund, as well as investing in external funding rounds of Imperial-generated companies.

The Flemings deal in May 2002 saw Fleming Family Partners agree to buy a stake in a portfolio of 36 unlisted companies being created by Imperial. They own 21% of a partnership with Imperial, which will hold the university's shareholdings in those companies. Gordon House, an independent finance firm, owns another 9%. *continued on page 26*

Continued from page 23

The portfolio companies are mainly between one and four years old, and by selling stakes in them, Imperial freed up cash to support ongoing commercialisation initiatives. Some of this cash went to Imperial College Innovations (the university's tech transfer company) the remainder is being used throughout the university.

And most recently, the BML Venture Fund, announced in May this year, saw BioScience Managers Ltd and Imperial announcing the launch of a new venture capital fund focused on early-stage medical and life science companies. The BML Ventures Imperial Fund has a target size of £50 million and will make investments in 12 to 15 start-up and early-stage companies in the healthcare sector. It will have exclusive preferential access to IP commercialisation opportunities from Imperial (where it expects to invest around 50% of its funds). Fundraising, reportedly going well, is due to close by the end of the year.

Building strong foundations

Imperial College Innovations already has an impressive track record, generating £7.1 million in annual licence revenues, filing one new patent a week and creating one spinout a month. And taken together, these three deals highlight Imperial's ongoing commitment to IP commercialisation. Brian Graves, who heads the physical sciences and engineering technology team at Imperial College Innovations, explains their relevance: "A key point of the Flemings deal was to get a valuation for the portfolio, enabling us to be more assertive in the onward development of these companies. The fact that we had a sufficiently large portfolio to put together this sort of deal is significant. It also highlights the fact that, on our own, we were not developing the right resources to manage a growing portfolio." Graves believes that there is a lesson in this for other tech-transfer departments which, after all, are not scaleable operations. "This stopped us from getting overwhelmed. The Nikko deal extended our £4m University Challenge Fund, and means that the companies we spin out have private and government money going in, which in turn gives them more muscle to attract follow-on funding," he explains. It has certainly proved to be a valuable catalyst. With the Flemings and Nikko relationships in place, Imperial has a strong foundation from which to launch a sector-specific fund, so reflecting the way the private equity industry is going.

Licensing time

Graves explains that, in the current environment, and notwithstanding this flurry of deals, his team is placing more emphasis on licensing activity than spinouts against the predominant UK trend: "We've already built up a large spinout portfolio and it takes a long time to reach exit nowadays, meaning that these companies will all require a considerable amount of ongoing involvement from us. Over the next few years, exit opportunities will increase as our portfolio matures, but these remain lumpy and unpredictable. So to cover our costs, we want to do more licence deals to generate a steady income flow. We are well-supported, but we're a commercial operation and we think like one."

Deciding between spinout and licensing opportunities is, to a degree, a subjective process. At Imperial, this decision is taken at the invention disclosure meeting: narrow applications for a technology suggest licensing; broad-based applications requiring significant levels of know-how and investment indicate spinouts. Equity splits in the UK tend to be more generous in the university's favour (50/50 is the usual starting point for discussion) than they are in the US, mainly because UK universities assign, rather than license, their IP to the spinout company, receiving equity in return (in the US, the universities retain ownership of the IP).

Unstoppable momentum

The momentum in favour of university tech-transfer is unstoppable – on both sides of the Atlantic. Men like Imperial's Sykes, MIT's Morse and Columbia's Cleare are powerful advocates and keen evangelists; they know that research universities can be academic centres of excellence *and* commercial powerhouses. The entrepreneurial ecosystems that have evolved in the Bay Area, Boston, Cambridge and London are all cases in point, thriving on the concentrations of capital, entrepreneurship and innovation that agglomerate around committed tech-transfer programmes. The focus, going forward, will be on improving management calibre and facilitating collaborative start-ups. At the same time, governments (especially in continental Europe) urgently need to address the labyrinthine legal and regulatory infrastructures which currently stand in the way of research, entrepreneurship and, ultimately, corporate renewal. ■

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Critical success factors – commercialising university IP

- **Quality of technology**
  Strong patents
  Supporting several new products
  Large market potential
- **Quality of management**
  Focused strategy
  Thorough market understanding
  Realistic product development plan
- **Quality investors**
  Track record building successful businesses
  Network of connections with partners/customers
  Personal involvement with the business
  Access to money over long-term
- **Passion**
  Technologists
  Management
  Investors
- **Targeted marketing of technology**
  Focus on very few companies
  Build and maintain relationships with inventors, potential licensees, entrepreneurs and venture capitalists
  Remember that inventors, rather than research sponsors, are a prime source for leads, followed by licensing officers.
- **Having found a potential licensee, tailor the terms to fit, for example**
  Shared risk, low initial fees, equity in partial lieu of royalty, reasonable royalty rates and diligence provisions (including minimum investments – financial and personnel; product development milestones; sales milestones; and sublicensing requirements)

Source: MIT Entrepreneurship Center, with thanks to Steve Brown, technology licensing officer, Technology Licensing Office, Massachusetts Institute of Technology