

CHAPTER

Best practice in Business-University Collaboration

Richard Lambert

Academics and business people are not natural bedfellows. They talk in different languages. They work to different timetables, and are driven by different incentives. Whereas business people are primarily held to account by a single group of stakeholders — the owners of their firm — academics are accountable to a much wider range of interest groups — including their colleagues and students, the institutions for which they work, and the providers of their funding.

Developing constructive relationships between such disparate groups of people is a challenging exercise. And yet efforts to build business-university collaborations are gathering momentum throughout the developed world, and for obvious reasons.

Governments everywhere are putting universities at the centre of their economic development strategies. As global competition intensifies, it is becoming increasingly clear that future economic growth will rely on knowledge-intensive industries, and that university teaching and research have a crucial part to play in this process. The obvious model is the U.S., where the innovative application of new scientific knowledge has been the key to economic success for at least the last quarter century. As the nation's principal source of basic scientific research, universities have made a substantial contribution to this competitive advantage (National Academy of Engineering, 2003).

At the same time, the nature of innovation and business research is changing in a way that gives a much more prominent role to university research departments. Businesses everywhere are cutting back their big corporate laboratories and seeking to build research partnerships with talented outsiders. And breakthroughs in new products and services are com-

ing increasingly from inter-disciplinary research — computer scientists, say, working alongside biologists — as opposed to the narrower focus of a traditional corporate laboratory. These trends favour universities, which are by definition multi-disciplined in character, and which are constantly being refreshed with new brains. As businesses cut back, a growing proportion of fundamental research is flowing from universities (Chesbrough, 2003).

There are now enough examples of good, and bad, practice in business-university collaborations to be able to draw some general conclusions about the ingredients of success. There are three main groups of participants in the process, and it is worth examining each of them in turn.

REGIONAL AND NATIONAL GOVERNMENTS

Governments have several important incentives for helping to build bridges between the higher education sector and the world of business.

- They want to push their economies up the value chain and build a competitive advantage in knowledge-intensive industries. High quality teaching in a wide range of disciplines at university level is an essential ingredient of this process.
- They want to maximize the return on the public funding of research. In Europe, German, British and French universities have high quality research outputs, but a poor record of translating this achievement into commercial success. Governments in all three countries see this as a problem that needs to be addressed.
- They want to attract and retain research-intensive multinational businesses at a time when business research is going global. Big companies are increasingly locating their research centres in their most important markets, especially if those markets happen to contain centres of outstanding research. Their home country is no longer the automatic first choice for this investment, and with the help of its strong university-based research the U.S. is taking an increasing share of the world's investment in business research and development.

Nowhere are these challenges more important than in Europe. Its businesses are much less research-intensive than is the case in the U.S. or Japan: in 2002, business financed 56% of domestic R & D spending in the E.U., compared to 63% in the U.S. and 74% in Japan.

This means that universities *have* to play a large role in the E.U.'s research and innovation effort. They employ more than a third of all researchers in Europe, and in countries like Spain or Greece the proportion is very much higher even than this.

Europe also has an urgent need to raise the quality and breadth of its human capital. Only about a quarter of young people aged between 18 and 24 were enrolled in higher education in the E.U.25 in 2002, compared with nearly two fifths in the U.S. (OECD, 2005).

Governments can support business-university collaboration in a number of important ways.

The first is by creating the conditions in which universities can cooperate with outside partners. This means giving them the authority to take on a rather more entrepreneurial role than has been traditional, in order that they can themselves work with entrepreneurs. They need enough autonomy to build areas of comparative strength and to form strategic partnerships. And improved systems of governance are necessary for the university to handle complex relationships with outside partners (Clark, 1998)

Among other things, universities need much more sophisticated financial management than most have been used to in the past if they are to make sensible decisions about collaboration. An institution that cannot produce a clear statement of its annual revenues and costs is in no position to negotiate terms for contract research. Indeed the reality is that a great deal of such work, especially in Europe, has been poorly costed and has subsidised business research at the institution's expense.

The second key support provided by the state comes in the provision of funding for high quality teaching and research. Much the most important form of knowledge transfer from the campus to commerce comes in the form of well-educated students completing their studies and moving into the work place. And universities are accounting for an increasing proportion of fundamental research as businesses cut back on their in-house laboratories.

There is a very wide range in investment per student among OECD members. Top of the list come Switzerland and the U.S., with annual spending of \$20,000 or more. At the other end of the table are countries like Italy, Spain and the E.U. accession countries, with well under \$9,000 per student. They will find it increasingly difficult to hold their own in what has become a globally competitive marketplace for research (OECD, 2005).

As well as providing funds for teaching and research, governments also need to create financial incentives for collaboration. For example, most now provide some form of R & D tax credit, but these are not always made available to collaborative research programmes. It is important to have in place a clear and consistent policy covering the management and ownership of intellectual property. Denmark, Germany and France all brought in legislation in the late 1990s to allow institutions to claim ownership of IP created by their researchers.

Governments need to make sure that public funding for collaborative research is available on the same basis as money that is provided for work

which is driven entirely by academic curiosity. In the U.K., research funding is allocated on the basis of peer review, which finds it easier to recognise excellence when it takes the form of academic citations as opposed to commercial success. The intention is to correct this anti-business bias in future reviews, but it will be a challenging task (Lambert, 2003).

The higher education systems that are likely to be the most successful in collaborating with business are those that contain a diverse range of institutions. The type of business collaboration that would make sense for one kind of university might be either impossible or irrelevant for another — for example, a less research-intensive institution can play an extraordinarily valuable role in working with local business in a way that might make no sense to one of the big research universities.

Moreover, proximity matters when it comes to business collaboration, especially for small and medium-sized enterprises. Informal networks cannot easily be sustained over long distances, and even large companies often find it more efficient to work with research departments in their own locality. Successful large economies need to contain both world-class research universities and a strong spread of regional institutions. This helps to explain why Germany is now determined to create a number of elite research-intensive universities to complement its strength in regional institutions.

The fifth area in which government support makes an important difference lies in building the infrastructure needed to support successful collaboration. Examples include the establishment of technology transfer offices and corporate liaison offices on the campus; the provision of seed funding to support pre-competitive research or early stage spin-out activities; or the provision of subsidies for students to spend time in industry.

Universities do not usually have the funds available to initiate such programmes. And businesses find it hard to justify investments which may not bring direct benefits to their shareholders. This is the kind of market failure that merits modest public funding, and such support is available in one form or another in many developed economies.

The U.K. is probably the example of best practice in this respect. The government introduced a specific stream of funding to support knowledge transfer in the university sector in 1999, and this money has now been consolidated into a permanent source of finance allocated on a competitive basis and approaching £100 million a year. The result is that successful entrepreneurial universities can plan ahead rather than having to adjust their knowledge transfer activities to match short-term funding incentives. This so called “third stream” funding (coming on top of funding for teaching and research) has contributed to a significant culture change on U.K. campuses over recent years, and has given academics real incentives to reach out to commercial partners.

Another obvious way in which governments can help or hinder collaborative efforts lies in the way they set targets for this kind of activity. One example of a perverse target: government ministers in a number of countries, including Japan and the U.K., have from time to time suggested that success can be measured by the number of spin-out companies created by university departments. But whereas establishing a spin-out is a simple process, sustaining such a business over time is a very different exercise. As a result, public funding has been wasted by too much effort being devoted to this particular activity.

The main role of universities is to create and distribute knowledge and they do not exist for the convenience of the corporate sector. But wise government policy-making can help to channel commercially relevant knowledge into the marketplace, to the benefit both of the university system and the national economy.

UNIVERSITIES

Universities must be clear about their motives for collaborating with business. Unless they are very lucky, such partnerships are not going to provide them with the resources that most of them so badly need to support their existing activities. The experience of the U.S., which is longer than that of other countries, demonstrates that technology transfer is not usually a large revenue earner. A number of U.S. universities started out with that aim, but found it impossible to make significant amounts of money and so changed their objectives. MIT, Stanford and Yale all now state that their main aim in pursuing commercial activities is the public good — they want to create the greatest possible economic and social benefits from their work, whether they accrue to the university or not (Bok, 2003).

This is an entirely proper approach. Public funding for university research is intended to create a public good, rather than to make universities rich. The public interest lies in the results of university work being widely distributed, rather than being used to maximize the economic returns for the exclusive benefit of the institution.

Of course this is not to say that collaboration does not bring economic returns. Working with outside partners may allow an institution to cover some of the overheads of a research laboratory. It may well give academics access to equipment that could not otherwise be afforded. Consultancy arrangements can provide a badly needed supplement to academic salaries. And from time to time, a licensing arrangement or a successful spin-out may bring a valuable boost to the university's income.

But there are other potential benefits for the university. There is an intellectual pleasure to be derived when ideas are translated into commercial activ-

ity. Some academics have distinct entrepreneurial flair, and enjoy the idea of commercial engagement. Companies like Du Pont and Rolls-Royce have demonstrated the ways in which academic and business researchers can work alongside each other over a period of time, to their mutual benefit.

Moreover rapid expansion in student numbers across the developed world over the past 30 years means that universities have for the first time become important economic entities in their own right. They are among the major wealth creators in many European cities, and they are by far the biggest employer of researchers in a good number of European regions. Universities lie at the centre of most of the successful business clusters around the world. For all these reasons, they have a much clearer role to play in economic life than in the days when most of them were nothing more than small communities of scholars.

Successful entrepreneurial universities have the following characteristics: They have sound and well established systems of governance. As universities become more involved in commercial activities of one kind or another, they have to develop clearer ideas of their mission and firmer rules for dealing with potential conflicts of interest. They need to build new kinds of relationships, and have a highly proficient approach in areas like financial control and human relations (Clark, 2004).

How much time are they prepared to let their academics spend on commercial activities? What are the rules for publishing collaborative research results? How far, if at all, are they prepared to let commercial sponsors shape their research programmes?

The U.S. provides examples of both the best and the worst practices in these sensitive areas. U.S. universities tend to be much more precise than their European counterparts about how academics can allocate their time. For example, MIT's faculty employment contract only covers nine months of the year: the rest of the time can be filled by consultancy work.

European universities, by contrast, tend to turn a blind eye to outside consultancies, regarding such activities as a useful supplement to often inadequate wages. This approach ignores the potential conflicts of interest that can tempt academics to spend a disproportionate amount of their time on commercial work.

But there are also well documented cases of governance failures in the U.S. — for example, where commercial sponsors have sought to suppress research that reflects badly on their products, or where universities have allowed the shape of their research activities to be distorted by commercial demands. These represent serious reputational risks, which university leaders have to recognize (Washburn, 2005).

Successful entrepreneurial universities have invariably set up systems to help businesses find their way around the campus. Business liaison offices are

established to act as the interface with the corporate sector: their job is to market the research strengths of the university; to develop business networks; to advise on consultancy arrangements; and to help arrange collaborate agreements and other joint ventures.

There is no single model for such offices. Some take in technology transfer activities, while other universities have established specialised companies to manage technology transfer.

But experience shows that at least three qualities are essential for success in this area.

- First, corporate liaison and technology transfer offices need trained staff with commercial experience. Such people are hard to find and to retain. This is why it usually makes sense to set up separate companies to manage these activities, not least to get away from academic pay structures and incentives.
- Second, the university needs to have an agreed and clearly understood approach to the management and ownership of its intellectual property. Disagreements about IP are the biggest single stumbling block in commercial collaboration, and lack of clarity about who owns what is the main explanation. In the past, German academics built their own relationships with industry: recent legislation means that their IP is now shared with their institution which — once the new system is properly established — should encourage stronger and longer lasting partnerships.
- Third and most critical, academics must have trust in the competence and effectiveness of their university's technology transfer arrangements. Otherwise they will not cooperate with the university authorities, whatever the rules may say. Examples of best practice in this respect include Oxford, Stanford and MIT.

Innovation processes are complex and non-linear. It is important to understand that the best ideas and the great product breakthroughs emerge out of all kinds of feedback loops, development activities and sheer chance. And inter-disciplinary research is becoming increasingly important — with social scientists, for example, making an increasingly important contribution to information technology.

So the most successful entrepreneurial universities are those which succeed in building dynamic networks both among their own academic researchers and with their business counterparts. If you walk around the campus of universities like Loughborough, Monash, or Twente you will often come across groups of like-minded people from different backgrounds discussing common problems — and sometimes coming up with innovative solutions. Some of these networks are formal, others are completely casual — where, for example,

alumni have built lasting relationships with their former teachers and colleagues.

Universities' relationships with business will depend on their location, mission and size. But networks that go across disciplines and functions are an essential ingredient of success in all cases.

BUSINESS

There are six related ways in which businesses around the world have gained competitive advantage from working with universities.

- Access to new ideas of all kinds. The best academic researchers are in touch with knowledge breakthroughs in their area of activity wherever they may be happening in the world.
- The ability to tap into a wider range of disciplines and a much larger intellectual gene pool than even the biggest company could possibly create on its own.
- The ability to overage the research dollar by working in partnership with institutions that have access to public funding.
- The opportunity to identify and recruit the brightest young talent.
- The ability to expand pre-competitive research. By working with universities, businesses can widen the range of their research horizons and spread the risk.
- Access to specialised consultancy (Lambert, 2003).

Not surprisingly, the evidence suggests that companies which use universities and other higher education institutions as a source of information or a partner tend to be significantly more successful than those that do not.

However, a good number of business-university collaborations fail to meet their objectives. Half the companies responding to a U.K. survey said they had difficulties in managing the relationships with academe (The Confederation of British Industry, 2003), and for their part universities complain about the problems that can arise from frequent changes in corporate strategies, or from personality changes in the boardroom. These collaborations require careful and consistent management by both sides: without that, they will fail.

Experience shows that it is critically important to get the relationships right from the very beginning. A whole range of questions has to be answered, including:

- What are the arrangements for the ownership and control of the resulting IP?
- What are the academics' publication rights?
- How important is exclusivity to the business sponsor?

- Who are the key individuals with responsibility for success on each side, and how will they work with each other?
- How will the recruitment process work?
- What are the financial and time commitments of both sides, and how will they be spread over the life of the project?
- What are the mutually understood definitions of success in this project? How can these be reviewed over time as the work moves forward?
- What are the appropriate milestones against which progress can best be measured?
- How much access will the business partner have to the campus?
- Remembering that proximity matters in building these relationships, how are the partners distributed geographically?

Once the initial agreements have been signed, the collaboration will need careful management and continued commitment from both parties if it is to succeed over time.

An increasing number of large multinationals are concentrating their collaborative efforts on a small number of research led universities around the world: examples include BP and Schlumberger. Advantages of this approach include the opportunity to relate to the university at many different levels, so that collaboration does not rest entirely on a small number of individuals. If things go wrong, it is much easier to resolve the problem if the partnership is broadly based. There are also real advantages in establishing a continuous relationship, in order to develop a shared sense of purpose and of trust.

For example, Rolls-Royce has established a number of University Technology Centres in the U.K. and elsewhere, each dealing with a specific piece of engine technology. The university researchers benefit from long-term funding, and from working alongside corporate researchers on practical challenges. These strategic partnerships encourage long-term working relationships and trust and, the company says, have proved to be substantially more effective than its previous approach of more ad-hoc relationships with academia.

Small and medium-sized companies are more likely to work alongside university departments located close to their plant, but the ingredients for success are much the same as with large multinationals. They include a strong and shared sense of purpose, a common strategic vision and detailed planning from the beginning. Each side must feel that the other is making a genuine contribution to the collaboration, and researchers need to get together often enough to discuss problems and establish trust.

Business-university collaborations are difficult to initiate and to sustain. But there are now enough examples of best practice around the world to show the ways in which governments, universities and businesses can work together to their mutual benefit.

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