The advantages of an incubator

For bioentrepreneurs looking for a home for their startups, there are very obvious advantages of incubators: they permit company founders to conserve cash and accelerate the commercialization of their technology by providing, if necessary, interim management and access to professional advisers (e.g., legal and financial specialists and patent agents) and shared but secure laboratory facilities.

In addition, for a university spinout, incubators help to shift the startup's culture from an academic perspective to an entrepreneurial one. Incubator staff can help with branding the company, increasing the confidence of investors that they are dealing with a commercial entity separate from a university. A successful biotechnology incubator is unlikely to be just a supplier of cheap real estate with laboratory resources in isolation from a technology pipeline. The incubator should ensure that a company's first steps make the later ones easier.

In summary, a good incubator should help to turn ideas into a commercial reality.

The future for incubation

The initial success of Manchester Innovation has encouraged us to plan a second incubator, and the university has made land available adjacent to the present building. At this stage, definite funding has not been pledged, but we hope to be able to construct a building large enough to house future biotechnology startups and to offer some core technology facilities and a lecture theatre.

Is the pipeline of new biotechnology startups sufficiently robust to justify our optimism? Interesting results have come from asking industrialists to say which of their products could not have been developed (without substantial delay) in the absence of recent academic research[3]. Within the US health care and pharmaceuticals industry, 31% of all new drugs and medical products launched during 1986–1994 were said to fall into this category.

There is intriguing evidence to suggest that universities may be an even more important source of new drugs in the future. The decrease in the number of new chemical entities reaching the market in recent years is of concern to the pharmaceutical industry. While the number of mergers and acquisitions in the pharmaceutical industry has increased, so has the number of companies involved in pharmaceutical research and development. According to the *Scrip* review of 2001 (ref. 4), the number of small companies is increasing: Between 1997 and January 2002, the number of companies with only one or two projects increased by almost 200. The majority of these companies will have originated from universities.

Recently Sir Richard Sykes, formerly nonexecutive chairman of GlaxoSmithKline and now rector of Imperial College (London), reinforced the need to provide the "necessary environment" for growth of companies from academia. There is a compelling argument that part of the "necessary environment" mentioned by Sir Richard should include a properly managed incubator to promote entrepreneurial activity.

It is, of course, difficult to prove that incubators can assist university researchers to commercialize their ideas effectively, but certainly the Manchester experience is encouraging. The main beneficiaries of advances in biotechnology—the pharmaceutical industry—are increasingly struggling for innovative pipelines. Sustainable growth in many areas including health care is likely to rely increasingly on interdependent networks and alliances rather than scientific self-sufficiency.

Continuing success will be dependent on new mindsets and capabilities creating value from intellectual property. The contribution of emerging "can-do" locations such as the Manchester Incubator should help to sustain the competitive edge in the market applications of biotechnology.

1. Salter A.J. and Martin B.R. The economic benefits of publicly funded research: a critical review. *Research Policy* **30,** 509–532 (2001).
2. Biotechnology Clusters (August 1999) report by a team led by Lord Sainsbury, Minister for Science defined clusters as "geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries and associated institutions e.g., universities."
3. Mansfield, E. Academic Research and Industrial Innovation: An update of empirical findings. *Research Policy* **26** 773–776 (1998)
4. R&D revolution remains just around the corner. *Scrip* February, 72–73 (2002).

Incubation without walls

No bricks, no mortar … but lots of encouragement, introductions, good advice, and minimum conflicts of interest at the Massachusetts Institute of Technology, say Thomas Ittelson and Lita Nelsen.

Charles M. Vest, the president of the Massachusetts Institute of Technology (MIT), once said, "…the primary goal of university licensing and associated offices and policies should be to move technology rapidly to industry [for development]." And indeed, the MIT's Technology Licensing Office (the "TLO") has the responsibility of placing inventions generated at MIT into the commercial sector where they can be best exploited for the public good.

This article describes the TLO's "virtual incubator" approach to starting businesses from MIT technology—a "non–bricks-and-mortar" method of fostering entrepreneurial activities within the MIT community.

Spotting the startup

Most often, inventions at the Institute are incremental improvements (sometimes important) to existing technologies or potential product extensions. In general, most incremental inventions are suitable for licensing to existing businesses in the field. However, around one in ten inventions arriving at the TLO has the technical and market potential to support an entirely new enterprise.

Each year, MIT research (and subsequent patents) form the technological basis for 25 or so such entrepreneurial business startups. Over the past 15 years, the TLO has facilitated the formation of more than 250 such businesses, including such leaders within the biotechnology sector as Ariad Pharmaceuticals, Cubist Pharmaceuticals, ImmuLogic Pharmaceuticals, StressGen Biopharmaceuticals, and Praecis Pharmaceuticals.

So, what makes a good startup opportunity? Positive indicators include very early-stage research, a technology that has several potential applications, no existing companies dominating the field, and an inventor who wants to participate actively in his or her invention's commercialization. We find that embryonic technologies with multiple new markets are often best exploited by focused and dedicated entrepreneurs funded

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by venture capitalists who understand technical and business risk and reward.

MIT startup opportunities usually have no business plan or even the beginnings of a management team. Often the invention has not yet been "reduced to practice" (i.e., proven to work), but the underpinning technology can have broad promise and can be potentially enabling in an important commercial arena. The Institute scientist-inventor can be a real visionary and technology champion. Then, if business conditions are favorable—a large potential market and large potential return with no current dominating competition—the TLO will try its best to fan entrepreneurial fires.

MIT's virtual incubator

The TLO uses a "virtual incubator" model to start up businesses based on Institute technology. We do not offer "physical" support, such as space and seed financing, and we do not write business plans, although we are happy to critique them. However, we do offer lots of encouragement, and provide matchmaking services with source of funding and potential management talent. Also, the TLO will pay for patent applications to protect the technology while the fledging (and unfunded) business is setting itself up. When the time comes, our licensing procedures are straightforward, with negotiation, commitment to proceed, and creation and signing of the license agreement all carried out within the TLO.

The TLO aims to be a conduit to, and not a gate between, venture capitalists and the faculty. We meet regularly with venture capitalists to discuss new technologies and ongoing research at the Institute that may be appropriate for a startup venture. We encourage venture capitalists to meet independently with the faculty, and we will make introductions and counsel faculty on the goals and objectives of venture capitalists and how best to interact with them. In an environment where it can be hard for entrepreneurs to get their business plans read (or even telephone calls returned), an introduction to a venture capital company can be invaluable. The TLO's success has gained the respect of the venture capital community, which now looks to us as a source of future opportunities. However, we will not represent a faculty member in negotiating his or her personal role in a proposed startup venture, regarding any such representation as a potential conflict with the TLO's primary charter as a "shepherd" of the technology.

Licensing staff at the TLO are experienced negotiators who can navigate the shoals of venture capitalists' demands, inventor ego, not-for-profit policy, and governmental regulations. Most of them have many years of industrial experience (the current average is 28 years), often in business development jobs and in smaller, entrepreneurial companies.

Recipe for success

Why have we succeeded? First and foremost, MIT has a wealth of good technology—technology that can be world-class and that, while very embryonic and basic, often has great potential commercial value.

Second, the MIT environment is very supportive to startup ventures. At MIT, industrial careers are respected (even in the biological sciences), and entrepreneurship is the goal of many on campus. Importantly, success does beget success. Past successful MIT startup ventures encourage faculty and students to take the plunge themselves and provide a group of very visible and accessible role models—a real cheerleading group. Further, entrepreneurship garners enthusiastic support from senior Institute administrators who understand their mission.

Third, although the TLO can hardly take the credit, the Boston/Cambridge area is a great place to start a business. More than 80% of MIT startups locate in eastern Massachusetts. Facilities are available and friendly landlords are ready to build out (and finance) space to the exact requirements of the startup. The large academic community provides a large pool of talented young scientists to staff research programs.

Minimizing conflict

The overriding purpose of the Institute and its faculty is the discovery and dissemination of knowledge. Commercial application of that knowledge is left to those outside the open and "not-for-profit" strictures under which the Institute operates. With so much entrepreneurial activity at the Institute, we have evolved clear policies to draw the line between Institute-encouraged entrepreneurism and misplaced for-profit commercial activity.

Our goal at the TLO is adequate "conflict minimization". We are not trying to impede or limit the entrepreneurial activities of the faculty, but rather to provide faculty and students with guidance regarding what is collectively regarded as appropriate behavior at the interface between knowledge for its own sake and commerce. But ultimately, and regardless of strictures, the individual faculty members are responsible for themselves.

Three basic principles guide MIT's conflict-of-interest policies for technology transfer, and these same principles also apply to Institute startup activities.

- Technology transfer and entrepreneurial activities are by-products (not the purpose) of the academic mission of education, basic (discovery) research, and dissemination of knowledge.
- Technology transfer activities must not deflect or distort this core mission.
- When conflicts of mission arise, the academic mission always takes precedence.

MIT's business startup conflict-of-interest rules were formulated during the late 1980s and remain essentially unchanged 250 startups later. We regard them as a conservative attempt to erect an appropriate "Chinese Wall" between academia and the startup company, allowing both to prosper independently. These well-publicized rules are listed here:

- There must be no incubation of the company within MIT once it has been formed.
- Faculty members may consult and be board members, but may not be line officers of the company.
- Faculty are required to report all outside consulting activities including activities with startups.
- Faculty members may not negotiate terms of the license with MIT.
- No sponsored research will be accepted from the company if the faculty founder holds equity in the startup.
- No confidentiality of MIT research results is permitted; everything is published.
- Only patents and copyrights can be licensed (no exclusive licenses to "know how" or trade secrets).

In addition, before starting up a company the faculty founders must sign a "conflict avoidance statement", promising not to accept research support from the company, not to suppress for the company's benefit the dissemination of research results developed at MIT, and not to use students on any company projects (that is, current students may not be employed by the startup company).

All the financial dealings between the new company and the Institute are kept at arms' length. MIT will not invest in early funding rounds and takes no board seat. Any equity received by the Institute from the startup at its inception is managed by the MIT treasurer, not by the TLO. Importantly, the company receives no rights in future research in the field of the license.

These clear policies, well thought out and consistently applied, are designed to facilitate startups. The simplicity, strictness, and "no exceptions" rules for keeping MIT and its startups separate actually help keep things moving, because negotiations do not get bogged down while committees ponder over exceptions and risks.