Academic innovation

Cambridge science park succeeds

LIKE a well-focused laser beam, the Cambridge Science Park (CSP) is hot in the middle. Its heat is that of fast growth — witness the new construction in every direction, the rising profit margins of the companies and the traffic jams outside the park.

This growth of high technology in a previously "backwater" university town has inspired a flurry of analysis about the reproducibility of the CSP experience and its long-term growth. How fertile is the industry/university link for jobs and increased income? Cambridge has been compared to the early Silicon Valley; does it also need the anchor of big companies with a marketing mentality gauged to the mass market rather than to the specialized niche?

CSP, with its 40-odd companies and 1,000 employees, is only a small part of what is now popularly called the Cambridge phenomenon. Since the early 1960s, some high-technology companies employing 14,000 people have been established in Cambridge, most of them with direct links to the university. CSP's acknowledged role is as symbol, proof and drawing card for what is happening in Cambridge. It is not, however, simply a further extension of that activity. Located just outside the town on land owned by Trinity College, CSP has high-rent buildings, lots of open space, a lake complete with rather antagonistic geese and its own personality.

The scarcity of good industrial sites in Cambridge means that CSP is one of the best places in the area. For this reason it attracts not only Cambridge companies that are growing or moving upmarket but also companies from outside the region which come because of Cambridge's reputation and because Britain's oldest science park is now a good address. They come to get away from "metal-bashing" industrial centres to a town where the air is clean. And increasingly they come to CSP because of its accumulated experience in getting new technology into established industry.

Many CSP companies such as Laser-Scan Laboratories, with its laser-deflection display devices for location of aircraft in distress, use computer technology; the hardware/software companies themselves, however, have so far chosen to stay in town, close to the university computer facilities. Spin-off companies are common among these, as they are in Silicon Valley and on Boston's Route 128. Because of CSP's small size and high specialization, there is less interaction among companies at the park.

An important factor in CSP's growing success is the unconventionality of the "oddball" entrepreneurs. Ideas that might previously never have seen the light of day outside an academic journal are now not only taking reproducible form but are also making money. At one turn, for example. Dr Felix "Polywater" Franks has turned his expertise to water in supercooling cells. At present, genetic engineers and companies doing drug tests on cell lines freeze their cells to preserve them. "Cells are contrary beasts", says Dr Franks; even if they can be frozen, they are often killed or experience genetic drift. Supercooling, according to Franks, keeps the cells alive and pure.

Another innovator is Andrew Goodfellow of Goodfellow Metals, which specializes in thin films and in changing the surface properties of metals by ion implantation. Goodfellow commercialized one of the first Cambridge inventions to become a success — the Huxley–Goodfellow micromanipulator originally designed by Sir Andrew Huxley. Britain, according to Mr Goodfellow, "breeds a nation of losers". The most important difference at Cambridge is the attitude of mind fostered there.

Dr William Bolton, of Cambridge Robotics, runs a tiny company involved in dedicated electronics for foundries. He sees his role as educating both engineering graduates and foundry management, showing the former that the problems of the assembly line can be challenging and providing the latter with graduates already experienced in technical and financial issues.

The Microelectronics Research Laboratory is so far an anomaly at CSP because it is a university facility. Many of the projects the laboratory works on, according to the director Dr H. Ahmed, are of direct benefit to industry. Examples include research on electron and ion beams, as well as new ways of putting silicon on top of insulators. The laboratory does not do contract research but, instead, collaborates with interested companies, a sharing that often results in joint publications.

Trinity's role as owner of the CSP land places it in a special relationship to the occupants of the park. The juxtaposition of high-technology companies with a college known for scientific excellence might be expected. On the other hand, this marriage of interests is an oxymoron: the universities in Britain have traditionally had nothing to do with applied research, and the timescale of Cambridge, "where things are happening fast if they are promised by next term", is antipathetic to the aggressive speed of high technology.

This timescale has its advantages. Dr J. Bradfield, senior bursar of Trinity College, says that growth was slow before 1980, but because Trinity owned the land already, looked at projects in terms of decades if not centuries, and had no specific plans for CSP, the park was never in danger of being labelled a failure. In addition, though Trinity definitely wants a close relationship between the CSP industries and the university, it sees no reason to force or formalize them. Here is the crux of the industry/university bridge; according to Bradfield, it is the "accidental and unexpected friends" that provide the finest spark.

Trinity's support of CSP has been an important catalyst for the entire Cambridge phenomenon, lending confidence to the movement according to Dr Nick Segal, whose firm Segal Quince & Partners recently published a report on Cambridge high technology. Dr Bradfield points to the 1960s debate over the role of the university and Cambridge's image as unindustrial (as opposed to Oxford) and quaint. Now, according to Dr Bradfield, CSP has shown that applied research can achieve "results of great interest that also make money".

Acceptance for the changing dynamic of university research and industry is expressed in many different ways. According to Dr Peter Woodsford of Laser-Scan, a scant five years ago his company was not allowed to specify the kind of work a Cavendish research fellow that it funded would pursue. He believes he would have such freedom now.

CSP's growth curve, says Dr Bradfield, is virtually classic in form; a slow first few years followed by a steep rise. CSP insiders agree that CSP, along with the entire Cambridge phenomenon, is still far from reaching a plateau.

As for second-stage growth of the Cambridge phenomenon, one issue is how many small companies will be bought out — a trend already begun between US companies and CAD firms in town. Dr S. Bragg is head of the Wolfson Industrial Unit, whose business is providing bridges between industry and university. He predicts that small enterprises will continue to be started, but cannot say whether existing companies will grow suddenly or stay the same size.

CSP's success will be a function of the model analysts apply. There is no reason why a large number of small companies should not provide at least a certain volume of employment and income, at the same time retaining flexibility by constantly burbling new ideas to the surface. Failing companies would be quickly replaced. It is tempting, however, to apply another model — the leaven of large firms governed by a marketing mentality that thinks in billions, not millions — because this model applies to the older larger science parks in the United States. Large companies offer widespread use of products, lots of jobs and the promise of stability. Already there is an IBM "listening post" on CSP. But for many of the innovators there, big fish moving into their pond would not be a welcome transformation.

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