HUGHES HALL

CAMBRIDGE UNIVERSITY

2006 CITY LECTURE

"From Science to Growth"

What exactly is the mechanism by which scientific research turns into economic growth?

6 March 2006

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Acknowledgements

I would like to thank all the people who have helped and inspired the work behind this lecture. There are too many to list here comprehensively.

Having first started to think about the issues involved in early 2000, I came to Cambridge in October 2001 to work full time as a Visitor in the Cambridge University Computer Laboratory. My title was Director of Development but I didn't use it much because people assumed I was fund raising. I wasn't fund raising. I was working on creating wealth; on “fund creating”.

My first acknowledgement is to Professor Ian Leslie who invited me to become a Visitor at the Laboratory and through his distinctive and empowering style of leadership inspired this work. I should also like to thank Margaret Levitt and Caroline Matthews for being so welcoming and helpful during my time in the Lab. I should like to thank Ms Jan Samols, Director-General of the Cambridge Computer Lab Ring, for sharing an office with me for almost 3 years and for building the Ring and now the Supporters' Club as well. I would like to thank all the staff of the Lab for being very welcoming.

I should like to thank Lucy Saunders of Mahseer for helping me persuade Stephen Timms to change the law on employers’ national insurance and then for introducing me to the Cambridge Enterprise Conference in 2000 which opened my eyes to the Cambridge Phenomenon.

I would like to thank Dr. Matt Schofield for providing me guidance on the technology transfer literature and for helping shape much of this work. I would like to thank Ajay Vohora for sharing his work with me and Dr. Tim Minshall for prompting me to develop these ideas more systematically.

I would like to thank Dr. Elizabeth Garnsey in the Institute for Manufacturing for all the positive influences that she has exerted on this work from inviting me to lecture in her department, reviewing drafts, encouraging me to publish both in Prospect and on the internet and for undertaking 2 studies of graduate founded companies in 2003 and 2004.

I would like to thank Rupert Morris of Clarity for helping me with my lamentable writing skills. I would like to thank all the people who have reviewed these ideas and given help in various ways including Ben Gales, Jamie Mitchell, Hamish McRae, Richard Lambert, Professor John Bates, Richard Ellis, Julian Walsh, Professor Alison Richard, Sir Graeme Davies, Daniel Storey, Philip Rutnam and Sir Ronald Cohen.

I would also like to thank my colleagues at Trinamo, Wayne Barker, Mark Watson, Jonathan Malin and Anthony Finbow for allowing me to use work time for this pro bono work.

Finally I would like to thank Professor Peter Richards, Dr Peter Richards and Nick Sinclair-Brown all of Hughes Hall, for inviting me to join the college as a City Fellow and Anna Marino and Dawn Scrivin-Wood for all today's arrangements.

INTRODUCTION

Welcome to Hughes Hall, which will shortly be the youngest college in Cambridge. So young it isn't born yet. But it is about to be. Hughes Hall was originally founded in 1885. A few weeks ago, on 8 February 2006, The University Council signed their Report recommending that consent be given to Hughes Hall's application for a charter of incorporation as a college. The baby is about to be born.

Hughes Hall offers mature students a second chance if they have missed out on a formal education when young. It specialises in business, education, law and medicine and is keen on sport, with the university cricket ground in front and plenty of Blues in the college. Particularly rugby Blues. We also have the University rugby coach in the college which might explain the presence of all the rugby Blues.

I am very grateful to the President, Professor Peter Richards, and to Hughes Hall for being able to invite you all here tonight. I am humbled by the fact that so many of you have made the effort to come, some from great distances.

Our subject tonight is "From Science to Growth; what exactly is the mechanism by which academic scientific research turns into economic growth?

This is an important question for many reasons:

- First, from the perspective of our society as whole; Europe is placing a bet that scientific research will help grow our economy. A key part of the Lisbon agenda is to increase spending on research, both academic and corporate, to 3% of European GDP. 3% of our GDP is a big number. The basic belief is that scientific research and economic growth are correlated and therefore more science will lead to more growth. Let us treat that as an assumption for the purpose of tonight's lecture. The United Kingdom is part of Europe and the United Kingdom is thinking the same way. The second item mentioned by Gordon Brown in his 2004 Budget was promoting research and innovation. Our society is investing huge sums in science, with good reason, but it would be tragic if this investment did not turn into growth, as expected.

- As well as being important for our society as a whole, our question tonight is important for our universities and especially our leading research universities. They need an appreciation of how the science to growth mechanism works to be able to help it work well. If the mechanism is misunderstood, opportunities might be missed or worse, misguided actions might damage the mechanism. Worst, misguided actions might damage the universities themselves.

- Our question tonight is important for Government and policymakers. With the best of intentions, our policymakers in the UK and in Brussels really do want to see the economy grow and really do want it to grow through science. Many, many initiatives have been undertaken to catalyse the science to growth mechanism. Have they worked? Have they been designed with a real understanding of how the mechanism works? Have they been misconceived?

- Our question tonight is important for business too. Businesses are always looking for ways to survive, make money and grow. If universities can help materially, businesses will want to take advantage of that opportunity. They will not be slow to make use of something valuable, if the mechanism really does deliver value.

- Our question tonight is important for students. Both undergraduates and research students want to feel they are doing something meaningful. They want to feel they are part of something that matters and that works. Forcing them into the wrong avenues based on a misconception of how the science to growth mechanism works will be bad for them.

- Finally, our question tonight is important to the growing number of academics who study this field.

How the science to growth mechanism works is important to society, to government, to our universities, to business, to students and to academics. That's plenty of people!

It's also important because of the resources invested in Third Stream initiatives. Universities' first two missions are teaching and research. Economic impact is the Third Stream and this is now well recognised. The Higher Education and Innovation Fund, known as "HEIF", was set up to promote Third Stream activities and has had a heavy focus on technology transfer. Many university technology transfer offices were expanded or set up using grants from HEIF and efforts were made to improve the business / university interface. HEIF alone is expected to disburse £110m per annum from this year.

In his 2004 Budget, Gordon Brown mentioned that promoting science and innovation are both long term goals of the Government. Another sign of the strong policy interest was the fact that Richard Lambert, former editor of the Financial Times, was asked by Gordon Brown to look at the business / university interface.

This is an important topic.

A good place to start our inquiry is the 2004 Treasury Science and Innovation Report which said:

TREASURY SCIENCE AND INNOVATION REPORT
July 2004

> "Studies show that R & D delivers benefits by allowing an economy to do two things:
>
> - understand and appreciate the value of others' findings and results;
>
> - and make new discoveries."

Source: http://www.hm-treasury.gov.uk./spending_review/spend_sr04/associated_documents/spending_sr04_science.cfm at p.150

The first means looking things up. The second means inventing things.

One question is, which of these two things is the key to the science to growth mechanism? Another question is, given certain circumstances, which of these two things works best? The Treasury report goes on to talk about technology transfer at length. This reflects the current policy climate. An important policy thrust circulating in the UK and Europe has been getting university inventions, "out of the door" and into the marketplace. People think that if this doesn't then grow the economy, it must be because of stuffy academic culture and an interface that is blocked. The policy theme has been, "let's change the culture and improve the interface to get more out of the door."

People think that turning science into growth is about the science.

This is understandable but appears, in some key respects to be a misapprehension.

Let me explain why.

In doing so, I am going to answer three main questions:

1. How does innovation actually occur in the economy?

2. How does a good business / university interface actually operate? How can universities contribute to innovation?

3. What are the appropriate policy actions to catalyse this mechanism?

FIRST, LETS LOOK AT HOW INNOVATION ACTUALLY OCCURS.

Innovation is diverse. It occurs in plenty of different ways. It can be customer led; which works like this: customers have a problem; solving the problem would be valuable to the customer, a supplier solves the customer problem. The value delivered to the customer by the solution is more than the cost of the solution. Value is created. This is called "pull".

On the other hand, innovation can be "pushed" to customers. The Irish had a surplus of milk. They go to David Gluckman, then working for IDV (now Diageo) and said "invent a product to use our surplus milk". David invented Baileys Irish Cream and it's a great hit. Customers tried it and liked it. This is called “push”.

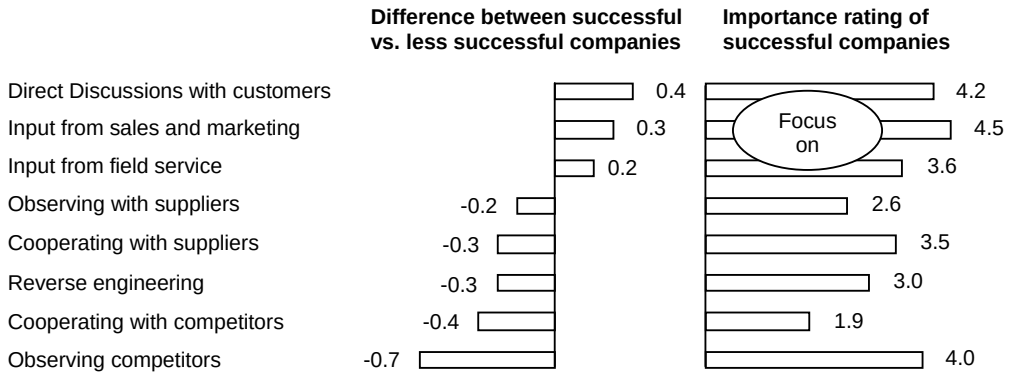
As well as "push" and "pull", there are plenty of other sources of innovation. The linear model of innovation is where laboratory inventions are commercialised. Iterative models involve some to-ing and fro-ing. There are many models.

Arguments about how innovation best occurs or which is the best model can be easily be resolved by pointing out that innovation occurs in all ways in all disciplines or industries but that the mix varies between disciplines or industries. The archetypal model occurs differently in differently sectors. Conversations between people from different sectors can become heated because they don't realise that both can be correct, in their own sector.

How does innovation in technology occur?

A McKinsey study called “Excellence in Electronics” analysed the differences between successful electronics companies and unsuccessful ones. The more successful ones sourced their design ideas more from customers than the unsuccessful ones.

SOURCES OF DESIGN IDEAS
index (1 = not important; 5 = extremely important)



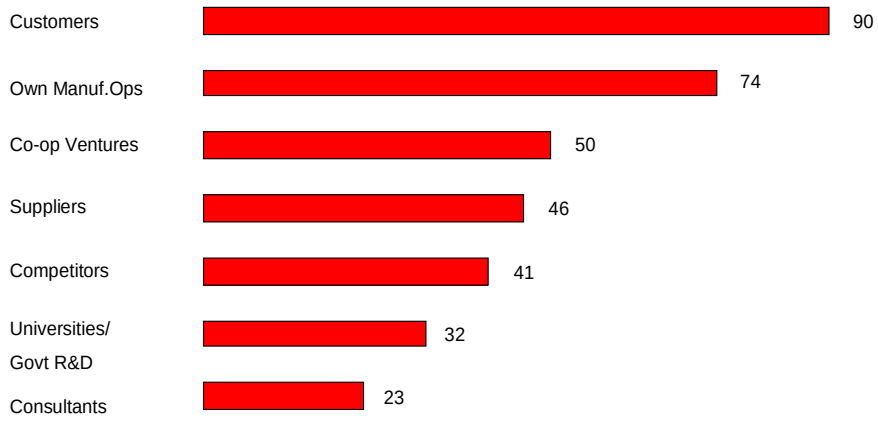
Source: Excellence in Electronics

Sourcing design ideas from discussions with customers is the biggest indicator of successful companies followed by sourcing design ideas from sales and marketing. Weaker companies are characterised by sourcing design ideas from competitors and suppliers. In electronics, customer input is key to innovation.

In 1994, three academics, Cohen, Nelson and Walsh[1] asked industry R&D managers where they got new project ideas. The results were published in 2002.

INFORMATION SOURCES SUGGESTING NEW R&D PROJECTS

% R&D managers in industry indicating source



Source : Cohen, Nelson & Walsh published in Management Science in 2002 from 1994 survey

Confirming the McKinsey findings, on average, customers are the top source of new R & D projects.

University R&D comes second bottom. In general, university research is not a great place to look for new product inspiration.

This is confirmed by Cohen & Walsh[2] (working without Nelson this time) who asked R & D managers how they accessed the university science they needed. Cohen & Walsh were interested in how the usage of various channels for example, accessing journals or accessing patents, varied between computing and pharmaceuticals. I re-cut the data to show how the balance of channels varied between sectors. The result shows clearly how different sectors use a different blend of channels to access science

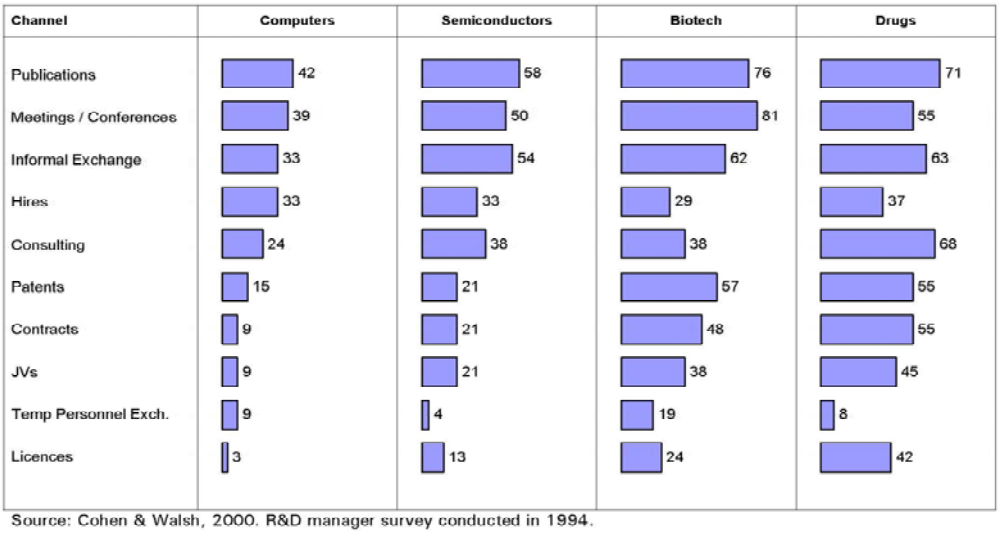
[1] Links and Impacts: The Influence of Public Research on Industrial R & D, Management Science 2002 (48) pp. 1-23

[2] W.M. Cohen & J.P. Walsh, "Public Research, Patents and Implications for Industrial R&D in the Drug, Biotechnology, Semiconductor and Computer Industries," in C.W. Wessner, ed., Capitalizing on New Needs and New Opportunities: Government-Industry Partnerships in Biotechnology and Information Technologies, Washington, D.C.: National Academy Press, 200

and by implication a different blend of innovation models. You'll be thinking; that's hardly surprising. It isn't!

HOW INDUSTRY ACCESSES RESEARCH

Percentage of respondents indicating channel 'moderately' or 'very' important



Source: Cohen & Walsh, 2000. R&D manager survey conducted in 1994.

Notice first that overall computing has a much lower level of interaction with academia than pharmaceuticals. Academia matters much more to pharmaceuticals than computing.

Notice next that publications and conferences are the top channels across all disciplines. Academics are correctly goaled and measured on publications. Industry uses publications and conferences to get hold of the science they need.

Third, notice, that people are the third equal most important source of research for computing but low down the list for pharmaceuticals. Notice finally that patents and licensing matter for pharmaceuticals (55%) but not very much for computing (15%).

Cohen & Walsh, working with Nelson in their 2002 paper, which I have already referred to, said[3]:

> "We also find that there are some clear differences in the impacts of public research across industries. In this regard, the pharmaceutical industry stands out as an anomaly along many dimensions. There is no other industry where public research - and particularly a basic science (i.e. biology) is thought to be so relevant. ... the linear model may characterize the innovation process better in this industry than in others."

As soon as one accepts that innovation might occur differently in different disciplines, it becomes obvious that policy approaches that prescribe or merely expect a common

[3] at page 21

approach, such as technology transfer, across all disciplines will be seriously flawed. One size does not fit all.

It is no answer to say that, in 2005, universities were consulted and invited to innovate in how they do technology transfer. If technology transfer is largely ineffective, why do it in a multitude of ways? Universities and local development agencies should have been asked to innovate in how they have economic impact.

We have talked about how R & D managers access research but not about who those R & D managers are likely to be. I guess the R & D departments of industry who are solving valuable customer problems employ a significant number of PhDs. It probably takes a PhD to be able to find and understand the papers or conferences where the science relevant to a particular customer problem is set out. The innovation process, which starts with a customer problem, uses a PhD and the PhD's training to solve that problem and thereby creating value. The PhD employer is a business, not the university. Finally, they are accessing any relevant science to innovate, from anywhere in the world and whenever invented, not the subject matter of their own thesis.

I call this the "People Centric Approach" to innovation.

Here is a summary of the mechanism.

THE SCIENCE TO GROWTH MECHANISM

ELEMENT OF MECHANISM	PEOPLE CENTRIC APPROACH
- Business idea source	Customers and Manufacturing operations
- PhD employer	Business
- PhD role	Looking things up
- Amount of science accessed	100%*
- Timing of use of science	When needed

* British science is 11% of global total

We start with the best source of new product ideas; customers.

PhDs solve the customer problem using their training to look up the answer.

The relevant science is used when it’s needed.

This is how much innovation occurs in the computer industry. Indeed, this is how it occurs in many industries. This is how science gets into the innovation process. You'll

see that PhD output is critical but they have to be employed in industry for this to work.

Some policy implications are already visible: industry needs functional sales skills to be close to customers and they need to employ PhDs in their R & D departments to design products which solve their customers' problems.

Let's compare the People Centric Approach with current thinking which has focused on the science as the source of value. As this involves ideas, I call it the "Idea Centric Approach".

THE SCIENCE TO GROWTH MECHANISM

ELEMENT OF MECHANISM	PEOPLE CENTRIC APPROACH	IDEA CENTRIC APPROACH
- Business idea source	Customers and Manufacturing operations	Research
- PhD employer	Business	University
- PhD role	Looking things up	Inventing
- Amount of science accessed	100%*	11%*
- Timing of use of science	When needed	When invented

* British science is 11% of global total

The linear model of innovation is "Idea Centric". Current policy on technology transfer is Idea Centric.

I hope it's obvious that starting with the second worst source of new business ideas (research) and then forcing that science into marketplace doesn't look like a very good approach.

It seems obvious to me that the People Centric Approach, in general, will be the better bet.

Let's be clear: I am not asserting that customer led problem solving is the sole innovation mechanism merely a very important one. I am not asserting that the linear model can never work in computing; merely that it's less common in computing than in pharmaceuticals. Many mechanisms are at work in all sectors. The policy question is where we get the biggest return on public investment.

Now we know how innovation occurs, let's turn to the second question tonight:

HOW DOES A GOOD BUSINESS / UNIVERSITY INTERFACE OPERATE?

Everyone acknowledges that the business / university interface is important for innovation. Gordon Brown realised this and asked Richard Lambert to investigate. Overall, I think Richard Lambert did a good job on most issues and I do not mean to be critical of him or his team.

Richard Lambert's own description of his mission was:

> "The Government asked me to examine how the long-term links between British business and universities could be strengthened for the benefit of the British economy"[4]

So far so good. This is about the economic impact of research and universities. To answer this question, one would need to understand how the science to growth mechanism works.

The technology transfer focus emerged in his next sentence:

> "The context of this review was a sense that the UK performs well in terms of the academic quality of its science and technology base, but is not as good as other countries at commercialising the knowledge generated in its universities[5] as some other countries, notably the USA."

Here we have the smoking gun. They have leapt to the conclusion that the mechanism is the linear model, that it's technology transfer and that it is Idea Centric. The UK Government believes that American universities have been good at technology transfer and that it's through technology transfer that Silicon Valley has grown up. Outside pharma this doesn't appear to be supported by the evidence.

When I read the relevant academic literature, what surprised me was how clear the evidence was. Professor Barry Bozeman, from Georgia Tech in Atlanta, published a survey of technology transfer[6] in 2000 in Research Policy, the leading journal in the field. I cannot claim any credit for scholarship here as Dr. Matt Schofield recommended this article to me.

At page 647 Professor Bozeman said:

> " ... there is an emerging consensus that university and federal laboratory technology transfer have only modest potential for creating new jobs or businesses."

He went on to say:

> "In their in-depth review of 23 technologies transferred from the University of Minnesota, Harmon et al (1997, p. 432) note that 'policymakers should proceed with caution before accepting a notion that

[4] http://www.hm-treasury.gov.uk/media/446/52/lambertemergingissues_173.pdf
[5] The Future of Higher Education, Department for Education & Skills, January 2003
[6] Technology transfer and public policy: a review of research and theory, Research Policy 29 (2000) 627-655

> new or high technology firms will create significant numbers of new jobs or have substantial economic impact'"

I was surprised to find not only was the economic potential for technology transfer modest but also that this was seen as an emerging consensus. Why was technology transfer such a focus of UK Government policy in this case?

Bozeman calls the idea that universities can play a role in developing technology for industry, the "Cooperative Technology Policy Paradigm". He says[7]:

> "In the US, the cooperative technology policy paradigm has been extremely controversial in that it goes against the strong market ethos that permeated not only science and technology policy but most realms of public policy." (emphasis added).

Whitehall thinks that US universities had a big economic impact through technology transfer, whereas Professor Bozeman says that, in the US, technology transfer has merely modest potential for impact and that the Cooperative Technology Policy Paradigm is extremely controversial.

This is a big disconnect.

I checked with some academic contacts to see what was the standing of Professor Bozeman and the journal, Research Policy. Maybe Whitehall was right and they were wrong.

I was assured that Professor Bozeman was very highly regarded, and that Research Policy was not only peer reviewed but also that it was the most prestigious journal in the subject. Not only that. This paper by Bozeman was the most highly cited paper in the field.

My money was now on Bozeman, not on Whitehall.

In autumn 2004, I decided to go and see the people in Whitehall to point this out. I met a senior official, close to the technology transfer programme. I showed him a copy of Bozeman and pointed out the paragraph on technology transfer having modest impact. I shall never forget the reaction and his words, which I wrote in my notebook.

> "I haven't heard of Barry Bozeman and that's not the view of this department."

The official also said that technology transfer and economic impact were “synonymous”.

Our 30 minutes was up at this point, so he showed me out. On the way home, I wondered how it was that a senior official responsible for administering technology transfer had never read or even heard of the Bozeman article. My naive confidence in Whitehall sagged. It was clear that they didn’t understand the science to growth mechanism.

[7] ibid at page 632

I had to find out more. Subsequent investigations have confirmed that Bozeman is right and Whitehall is wrong.

Sir Geoffrey Owen, former editor of the FT, says, correctly in my view, that Silicon Valley grew from corporate, not university spinouts, and that Stanford's role was supplying graduate labour for those companies.[8] This was certainly true in the silicon era.

I checked the figures and found that the average number of spinouts from American universities per year per university was a measly 2[9]. The income American universities generate from technology transfer as a proportion of research income is insignificant. MIT started their technology transfer office in 1940 and in 2002 they generated $22m of net licensing income compared to total research income of $899m. Licensing income therefore was a trivial 2.4% of their research income[10]. After making reasonable estimates for the costs of running their technology transfer office, the profit yielded would be even less. Lambert correctly noted this. 52% of American universities lose money on technology transfer, according to my own analysis of the 2002 Association of University Technology Managers figures and making some reasionable estimates for costs. The exceptions are, of course, the handful of American universities which own patents on blockbuster drugs with Columbia in the lead.

Technology transfer is not the way to run the business / university interface.

An important piece of evidence from the work of Thursby and Thursby[11], both academics at Purdue University, reinforces this thesis. The abstract for their article says:

> "We report results of a survey of industry licensing executives who identified personal contacts between their R & D staff and university personnel as the most important source of university technologies. Journal publications and presentations at professional meetings were also important. While the least important sources were marketing efforts by universities and canvassing of universities, a number of executives did indicate that they were important." (emphasis added).

I respectfully agree with them on all these points.

If you are trying to grow the economy, the evidence shows that technology transfer is a bit of a waste of time.

The way to create and ensure personal contacts between R & D staff and university personnel is to encourage industry R & D departments to recruit PhDs from university departments. PhDs form strong social and professional bonds with their professors during their work. These persist if and when they move into industry. Note that bachelor graduates do not form the same bonds.

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[8] see page 12 of Where are the big gorillas? High-technology entrepreneurship in the UK and the role of public policy at http://www.lse.ac.uk/collections/IIM/pdf/Entrepreneurship%20main%20edit1.pdf
[9] AUTM Licensing Survey FY 2002
[10] The author's own analysis of the Association of University Technology Managers data, 2002.
[11] http://www.autm.net/pubs/journal/00/perspectives.pdf

So here we have it: the way to build a strong business / university interface is to get industry to recruit PhD graduates.

Other things one can do include

- ¶ Ask local industry executives to supervise undergraduate student projects
- ¶ Encourage students to undertake summer jobs in industry
- ¶ Encourage academics to undertake consultancy projects for industry.

Surprisingly, collaborative research does not appear to be a good way to build a strong interface either. I have some field based evidence for this assertion but don't want to dwell on it now in detail - it could be the subject of a separate lecture. If I'm right on this, then it would mean another strong focus of UK policy had been misguided.

I have speculated that the strong UK pharmaceutical industry might have influenced our policymakers. I can imagine that they may have seen linear innovation occuring in that field and made the, mistaken, assumption that its successes should be rolled out to other disciplines.

It has also been suggested to me that another factor was the reduction in university funding in 1981 by the Thatcher government. Universities then sought other sources of income and licensing and technology transfer was seen as a possible way of bridging the funding gap.

Most recently the success of Google has been cited as evidence that technology transfer by Stanford University has been successful. I decided to check out the details of this. Interestingly both Yahoo and Google were founded by Stanford students. Stanford didn't claim intellectual property in the Yahoo technology, because it was developed in the students' spare time whereas they did for Google's technology[12]. Both companies were extremely successful.

What can we learn from this? Stanford received plenty of money from Yahoo in the form of donations and Stanford made more money from their VC investment into Google made through local VC firms than they did from their technology licence[13] (although this does depend on their current share price).

The real policy lesson is that you get a Yahoo or Google if you have Jerry Yang or Sergey Brin or Jerry Page around. The policy lesson is not to go and trap and license the intellectual property.

The real policy lesson is People Centric.

Attract and retain and Sergey Brin and you could get the next Google.

[12] Software licensing in the University Environment, Katherine Ku, January 2002, Computing Research News

[13] Why Stanford is celebrating the Google IPO www.matr..net/article-11816

MY FINAL QUESTION IS - WHAT SHOULD BE DONE?

We now know how the science to growth mechanism works and we now know how to build the business / university interface.

What should our universities, policymakers and businesses do to use science to drive growth? If Gordon Brown asked me to head a commission to recommend what should be done to turn science into growth, my report would say that the answer is simple:

The first key initiative is to increase the flow of entrepreneurs through a department. Much work has been done on developing the latent entrepreneurial abilities of students chosen purely on academic ability. Why not start with some people who have entrepreneurial talent in the first place?

I propose that a small number, say one in a hundred, students are selected on entrepreneurial ability. We could have an entrepreneurial scholarship. I have seen MIT research which identifies personality profiles which are predictive of entrepreneurial activity. The key here is to mix the potential entrepreneurs with technical people so that together they can build businesses. As well as some training and encouragement, we could provide them with 6 month bursaries to enable them to remain in their university town after graduation while they worked out what to do. Getting a business plan funded is too high a hurdle for a fresh graduate.

We should also do some marketing and PR to attract the next Sergey Brin to our leading universities.

Second we should encourage leading technical university departments to:

- ¶ recruit an outstanding individual to run a
- ¶ departmental
- ¶ recruitment centred
- ¶ Industrial Supporters' Club
- ¶ of technology companies
- ¶ who pay annual subscriptions, say of a few thousand pounds per annum,
- ¶ to recruit graduates both permanently and as summer students
- ¶ and to network with each other at an annual CEO networking dinner
- ¶ and attend regular technical seminars in the department.

There is a working model for this here in Cambridge which is the Cambridge University Computer Laboratory Industrial Supporters' Club[14]. It was set up by the late Professor Roger Needham in 1981. I interviewed Roger in December 2001 and he told me the story of how it came about. The Thatcher Government had cut university

[14] http://www.cl.cam.ac.uk/ext/supporters-club/

funding and the Computer Lab was short of money. Jack Lang suggested a whip round of local companies to raise money; offering the right to recruit in exchange. It worked and substantial sums were raised and have been to this day. It currently has 42 company members and 36 companies exhibited at the last recruitment fair in November 2005. It is more than self-funding and it works really well.

There is plenty of evidence in the academic literature that such an approach can be expected to work. Barry Bozeman observed[15] that:

> "The most obvious advantage of universities over federal laboratories is a vitally important one - students. The presence of students makes a remarkable difference in the output, culture and utility of research. ... students are a means of technology transfer (through post-graduate job placements) and they often provide enduring links as the social glue holding together many faculty scientists and the companies they work with. Roessner at al. (1998) found that the single most important benefit to industry from participation in the NSF Engineering Research Centers, according to the industrial participants themselves, is the ability to hire ERC students and graduates."

You may be wondering; "doesn't a university careers service already perform this function?". The answer is no; it doesn't, but the two are complementary.

The University Careers Service is complementary to the Supporters' Club and does not provide the same function

COMPARISON WITH UNIVERSITY CAREERS SERVICE

	Laboratory Supporters' Club	Careers Service
Mission	- Make money	- Advise students
Funding	- Membership fees	- University central funds
Direction	- Dept Head/Steering Group	- University
Event location	- Inside the department	- Central venues
Admin location	- Inside the department	- Central office
Subject/industry focus	- Hardware - Software - Enterprise IT depts	- None
	▼	▼
	Provides very good business/university interface	Provides good career advice to some students

A careers service is centrally funded to advise students. The Supporters' Club is funded by companies to help them recruit. It is focused on a single department and under the direction of that department. Importantly, the events take place in the department bringing business physically to the department and not, like many

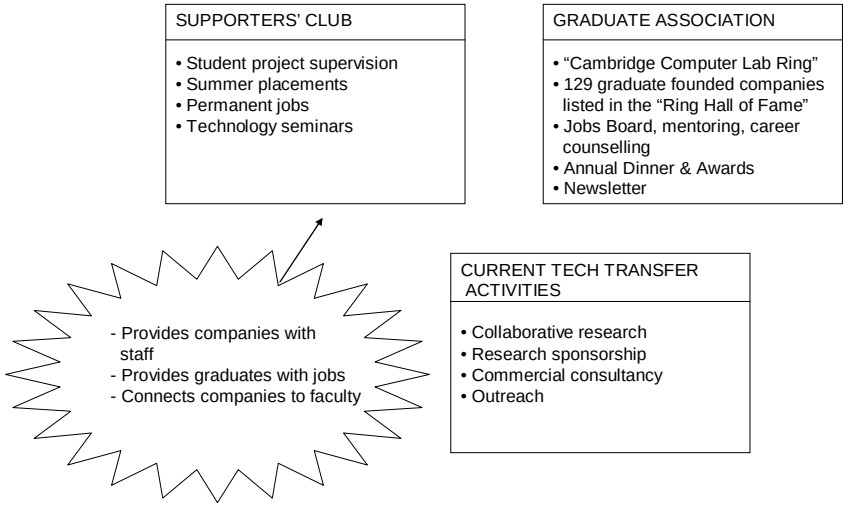
[15] Technology transfer and public policy: a review of research and theory, Research Policy 29 (2000) 627-655 at page 635-636

university careers fairs, in some central location. Careers services tend to attract non subject specific recruiters like accountancy, consumer goods and consulting. The Supporters' Club administrator much be based in the department itself so that they are well connected with the faculty members. Careers Services are based centrally.

Note that it does take an energetic, outgoing, salesey person to run one of these Clubs. This is a different profile from a typical university departmental administrator.

One key initiative therefore is to run these Supporters' Clubs.

THE SUPPORTERS' CLUB IS <u>THE</u> KEY SUCCESS FACTOR



A Supporters' Club provides companies with staff who invent new products and then with the staff who develop those new products. A Supporters' Club provides graduates with jobs, helps them and helps attract students. Finally a Supporters' Club provides the human business / university interface which is the one that actually works.

Once your graduates have got jobs in industry, you should keep them in touch with each other with a Graduate Association. The one I founded in the Computer Lab is called the Cambridge Computer Lab Ring. Its mission is to help graduates derive a lifetime benefit from their Cambridge Computer Science degree.

My third and final initiative is to celebrate entrepreneurship amongst the graduate communities of technical departments. The Cambridge University Computer Laboratory Graduate Association has now catalogued 132 companies founded by its graduates, the most of any department in Cambridge University. We call this list the *Cambridge Computer Lab Ring Hall of Fame.* We are presenting awards for the company of the year and the product of the year at the Ring Annual Dinner in 2 weeks time. The Ring has 400 members (out of a universe of 4,000 Cambridge Computer Science graduates.) The Hall of Fame companies recruit experienced staff through the Ring private jobs bulletin board. Senior Ring members mentor junior members. The largest Ring Hall of Fame company has 1,000 employees. That is serious economic

impact. It's much more than the level of university spin outs. I propose that the Computer Laboratory put up a board in its entrance lobby with the names of the Hall of Fame companies painted on, like a clubhouse.

I call these 3 initiatives, the *People Centric Approach* to enabling our research universities to have more economic impact.

For completeness, there are plenty of further sources of university economic impact, including consultancy and the money that staff and students spend. I am indebted to Sir Graeme Davies, Vice-Chancellor of London University, for his observation that further education in the UK is now larger than agriculture.

Tonight, I have been talking about the *People Centric Approach.*

Current UK and EU policy is based on the linear model of innovation; commercialising research. I call this the *Idea Centric Approach.*

We should invest more in the *People Centric Approach* than we do at the moment.

People are a key mechanism by which science turns into growth. We train PhDs so they can appreciate the value of other peoples' inventions, not just to invent things. In exchange for their training, they have to do some novel work which one day may be of value to someone else.

SUMMARY

To sum up:

Innovation occurs in the economy in a broad range of ways which vary between industries and academic disciplines but, outside pharmaceuticals, the customer is likely to be king. Trained scientists use their training to find the solutions to valuable customer problems, given management and capital, their solutions can grow into businesses.

A good business / university interface can be expected to operate differently by subject within a university and differently from one university to another. Any approach, such as technology transfer, which applies the same formula across the board is, by definition, wrong. In general and outside pharmaceuticals, a good interface is built on people and particularly the relations between faculty and their former PhD students.

Three simple People Centric Initiatives can be expected to make a big difference to the science to growth mechanism and therefore the economic impact of scientific research. They are

1. Recruitment centred Supporters' Clubs

2. Admissions of entrepreneurs

3. Departmental Halls of Fame

I commend them to you. I commend them to Whitehall and I commend them to Brussels.

Thank you for your gracious attention this evening.

THE HUGHES HALL 2006 CITY LECTURER

Stephen Allott is a business and social entrepreneur.

He is executive chairman and co-founder of Trinamo Ltd., a management consultancy for technology companies.

He is non-executive chairman of Tideway Systems Ltd., a London headquartered software company.

He is a member of the Governing Council of the Cambridge University Computer Laboratory Graduate Association and is a City Fellow of Hughes Hall, Cambridge University.

A graduate in law from Trinity College, Cambridge University, Stephen was called to the Bar at Gray's Inn.

He has worked for in legal roles for Babcock International plc, Rank Xerox Ltd and Sun Microsystems Ltd and from 1990 to 1995 at McKinsey & Company as a strategy consultant.

From 1995 to 2001, he worked at Micromuse, a London origin software company where he was President, Chief Financial Officer and a main board director. During this time the company grew from 50 to 800 people, from £1m to £140m in sales and reached over £4 billion in market capitalisation.

From 2001 to 2004 Stephen was a full time Visitor at the Cambridge University Computer Laboratory. During this time he founded the Laboratory Graduate Association.

Stephen was the youngest ever chairman of the Bar Association for Commerce, Finance & Industry and has served on the Bar Council for England and Wales.