



Looking Inwards, Reaching Outwards

The Cambridge Cluster Report – 2007

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This report was published in November 2007

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Sponsors Foreword

BDO Stoy Hayward

Is all well in the state of Cambridge?

This report looks at Cambridge in the context of its European and world wide “competitors” and concludes that as a standalone cluster no, all is not well in the state of Cambridge. The report highlights the emergence of other regions and technologies and how well they have done in comparison to Cambridge. Also, as last year, however the report suggests that when looked at in context of a more rounded picture of a supercluster with London, Reading and Oxford disaster is, in fact, not just round the corner.

Part of this report argues that Cambridge is falling behind because it has not embraced the new worlds of innovation, the so called soft innovation that other centres are basing their growth on. The figures suggest it is true and we have no great reason to doubt that conclusion but there is also the question of time and possibly fashion. While the current trend is in this soft section of the market it may well be true that in another five years people will still be needing new technologies to help with health and new forms of energy supply after the shorter term lower risk opportunities have been and gone. At that point the focus may once more come round to the harder technologies. By continuing now on the base it has created Cambridge could very well be cementing its future prosperity. However the cluster has to survive the current era and this is best achieved by being part of a larger and more varied environment.

Silicon Valley is still by far the most successful “cluster” and most would agree that part of that success comes from the critical mass of skills and companies and entrepreneurialism that abounds in the region. It is in fact a supercluster and covers all the bases. The Wikipedia entry on the Valley (admittedly not always the most reliable source of data known to man albeit a recent innovation of the soft type alluded to in this report) lists 17 cities and 5 universities in the region. Totalling the population of these cities however gives less than two million people. While Cambridge cannot compare to this alone the combination of the populations of Cambridge, Oxford, Reading and London dwarfs this figure. Geographically the four UK cities are also probably closer to one another than those in the Valley.

The European and Middle East competitors are catching up, the figures show a distinct increase in their presence. It is worth noting however that large percentage increases are easier to achieve at small levels. Also if the soft sector does burn out these clusters may be left wondering where to go next.

What this report highlights then, even more perhaps than last year’s report did, is that it is a collective approach within the UK that will allow all to survive and all to thrive and ensure that the whole is allowed to become significantly greater than the sum of the parts. Human nature being what it is however, grouping the results of the four cities and renaming the resulting cluster as Silicon South East will not change the internal structures and political make up and push the cluster overnight into an unchallenged second place in the technology industry hierarchy. Nor will it improve the physical infrastructure, the simple communication links or even generate additional funding. What it does do however is show that collectively UK business can stand and fight for a place in the modern international marketplace

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Sponsors Foreword

Pure Resourcing Solutions

Employers, entrepreneurs and investors have crucial stakes in the Cambridge Cluster's ability to harness talent.

Employers, because without the right people, the most forward-thinking strategy remains just that: strategy. Entrepreneurs, because transforming pioneering ideas requires the brightest minds. And investors, because only by broadening the talent pool can they capitalise on existing ventures with further innovation.

Technology companies focus on developing ground-breaking initiatives. But sound business management underpins every organisation, however new-wave. We need to ensure the brightest professionals regard the Cambridge Cluster as a great place in which to live and work.

That means engaging with those in higher and further education, so that the bright lights of London or further afield need not be an instinctive choice. Successful local employers have also been promoting themselves to experienced professionals from around the UK, and even overseas. Candidate interest has been – and can be – secured by marketing the prospect of contributing to young, hungry businesses, working at the frontline of often revolutionary technological change. These factors will attract highly skilled business professionals with a keen eye on future commercial opportunities.

There is work to be done to protect and sustain our region's success – but there's good reason to be confident that both a will and a way exist. That's why Pure Resourcing Solutions is pleased and proud to be a sponsor of this important report.

Lynn Walters

Director, Pure Resourcing Solutions

Key Facts

108 the current number of venture backed companies in the Cambridge Cluster

36% the percentage of venture backed cluster companies in the Healthcare & Life Sciences sector

£600m the amount of institutional capital currently committed into the cluster

£50m the largest venture capital deal completed in the cluster in H1 2007 (Plastic Logic, Q1 2007)

Cambridge Gateway Fund the most active investor in the cluster since 2006

Amadeus Capital Partners the top investor in the cluster by syndicated amount invested since 2006

£230m the biggest disclosed exit in the cluster since 2006 (GlaxoSmithKline acquires Domantis, Q4 2006)

4th the position of the Cambridge Cluster in terms of total disclosed European institutional investment in 2006

1st the position of the Cambridge Cluster in terms of IT Hardware European (exc. Israel) institutional capital committed

London the largest European innovation cluster in terms of the number of venture backed companies and capital committed

£320 the amount of investment per capita that the Cambridge Cluster received in 2006, the highest in Europe

25% the percentage of deals into the Cambridge Cluster in H1 2007 that involved at least one US investor

56% the percentage of deals into the Tel Aviv Cluster in H1 2007 that involved at least one US investor

£140m the amount of investment spin-outs from the University of Cambridge attracted between 2001 and 2006, more than any other UK and US university studied, except for Stanford University

Executive Summary

The Cambridge Cluster is widely recognised as one of the most important clusters in Europe, characterised by particular strengths in Health Care & Life Sciences, IT and Communications. Investment in these sectors has remained dominant, and overall funding levels, accounting for the skewing of figures by the recent £50m Plastic Logic deal, have displayed similar trends to previous years.

Exits within the cluster are dominated by trade sales, which is largely attributable to the significant proportion of Healthcare & Life Sciences companies, with notable recent exits including GlaxoSmithKline's 2006 acquisition of Domantis and Kudos Pharmaceuticals' sale to AstraZeneca. A theme noted in the success of many venture backed cluster companies is the importance of the US in contributing financial support, not least in the Kudos example where much of the £30m final round funding was from US supporters.

Angel funding within the cluster continues to be important, with the three main players, NW Brown, Cambridge Capital Group and Cambridge Angels contributing to a vibrant seed funding environment. Sectoral focus from these groups remains within the 'hard technology' areas that characterise the Cambridge cluster.

Placing Cambridge Cluster in the broader context, by comparing it to other major European innovation clusters, points towards some clear differentiation between cluster characteristics. Depending upon which health indicators are used, Cambridge Cluster stands up relatively well in terms of its monetary significance, coming fourth in terms of total European institutional investment in 2006, (with London, Paris and Tel Aviv clusters taking first, second and third place respectively). In addition Cambridge takes first place when considering investment in 2006 per capita, which normalises Cambridge for its relatively small population.

However, looking at the relative performance over time, Cambridge's share of deals made by the top 20 European clusters has shown a marked reduction from 9.3% in 2005 to just 5.6% in H1 2007, suggesting it has been losing out to European counterparts in recent years. This can be largely accounted for by a structural shift in the direction of venture funding towards so-called 'soft innovation', in particular the Service and Retail sector, which can be closely related to the emergence of Web enabled products and Mediatech. The Cambridge Cluster has shown very limited activity in these sectors, whilst other major European Clusters have shown a significant increase.

Cambridge's apparent weakness in this area is largely attributable to two main factors: its characteristic tendency towards 'hard innovation', and its relatively small population. Whilst the density of highly educated labour and quality research, supplied in large part by the University, enables strengths in hard innovation, it seems in the case of soft innovation, where education and hard skills are less of a barrier, the macroeconomics of more populous clusters are advantageous. In addition the traditional prominence of Media and other creative industries in clusters leading the way in soft innovation, such as London and Berlin, provides an inherent advantage. These factors emphasise the need for critical mass for innovation, and suggest the need to balance hard innovation competences with the 'softer' skills relating to creative foresight and commercial acumen, required for soft innovation.

One area where Cambridge should be well placed to develop world class innovation is in the expanding field of Clean Energy, where hard innovation is key. Surprisingly this sector currently only represents a small fraction of venture capital backed companies in the Cambridge Cluster. However, opinion is that whilst Cambridge may have missed the first wave, it is anticipated that the traditional core competences of the cluster could well see it emerge as a key player in the future.

A concern highlighted by the data suggests the Cambridge Cluster is lacking a pipeline in early-stage companies compared to its European counterparts. This is countered by the perspectives of leading figures within the Cambridge Cluster, who claim that Cambridge's pipeline is in good health. For example, recent successes in the Healthcare & Life Sciences and IT sectors are said to be inspiring a new slate of entrepreneurial ventures.

Comments from Cambridge's luminaries raised concerns as well as assuaging them. Investors and entrepreneurs alike maintain that to succeed the cluster needs not only the best engineers, but also the commercial talent to guide technologies to market. Despite the increased professionalism that a new generation of serial entrepreneurs has brought to the cluster, the region still needs to attract more entrepreneurs who can tell a compelling story to investors, to customers, and to the market. Cambridge is a small city with high housing prices, which hampers the cluster's ability to attract and retain these people. The cluster could benefit in this respect from modest growth, with correspondingly improved physical and communications infrastructure.

Cambridge could improve its already strong connections to London and the rest of South East England. Combining the commercial and soft innovation expertise of London with Cambridge's hard technology pedigree, the wider region would be a leader in all aspects of technology innovation. Companies in the cluster must also think globally from the outset. Whether to attract international talent and capital, or to build partnerships and acquire customers in worldwide markets, there are many reasons for Cambridge start-ups to reach out beyond the limits of the cluster.

Cambridge has a long history of building world-class technology companies, and the issues facing the cluster today are surmountable. To ensure the cluster's continued importance in the global tech industry, Cambridge must reflect on and recognise its strengths, then reach out to build new, and foster existing, relationships with other tech clusters around the world.

Introduction

Cambridge has long been hailed as one of the most influential technology clusters in the world. Historically, the cluster has performed extraordinarily well when compared with other innovation centres in the UK and Europe but there is concern within the Cambridge community that its importance may be declining on the world stage, especially following last year's cluster report which concluded that growth in the cluster had stalled.

This is the fourth Cambridge Cluster report that has been published by Library House, a data and research company that delivers comprehensive, essential intelligence on the companies of tomorrow. Previous reports have investigated the cluster either as an isolated entity or in comparison with the UK only.

This year, to understand the wider influence of the cluster, we have placed it in an European context by examining its place amongst the twenty most significant innovation clusters in Europe. In order to compare the cluster to the rest of Europe, we have used the number of venture backed companies as a proxy for overall innovation. In these clusters, sector specialisations have been identified and the concept of 'hard' versus 'soft' innovation clusters has been examined.

Library House, in conjunction with BDO Stoy Hayward, has also chosen to engage with key luminaries and influencers in the Cambridge Cluster through a series of interviews and breakfast forums to elicit their opinion around key topics including: investing in Cambridge, the impact of the University of Cambridge, infrastructure issues in the cluster and the relationship between Cambridge and the US.

This report provides a more balanced view of the Cambridge Cluster than previous reports by comparing it with the other top clusters in Europe and developing conclusions based on both hard data and informed opinion.

In the first section of this report we quantify the Cambridge Cluster with regards to companies, investment and sector activity. The second section examines the cluster's position on the European and global innovation stages. The third and final section of the report takes a more in depth look at Cambridge's investment climate, infrastructure and the impact of the University of Cambridge on the cluster.

Spread throughout the report are three 'cluster perspectives' which highlight some of the particular traits of the Cambridge Cluster, using comments from our interviews with the cluster's key players.

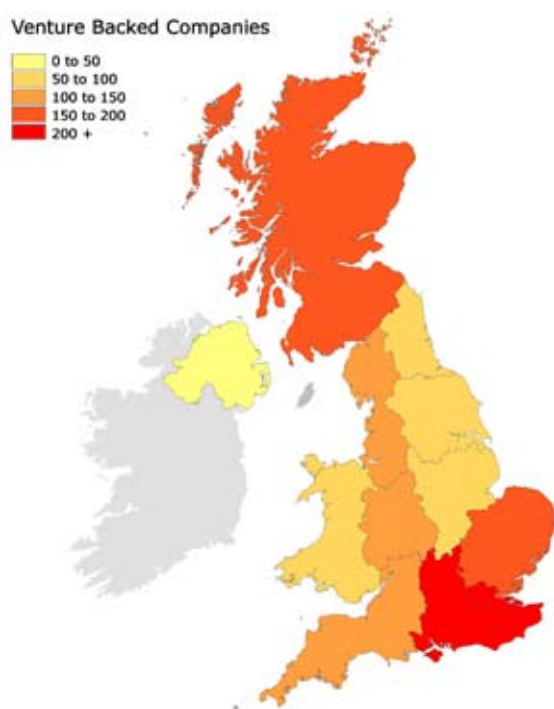


Figure 1a – Colour map showing the distribution of venture backed companies by government office region (GOR)

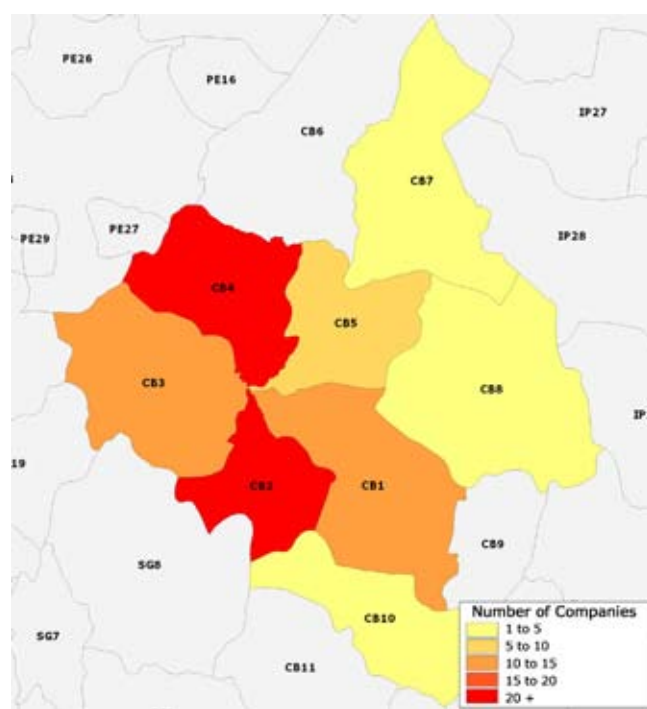


Figure 1b – Colour map showing the distribution of venture backed companies by CB postal district

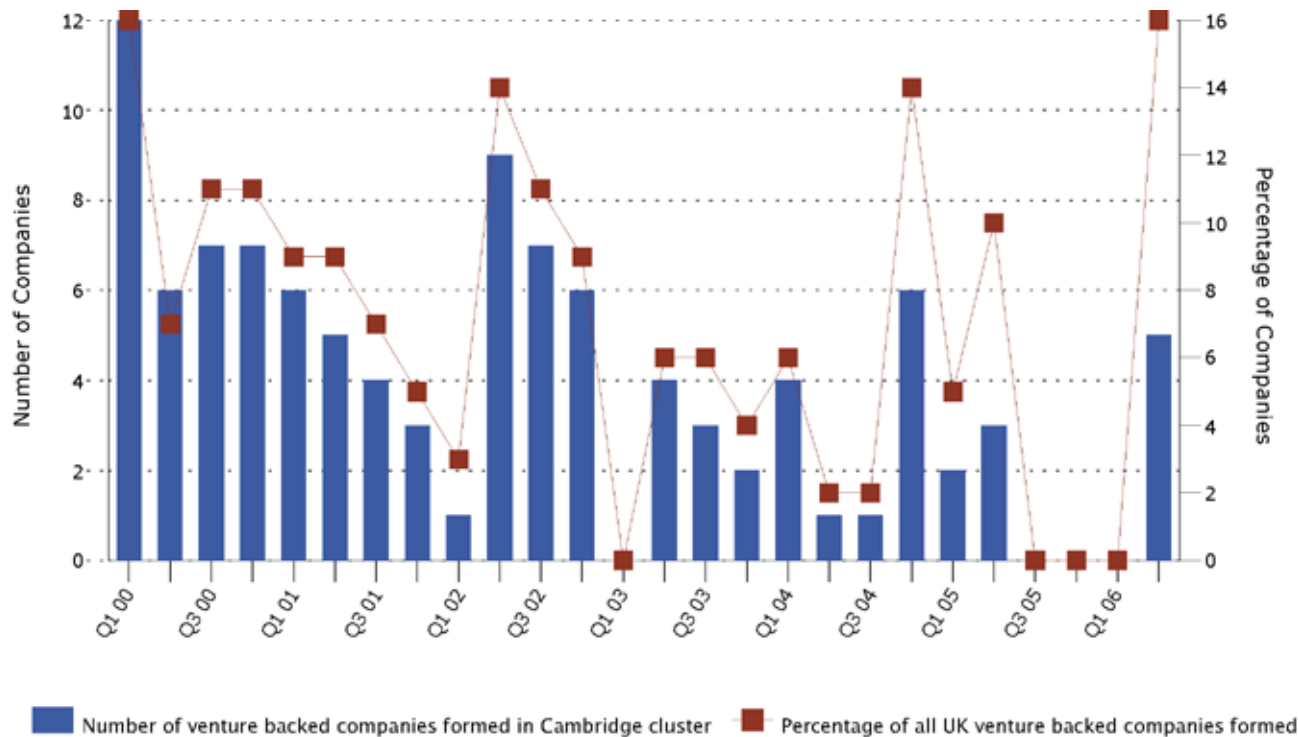


Figure 2 – Active venture backed companies in the Cambridge Cluster and the cluster's share of UK company formations by quarter

The Cambridge Cluster

Companies

As of September 2007, the Cambridge Cluster contains 108 publicly disclosed active venture backed companies. Between them, these companies have over £600m of institutional capital committed, just under 10% of the UK total. The importance of the East of England, predominately made up of the Cambridge Cluster in terms of innovation, to the UK venture capital market in terms of the number of companies can be vividly seen in Figures 1a and 1b.

As Figure 2 shows, the majority of the currently active venture backed companies in the Cambridge Cluster were formed during the dot-com bubble at the turn of the century. The reason that seemingly so few venture backed companies appear to have been formed in 2005 and 2006 is that upon company formation, the average company takes around 3 years to become venture backed. It is expected that in subsequent Cambridge Cluster reports the number of companies formed in 2005 and 2006 will rise.

The majority of venture backed companies in the Cambridge Cluster are split among Cambridge's three traditionally strong sectors, Healthcare & Life Sciences (36%), Information Technology (24%) and Communications (16%) (Figure 3). This demonstrates that the Cambridge Cluster is a so called 'hard innovation' cluster. Hard innovation clusters are those in which the majority of companies contained in them are in sectors developing underlying technology, for example, Communications Hardware and Healthcare & Life Sciences. In contrast, sectors such as Web and Mediatech are considered 'soft' technology sectors. In the 'Cambridge in Context' section of this report, the

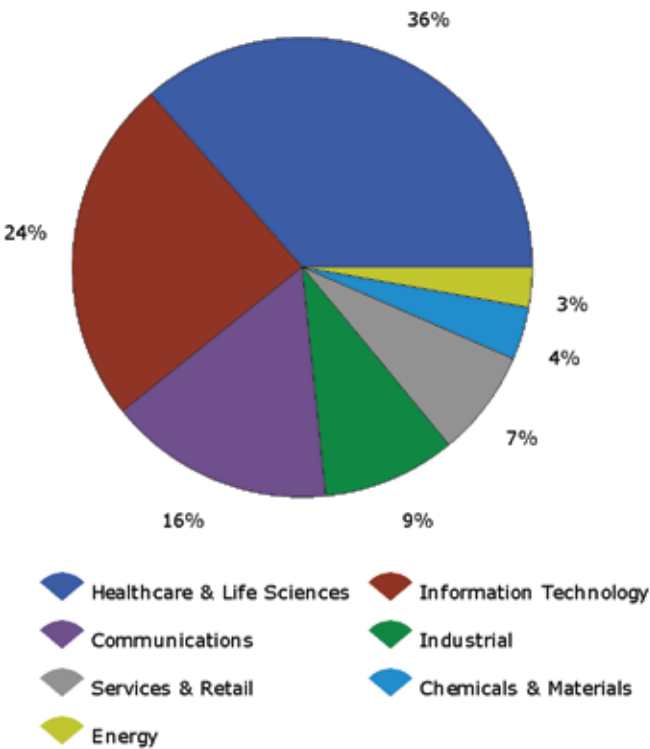


Figure 3 – Current venture backed companies in the cluster by sector

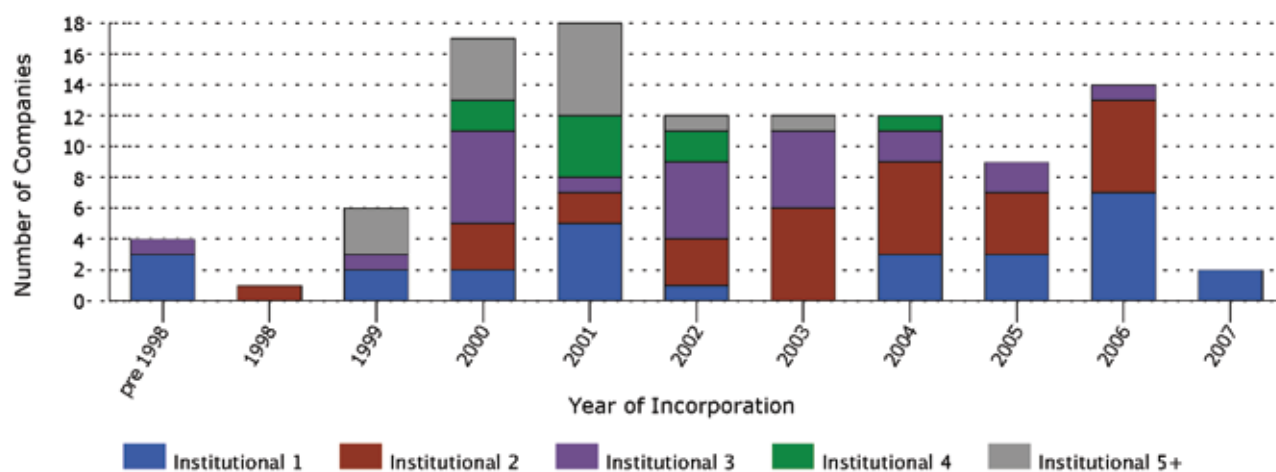


Figure 4a – Venture backed companies in the cluster by year of first institutional funding round and current funding stage

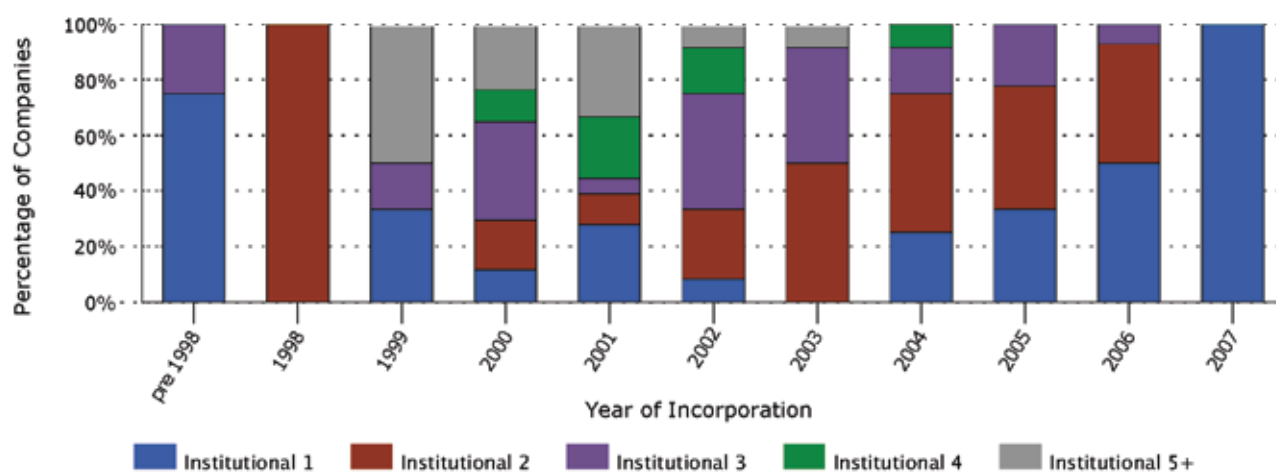


Figure 4b – Percentage of venture backed companies in the cluster by year of first institutional funding round and current funding stage

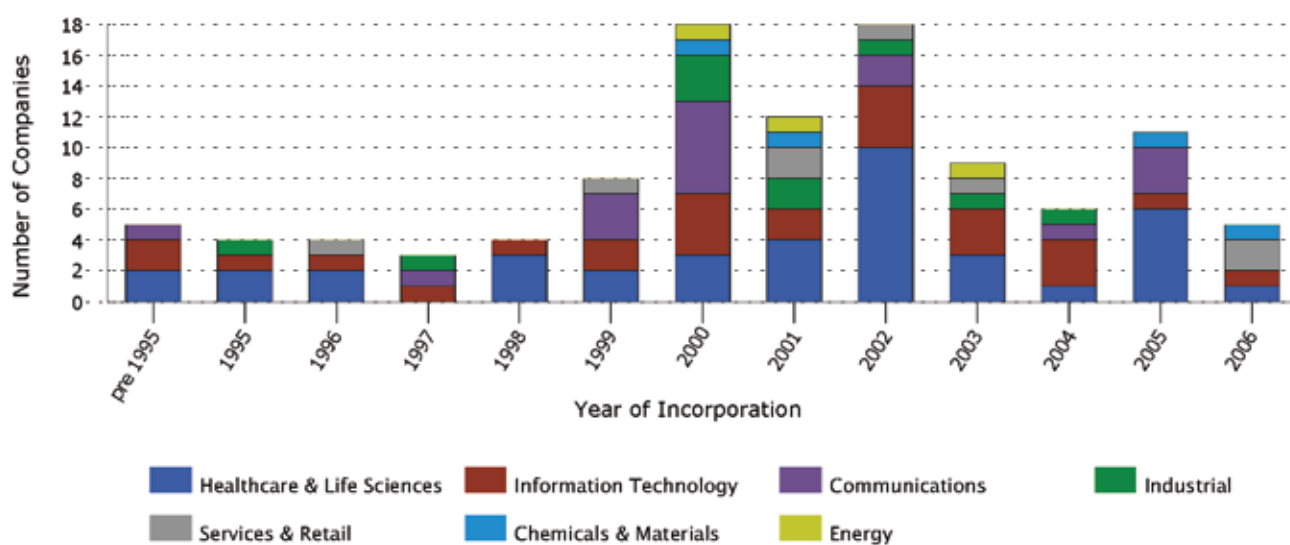


Figure 5a – Venture backed companies in the cluster by incorporation year and sector

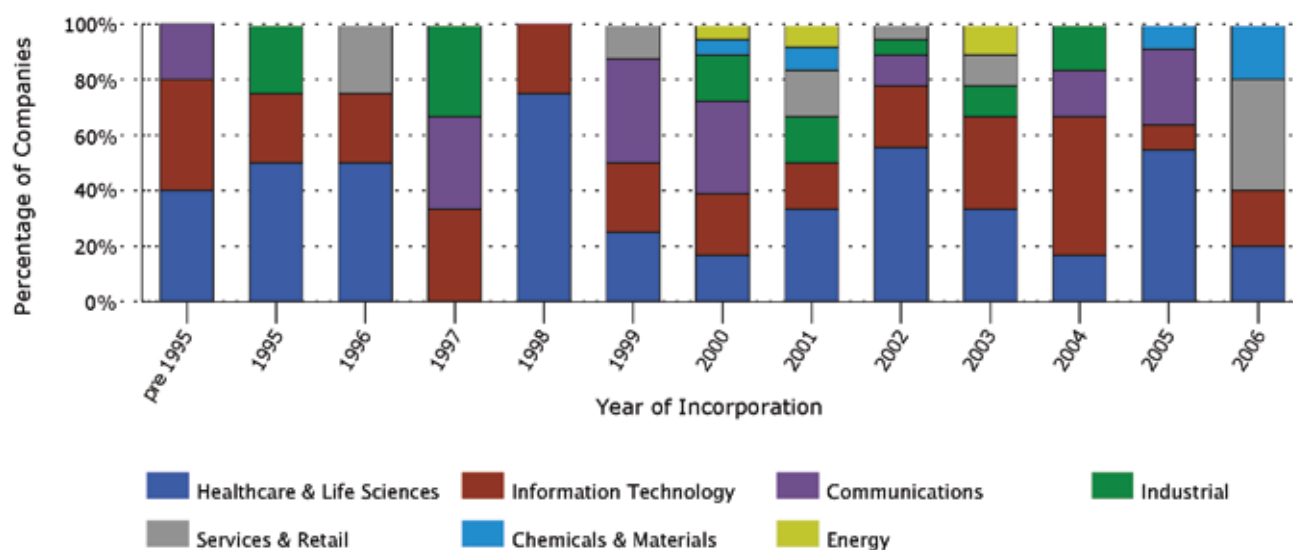


Figure 5b – Percentage of venture backed companies in the cluster by incorporation year and sector

top clusters in Europe are investigated and specialisations such as this are identified.

When examining the companies by year of institutional funding and current funding stage, one can clearly see the effect of the dot-com bubble burst on the Cambridge venture capital market. Although Figures 4a and 4b show that many of the currently active venture backed companies in the Cambridge Cluster received initial institutional funding during this period of market turmoil, several of these companies have failed to attract any follow on funding since this time. Removing the companies that have failed to attract any more external capital since this time from Figure 4a leaves the total number of companies receiving

initial funding during this period at a level similar to those seen post-bubble, suggesting that investors into the Cambridge Cluster have been effective in picking out the dot-com winners from the losers. However, all the companies that were initially funded in 2001 which have not received any follow on funding since, are in fact currently shipping product and the majority of the companies are generating revenues. This suggests that, for at least some of these companies, the reason for not receiving follow on funding is that they do not require it.

Figure 5a and 5b show that, interestingly, not only were Information Technology and Communications sectors greatly affected by the dot-com crash but other sectors such as Healthcare & Life Sciences were also seriously impacted. Although a lull in the formation of Healthcare & Life Sciences companies occurred between 2003 and 2004, when the general venture capital market was still reeling from the bursting of the dot-com bubble, in 2005 Healthcare & Life Sciences start-ups represented the largest single sector for new company incorporations. As Healthcare & Life Sciences is one of the more capital intensive sectors, this is a hopeful sign for investment in Cambridge and suggests that investors may have rediscovered their confidence in Cambridge Healthcare & Life Sciences companies. In 2006, however, the proportion of companies appears to have dropped back down to 2003/04 levels. In contrast, the number of IT companies formed appears to have been more stable over the period.

The fact that in 2003 and 2004 fewer currently active venture backed companies were formed in Cambridge lends weight to the theory that entrepreneurs were hesitant to start new ventures during this period of contraction in the venture capital market. In contrast, our 2007 UK Venture Backed Report found that at a national level the rate of company formation was unaffected by the collapse of the dot-com bubble. Instead, venture capitalists were less likely to invest in these companies during this period. Perhaps Cambridge entrepreneurs had a keener understanding of the financing landscape at the time than those outside the cluster.

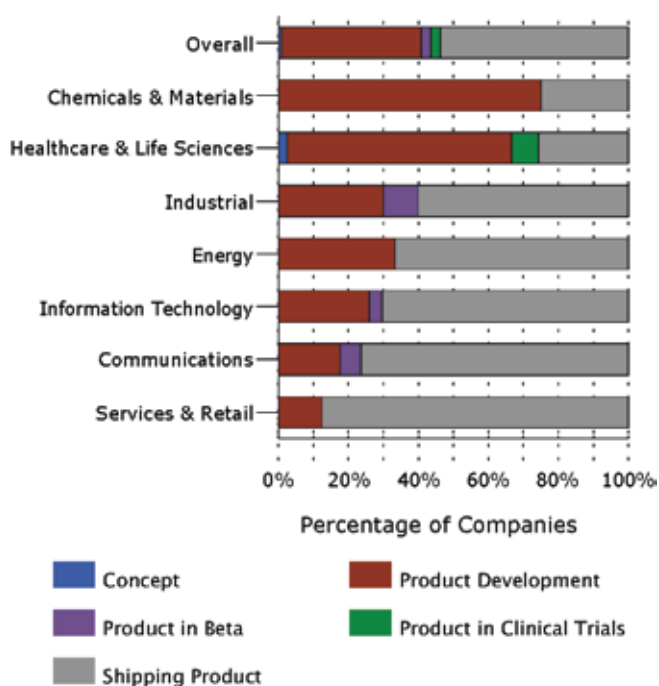


Figure 6 – Percentage of venture backed companies in the cluster by sector and product development stage

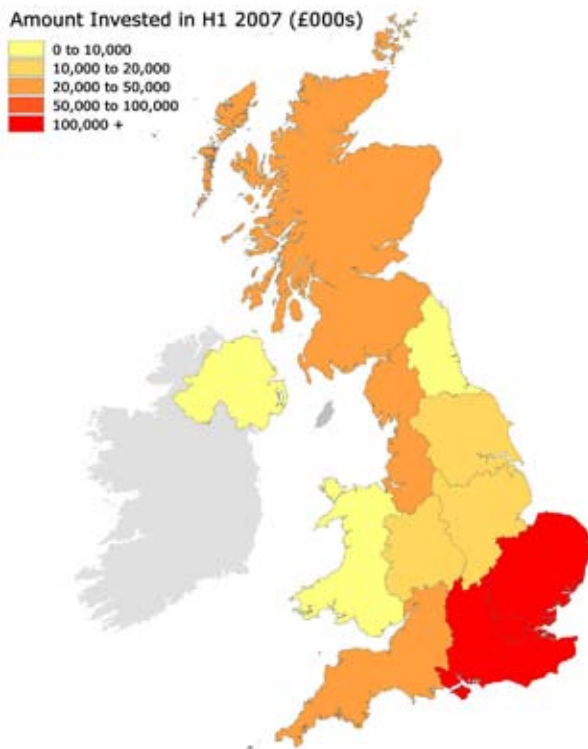


Figure 7a – Colour map showing the distribution of venture capital investment in H1 2007 by government office region (GOR)

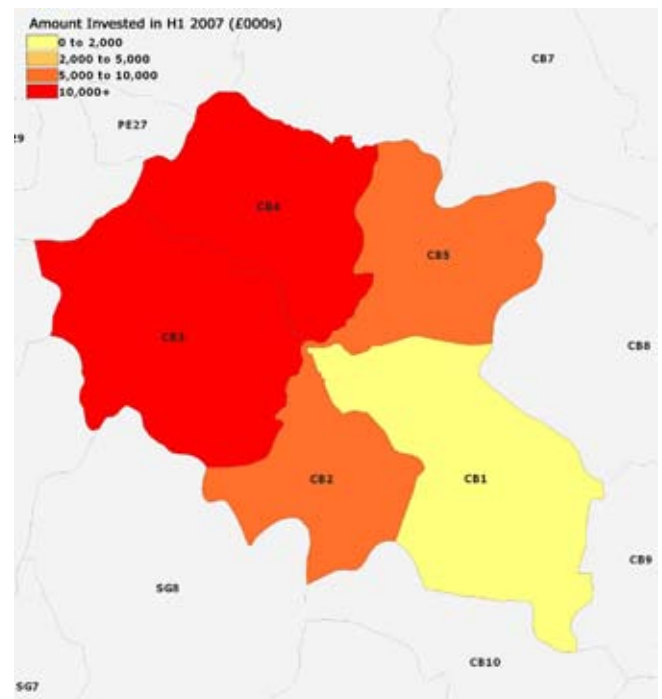


Figure 7b – Colour map showing the distribution of venture capital investment in H1 2007 by CB postal district

Entrepreneurs in Cambridge evidently also have a good understanding of what venture capitalists expect in terms of product development. Looking at venture backed companies in the cluster by sector and product development stage (Figure 6), it is clear that very few venture backed companies in the cluster, in any sector, are at the 'concept' stage. This demonstrates the importance to venture capitalists of investing into companies with proven technology. In agreement with conventional wisdom, companies in the Healthcare & Life Sciences sector have the least developed products. Also as expected, companies in the

Services & Retail sector have the most developed products with almost 90% currently shipping product.

The attractiveness of the Services & Retail sector for venture capitalists was vividly demonstrated in our 2007 UK Venture Backed Report, 'Funding Growth in a Changing World', which showed that, in the UK as a whole, investment into the Services & Retail sector grew 91% between 2005 and 2006. This was partially attributed to the explosion of Services & Retail companies operating solely on the Web.

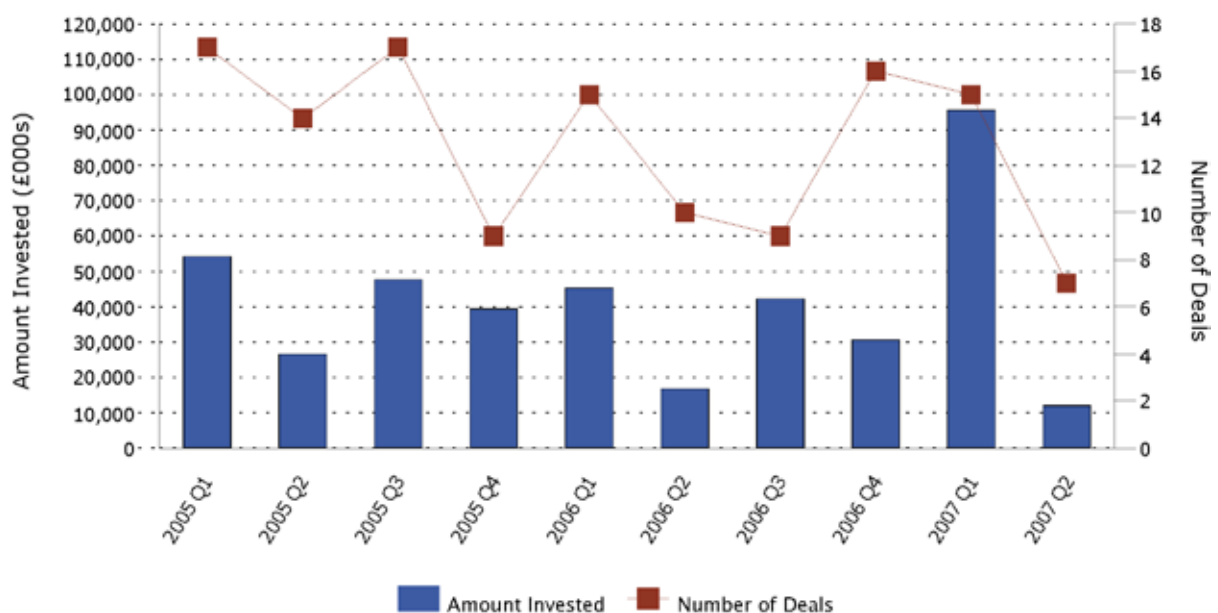


Figure 8 – Investment levels and the number of deals into the Cambridge Cluster by quarter

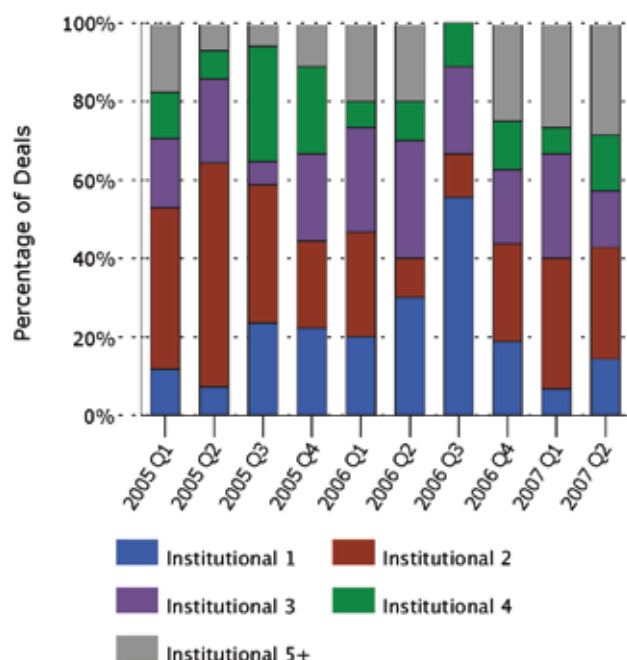


Figure 9 – Percentage of deals into the cluster by funding stage

Investment

In terms of investment, Cambridge is extremely important to the whole UK venture capital market (Figures 7a and 7b). During H1 2007, the Cambridge Cluster attracted 18% of all venture capital investment in the UK.

Figure 8 shows the investment into the Cambridge Cluster by quarter since 2005. The large amount invested in Q1 2007 was mainly due to the raising of £50m by Plastic Logic, one of the

darlings of the Cambridge Cluster. Removing this deal drops the total amount invested to almost exactly the same level as Q1 2006.

Although Q2 2007 has seen a reduced amount of investment, both in terms of the number of deals and actual investment value, looking at the trends of previous years, it seems that this has traditionally been a slow quarter for the Cambridge Cluster and that investment levels will pick up for the remainder of the year.

Looking at deals in the Cambridge Cluster since the beginning of 2005, it is clear that the percentage of first round institutional deals is low and has remained low over a considerable period (Figure 9). Only in the third quarter of 2006 did first round deals represent more than 50% of all deals concluded - a typical figure for many other clusters. This characteristic suggests that the Cambridge Cluster is fairly mature in comparison with other major centres of innovation around Europe. This is discussed further in the second section of this report.

Sectors

Investigating which sectors are attracting the majority of venture capital in the cluster reveals a close match with the sectors observed in the company breakdown in Figure 3. The clear majority of investment in the Cambridge Cluster is pumped into the Healthcare & Life Sciences, Information Technology and Communications sectors (Figure 10a). This trend is also shown in terms of the number of deals into the cluster (Figure 10b).

Figures 10a and 10b have been ordered in terms of the H1 2007 data. The reason for Information Technology being the number one sector in terms of the amount of investment in H1 2007 is explained by the aforementioned large Plastic Logic deal. In terms of the number of deals, the Healthcare & Life

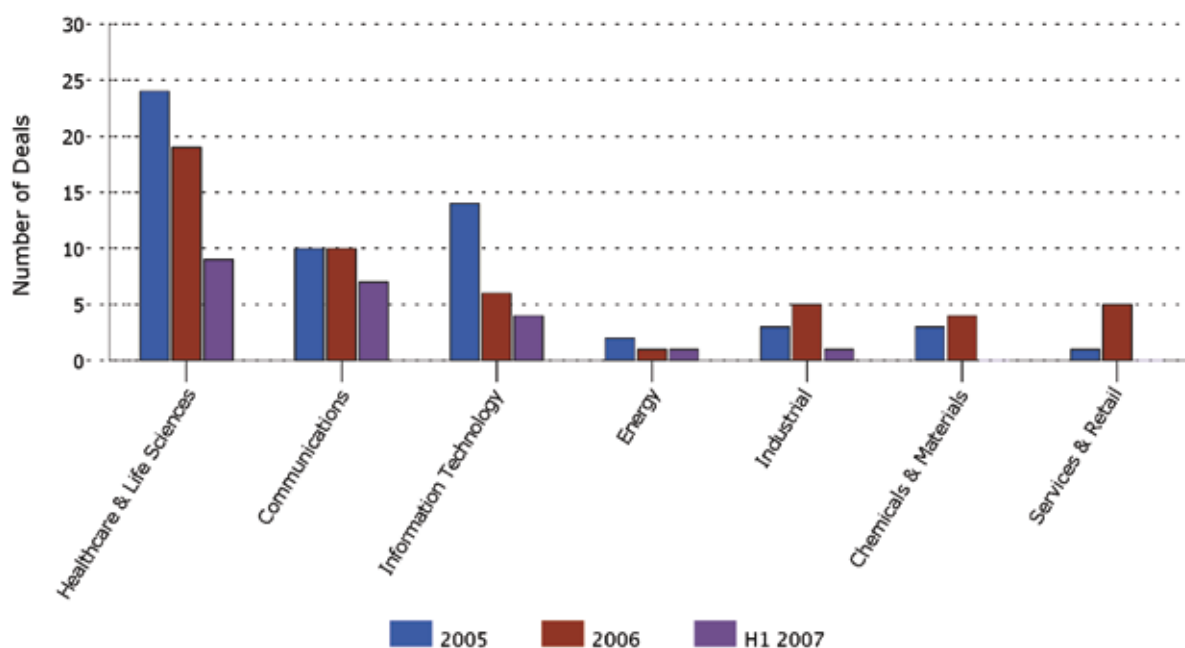


Figure 10a – Number of deals into the Cambridge Cluster by sector

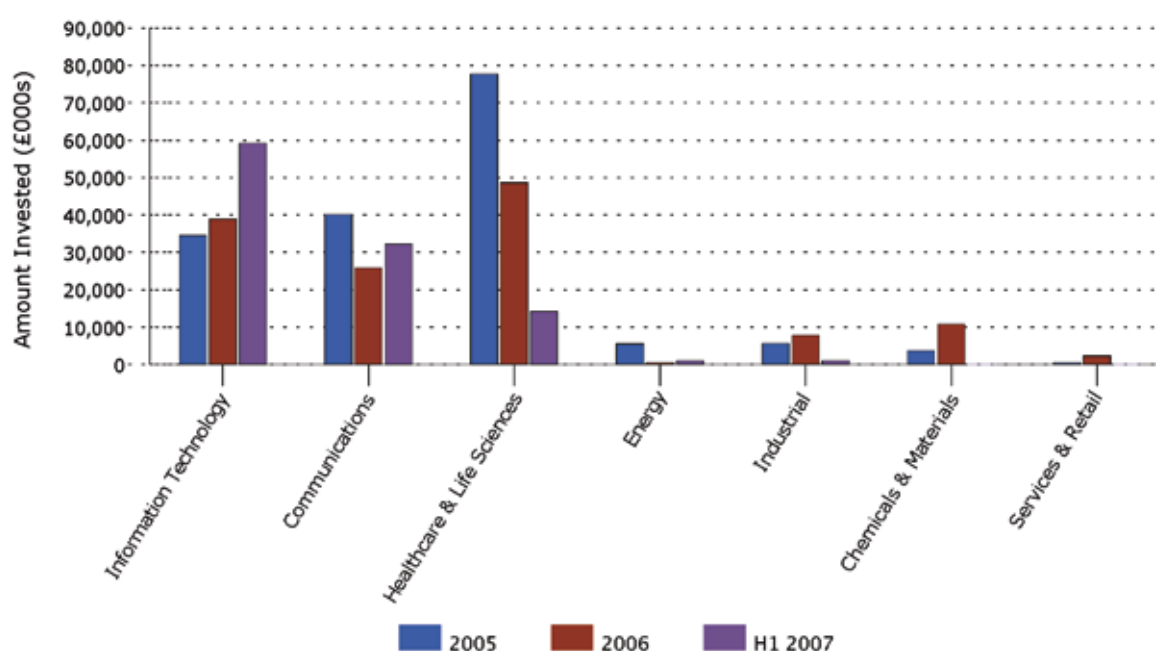


Figure 10b – Amount invested into the Cambridge Cluster by sector

Sciences sector tops the table in H1 2007. So even though it has the greatest number of deals in H1 2007 the Healthcare & Life Sciences sector has the lowest amount of investment out of the big three sectors. This is due to companies in this sector raising smaller amounts than usual in later rounds and the trend towards raising smaller multiple funding rounds. This reflects a common complaint of entrepreneurs in the UK that they have to spend a lot of time and effort continually trying to raise funds to keep the company going whilst their counterparts in the US receive much larger funding rounds earlier and can then concentrate on expanding the business.

Table 1 shows this trend in more detail. The average deal size in Healthcare & Life Sciences has dropped to £2.3m in H1 2007, from a high point of £3.3m in 2005. Whereas Information Technology deal sizes have risen constantly since 2005, although the Plastic Logic deal has skewed the H1 2007 figure in this sector.

It is a particular surprise that deal sizes have been decreasing in the Healthcare & Life Sciences sector as this is generally thought to be extremely capital intensive. If this trend reflects the difficulty Cambridge life science companies are having in raising funds, then it is a concern for the future viability of the sector in the cluster.

| Sector | Average Deal Size (£000s) 2005 | Average Deal Size (£000s) 2006 | Average Deal Size H1 (£000s) 2007 |
|----------------------------|--------------------------------|--------------------------------|-----------------------------------|
| Communications | 5,023 | 3,694 | 5,371 |
| Healthcare & Life Sciences | 3,378 | 3,040 | 2,374 |
| Information Technology | 3,459 | 6,487 | 14,804 |

Table 1 – The average size of deal in 2005, 2006 and H1 2007 made into Cambridge's three main sectors

| Company Name | Date | Deal Stage | Deal Amount (£000s) | Sector | Sub-Sector |
|------------------------------|---------|-----------------|---------------------|----------------------------|--|
| Plastic Logic | Q1 2007 | Institutional 5 | 50,685 | Information Technology | IT Hardware |
| Cambridge Broadband Networks | Q1 2007 | Institutional 7 | 11,421 | Communications | Communication Hardware, Software & Systems |
| Serentis | Q2 2007 | Institutional 2 | 10,244 | Healthcare & Life Sciences | Pharmaceuticals & Drug Development |
| Antenova | Q1 2007 | Institutional 5 | 5,207 | Communications | Communication Hardware, Software & Systems |
| OpenCloud | Q1 2007 | Institutional 2 | 5,183 | Communications | Communication Hardware, Software & Systems |

Table 2 – The top 5 deals in the Cambridge Cluster in H1 2007

Andy Richards, a serial biotech entrepreneur, suggests a different reason for the reduction of biotech deals in the cluster. He states that, with trade sales now clearly the most attractive exit option for biotech start-ups, a new model for investment has emerged. At an early stage in the company's development, syndicates are increasingly being sought that have the resources to provide capital to the company at every stage in its lifecycle, eliminating the need to shop around for new external investors at each funding round. This leaves entrepreneurs able to concentrate fully on creating a profitable, saleable, business rather than spend time fundraising. Because they do not need to attract external investors, investments into these companies are not publicly announced and the companies are kept away from the public spotlight. It will be interesting to examine future exits in this sector to see if these observations are borne out.

In terms of general sectoral trends, it is interesting that investment into the Communications sector looks set to overtake both the 2005 and 2006 levels in 2007. This sector suffered greatly from the collapse of the dot-com bubble but now seems to be recovering strongly. In fact, 3 of the 5 biggest deals of H1 2007 have been in the Communications sector (Table 2).

Obviously, the major deal of H1 2007 was the Plastic Logic deal in the first quarter. This deal provides the company with funds to build the first factory to commercially produce plastic electronics. Cambridge Broadband Networks also raised funds in the first quarter. The funding from this round will be used to further develop carrier-class wireless transmission equipment. Serentis, the only Healthcare & Life Sciences company in the top 5 deals table, will use its funding to progress its products into clinical-stage proof-of-principle trials and to expand its development pipeline.

Investors

The most active investor in the Cambridge Cluster in terms of the number of deals is the Cambridge Gateway Fund, which has participated in a total of 10 deals since 2006 (Table 3a). Amadeus Capital Partners is the top investor in terms of syndicated amount invested (Table 3b).

It is interesting to note that in Table 3a, the top investors by number of deals, only one of them is a foreign investor and that many of the domestic investors are actually based in Cambridge itself. Whereas, in Table 3b, the top investors by syndicated

| Institutional Investor | Number of Deals (2006 - H1 2007) | Investor HQ Country | Syndicated Amount Invested (2006 - H1 2007, £000s) |
|--|----------------------------------|---------------------|--|
| Cambridge Gateway Fund | 10 | United Kingdom | 40,717 |
| Amadeus Capital Partners | 8 | United Kingdom | 104,976 |
| Cambridge Capital Group | 8 | United Kingdom | 10,232 |
| University of Cambridge Challenge Fund | 7 | United Kingdom | 2,480 |
| 3i Group | 6 | United Kingdom | 20,840 |
| CREATE Partners | 5 | United Kingdom | 3,381 |
| Qvest Capital Management | 4 | United Kingdom | 26,407 |
| DFJ Esprit | 4 | United Kingdom | 9,258 |
| GEIF Ventures | 4 | United Kingdom | 1,900 |
| Intel Capital | 3 | United States | 64,304 |

Table 3a – The ten most active investors in the Cambridge Cluster by number of deals between 2006 and H1 2007

| Institutional Investor | Syndicated Amount Invested (2006 - H1 2007, £000s) | Investor HQ Country | Number of Deals (2006 - H1 2007) |
|----------------------------------|--|---------------------|----------------------------------|
| Amadeus Capital Partners | 104,976 | United Kingdom | 8 |
| Oak Investment Partners | 64,529 | United States | 2 |
| Intel Capital | 64,304 | United States | 3 |
| Tudor Investment Corporation | 59,224 | United States | 3 |
| BASF Venture Capital | 50,685 | Germany | 1 |
| Bank of America Capital Partners | 50,685 | United States | 1 |
| Quest for Growth | 50,685 | Belgium | 1 |
| Merifin Capital | 50,685 | Belgium | 1 |
| Cambridge Gateway Fund | 40,717 | United Kingdom | 10 |
| Accel Partners | 30,365 | United States | 3 |

Table 3b – The top ten investors in the Cambridge Cluster by syndicated amount invested between 2006 and H1 2007

| Region | Proportion of all Companies (%) | Proportion of all SMEs (%) | Proportion of all High-Tech Companies (%) | Proportion of all High-Tech SMEs (%) |
|---------------|---------------------------------|----------------------------|---|--------------------------------------|
| North East | 2% | 2% | 3% | 3% |
| North West | 10% | 10% | 11% | 11% |
| Yorkshire | 7% | 7% | 9% | 9% |
| East Midlands | 5% | 5% | 7% | 7% |
| West Midlands | 8% | 7% | 10% | 10% |
| East | 9% | 9% | 11% | 12% |
| London | 24% | 24% | 11% | 11% |
| South East | 17% | 18% | 15% | 15% |
| South West | 8% | 8% | 9% | 9% |
| Rest of UK | 10% | 10% | 11% | 11% |
| Totals | 100% | 100% | 100% | 100% |

Table 4 – Percentage of high-tech companies by government office region (GOR)

amount invested, the majority are foreign investors. The degree of support that Cambridge receives from foreign investors, particularly those from the US, is covered in a case study, following the "Access to finance, markets and infrastructure" section of this report, looking at the 'special' relationship between Cambridge and the US.

Incorporations

Cambridge, like any innovation cluster, relies on entrepreneurs to start new exciting innovation based companies. Over the last few years many in the Cambridge Cluster have stated that the cluster is stagnating or even contracting. As the earlier analysis has shown, Cambridge is still receiving significant levels of venture capital and has many innovative venture backed companies in the cluster. Clearly venture capital backed companies come from a wider ecosystem of high-tech companies. It is essential to look at the flow of non-venture backed high-tech companies if one is to assess the health of a cluster and the potential for it to attract external investment in the future. Using Companies House and the OECD definition of high-tech companies it is possible to view the innovation cluster in a wider context.

Figure 11 shows the rate of formation of all companies (including those that have subsequently gone out of business) in the CB postal district (taken as a reasonable proxy for the Cambridge Cluster for this analysis) since 1990.

Focussing only on high-tech companies (Figure 12), it is clear that, although company formation rates have been fairly sporadic over the period, there has been an overall increase in high-tech company formation in Cambridge since 1990. This data also includes companies that have subsequently gone out of business. The effect of the bursting of the dot-com bubble is clearly evidenced by the fall in levels of high-tech company formation in Cambridge post 2002. Accurate data for 2006 figures is not currently available from Companies House but the rise in company formations in 2005 for both high-tech and all companies is a hopeful sign for the future.

Table 4 shows that compared to the other 8 government regions in the UK, the East of England, of which the Cambridge Cluster is the major contributor, has one of the highest proportion of high-tech SMEs, second only to the South East region.

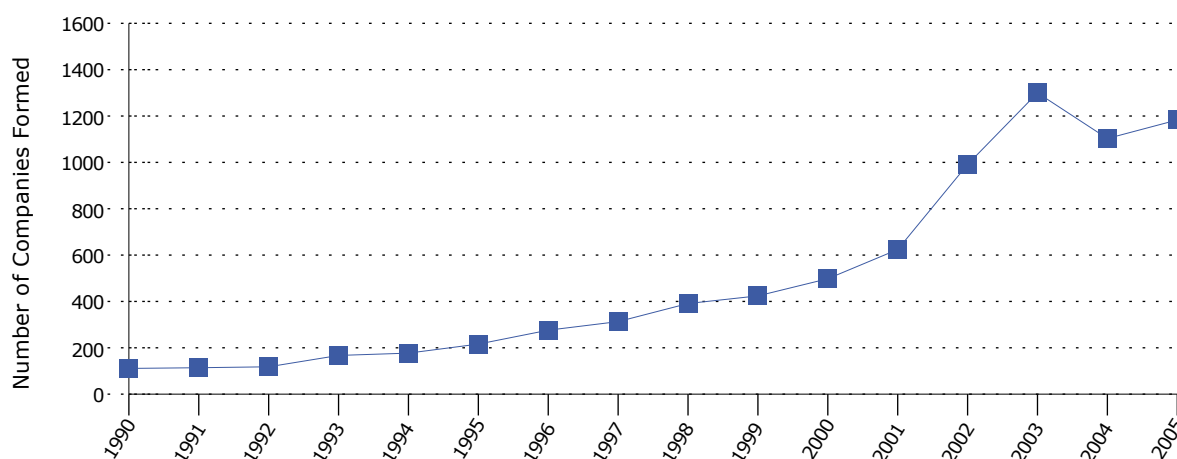


Figure 11 – Formation rate of all companies in the Cambridge Cluster since 1990

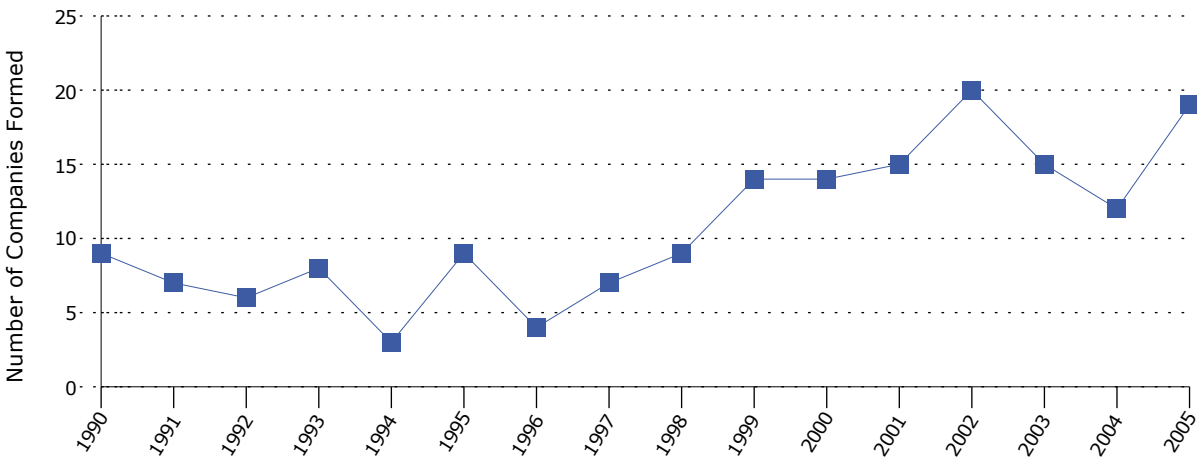


Figure 12 – Focus on the formation rate of high-tech companies in the Cambridge Cluster since 1990

Overall, this data suggests that, given a consistent quality of company, the flow of new opportunities for venture capitalists should be healthy in the Cambridge Cluster. Whether this is borne out in the relative performance of Cambridge compared to Europe’s other major clusters is examined in the second section of this report.

Exits in the cluster

The Cambridge Cluster has witnessed some very notable exits in the past few years, including GlaxoSmithKline’s 2006 acquisition of Domantis for £230m and the 2005 NASDAQ listing of Cambridge Display Technology, the first modern University of Cambridge spin-out to go public. So where are the next big exits in the Cambridge Cluster going to come from?

By interviewing senior management of venture backed companies in Cambridge, Library House was able to ascertain the exit intentions for many companies in the cluster (Figure 13a). Trade sales are clearly the preferred route for companies in the cluster. This is similar to the trend seen in the UK as a whole (Figure 13b).

Looking at the actual exits by type in the Cambridge Cluster (Figure 14), the preference for trade sales aligns well with reality, suggesting that Cambridge entrepreneurs have a good understanding of the exit options open to them. The large percentage of companies aiming for a trade sale rather than a public listing is heavily influenced by the large number of biotech companies in the cluster. These companies and their investors are actively aligning their strategy towards the biotech goliaths who are currently looking to bolster their own product pipelines through strategic acquisitions. The actual exits achieved in the cluster since 2006 are shown in Table 5.

The majority of the exits from the cluster were from the Healthcare & Life Science sector, reflecting the overall balance of the cluster in favour of this sector. The big story of the year was Domantis’ £230m sale to GlaxoSmithKline. Together with KuDOS Pharmaceuticals’ sale to AstraZeneca, this shows the ability of the Cambridge life science space to deliver real value to investors. We estimate that the Domantis exit generated a company level IRR of +63% whilst Kudos managed +29%.

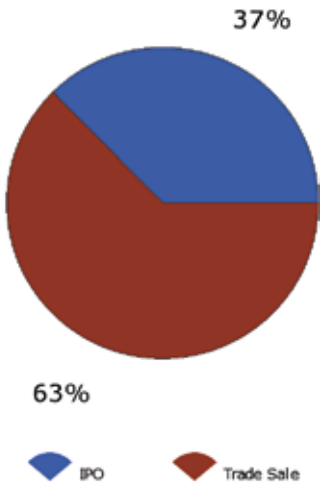
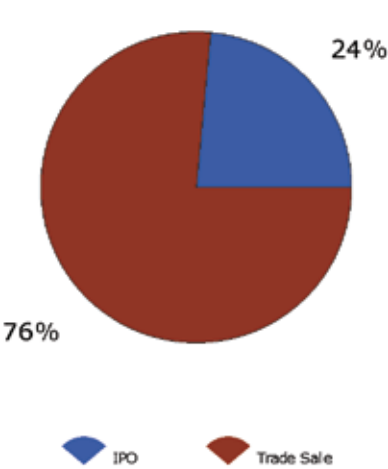


Figure 13a – Exit intentions of venture backed companies based in the Cambridge Cluster

Figure 13b – Exit intentions of venture backed companies in the UK as a whole

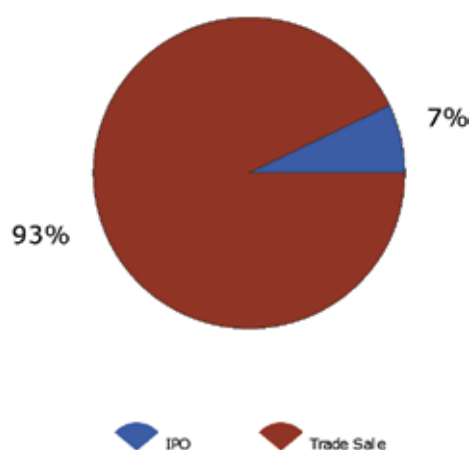


Figure 14 – Actual exits achieved by Cambridge Cluster venture backed companies since 2006 by type

Although the majority of investors into Domantis were based in the UK, many of the other exited companies received a considerable amount of capital from US based investors. KuDOS, for example, received a £30m final round of funding before exit from a syndicate including UK based 3i and Advent Capital Partners and US based EuclidSR Partners and the Johnson &

Johnson Development Corporation. The practice of Cambridge investors setting up investment syndicates with highly experienced US investors is a trend that has to be encouraged in order to fully develop the cluster's companies into truly world-beating, global corporations.

| Company Name | Sector | Total Disclosed Institutional Funding Raised Before Exit (£000s) | Date of Exit | Type | Amount Raised (£000s) | Acquirer/Market | Acquirer Country |
|-------------------------------|----------------------------|--|--------------|------------|-----------------------|-------------------------------|------------------|
| KuDOS Pharmaceuticals | Healthcare & Life Sciences | 42,500 | 1/1/06 | Trade Sale | 121,000 | AstraZeneca | United Kingdom |
| Proteom | Healthcare & Life Sciences | 7,000 | 25/1/06 | Trade Sale | Und | Amura | United Kingdom |
| Intercytex | Healthcare & Life Sciences | 31,400 | 1/2/06 | IPO | 45,000 | AIM | N/A |
| Level 5 Networks | Communications | 22,376 | 19/4/06 | Merger | Und | Solarflare Communications | United States |
| NeuroServe | Healthcare & Life Sciences | 200 | 19/4/06 | Trade Sale | Und | Lectus Therapeutics | United Kingdom |
| KinderTec | Healthcare & Life Sciences | 3,500 | 1/7/06 | Trade Sale | Und | Jake Holdings | United Kingdom |
| Domantis | Healthcare & Life Sciences | 41,960 | 8/12/06 | Trade Sale | 230,000 | GlaxoSmithKline | United Kingdom |
| Cambridge Positioning Systems | Information Technology | 39,879 | 15/1/07 | Trade Sale | 17,839 | Cambridge Silicon Radio | United Kingdom |
| Enviros Group | Information Technology | 3,550 | 1/2/07 | Trade Sale | Und | Alfred McAlpine | United Kingdom |
| Paradigm Therapeutics | Healthcare & Life Sciences | 24,500 | 12/3/07 | Trade Sale | Und | Takeda Pharmaceutical Company | Japan |
| DanioLabs | Healthcare & Life Sciences | 6,178 | 22/3/07 | Trade Sale | 15,000 | VASTox | United Kingdom |
| 3 Way Networks | Communications | 500 | 1/5/07 | Trade Sale | Und | Airvana | United States |

Table 5 – Recent disclosed exits in the cluster (Und = Undisclosed)

Cluster perspectives: angel backed groups and angel financing in the cluster

The Cambridge Cluster has three main angel groups that help finance early stage companies: NW Brown, through its management of various seed funds and its involvement with the Great Eastern Investment Forum (GEIF); Cambridge Capital Group; and Cambridge Angels. These groups, alongside other early stage investors like Create Partners, have contributed to the development of an extremely vibrant seed funding environment in the cluster. Here we profile some of the key players in the Cambridge angel investment scene.

GEIF/GEIF Ventures

NW Brown, a financial services company based in Cambridge, runs the GEIF and manages the GEIF Ventures Early Growth Fund, a £5m co-investment fund that invests into promising early growth businesses alongside GEIF business angels.

Looking at the GEIF Ventures current portfolio (Figure 1), it is clear that two sectors dominate, Healthcare & Life Sciences and Information Technology. GEIF Ventures invest an average of £70,000 per funding round.

GEIF Ventures made 14 investments in the first three quarters of 2007, including an initial investment into Altacor, an early stage pharmaceutical company focussed on the area of therapeutic ophthalmology. The group also participated in follow on rounds with Short Fuze, a company developing software products in the emerging field of machinima, and CamrivoX, a VOIP provider targeted at the small business and home market.

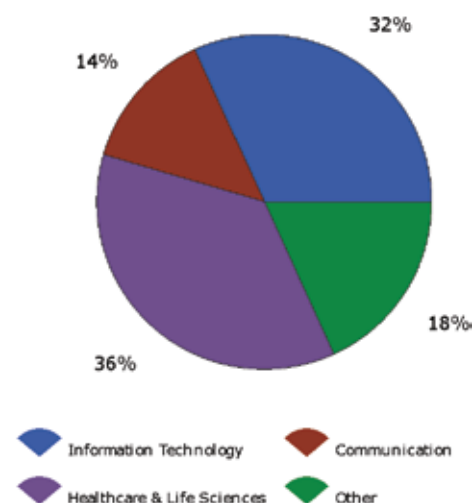
In some cases GEIF business angels invest directly into companies without syndication from the GEIF Ventures co-investment fund. Some recent investments in which a group of GEIF angels participated independently from GEIF Ventures include the investment into Syrris, developing products for R&D chemists, and OptiSynx, a company developing an alternative to the caesium atomic clock.

Cambridge Capital Group

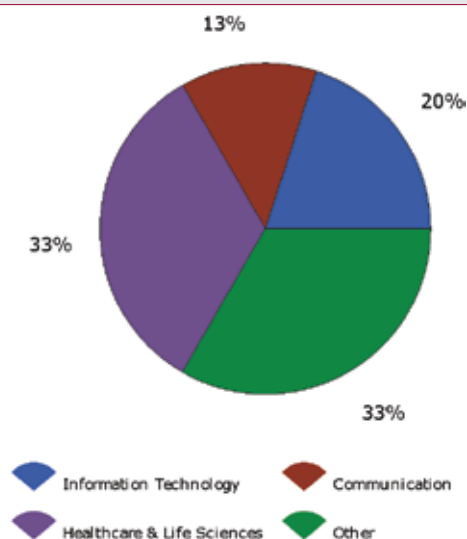
The Cambridge Capital Group (CCG) provides technology companies, primarily based in Cambridge, with early stage finance. Although based in Cambridge, the group aims to attract angel investors from outside the area to invest in promising Cambridge technology companies.

The sector breakdown (Figure 2) shows that CCG tend to invest in similar sectors to GEIF Ventures, the ones in which the cluster is very strong, for example, Healthcare & Life Sciences and Information Technology.

On a more granular level, it can be seen that the majority of CCG's investments are made into companies based on hard innovation, namely those involved in Medical Technologies, Communications Hardware and Biotech.



Case Study 1: Figure 1 – GEIF Ventures current portfolio by sector



Case Study 1: Figure 2 – CCG current portfolio by sector

Demonstrating the importance of the University of Cambridge in supplying much of the technology currently being commercialised in the cluster, the majority of CCG's most recent investments have been into University of Cambridge spin-outs. In Q3 2007, CCG participated in a £13m round in Metalysis, a university spin-out technology business for the global specialty metals industry, to allow the company to take three of its product lines to production ahead of a possible stock market listing. Inotec and Light Blue Optics, both University spin-outs, have also received funding this year from the Cambridge Capital Group.

Cambridge Angels

Since its inception in 2001, the Cambridge Angels have invested over £11.5m in 29 start-up companies, primarily in the hi-tech and biotech sectors (Figure 3).

Whilst most of these portfolio companies are based in and around the Cambridge area, the Cambridge Angels do participate in deals outside Cambridge, and in particular have invested in several companies based in London. One such deal, closed in the third quarter of 2007, is with Ionscope, which develops systems for 'scanning ion conductance microscopy' (SICM), enabling the creation of images of living cell membranes at a resolution fifty times greater than conventional optical microscopes.

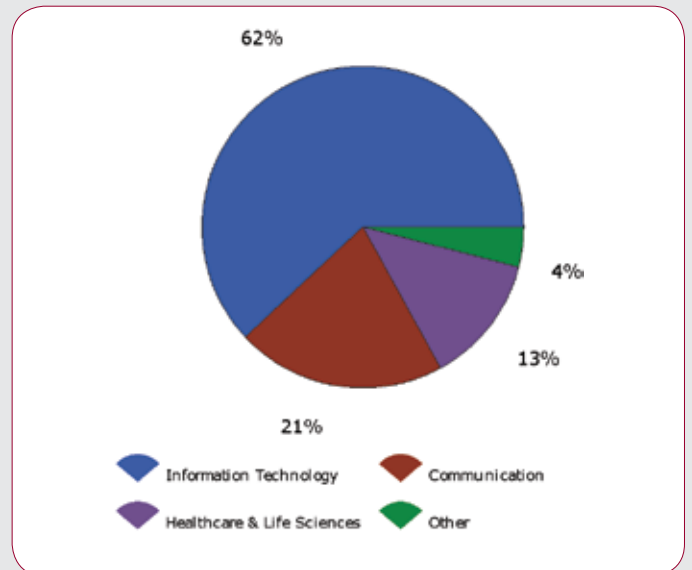
When asked if investments outside Cambridge are set to increase, Robert Sansom, Chairman of the Cambridge Angels, commented: "We are always interested in exceptional investment opportunities in London such as Ionscope, but our bread and butter will remain local start-ups here in Cambridge. We feel fortunate to be at the centre of the most dynamic technology cluster in Europe, and one side-benefit of this is that we can usually cycle to board meetings with our portfolio companies!"

Other companies that have recently received investment from the Cambridge Angels include: Altacor, alertme.com, Beats Digital and i2o Water.

Enterprise capital funds (ECFs) in Cambridge

ECFs were set up to provide early stage funding for SMEs affected by the government defined 'equity gap'. Of the five ECFs launched after the first round of bidding in 2005, two are run by Cambridge based firms. These are the IQ Capital Fund, run by NW Brown, and the Amadeus & Angels Seed Fund, run by Amadeus Capital.

The IQ Capital Fund is a £25m early stage fund that launched in December 2006. It has made four investments into three companies to date: OnRelay, Short Fuze and Spikes Cavell. OnRelay, the London based software company that specialises in fixed mobile integration, received £1.5m in the third quarter of this year, the largest single investment by the fund so far.



Case Study 1: Figure 3 – All deals completed by the Cambridge Angels by sector

A typical Cambridge early stage deal

In Q1 2007, NW Brown, through its IQ Capital Fund, joined with Create Partners to invest £1m in Short Fuze, a company developing a movie-making tool based on Machinima, an emerging new media form that uses a videogame engine to produce 3D animation quickly, cheaply, and easily. Short Fuze has previously received funding from GEIF Ventures and Cambridge Angels, demonstrating the propensity of the cluster's seed investors to come together to fund early stage companies. This co-operation between investors certainly allows quality companies in the cluster access to early stage finance but is the fact that they are all generally involved with the same companies symbolic of a lack of overall quality investment opportunities in the cluster?

Cambridge in context

How does Cambridge compare with other innovation clusters around the world? It is generally assumed to be one of the most significant hotbeds of activity in Europe and is widely known as 'Silicon Fen'. However, in recent years, especially following the publication of last year's Cambridge Cluster Report, there has been increasing concern that the cluster may be declining in importance. This section of the report compares Cambridge with other key innovation clusters around the world, particularly in Europe, and addresses the question: has Cambridge maintained its position or failed to keep up with the pace of global innovation?

European innovation clusters

In this report we take venture capital investment to be a proxy for general levels of innovation. This is assumed to be reasonable because venture capital has been shown through academic research to be uniquely effective at promoting innovation. In order to identify the leading clusters in Europe in terms of venture finance, we first set about defining a cluster. Michael Porter, the father of economic cluster theory, defined a cluster as being "a geographically proximate group of companies and associated institutions in a particular field, linked by commonalities and complementarities". In practical terms, we believe this approximates to companies within a metropolitan area and their associated business parks, science cities and similar.

The definition of a cluster can, of course, always be open to question. What constitutes a science city? How far away can a business park be from a city to be considered part of the

cluster? In this work we have sought to define each of the leading clusters such that those living in each area would recognise the relevance of the term 'cluster' as applied. Table 6 shows which districts or municipalities have been included in each of the top twenty clusters in Europe.

Having identified each cluster we were able to define, using our proprietary dataset, a number of parameters relevant to venture capital and innovation. For example, the number of venture capital backed companies, the amount of institutional capital committed to these companies and the sector of operations for each company.

The top twenty clusters in Europe, by number of venture backed companies, are shown in Figure 15. By this crude measure, Cambridge is the ninth largest cluster in Europe. However, in order to take into account the quality rather than simply the number of companies, the total institutional capital committed to currently active, privately held companies was calculated for each cluster. This number was also adjusted to take into account the levels of deal disclosure in each cluster. For example, the amounts invested in Finnish venture deals are more often left undisclosed than in the United Kingdom. Taking this into consideration, Cambridge is the 6th most significant cluster in Europe, lagging behind London, Paris, Tel Aviv, Stockholm and Copenhagen (Figure 16).

This measure is likely to be skewed in favour of longer established clusters because it includes all institutional capital currently committed to privately owned ventures regardless of when the finance was injected. Looking just at deals concluded in 2006, however, it is clear that this factor is not unduly exaggerating the importance of Cambridge (Figure 17).

| Cluster | Definition |
|------------|--|
| London | All Greater London |
| Paris | All communes of Paris |
| Stockholm | Stockholm urban area plus Kista |
| Tel Aviv | All cities in Tel Aviv district |
| Helsinki | Helsinki urban area plus Espoo and Vantaa |
| Copenhagen | Copenhagen urban area plus Kongens Lyngby, Gentofte, Brøndby and Frederiksberg |
| Munich | Munich urban area plus Martinsried |
| Berlin | Berlin urban area plus Potsdam |
| Cambridge | All CB postcodes plus SG8, PE29 and PE28 |
| Dublin | Dublin urban area plus Dun Laoghaire |
| Madrid | Madrid urban area |
| Oxford | Oxford plus Abingdon |
| Gothenburg | Gothenburg urban area |
| Barcelona | Barcelona urban area |
| Glasgow | Glasgow urban area |
| Edinburgh | Edinburgh urban area |
| Jerusalem | Jerusalem urban area |
| Hamburg | Hamburg urban area |
| Vienna | Vienna urban area |
| Oslo | Oslo urban area |

Table 6 – Library House Cluster definitions

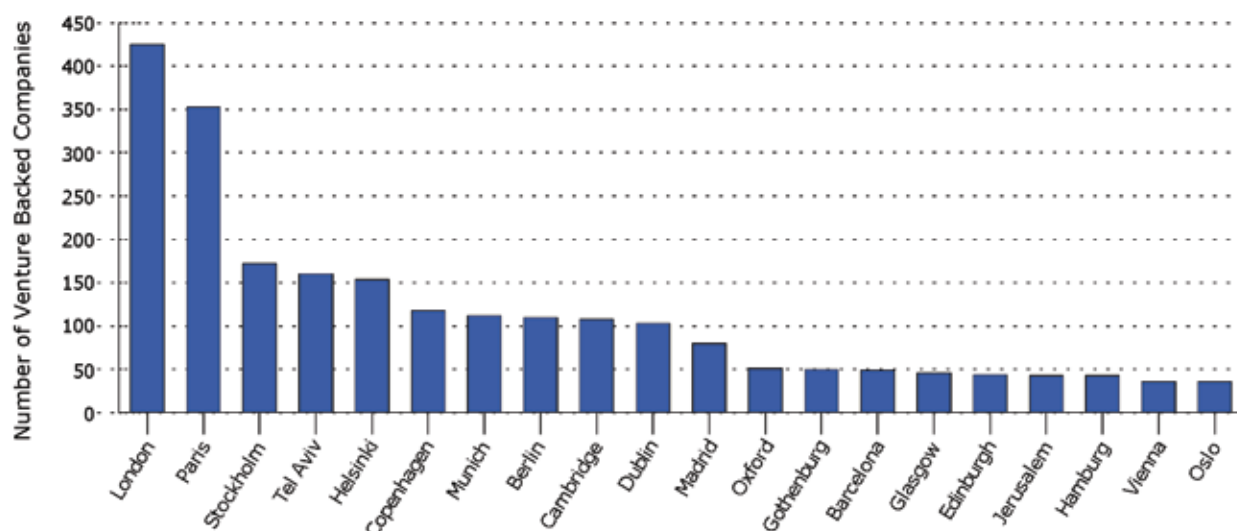


Figure 15 – The top 20 clusters in Europe by the number of venture backed companies

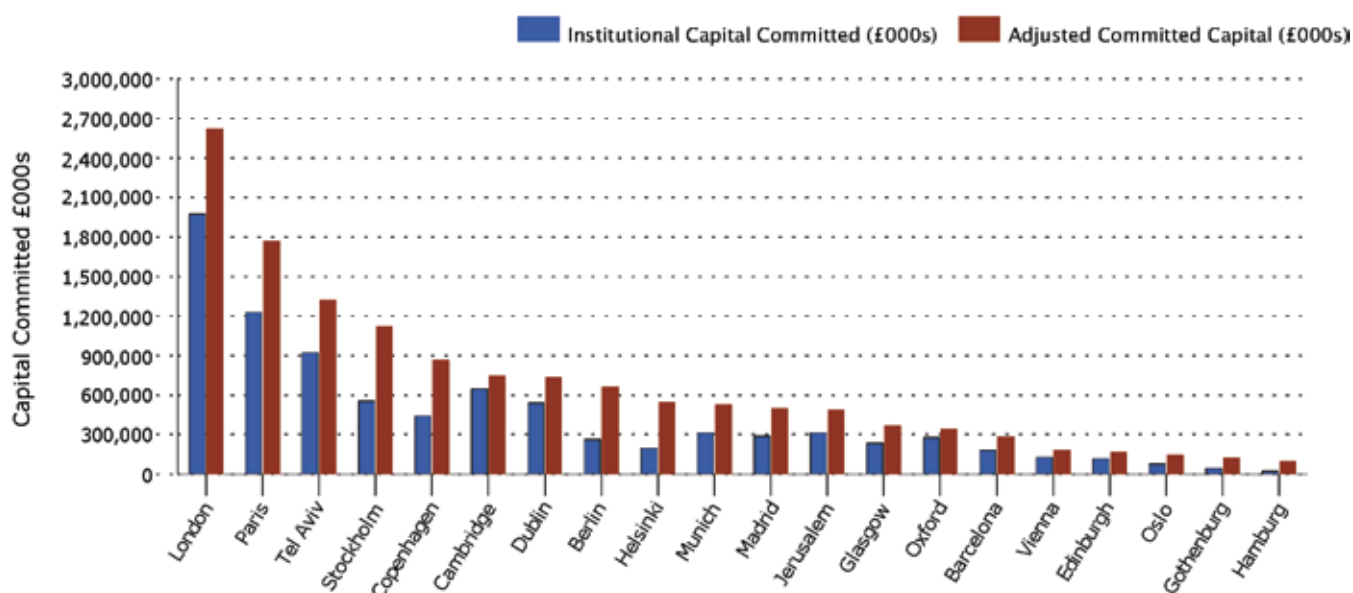


Figure 16 – The top 20 clusters in Europe by the total amount of adjusted committed capital

Indeed by this measure, not taking into account deal disclosure rates, Cambridge is the fourth most significant cluster in Europe behind just London, Paris and Tel Aviv.

Figure 17 also shows the size of European clusters relative to the world's pre-eminent technology cluster, California's Silicon Valley. As shown, Silicon Valley is over ten times the size of London, Europe's largest cluster, in terms of 2006 investments. Even on a per capita basis, Silicon Valley attracts substantially more venture capital than any European cluster, including the innovation hubs of Israel such as Tel Aviv and Jerusalem.

Interestingly, the most vibrant innovation in Europe and Israel, on a per capita basis, is Cambridge. In 2006, over £320 was invested per capita in the Cambridge Cluster, approximately twice that in Tel Aviv and six times that in London.

Cluster trends

Perhaps more important than a snapshot of where Cambridge stands in Europe and the world is where it's going. Is Cambridge expanding relative to its rival innovation hubs or is its importance decreasing?

As shown in Figure 18, looking at the proportion of venture deals into Europe's top clusters attracted by Cambridge, the cluster appears to be declining in importance. In 2005 9.3% of deals into Europe's top clusters went to Cambridge whereas so far this year (2007) just 5.6% of deals did so. In contrast, London has substantially increased its lead over other European clusters, taking a 22.9% share of deals up from 18.8% in 2005. The drop in relative deal activity in Cambridge is the most dramatic of any of the top clusters in Europe whereas London's gain has been the most significant increase. The reason for this shift from Cambridge to London is a key element of the analysis which follows.

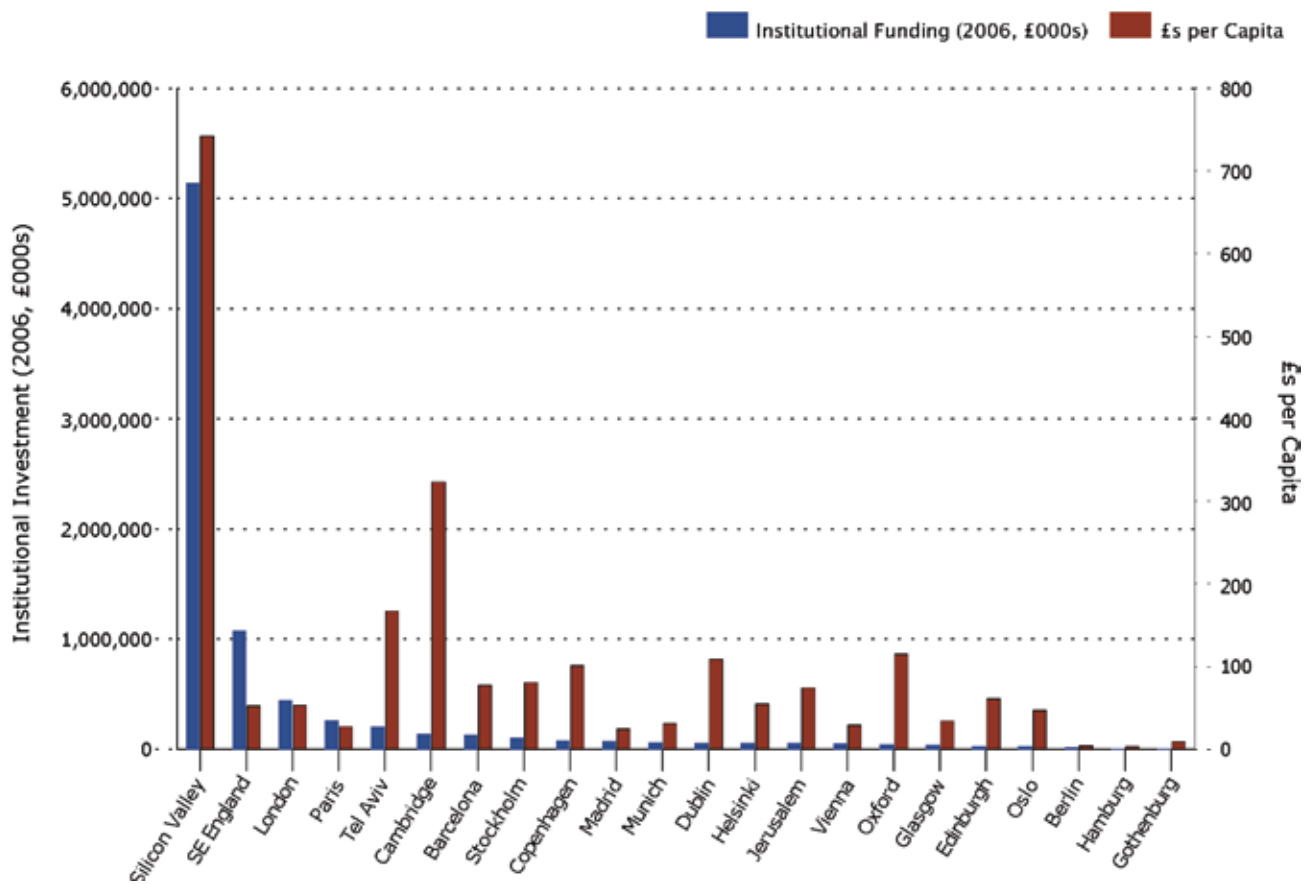


Figure 17 – The top 20 European clusters compared to Silicon Valley in terms of total institutional investment in 2006

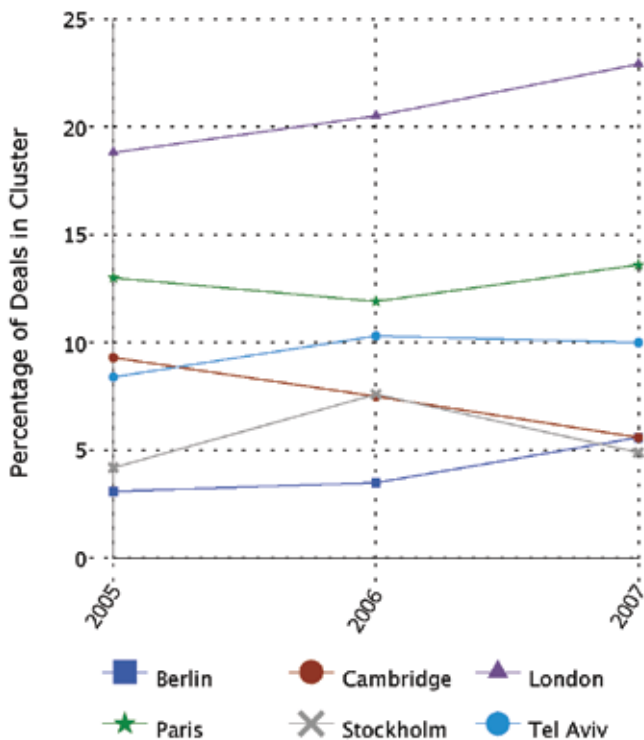


Figure 18 – The percentage breakdown of venture capital deals into selected top clusters within Europe

Looking outside of the United Kingdom, the most significant increase in relative deal activity has been in Berlin. Its companies have attracted 5.6% of all deals into Europe's top clusters so far in 2007, up from just 3.1% in 2005 (Figure 18). The deal activity in Berlin so far in 2007 actually matches that in Cambridge for the first time, reinforcing the extent of the progress being made by the German capital.

The most likely explanation for the relative decline of the Cambridge Cluster is structural shifts in the venture capital market. It is unlikely that any of the fundamental strengths of Cambridge, such as its world class university or proximity to the financial capital of Europe, have changed over the past several years. Instead, it is more probable that changes in the sectoral focus of investment are leading to these advantages being less significant. In our 2007 UK Venture Backed Report, 'Funding Growth in a Changing World', we pointed out the dramatic growth in Services & Retail companies as a target for venture capital investors. The Web has enabled many products and services to be delivered in new ways such that innovation no longer has to mean technology. Instead, innovative business models can be built not on developing new technologies but on using these technologies to create value for consumers.

Could it be that Cambridge's focus on 'hard innovation' derived from academic research is leading to it missing out on the 'softer' innovations in the Web and media technology space? If so, does this matter?

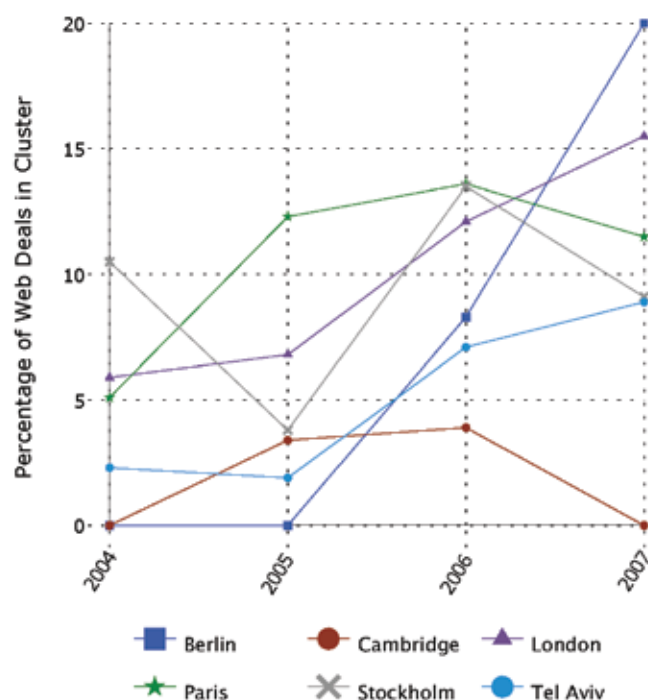


Figure 19 – The percentage breakdown of venture capital deals in the Web sector of selected top clusters within Europe

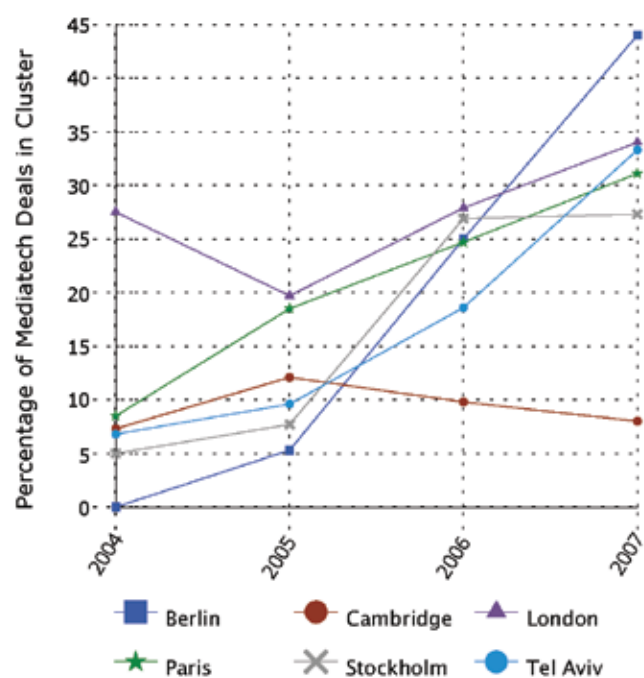


Figure 20 – The percentage breakdown of venture capital deals in the Mediatech sector of selected top clusters within Europe

Emerging sectors: the rise of 'soft' innovation clusters

Venture capital has traditionally been associated with investment in technology. The root of this tradition is entirely understandable. Technology based business models are inherently scaleable and so are more likely to be able to deliver returns within a short timeframe. However, recent history has shown that dramatic returns are possible outside pure technology investments, for example in the Services & Retail space. Although there have always been examples of services businesses able to grow rapidly and deliver solid returns over a venture capital type timeframe (for example the Pret A Manger chain of sandwich shops), the growing maturity of the Web and media convergence has made this a far more frequent occurrence.

Three important trends have emerged in the wake of the Web's maturity:

- Retail has moved from the highstreet to the Web – a large number of scaleable business models have been developed which leverage the Web in the delivery of traditional products and services
- New Web services have emerged – the Web has made possible the delivery of services not previously viable. For example, the Web has allowed the mass participation in auctions through sites such as eBay that would not have been possible pre-Web. A more recent example is the ability for individuals to hire and lease parking spaces using the online service, parkatmyhouse.com.
- Digital media – the Web, or more particularly the internet, has allowed a whole range of previously separate products

and services to be delivered in bundles over IP. The switch to IP is revolutionising telecoms and traditional media, allowing new businesses to emerge in the 'Mediatech' space.

Together these three trends represent a huge opportunity for innovating entrepreneurs. However, unlike the emergence of biotech in the 1980s and 1990s or the ICT bubble of the late 1990s, these emerging opportunities do not rely, for the most part, on hard technology innovation. Instead they require innovative ideas and effective business model development.

It is highly likely that these trends are having a substantial negative impact on the significance of innovation clusters wedded to the development of 'hard' technology. In contrast, those suited to the emerging Web and Mediatech phenomena are likely experiencing substantial expansion.

Defining soft vs hard innovation

Innovation is the discovery and introduction of something new or different

Hard innovation is when the novelty or difference is based on a substantive technological advance

Soft innovation is when the novelty or difference derives from the imaginative use of existing technologies rather than the development of new ones.

Examples: Developing bluetooth semiconductor chips is hard innovation. Using peer-to-peer technology to build a video sharing portal is soft innovation.

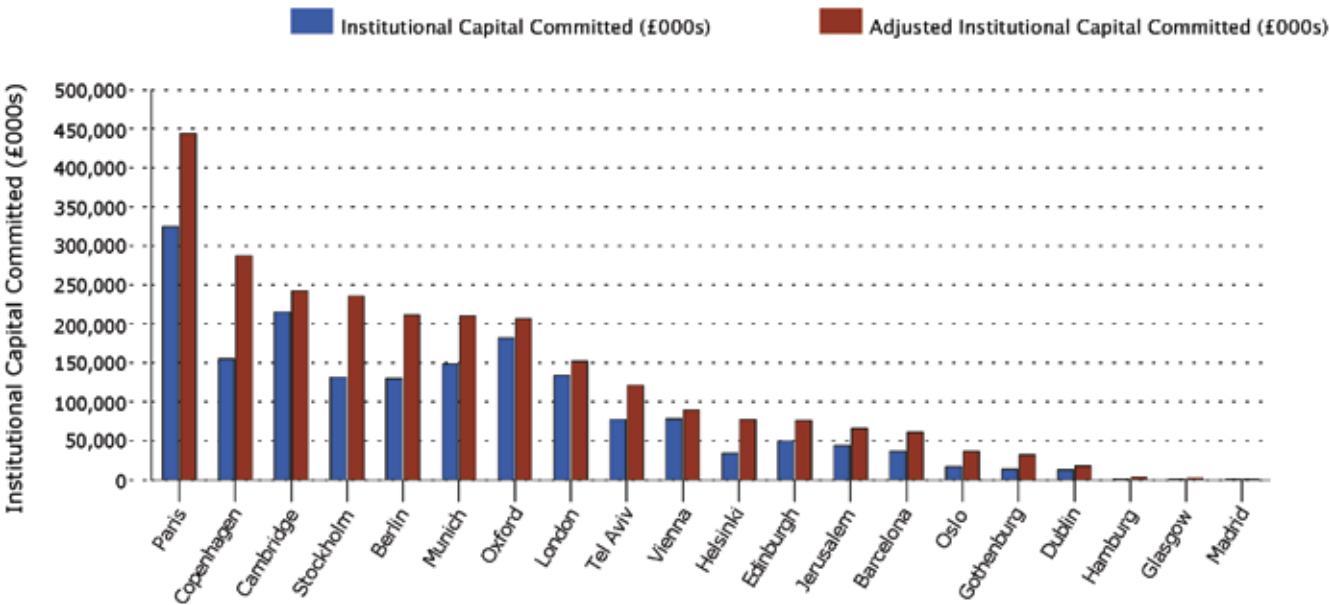


Figure 21 – The top 20 Healthcare & Life Sciences clusters in Europe by the total amount of adjusted committed capital

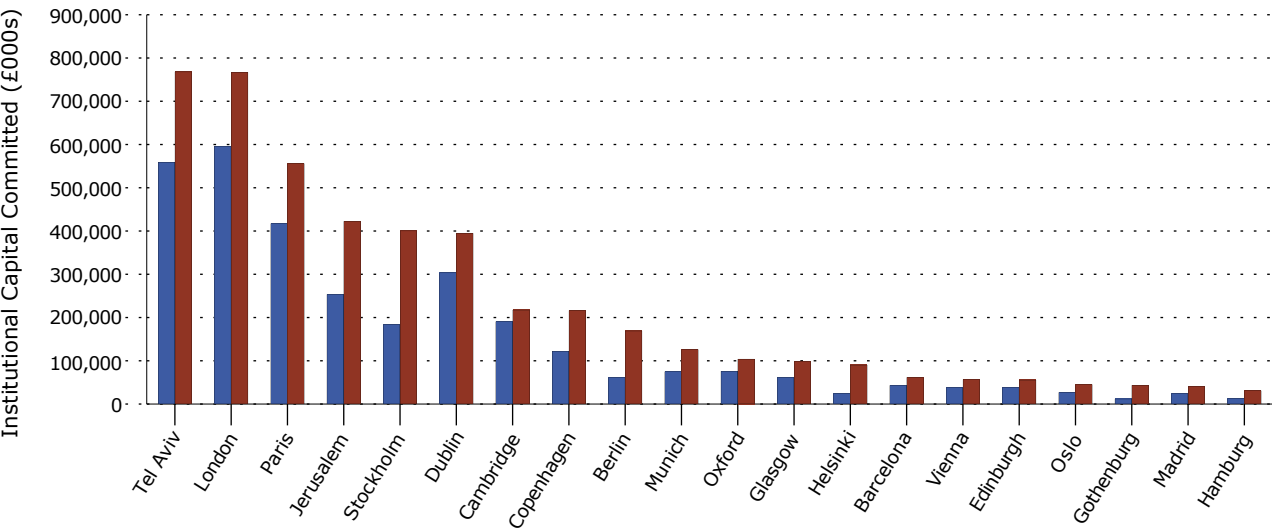


Figure 22 – The top 20 Information Technology clusters in Europe by the total amount of adjusted committed capital

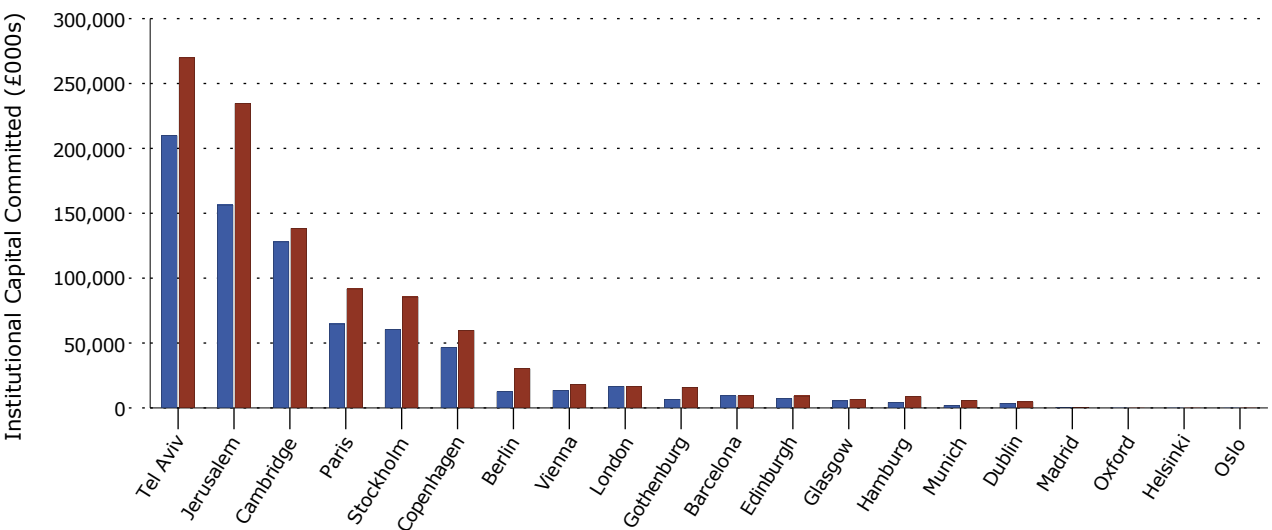


Figure 23 – The top 20 IT Hardware clusters in Europe by the total amount of adjusted committed capital

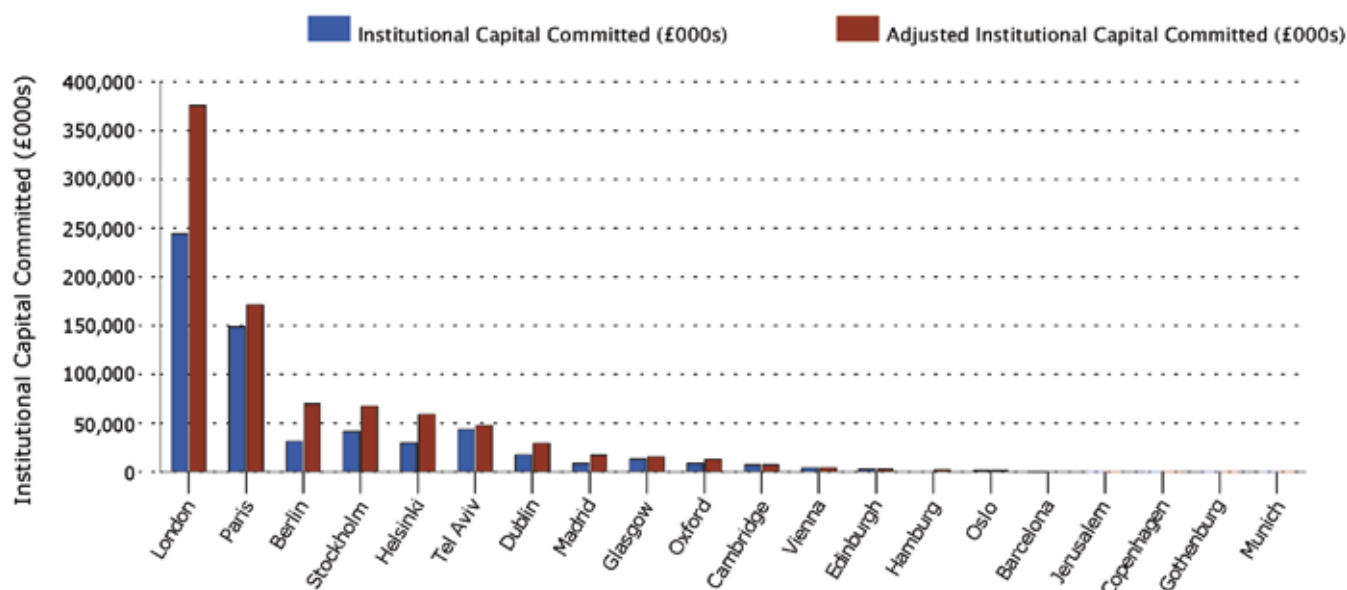


Figure 24 – The top 20 Web clusters in Europe by the total amount of adjusted committed capital

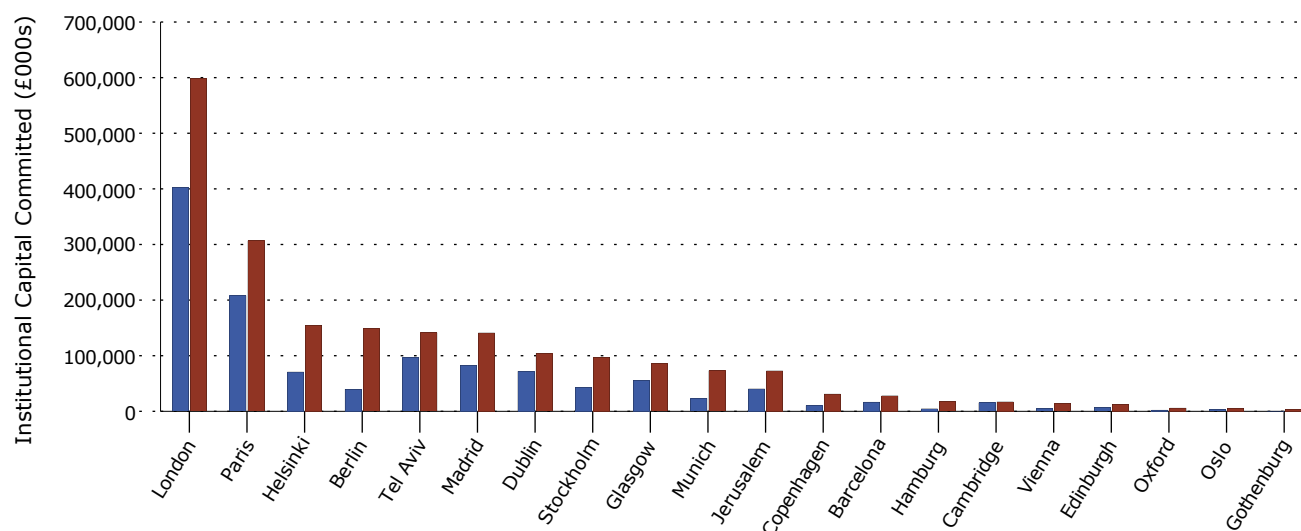


Figure 25 – The top 20 Mediatech clusters in Europe by the total amount of adjusted committed capital

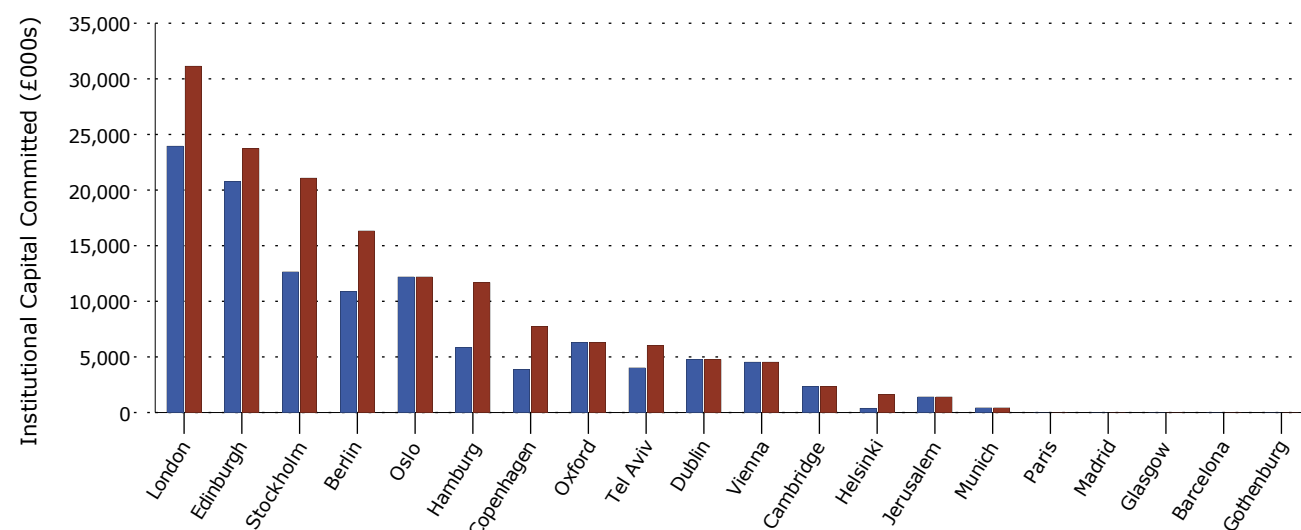


Figure 26 – The top 20 Clean Energy (exc. energy efficiency) clusters in Europe by the total amount of adjusted committed capital

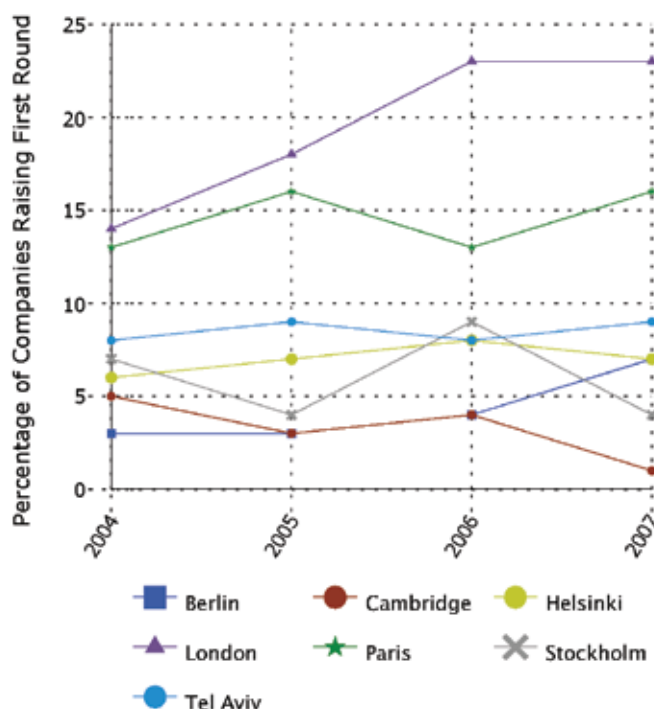


Figure 27 – The proportion of companies within selected European clusters receiving their first institutional funding round

To examine whether this is the case, the percentage of all deals in the emergent Web and Mediatech sectors was determined for each of Europe's top twenty clusters between 2004 and 2007.

As shown in Figure 19, Europe's fastest growing and largest cluster, London, increased the proportion of its deals attributable to the Web sector from 5.9% in 2004 to 15.5% so far in 2007. Other clusters which have shown overall growth, such as Berlin, also show dramatic increases in the number of Web deals. In 2004 not a single venture deal in Berlin targeted the Web sector whereas so far in 2007, 20% of deals have been in this space.

In contrast, Cambridge has failed to take advantage of the emergence of the Web. Just 3.9% of Cambridge's venture deals in 2006 targeted the Web sector. In H1 2007, not a single Web deal was completed in the cluster.

A similar picture emerges in the Mediatech sector (Figure 20). London was early into the Mediatech space: in 2004, 27.5% of the deals in London were in the Mediatech sector. Since 2005, the share of London's deals classified as Mediatech has risen from 19.7% to 34% so far in 2007. Over the same period, the proportion of Cambridge's deals which are Mediatech has actually dropped from 12.1% to 8%.

This data demonstrates that, through its weakness in emerging investment areas such as Web and Mediatech, Cambridge has missed out on the growth experienced by some of Europe's other innovation clusters.

To look in more detail at the strengths and weaknesses of European innovation clusters, the total institutional capital committed to specific sectors in each major cluster was determined (corrected for deal disclosure rates as previously). Figures 21, 22, 23, 24, 25 and 26 show this data for the Healthcare & Life Sciences, IT, IT Hardware, Web, Mediatech and Cleantech sectors.

It is clear that Cambridge is a hugely important cluster for life science companies. The cluster is the third most significant in Europe in this sector behind only Paris and Copenhagen. In the IT sector, it is the seventh most important cluster behind London, Paris, the two Israeli clusters of Tel Aviv and Jerusalem, Stockholm and Dublin. However, looking just at IT Hardware it is clear that the cluster has maintained its dominance of this sub-sector. Cambridge is the most important cluster for IT Hardware in Europe outside of Israel.

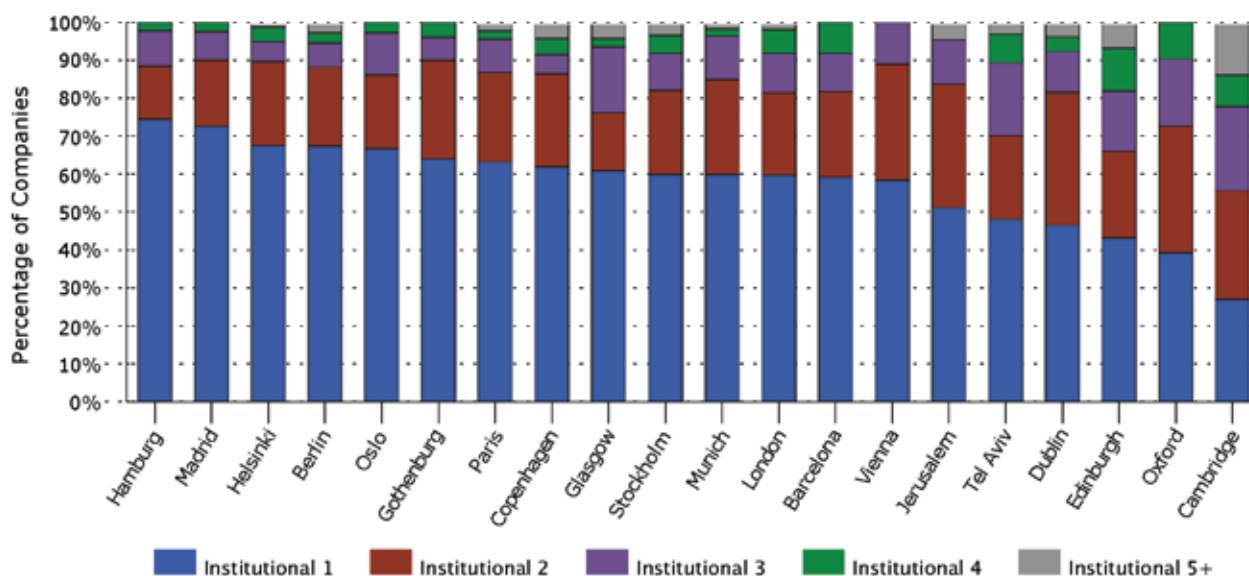


Figure 28 – Companies in the top 20 clusters in Europe by funding stage

Clean energy

As would be expected from the above discussion, the performance of the Cambridge Cluster in the Web and Mediatech clusters is poor. Very little investment in these sectors has reached Cambridge.

An additional concern for the future of the cluster is its performance in the other emerging sector of the moment, Clean Energy. Excluding energy efficiency companies, only just over £2m is currently committed to Cambridge based venture backed companies in this sector compared to over £23m in London and £20m in Edinburgh. The Clean Energy sector is largely based on hard technology innovation, unlike Web or Mediatech, and so the absence of this activity in Cambridge is a surprise.

The future of the Cambridge Cluster

The preceding analysis suggests a somewhat bleak picture for the Cambridge Cluster. Overall, the cluster is losing ground to its competitors, particularly London. At a sectoral level, the cluster is strong in stagnating areas such as life science but weak in emerging areas like Web, Mediatech and Clean Energy.

A key metric to determine the likely future health of a cluster is the quantity of seed and series A financing rounds taking place. As shown in Figure 27, the proportion of companies in Europe's top clusters receiving their first institutional funding round that are located in Cambridge declined from 5% in 2005 to less than 1% so far in 2007. In support of the view that Cambridge is lacking in early stage opportunities for investors, the cluster has the lowest proportion of companies having raised only one round of institutional funding of any major cluster (Figure 28). Just 27% of Cambridge companies have raised only one round of funding compared to almost 60% in London and 67% in Berlin and Helsinki. This data suggests a lack of emerging companies in the Cambridge Cluster - though this is countered by comments from investors and entrepreneurs, covered in the "Access to finance, markets, and Infrastructure" section.

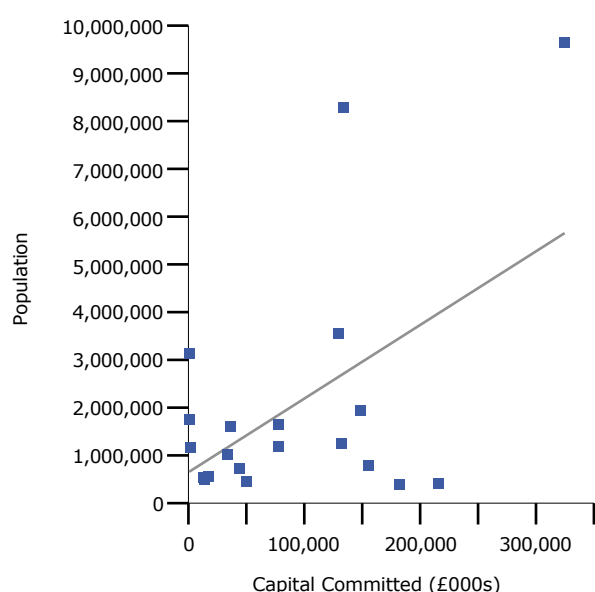


Figure 30 – The relationship between population and total capital committed into the Healthcare & Life Sciences sector

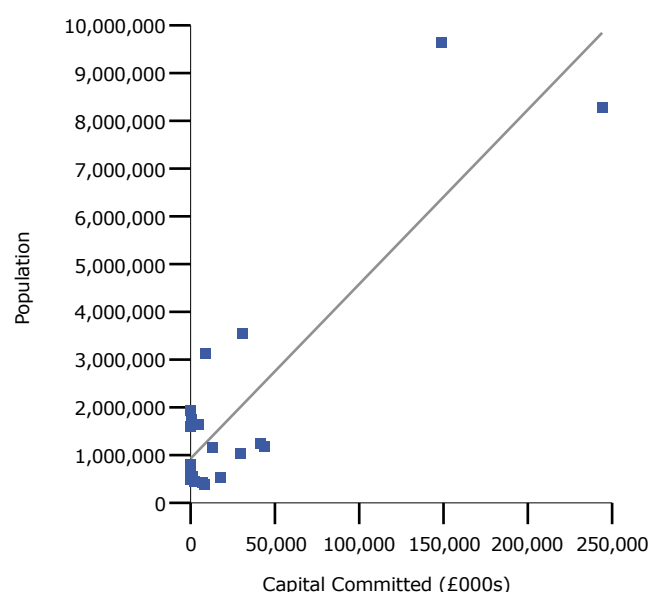


Figure 29 – The relationship between population and total capital committed into the Web sector

The cluster faces two distinct problems. In the first place it has failed to latch on to new investment trends. In the second, the maturity of the current portfolio of companies suggests that the pipeline of new companies is thin. The next sections will discuss the possible ramifications of these two problems.

Missing out on the Web and Mediatech: does it matter?

Crucial to this issue is the distinction, already made, between hard and soft innovation. Hard innovation based companies are those whose business model depends on the development of fundamentally new technologies. Soft or non-technology based firms instead rely on using technology to deliver innovative

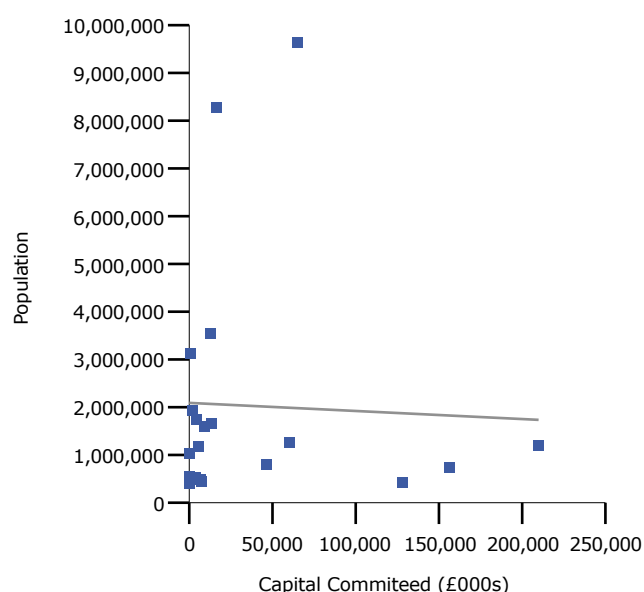


Figure 31 – The relationship between population and total capital committed into the IT Hardware sector

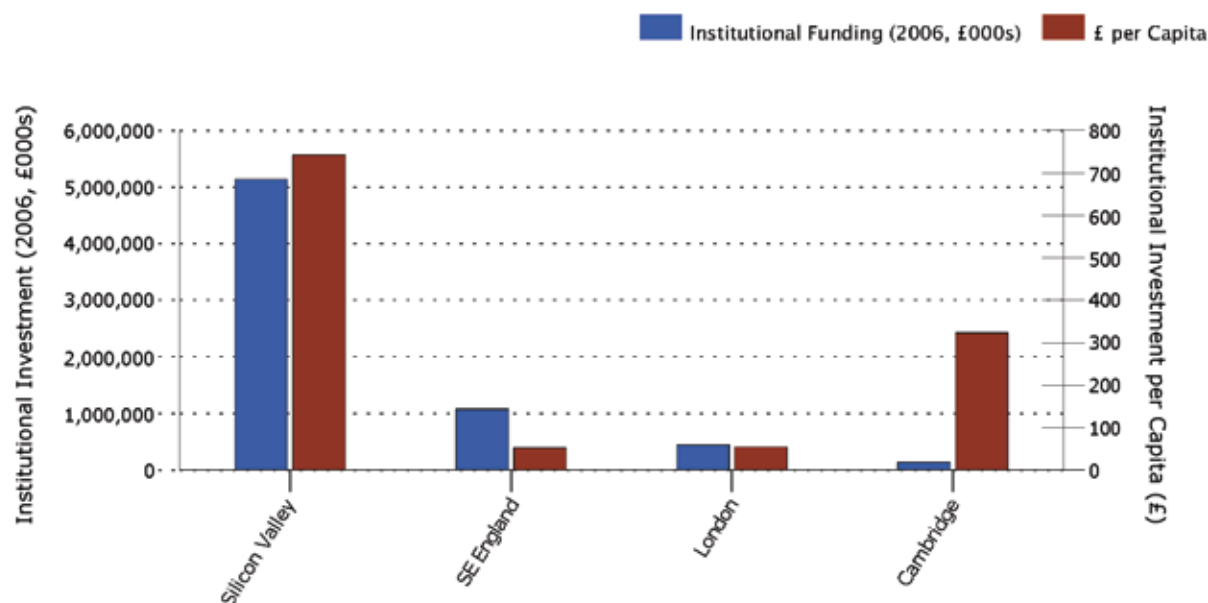


Figure 32 – Comparison of Silicon Valley, London, Cambridge and the South East of England by institutional investment in 2006

products or services. It is likely to be the case that clusters of the former have very different strengths from clusters of the latter.

Hard technology innovation relies almost totally on a flow of world class intellectual property. This is likely to be derived from a world class university, research institutes or corporate R&D centres. In contrast, softer innovations such as those based on offering products or services over the Web are likely to be less dependent on academic research and more dependent on a large pool of potential entrepreneurs – i.e. a large, generally well-educated population.

In support of this view, it is clear that the relationship between the amount of capital committed to Web companies and the size of a cluster's population is strong, with a coefficient of determination, R^2 , of 0.76, whereas the same relationships for capital committed to the life science and IT Hardware sectors are weak at 0.28 and -0.001 respectively (Figures 29, 30 and 31). This strongly suggests that soft innovation is dependent mainly on the size of population, whereas hard innovation relies on world class knowledge generation.

Given this, the failure of Cambridge to harness the growth in the Web and new media industries is likely the result of the fundamental natures of these new sectors rather than a specific defect in the development of the Cambridge Cluster. London, simply because of its vast size, is far more likely to be a leader in soft innovation. This issue is further discussed in the "Is Cambridge missing the boat on Web and Mediatech?" case study at the end of this section.

These issues reinforce the importance of critical mass for innovation. Although a relatively small cluster such as Cambridge can survive and prosper based on a world class knowledge base, achieving the scale of a major global cluster, such as Silicon Valley, requires much more than this. It requires, in particular, a scale in terms of population and associated infrastructure that allows soft as well as hard innovation to grow. Given the potential for the cross pollination of ideas between hard and soft innovators this may be a major weakness for the smaller hard technology clusters, the most famous example of which is Cambridge.

This is why, further to the main thrust of last year's report, we again stress the importance of linking Cambridge, London, Reading and Oxford into a 'supercluster' area including most of South East England. On its own, Cambridge is thirty eight times smaller than Silicon Valley in terms of institutional investment received during 2006. London is around eleven times smaller. However, South East England as a whole is just under five times smaller – within an order of magnitude (Figure 32). South

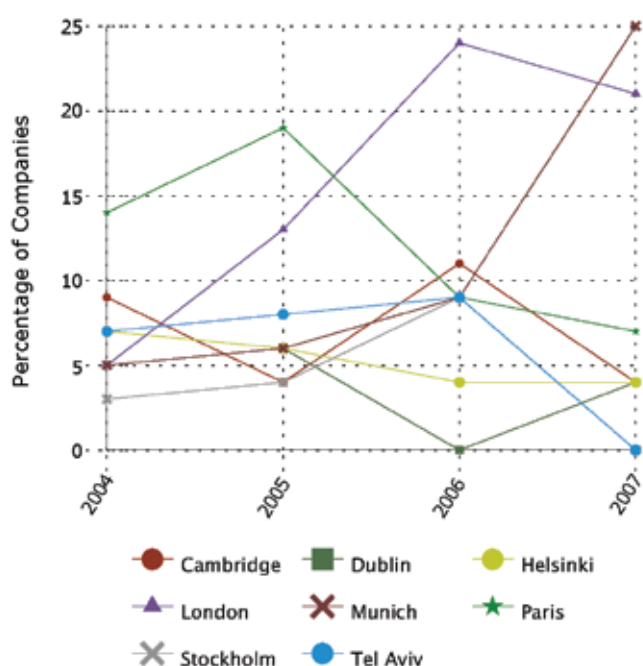


Figure 33 – The percentage of Healthcare & Life Sciences companies within selected European clusters receiving their first institutional funding round

East England as a whole, with soft innovation clusters such as London and hard technology hubs like Cambridge, may be able to achieve the spectrum of activity and scale seen in Silicon Valley.

The innovation pipeline

This work has shown that Cambridge is one of the most mature innovation clusters in Europe. On its own this is not a cause for concern. However, it has also been shown that the proportion of emerging venture backed companies being formed in Cambridge compared to other top clusters is declining.

A key reason for this is likely to be that other clusters have benefited from newly emergent Web and Mediatech companies, whereas Cambridge has not. But, does this fully account for the reduction observed in Cambridge's pipeline of emerging venture backed companies?

The data shown in Figure 33 and 34 suggests not. Even in 'hard' technology sectors like Information Technology and Healthcare & Life Sciences, the proportion of companies raising their first round that are located in Cambridge has dwindled since 2004. For example, in the Healthcare & Life Sciences sector, London now accounts for 21% of all first round deals compared to just 5% in 2004. As shown in Figure 33, Munich has grown even more dramatically. The equivalent percentages for Cambridge show a drop from 9% to 4% (although in 2006 the cluster took an 11% share of first round deals in the sector).

In both IT and Healthcare & Life Sciences, traditional strengths of Cambridge, other clusters have begun to overtake in terms of the number of emerging companies. Although part of this may be due to the fact that other regions of the UK and continental Europe have begun to catch up with Cambridge in terms of the sophistication of technology transfer mechanisms and public support for innovation, the decline has been in absolute as well as relative terms.

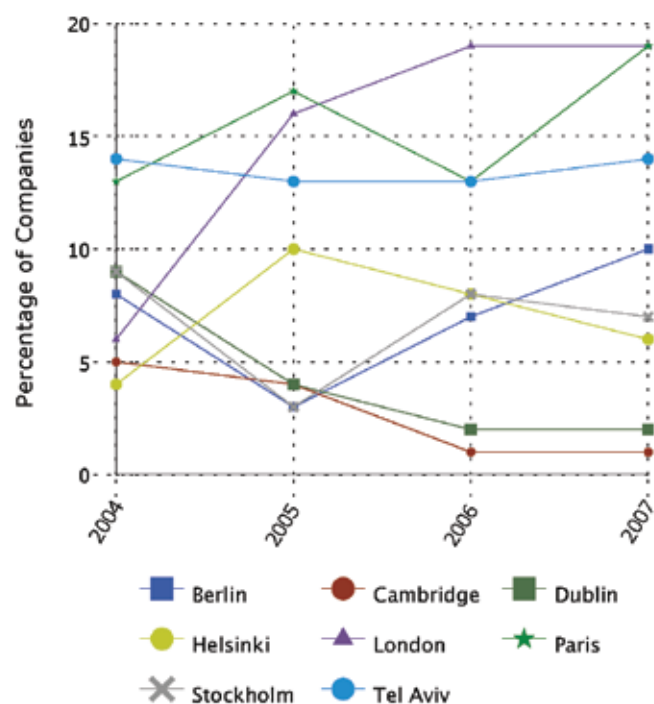


Figure 34 – The percentage of Information Technology companies within selected European clusters receiving their first institutional funding round

In the final chapter of this report, the reasons for the apparent weakening of the Cambridge Cluster's influence on the European stage are examined based on interviews with many of the Cambridge Cluster's key players.

Cluster perspectives: is Cambridge missing the boat on Web and Mediatech?

As the data presented in the preceding section shows, Cambridge is dominated by 'hard' innovation rather than 'soft' innovation. This is evidenced by the small percentage of deals classed as Web or Mediatech when compared with clusters such as Berlin and London. Our data also shows that for 'soft' sectors there is a strong relationship between capital invested and population. This puts small population centres such as Cambridge at a distinct disadvantage.

"While I think we would all wish to see Cambridge being stronger in the softer tech space, I think that the macroeconomics of the cluster are really not there to support it," says Max Bautin, managing partner of IQ Capital Partners. "Softer tech, like fashion, is to a great extent all about numbers really... it's about a big number of people trying it and many of them getting it wrong and a few of them getting it right. In Cambridge you simply don't have those numbers of people."

Another factor which favours populous areas is the presence of traditional Media industries. Mediatech companies frequently need to work with the music, television, film, and advertising industries – industries traditionally located in large metropolitan areas like London, Berlin, and Paris. For example, a start-up offering a digital music service will need content to host on that service. That content will have to come either from record labels or directly from musical artists, both of whom are located in big cities. Likewise, a start-up with a new advertising technology will need to partner with and find customers amongst advertising agencies, media buyers, and publishers, all of whom are centered in the largest cities.

Cambridge attracts only the very brightest minds – the top one-percent of the top one-percent, as Michael Ledzion, Executive Vice President of worldwide sales for Cambridge hardware company DisplayLink, puts it. But IQ Capital's Bautin says, "you don't necessarily need a good University degree to do a lot of this type of [soft] innovation." Cambridge is a small town compared with Europe's other major clusters and does not have the housing or infrastructure at present to support a larger population, as will be discussed at length in the section entitled, "Access to finance, markets and infrastructure". This means it attracts and retains only the best engineers and scientists, but lacks the rest of the personnel necessary to a company's growth. Laurence John, chief executive of Amadeus Capital Partners' Amadeus Mobile Seed Fund, says that while in Cambridge you can hire elite computer scientists, it can be tough for young companies to find enough software engineers.

Focus on users, not technology

This science-heavy approach permeates Cambridge's culture, leading to an overall cluster focus that values technology above the user experience. "I notice it in particular when I go to Cambridge Wireless events... companies in Cambridge are very interested in the communications technology," says Clennell Collingwood of TTP Ventures. "In contrast you go down to London and to the Mobile Monday events, and it's completely the opposite – absolutely as far away from technology as you can get and all

about the services." Collingwood is in an excellent position to compare the different approaches to usability taken by London and Cambridge. He and his firm are based in the Cambridge Cluster, but are investors in London consumer technology start-up ShoZu, which produces software that makes it easy for users to transfer photos and other media between their mobile phones and the Web.

An emphasis on usability is critical for tech start-ups today, in particular those that target consumers. The reason is that many consumer technologies have reached the point at which they are 'good enough' for most consumers. For example, in the late 1990s and early 2000s, chipmakers Intel and AMD were locked in a processor speed battle, and adverts focused on the number of MHz or GHz a processor could be measured at. Today, PCs and laptops are fast enough for the majority of users, so adverts instead focus on intangibles, suggesting to consumers that with an Intel or AMD processor you can better experience movies, music, games, video, etc.

Broadband has rendered the access technology behind the Web 'good enough' for many applications as well – so recent Web successes have been as focused on the consumer experience as on underlying technology. Cambridge is not, in general, adept at making technology friendly. The top one-percent of the top one-percent referenced by DisplayLink's Ledzion are not themselves representative of typical users. To create user-friendly technologies it helps to draw from the talent pool that big cities provide.

Cambridge's niche

There are, of course, exceptions. Cambridge has several homegrown Web or Mediatech successes, including mobile content enabler Bango and mobile search startup Taptu. Both place enormous emphasis on simplifying the complex technology which underlies their services: Taptu's aim is to create an intuitive mobile search service which is easy to use, despite the limited screen size and text-input capabilities of the mobile phone. Bango has become a leader in its space by simplifying the transactional complexity of mobile content purchases and making it easy for media companies to set up mobile web sites and from them, sell content.

Companies like Bango and Taptu highlight an opportunity for Cambridge to create companies that bridge the divide between 'hard' and 'soft' innovation. Connectors and enablers like Bango use complex software to make technology usable for 'softer' companies. "We should just accept there are things that are a little more sophisticated but still in the Web/Mediatech space which we are quite good at and will always be good at, and that's sort of the niche of Cambridge," says Max Bautin of IQ Capital Partners.

Access to finance, markets and infrastructure

Investing in Cambridge

Analysis in the 'Cambridge in Context' section of this report has shown that the Cambridge Cluster's share of European venture capital compared to the other top European clusters has been declining in recent years. This decline is partly due to Cambridge's inability to embrace the thriving 'soft' innovation explosion in other clusters of Europe covered in the previous case study, "Cluster perspectives: is Cambridge missing the boat on Web and Mediatech?". In addition, our data suggests that early stage investment opportunities across all sectors are also thinning in the cluster. This following section attempts to understand the current thinking about investment opportunities, from the principle investors in the community, to gain a broader perspective on our findings.

How is the pipeline of innovative companies in Cambridge looking?

It is well known that company acquisitions contribute to the vibrancy of a cluster. Amongst other things, they provide inspiration for fellow entrepreneurs and a stream of experienced, successful people, ready to start companies.

Andy Richards, a serial biotech entrepreneur and business angel, thinks that the biotech sector in Cambridge is currently extremely buoyant and has recovered well from the slump seen a few years ago. In some part this is due to the recent high profile biotech exits that the cluster has seen, for example, GlaxoSmithKline's acquisition of Domantis for £230m in Q4 2006. According to Richards, this large pool of experienced staff in Cambridge has created a life sciences sector that is abuzz with new ideas and meetings about how to create the next big thing.

Laurence John, Chief Executive of Amadeus Mobile Seed Fund, agrees and states that a similar trend can be observed in the IT sector following the acquisitions of Alphamosaic, Trigenix, and Ubinetix. He points to the example of Steve Ives, founder of Trigenix, who has now founded the Cambridge based mobile search company, Taptu.

Investors are generally very confident about the pipeline for new innovative companies and are very positive about the clusters future development.

How easy is it to find syndicate partners for deals into Cambridge based companies?

Some investors in Cambridge have commented that early stage syndicate partners have been hard to find for some deals because VCs in Europe are increasingly moving towards less risk, later stage deals. They appear less concerned about the apparent reduction in early stage investment opportunities and point to some of the research currently being completed at the university and the strength of repeat entrepreneurs in the area as good indications for the future.

Laurence John and Hermann Hauser, both from Amadeus Capital Partners, agreed that attracting syndicate investors depended heavily on how the very early stage investors presented the company. John said it was not usually that difficult to find syndicates as long as a lot of hard work had been completed developing the company's business strategy. Hauser provided the example of taking Xmos, a fabless semiconductor company that Amadeus have been involved in from an early stage, to the US to find syndicate partners for a larger Series B round. Initially US investors were sceptical but once the company was presented in the correct way, it was easy to attract investment partners and the £8m round was completed.

How has the professionalism of entrepreneurs in the cluster changed over the years?

Demonstrating the rise of serial entrepreneurs in the cluster, data from Amadeus Capital Partners, shows that serial entrepreneur led companies made up 17% of all deals in its Amadeus I fund, 40% in Amadeus II and 80% in Amadeus III. The rise of serial entrepreneurship in Cambridge has greatly contributed to the increased professionalism of entrepreneurs in the cluster and has facilitated an improved understanding of exactly how raising external finance can help early stage businesses. Hauser certainly supports this conclusion, saying that when he first started out in the UK, many entrepreneurs did not understand the concept of venture capital and were astonished that a venture capital firm wanted to own a share of their company. However, he agrees that today's entrepreneurs are a lot more professional and business savvy.

Who are the unsung heroes of the Cambridge Cluster?

The Cambridge Cluster contains a number of companies that have exited and are now having a significant economic impact on the cluster. However, many in the cluster believe these companies are not as widely recognised as some of their US competitors and should be championed more.

Cambridge Silicon Radio, the largest global Bluetooth chip supplier having shipped over 500 million Bluetooth units since founding in 1998, currently employs over 800 people and reported revenues of over £100m for the second quarter of this year. Before going public, the company had received funding from 3i, Amadeus Capital and Intel Capital amongst others.

Autonomy, the global leader in Meaning-Based Computing infrastructure software, reported revenues of over £40m for the third quarter of 2007. The company's software solutions are used by over 17,000 blue chip corporations and government agencies worldwide, including the US Department of Homeland Security, Ford, BAE Systems, Boeing and Citigroup.

ARM, a leading provider of embedded microprocessors generated revenues of £62.8m in the third quarter of 2007. Although the company is well known in the semiconductor sector, in the wider market it is less well known, especially when compared to US semiconductor giant Intel. Hermann Hauser commented that the company had sold over 7 billion processors, more shipped processors than people on the earth, and many more than Intel have shipped.

These iconic, global success stories have a profound impact and contribute to the cluster in a number of ways. On an immediate level, these companies contribute to the local area by attracting highly skilled employees from across the world and providing investment into the area. Additionally, these success stories inspire entrepreneurs to aim high and try to create companies of similar size and global importance. They also demonstrate to investors that investing in Cambridge can produce great returns.

Why has Cambridge seen so little cleantech investment, primarily a 'hard innovation' sector?

For such a prolific hard innovation cluster, Cambridge has had a surprisingly small amount of investment into cleantech companies. The one area of cleantech innovation where the cluster does seem to be attracting investment is in energy efficiency, particularly in the semiconductor space. This has been most recently evidenced by the £12.5m October 2007 investment into CamSemi, a fabless semiconductor company developing energy efficient integrated circuits that have the potential to reduce 'standby' energy consumption by 90%. The activity in this sector is unsurprising given Cambridge's long history of semiconductor excellence but it is of concern that many more 'obvious' cleantech companies do not appear to be operating in the cluster.

Angel investor Sherry Coutu notes that although Cambridge has largely missed the first cleantech wave, the second cleantech wave will be much more technology based, and the university will undoubtedly provide much of the research needed to develop these new technologies. It will be interesting to see whether, over the next few years, Cambridge does develop into an important cleantech cluster, based on research done at the university.

Impact of the University of Cambridge

The University of Cambridge is without doubt one of the world's best universities, placed second in the Shanghai Jiao Tong Ranking and the Times Higher World Ranking. In the national Research Assessment Exercise (RAE, www.rae.ac.uk) 48 of 51 submitting departments achieved the highest quality mark of 5 or 5* (international excellence).

The University has both a direct and indirect effect on the local Cambridge Cluster. Direct effects include technology transfer activities, such as corporate sponsored research, licensing, and spin-out company formation, as well as direct economic effects on the surrounding area. Indirect effects of the University on the Cambridge Cluster include the impact of the University's knowledge-base, the creation of alumni networks, and the generation of an entrepreneurial culture. In addition, the University of Cambridge and the Cambridge Cluster also forms an integral part of the UK economy.

Research and technology transfer activities

In terms of total research income, the University of Cambridge is the biggest UK university, acquiring a total of £270m in 2004/05. In 2004/05, it also generated £20.3m in revenues from industry,

an amount similar to the leading university in this field, Imperial College London, which generated industry revenues of £20.4m.

In terms of research output, Cambridge academics have transformed this income into nearly 34,000 publications between 2001 to 2006. In addition, each of these publications received on average 8 citations. Such an unprecedented output of research is an excellent source for knowledge and technology transfer activities. The University of Cambridge and its technology transfer office ("Cambridge Enterprise") have played a leading role in the commercialisation of this research base and Library House has identified that Cambridge University is among one of the top UK performing universities in terms of technology transfer activities, such as generating licensing income and forming collaborations with industry.

Moreover, Library House has also identified that the University of Cambridge leads the world in terms of forming spin-out companies from this technology base. In a report Library House published for the Gatsby Foundation that fed into Lord Sainsbury's Review of Government's Science and Innovation Policies, 'The Race to the Top', we indicated that spin-outs from the University of Cambridge attracted more pre-IPO investments between 2001 and 2006 than any other UK and US university in this study, except for Stanford University (Figure 35).

Regardless of the concerns that the University's technology transfer office tends to introduce complicated structures which can discourage some investors, these spin-outs have attracted significant amounts of external pre-IPO investment.

Through such technology transfer mechanisms the University has had a direct impact on the surrounding Cambridge Cluster by forming strong links with surrounding corporates, SMEs, and non-commercial organisations. An excellent example of the direct effects of the University on the surrounding cluster is Plastic Logic. Plastic Logic spun out of the University in 2000 and has since gone on to raise a total of over £77m in venture capital finance. The company, still located in Cambridge, now employs 85 people and has become an integral part of the Cluster.

Furthermore, according to Library House's report, 'The Impact of the University of Cambridge on the UK Economy and Society' (2006), the University also has a direct economic impact on the Cambridge Cluster employing more than 12,000 people and indirectly supporting around 80,000 jobs in the local region.

The university's knowledge-base

In terms of its capacity of graduates, on average the University of Cambridge turns out approximately 1,000 PhD students every year. Of these PhD students, the majority study a science or engineering-based discipline, suggesting that Cambridge has a very strong knowledge-base to support the region's high-tech businesses, and the capacity to generate new and innovation-based companies.

But how many of these students actually stay in the local Cambridge region after they have finished their PhD? According to a report by the Careers Research and Advisory Centre (CRAC), 'What do PhDs do? A regional analysis of first destinations for PhD graduates' (2004), apparently quite a few. The report indicates that of the PhD students who completed their degree

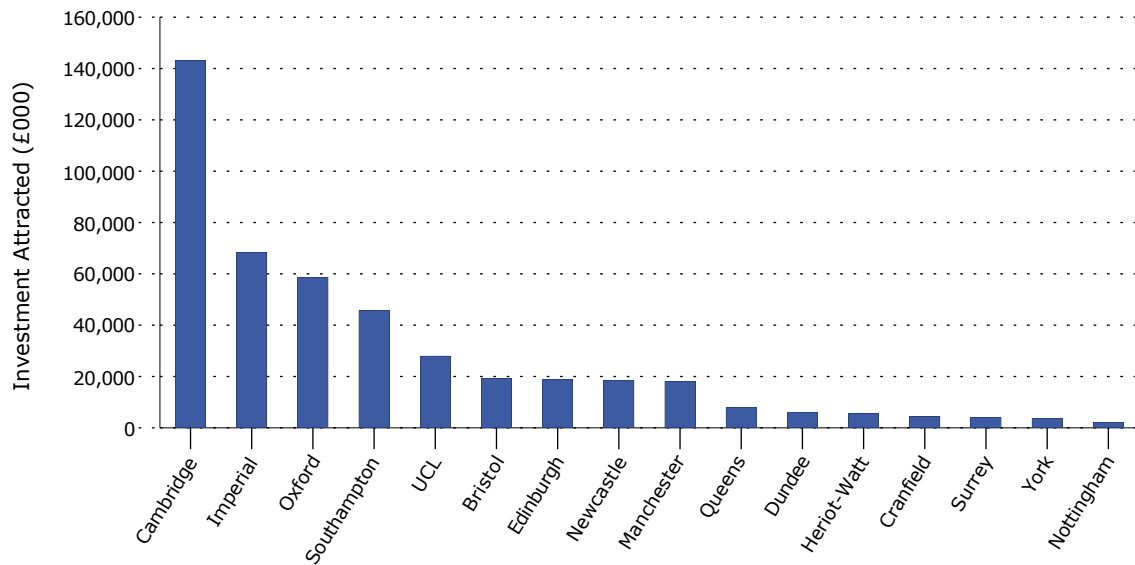


Figure 35 – Venture capital attracted by university spin-outs

in the East of England, 53% of them went on to stay in the local region. That's an extra 500 PhD students in the region every year. Moreover, in addition to these students, the East of England also attracts a further 12% of the UK's recently qualified PhDs. Therefore, every year the East of England probably attracts a total of almost 1500 recently qualified PhD students.

Although there are no specific figures on the number of PhD students that are retained by the Cambridge region, due to the dominance of the Cambridge Cluster in the East of England it is extremely likely that these students will be based in the immediate vicinity of Cambridge. According to figures from the University of Cambridge Careers Services and from CRAC, the greatest proportion of PhD students in the Cambridge and East of England end up being involved in scientific research and analysis (30%). The remainders are predominantly involved in teaching (17%) or in other professional or technical capacities (22%).

This large pool of PhD students is not just good news for local Cambridge businesses seeking highly qualified and skilled employees but it also has benefits for generating the companies of tomorrow. A large majority of university spin-out companies involve PhD students and the University of Cambridge is a world leader in enabling students to develop ideas into innovation-based companies.

Alumni networks

The University of Cambridge alumni networks are also having a clear, if less tangible effect on the surrounding Cambridge Cluster. During a discussion session with Library House, Jack Lang, a serial entrepreneur based in Cambridge, David Connell, a senior research associate at the Judge Business School, University of Cambridge and Tim Minshall, Centre of Technology Management, University of Cambridge, all stressed the importance of the "time delay" of returning Cambridge University students on the success of the Cambridge Cluster. In this instance, both undergraduates and graduates, who have gained experience in working for world class corporates and consultancies, such as McKinsey & Company, return back to the

Cambridge area and help its development by not only adding to the local skills pool but also by creating start-up companies in their own right. An example of a successful Cambridge alumni entrepreneur who regularly visits the Cambridge area is Karan Bilimoria, a Cambridge law graduate who founded Cobra beer. Furthermore, the majority of the investors in the Cambridge Angel networks are also Cambridge University alumni.

A key factor in enabling the process of successful university entrepreneurship and spin-out companies is observability. Observability is the degree to which potential entrepreneurs can visualise the paths of previous successful entrepreneurs, allowing them to follow similar routes. In such cases, successful alumni entrepreneurs make good role models and enable the university in forming spin-out companies. According to our interviewees, the University of Cambridge is extremely competent in this observability process.

Furthermore, alumni networks have also helped form links between Cambridge University and business. A good example of this is the creation of the Cambridge Computer Lab Ring, which was set up in 2002 by a Cambridge Computer Science and McKinsey alumni. The network is a not-for-profit organisation that allows ex-graduates to keep in touch, stay up-to-date on scientific breakthroughs as well as search for jobs. The network blurs the boundaries between the alumni, the Cambridge Computer Lab, and the companies with which the alumni work in, and is an excellent example of how the University of Cambridge interacts peripherally with the surrounding cluster.

As well as the alumni connections, there are other intangible relationships between the University and the surrounding area that have helped foster the development of the Cambridge Cluster. One such relationship, which according to Tim Minshall, is being championed by the University, is the pairing-up of university students with local start-up companies and innovation-based SMEs. The aim of this scheme is to encourage more students to become engaged in entrepreneurial activity. Such soft and fuzzy interactions between the University and the surrounding area help make the Cambridge Cluster so successful.

These interactions also allow the mobility of people between the University and local companies, generating relationships which in time can foster subsequent innovation and company development. However, it is the overall synergistic interactions between the networks, businesses, and the University that help facilitate the overall success of the Cambridge Cluster and help to form globally competitive organisations, such as Cambridge Silicon Radio.

Creating an entrepreneurial culture

The University of Cambridge stimulates students to become more entrepreneurially minded through teaching, workshops and the organisation of networking events and business plan competitions. It is through these activities that the University creates an indirect impact on the Cambridge Cluster.

There are currently around 16 different groups within the University supporting entrepreneurship and innovation, including three business plan competitions. One example is the Cambridge University Entrepreneurs (CUE), which organises the most successful student run business planning and creation competitions in Europe. CUE also organises a range of events for students including lecture series and pitching challenges. Essentially, it gives budding entrepreneurs at the University the chance to learn and practice business creation skills. Since its foundation in 1999, CUE has had over 450 entries and awarded over £320,000 in grants to 41 business ideas. Furthermore, these companies have gone on to raise a further £28m in funding and are currently valued at more than £42m, which is an indicator of the quality of companies that span out from the competition.

The more formal teaching in entrepreneurship is undertaken by the Centre for Entrepreneurial Learning (CfEL), launched in September 2003 as a programme of the Judge Business School with a mission to 'spread the spirit of enterprise'. CfEL delivers a range of educational activities designed to inspire ideas and build skills. It also provides numerous networking events, such as Enterprise Tuesday, that provide students and staff of the University not only the opportunity to listen to successful entrepreneurs and investors but also to network and share innovative ideas. It is at this central spot in Cambridge where many budding entrepreneurs are inspired to write a business plan and to start a business. According to Jack Lang, the system of teaching entrepreneurship at the Judge Business School is "good" and it is encouraging to see that over the last few years the focus of the Judge Business School's curriculum has shifted from subjects related only to the strategic management of large companies to training students to go and manage their own businesses. However, he also said that more can be done to change the culture and to stimulate the formation of teams that go on to start a venture.

Another important organisation that was set up in 1999 to stimulate entrepreneurship is The Cambridge-MIT Institute (CMI), which was established as a partnership between MIT and the University of Cambridge. The UK Government provided the CMI with £65m over five years with the objective to undertake joint education and research initiatives that will improve entrepreneurship, productivity and competitiveness in the UK. Now that CMI has moved beyond the grant giving phase it has formed the new CMI Partnership Programme to further build on the established excellent transatlantic partnerships.

The increased emphasis by the University to enhance partnership formation with external organisations is further underlined by the activities of the Cambridge Network. Cambridge Network was co-founded by the University in 1998 with the aim to facilitate networking and support interaction between the University, public research institutes and industry.

A more recent collaboration involving the University of Cambridge is i-Teams. i-Teams allows entrepreneurial post-graduate students to work with real inventions from several University departments to determine the best route for their commercialisation. The teams consist of up to seven students from different disciplines and are guided by the labs' Principal Investigators, the i-Teams Program Director (Amy Mokady) and mentors from the local business community.

Collectively, these fore-mentioned projects and programmes by the University have a long term effect on the Cambridge Cluster in terms of creating a healthy pipeline of budding entrepreneurs and facilitating the commercialisation of ideas coming out of the University.

Economic impact of the university and surrounding cluster on the UK

The University of Cambridge and the surrounding cluster also have a large impact on the UK economy as a whole. According to a recent report published by Library House, 'The Impact of the University of Cambridge on the UK Economy and Society' (2006), if the University of Cambridge and its cluster did not exist, the economic impact of the loss of the cluster to the UK over the next ten years would, even on a conservative basis, be dramatic:

- Conservatively – replacement of an NPV of £15.4bn in GDP and approximately 42,000 new jobs
- Realistically – replacement of an NPV of £53.1bn in GDP and approximately 143,000 new jobs

Infrastructure in the Cambridge region

The size of a cluster matters: data presented in the preceding section of this report, "Cambridge in Context", shows a strong link between a cluster's population and the amount of capital invested into up-and-coming 'soft innovation' sectors such as Web and Mediatech. Cambridge, with a population of just over 100,000, is not a large city. Attracting more talent to Cambridge is one potential route to ensure Cambridge's continued importance as a major European tech cluster. But enlarging the city would require increasing and improving Cambridge's infrastructure, from building new homes to improving road and rail connections.

House prices constraining growth

Michael Ledzion, Executive Vice President of worldwide sales for Cambridge-based DisplayLink, says that housing prices are the most pressing problem with Cambridge's infrastructure. DisplayLink recruits globally, bringing much of that talent to their Cambridge base, but Ledzion says steep home prices hurt his bottom line since he must pay for generous salaries and

relocation packages for new recruits. He explains that since the higher salaries go straight into higher mortgages, employees are not seeing the full benefit of their pay.

Investors are also concerned about the effect that home prices have on Cambridge's talent pool. Laurence John, Chief Executive of the Amadeus Mobile Seed Fund, says simply that Cambridge needs more housing. Clennell Collingwood of TTP Ventures is concerned that the housing that is being built near the station area in Cambridge will not only fail to ease housing prices but will have the opposite effect instead. "The way it's being advertised it's all about commuting to London," he says. "We've got high house prices in London that are reflecting themselves up here and will maintain current house prices in Cambridge."

Max Bautin, managing partner of IQ Capital Partners, suggests what is needed is more housing in the areas surrounding Cambridge rather than in the city centre. He says, "Cambridge needs to have more things like Cambourne around it, which are far enough from Cambridge where people are not using it to commute to London."

However, Cambridge's situation is not unique - high cost of living is an attribute shared by many other tech clusters around Europe and around the world. The Silicon Valley is one of the most expensive residential property markets in the United States. London is the second-most expensive city in the world to live in, according to this year's Cost of Living Survey, carried out annually by consulting firm Mercer.

Cambridge's housing shortage differs from those faced by other tech clusters, though, due to Cambridge's small size. IQ Capital's Bautin provides the hypothetical example of a post-doctoral student leaving Cambridge University and choosing between a job in Cambridge and a job in London. The former might pay £30,000, whereas in London the same qualifications could result in an annual salary of £45,000. Bautin suggests that while London is a more expensive city to live in than Cambridge, the greater range of job and housing options make it preferable for recent graduates. "You progress there quicker, and there are more places in London to choose from in terms of cost of living," he says. "You can live cheaply to start with and then progress, whereas in Cambridge you don't have that decision."

Attracting talent to the cluster

Both DisplayLink's Michael Ledzion and Amadeus's Laurence John temper their comments on the impact of housing prices by explaining that companies can and do attract top talent to Cambridge once they have the right market positioning and momentum - in other words, once they have a story to tell. As Ledzion puts it, "you can find all the talent you want if you have the right proposition."

John says that Cambridge companies should recognise what aspects of their business are best done in Cambridge, and increase connections with other clusters around the world to best take advantage of their respective strengths. Ledzion suggests that a company should operate in all geographies that have a major influence on their business. He provides his own company as an example. DisplayLink develops chips which make it possible to connect multiple PC monitors to PCs and laptops using USB 2.0 connections rather than VGA or DVI cables. In

addition to Cambridge, the firm has offices both in Taiwan, where the company's customers, such as display manufacturers and PC OEMs, are located; and in the Silicon Valley, where the company is close to the headquarters of companies in the wider PC ecosystem, such as Intel, Nvidia, and AMD.

When a company is first starting out, though, it can be challenging and even dangerous to attempt to operate multiple offices around the world. Ledzion says that a critical period in company-building occurs before the start-up reaches its fifth birthday or its hundredth employee. During that formative period, companies work best if the large majority of their employees and business functions are in the same office. When the company is split amongst several sites, there is too great a loss in productivity.

Similarly, Amadeus' John says that while he is in favour of start-ups tapping a global talent pool, he recognises the need firstly to develop the appropriate route to market for a company's technology. He says Cambridge could use more product marketers, who work closely with a company's engineers to bridge the gap between technology and market. Ledzion thinks Cambridge could attract more of that sort of commercially-oriented staff if the city was enlarged - a task he believes would require more housing and better transportation within the city.

Opinions mixed on Cambridge's infrastructure

Entrepreneurs, investors, and other influential members of the Cambridge Cluster interviewed for this report are split as to whether Cambridge's physical infrastructure was benefiting the cluster or hampering its development.

For example, interviewees were of two minds about the present state of Cambridge's train links to London. Peter Thomas, Co-Founder and Chief Product Officer of Cambridge-based Texperts, is adamant about the need for improved rail connections between Cambridge and London. Peter Hornby of St. John's Innovation Centre, on the other hand, offers up Cambridge's rail connections to London as one of its greatest infrastructural assets, alongside its proximity to Stansted Airport.

Serial biotech entrepreneur Andy Richards is enthusiastic about the new Eurostar terminus at London's St. Pancras station. One of Cambridge's two train lines into London terminates at King's Cross station, which is adjacent to St. Pancras, so the new Eurostar connection will shave at least thirty-five minutes off rail travel from Cambridge to continental European destinations such as Paris.

The new homes being built in the station area draw similarly mixed responses. Clennell Collingwood of TTP Ventures points out the window of Library House's Station Road offices and predicts, "Trains are going to get even worse with all the building out here." As mentioned previously, Collingwood further believes that the new homes, which are being marketed towards London commuters, will simply drive up Cambridge housing prices. Andy Richards, however, says that luring London workers to Cambridge may actually benefit Cambridge. That is because after a few years those commuters may tire of the commute and decide to apply their expertise at new ventures and existing businesses in Cambridge.

Richards also suggests that new homes in close proximity to the rail station will make it easier for families with one partner working in Cambridge and the other in London. The flexibility to work in either Cambridge or London reduces the risk of moving to Cambridge in the first place for a working couple. Reducing personal risk, in turn, helps foster new business creation. Richards says, “a cluster is a low-risk environment for an individual to take a high risk.” Two stabilising factors that can induce an entrepreneur to take a high risk and found or join a new start-up are whether their partner is steadily employed and whether they themselves can find a new job if their venture fails. The odds of a couple succeeding on both counts are increased by housing which gives them access to both the Cambridge and London job markets.

Beyond roads and houses

Rend Shakir, CEO of Cambridge Matrix, suggests that the Cambridge Cluster is hampered primarily by lack of broadband access, rather than by a lack of physical infrastructure. Rend’s interest in broadband is understandable, as her company has been selected by the City of Cambridge to deploy a WiFi network based on Cambridge Matrix’s MatrixWiFi mesh network technology. Andy Richards agrees with Rend’s assertion, however. He argues that if Cambridge has infrastructure limitations at all, they are matters of communications access rather than the classic constraints like lack of roads and houses.

Steady improvement required

Entrepreneurs like DisplayLink’s Michael Ledzion have been able to build successful companies in Cambridge, attracting talent from around the world to the region. Local businessmen including Andy Richards and Peter Hornby praise the region’s physical infrastructure, which enables close ties to London and to continental Europe. That entrepreneurs and investors have so many positive things to say about Cambridge indicates that the area needs no radical overhaul of its physical infrastructure.

Yet consistent complaints about Cambridge’s housing prices, overcrowded trains, and lack of broadband access suggest there are incremental ways in which the city might be improved. Most worrying is the impact that the short supply of homes is having on companies during their formative stages. Cambridge is not large enough to attract all of the product marketers and commercial personnel a start-up requires when developing a route to market for its innovation. If Cambridge were to grow in size, even modestly, it could well improve those companies’ chances of finding the talent they need within the area. At the least, it would reduce the cost of recruiting that talent to Cambridge from other regions – and that would be in the best interests of both investors and start-ups.

Cluster perspectives: Cambridge and the US

The Cambridge Cluster's significant business relationship with the US has benefited the cluster in a number of ways and has provided Cambridge with, amongst other things, commercial expertise, skilled workers and finance. Looking at the top VCs, in terms of syndicated amount invested ("The Cambridge Cluster" table 3b), it is clear that the top investors in Cambridge are predominately from the US.

In total, 25% of deals into the Cambridge Cluster in H1 2007 had at least one US investor involved, compared to 56% of deals into the Tel Aviv cluster. This data suggests that although Cambridge does have strong links to the US, it is still some way behind some of the other leading clusters in Europe. In recent years, there has been a general trend for US VCs to look outside the US for investment opportunities. Cambridge angel investor Sherry Coutu agrees that US VCs are trying to be more global in their outlook than they have been previously and states that this is why we have seen some of the cluster's most high profile deals, like Plastic Logic in the first quarter of this year, dominated by US VCs.

Going stateside

Many companies in the Cambridge Cluster have opened offices, divisions and even headquarters in the US. DisplayLink and Artimi are examples of Cambridge companies that have transferred their headquarters to the US.

In an interview with Richard Dellabarca, Chief Financial Officer and a co-founder of Artimi, the rationale for the company's switch of headquarters from Cambridge to the US was described. There were five primary reasons for the move.

Firstly the move allowed the company to establish links with US investors. Dellabarca stated that this was a very important reason as "some US VCs at that time had a mandate to only invest in US based companies".

As part of its exit strategy planning, in relation to trade sales, the company's and investors research before the move indicated that comparable fabless semiconductor companies M&A exit multiples were approximately twice that of their British counterparts.

In relation to public market exits, the public markets in the US, particularly the NASDAQ, provided at the time more educated investors and liquidity than the markets in Europe did for semiconductor companies. However, Dellabarca said that the perception of the US as the preferred public exit location for UK companies had now changed slightly due to the successful floats of CSR and Wolfson Microelectronics on the London Stock Exchange, and the additional regulatory issues associated with Sarbanes-Oxley Act (2002) in the US, although this latter issue has been ameliorated recently as the compliance requirements have been relaxed to a degree relative to when it was initially imposed.

Tax considerations also influenced the decision to set up US headquarters so early in the company's life cycle. In particular, an early move to the US provided less tax problems for the

company's early investors and angels should the company exit via the public markets in the US.

Lastly, another major reason for the move was access to the skilled semiconductor workforce in the US, particularly people with commercial expertise in the areas of Sales, Marketing, Business Development and Operations. In this regard, those skill sets preferred to be employed by a US entity rather than a UK entity.

Finally when asked if these primary reasons were still valid for such a move, he confirmed that this still appeared to be the case.

UK entrepreneurs need to think globally from the outset

A comment received from many early stage investors in the Cambridge Cluster is that there is a fundamental difference between UK and US entrepreneurs in that US entrepreneurs are a lot more ambitious in their plans. Sherry Coutu expressed her surprise to hear at a recent UK business conference, that the start-up companies presenting on stage were all declaring their intention to target the UK market. At similar conferences in the US, it can be guaranteed that almost every company would state their intention to target the global market.

The problem is not limited to entrepreneurs in the UK and Europe though, according to Coutu some investors in Europe do not know who to contact in the US to form syndicates for investment opportunities. It is claimed that this lack of global ambition from both European entrepreneurs and investors means that Europe ends up with companies worth a few hundreds of million pounds rather than a few billion pounds. Dellabarca, of Artimi, highlights the disparity between company perception in the US and Europe with the example of CSR, which is trading at about a 35% discount when compared with its US counterparts.

With latest figures showing that the European economy is now larger than the US economy, based on total GDP, UK entrepreneurs need to at least envisage targeting the whole European market, if not the global market, when forming new companies. Targeting the UK market in isolation means that entrepreneurs are running the risk of not developing UK companies to their full potential.

Future business relations with the US

Hope for the future is provided by Hermann Hauser who stated that he would not be surprised if average returns for the next 5-10 years were higher in Europe than the US for two main reasons. Firstly, the aforementioned increased professionalism of the whole VC scene in Europe has meant a greater understanding between entrepreneurs and VCs over what they both expect from a round of funding. Secondly, there is just enough money in Europe to put syndicates together for deals, whilst in the US there is so much money around, that as soon as a good deal comes along, the competitiveness of VCs drives valuations upwards and so it is harder to achieve good returns. This scramble for good deals in the US, also contributes to the trend of US investors looking to Europe for less competitive, quality deals.

Conclusion

In this report we have presented data that reaffirms Cambridge's standing as one of Europe's leading technology clusters. The area attracts the highest per-capita venture capital investment in Europe. Cambridge's traditional strengths in 'hard innovations' like semiconductors and biotech are assured: it is the leading IT Hardware cluster outside of Israel, and the third-most important area for Healthcare & Life Sciences investment. The University of Cambridge continues to provide a backbone of world-class research and talented personnel for the region's companies. Lastly, the employees of Cambridge success stories - from ARM to Cambridge Silicon Radio, Domantis to Cambridge Antibody Technologies - represent a pool of some of the world's brightest minds, from which new innovations will spring.

Yet this report has also highlighted several areas of concern for Cambridge's future. Firstly, the data indicates that the region is losing its share of European investment to rising clusters such as London and Berlin. This is particularly true in up-and-coming 'soft innovation' sectors such as Web and Mediatech. Even in 'hard innovation' sectors, Cambridge's pipeline of newly-formed and funded companies has slowed as the cluster has matured.

To conquer these challenges, Cambridge must reflect on and recognise its strengths, then reach out to build new and foster existing relationships with other tech clusters around the globe. The cluster has a remarkable track record of technological innovation. To succeed Cambridge needs not only the best engineers, but also the commercial talent to guide technologies to market.

Despite the increased professionalism that a new generation of serial entrepreneurs has brought to the cluster, Cambridge still needs to attract more entrepreneurs who can tell a compelling story to investors, to customers, and to the market. Cambridge is a small city with high housing prices, which hampers the cluster's ability to attract and retain these people. The cluster could benefit in this respect from modest growth, with correspondingly improved transportation and broadband infrastructure.

With a story in place, Cambridge companies should leverage the expertise found in other clusters worldwide, thinking globally from the outset. The cluster already has a close relationship with the United States, with one-quarter of all Cambridge deals in the first half of 2007 involving at least one US investor. But this could be further strengthened, with Tel Aviv as a model. During the same period, 56% of deals into that Israeli cluster involved a US VC. Since cross-border investment is driven largely by the individual relationships entrepreneurs and investors have with their global counterparts, Cambridge would benefit from forums which encourage such collaboration.

The cluster could also improve its already strong connections to London and the rest of South East England. While on its own Cambridge is 38 times smaller than the Silicon Valley, when considered together with the whole of South East England, the region would be closer to the Silicon Valley's scale, attracting one-fifth as much investment as the world's largest tech cluster. Combining the commercial and 'soft innovation' expertise of London with Cambridge's hard technology pedigree, the wider region has strengths in all aspects of technology innovation.

Cambridge has a long history of building world-class technology companies, and the issues facing the cluster today are surmountable. Cambridge must look inward to its strengths, and reach outward to partners worldwide, in order to ensure the cluster's continued importance in the global tech industry.

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Acknowledgements

We would like to thank everybody that contributed to this report, particularly **BDO Stoy Hayward** and **Pure Resourcing Solutions** for their sponsorship.

The following individuals participated in the breakfast roundtable briefings, supplied data and provided insight in one-on-one interviews for use in this report:

Max Bautin, Managing Partner, IQ Capital Partners
Adrian Calder, Cambridge Angels
Clennell Collingwood, TTP Ventures
David Connell, Senior Research Associate, Judge Business School, University of Cambridge
Sherry Coutu, Serial Entrepreneur
Richard Dellabarca, Co-founder and CFO, Artimi
Hermann Hauser, Co-founder, Amadeus Capital Partners
Peter Hornby, St. John's Innovation Centre
Laurence John, Chief Executive of the Amadeus Mobile Seed Fund
Jack Lang, Serial Entrepreneur
Michael Ledzion, Executive VP, Worldwide Sales, DisplayLink
John Mills, Chief Operating Officer, Plastic Logic
Tim Minshall, Centre for Technology Management, University of Cambridge
Andy Richards, Serial Entrepreneur
Thomas Roberts, Co-founder and Chief Product Officer, Texperts
Robert Sansom, Chairman, Cambridge Angels
Rend Shakir, Co-founder and CEO, Cambridge Matrix

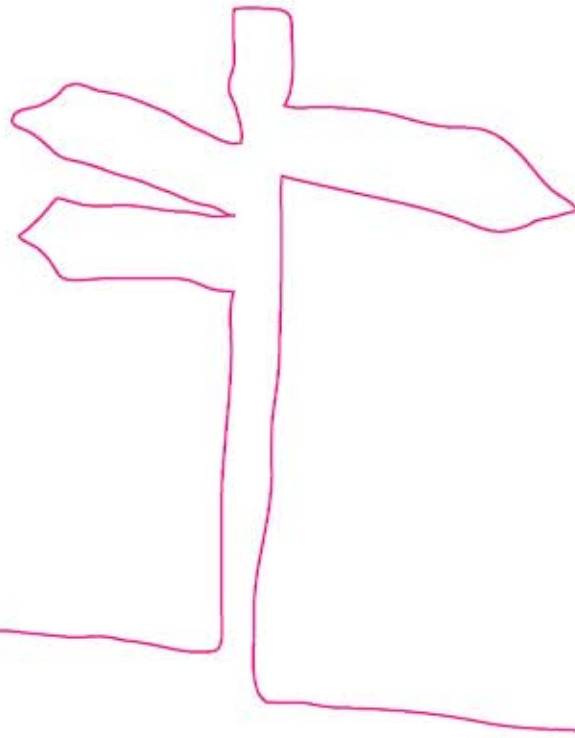
We would also like to thank the members of the Library House team who helped produce the report:

Charlene Gibbons, Marketing Manager
Along with the whole Library House data team

and finally...

The management of all the companies that provide Library House with the data contained within our reports, ensuring that they are both timely and correct.

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