



Cambridge: *From the Lab to the Limelight*

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Acknowledgements

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**CAMBRIDGE
ANGELS**

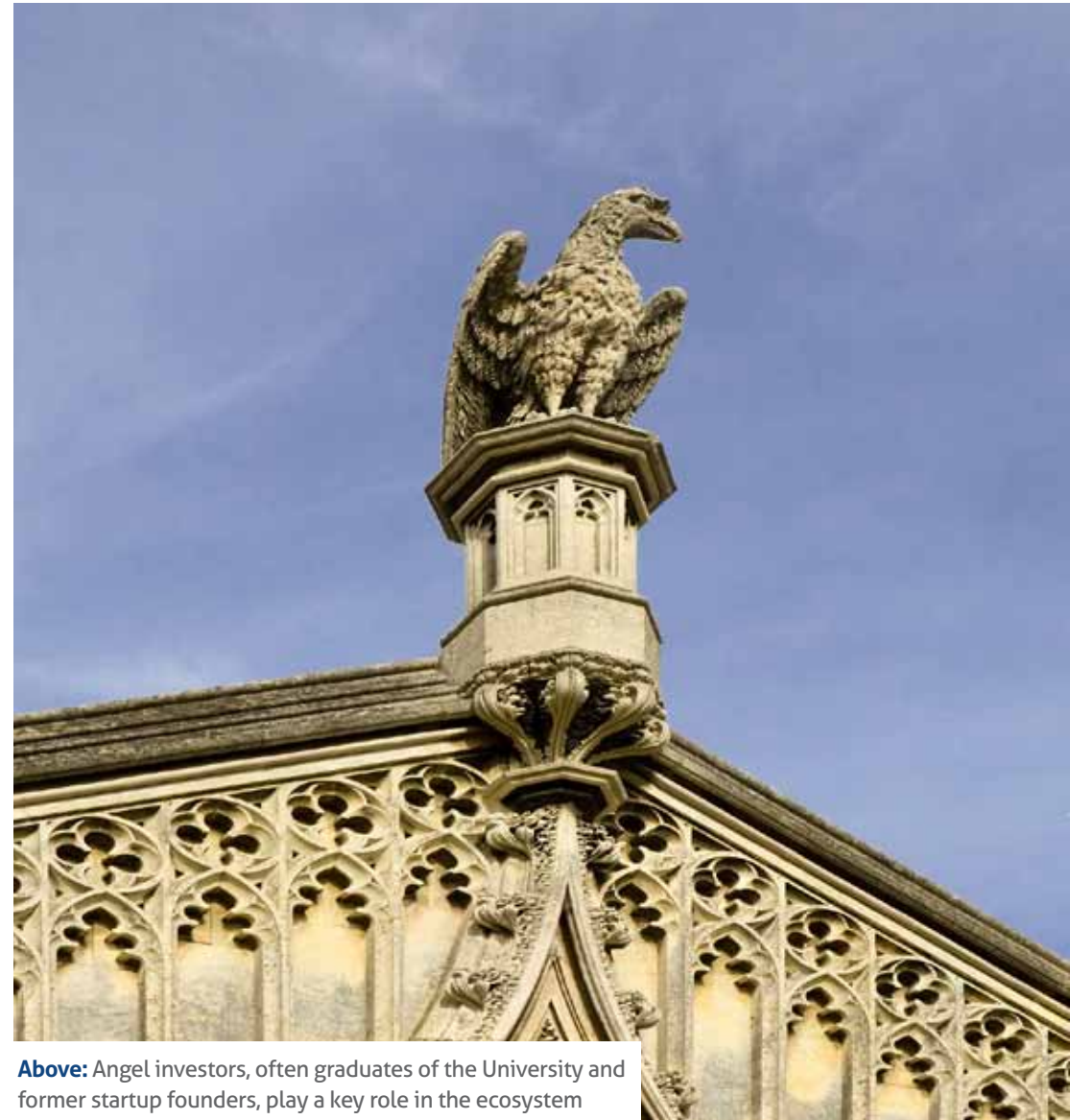
And:

Robert Brady, David Cleevely, Charles Cotton, Sherry Coutu, David Gammon, Randeep Grewal, Hermann Hauser, Jack Lang, Jonathan Milner, Andy Phillipps, Eddie Powell, Ian Pratt, Andy Richards, Mark Richer, Robert Sansom

Cambridge

SUMMARY

- Cambridge is home to one of the highest concentration of technology companies in the world
- Clean technology companies are leading the fourth major wave of commercial innovation after Radio, Computing and Biotechnology. Local companies are coming up with new commercial applications in New Energy for traditional expertise
- The diversity of specialised clusters makes Cambridge a unique technology entrepreneurial ecosystem – local companies include leaders in sectors as diverse as biotechnology, medical technology, gaming, audio, semiconductors, materials and printing
- The most recent startups blur the boundaries between sectors – there are tempting business opportunities for Cambridge to develop medical device companies exploiting local expertise in precision engineering and biotechnology
- Cambridge startups are becoming more ambitious to solve mass-market problems but the ratio of marketing, design and project-management to technical skill is still comparatively low
- Angel investors play a key role in the region and are becoming even more important



Above: Angel investors, often graduates of the University and former startup founders, play a key role in the ecosystem

Cambridge

INTRODUCTION

For 50 years, Cambridge has led Europe in the commercial application of scientific research. This specialism is rooted in centuries of academic excellence. But local companies need to keep iterating on their previously successful models to stay at the forefront of global competition. Cambridge companies must compete with others in clusters around the world, some with extensive state support (such as Silicon Valley) and others with plentiful supplies of cheap labour and favourable legislation for manufacturing (such as Shenzhen).

Cambridge benefits from a unique mix of characteristics that make it one of the world's most advanced technology clusters: a pool of superb academic talent, from around the world, with 7,000

graduate students at any one time¹, a compact network of institutions and associations that foster innovation and support entrepreneurship and some of Britain's most successful entrepreneurs turned angel investors who are keen to fuel the new generation of 'Made in Cambridge' successes, all within a 20-mile radius.

The greater region hosts 27,500 businesses, employing more than 700,000 people. Their contribution to the local economy is estimated to be worth over £12 billion². Previous studies³ showed that innovation and high-growth companies are the top contributors to employment and economic growth.

The model of ARM, one of Cambridge's star companies, is close to a stereotype for the region: ARM develops



Above: The University gathers talent from around the world into a small area

↳ advanced processor code ‘cores’ for microprocessor manufacturers elsewhere to slot into their production lines. Whilst keeping hardware costs down by producing only test rigs in labs for their code and stripping staff down to mostly specialists, ARM sells into B2B value chains around the world. Today, the company designs chip cores for most smartphones and tablets.

Similarly, software producer Autonomy has been a key role model to Cambridge’s software startups. Like ARM, Autonomy’s code slots into the systems of other companies. The software eases the flow of knowledge between humans and machines. Autonomy now has a market cap of £6 billion and was recently acquired by HP for £6.5 billion (see M&A Activity).

Both companies have planted seeds of innovation in the region. Spinouts Amantys, Blinkx and Aurasma are the

living proof of this.

After two successful waves of innovation in radio systems and computing software, Cambridge led again in the fields of life sciences and biotechnology, with admirable feats in genetics and stem cell research (see graphic on page 20). A large number of local companies have been capitalising

on that knowledge and developing commercial solutions in stem cell research and drug discovery, e.g. Bicycle

Therapeutics and Horizon Discovery.

Today the Cambridge entrepreneurial community is taking a new turn to stay ahead of the curve. Local companies are building upon the knowledge acquired after years of academic and industrial R&D and focusing increasingly on emerging sectors such as medical technology or clean technology, increasingly blurring the boundaries between sectors. It is

**BOTH ARM AND AUTONOMY
HAVE PLANTED SEEDS OF
INNOVATION IN THE REGION**



Above: The headquarters of CSR at Cambridge Business Park

not about shifting focus, but rather about coming up with new commercial applications for traditional areas of knowledge. An increasing number of companies innovate by crossing sectors and hybridising technologies. Founders are putting a stronger focus on marketing their

technologies and becoming more ambitious to solve problems with mass application.

This report dissects the reasons for Cambridge’s success and explains why it has all the ingredients for the growth companies that will lead the UK on the road to economic recovery. ■

State of Affairs

The number of high-technology firms in the Cambridge area has been growing steadily since the early days of the ‘phenomenon’ in the early ‘60s, when the pioneer consultancy firm Cambridge

Consultants began to apply Cambridge academics’ methods and knowledge to industrial problems.

There are now 1,500 technology firms in the city alone, employing around 40,000 people⁴. Even though the number of firms has declined since 2008 and the economic crisis, the number of jobs being created hasn’t suffered as much.

The tendency has been to consolidate.

With the financial crisis and the slow economic recovery, some smaller firms didn’t survive and others were acquired by bigger competitors; so as the number of companies decreased, the average company size increased.

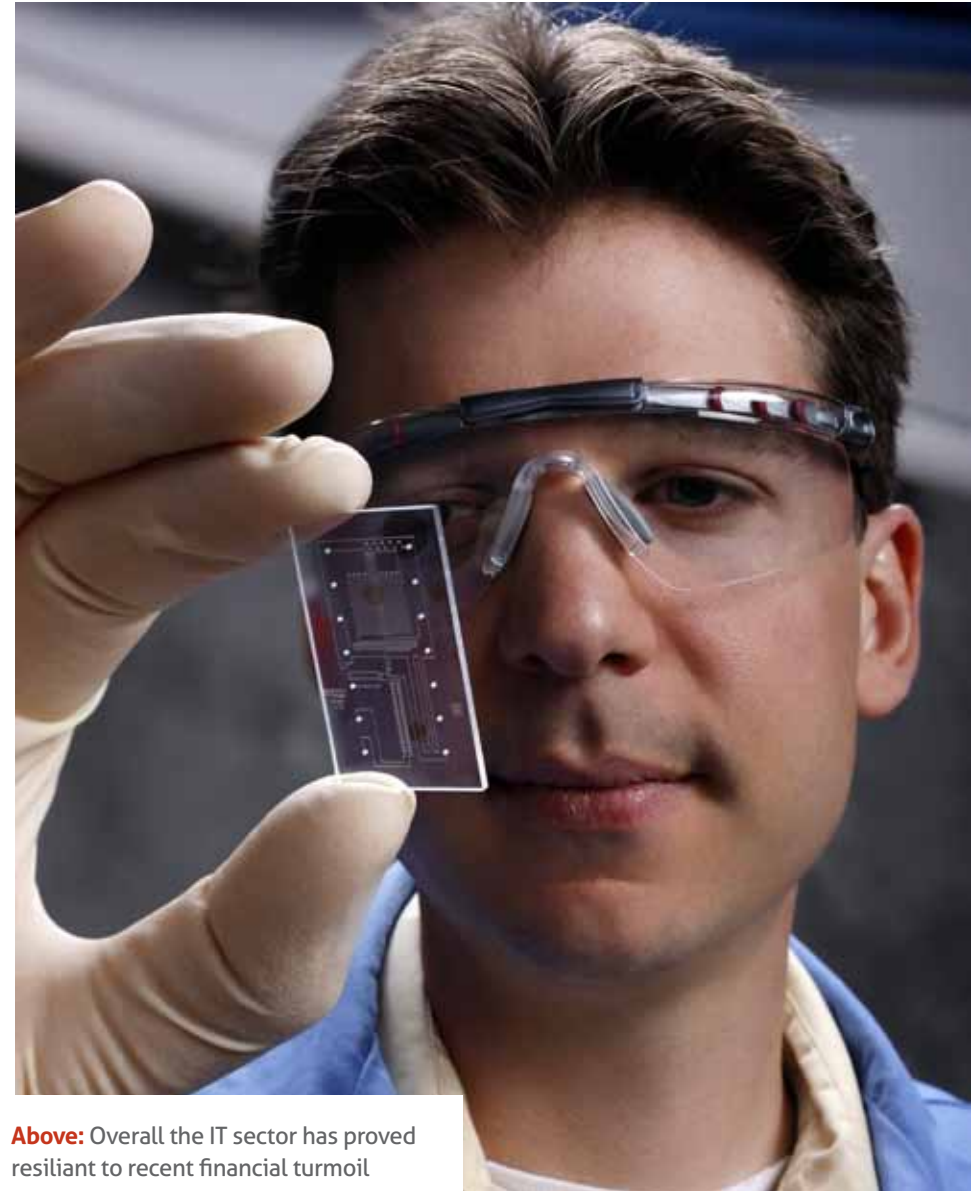
The high-technology sector – particularly the IT software, biotechnology and R&D sub-sectors – showed impressive resilience during the economic downturn⁵. Employment in more

specific areas such as opto-electronics and environmental technologies actually increased – hinting at very promising business opportunities in the near future.

Economically speaking, the region



THE FINANCIAL CRISIS SAW CONSOLIDATION AS SMALLER FIRMS STRUGGLED TO SURVIVE



Above: Overall the IT sector has proved resilient to recent financial turmoil

in general performed well. House prices rose strongly throughout 2010, unemployment is at 2.1%⁶ (way below the national average of 7.9%) and employment in the R&D sector is 18 times the national average⁷.

Designed, but not Made in Cambridge

With so many high-technology firms concentrated in such a small area, why can't most people name even a handful of successful Cambridge companies? The main reason is that these companies tend to sell to other businesses. They develop state-of-the-art technologies and components that fit into other technology companies' supply chains, so visibility is low while impact and value is high. This is true of

ARM and Autonomy and other major Cambridge companies such as Domino, a leader in inkjet printing, or CSR, a leader in wireless technologies. Each represent a sub-sector in which Cambridge has been outstandingly successful.

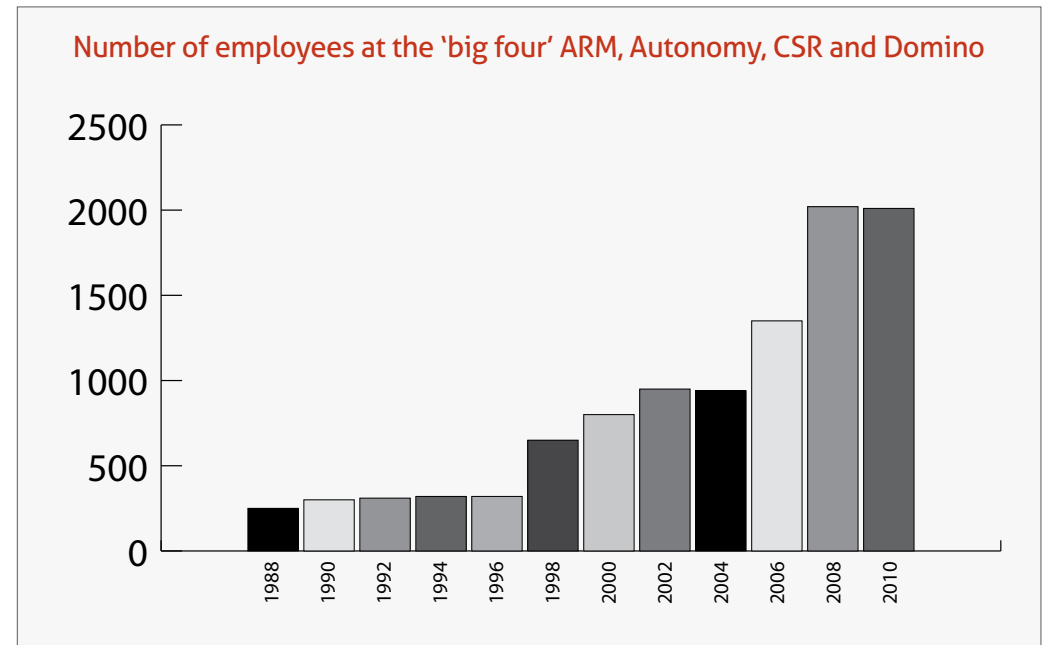
The Cambridge cluster is not really one but many different clusters. There are top-tier companies in radio and wireless systems, consultancy, semiconductors, innovative materials, printing, sensors, audio and gaming. These sectors used to be quite isolated but they are now sharing their knowledge and founders are more willing to talk to each other, which translates into innovative solutions like that of Arachnys (see Startups to Look Out For) which blends human consultancy with software text analysis.

CAMBRIDGE STARTUPS ARE BEGINNING TO DRAW ON MULTIPLE AREAS OF EXPERTISE

The role models

The typical Cambridge technology company is still quite small, with an average of 29 employees per company⁸. 24% of local firms have between 10 and 50 employees and 23% have between 200 and 500. These

numbers are skewed by the companies known as the 'Big 4' – ARM, Autonomy, CSR and Domino. Together with antibodies company Abcam, they employ almost 2,500 people in the region, twice as many as they did in 2004 (see below).





Below: Cambridge technology consultancies support innovation and tech commercialisation for companies all over the world

➤ Other major employers in the region are the local technology consultancies. Companies such as Cambridge Consultants, PA Technology (now PA Consulting), TTP and Sagentia together employ around 2,000. They deal with a wide range of technology sectors – medical, industrial, communications and consumer products – which also explains why they are a fertile ground for cross-sector innovation. Entrepreneur and investor Hermann Hauser says these consultancies ‘are doing better than they have ever done’ as corporations realise they need to innovate more to maintain growth and employ consultancies to help them.

The consultancies have been important incubators of new technology companies. Cambridge Consultants recently spun out Aveillant, a radar technology company for the aviation industry that reduces wind turbine interference on air controllers’ radar screens. Cognovo – a startup



developing wireless modem technology – was founded by former TTPCom and ARM executives⁹. Sagentia no longer

invests in spinouts but in the past spawned CMR – a mini fuel-cell producer now listed on AIM, Sphere Medical Holdings – a

Medical products developer, Intrasonics – which allows interactivity in mobile TV and TurfTrax – a horse-racing and betting data aggregator also now listed on AIM.

The movers and shakers of Cambridge

The growth of the Cambridge cluster is not only due to this bedrock of exceptional companies. Its evolution from an academic centre of excellence to a technology hub happened thanks to a group of key figures who have been the movers and shakers of the Cambridge startup industry, leaving a firm mark in

their fields of knowledge. Entrepreneurs like David Cleevely and Hermann Hauser shaped some of the first big companies

in Cambridge, but also catalysed entrepreneurship in the region. They co-founded the Cambridge Network, the first major organisation

linking local hi-tech companies and universities to boost their entrepreneurial activity. They are still major angel investors and board members on some of the most promising companies from the new generation, like CRFS or XMOS. In the same fashion, Canadian entrepreneur and angel investor Sherry Coutu has been putting Cambridge on the international technology scene. After founding Interactive Investor in Cambridgeshire, she has invested in many local companies such as AlertMe, and is one of the organisers of the Silicon Valley Comes to Cambridge event (SVC2C) that connects

A SMALL, CLOSE-KNIT GROUP OF INVESTORS AND MENTORS ARE REFERRED TO FREQUENTLY BY ENTREPRENEURS

THE CAMBRIDGE UNIVERSITY COMPUTER LAB HAS SPUN OUT MORE STARTUPS THAN ANY OTHER DEPARTMENT

Silicon Valley startups to their Cambridge peers.

Some academic personalities have also re-shaped the way the University views the applications of scientific knowledge to industry. The Cambridge hi-tech scene wouldn't be the same without visionaries like Lord Alec Broers. The Baron first came to Cambridge to study, returning years later to become a Professor at the University. As the University's Vice-Chancellor he was determined to develop closer ties to industry.

Some of his major achievements include the £12 million fund he received from Microsoft to invest in the University and the partnership with MIT. His openness to industry marked a sea change in the way the University sees commercialisation of its knowledge.

Professor Andy Hopper and Richard Friend have revolutionised

the University's Computer Lab and Physics department respectively. The Computer Lab has spun out more companies than any other department at the University (70 until last year). Richard Friend's work on organic polymers, light-emitting diodes (LEDs) and photovoltaic cells has led to 600 publications and 20 registered

commercial patents. He founded Plastic Logic and Cambridge Display Technology and inspired other new energy companies

like eight19 and Polysolar (see graphic on page 20). Many others have inspired their sectors. Serial entrepreneur Andy Richards has been one of the biggest drivers in the biotechnology sector, having exited seven companies. Professor Chris Lowe's work in biotechnology field is behind nine spinouts. ■

Cambridge's Strengths

What makes Cambridge such a good place to incubate and grow a technology company?

The University

The number one answer to this question is always the University of Cambridge.

Although many have seen the institution as an obstacle to entrepreneurship due to its traditional focus

on pure academic research and suspicion of commercialisation, the Cambridge Cluster exists because of the University and its academic community.

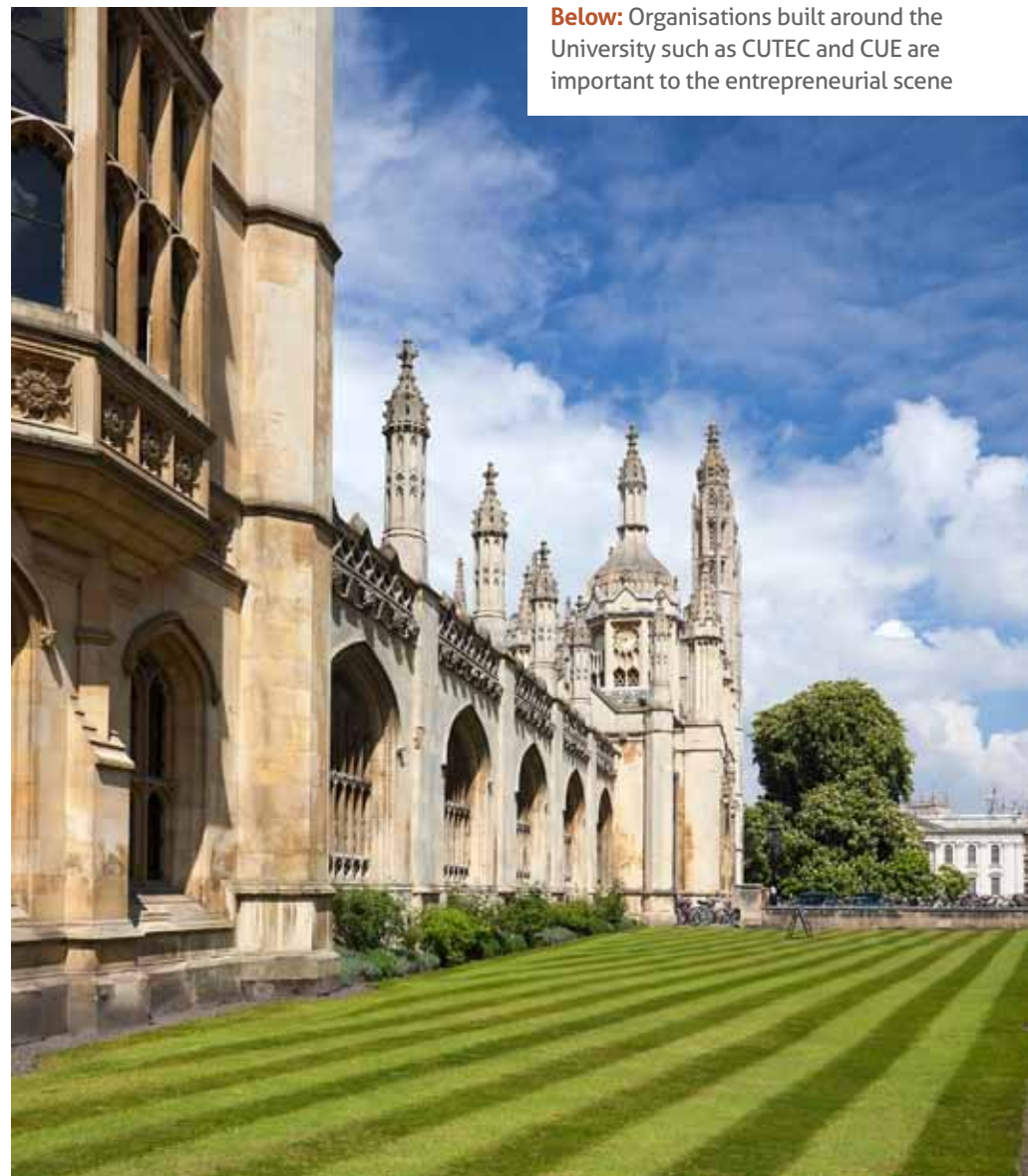
Cambridge University is one of the oldest academic institutions in the world and one of the most prestigious. It attracts more than 20,000 students from all over the world every year, from which around 7,000 are post-graduate. These, with the

ALTHOUGH KNOWN ESPECIALLY FOR EXCELLENCE IN TECHNICAL FIELDS, CAMBRIDGE ACADEMICS EXCEL ACROSS MANY SECTORS

9,000 academic staff make up an unusual concentration of talent¹⁰. 88 Cambridge Nobel Prizes are proof of that. The University's affiliates have won more prizes than those from any other Institution¹¹. The fact that the University has laureates in every Nobel category shows that it excels in many areas, which is reflected



Below: Organisations built around the University such as CUTEC and CUE are important to the entrepreneurial scene





Below: A clean environment research room at Cambridge University's Cavendish Laboratory

in the diverse local startup scene. It is also notable that many of the key figures in the local hi-tech scene are foreigners who came to Cambridge to study and ended up staying to play a key role the local startup scene.

Cambridge University's reputation for

'pure' academic research has been a blessing and a curse in the modern world. Both Oxford and Cambridge have lagged far behind their US peers (notably Stanford) in terms of urging their students to think about commercial applications for research. One symptom of this is that undergraduates

at most colleges are still strongly discouraged from making money on the side during their studies and encouraged to rely on the many college grants.

The University has often been criticised for not doing enough to make it easy to take knowledge from lab to market. But this is changing thanks to a new attitude from university bodies such as Cambridge Enterprise, the University's commercialisation

office that helps academics transfer technology to the market through product development and IP licensing.

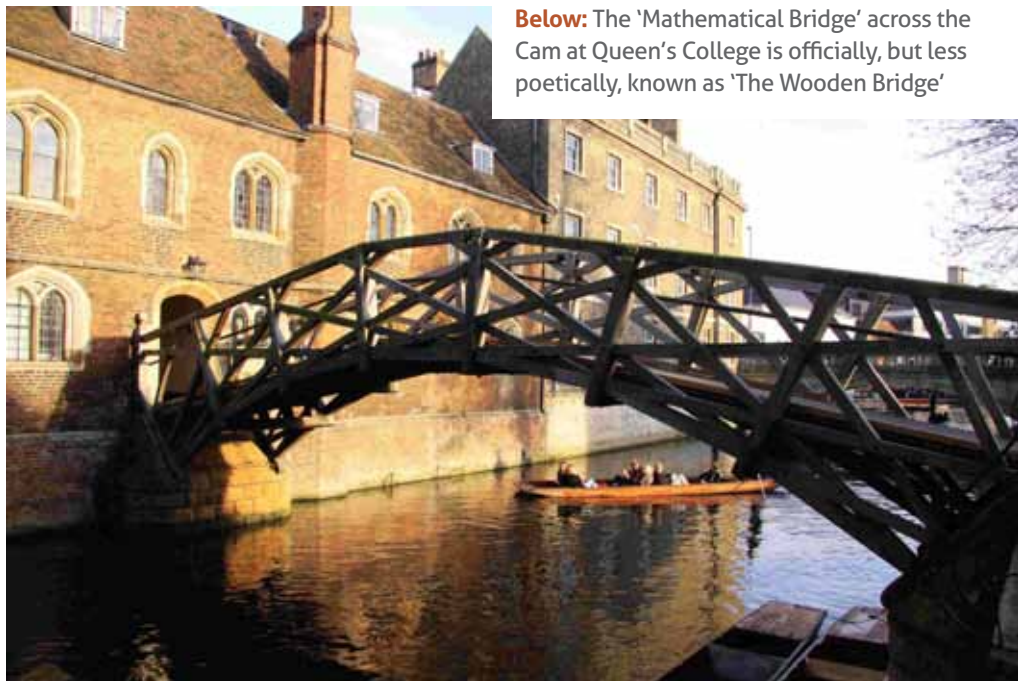
The other local University - Anglia Ruskin - might not have Cambridge University's reputation, but it is doing its fair share when it comes to fostering entrepreneurship. Professor Lester Lloyd-Reason agrees with the common criticism that local academics lack business acumen. Lloyd-Reason is the driving

force behind CEDAR - the Ruskin Centre for Enterprise Development and Research. The Centre teaches two MAs in Entrepreneurship, where students can 'blend theory and practice' by studying while being supported by experienced mentors from the commercial world.

Other key players in the process of connecting academia and industry are CUE and CUTEC. The two academic entrepreneurs

associations play a decisive role in fostering entrepreneurship at the University. They run conferences and pitching events, consult with startups that need advice and connect entrepreneurs with investors and mentors in the region. CUTEC's Technology Venture Conference is already a keystone event for the local community. The last meeting gathered more than 300 people from industry and the startup community.

**AT ANGLIA RUSKIN UNIVERSITY
PROFESSOR LLOYD-REASON
HAS CONNECTED ACADEMICS
AND INDUSTRY**



Below: The 'Mathematical Bridge' across the Cam at Queen's College is officially, but less poetically, known as 'The Wooden Bridge'

entrepreneurs or potential investors. People in the industry bump into each other at social events, pitching competition and conferences. Entrepreneur David Clevely says this 'culture of networking [in the region] goes back decades.' There are more than 50 professional networks, so entrepreneurs who need advice in specific sectors can find an organisation that is able to provide support. Cambridge Wireless or the recently created Cambridge CleanTech network are good examples of this.

THERE ARE MORE THAN 50 PROFESSIONAL NETWORKS FOR COMPANIES FROM A VARIETY OF SECTORS

Those Mentors

Edward Benthall, partner at Charterhouse Capital Partners, highlights the 'unusual concentration of serial entrepreneurs' that one can find in Cambridge. Because the 'Cambridge Phenomenon' (Cambridge's first commercial boom) dates from the early sixties, there is a whole generation of entrepreneurs who have founded and exited successful businesses and have become angel investors and mentors. Hermann

Hauser highlights how this knowledge is crucial to the local scene. Ten years ago, 17% of the companies in his Amadeus Capital portfolio were led by serial entrepreneurs. Today the number has risen to 70%.

Hermann Hauser himself is one of the best examples. He was involved in spinning out ARM from Acorn (and instrumental in setting up the Hauser forum Entrepreneurship Centre – see



Due to its academic and commercial research heritage, the city has a high number of specialised service providers that can offer swift and cheap advice. The range of specialised lawyers or accountants in sectors such as IT or lifesciences 'really helps Cambridge SMEs grow,' says Jeff Solomon, non-executive advisor for BioscienceNEDs.

to 'its mix of high incomes, life expectancy, good health, high educational standards.' The city is very compact and despite some congestion problems in the centre is easy to move around. It is also easy to get to London, with trains every 30 minutes which take only 50 minutes to get to King's Cross. The 'cosiness' of the city makes it a great place to network with likeminded

The Region

'Who wouldn't like to live in Cambridge?' – asked one entrepreneur we interviewed. The scenic landscape, the top league high schools and the relatively peaceful environment (especially if compared to bustling London) make it a great place to live. A study by Halifax¹² elected the region as the best rural place to live in Britain due

map). David Cleevely co-founder of Abcam, Sherry Coutu founder of Interactive Investor and Charles Cotton, ex-CEO of Virata, are only some of the best-known entrepreneurs who have invested in new ventures in the region. Mike Lynch, the CEO of Autonomy is also supporting emerging businesses such as Featurespace.

The two main local angel networks – Cambridge Capital Group and Cambridge Angels – gather the local crème de la crème, totalling around 70 high-net worth individuals. Cambridge Angels alone have invested more than £3 million last year (See investment Scene). More important than the amount of money put into early-stage ventures, local entrepreneurs highlight the sense of ‘community’ between angels, entrepreneurs and students that people in the region feel. Successful entrepreneur and startup mentor Alan Barrell describes it as an ‘informal network of people who constantly work towards the same goal.’ ■



Above: Researchers from Cambridge University's Department of Engineering

Investment Scene

The local investment scene is heavily dominated by angel investment in the minds of most entrepreneurs. DFJ Esprit and Amadeus Capital Partners stand out as the only two major British VC firms that have offices in Cambridge. Between them they hold portfolios of many local companies. The planned opening of a Silicon Valley Bank office in the city next year will stir up the local scene, providing more options for pre-revenue startups and companies in need of significant follow-on or companion debt-funding (see Roadblocks).

Early-stage investment

Cambridge angel groups 'kept alive the prospect of early-stage' in the region, states Alan Barrell. With the lack of early-stage VC investment and genuine seed funds, angels have stepped in. The two

main networks - Cambridge Angels (CA) and Cambridge Capital Group (CCG) – have contributed to the local economy to an extent comparable only to the activity of VC firm Amadeus Capital Partners.

Both associations together have around 80 high-net worth individuals. CCG has a broader membership – with entrepreneurs, industry professionals and PE professionals – who come from various locations and have a broader sector and regional focus. CA members are mostly local entrepreneurs and focus their investments on the greater Cambridge region.

CCG has invested more than £10 million in the last ten years and has 20 to 30 companies in its portfolio. Angels meet at quarterly events to analyse investment opportunities and pick their bets. CCG invests in three to five companies per year, with deals averaging £200k, they frequently ask for a share of 15 up to



Above: The Cambridge Venture Centre



➡ 35% of equity, according to Chief Executive Struan McDougall. Many entrepreneurs highlighted how ‘absolutely critical’ angels are in Cambridge when it comes to funding and supporting early-stage fast-growing companies. This is particularly vital in tough economic times, when VCs struggle to raise funds and become more conservative in their investments.

Cambridge Angels has had a similar path, with £16 million invested since 2001. Similarly to CCG, it does not raise a common fund, but attracts deal flow through its members’ connections. Angels meet in monthly dinners to evaluate pitches and if interested, invest jointly in new ventures. Average deal size ranges from £300-500k but members also invest in seed deals between £50k and £75k. CA has invested 2 to £3 million per year, with deal flow increasing significantly in the last year. From the 33 portfolio companies, one floated on AIM, three have been acquired and 26 remain active: a relatively positive track record.

Cambridge Enterprise

Another key player in the region is the commercialisation office of Cambridge University – Cambridge Enterprise. Founded in 2006, the organisation provides consultancy services, helps with technology transfer and invests in early-stage ventures through its Seed Funds.

67 companies have been spun out of the University through Cambridge Enterprise, with a particular emphasis on life sciences, biotechnology and medical technology. But Edward Benthall, chair of Cambridge Enterprise, points out that this doesn’t represent the sum of University spin outs. There is also a lot of support from University departments.

Cambridge Enterprise has tended to hold on to IP in companies it helps to spin out. Some entrepreneurs mentioned the expense and complexity of dealing with IP in these deals with Cambridge Enterprise and becoming an ‘official’ University spinout. Most of the entrepreneurial activity coming out of the Computer lab for example, happens without Cambridge Enterprise support. The Lab is less inclined to hold on to IP.



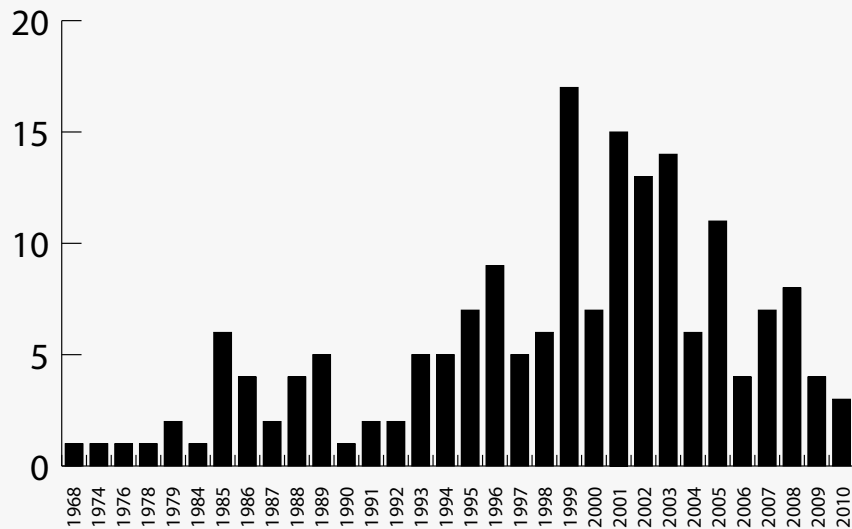
➡ The University is now raising its third fund – The Discovery Fund. This is an evergreen fund made up of donations and managed by Cambridge Enterprise. It aims to raise around a relatively modest £5 million (it has just reached £2 million) to invest around £100k per deal. All the cash realisations are reinvested in the fund. Pneumacare, Horizon Discovery and Bluegnome are some of Cambridge Enterprise most promising investments.

Entrepreneur and investor Hermann Hauser argues that a larger University fund would give Cambridge companies the boost they need to get over funding gaps (see Roadblocks). The office of commercialisation at Imperial College, Imperial Innovations, by contrast recently raised a more impressive £160 million fund.

Going after the money

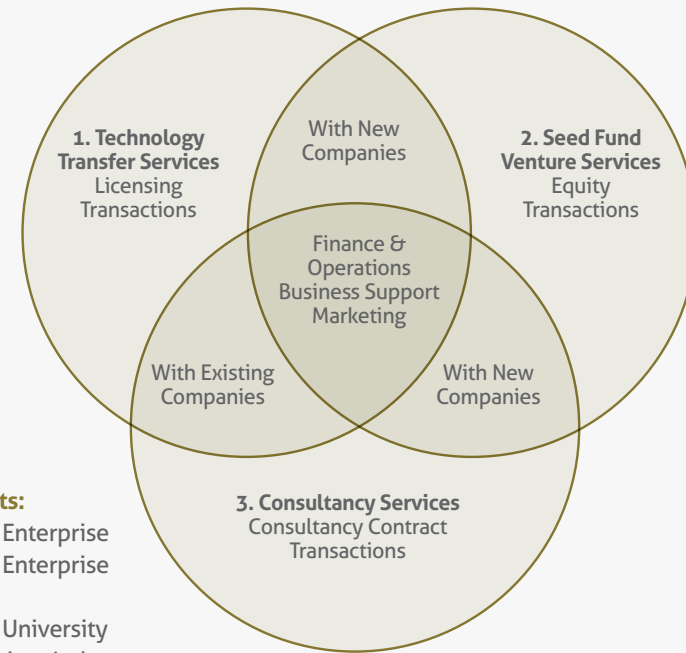
International funding is becoming

Number of Cambridge University computer lab spinouts per year



Above: Note the surge around ten years ago: Cambridge wasn't immune from the IT startup boom at the turn of the millenium

The roles of Cambridge University's commerical services units



The three units:

1. Cambridge Enterprise
2. Cambridge Enterprise Seed Funds
3. Cambridge University Technical Services Ltd

increasingly important, especially since the financial crisis dried up the prospects of growth in Europe and VC investors have less money to invest. As the entrepreneur and investor Charles Cotton puts it, entrepreneurs need to change their mindset and 'go where the money is', instead of waiting for the money to come to them.

Business journalist Tony Quested says that the scene is slowly becoming a lot more international, demonstrated by the success of the 'Silicon Valley comes to Cambridge' event (SVC2C). Japan's largest pharma company – Takeda – is already present in Cambridge. Indian and Chinese investors have shown interest.



Above: Headquarters of Autonomy, a keystone company in the Cambridge high-tech ecosystem

➤ Entrepreneur Alan Barrell founded Medical Technology International earlier this year with two Chinese co-founders. The aim of the company is to accelerate cross-border trade and investment between the UK and China. With the slow economic growth prospects in the West, Cambridge companies must warm to the idea of going after foreign investment in emerging markets (see Roadblocks).

M&A

The Cambridge mergers and acquisition scene is overshadowed by the giant HP-Autonomy deal (see graphic on next page). The acquisition of the search software company was the biggest ever in the region (£6.5 billion), dwarfing the second largest deal – Virata’s merge with Globespan in 2001 for £870 million. The deal was also larger than the total of all previous acquisitions of University spin outs, turning the page on the region’s M&A history.

From 1988 to 2008, 42% of all high-growth companies in the cluster were

acquired – a lot if compared with the 14% rate of acquisition across all firms in the region. The slow IPO market in the recent years hasn’t helped recent returns, with many investors struggling to cash in their investments.

At the other end of the line from the startups there is a significant gulf in public company sizes between the giants ARM and Autonomy and the rest. ■

MARKET CAP FOR TOP CAMBRIDGE COMPANIES:	
ARM	£8.39Bn
Autonomy	£6.23Bn
Aveva	£1.09Bn
Abcam	£645.12M
Domino	£622.34M

Business Opportunities

New Energy – The fourth wave after Radio, Computing and Biotechnology




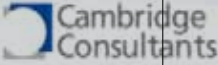











Renewable energy is a market set to grow. The European Commission Directive on renewable energy established ambitious targets for 2020, when a 20% share of energy should come from renewable sources. Globally, the market of clean energy is estimated to grow to \$92 billion by 2013¹³.

In Greater Cambridge alone, the sector is worth £1.2 billion, growing at 4 to 5% a year. 450 New Energy companies have created around 8,000 jobs in the area already.

‘Clean technology is an unfortunate term,’ argues Hugh Parnell, chairman of the brand new Cambridge Clean technology – an organisation created to support the recent wave of emerging



Above: New Energy technology is the fourth major wave of innovation to boost Cambridge research commercialisation

	60s	70s	80s	90s	00s	10s
Radio	 					
(Consultancies)				 		
Computing						
Biotechnology (and medical technology)						
Cleantech						

Above: The major waves of science commercialisation in Cambridge through the decades, with some pioneering companies highlighted

businesses in this sector; the local cluster is focusing on a variety of ways of making energy more efficient, beyond developing wind turbines and solar panels. Local companies have to developed tremendous technologies but still tend to be short of business development and fundraising skills. With long times to market and little medium-scale investment available, great ideas move slowly towards commercial profitability and often get off the ground by providing consultancy services to companies elsewhere who have production capability already.

However, some founders are already transforming their research into viable products. Professor Sir Richard Friend is one of the best examples. His research in semiconducting polymers has resulted in two different companies – Cambridge Display Technology and Plastic Logic and inspired many others. Cambridge University spin out Eight19 builds upon the same research work. This startup develops solar cells based on printed plastic that is cheaper,

more flexible and can be applied to new surfaces. Similarly, Polysolar develops organic polymer photovoltaics that can be applied directly on glass, transforming windows into solar panels.

Apart from solar technologies, there are other areas in which Cambridge New Energy startups are proving themselves. These include new generation biofuels and waste recycling technology, as well as new building materials and sustainable construction, for example Eight19. The startup Cambridge Carbon Capture uses electrochemical mineral carbonation technology to sequester carbon dioxide and use it to produce building materials (see startups to look out for). Breathing Buildings is another Cambridge-based startup that uses patented ventilation systems to create low energy buildings.

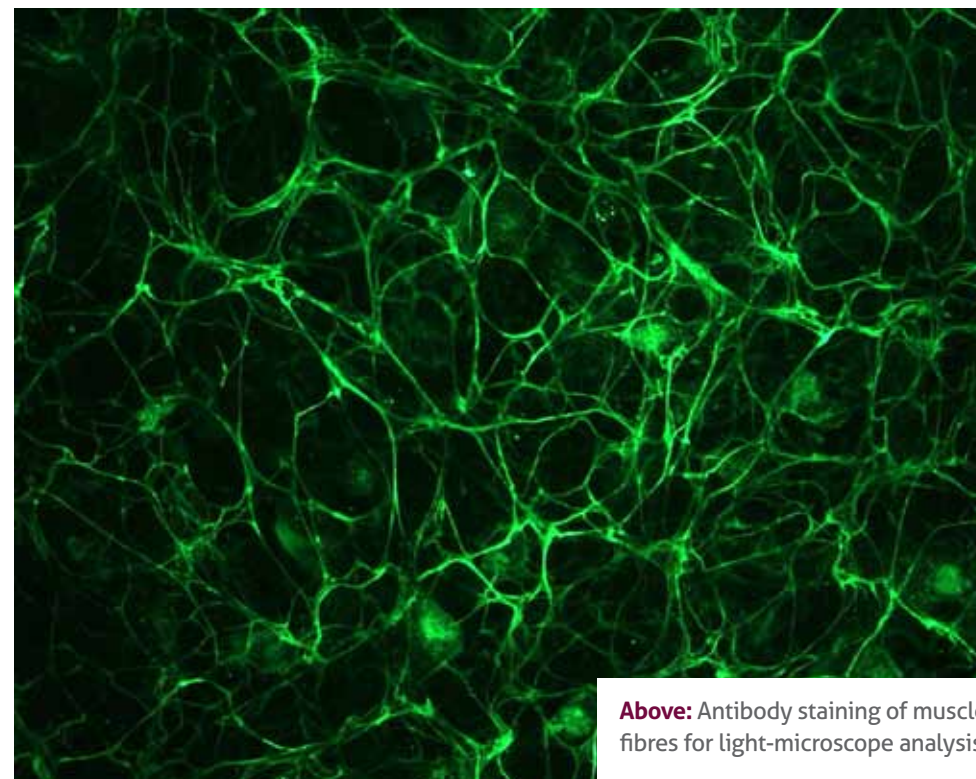
Behind most New Energy companies lies the rationale that to consume energy more efficiently is often more efficient than generating more. This explains why so many companies are operating in the fields of smart grid and energy

monitoring. AlertMe is only the most famous of a group of companies experimenting in this area (see Trends).

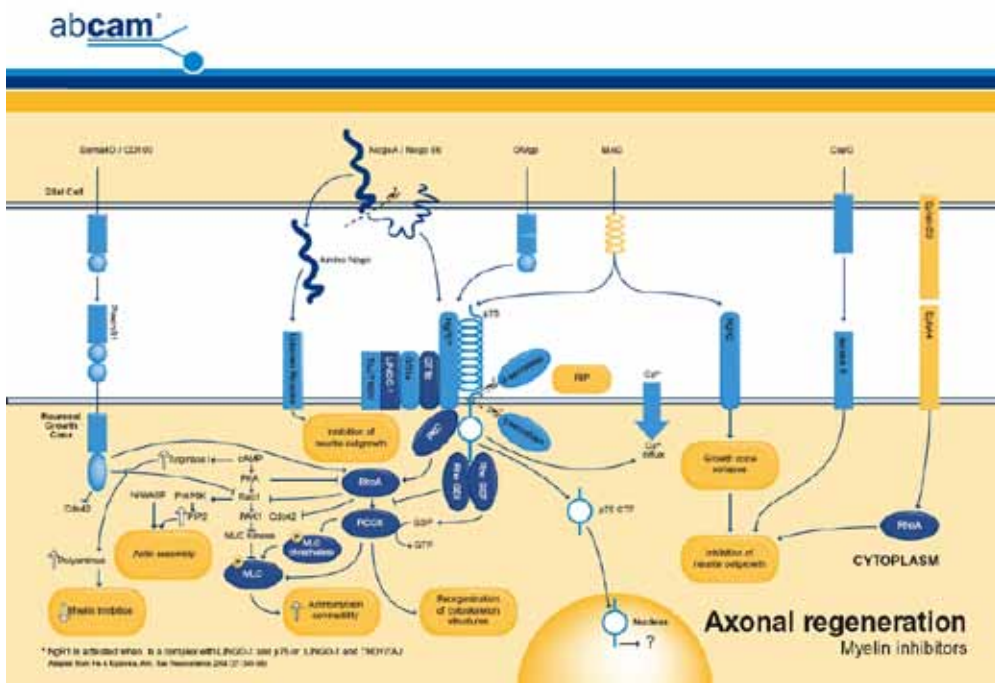
Medical technology – where engineering and life sciences meet

The evolution of the medical technology

field is the obvious sign that boundaries between sectors are increasingly blurred. Founders are more willing to talk to each other and share knowledge which didn't happen before, says Alan Barrell who believes that a renaissance-like 'era of convergence' is dawning in Cambridge.



Above: Antibody staining of muscle fibres for light-microscope analysis



Above: Part of an Abcam kit-supporting document on Axonal Regeneration

Entrepreneurs are certainly becoming more commercially-oriented, developing products with shorter times to market and with broader appeal. Theodoros Koutroukides, founder of healthcare-focused Atlantic Accelerator says: ‘there is an increasing awareness of the need to

connect academia and industry – it is not perfect but it is much better.’

The local Atlantic Accelerator (AA) is another step towards that goal. The new programme identifies hospitals’ specific needs and startups willing to solve them. Diagnodus, an innovative startup with a

less invasive and more accurate procedure for colorectal cancer screening, will be supported by the AA. The mentoring team will help Diagnodus raise funding and speedup its route to market. The company has signed partnerships with University College London Hospital and Southend University Hospital, which will test the device and methodology.

Diagnodus illustrates an ongoing trend within medical technology – a surge in cost-effective, portable and accurate diagnostic instruments that tackle very specific problems (see Trends). These solutions are very much needed at a time when the NHS needs to rationalise its resources and streamline its operations.

Biotechnology – Putting genetics to work

Cambridge is known for its academic expertise in the fields of stem cell research and gene sequencing. The Cambridge Stem Cell Initiative gathers 25 stem cell laboratories in Cambridge producing some of the best medical

research in the world¹⁴.

Since 2007, the University has invested over £38 million in stem cell biology and prioritised it as a strategic sector. The local laboratories have attracted around £95 million in funding and are now looking more and more into potential commercial applications in medicine.

Stem cells can be used to better understand cancerous tissues, to test therapeutic drugs, to repair damaged tissues and to prevent long-term diseases and aging conditions. An expert in the biotechnology sector Jeff Solomon calls it an ‘embryonic industry’ – but with an enormous potential. In the past five to ten years, the growing number of major pharma and biotechnology companies setting up shop in the region – by establishing research centres or via acquisitions – has fostered the ecosystem, creating the necessary critical mass for a healthy biotechnology community.

Local knowledge in biotechnology research has given birth to a cluster in antibody technology, of which

➤ Abcam is the leading example. Abcam, founded in 1998 is a pioneer in its field and a neat example of how best to productise scientific research. The ‘Amazon for Antibodies’ has a market cap of £640 million, almost 300 employees and offices in the US, Japan and China. Abcam’s blend of extensive online intelligence and user-friendly, discrete antibody kits (and other organic molecular tools) has been a hit with labs around the world.

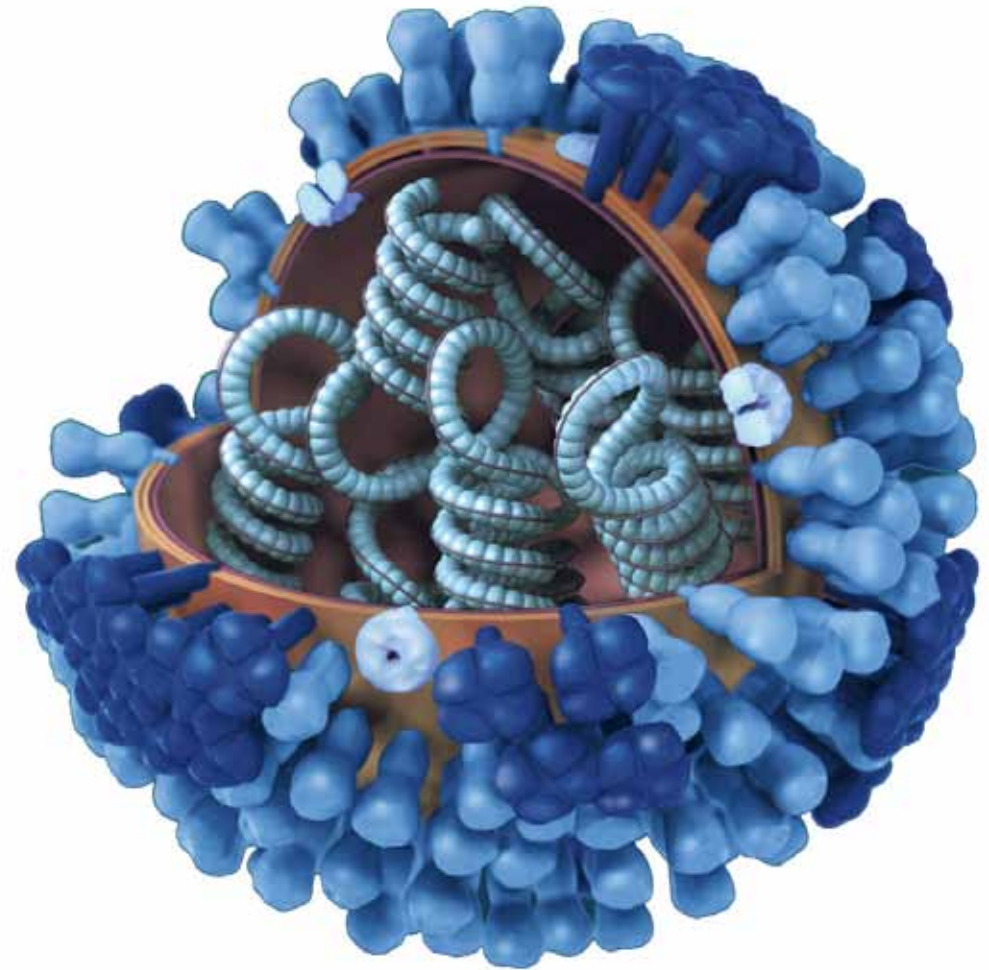
Other innovative companies in the field of antibodies are Bicycle Therapeutics, which is developing a new platform to produce drugs through the accurate selection of components by virus-like phages.

As DNA is becoming cheaper, many local startups are developing innovative ways to discover the potential uses of molecules as gene-modulating drugs. Examples include Population Genetics, which helps by identifying genetic variations in populations that can cause predisposition to certain diseases.

Horizon Discovery provides a model that allows professionals to see how certain drugs work. Many of these

companies fall under the emerging industry of ‘personalised medicine’, i.e. understanding which drugs are most effective with particular gene combinations (see Trends).

There has been a consolidation of the sector in recent years – with high levels of M&A activity (see M&A Activity). This is a mixed blessing. On the one hand, there is less regional competition to drive innovation. Before were 100 to 200 companies that could license pharmaceutical products, now there are 50 to 100. On the other hand, the closure of large hubs from companies like Roche or GSK in recent years put many talented people back in the market, who are sometimes keen to start their own business. It also means more business opportunities for independent and innovative biotechnology startups. They become attractive targets for large pharmaceuticals companies who increasingly outsource the process of drug developing, investing in startups through their corporate venture arms. ■



Above: 3D structure of a virus

Trends

Sensors and diagnostic devices

Within the broader world of biotechnology, entrepreneurs are becoming more aware of the need to productise their expertise. A perfect example of this is the recurring trend of instrumentation of biotechnology research.

Cambridge companies are increasingly developing flexible and affordable tools

to identify and monitor changes in chemical/gas compositions which can be used as components in medical diagnostic tools. They often build on the knowledge of local consultancies, which have the experience and the know-how to take technologies to market.

Pneumacare and Cambridge Temperature Concepts are two examples of hardware, computing and biotechnology experience being transferred to solve a medical problem. CTC's DuoFertility is a product that monitors women's

basal temperature identifying its most fertile period.

Pneumacare scans are non-invasive imaging systems that assess lung function.

Owlstone Nanotechnology is also developing sensors but applied to a different industry. Its 'dime size' chip is able to detect chemicals for industrial or security scenarios, cheaply and quickly without the need for a lab.

POWER-USE MONITORING IS A SUB-TREND OF NEW ENERGY THAT HAS ALREADY SEEN SUCCESS

Smart Grid and Monitoring Tools

AlertMe is one of the more famous consumer-focused startups in Cambridge. It raised £17.5 million to take smart metering products to the consumer and leads a related group of local companies specialised in power-use monitoring.

Amantys is a startup founded in 2010 by former ARM executives that is also tackling this. Its technology reduces the power losses that happen between every step of energy conversion in industrial processes. Startup Green Energy Options offers a monitoring tool for photovoltaic energy. Founded in 2006 and with offices in Cambridge and Germany, the company has sold more than 1.4 million products.

The focus on smart





Below: Part of a DNA double helix visualised in 3D

➤ grids and energy monitoring also demonstrates the increasing convergence between once isolated sectors. The ‘Smart Systems and Device Design’ theme within University of Cambridge’s Energy Initiative comprises research by the departments of Engineering, Physics, Materials Science, Metallurgy and the Computer Lab. One of the hottest startups in Cambridge –

Neul – is the perfect example of such trend: The wireless company develops IP and technology to use the TV ‘white space’ spectrum, providing wireless connectivity to machine-to-machine devices. Its applications are broad, but they can be used to automatically read energy utility meters, substituting the common manual periodical readings.

Personalised Medicine and Drug discovery

Patients react differently to treatments, some of this difference is due to genetics. Personalised medicine aims to improve the patient response to therapy by using different drugs depending on personal genetic profiles. There is still a lot to be done to bridge the gap between the recently acquired knowledge and the medical industry. But personalised medicine has the potential to reduce costs due to wasted treatments and cost-cutting in the NHS is speeding up the customisation of healthcare.

Cambridge initiatives such as Health Analytics and Cambridge Healthcare are analysing clinical data to better understand patients and improve NHS efficiency. The platform ‘how are you?’ was created by Cambridge Healthcare in partnership with the NHS. It is a social network for people with long-term conditions where they can track their symptoms and get professional advice. In the future, it will also connect with medical devices, expanding the possibilities of new diagnostic tools and

personalised treatment.

Health Analytics’ LinkWell platform is a software tool for health practices that aggregates patient data from different sources. Practices can then track and manage their patient records in a more efficient way. They can analyse particular populations’ health, identify risks, manage referrals and monitor their costs.


At the same time, advancements in genetic coding technologies by companies such as EagleGenomics or BlueGenome make it more feasible to tailor therapeutics to patient groups based on their biological characteristics. Due to its close connections to the pharma industry, Cambridge companies are at the forefront of drug discovery and testing. Convergence Pharmaceuticals span out of GlaxoSmithKline in 2010. It has raised £22.2 million to develop more effective painkillers with fewer side effects. Another example in the drug discovery field is Xention, a company that is developing therapies for heart disease by targeting nerve cells in the heart. ■

Roadblocks

Lack of sequential funding

Angel Investors play a key role in seed funding, but entrepreneurs often mention how hard it is to raise subsequent larger rounds of funding. Because the typical Cambridge products are based on complex R&D in technology and life sciences, they have long development cycles. Companies need years to test new

in a relatively short timeframe that usually does not coincide with product lifecycle in areas such as biotechnology or clean energy. Surviving until the product is ready to market is a major challenge and the rationale for many Cambridge-based companies to provide less scalable consultancy services or license their IP to generate cash flow more rapidly in the short-term.

Edward Benthall, chair of Cambridge Enterprise, believes this is limiting 

SURVIVING UNTIL THE PRODUCT IS READY TO MARKET IS A MAJOR CHALLENGE FOR R&D-HEAVY COMPANIES

drugs and most investors aren't willing to wait. Angel investors have limited amounts of money to invest and whilst VCs can offer more money, they are under pressure to exit their investments



➡ the growth of the Cambridge Cluster: ‘there is no active investor community to take care of a certain kind of company.’ PlasticLogic is a clear example of this issue. The company developed a groundbreaking technology that allows silicon to be replaced by plastic in chips and created a flexible electronic display. The capital-intensive business could not produce returns to its early-stage investors (due to market

INVESTORS AND SERIAL ENTREPRENEURS ARE BRINGING IN MARKETING SKILLS

and management factors) and it ended up being ‘saved’ by a massive investment round of £440 million from Russian investors who may give a second life to the business.

This Thursday (17th November 2011) saw the IPO of Sphere Medical,

a Cambridge-based medical device company. Even with the depressed IPO market, CEO Stuart Hendry claimed the fact that ‘private money is hard to get hold of’ was a factor in his decision to attempt a listing.

Entrepreneur David Gammon mentions the ‘evaporation of credit from commercial banking’ as another major hurdle for startups. Because of the financial crisis, banks have tightened their lending conditions, making it harder for startups to find working capital.

Lack of commercial skills

In London, entrepreneurs complain about how difficult it is to find the right CTO. Cambridge faces the opposite challenge. Most Cambridge startup teams have very strong scientific backgrounds, with PhD students or academics on virtually every board or management team. But there is a general lack of more commercial skills, which

are essential when it comes to make an idea profitable. Investors and mentors agree that Cambridge startups need more people with skills in project management, marketing and sales to make companies financially viable.

One example of this is the struggle of student-led Cambridge University spinout Light Blue Optics. The company has raised \$57m in venture funding, but the board recently took the decision to replace CEO and ex-academic Dr Chris Harris with Mark Maoz, a seasoned executive and ex-partner at Amadeus Capital Partners, with a mission to re-focus the company on swift commercialisation after slow revenue growth.

Most entrepreneurs mention that the situation is slowly improving. The University is more encouraging when it comes to transfer technology to the market-led products. The vast network of organisations – Cambridge Cleantech,



Cambridge Wireless, CUTEC and CUE, among many others – helps teams in the commercial aspects of their business. Many of Cambridge entrepreneurs are on their second or third venture, which is also changing the way startups are built. Their previous experience has taught them the importance of having the right mix of skills to make a business successful, and that includes investing in staff skilled at marketing, sales and business development.

Lack of keystone companies

First-time entrepreneurs look up to people like Mike Lynch or Sherry Coutu when it comes to starting a company and most know the local success stories, of which Autonomy is only the latest chapter. But there is a need for more middle-size firms that can train qualified staff, recycle talent, generate critical mass and promote competitiveness. Only 18%

of the local companies have more than 500 employees.

The consolidation in certain sectors is creating larger companies but when they get to a certain size they often end up being acquired by foreign companies,

IT TAKES A LONG TIME TO BUILD
KEYSTONE COMPANIES WHICH
CAN RE-CYCLE COMMERCIAL
WISDOM

as it happened to Autonomy. These acquisitions often have a positive spill-over effect – former employees move on and start their ventures – but it then takes a whole generation to develop a large and established company. Most of Cambridge current keystone companies were born in the nineties. We will have to wait to see who the next giants will be (See Startups to Look Out For). ■



Startups to look out for



Neul

Neul develops hardware and software systems allowing computers to communicate using radio bandwidth usually reserved for analog TV. More and more objects in our lives need to be connected to the web, but the carving-up of radio spectrum - which allows a certain bandwidth for 3G communications, more for analog and digital radio and more for analog TV - is outdated. Because there is only a limited range of useful spectrum, opening up more is valuable.

Neul calls itself 'the internet of everything'. The company is providing

new IP and technology to exploit the available 'white space' spectrum and enable wireless connections in machine to machine (M2M) products and applications.

Its technology is superior to available technologies (3G, 4G) because it consumes less power, it is cheaper and it allows multiple, long range and non-line of sight connections, making the use of this bandwidth for data transmission commercially feasible for the first time. 3G networks are close to their capacity limits and are licensed to network operators, which makes them limited in terms of the amounts of data they can transmit and makes them expensive.

Neul was founded in 2010, by the co-founders of CSR – a leading Cambridge wireless technology company: James



Collier is the CEO and Glenn Collinson is a board member and chairman of the strategy committee. The former Director of Technology Resources at Ofcom (the British communications regulator) Professor William Webb is the company's CTO. The team has a deep understanding of the sector. Neul employs 20 and is based at the Cambridge Science Park's Innovation Centre.

The company's first product is NeulNET, a radio system made of a base station and a terminal on top of which regulators and other clients are now conducting several trials. Its applications are broad. It can be used to power automatic utility smart meters in households, but it also works in high bandwidth connections, for rural broadband applications, for example. Neul enables what the industry calls 'the Internet of Things', by providing a

feasible way of automatic communication between machines (M2M) - a market that the team estimates it will be worth 50 billion by 2020.

Other applications of Neul's technology include the areas of environmental monitoring through sensors, shelf labeling and asset tracking solutions, remote health monitoring, automatic software updates in cars.

The company has raised £8 million in June in a round led by DFJ Esprit. IQ Capital, Cambridge Angels and the founders themselves have also invested.



Cambridge Carbon Capture

Cambridge Carbon Capture develops devices to turn carbon dioxide into

limestone.

The company was founded in April 2010, although founder Michael Priestnall has been working in the project since 2009. The team of two is based at the incubator Idea Space, at the Hauser Forum. CCC's technology is based on Michael's IP and it is being developed through Cambridge Enterprise, which has invested in the project.

Together with the Department of Materials and Judge Business School,

the team has proven that the invention works and is commercially feasible. Traditional methods usually capture carbon dioxide from fossil fuels and pipe it back underground, which takes a lot of energy and money. CCC mineralises carbon through a reaction with silicate materials. It can take in industrial waste products – such as ashes or muds – and

produce valuable byproduct materials, such as cement or amorphous silica (used as rubber fillers).

According to the financial modelling carried by Judge Business School, the technology is profitable without subsidies for some markets, such as the minerals and mining industry, construction or

oil and gas. The team received a TSB grant of £150k subject to match funding and £15k through Cambridge Enterprise. Their

business model is based on consultancy and R&D projects tailored to clients' needs. CCC has recently signed a partnership with Polarcus – a marine geophysical company operating 3D seismic vessels – to make the company's fleet carbon neutral.

The topic of carbon capture and storage has been on the

CCC'S DEVICES TURN CO2 INTO LIMESTONE

environmentalists' agenda for a while. But although it has been technically demonstrated, few have made it commercially available. According to Priestnall, there are only a handful of companies working on this particular technique of mineral carbonation. California-based company Calera is a competitor.



Polysolar

Polysolar builds transparent solar panels that can be applied to roofs, walls and windows.

The team of six was founded in 2007 by Hamish Watson. The first version of its product is a translucent, but heavily tinted, glass panel with embedded photovoltaic cells. The panels are already being tested on buildings such as the Hauser Forum and will soon go into production in Taiwan.

They cost about £100 per square metre and are half as efficient as normal panels. To get the same cost per watt, clients need to cover twice the area that normal panels do – an obstacle that is compensated by the fact that they do not take any extra space. The company is working on a future version of the product that will be almost transparent.

Polysolar is partnering with glass company Pilkington and chemical group Solvay, who may manufacture and customise the final product. Possible applications are endless: from domestic use in conservatories, greenhouses,

buildings' facades or public infrastructure. The company is in talks to apply its technology at the World Cup 2022 stadiums in Qatar. Meanwhile, it also develops consultancy projects for architects and builders who want to integrate its photovoltaic systems.

A £1.1 million collaborative R&D grant from the TSB kick-started the project in 2008. The founder is now seeking a new round of investment (about £5 million) to develop a manufacturing plant in the UK. Hamilton says Pilkington, Solvay and other institutional investors will probably lead the round. Polysolar already has an R&D centre based in Durham.

Competitors include other solar photovoltaic panel producers that have more aesthetically-pleasing solutions such as Shott or Romag.



Pneumacare

Pneumacare is a Cambridge University spinout that produces a non-invasive method of assessing lung function. It has developed 'Pneumascan' – a family of products that use 3D video motion capture technology to diagnose patients' respiratory conditions.

The company was founded by



entrepreneurs and healthcare professionals in 2009. Serial entrepreneur Dr Ward Hills is the CEO and Dr William Mason the Chairman. The team of nine is based at the St. John's Innovation Centre.

Pneumacare's main clients are national healthcare services. In the UK, local

NON-INVASIVE DIAGNOSTICS COMBINE TRADITIONAL EXPERTISE IN PRECISION ENGINEERING AND BIOTECH

authorities, clinics and NHS consultants buy the product; it is already being used in Papworth and Addenbrooke's hospitals in Cambridge, the John Radcliffe Hospital in Oxford and Sheffield Children's Hospital. They have customers in France and Southeast Asia and are waiting for '510k' approval to sell in the United States.

Pneumacare's scans are more compact than traditional instruments. They use light to measure how deeply and quickly a patient is breathing and which muscle groups are being used. They are as efficient as traditional tools (spirometers) but they work with a broader set of patients and are able to measure many more respiratory parameters. Because the process doesn't involve physical contact with the patient, they have lower infection risks, fewer sterilisation requirements and lower running costs.

The startup recently raised a £2 million round of investment that will be used to fund its operations and its commercial expansion. Sud Investments led the financing round together with a group of previous investors including Cambridge Enterprise, Cambridge Capital Group, members of Cambridge Angels and strategic investor Plextek, who are productising the technology.



Diagnodus

Diagnodus is a biotech startup that is developing an new method to screen for diseases of the gut. Diagnodus diagnostic solutions are non-invasive and produce more accurate results than previous methods, avoiding the uncomfortable and

expensive traditional colonoscopy.

The startup was founded in April 2011 by a group of researchers with 10 years of experience in the field of colorectal diseases. The senior team of six was founded by Alexandre Loktionov (CEO) with Dr Neil Anderson and Dr Tatiana Bandaletova.

The technology is based on a patent pending method and device (a disposable test kit called Screen2C) that uses biomarker detection to analyse collected samples of stool. This method is cheaper, non-invasive, self-applicable and more sensitive than existing methods. Its primary focus is colorectal cancer but it can be used to screen for other conditions such as inflammatory bowel disease.

Diagnodus is the first startup to partner with Atlantic Accelerator (AA), a new Healthcare incubator based in Cambridge that speeds biotech companies' route to market, by answering hospitals'

unmet needs. The accelerator will help Diagnodus raising finance, getting through regulatory issues and finding clinical trials and business partnerships. AA mentors Paul White and Dave Hampton joined the company as Chairman and Non-executive director respectively. The company needs funding to develop the prototype and the full commercialisation of the product.



Health Analytics

Health analytics does what it says on the tin. It is a software solution that integrates and analyses NHS data records to better

understand and manage in patient care. Its 'Linkwell platform' helps caregivers across the NHS to identify health trends, analyse risk, manage referrals to secondary care, manage budgets and financial records and acquire GP data.

The startup was founded in 2009 by Phil Wigglesworth and Stuart Bond. The system is analysing data on 1.2 million patients for 50% of the Pathfinder Consortia – a pilot group of 52 GP practices that are commissioning private healthcare services. The team was the 2011 winner of the Cabinet's Innovation Launch Pad initiative – a Government competition that identifies startups that can improve public services and save public money.

The system integrates primary and secondary sources of data, from hospitals, clinics and GP practices providing a more comprehensive view of a specific patient population. Its algorithmic analysis provides a risk stratification model that lets clinicians identify populations at risk and invest in preventative care.

The software not only improves patient outcomes but it potentially allows the NHS to make savings. Users can monitor invoices and challenge suspicious billings. One recent practice saved £200,000 worth of invoices in a month. The team estimates that the system currently saves £2 million per month per 300,000 people.

Andrew Lansley's plan for the new NHS is likely to depend very heavily on private data providers for outcomes tracking. The Health and Social Care Information Centre will gather data about patient feedback and treatment outcomes and use this to set prices for private care suppliers and provide patients with 'choices' about their care provider. Without valid outcomes data the entire edifice falls down. So Health Analytics and similar companies will be in a great position to profit from this. But they will have to battle to persuade GPs to buy their services one-by-one and cannot rely on getting a single commission for the entire country, as has happened with previous IT systems. Still, this is likely to work in the favour of smaller companies.



Arachnys

Arachnys is a business intelligence tool specialising in emerging markets. The product indexes websites and aggregates thousands of sources of information on emerging economies in a variety of languages. Users can search in English and retrieve results in foreign languages that are then automatically translated.

David Buxton and Harry Waye founded the startup in November 2010. Buxton combined his experience in risk consultancy and knowledge of emerging markets with David Haye's technical and mathematical background. They are Arachnys' core team and are now looking to hire. Contractors with knowledge of the local markets compile the set of sources for each country.

Arachnys is targeting the compliance



and risk analysis market, particularly clients such as investment banks or consultancies that need to conduct background checks, due diligence and anti-money laundering processes. The platform is accessible via monthly subscriptions that can cost ‘from £1,000 to hundreds of thousands,’ according to

ARACHNYS ARE CONSIDERING THE MOVE TO LONDON TO BE NEARER THEIR CLIENTS

the founder. While happy to be based in Cambridge, they consider a future need to move to London, since it is where their clients are.

They received investment from Cambridge accelerator Springboard and expect to break even in six months, says Buxton. The company has recently

announced a series A round by Martlet, Cambridge Capital Group and Cambridge Angels, although they did not disclose the amount raised.

Arachnys has data on 30 countries and is working to build regional coverage in regions where it is difficult to find and analyse reliable info, like India or Russia. As an example, it has 67 local sources of information on local companies for Egypt. The founders’ goal is to develop the platform to make it ‘more mature.’ They do not reveal current clients but assure they have signed a deal with a major investment bank.



Featurespace

Featurespace is an enterprise tool that aggregates and analyses consumer

behaviour. Its engine captures information about online transactions and predicts customer preferences, actions and value.

Its technology is based on Bayesian inferences and predictive modelling. Bayesian inferences are inspired by British mathematician Thomas Bayes’ work, who devised a formula for calculating

FEATURESPACE WAS STARTED BY PROFESSOR AND HIS STUDENT

conditional probabilities to produce theories of evidence. Featurespace’s technology applies Bayes’ principle in real time, analysing each client’s record of behaviour on a retail website and refining the system through machine learning.

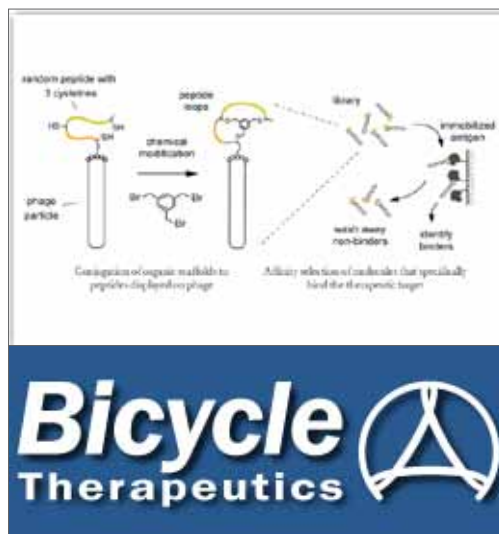
The system can be used in the e-commerce and marketing sector, in

gaming and in the financial industry, since it can predict and identify fraudulent use. Betfair, William Hill and King.com are all clients, using Featurespace to prevent gambling fraud. Online credit company Wonga also uses the system.

Founder and CEO David Excell build up his knowledge in behavioural analytics while studying at Cambridge University. He started the company with his applied statistics professor, William Fitzgerald, in 2005.

The startup received funding in 2008 and in 2010, totaling more than £1 million and it has now 21 staff. Investors include NESTA, Cambridge Angels and Cambridge Capital Group.

Often branded ‘the new Autonomy’ – Mike Lynch, CEO of Autonomy, is a non-executive director – Featurespace has won the EGR award for ‘Services Rising Star of the Year 2011’ and its founder David Excell the ITC Enterprise Young Entrepreneur award.



Bicycle Therapeutics

Bicycle Therapeutics is a biotech company spun out of Cambridge University's Laboratory of Molecular Biology. It develops protein drugs using a novel process that combines small molecules and biopharmaceuticals. This creates a new generation of medicines while speeding up the drug discovery process.

The company was founded in 2009 by

Professor Christian Heinis and Professor Sir Gregory Winter, researchers at the University's lab. Sir Gregory Winter was one of the founders of CAT – a pioneer Cambridge company in the antibodies field and Domantis.

The team has the support of the industry, with Atlas Venture, Novartis Venture Fund, SV Life Sciences and SR One (the independent venture arm of GlaxoSmithKline) as investors. John Tite, former Vice President and Head of Discovery Biology for GSK Biopharm, is the CEO.

The company's proprietary bicyclic peptide technology (which inspired its name) merges aspects of small molecules and biologics to create a new class of stable and low-cost drug molecules.

It identifies and optimises bicyclic peptides – 'mini-antibodies with organic cores' – which are more stable than the previous peptide-based therapeutics.



Owlstone Nanotech

Owlstone developed a tiny chip that is able to accurately detect low levels of chemicals. The five-pence-coin-sized chip is much smaller, cheaper and more versatile than other chemical detection systems and can be applied to a variety of industries.

The company was co-founded by PhD students Billy Boyle, Andrew Koehl and David Ruiz-Alonso who suspended their studies in 2004 to start the business. In 2006 they named former VP of Smiths








Detection Americas, Brett Bader, as CEO and incorporated the company in the US. The 35 staff has been based at the Science Park since 2009, after 'graduating' from St. John's Innovation Centre.





Owlstone's nanotechnology can be used in different areas, such as security and defense, automotive, food and beverage industry, water, oil & gas or healthcare. They now have more than 30 clients across the world, with a strong focus on defence and academia, including the Home Office, the US Army and many top-tier Universities. The UK Ministry of Defence has signed an £80k contract to develop an investigation project.


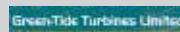

The company raised \$14m of development capital and is yet to break even. Two years ago the company was generating around £200k per year and this year Billy Boyle estimates they will turn over £3.5 million.






The company won the R&D 100 award in 2010. This year, they won the first edition of the Cambridge Graduate Business of the Year Award. ■







50 companies that will shape Cambridge's Future






Category: RADIO	Name	Description
	Cognovo	Developing low power-consumption software modems for mobile phones
	CRFS	Allow security services to perform radio spectrum surveillance
	ip.access	Leading designer of femtocells - radio base stations for local or regional telecommunications coverage
	Neul	Make hardware and software to allow machine to machine communications via unused TV 'white space' radio bandwidth
	Nujira	Produce Power Modulators and Radio Amplifiers for radio base stations and mobile handset manufacturers
	Ubisense	Allows companies to monitor the movement of items using ultra wide-band radio systems combined with GPS systems
	Zinwave	Produces distributed antennae systems for indoor telecommunications coverage



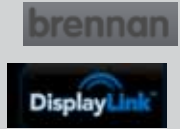
Category: NEW ENERGY	Name	Description
	Alertme	Builds web-connected power-use monitoring systems for domestic and commercial use
	Alquist	Provides energy-use consultancy for businesses and builds web-connected energy-use and heat monitoring systems
	Amantys	Provides power-use monitoring and power-switching systems to reduce power consumption for businesses
	Aveillant	Improves the performance of radar aircraft-tracking systems near wind farms, meaning that turbines can be set up nearer to airports
	Breathing Buildings	Provides low energy ventilation systems using hot-air updraft as the motive force rather than fans
	Cambridge Carbon Capture	Builds systems that turn carbon dioxide into limestone, this is useful for carbon capture in energy-generation and in industrial processes
	Eight 19	Builds thin, flexible plastic solar panels





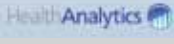

Category: NEW ENERGY	Name	Description
	Green Energy Options	Sells good-looking energy monitors for retailers and industry to engage people with energy-use reduction
	Green Tide Turbines	Builds small turbines for tidal or river-flow energy generation
	Polysolar	Makes glass, translucent solar panels that replace traditional building glazing




Category: BIOMEDICAL	Name	Description
	Bicycle Therapeutics	Uses phage-selection to accurately build organic molecules for drug production
	BlueGnome	Produce a chip that performs automatic analysis of DNA samples for genetic abnormalities
	Cambridge Temperature Concepts	Makes a body temperature monitor for tracking women's fertility
	Cellcentric	Working to discover drug-action sites in the human genome through epigenetics, i.e. the action of genes on other genes
	Convergence Pharmaceuticals	Developing new painkillers with lab resources purchased from Glaxo Smith-Klein

Category: BIOMEDICAL	Name	Description
	DiagNodus	Develop non-invasive diagnostics for colorectal diseases
	Eaglegenomics	Provides software for genetics researcher and pharmaceutical companies to map genomes and manage genetics-related projects
	Phico	Developing a new antibiotic based on genetic interference: disabling a bacteria's genome
	Horizon Discovery	Engineer human cells to mimic mutations commonly found in diseased people for use in research labs. This means labs don't have to take samples from diseased people
	InotecAMD	Builds a device to aid the fast-healing of pressure sores
	Ionscope	Manufactures Scanning Ion Conductance Microscopes, the latest-generation of ultra-powerful microscopes for visualising living cells, viruses and nano-scale material surfaces
	Kymab	Discovers antibody drugs by analysing the binding of antibodies to other small molecules

Category: BIOMEDICAL	Name	Description
	Oval medical	Produces a tiny autoinjector for patients to self-administer drugs, for example diabetics. It is easier and safer than using a hypodermic syringe
	Owlstone	Nano technology developer with a range of smart sensors for automatic chemical and gas analysis
	Pneumacare	Builds non-invasive diagnostic technology for respiratory disorders
	Population Genetics	Allows scanning for genetic indicators of disease by processing very large datasets of genetic information linked to disease outcome or response to a drug
	Sphere fluidics	Makes devices for parrallel processing of chemical analysis using sheets of very tiny fluid droplets, each with a microchip interface scanning for a single chemical
	Xention	Develops new treatments for cardiac disease using drugs that act on the nerves of the heart to correct poor heartbeat

Category: VIDEO AND AUDIO	Name	Description
	Audio Analytic	Develops software to identify specific types of sounds from noisy recordings
	Blinkx	Provides consumer video search on the open web
	Brennan	Produces a hard-drive music player for the mass market, replacing a cd or minidisc hifi without the need for an entire pc

Category: ENTERPRISE SOFTWARE	Name	Description
	Arachnys	Allows financial institutions to search documents and do due diligence on companies around the world in multiple languages
	Bromium	Security software for the cloud, currently in stealth mode
	Cambridge IP	Offers services and intelligence on Intellectual Property to the tech sector
	Featurespace	Produces consumer insights for companies to track buyers of their products and predict their likely future behaviour
	Health Analytics	Health Analytics synchronises data on patient care in healthcare systems
	iceni mobile	Develops mobile payments solutions for developing countries
	RealVNC	Provides an application that lets users access their desktop remotely

Category: CONSUMER WEB	Name	Description
	Cambridge Healthcare	Created a eHealth portal for patients with longterm condition and healthcare professionals
	Jagex	Independent developer and publisher of online games
	MagicSolver	Discovery tool for web and mobile applications

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