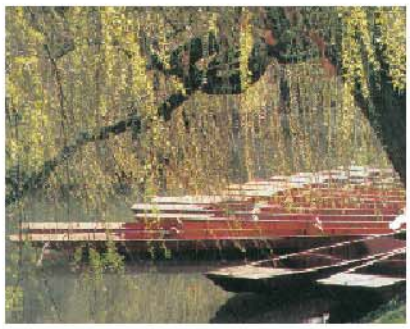

LIBRARY HOUSE

The Cambridge Cluster Report 2003

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About Library House

Library House is a ground-breaking concept – a buy-side research house, a networking hub holding exclusive events that introduce members to interesting companies and entrepreneurs, and a members' club serving a rapidly expanding national and international membership. Based in Cambridge, England, Library House is located at the centre of Europe's most dynamic information technology and life sciences cluster.

Our guiding principles are 'Transparency' and 'Community'. We believe passionately that transparent markets lead directly to benefits for investors, professional services firms, corporations, universities and research establishments, innovation businesses and ultimately to nations. Transparency matters because it encourages competition, which leads to improvements in quality, practices, standards and performance.

In Silicon Valley, thousands of venture capitalists, bankers, lawyers, accountants, company executives and academics interact with entrepreneurs and each other in a mutually supportive, seamless and profitable way. The result is the world's most successful example of wealth creation from innovation. Our goal is to stimulate similar economic benefits by encouraging the formation and development of Silicon Valley style innovation-based communities across the UK and longer term Europe.

Library House delivers a range of services and benefits to our members for which we charge membership fees. Our members are companies engaged in venture capital, banking, mergers and acquisitions, law, accountancy, technology transfer, executive recruitment and other specialist services. Members benefit through easy access to investable businesses identified in our database of companies, from the networking events we organise and from tailored services we devise for them. We also bring significant benefits to entrepreneurs and their innovation-based businesses throughout their life cycles.

Library House does not compete with the business of any of our members, does not represent or accept money from entrepreneurial companies, neither does it invest in or take equity positions in such companies.

Our aim is to capture information on all innovation-based companies in the UK.
We publish reports based on data compiled by our in-house research team. These Market Reports deliver analyses and hard-hitting commentaries regarding innovation-based companies in the UK, including innovation activity by region and county, capital shortfall by area, and emerging innovation clusters.

More Information about Library House is available at our website www.libraryhouse.net or call Mark Littlewood, Kjell Nace or Duska Puvacic on (44) 1223 500 550.

The Library House Database

The Library House database is a comprehensive and rigorous resource focused on innovation-based companies in the UK. It comprises a coherent, consistent mapping of technology companies across the software, telecom, materials, hardware, life science and biotechnology sectors. We designed it from the ground up for the specific purpose of capturing the critical information our members need to know about a company, such as: market sector, product type; investment stage; amount of funding required. To date, we have profiled the innovation-based companies in the Cambridge region and are expanding coverage to include other hot spots and geographic areas with the objective of covering the entire UK.

Definitions

According to our definition, an *innovation-based business* is one where the primary purpose of the enterprise is to exploit an innovation for commercial gain. We exclude businesses that provide support, installation, contract services or advice on technology to innovation-based start-ups. While such companies underpin the development of a cluster and their diversity and scope is an indicator of its maturity, they are not the subjects of our interest which focuses on the innovation-based businesses themselves.

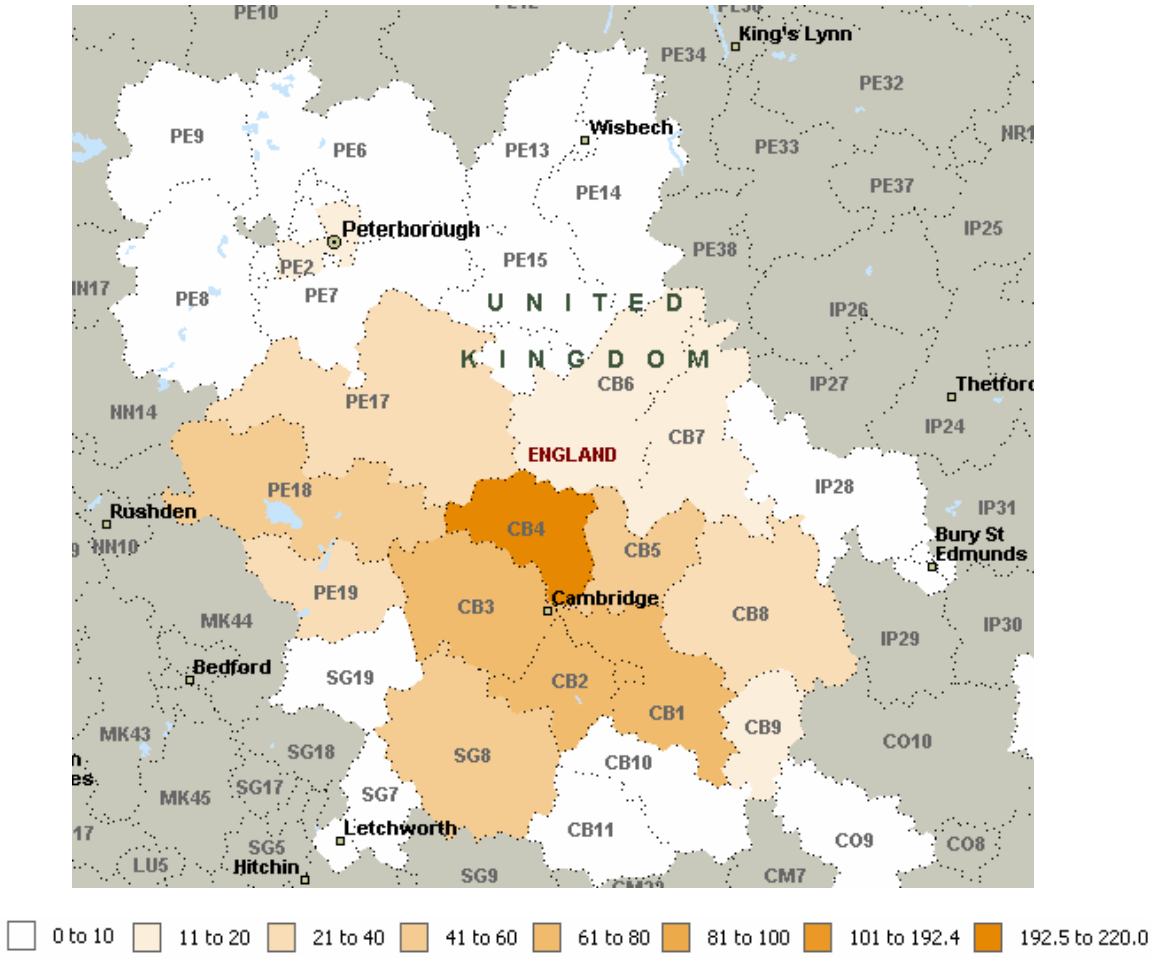
In architecting the Library House database, we created a *taxonomy* to classify all innovation-based businesses. At the top level, there are 7 prime sectors. These 7 prime sectors give rise to 40 sub-sectors which themselves are analysed into a total of 236 sub-sectoral categories and sub-categories.

All companies are classified according to their funding stage. *Seed Stage* is defined as those companies that have either received no funding or they have received business angel funding, friends and family funding, government grants or awards or a combination of any of them. *Series A* funding is defined as the first institution-led round of funding. *Series B* funding is defined as the second institution-led round of funding.

Our *research method* is to conduct telephone interviews with each company as the basis for populating 100 fields of information in the database about that company. These interviews are undertaken by our research team; which comprises PhD, post-doctoral and MBA students from Cambridge University and whose domain expertise spans the sectors.

Introduction to the Cambridge Cluster Report

The Cambridge Cluster Report 2003, which is published on 26 June 2003, marks the culmination of Library House's initial investigation of the Cambridge Cluster. Data collection work commenced in August 2002 and was completed at the end of March 2003. In that time, Library House examined 1,568 companies within the geographic boundaries of the Cambridge region that potentially met the definition of an innovation-based business. Once companies that did not comply with our definition were excluded, 898 innovation-based companies remained which are the subject of this report. In addition to excluding companies which did not comply with our definition of an innovation-based business, we excluded from this Report, divisions of three large companies whose scale we considered would have distorted the results: Johnson Matthey, Marshall Aerospace and Perkins Engines.



Number of Companies by Area

This 2003 Report will provide the baseline for tracking changes over time in the Cambridge Cluster and for comparisons with other high technology clusters and regions. The map above defines the geographic scope of the Report according to the post-codes in which the companies within the Cambridge Cluster Report 2003 are located.

The Cambridge Cluster Report 2003 is available to Library House Members who receive it free as part of their annual membership fee. It will also be essential reading for external audiences who are interested in access to the first comprehensive and detailed description of the Cambridge Cluster. The Report is available to purchase in electronic and hard copy formats.

Acknowledgements

We take this opportunity to thank our Shareholders and Members without whose financial support this Cambridge Cluster Report 2003 could not have been undertaken and to all the companies that provided information on their businesses.

We also thank our Research Director, Kjell Nace and research team who populated the Library House database and completed the analyses that are presented in this report:
Nathan Benson, Dr. Jane Dancer, Peter Eckley, Cynthia Hou, Robert Lancastle, Dr. Jens Lapinski, Dr. Albert Liao, Dr. Angela Loihl, Dr. Anuj Madhok, Grainne McNeece, Zahid Moneer, Oded Nov, Shaan Oosthuizen, Dr. Galatia Politopoulou, Dr. Sangkaran Ratnam, Jason Rolles, Quentin Tannock and Dr. Lin Tze Tan

Executive Summary

The Cambridge Cluster by Sector

The initial effort was to understand the Cambridge Cluster (the 'Cluster') by measuring the size of each sector. Of the seven top-level sectors, the Information Technology sector is the predominant sector in the Cluster containing 536 companies which represents 59.7% of the Cluster followed by Life Sciences containing 202 companies which represents 22.5% of the Cluster. When the entire Cluster is viewed at the next level down, as 40 unique sectors, a different story emerges.

Now, instead of a cluster clearly dominated solely by Information Technology, three sub-sectors stand out: Application Software, Biotechnology and Electronic Equipment & Instruments representing 160, 153 and 106 companies respectively. These three sub-sectors contain 46.6% of all the companies within the Cluster which begins to show the concentration within the Cluster and further, the importance of Biotechnology, which is obscured at the top level.

These and other sub-sectors are best understood by looking at them in detail at the category and sub-category level. A selection of the largest or most interesting is described below.

Application Software. The largest sub-sector within the Information Technology sector is Application Software. This sub-sector comprises 160 companies and represents 28.1% of the total Information Technology sector. Companies producing Business Application Software dominate the Application Software sub-sector. The 71 companies in this category represent 44% of all companies within the Application Software sub-sector.

Three categories trail Business Application Software: Graphics Software (11.3%), Communications Software (8.8%) and Industrial Applications (7.5%). All other categories are smaller than 5%.

Biotechnology. 76% of Life Science start-ups in the Cluster are biotechnology start-ups. Biotechnology is dominated by companies either directly involved in development of health care products and services or in the creation of research tools, reagents and equipment (RTR&E). The largest sub-category within the Health Care category of Biotechnology is in the discovery and development of therapeutics. Fifty-two companies are solely devoted to therapeutics.

Therapeutics may be examined more closely. First, most therapeutic biotechnology companies in the Cluster use either small molecules or proteins/antibodies as therapeutic substances. Other technologies, such as cell or viral therapies play an insignificant role in this cluster. Second, the route for the discovery or selection of those molecules is more diversified, but there is a clear focus on "clever" drug design, utilising informatics (bio- & chemo-), structure based drug design and combinatorial chemistry. Third, the therapeutic areas, in which the Cluster biotechnology companies specialise, are immunology & inflammation, cancer, and infectious diseases. All other areas trail those three leading sectors significantly.

The Electronic Equipment and Instruments Sub-Sector. The Electronic Equipment & Instruments sub-sector is the third largest in the Cluster comprising 106 companies or 11.8% of all Cluster companies. In contrast to the Biotechnology and Application Software sub-sectors, Electronic Equipment & Instruments is not dominated by one or two large categories. Instead, the sector is more or less evenly divided into five categories: General, Electronic Security Equipment, Electronic Test & Measurement Instruments, Scientific & Technical Instruments and Other. The "General" and "Other" categories combined account for more of 40% of the companies in this sub-sector.

Wireless Telecommunication Services Sub-Sector. Although this sub-sector is only ranked 7th in terms of company numbers, some of these companies can be considered to be

world leaders in wireless telecommunication technology. There are five categories with the largest being Wireless Applications containing 23 companies representing 65.7% of the sub-sector.

The Cluster Over Time

Though it is clear from the above that Information Technology and Life Sciences are the largest sectors and further that within those two sectors, Application Software, Biotechnology and Electronic Equipment & Instruments are the most active sub-sectors, what is not clear is how active they are now. This may in part be shown through company formation data. This data is inherently skewed insofar as the universe tracked comprises only those companies that are in business today. Thus it shows the cumulative date of formation of *surviving* companies. Nevertheless, with that caveat in mind, it is accurate and comprehensive.

We began by comparing the formation of Information Technology and Life Sciences from 1970 to date. What the data shows is that Information Technology had its first wave of company formation in the early 1980s, its second wave in the late 1980s and its third wave concurrent with the internet boom from 1994 onwards. By contrast, Life Sciences only began to take off significantly in Cambridge post 1994.

It could be inferred from the data that Information Technology has been and remains the driving force in the Cluster. However, closer examination reveals a more important trend, namely, that the surviving Information Technology companies were formed in three distinct waves.

The first wave was Electronic Equipment and Instruments beginning in the early 1980s. The second wave was Application Software beginning 10 years later in the late 1980s. *The most recent wave has been Biotechnology which significantly is the fastest growing and highest peaked wave of company formations that the Cluster has ever seen.*

Though these waves formed and crested at different times, new companies continue to be formed within the earlier sub-sectors. Those sectors remain vibrant and the Cluster can now be seen as multiple, more narrowly defined Clusters, which interact and amplify each other.

Employment by Sector

When sorted by employment, the Cluster appears quite different. The vast majority of companies within the Cluster are small. More than 300 of the 898 companies surveyed employ 5 or less people. An additional 200 employ 20 or less people.

A breakdown of the Cluster into the seven primary sectors shows that Telecommunication Service companies have the highest mean number of employees per company with an average of 58.4 employees per company. The Life Sciences and Information Technology sectors are not significantly different to each other at 32.8 and 26.9 average number of employees respectively. At the sub-sector level though differences begin to appear. A sort of the Information Technology and Life Sciences sub-sectors only, shows that the Semiconductor sub-sector employs almost twice as many people per company as any other sub-sector within Information Technology and Life Sciences.

But on an absolute basis the Biotechnology sub-sector, the fastest growing and the youngest sub-sector of significance, has become, amongst all Information Technology or Life Sciences sub-sectors, the largest employer in the cluster as well, employing 5,343 people. Once again, the emerging importance of this sub-sector is becoming evident.

Equity Investment

The intent of this section is to understand the Cluster by examining each sector by the companies' stage and funding status. An overview of the Cluster demonstrates that the vast majority, over 525 companies, have not yet received Series A funding which Library House defines as the first institutional round of funding. Seed funding is defined as those companies that have either received no funding or have received business angel funding, friends and family funding, government grants or awards or a combination of any of them.

On a sector-by-sector basis, a different picture of business maturity emerges. A side-by-side comparison of Information Technology versus Biotechnology suggests that a much greater percentage of Information Technology companies are at the seed stage.

A greater number of Life Sciences companies as a percentage of all Life Sciences companies are moving through the pipeline from Seed to later stage than their counterparts in Information Technology. But, on an absolute basis the total number of Information Technology companies receiving A series funding is about the same as Life Sciences. Also, a greater percentage of Life Sciences companies are receiving subsequent rounds of funding, although that may be an artefact of Life Sciences funding where a greater number of rounds and a greater absolute amount of capital is typically employed across the lifetime of the company.

Financing in the Cluster

Perhaps the most debated question regarding the Cluster surrounds the capital needs of the innovation-based start-ups. This section explores the general picture of financing. The first question concerns the total aggregate desire for capital by sector within the Cluster.

As of 31st March when data collection was finished, the 898 innovation-based companies in the Cluster were seeking in aggregate £259 Million. The Life Sciences and Information Technology sectors each seek greater than £100 Million and together account for the majority of capital desired. But, even at this level, differences appear. There are 38 Life Sciences companies seeking an average of £3.1 Million, while there are 64 Information Technology companies seeking an average of £1.7 Million. *The Life Sciences start-ups are seeking almost twice as much capital per company as their equivalents in Information Technology.*

At the 40 sub-sector level a more precise picture of Life Sciences and Information Technology Capital requirements appear. *The Biotechnology sub-sector, by itself, accounts for 41% of all the capital desired in the entire Cluster and 91% of the capital desired within the Life Sciences sector.*

Also, some new sub-sectors that contain few companies and few employees, but which are capital intensive appear: Semiconductors and Wireless Telecommunications Services in particular.

Most importantly, to the degree that one accepts, i) that equity funding employed is a more meaningful proxy for Cluster activity than company formation and ii) that at least in the aggregate that equity funding required and equity funding employed have a direct relationship, then it is very significant that only 8 sub-sectors account for more than 85% of the desired capital in the Cluster. These sub-sectors are: Biotechnology, Semiconductors, Application Software, Wireless Telecommunication Services, Computer Storage and Peripherals, Electronic Equipment and Instruments, Systems Software and Health Care Equipment.

In fact, the picture sharpens even more when companies are sorted by their mean equity-funding requirement; that is, by the average amount a given company within a sub-sector is seeking. It becomes apparent that Semiconductor (£7,425,000) and Computer Storage and

Peripherals companies (£6,750,000) have approximately twice the need for capital as a typical Life Science start-up and more than four times the average Information Technology start-up. Once again, the point to be understood is that these sub-sectors are small as measured by the number of companies within the sub-sectors but they are outsized in terms of the amount of capital employed.

The second question concerns the distribution of companies by stages that seek capital. The preponderance of companies are Seed Stage companies, though a significantly greater percent of Life Science companies are at Series A than Information Technology companies.

At the sub-sector level the picture changes. Biotechnology and Application Software mimic their parent sectors above; but Wireless Telecommunications Services, Computer Storage and Peripherals and Semiconductors all reflect a considerable shift towards A Series or later funding. The latter three sub-sectors in effect shift the total funding picture towards the later stages, while the first two sub-sectors pull the total funding picture towards the earlier stages.

An examination of the number of companies seeking funding at a given stage as a percentage of the total number of all companies at that stage reveals that the later stages have a greater percentage of their companies seeking funding than the earlier stages, ranging from 17% of Seed stage companies to 27% of Series B stage companies.

The last question to explore is the distribution of capital requirements by sub-sector and stage. The data shows that the amount of capital across stages is more evenly distributed than the number of companies pursuing capital. Not surprisingly, as the stages progress, the amount of capital does not diminish as rapidly as the number of companies decrease. In the later stages, a much smaller population of companies is seeking much greater quantities of capital.

Funds Invested

Capital required can only tell us so much. Perhaps the most interesting data lies in how much funding has actually been raised in the past three years. Library House has tracked the total funding activity across the sector for the years 2000, 2001 and 2002. At the top level, the funding across the Cluster over the last three years appears relatively stable ranging between £245 Million and slightly over £300 Million totalling £829 Million.

Within the above numbers considerable disparity exists when comparing the relative success of different sectors in securing capital. Life Sciences dominates the amount of funding successfully raised. In addition, Telecommunication Services, receives a much larger share of capital than would be anticipated based on the relatively small number of companies in the sector.

The Life Sciences, Information Technology and Telecommunication Services sectors attracted more than 96% of the funding for the entire Cluster for the last three years. However, if one investigates the investment pattern at the sub-sector level, the distribution of capital is shown to be even more concentrated. Five sub-sectors alone represent 80% of all finance raised. Biotechnology raised £361 Million, Wireless Telecommunication Services raised £86 Million, Alternative Carriers raised £75 Million, Semiconductors raised £70 Million and Application Software raised £68 Million.

Deal size and character changed over the period as well. On the one hand the number of Seed stage deals funded increased dramatically but on the other hand the average amount invested at the Seed stage decreased precipitously.

Unlike the Seed stage environment shown above, at the A Series stage the decline has been absolute. The average A Series deal declined from above £5 Million to about £2 Million from

2001 to 2002 while the total number of deals in the Cluster neither rose nor fell significantly during the period.

When one analyses those five sub-sectors in closer detail, trends within the investment patterns start to become apparent: instead of simply counting amounts invested per year, we can analyse amounts invested per stage and sub-sector. By doing so, we see that investments, similar to company incorporation patterns, exhibit waves. For example, the Biotechnology sub-sector saw strong investment levels in Seed and Series A stages in 2000. In 2001, almost no companies received seed funding, but very strong Series A and moderate Series B, C and D funding took place. This trend continued in 2002, where Seed stage and Series A funding were less pronounced than investments in Series B and C. A very similar wave pattern can be observed in all other sub-sectors, although the peaks of investments per stage tend to differ.

This story becomes more pronounced, when one analyses the average deal size for a particular sub-sector, investment stage and year. By analysing the average deal size by sector and investment stage, three things can be learned. First, Biotechnology is by far the most active sub-sector within the Cluster: 88 separate investment deals took place in that sub-sector within the last three years, the other four sectors combined accounted for only 63 deals. Second, the number of deals per sub-sector in a given year has steadily increased from 2000 over 2001 to 2002. This is true for all sub-sectors. Third, the average deal size has decreased substantially at the Seed and Series A stage, but has remained more or less constant for Series B and C & D stages. An exception is the Semiconductor sub-sector, which has remained stable over three years, although Seed funding has recently dried up in this sub-sector, too.

We also begin to observe some disturbing trends in the funding across stages. Generally there has been little Seed stage funding over the past three years. Further, the source of the strength of the Biotechnology sub-sector becomes apparent. Seed stage funding is the predicate to all growth within a sector and as can be clearly seen dating back as far as 2000 there has been little Seed stage funding except in Biotechnology which had a vigorous year in 2000, a dip in 2001 and a restoration in 2002. This is in stark contrast with the other five key sub-sectors.

In fact aside from strong investment in B Series rounds in Application Software in 2000 and A Series rounds in Wireless Telecommunications Services in 2000, the investment market has been quiet except for Biotechnology. Biotechnology has shown strong financing across stages and years for the entire period. Given its recent past performance and its continued appetite for capital it is reasonable to assume that it will continue to outperform all other areas.

The report concludes with a list of the top deals by stage for 2002.

The Cluster by Sector

As described above, Library House created a custom taxonomy to classify all innovation-based businesses. The 7 primary sectors is divided into 40 2nd level sub-sectors:

Illustration 2: **The seven key sectors and 40 sub-sectors**

KEY SECTOR	SUB-SECTOR
Consumer Discretionary	General
	Broadcasting and Cable TV
	Consumer Electronics
Energy	Alternative Energy
	Alternative Energy Technologies
Life Sciences	Biotechnology
	Health Care Equipment
	Health Care Supplies
	Pharmaceuticals
Industrials	General
	Aerospace and Defence
	Commercial Printing, Services & Products
	Electrical Components and Equipment
	Industrial Machinery
Information Technology	General
	Application Software
	Communications Hardware
	Computer Storage and Peripherals
	Computing Systems Hardware
	Discrete Components
	Electronic Equipment and Instruments
	Internet Software & Services
	IT Management, Consulting & Services
	IT Systems
	Office Electronics
	Photonics
	Semiconductor Equipment and Materials
	Semiconductors
	Subassemblies & Components
	Systems Software
Materials	General
	Advanced Materials
	Fertilizers & Agricultural Chemicals
	Industrial Gases
	Metals, Metallurgy & Alloys
	Speciality Chemicals
Telecommunication Services	General
	Alternative Carriers
	Integrated Telecommunication Services
	Wireless Telecommunication Services

At the top level the Cluster breaks down according to company numbers as follows:

Illustration 3 **The Cluster's primary sectors by number of companies**

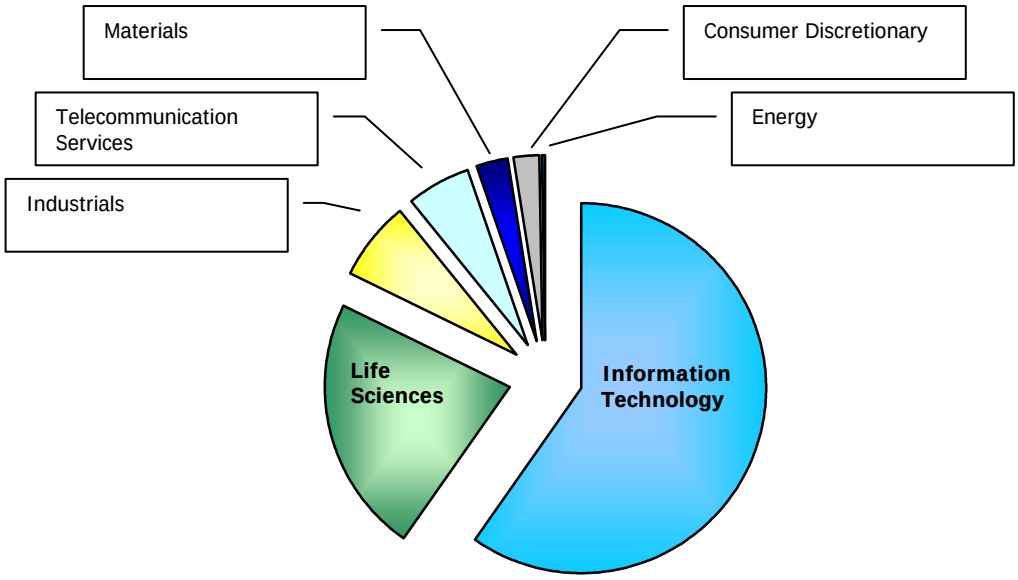


Illustration 4 **The Cluster's primary sectors ranked by number of companies**

Sector	#	%
Information Technology	**536**	**59.7**
Life Sciences	**202**	**22.5**
Industrials	63	7.0
Telecommunication Services	49	5.5
Materials	25	2.8
Consumer Discretionary	21	2.3
Energy	2	0.2
Total	**898**	**100**

As can be seen from the table and chart above, the Information Technology sector is the predominant sector in the Cluster. When it is combined with the Life Sciences sector the two together represent greater than 80% of the entire Cluster. However, a different picture emerges when the sub-sectors within the 7 primary sectors are examined.

The Cluster's primary sectors can be divided into 40 sub-sectors. The twelve largest sub-sectors are indicated by text boxes:

Illustration 5 **All sectors and sub-sectors of the Cluster ranked by number of companies**

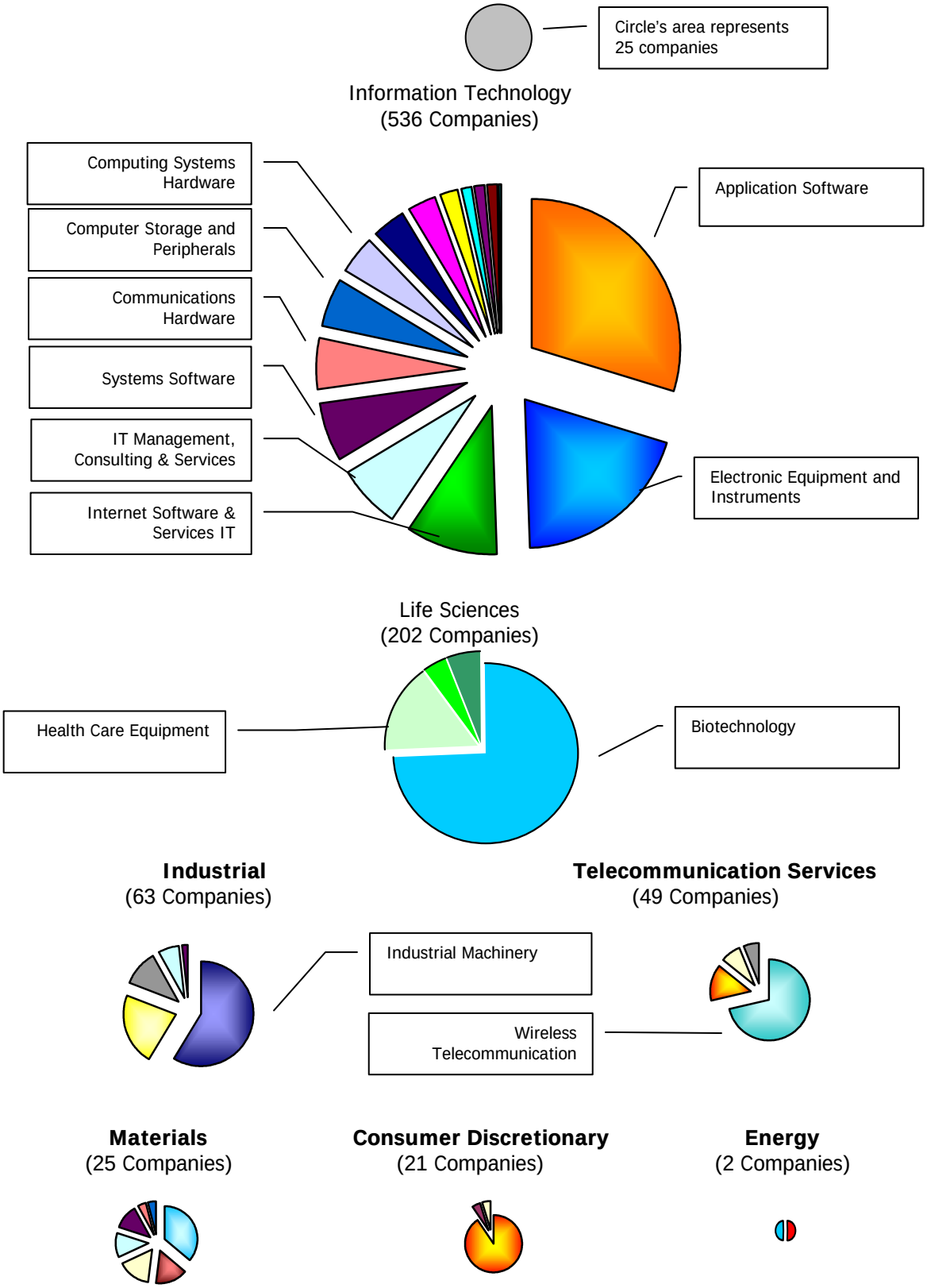


Illustration 6 **All sub-sectors of the Cluster ranked by number of companies**

Rank	Sector	> Sub-Sector	#	%
1	**Information Technology**	**> Application Software**	**160**	**17.8**
2	**Life Sciences**	**> Biotechnology**	**153**	**17.0**
3	**Information Technology**	**> Electronic Equipment & Instruments**	**106**	**11.8**
4	Information Technology	> Internet Software & Services	53	5.9
5	Information Technology	> IT Management, Consulting & Services	37	4.1
6	Industrials	> Industrial Machinery	37	4.1
7	Telecommunication	> Wireless Telecommunication Services	35	3.9
8	Information Technology	> Systems Software	34	3.8
9	Life Sciences	> Health Care Equipment	32	3.6
10	Information Technology	> Communications Hardware	29	3.2
11	Information Technology	> Computer Storage and Peripherals	29	3.2
12	Information Technology	> Computing Systems Hardware	23	2.6
	Information Technology	> IT Systems	19	
	Consumer Discretionary	> Consumer Electronics	19	
	Information Technology	> Photonics	16	
	Industrials	> Electrical Components and Equipment	14	
	Information Technology	> Semiconductors	10	
	Life Sciences	> Pharmaceuticals	9	
	Materials	> Advanced Materials	9	
	Life Sciences	> Health Care Supplies	8	
	Industrials	> Aerospace and Defence	7	
	Telecommunication	> Alternative Carriers>Broadband	7	
	Information Technology	> Discrete Components	6	
	Information Technology	> Semiconductor Equip.& Materials	6	
	Information Technology	> Subassemblies & Components	6	
	Industrials	> Commercial Printing, Services & Products	4	
	Materials	> Metals, Metallurgy & Alloys	4	
	Materials	> Speciality Chemicals	4	
	Telecommunication	> General	4	
	Materials	> Fertilizers & Agricultural Chemicals	3	
	Materials	> Other	3	
	Telecommunication	> Integrated Telecommunication Services	3	
	Information Technology	> Office Electronics	2	
	Consumer Discretionary	> Consumer Discretionary General	1	
	Consumer Discretionary	> Broadcasting and Cable TV	1	
	Energy	> Alternative Energy	1	
	Energy	> Alternative Energy Technologies	1	
	Industrials	> General	1	
	Materials	> General	1	
	Materials	> Industrial Gases	1	
Total Number of Companies			**898**	

At the sub-sector level, instead of a Cluster clearly dominated solely by Information Technology, three sub-sectors stand out: Application Software, Biotechnology and Electronic Equipment & Instruments. The following sections examine the context and constituency of these and other large sub-sectors.

The Application Software Sub-Sector

The largest sub-sector within the Information Technology sector is Application Software. This sub-sector comprises 160 companies and represents 28.1% of the total Information Technology sector. The Applications Software sub-sector breaks down into the following categories:

Illustration 7 **Application Software sub-sector by category**

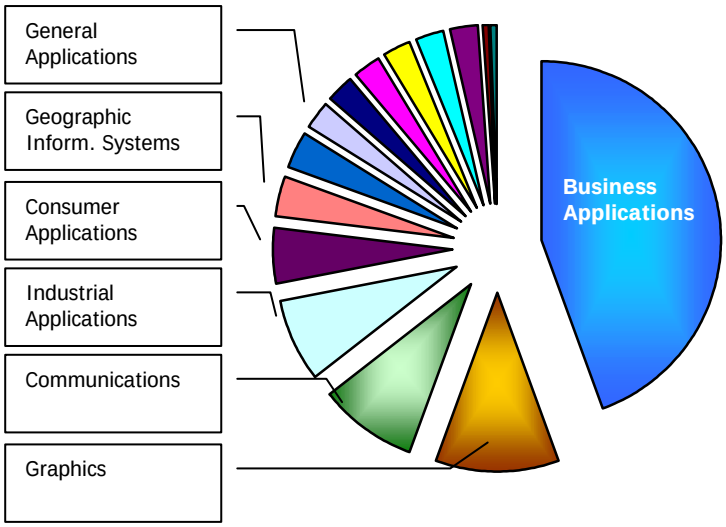


Illustration 8 **Application Software sub-sector ranked by number of companies**

IT>Application Software	#	%
Business Application	**71**	**44.4**
Graphics Software	18	11.3
Communications Software	14	8.8
Industrial Applications	12	7.5
Consumer Applications	8	4.9
Geographic Information	6	3.8
General	5	3.1
Automotive Manufacturing	4	2.5
Graphics & Publishing	4	2.5
Healthcare Applications	4	2.5
Internet Applications	4	2.5
Simulation & Analysis	4	2.5
Wireless Applications	4	2.5
Design-Automation Software	1	0.6
Project Management	1	0.6
Total	**160**	**100**

The two illustrations above show that Business Application Software dominates the Application Software sub-sector. 71 companies in this category represent 44% of all companies within the Application Software sub-sector. Prominent examples are **Autonomy Corporation** and **Jobstream Group**. Three categories trail Business Application Software: Graphics Software (11.3%), Communications Software (8.8%) and Industrial Applications (7.5%). All other categories are smaller than 5%. The companies specialising in Business Applications Software can be grouped as follows:

Illustration 9 **Business Application Software category by sub-category**

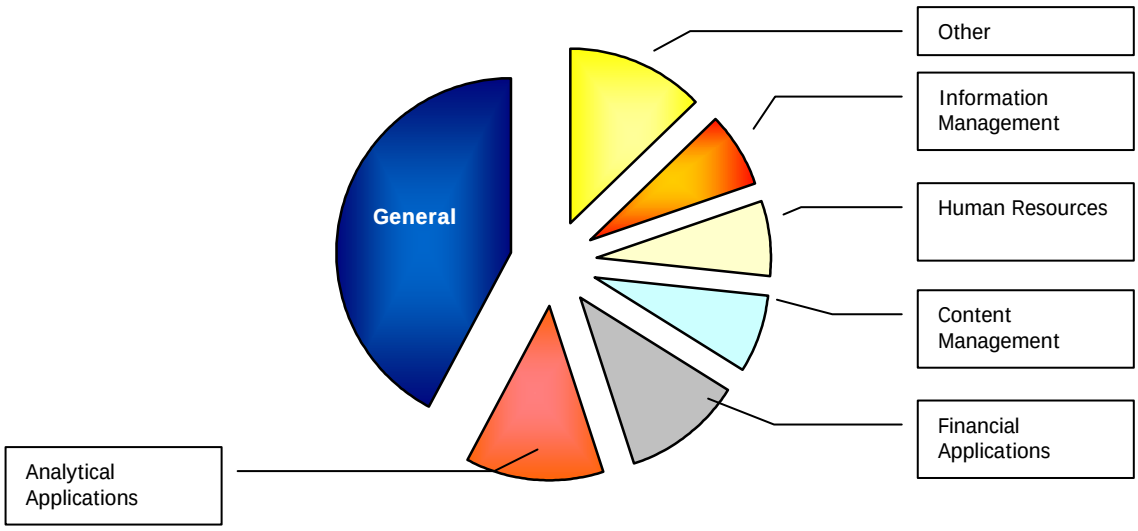


Illustration 10 **Business Application Software sub-categories ranked by number of companies**

IT>Application Software>Business Application Software	#	%
General	30	42.3
Analytic Applications Software	9	12.7
Financial Applications Software	8	11.3
Content Management Software	5	7.0
Human Resources Software	5	7.0
Information Management Software	5	7.0
Other	9	12.7
Total	**71**	**100**

As can be seen from the two illustrations above, there is no further significant specialisation of companies in the Business Application category. Fifty-five percent of all companies in this category were either defined as “General” (meaning they are involved in several sub-categories) or “Other” (involved in a sub-category which Library House does not classify).

The Biotechnology Sub-sector

76% of Life Science start-ups in the Cluster are biotechnology start-ups. Biotechnology is dominated by companies either directly involved in development of health care products and services or in the creation of research tools, reagents and equipment (RTR&E). Example companies in the Health Care category include: **Acambis**, **Cambridge Antibody Technology**, **Celltech**, **GeneMedix**, **Pharmagene**, **RiboTargets** or **Xenova**. RTR&E examples include **AbCam**, **Celsis** and **Whatman International**.

Illustration 11 **The Biotechnology sub-sector by category**

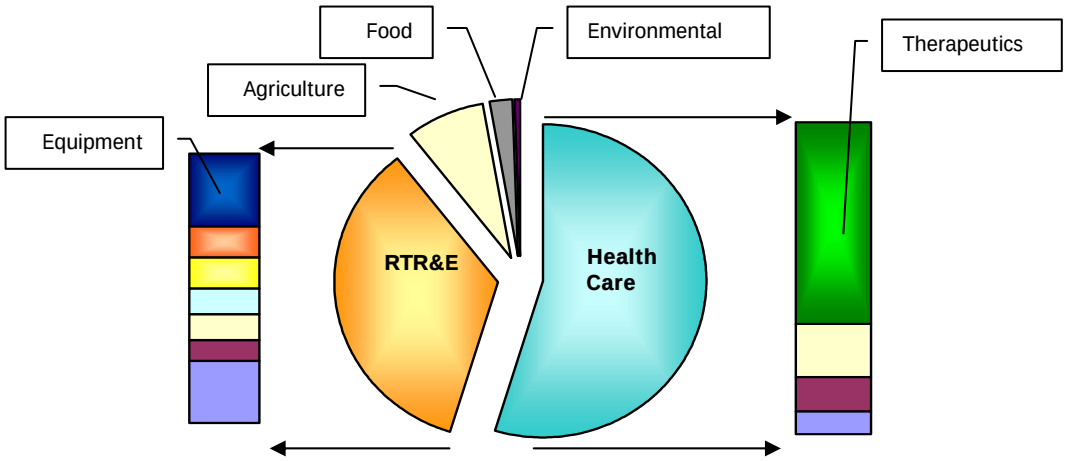


Illustration 12 **Health Care sub-categories ranked by number of companies**

Life Sciences>Biotechnology>Health Care	#	%
Therapeutics (Discovery and Development)	**52**	**63.4**
Biotech R&D Enhancement	14	17.1
Diagnostics	10	12.2
Other	6	7.3
Total	**82**	**100**

Illustration 13 **RTR&E sub-categories ranked by number of companies**

Life Sciences>Biotechnology> RTR&E	#	%
Other	17	29.8
Equipment	14	24.6
Assays	6	10.5
Screening Technology	6	10.5
Micro Arrays/Lab On a Chip	5	8.8
Reagents	5	8.8
Software	4	7.0
Total	**57**	**100**

As can be seen from the two tables above, at the final level it becomes apparent that the largest category within Biotechnology is in the discovery and development of therapeutics. 52 companies are devoted to therapeutics. Their specialisation is shown in illustration 14.

Illustration 14 **Specialisation of Therapeutics companies within the Health Care category by therapeutic area covered, the type of therapeutic molecule used and by method of molecule discovery**

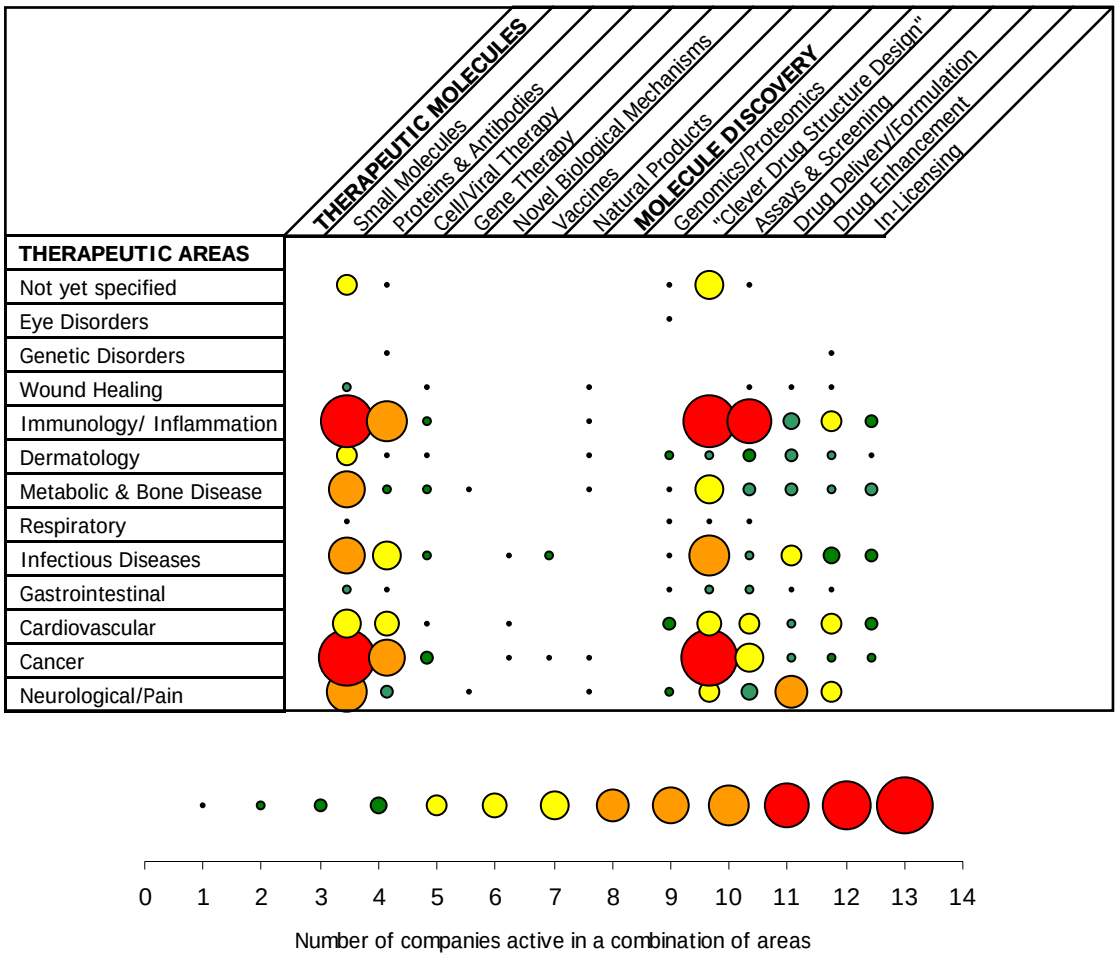


Illustration 14 analyses therapeutics companies in three ways:

1. Most therapeutic biotechnology companies in the Cluster use either small molecules or proteins/antibodies as therapeutic substances. Other technologies, such as cell or viral therapies play an insignificant role in this Cluster.
2. The route for the discovery or selection of those molecules is more diversified, but there is a clear focus on “clever” drug design, using methods such as informatics (bio- & chemo-), structure based drug design and combinatorial chemistry.
3. The therapeutic areas in which Cluster biotechnology companies specialise are immunology & inflammation, cancer, and infectious diseases. All other areas trail those three leading sectors significantly.

The Electronic Equipment and Instruments Sub-Sector

The Electronic Equipment & Instruments sub-sector is the third largest in the Cluster and comprises 106 companies or 11.8% of all Cluster companies. This sub-sector can be broken down into five further categories, as shown below:

Illustration 15 **The Electronic Equipment & Instruments sub-sector by category**

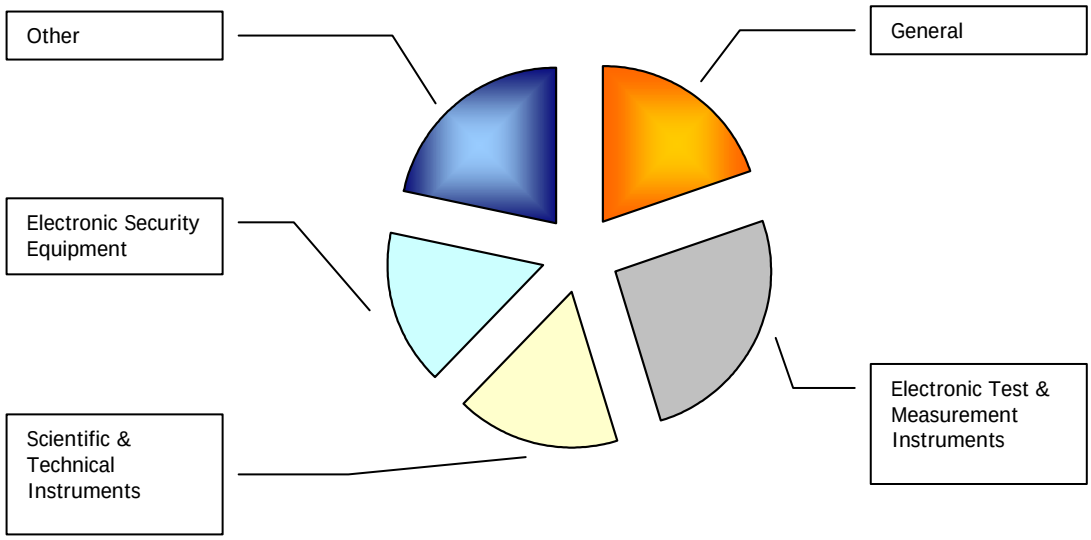


Illustration 16 **Electronic Equipment & Instruments categories ranked by number of companies**

IT>Electronic Equipment & Instruments	#	%
Electronic Test & Measurement Instruments	27	25.5
Other	23	21.7
General	21	19.8
Scientific & Technical Instruments	18	17
Electronic Security Equipment	17	16
Total	**106**	**100**

In contrast to the Biotechnology and Application Software sub-sectors, Electronic Equipment & Instruments is not dominated by one or two large categories. Instead, the sector is more or less evenly divided into five categories (see above). Interestingly, the "General" and "Other" categories combined account for more of 40% of the companies in this sub-sector. Typical examples of companies assigned to the general category are **The Roxboro Group**, whose operating companies work in a wide range of high technology areas or **1 Limited**, a company specialising in ceramic actuators, digital signal processing and aero-gel-based acoustic absorbers. An example of a company in the "Other" category is **Smart Drive**, a specialised business for the development of high-precision stepper motors and supporting technology.

Wireless Telecommunication Services Sub-Sector

Although this sub-sector is only ranked 7th in terms of number of companies, some of these companies can be considered to be key players in wireless telecommunication technology. Companies such as **3G Lab**, Hutchinson 3G (now "**3**"), **Cambridge Positioning Systems**, **CommunicAID**, **Infomatrix**, **ip.access**, **nGame**, **Sepura**, **Symbian**, **TTP Communications** or **UbiNetics** have operations within the Cluster. The sub-sector can be segmented as follows:

Illustration 17 **The Wireless Telecommunications sub-sector by category**

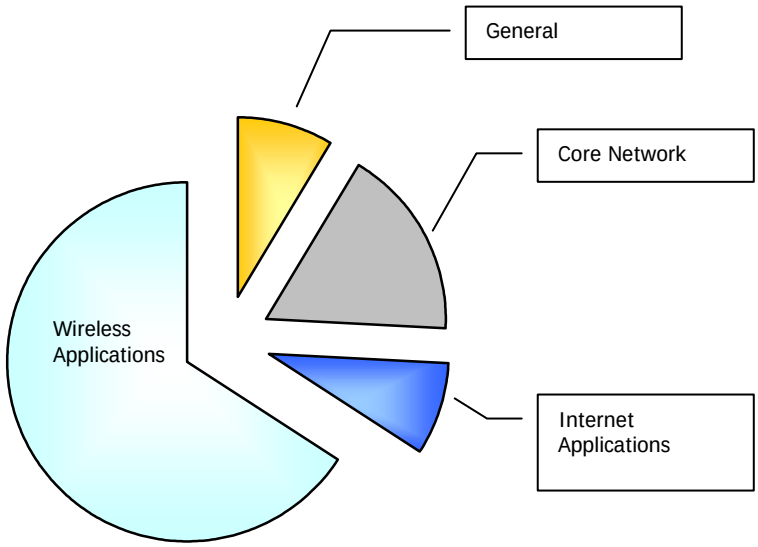


Illustration 18 **Wireless Telecommunications categories ranked by number of companies**

Telecomm.>Wireless Telecomm.	#	%
Wireless Applications	**23**	**65.7**
Core Network	6	17.1
General	3	8.6
Internet Applications	3	8.6
Total	**35**	**100**

The majority of companies (65.7%) within the Wireless Telecommunications sub-sector are found in the category Wireless Applications. Consistent with this observation, most of the larger players within the sub-sector, with the exception of **ip.access** and **UbiNetics** (both category Core Network), can also be found in the Wireless Applications category. The Wireless Application category may thus be seen as a highly successful "mini-cluster" within the Cluster.

Internet Software and Services Sub-Sector

The fourth largest sub-sector in the Cluster, Internet Software and Services comprises 53 companies. Companies in this sub-sector include: **Dalmatian Design**, distribute their own small-scale Internet content management system aimed at small businesses, **Active Hotels**, which facilitates online booking of hotels and houses, **Virtual Business Network**, whose bFORA platform technology enables information exchange between separate networks and **Zeus Technology**, focusing on web server infrastructure research and development.

IT Management, Consulting & Services Sub-Sector

Companies assigned to this sub-sector are generally businesses which tailor make IT and/or other solutions for their customers, using innovative processes or procedures. Although we have excluded most consulting and service businesses from our database, these businesses meet our definition of innovation-based businesses, where the primary purpose of the enterprise is to exploit an innovation for commercial gain.

Examples of companies in this sub-sector are **Sentec**, a company that works with high-technology and biotechnology companies to help develop their technologies and bring them to market; **ObjectSecurity**, a Cambridge University spin-out, whose consultants and software engineers deliver a package of services, ranging from the specification of an enterprise security policy to the implementation and integration of security infrastructures in distributed systems, using their own software; or **Tessella Support Services**, founded in 1979, which provides bespoke software development services and computer consultancy to scientific and engineering organisations.

Industrial Machinery Sub-Sector

Thirty-seven (37) companies are classified in this largest sub-sector within the Industrial sector. Examples of companies are **Pursuit Dynamics**, which develops and commercialises a novel technology for marine propulsion and pumping applications and **Cambridge Vacuum Engineering**, a company which manufactures Electron Beam Welders and Vacuum Furnaces.

Systems Software Sub-Sector

Similar to the Applications and Internet Software sub-sectors, Systems Software is an important area within the Cluster. There are currently thirty-four (34) companies within this sub-sector. Larger players (with specialisation shown in brackets) include: **Citrix Systems** (Server Software), **Kaspersky Lab UK** (Virus Detection Software), **nCipher** (Security Software), **Productive Computer Insight** (Network Management Software), **Tadpole Technology** (Remote Access Software), **Teamstudio Europe** (Software Development Tools) and **Venation** (Content Distribution Software). As can be seen from the specialisations of these larger companies, the sector is highly diverse.

Health Care Equipment Sub-Sector

There are thirty-two (32) companies within this sub-sector, representing the Medical Devices category, Drug Delivery Systems and Medical Precision Instruments categories. Examples are **Cambridge Electronic Design**, which produces hardware and software for recording physiological signals; and **LiDCO Group**, producers of critical care monitoring technology.

Communications Hardware Sub-Sector

The last of the top ten sub-sectors, Communications Hardware comprises 29 companies, of which many are smaller companies, however, there are also some very large players in this category, such as: **C3** (Voice Communications hardware), **Drake Electronics** (Voice Communications Hardware), **GlobespanVirata** (Broadband Communication Semiconductors), **Tait Europe** (Voice Communications Hardware), **Cambridge Silicon Radio** (Single-Chip Wireless Bluetooth solutions) and **Team Simoco** (Voice Communications Hardware).

Clusters Over Time

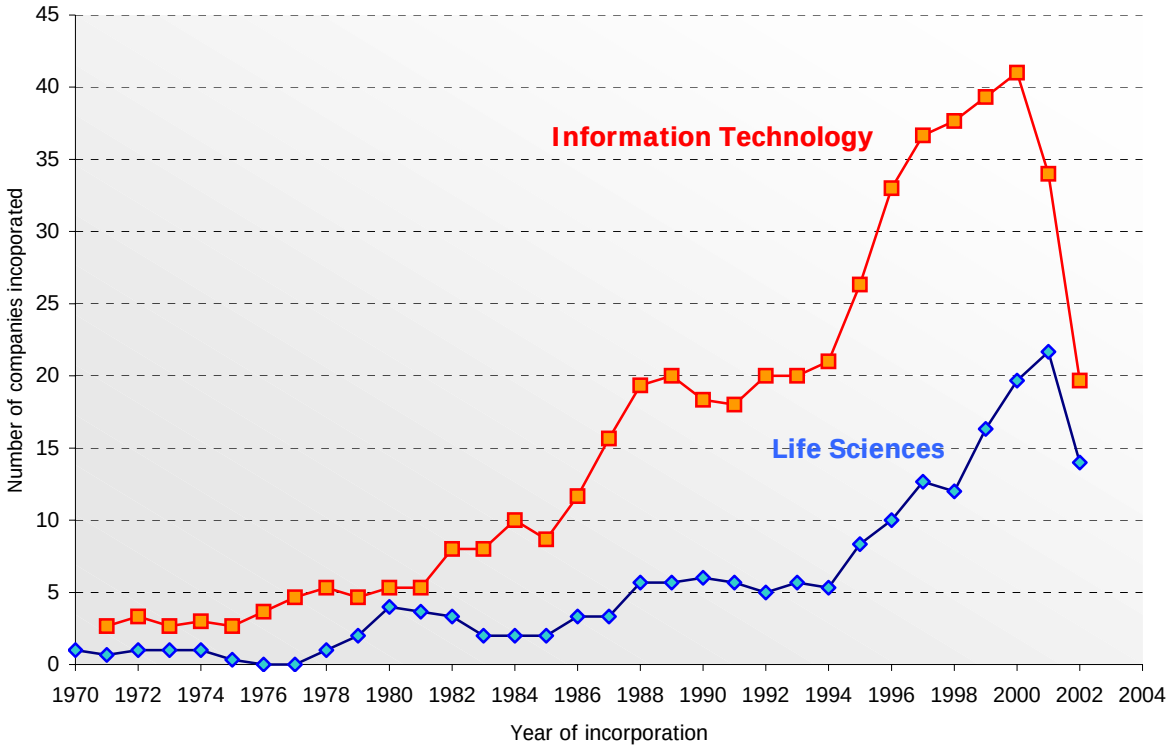
Though it is clear from the above that Information Technology and Life Sciences are the largest sectors and further, that within those two sectors, Application Software, Biotechnology and Electronic Equipment & Instruments are the most active sub-sectors, what is not clear is how active they are now.

This may in part be shown through company formation data. The charts below show when the companies that are tracked were formed. This data is inherently skewed insofar as the universe we track is those companies that are in business today. Thus it shows the cumulative date of formation of surviving companies. Nevertheless, with that caveat in mind, it is accurate and comprehensive.

In the first chart below the formation of Information Technology and Life Sciences from 1970 to date is compared. As can be seen, Information Technology enjoyed its first wave of company formation in the early 1980s, its second wave in the late 1980s and its third wave concurrent with the Internet boom from 1994 onwards.

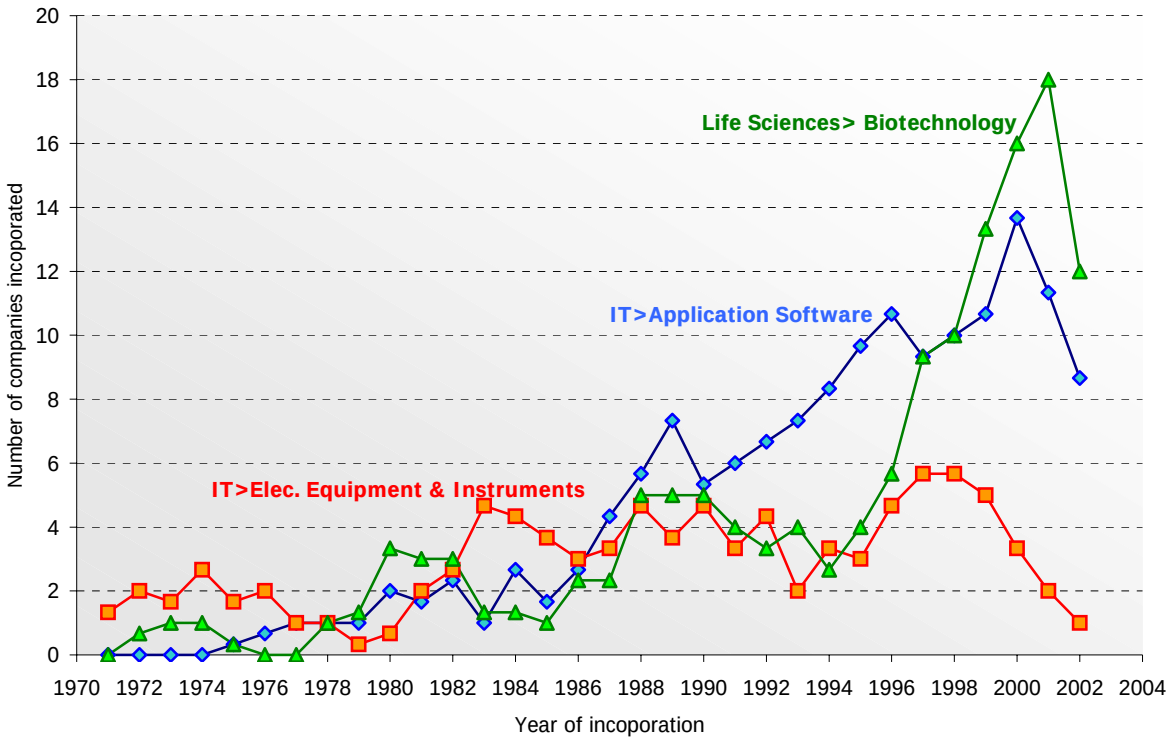
By contrast, Life Sciences only began to take off significantly in Cambridge post 1994.

Illustration 19 **Incorporations in the Information Technology and Life Sciences sectors since 1970**



It could be inferred from this graph that Information Technology has been and remains the driving force in the Cluster. However, closer examination reveals a more important trend, namely, that the surviving Information Technology companies were formed in three distinct waves.

Illustration 20 **Incorporations in the Application Software, Electronic Equipment & Instruments and Biotechnology sub-sectors since 1970**



The first wave was electronic instrumentation beginning in the early 1980s. This includes such companies as **Primagraphics**, a specialist supplier of graphics and video display systems and a recognised leader in the radar and command and control markets; **Cellstack Systems** (formerly known as K-NET Research and Development Limited & Nine Tiles Computer Systems Limited*)* which specialises in the design, manufacture and supply of high-quality video and audio networking equipment for use on high-speed digital networks; **Datapaq**, which produces systems for temperature profiling in hostile thermal environments and **MASS,** specialising in signal recording, processing, analysis, databases and test systems.

The second wave was application software beginning 10 years later in the late 1980's. This includes such companies as **APS** (Advanced Printing Solutions), which offers a fully integrated document production and document management solution for printed and electronic forms; **i2,** which develops analytical software solutions for assisting in the visualisation, analysis and communication of complex scenarios primarily for law enforcement agencies and **Brady**, a provider of software for derivative trading and risk management solutions.

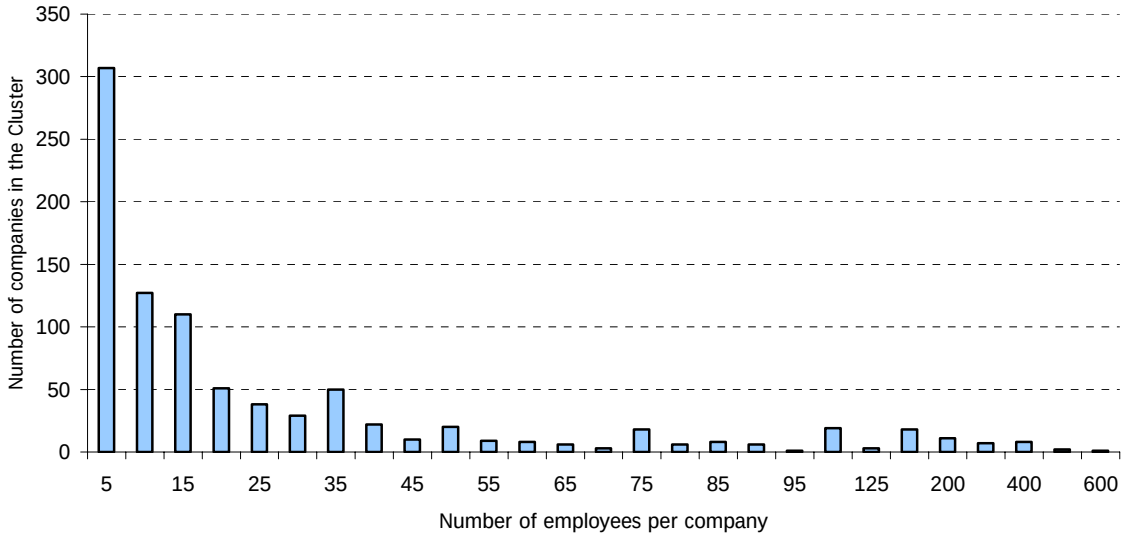
The most recent wave has been biotechnology which significantly is the fastest growing and highest peaked wave of company formations that the Cluster has ever seen. Beginning in the mid 1990s the biotechnology wave includes companies such as **Acambis** (originally Peptide Therapeutics) which discovers, develops and manufactures vaccines against infectious diseases; **PhytoPharm,** an established drug discovery specialist with a proven record in developing plant extracts (botanicals) as candidates; and **Celsis** specialising in manufacturing and marketing products for the rapid detection of microbial contamination.

Though these waves formed and crested at different times, new companies continue to be formed within the earlier sub-sectors. Those sectors remain vibrant and the Cluster can now be seen as multiple, more narrowly defined clusters, which interact and amplify each other.

Employment by Sector

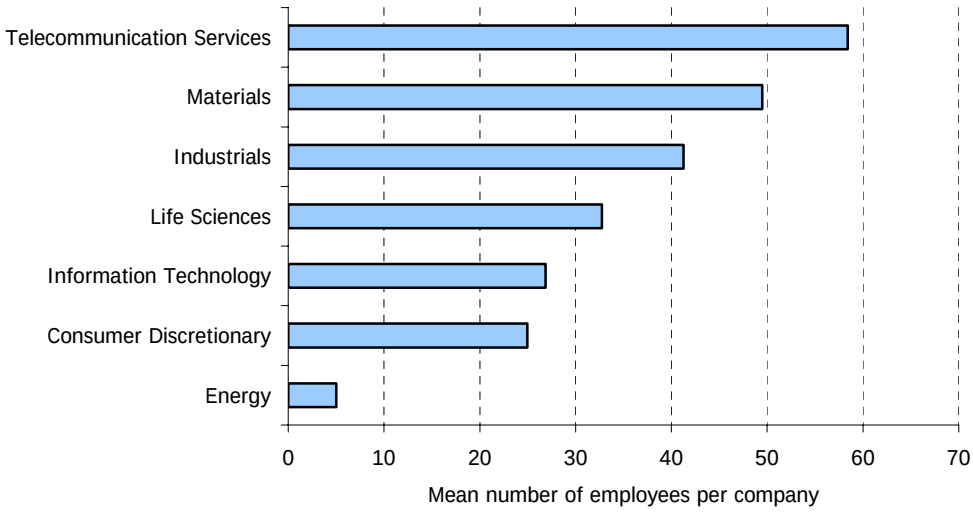
When sorted by employment, the Cluster appears quite different. The vast majority of companies within the Cluster are small. More than 300 of the 898 companies surveyed employ 5 or less people. An additional 200 employ 20 or less people:

Illustration 21 **Distribution of all companies within the Cluster by number of employees**



Examining the 7 primary sectors in the Cluster shows that Telecommunication Service companies have the highest mean number of employees per company with an average of 58 employees per company. The Life Sciences and Information Technology sectors are not significantly different to each other at 33 and 27 mean number of employees respectively. At the sub-sector level though differences begin to appear:

Illustration 22 **Mean number of employees per company by sector ranked according to size**



Analysing the Information Technology and Life Sciences sub-sectors only, shows that the Semiconductor sub-sector employs almost twice as many people per company as any other sub-sector within IT and Life Sciences.

Illustration 23 **Sub-sectors within the Information Techology and Biotechnology sectors ranked by mean number of employees per company**

Sector>	Sub-sector	Mean No. of Employees
Information Technology	**Semiconductors**	**79.5**
Information Technology	IT Systems	42.1
Information Technology	Computer Storage and Peripherals	38.9
Information Technology	Subassemblies & Components	35.0
Information Technology	General	35.0
Life Sciences	Health Care Supplies	33.1
Information Technology	Communications Hardware	30.5
Information Technology	Photonics	29.9
Information Technology	Semiconductor Equipment and Materials	29.2
Information Technology	Electronic Equipment and Instruments	27.8
Information Technology	Application Software	26.3
Information Technology	Systems Software	25.9
Life Sciences	Health Care Equipment	22.7
Life Sciences	Pharmaceuticals	21.0
Information Technology	Discrete Components	19.0
Information Technology	Office Electronics	18.5
Information Technology	Computing Systems Hardware	18.4
Information Technology	IT Management, Consulting & Services	17.8
Information Technology	Internet Software & Services	12.6

But on an absolute basis, the Biotechnology sub-sector, the fastest growing and the youngest sub-sector of significance, has become the largest employer in the Cluster as well, employing 5,343 people. Once again, the rapidly emerging importance of this sub-sector is becoming evident.

Illustration 24 **Total number of employees within all 40 industry sub-sectors**

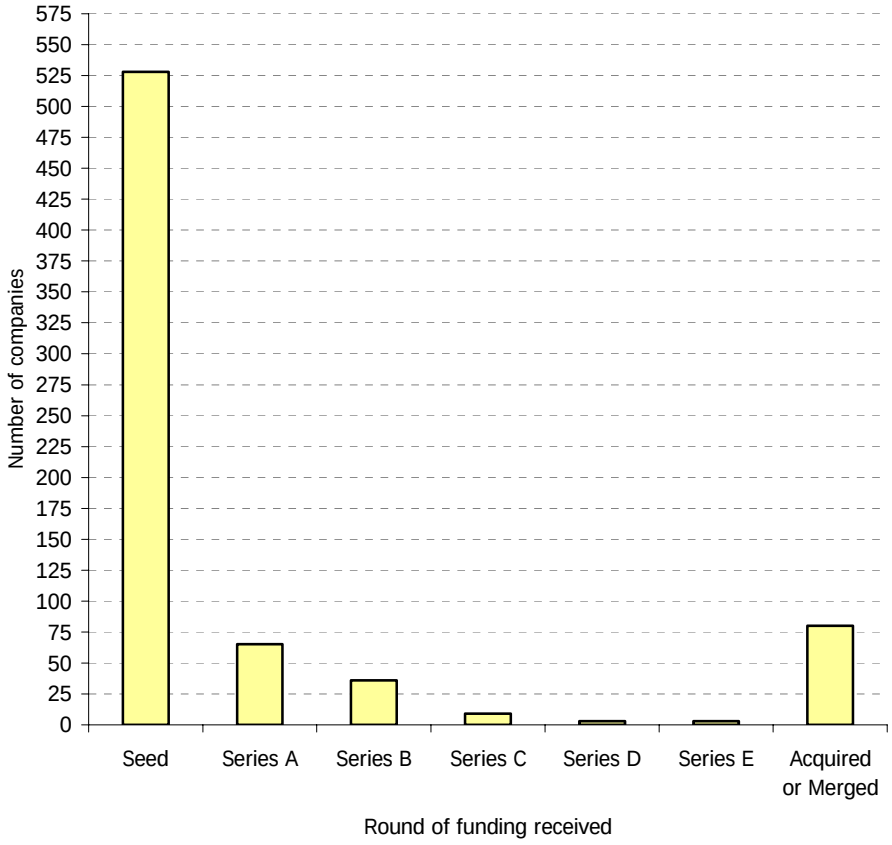
Sector>	Sub-sector	Employees
Life Sciences	**Biotechnology**	**5,343**
Information Technology	Application Software	4,209
Information Technology	Electronic Equipment and Instruments	2,951
Telecommunication Services	Wireless Telecommunication Services	1,502
Industrials	Industrial Machinery	1,262
Information Technology	Computer Storage and Peripherals	1,088
Telecommunication Services	General	980
Information Technology	Communications Hardware	884

Information Technology	Systems Software	881
Information Technology	IT Systems	800
Information Technology	Semiconductors	795
Life Sciences	Health Care Equipment	725
Information Technology	Internet Software & Services	681
Information Technology	IT Management, Consulting & Services	658
Industrials	Electrical Components and Equipment	600
Materials	Advanced Materials	518
Consumer Discretionary	Consumer Electronics	517
Information Technology	Photonics	478
Information Technology	Computing Systems Hardware	423
Materials	Speciality Chemicals	420
Industrials	Aerospace and Defence	327
Industrials	Commercial Printing, Services & Products	326
Telecommunication Services	Alternative Carriers	315
Life Sciences	Health Care Supplies	265
Life Sciences	Pharmaceuticals	252
Information Technology	Subassemblies & Components	210
Information Technology	Semiconductor Equipment and Materials	175
Materials	Fertilizers & Agricultural Chemicals	155
Information Technology	Discrete Components	114
Industrials	General	85
Telecommunication Services	Integrated Telecommunication Services	65
Materials	Metals, Metallurgy & Alloys	58
Materials	General	40
Information Technology	Office Electronics	37
Information Technology	General	35
Materials	Other	18
Energy	Alternative Energy	7
Consumer Discretionary	Broadcasting and Cable TV	5
Energy	Alternative Energy Technologies	3
Consumer Discretionary	General	2
Total		**28,209**

Equity Investment

The intent of this section is to analyse the Cluster by examining the funding stages for the companies in the sector. An overview of the Cluster demonstrates that the vast majority of companies have not yet received Series A funding which Library House defines as the first institutional round of funding. Seed funding is defined as those companies that have either received no funding or they have received business angel funding, friends and family funding, government grants or awards or a combination of any of them.

Illustration 25 **Companies within the Cluster by round of funding received**



On a sector-by-sector basis, a different picture of business maturity emerges. A side-by-side comparison of Information Technology versus Biotechnology suggests that a much greater percentage of Information Technology companies are at the seed stage. Illustration 26 shows their distribution on an absolute basis while Illustration 27 shows their distribution on a comparative basis.

Illustration 26 **Companies in the Information Technology and Life Sciences sectors by funding round received**

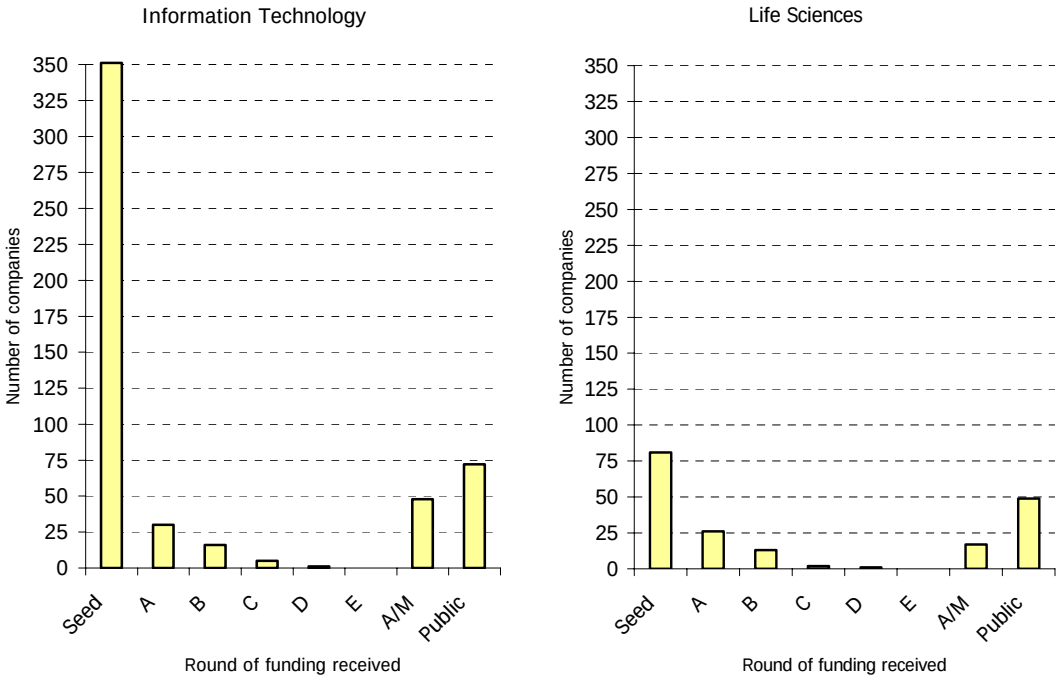
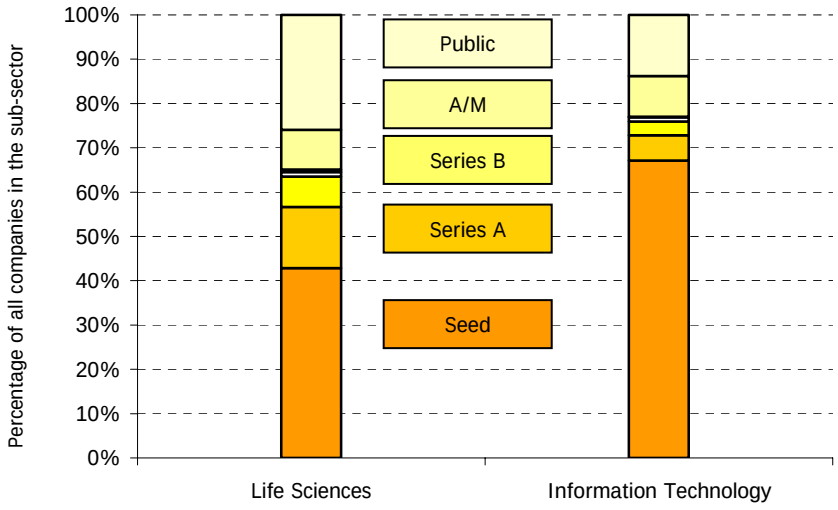


Illustration 27 **Comparative number of companies per round of funding received in the Information Technology and Life Sciences sectors**



A greater number of Life Sciences companies as a percentage of all Life Sciences companies are moving through the pipeline from seed to later stage than their counterparts in Information Technology. But, on an absolute basis the total number of Information Technology companies receiving A series funding is about the same as Life Sciences. Also, a greater percentage of Life Sciences companies are receiving subsequent rounds of funding. That may be an artefact of Life Sciences funding where a greater number of rounds and a greater absolute amount of capital is typically employed across the lifetime of the company.

Funding in the Cluster

Perhaps the most debated question regarding the Cluster surrounds the capital needs of the innovation-based start-ups. In particular, attention has been focussed on whether there is a funding gap; that is, whether there is an adequate amount of capital at each stage of the funding cycle for the start-ups or whether one stage is disproportionately under-funded. This section explores the general picture of financing and the particular question of the funding gap.

The exploration will not provide a clear answer as regards the gap because the answer lies in comparing the need for capital at each stage to the amount of capital that "should" be available at that stage. There is no easy way to know how much funding should be available at each stage.

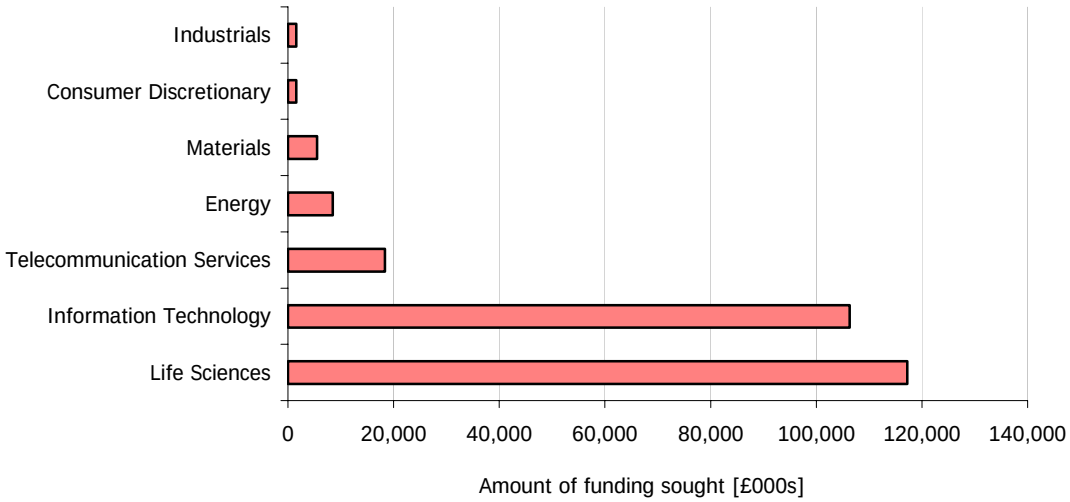
The question is further clouded by the fact that not all companies at each stage should be funded to the next stage. The achievement of funding, or conversely the failure to achieve funding, is part of the winnowing mechanism of the market.

But, as much of the debate relies on data to support various positions, what can be achieved is clarity and transparency as to the underlying numbers. Over time, when multiple years' data has been collected, year over year comparisons will help to clarify the situation.

To gain that clarity, what is the total aggregate desire for capital by sector within the Cluster?

As of 31st March when data collection was finished, the 898 innovation-based companies in the Cluster were seeking in aggregate £259 Million. This breaks down across the top seven sectors as follows:

Illustration 28 **Aggregate funding sought by companies within the seven key industry sectors (£000s)**



It is clear that Life Sciences and Information Technology companies seek the vast majority of capital. But, even at this level, differences appear. There are 38 Life Sciences companies seeking an average of £3.1 Million while there are 64 Information Technology companies seeking an average of £1.7 Million. *The Life Sciences start-ups are seeking almost twice as much capital per company as their equivalents in Information Technology.*

Illustration 29 **Mean amount of next-round funding required by company by industry sector**

Sector	Total (£000)	Total Co's	Mean (£000)
Life Sciences	117,210	38	3,084
Information Technology	106,347	64	1,662
Telecommunication Services	18,350	8	2,294
Energy	8,500	2	4,250
Materials	5,500	3	1,833
Consumer Discretionary	1,550	3	517
Industrials	1,550	3	517
Total	**£259,007**	**121**	**£2,140.6**

At the 40 sub-sector level a more precise picture of Life Sciences and Information Technology Capital requirements appear. *The biotechnology sub-sector, by itself, accounts for 41% of all the capital desired in the entire Cluster and 91% of the capital desired within the Life Sciences sector.*

Also, some new sub-sectors that contain few companies and few employees, but which are capital intensive appear: semi-conductors and wireless telecom services in particular.

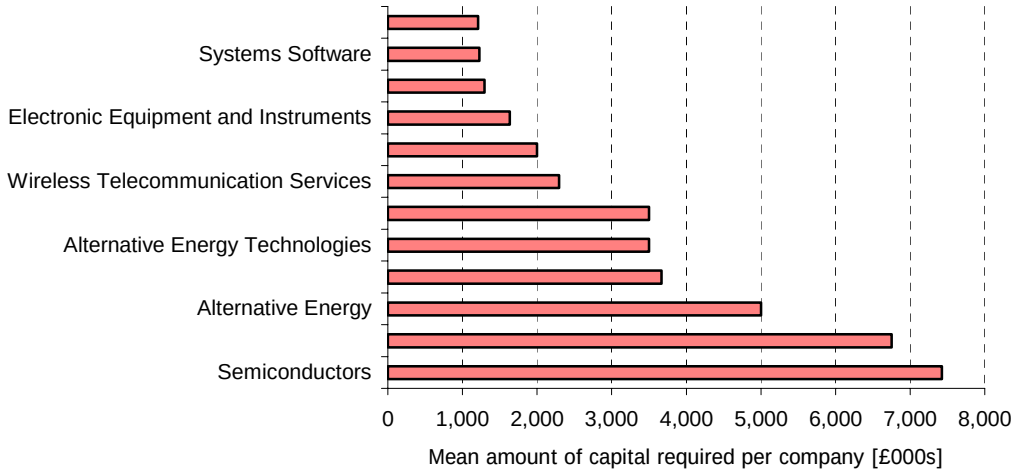
Most importantly, to the degree that one accepts, i) that equity funding employed is a more meaningful proxy for Cluster activity than company formation and ii) that at least in the aggregate that equity funding required and equity funding employed have a direct relationship, then it is very significant that only 8 sub-sectors account for more than 85% of the desired capital in the Cluster.

Illustration 30 **Funding desired by sub-sector ranked by cumulative amount**

Sector	Sub-Sector	Total (£000s)
Life Science	**Biotechnology**	**106,360**
Information Technology	**Semiconductors**	**29,700**
Information Technology	**Application Software**	**27,860**
Telecommunication Services	**Wireless Telecommunication Services**	**18,350**
Information Technology	**Computer Storage and Peripherals**	**13,500**
Information Technology	**Electronic Equipment and Instruments**	**11,450**
Information Technology	**Systems Software**	**11,037**
Life Science	**Health Care Equipment**	**10,350**
Energy	Alternative Energy	5,000
Information Technology	IT Management, Consulting & Services	3,910
Information Technology	Internet Software & Services	3,840
Energy	Alternative Energy Technologies	3,500
Materials	Advanced Materials	3,500
Information Technology	Communications Hardware	2,000
Materials	Other	2,000
Information Technology	Photonics	1,900
Industrials	Industrial Machinery	1,550
Consumer Discretionary	Consumer Electronics	1,300
Information Technology	Computing Systems Hardware	1,150
Life Science	Health Care Supplies	500
Consumer Discretionary		250
Total		**£259,007**

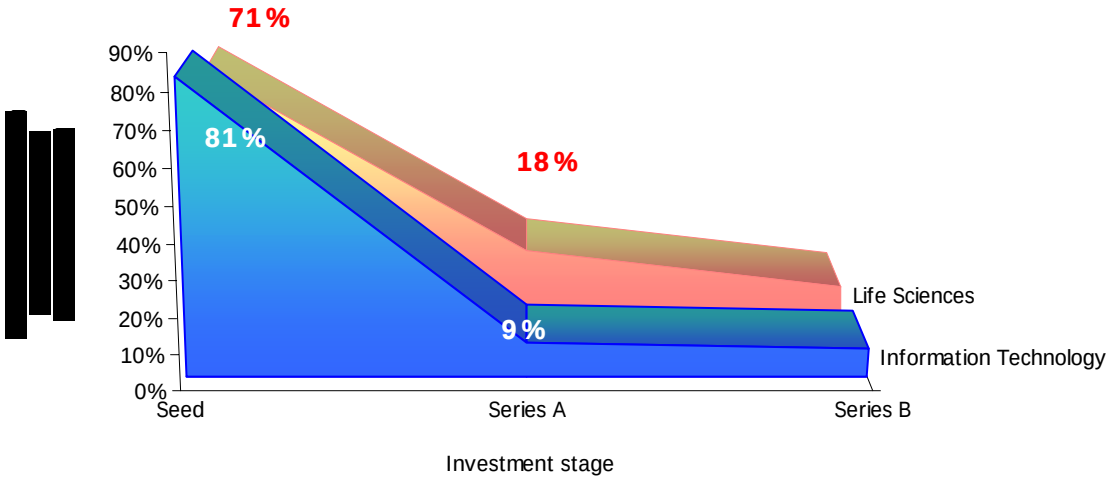
In fact, the picture sharpens even more when companies are sorted by their mean equity funding requirement; that is, by the average amount a given company within a sub-sector is seeking. It becomes apparent that Semiconductor (£7,425,000) and Computer Storage and Peripherals companies (£6,750,000) have approximately twice the need for capital as a typical Life Science start-up and more than four times the average IT start-up. Once again, the point to be understood is that these sub-sectors are small as measured by the number of companies within the sub-sectors but they are outsized in terms of the amount of capital required.

Illustration 31 **Mean capital requirement per company within selected sub-sectors**



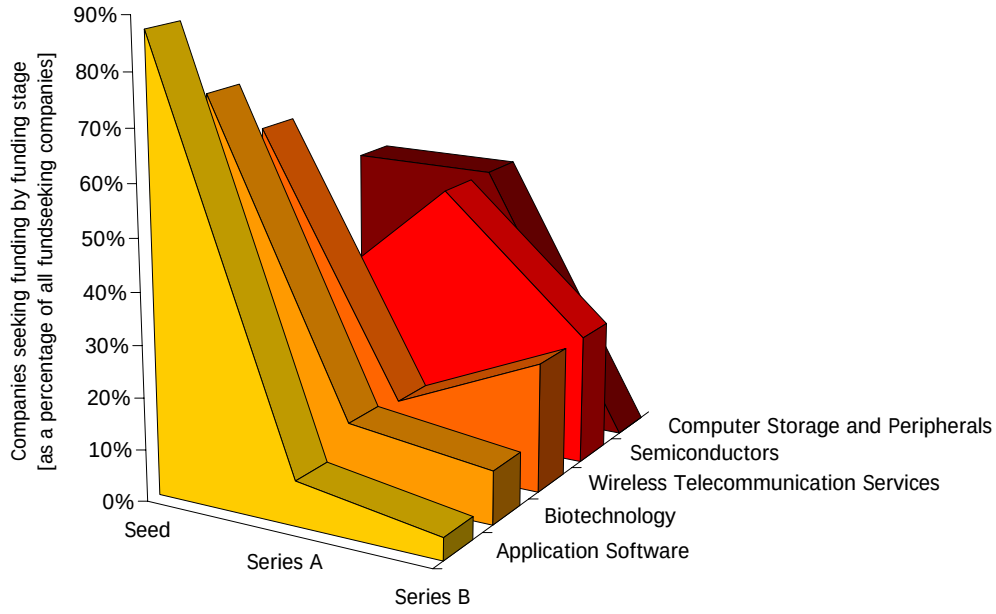
The second question concerns the distribution of companies by stage that seek capital. As a baseline, the 3D graph below shows the percent of companies within the Information Technology and Life Sciences by stage that require capital. As can be seen below, the preponderance of companies are at the Seed Stage, though a significantly greater percent of Life Science companies are at Series A than Information Technology companies.

Illustration 32 **IT and Life Sciences companies seeking funding across the funding stages**



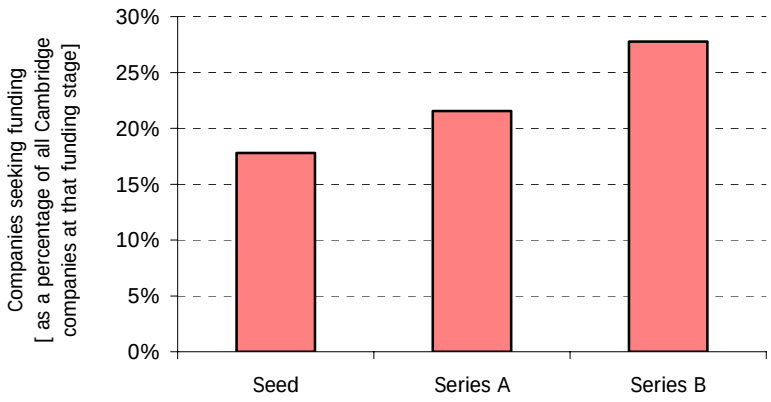
At the sub-sector level the picture changes. Biotechnology and Application Software mimic their parent sectors above; but Wireless, Storage and Semiconductors all reflect a considerable shift towards A Series or later funding. The latter three sub-sectors in effect shift the total funding picture towards the later stages while the first two sub-sectors pull the total funding picture towards the earlier stages.

Illustration 33 **Companies seeking funding displayed as a percentage distribution across the funding stages**



An examination of the number of companies seeking funding at a given stage as a percentage of the total number of all companies at that stage reveals that the later stages have a greater percentage of their companies seeking funding than the earlier stages, ranging from 17% of seed stage companies to 27% of Series B stage companies.

Illustration 34 **Companies seeking funding as a percentage of all companies at this stage**



The last question to explore is the distribution of capital requirements by sub-sector and stage. As the table below shows the amount of capital across stages is more evenly distributed than

the number of companies pursuing capital (as shown above). Not surprisingly, as the stages progress, the amount of capital does not diminish as rapidly as the number of companies decrease. A much smaller population of companies is seeking much greater quantities of capital.

Illustration 35 **Total funding requirements broken down by sector and funding stage**

Funding required (£000s)	Seed	Series A	Series B
Biotechnology	41,660	31,500	33,000
Semiconductors	1,700	23,000	5,000
Application Software	21,660	1,200	5,000
Wireless Telecommunication Services	10,350	1,000	7,000
Computer Storage and Peripherals	8,500	5,000	
Electronic Equipment and Instruments	3,250		2,200
Systems Software	4,630	6,407	
Health Care Equipment	5,850	4,500	
Total	**£97,600**	**£72,607**	**£52,200**

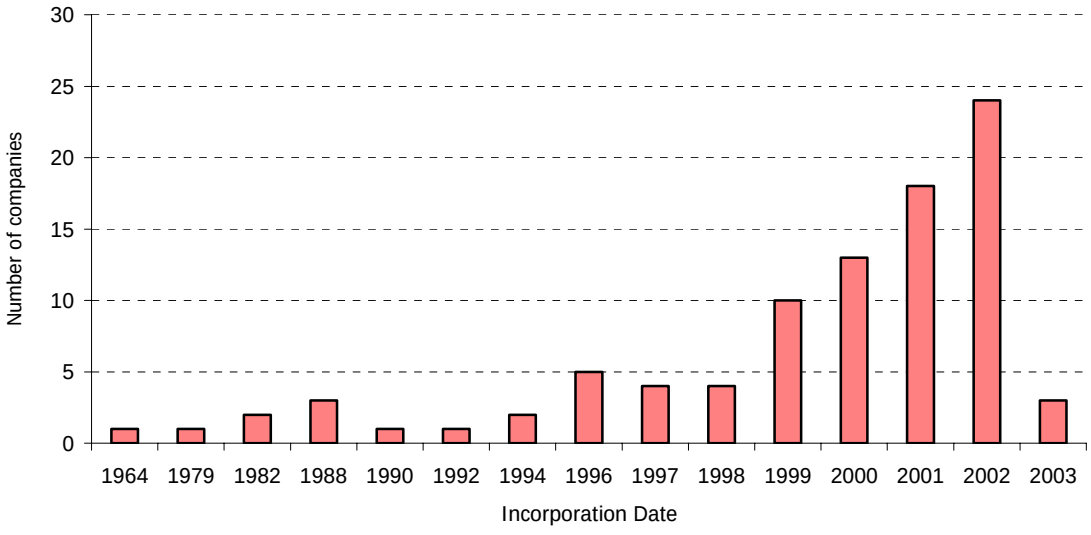
In summary, the financing data is revealing. It shows that there is a £259 Million desire to secure capital throughout the Cluster. It also shows that Information Technology and Life Sciences require the majority of that capital. But it also reveals that Life Sciences companies and Information Technology companies have very different capital requirements on an individual basis. The Life Sciences companies require almost twice as much capital across stages as their IT counterparts.

At the sub-sector level the financing data provides a separate means of evaluating the most significant sub-sectors and in so doing presents a different list than the company formation data. The top eight sub-sectors by capital requirements include Semiconductors and Wireless Telecommunication. Also, the variation in capital requirements becomes more pronounced at the sub-sector level including Semiconductors and Computer Storage and Peripherals companies each requiring in the neighbourhood of £7 Million average investment across the Seed, Series A and Series B rounds.

But for those sectors with large numbers of companies in the seed stage it is likely that not all of them will progress. Though the data cannot indicate whether in fact a funding gap exists, and in fact one may speculate that until the data is collected over a number of years it may not be possible to know, it is clear that the hurdle from Seed stage to Series A is profound.

The next graph illustrates this clearly by showing the age of all companies looking for seed stage funding:

Illustration 36 **Seed stage companies sorted by age of incorporation**



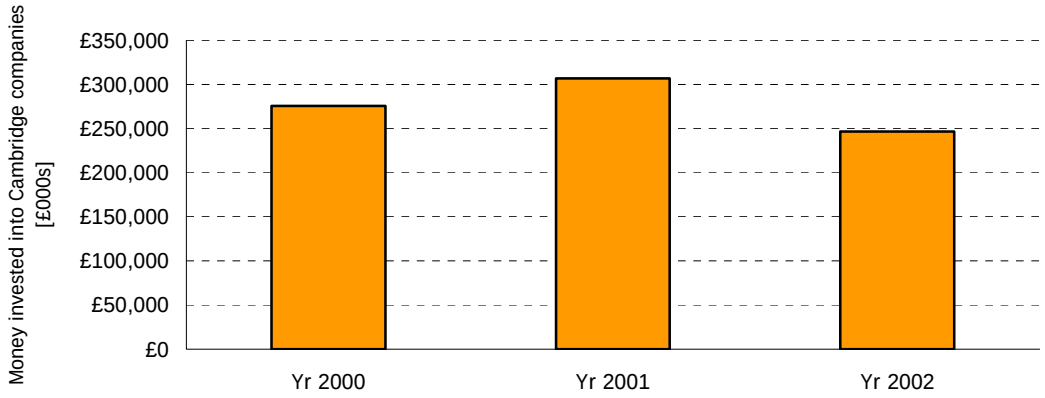
Funds Invested

Capital required can only tell us so much. Perhaps the most interesting data lies in how much funding has actually been raised in the past three years. This section tells that story.

Library House has tracked the total funding activity across the Cluster for the years 2000, 2001 and 2002.

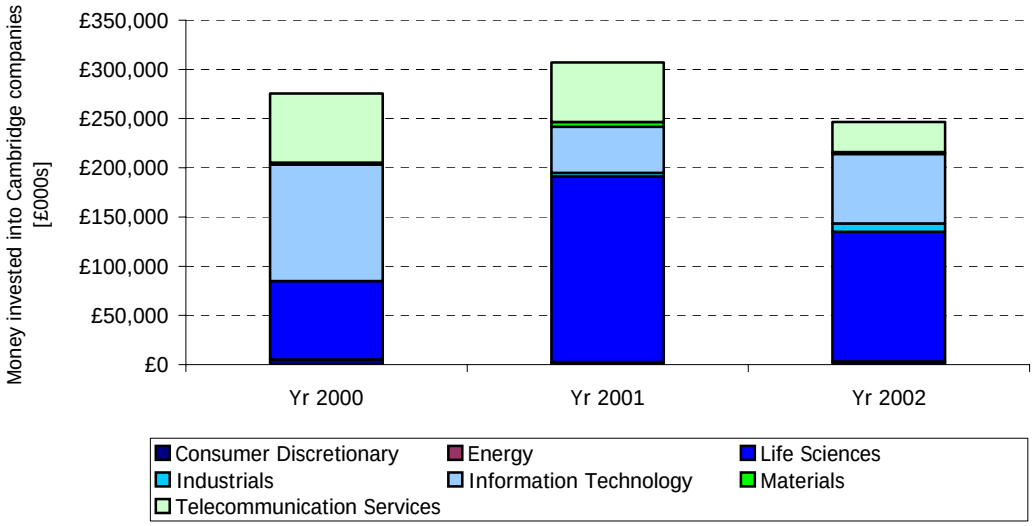
At the top level, the funding across the Cluster over the last three years appears relatively stable ranging from £245 Million in 2002 to slightly over £300 Million in 2001 and totalling £829 Million over the 3 years.

Illustration 37 **Total investment in the Cluster by Year**



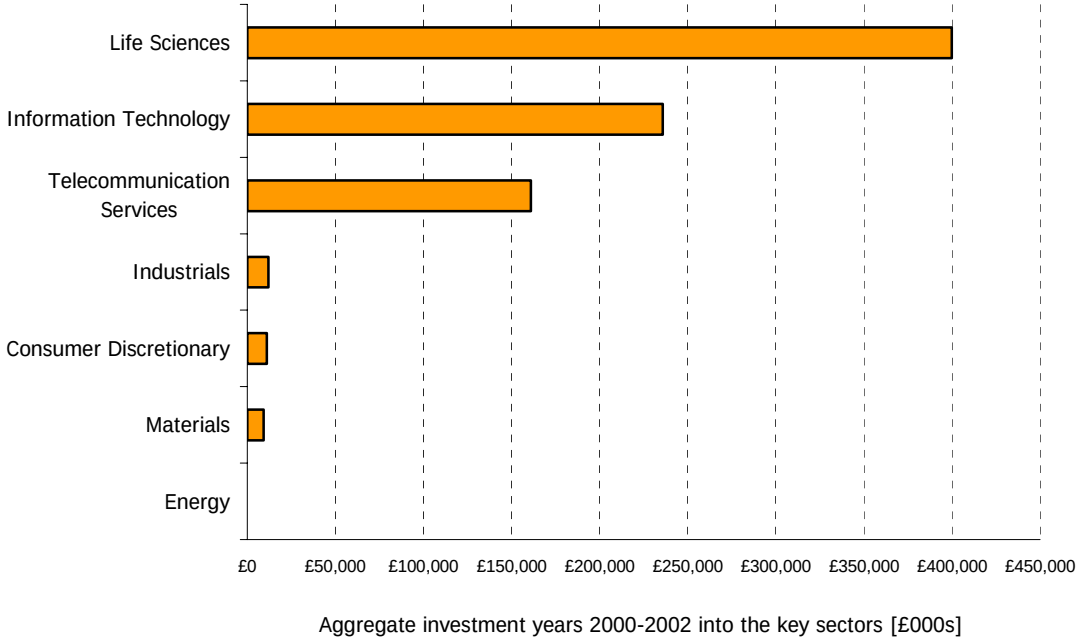
Within the above numbers considerable disparity exists when comparing the relative success of different sectors in securing capital. Life Sciences, in deep blue below, clearly dominates the amount of funding successfully raised.

Illustration 38 **Total investment into Cambridge companies broken down by sectors**



In addition, Telecommunication Services, receives a much larger share of capital than would be anticipated based on the relatively small number of companies in the sector. This is more clearly shown in the graph below.

Illustration 39 **Aggregate investment into Cluster companies over three years**



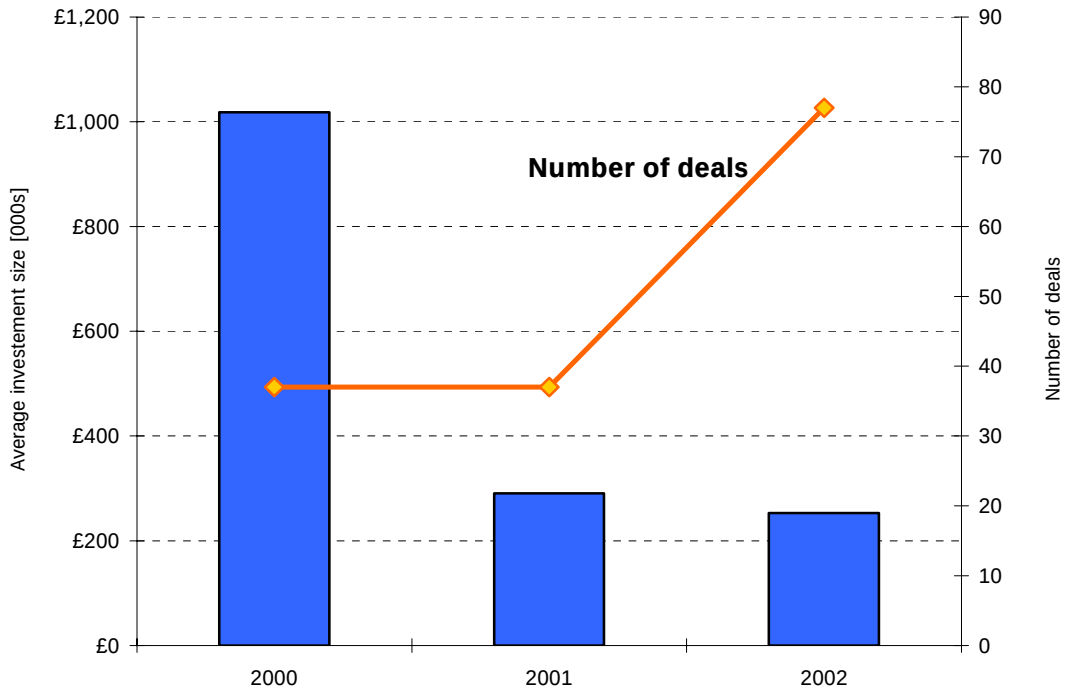
The Life Sciences, Information Technology and Telecommunication Services primary sectors attracted more than 96% of the funding for the entire Cluster for the last three years. However, if the investment pattern at the sub-sector level is examined, the distribution of capital is shown to be even more concentrated. Five sub-sectors alone represent 80% of all finance raised in the past 3 years.

Illustration 40 **Aggregate 2000-2002 investment into companies broken down into significant sub-sectors**

Sector	>	Sub-Sector	Money raised (£000s)
Life Sciences	>	Biotechnology	361,807
Telecommunication Services	>	Wireless Telecommunication Services	86,149
Telecommunication Services	>	Alternative Carriers	74,840
IT	>	Semiconductors	70,169
IT	>	Application Software	67,654

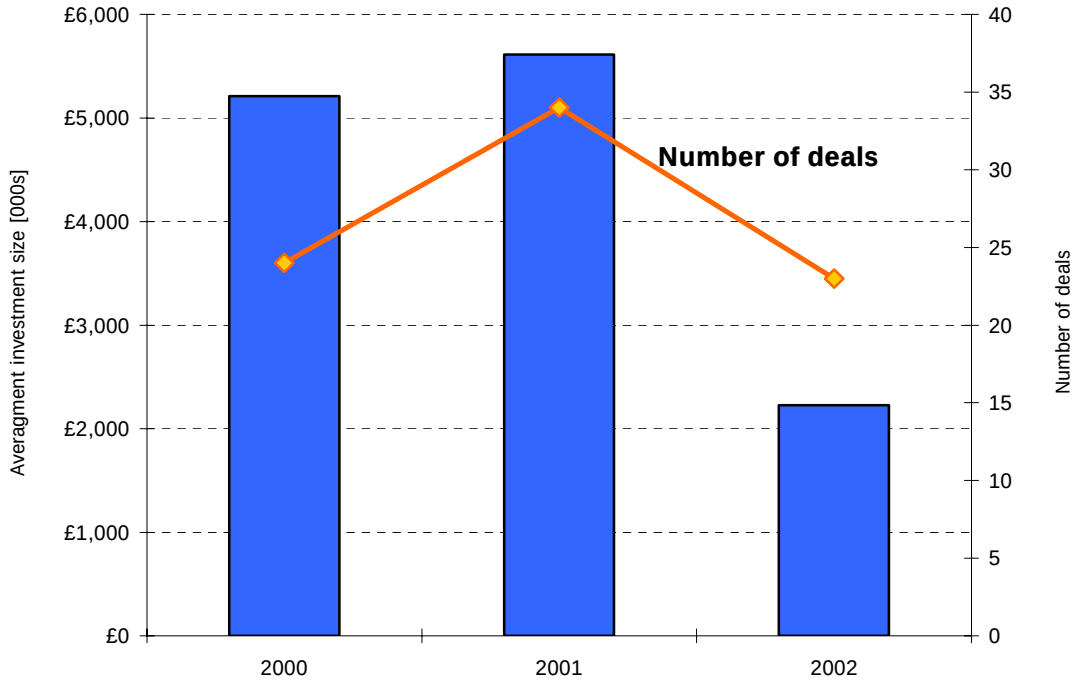
Deal size and character changed over the period as well. On the one hand, the number of Seed stage deals funded increased dramatically; but on the other hand, the average amount invested at the Seed stage decreased equally precipitously. This is the clearest evidence of the emergence of a gap seen so far. It equally demonstrates that innovation and entrepreneurship continue despite difficulties in the funding environment and that company formation as an indicator of innovation and entrepreneurship continued. However the funding environment has been challenging in the past 2-3 years.

Illustration 41 **Average seed stage investment size and number of deals across the years**



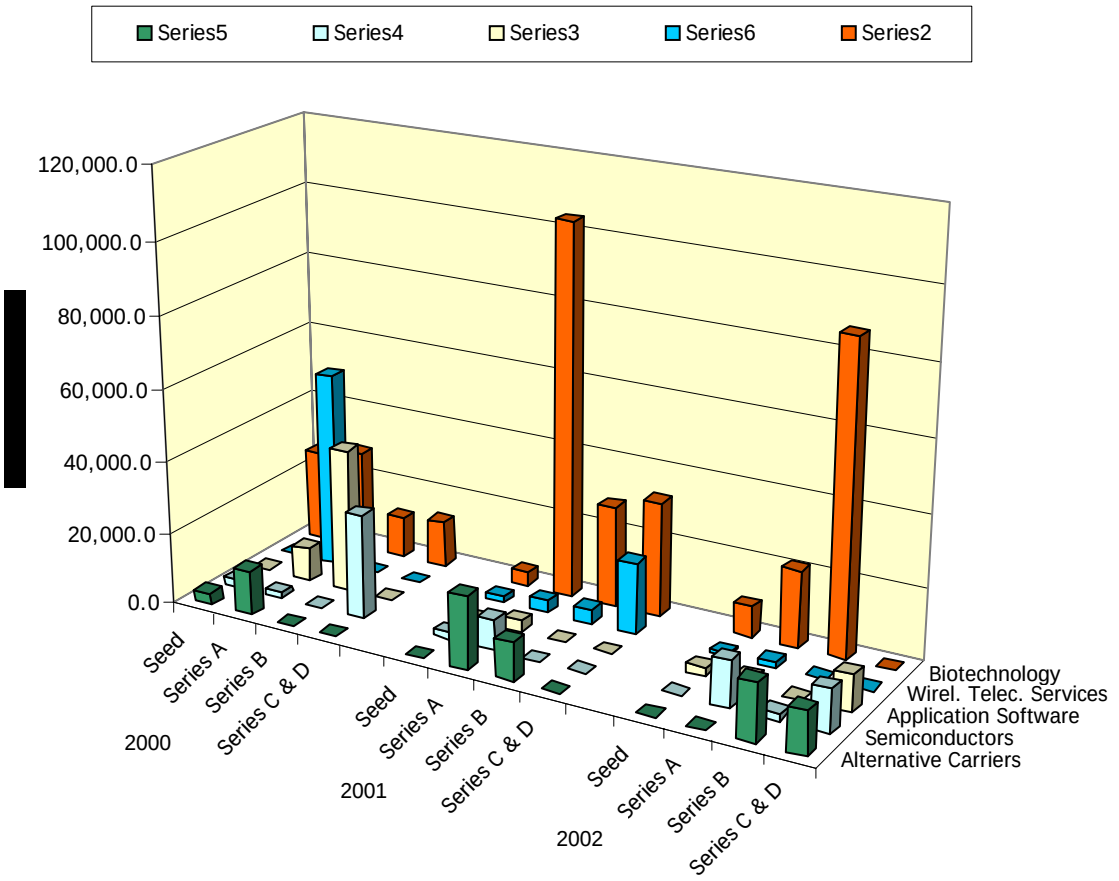
Unlike the seed stage environment shown above, at the A Series stage the decline has been absolute. The average A Series deal declined from above £5 Million to about £2 Million from 2001 to 2002 while the total number of deals in the Cluster neither rose nor fell significantly during the period.

Illustration 42 **Average series A investment size and number of deals across the years**



An analysis of those five sub-sectors in closer detail reveals trends within the investment patterns.

Illustration 43 **Investment into companies by year, investment stage and sub-sector**



Instead of simply counting amounts invested per year, the above graph enables analysis of amounts invested per stage and sub-sector. By doing so, we see that investments, similar to company incorporation patterns, behave like waves. For example, the Biotechnology sub-sector saw strong investment levels in seed and series A stages in 2000. In 2001, almost no company received seed funding, but very strong series A and moderate series B, C and D funding took place. This trend continued in 2002, where Seed stage and series A funding were less pronounced than investments in series B & C. A very similar wave pattern can be observed in all other sub-sector, although the peaks of investments per stage tend to differ.

This story becomes more pronounced, when one analyses the average deal size for a particular sub-sector, investment stage and year:

Illustration 44 Average deal size (number of deals) by year, investment stage and sub-sector, in £000s

		Funding (£000)			
Sub-sector	**Year**	**Seed**	**Series A**	**Series B**	**Series C & D**
	2000	2,104 (12)	3,494 (8)	5,800 (2)	12,700 (1)
Biotechnology	2001	345 (11)	7,425 (14)	7,013 (4)	32,000 (1)
	2002	329 (26)	3,067 (7)	21,625 (4)	0
	2000	73 (3)	3,033 (3)	40,000 (1)	0
Application Software	2001	128 (2)	1,510 (2)	0	0
	2002	182 (13)	900 (3)	0	10,000 (1)
	2000	1,000 (2)	1,500 (1)	0	29,000 (1)
Semiconductors	2001	1,800 (1)	4,250 (2)	0	0
	2002	160 (2)	4,350 (3)	14,000 (1)	12,000 (1)
	2000	3,200 (1)	12,500 (1)	0	0
Alternative Carriers	2001	20 (1)	10,100 (2)	10,820 (1)	0
	2002	100 (1)	0	16,000 (1)	12,000 (1)
	2000	35 (1)	18,167 (3)	0	0
Wireless Telecommunication Services	2001	885 (2)	3,500 (1)	2,000 (2)	20,000 (1)
	2002	221 (4)	487 (3)	0	0

(Number in parentheses indicates number of deals at that stage per year)

By analysing the average deal size by sector and investment stage, 2 things can be learned. First, Biotechnology is by far the most active sub-sector within the Cluster: 90 separate investment deals took place in that sub-sector within the last three years, the other four sub-sectors combined accounted for only 68 deals. Second, the average deal size has decreased substantially at the seed and series A stage, but has remained more or less constant for series B and C & D stages. An exception is the semiconductor sub-sector, which has remained stable over three years, although Seed funding has recently dried up in this sub-sector, too.

We also begin to observe some disturbing trends in the funding across stages. Generally there has been little Seed stage funding over the past three years. Further, the source of the strength of the biotechnology sub-sector becomes apparent. Seed stage funding is the predicate to all growth within a sector and as can be clearly seen dating back as far as 2000 there has been little seed stage funding except in Biotechnology which had a vigorous year in 2000, a dip in 2001 and a restoration in 2002. This is in stark contrast with the other five key sub-sectors.

In fact, aside from strong investment in B Series rounds in application software in 2000 and A Series rounds in Wireless Telecom Services in 2000, the investment market has been quiet except for Biotechnology. Biotechnology has shown strong financing across stages and years for the entire period. Given its recent past performance and its continued appetite for capital it is reasonable to assume that it will continue to outperform all other areas.

The Top Deals in 2002

Finally, this report takes a quick look at the individual companies that were most successful in securing funding last year. The following tables separately list the largest 5 deals funded by stage in the Cluster across sectors.

Sector	Sub-Sector	Company	Deal [£000s]
Seed			
Life Sciences >	Biotechnology	Cambridge Cognition	1,600
Life Sciences >	Biotechnology	Daniolabs	1,316
IT >	Semiconductor Equipment & Materials	Nano Beam	1,200
Industrials >	Industrial Machinery	Webtec Products	1,000
Life Sciences >	Biotechnology	Discerna	800
Series A			
IT >	Semiconductors	Plastic Logic	8,800
Life Sciences >	Biotechnology	Cambridge Biotechnology	6,400
Life Sciences >	Biotechnology	Xention Discovery	4,000
IT >	Semiconductors	Cambridge Semiconductor	3,750
IT >	Computer Storage & Peripherals	Polight Technologies	3,200
Series B			
Life Sciences >	Biotechnology	KuDOS Pharmaceuticals	29,500
Life Sciences >	Biotechnology	Arakis	16,000
Telecommunication Services >	Alternative Carriers	Radiant Networks	16,000
Life Sciences >	Biotechnology	Paradigm Therapeutics	12,000
IT >	Communications Hardware	Polatis	8,400
Series C			
Telecommunication Services >	Alternative Carriers	Radiant Networks	12,000
IT >	Application Software	Apama	10,000
Series D			
Information Technology >	Semiconductors	Cambridge Silicon Radio	12,000
Consumer Discretionary >	Consumer Electronics	Imerge	3,600