Critical I
thinking allowed

Biotechnology in Europe:
2006 Comparative study

Critical I comparative study for EuropaBio

EuropaBio
The European Association for Bioindustries

Contents

Sources

This is the second report Critical I has produced that compares the biotechnology sectors across some eighteen European nations and the USA. As part of its ongoing survey work, Critical I has looked in depth at the biotechnology sectors of four European nations – France, Germany, Switzerland, and the UK – and at that of the USA. For these countries, and also for the 2003 data presented here for the Scandinavian nations of Denmark, Finland, Norway and Sweden, and for Ireland, the information has been gathered and validated according to the approach outlined in the Methodology Appendix.

In addition, Critical I has undertaken some preliminary survey work on nine additional European nations – Austria, Belgium, Estonia, Greece, Hungary, Italy, The Netherlands, Portugal, and Spain. We have also updated our records for the four Scandinavian nations and Ireland. For these thirteen nations, we have used available primary information sources to assess on an individual company basis within the definitions used in this survey. We have worked closely with the bioindustry organisations in some of these countries, notably with Flanders Bio in Belgium, Bionova in Greece, Assobiotec in Italy, NIABA in the Netherlands, SwedenBio in Sweden, and Genoma Espagne in Spain. We have also been able to obtain information on metrics such as numbers of employees, research spending, number of R&D employees, and revenues for many of the companies, but the penetration of these data is lower than for those countries covered in our on-going work. In addition, it has not been validated by company sources (with the exception of a few instances) as we would normally do. Our assessments of the biotechnology sectors within Austria, Belgium, Italy, The Netherlands, and Portugal are accurate, but based on a less complete set of data.

For sixteen of the nineteen countries covered in this report – Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the UK and the USA - we can compare metrics directly on a year-on-year basis at a company level. Thus we know, for instance, not only how many people a particular company employs and what its R&D spend is, but also whether it is expanding or contracting. As an example of the utility of this approach, data on the proportion of companies in the UK, USA, France, and Germany that have increased their employee counts between 2003 and 2004 has been used as an early indicator of impending restructuring or likely future expansion.

Executive Summary

2006 is, according to some commentators, the 40th anniversary of the beginning of the modern biotechnology era: the founding of the San Francisco firm, Genentech in 1976. Genentech is now a subsidiary of the European pharmaceutical and diagnostics firm, Hoffmann-La Roche, a consequence of biotechnology "following the money" in the early 1990s. At that time, Genentech was running out of money to fund its late-stage development compounds, even though the company already had a number of products on the market including the clot-busting drug, tissue plasminogen activator. Roche stepped in, left Genentech relatively untouched, allowed it to get on with innovating, and is now reaping the financial benefits of blockbuster drugs such as Herceptin.

Nearly 15 years on from the original Roche-Genentech deal, it is the European innovating companies that are having to face the more stringent financial strictures. Even though total equity financings in Europe were up 44% in 2004 from 2003 and money raised through venture capital up a massive 41% from the 2003 figure, European companies still had access only to a fifth of the private equity finance that US companies had. Through the public equity markets, US companies raised 10 times as much money as their European competitors who struggled to raise sufficient investor interest in markets, too that are still mainly localised and inward-looking. European biotechnology is not, in general, sufficiently mature to attract the kind of substantial debt finance that is currently sustaining the growth-by-acquisition of parts of the US biotech industry.

This study identified 2,163 European biotechnology companies whose primary commercial activity fell within the definition of biotechnology outlined in the Methodology Appendix.

Europe's newest companies (under 5 years old) are dotted around the continent

Source: Critical I Limited

At the end of 2004 the biotechnology industry in the eighteen European countries surveyed here:

- Had 2163 companies (compared to 2200 in 2003)
- Employed approximately over 96,500 people, including 42,500 in R&D (96,000 in 2003 with 41,000 in R&D)
- Spent about €7.6 billion in R&D (€7.6 billion in 2003)
- Generated over €21.5 billion revenue (€20.5 billion in 2003)
- Raised €1.1 billion in venture capital in 2004 (€787 million in 2003)
- Raised a total of €2.1 billion through equity in 2004 (€1.45 billion in 2003)
- Raised over €1.8 billion in debt financing in 2004 (€1 billion in 2003)
- Formed 119 new companies in 2004 (over 130 in 2003)

The appropriate benchmark for the European industry is the world leader in biotech and Europe's principal competitor, the United States. In 2004, the US biotechnology industry:

- Comprised 1991 companies (2003: 1975)
- Employed approximately 190,500 people (2003: 170,500)
- Spent €21 billion on research and development (2003: €20 billion)
- Generated over €41.5 billion of revenue (2003: nearly €40.5 billion)
- Raised €2.5 billion in venture capital in 2004 (2003: €2.2 billion)
- Sold an additional €5.3 billion worth of equity – largely through the public markets (2004: €3.5 billion)
- Raised a further €6.6 billion of debt (2003: €6.0 billion)
- Formed 78 new companies

The European and the US biotechnology industries both have around 2000 companies, but the US sector employs nearly twice as many people, spends around three times as much on research and development, has twice the number of employees involved in research and development, raises over twice as much venture capital, and has access to 10 times as much debt finance. It earns twice as much revenue.

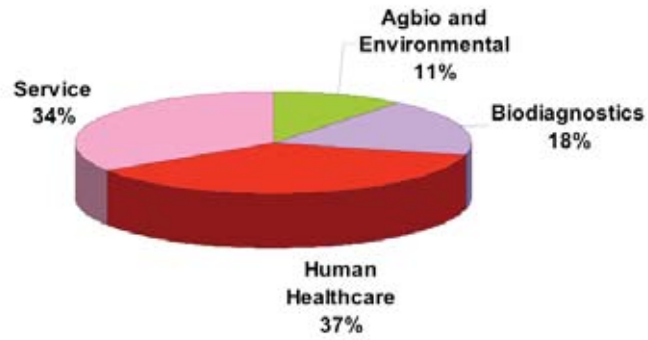
By its nature, biotechnology is a long-term business. It plays into the long-term future of a densely-populated and interdependent Europe that wants to act in a sustainable and local way within a global economic environment. The biological raw materials with which it is concerned are both malleable and precious. But living matter has to be cajoled and persuaded: it cannot be blasted, smelted, cast, sintered, or laser-etched. The development of healthcare products proceeds at the pace of healthcare regulators, whose reputations for care and maintaining public confidence in approved medicine demands an equal level of scrutiny for all potential drugs. And it is the regulatory regime in the agricultural and environmental markets too that dictates the pace of change towards a more sustainable and biology-rich future.

Despite the right-minded high-level political intentions to transform Europe into an innovation-intensive economic powerhouse, Europe's biotechnology project is in danger of foundering from the relative dearth of that most vital of fuels for innovation: money. There is a good deal of national government enthusiasm for biotechnology, apparent in a myriad of technology transfer initiatives, seed funding schemes, and taxation schemes encouraging bioscience and other high-technology research and development. Europe's science base is inventive, and the establishment of over 100 new biotechnology firms across Europe in 2004 is testimony to the fact that its inventors are entrepreneurial, too. However, the practicalities of funding innovation, whether in science or in business, are currently confounding the good intentions and enthusiasm.

This survey clearly demonstrates a number of consequences of an insufficient and unsustained stream of finance for biotechnology:

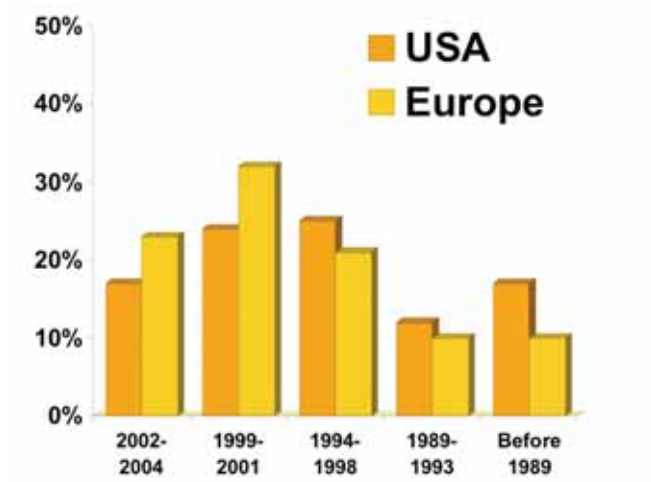
- Consequence: many companies are founded, but most are distracted from the business of building value by the preoccupation of staying in business.
- Consequence: European biotechnology firms grow far more slowly than their better funded counterparts in the USA.
- Consequence: young European firms are overtaken by their competitors and thereby relinquish any competitive edge they had at the outset.
- Consequence: European firms, on average, do not compete well in international markets for the substantial tranches of finance needed to propel them towards economic competitiveness and sustainability.
- Consequence: a series of relatively mature European biotechnology firms have been acquired by better funded US counterparts: some of those that remain are looking to establish a presence in the USA specifically to access the more generous financial market. This often means that value-creating research, development and manufacturing jobs are, in effect, exported.

Distribution of companies by Sector - Europe

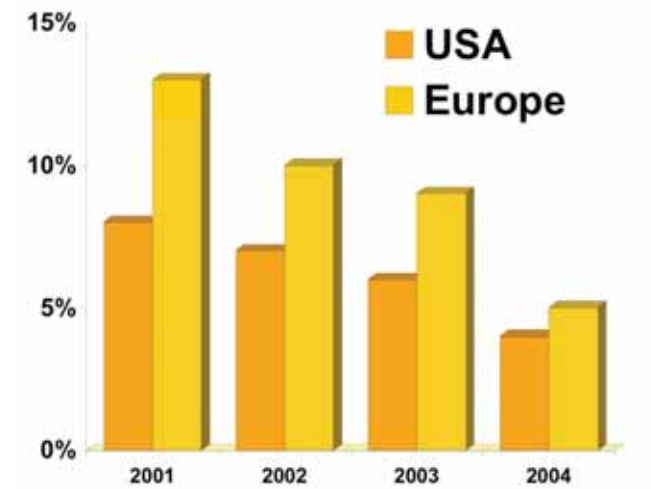


European biotech by sector

Europe has more younger companies and fewer older companies than the USA



The rates of new company formation have been falling in Europe and the USA since 2001



Source: Critical I Limited

In many of these measurements, Europe is to some extent catching up with the USA.

Europe - the typical company (Financial data in €m)

Age (years)	*0-2*	*3-5*	*6-10*	*11-15*
Employees	9	17	28	41
R&D employees	9	11	17	18
R&D Spend	€0.69	€1.7	€3.3	€4
Revenue	€0.34	€1.01	€2.6	€6.07

US - the typical company (Financial data in €m)

Age (years)	*0-2*	*3-5*	*6-10*	*11-15*
Employees	15	28	49	77
R&D employees	9	18	27	47
R&D Spend	€1.66	€5.16	€8.74	€13.34
Revenue	€0.53	€1.51	€4.67	€7.63

Source: Critical I Limited

Structure and growth

The structure of the European biotechnology industry

The survey for this 2006 report gathered data from 4154 companies, of which 2163 were in Europe and 1991 in the USA. The European companies employed around 96,500 people in 2004, almost exactly the same number as it had employed in 2003. The sector is clearly highly research-intensive with 44% of European employees being involved in research and development functions. The US industry with 190,000 employees has nearly twice the number of the European industry, although a slightly lower proportion (42%) are in R&D, possibly reflecting the greater maturity of some of the bigger US companies which hire substantial numbers of people in revenue-generating functions such as manufacturing and sales.

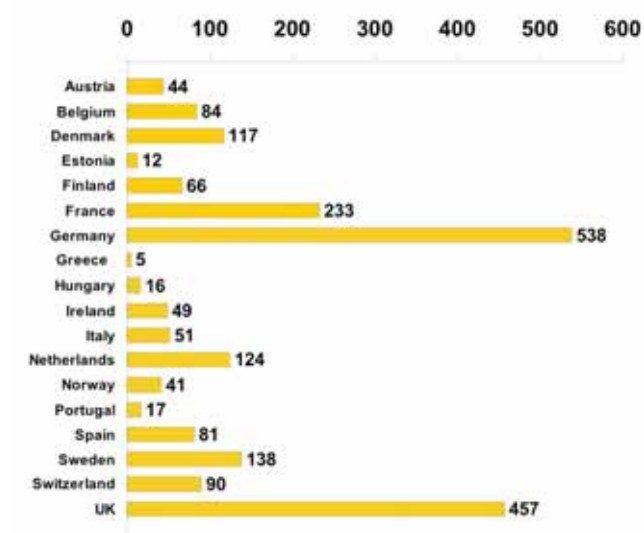
In Europe, a third of these companies undertook Healthcare related activities, and a further third provided technical, manufacturing or research services (Service: the service sector discussed throughout this report does not include organisations that are involved in the provision of financial, legal, public relations, technology transfer, consultancy, or other services of a general business nature). The remaining small third of European companies were either involved in activities leading to applications in agriculture, food technology, and the environment (Agbio and Environment: 11% of companies), or in the development and manufacturing of biologically-based diagnostics, largely for the diagnosis of human disease (Biodiagnostics: 18% of companies).

While the Healthcare sector in Europe accounts for just over a third of companies, it employs 50,000 people, approximately 52% of the European biotechnology workforce, while Agbio and Environmental represent just 8% of the people in the industry.

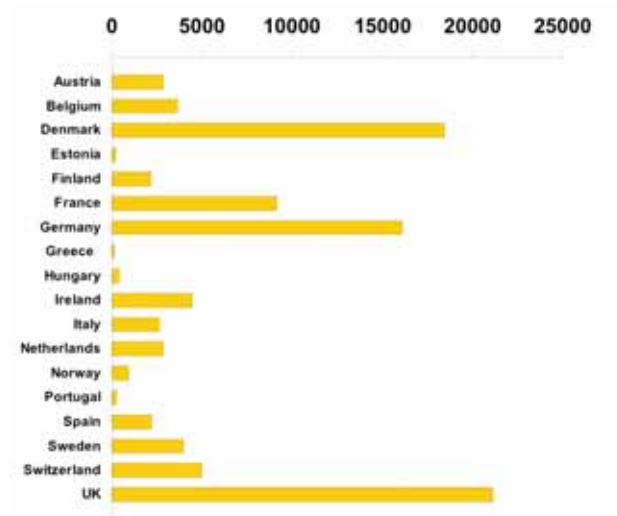
The picture in the United States is similar in some respects with the Service sector accounting for roughly a third of companies. However, companies in Healthcare represent a larger proportion than in Europe with over half of the total. The Agbio and Environmental group is proportionally much smaller than the European equivalent, largely because of the relative absence of environmentally-focussed specialist firms.

The dominance of the Healthcare sector is reinforced by the data on employment: Healthcare companies in 2004 employed 120,000 people, nearly two-thirds of the 190,000-strong US biotechnology workforce. If the predominantly healthcare-oriented US Biodiagnostics sector is included too, the total rises to 140,000 or just under three-quarters of the total. In the US, only 5% of employees in biotechnology were found in Agbio and Environmental companies. Even in this, the weakest of the US biotechnology subsectors, however, the 8,800 people employeed in Agbio and Environmental companies in the USA exceeds the 7,500 in equivalent companies in Europe.

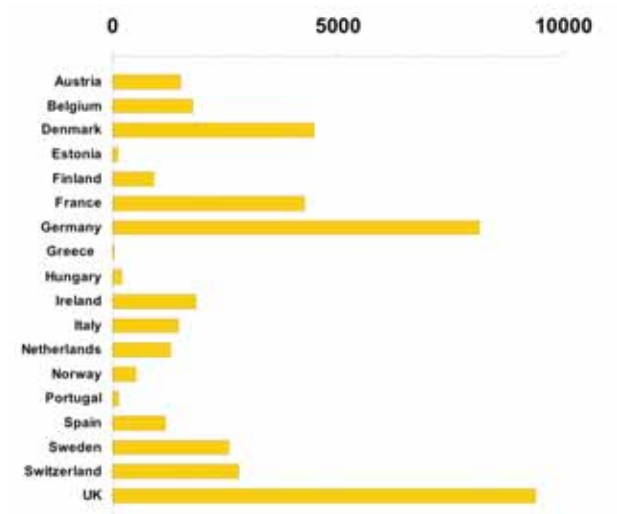
Number of European Companies -2004



Number of Employees – 2004



Number of Research and Development Employees – 2004



Source: Critical I Limited

Distribution of companies by sector - Europe

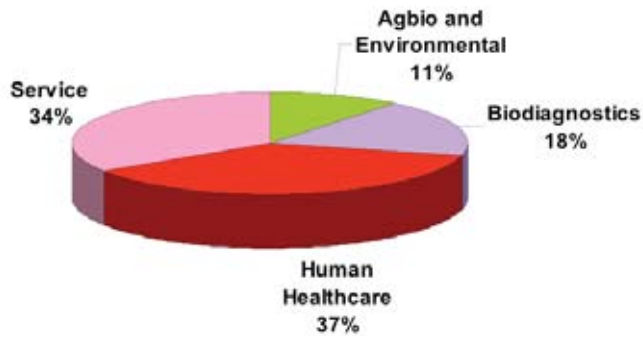
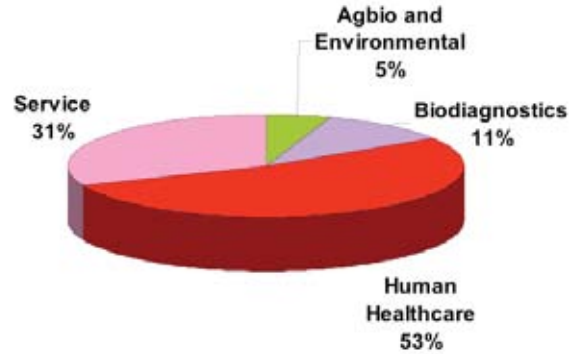
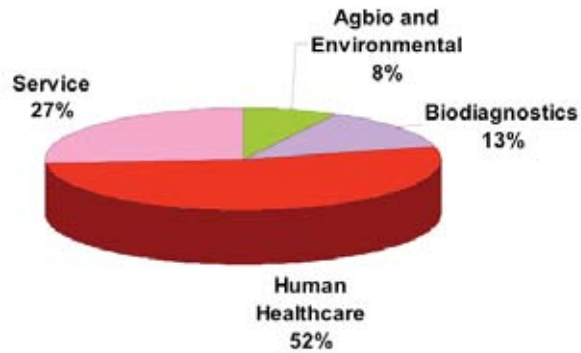


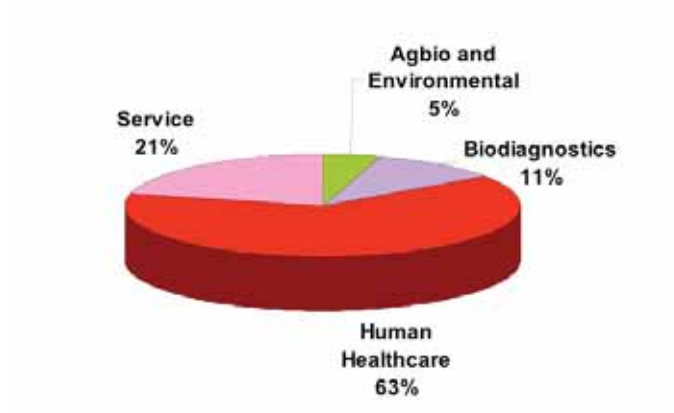
Figure: Distribution of companies by sector - USA



Distribution of employees by sector - Europe



Distribution of employees by sector - USA



Source: Critical I Limited

Company count 2003-2004

	Number of Companies		
Country	2004	2003	Difference %
Austria	44	41	7%
Belgium	84	79	6%
Denmark	117	121	-3%
Estonia	12	12	0%
Finland	66	66	0%
France	233	225	4%
Germany	538	575	-6%
Greece	5	4	25%
Hungary	16	16	0%
Ireland	49	42	17%
Italy	51	43	19%
Netherlands	124	116	7%
Norway	41	43	-5%
Portugal	17	17	0%
Spain	81	70	16%
Sweden	138	151	-9%
Switzerland	90	93	-3%
UK	457	484	-6%
USA	1,991	1,975	1%
Europe	2,163	2,198	-2%

Source: Critical I Limited

The number of European companies in business in 2004 was slightly down on the total for 2003, but the pattern was not uniform across the continent *(see Table: Company count 2003-2004)*. In countries such as Spain, Italy, and Ireland which are relatively new to biotechnology, there was double digit growth in the number of companies in the field. There were increases too in Austria, Belgium, France, and The Netherlands. However, elsewhere the picture was either flat or the number of companies fell as they merged in order to gain critical mass or were "restructured" out of existence. The decline in company numbers was particularly severe in Germany, Scandinavia and the UK, which were the earliest countries to follow the wave of merger and restructuring activity that started in 2003 in the USA. The decline in numbers in Germany was lower than many had expected given the large numbers of firms that started in the burst that followed the launch of the BioRegio scheme in the late 1990s.

With the exception of Denmark where the strength of Novo Nordisk and Novozymes provides a ballast of biotechnology employment that the demise of a few small companies is unlikely to disturb, declining company numbers have been reflected in a reduction of employment in the sector, as the tables in the National Statistics section of this report show.

What is of greater concern, perhaps, is the westward drift of parts of the European biotechnology scene to the US. Some of the relatively more mature European companies have been acquired in recent years by larger – or at least better funded – US firms. There has been little reciprocal business in the other direction. In addition, a number of companies, particularly from the UK, have moved or are looking to move large parts of their businesses to the United States. In some cases the driving force is access to product markets and to US regulators; in others it is access to capital.

The way in which this particular Critical I survey has been conducted somewhat obscures the impact of these kinds of transnational changes in ownership and control: as long as a company based in France, for example, prepares distinct accounts or makes information on its French activities available separately, that data will be added to the totals of biotech resources in France regardless of whether the company is French-owned or foreign-owned. The impact will only be seen at the point when a decision made at the foreign headquarters results in the relocation of staff or the restructuring of operations.

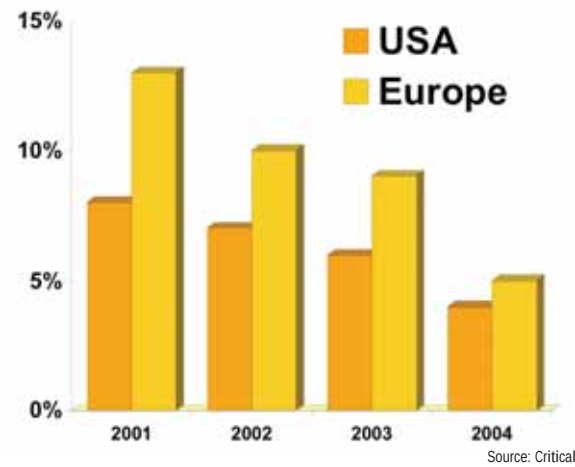
European biotech is stll relatively youthful

The gradual migration of mature European companies to the USA is serving to exacerbate the youthfulness of the Europe biotechnology sector (*see Figure: Distribution of company age*). Fully 55% of European companies in business in 2004 were 5 years old or less: 23% were two years old or younger. The equivalent figures in the USA were 41% of 5 years or under and only 17% of 2 years or less. The US leads narrowly in the proportion of companies between 6 and 15 years old, and by a significant amount for those companies over 15 years old: 17% of US companies have been going for more than 15 years compared with just 10% in Europe.

Europe is presently excelling at the formation of new biotechnology companies (see Figure: *The rate of new company formation*). In Spain, Italy, Austria, The Netherlands and Portugal, between 18% and 25 % of companies in business in 2004 were formed only in 2003 or in 2004 (the same is true also of Greece, but there the low number of companies makes the significance of the observation questionable). Even in the relatively mature biotechnology sectors in Denmark, Sweden, Switzerland, and the UK, the proportion of new companies forming in 2003 and 2004 equals or exceeds 15%. In Europe as a whole, the rate is 14% whereas it is 10% in the US.

Even though the enthusiasm for new biotechnology company formation remains high in many parts of Europe, the overall rates of company formation in Europe and in the USA are falling.

The rate of new company formation is falling



Source: Critical I Limited

Young biotechnology firms are springing up all over Europe. Each dot represents at least one company formed this millennium (postcode clustering means some companies are obscured)

Source: Critical I Limited

If the formation of new companies is a healthy sign, then European entrepreneurialism is operating well at the point of intellectual property incorporation and technology transfer. Governments, researchers, and early-stage investors have clearly received the Lisbon messages that Europe needs to become the leading technology-based trading bloc and that industry needs to make up the lion's share of the Lisbon deficit.

The rate of new company formation. Data shows companies founded in 2003 or 2004 as a percentage of the total number of companies in 2004

Source: Critical I Limited

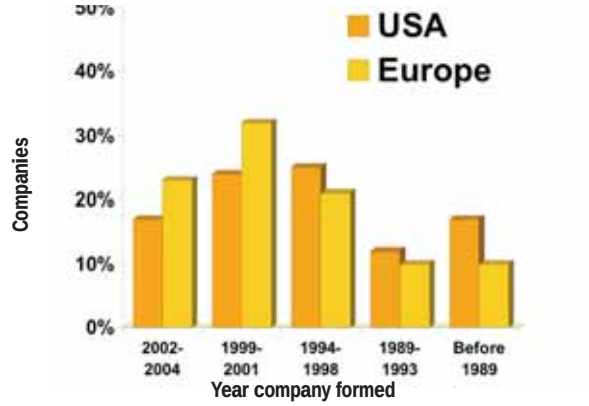
From little acorns a thousand oaks may grow?

While the entrepreneurial spirit is a sine qua non for success in biotechnology, the formation of new companies in its own right has only a minimal impact on the employment or economic performance of the sector. The 867 companies formed since 2001 – 21% of the firms included in this survey – contribute only 3.5% of the sector's employment. In Europe, those youngest of companies represent virtually a quarter (24%) of the total of European firms, yet they employ only just over 5% of the staff *(see Figure: The number of employees by age of company).*

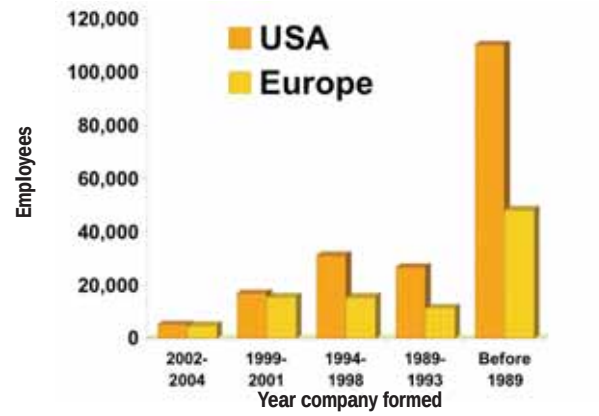
Most people, of course, work in the largest, longest established firms: half of European employees do, and nearly 60% of US employees. The larger firms contribute an even disproportionately greater amount to revenue generation: in both European and the US, companies formed before 1990 earned four-fifths of the total revenue *(see Figure: The number of employees by age of company).*

Even in innovation, the youngest firms contribute relatively little, at least quantitatively: the bottom quartile of European firms by age (the youngest 25% of companies, all of which were formed after 2001) harnesses only 4% of the sector's R&D spending. Companies that are somewhat older – between 3 and 10 years – do much better in R&D spending: this group of around 1200 companies accounts for over €3 billion or 40% of European biotechnology's research budget. This is 10 times as much as the contribution from the young minnows and nearly as much as that from the long-established firms.

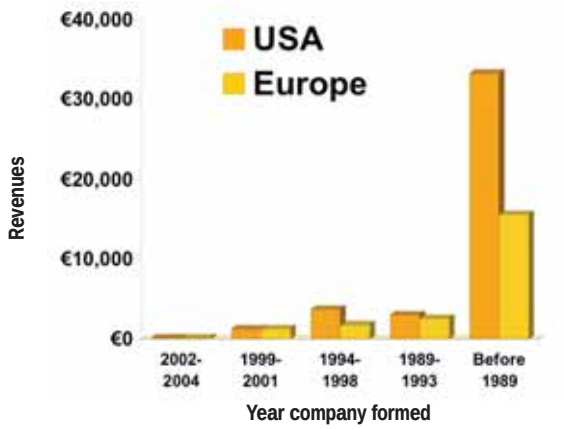
Distribution of company age: number of companies by year of foundation



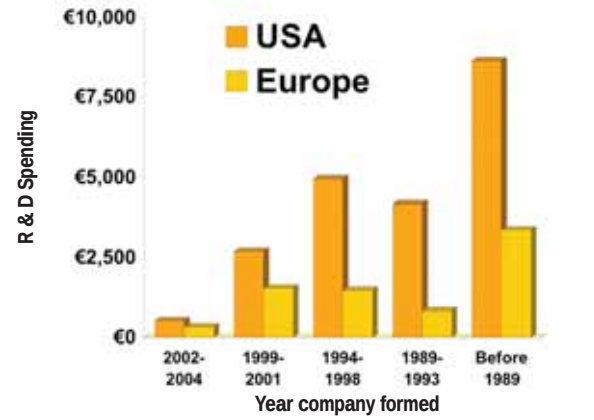
The number of employees by age of company



The total revenue earned by age of company (€ millions)



Research and development spending by age of company (€ millions)



Source: Critical I Limited

The data from this survey thus clearly indicate that there is one thing that Europe's small biotech firms need in order to be able to provide any significant contribution to the Lisbon targets, and that is to stop being small biotech firms as soon as possible. They need to grow rapidly, running as fast as they can just to remain competitive. In academia it is eminently possible for a small research group to remain competitive with its peers: although this may not ultimately be desirable, it simply specialises and starts to work in an area in which the competition is weak. In biotechnology, that mindset is not productive. The end-points are much more tightly defined: each company competes with the other in the space to develop new diagnostics, new agricultural products, new drugs and vaccines, or improved environmental practices, or increased manufacturing efficiency. Their technical approaches will be different, possibly very different, but technology and technical advantage alone does not lead naturally and unswervingly to the establishment of commercial competitive advantage.

The key to remaining competitive is the garnering of the human and financial resources that allow a company to address the problem in a sensible timeframe or, at least, to remain attractive to potential investors or acquirers. In the next section, we will see that the rate at which European biotechnology companies grow is, on average, much slower than that of their competitors from the USA. This has profound consequences both for the destinies of individual companies as they mature and for the development of the European biotechnology sector as a whole.

Proportion of companies that added employees between 2003 and 2004

Country	% Growing	% of employees that those companies represent
Austria		55% 67%
Belgium	57%	58%
Denmark	39%	83%
Finland	15%	13%
France	50%	67%
Germany	39%	41%
Greece	20%	6%
Ireland	37%	56%
Italy	24%	33%
Netherlands	24%	15%
Norway	44%	73%
Portugal	35%	53%
Sweden	51%	58%
Switzerland	49%	48%
UK	44%	47%
USA	43%	65%
Europe	42%	54%

Source: Critical I Limited

Size may not be everything, but it is important

In the previous section, we have demonstrated that it is the older, larger companies both in Europe and the USA which are responsible for the majority of employment, revenue and investment in innovation in the sector. In a sense this is merely stating the blindingly obvious: of course larger companies employ more people, and most of the people they employ are in revenue-generating or innovation functions.

What is less obvious is how well or efficiently companies make the transition from minnow to medium-sized to megalith. This section uses a more detailed analysis of the population of biotechnology companies that were in business in 2004 to cast some light on this issue.

Critical I holds a great deal of data not only on the existence of biotechnology companies in Europe and the US but also on the size of each of those companies. In the table, we have compared the distribution of company size and age for both Europe and the United States. We have looked only at companies of 10 years old or younger because we are more interested in how companies get to be old and large than in what they look like when they get there (important though that is). In any case, 80% of European companies and 70% of US biotechnology companies are 10 years old or younger, so this analysis addresses a sizable proportion of the biotechnology universe.

What we want to know is what proportion of any particular vintage of company is within each size range, and how that changes with the age of the companies.

Older European companies tend to stay small:
Percentage of each age group with number of employees.
The largest class in each age range is highlighted.

Number of employees	Year company founded 2002-4	1999-2001	1994-1998
Europe			
0-20	**93%**	**68%**	**49%**
21-50	6%	27%	33%
Over 50	1%	5%	17%
USA			
0-20	**77%**	28%	30%
21-50	22%	**60%**	26%
Over 50	1%	12%	**44%**

Source: Critical I Limited

As would be expected, the class of companies founded between 2002 and 2004 is composed predominantly of small organisations. In Europe, 93% of these young companies under two years old (as they were) have fewer than 20 employees and only 1% have more than 50 people working for them. The picture is very similar in the USA, where 77% of this group of companies has under 20 employees. In both trading blocs, the dominant size class for the youngest companies is below 20 people.

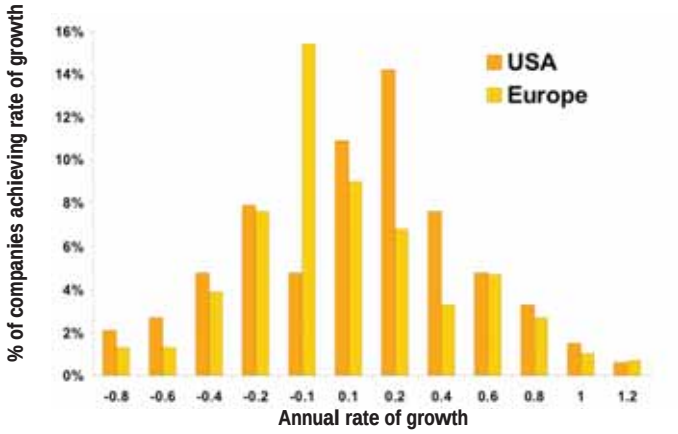
Among companies in the next age group – those founded between 1999 and 2001 – the picture changes. In the USA, 60% of that age group have between 21 and 50 employees with nearly three-quarter of companies having more than 20 employees. In Europe, only just under a third of companies is one of the bigger size range: nearly 70% of companies still have 20 people or less. By the time US companies are 6-10 years old, the over-50 employee class contains the largest proportion of companies – 44%. Meanwhile, back in Europe, although half the companies of this vintage now have more than 20 employees, the other half don't: the 20-or-less class still predominates. Indeed, 20-or-less still the remains the biggest European size class until companies exceed 15 years old.

The outcome of this analysis remains the same regardless of the age brackets and size ranges chosen. This indicates that, in general, European companies take longer to grow to a particular size.

That indication is confirmed by an examination of the year-on-year growth in employees in over 1000 US and European companies. For this analysis, the companies were all 10 years or under in 2004 and had between 5 and 100 employees in 2003. The graph in the figure on the next page shows that the pattern of growth in US and European companies is quite similar: in both cases the biggest group of companies was more or less static during 2004. This group represents 40% of companies in Europe and around a third of US companies (and, for clarity, it is not shown on the graph.

However, at the higher growth rates of 10 per cent per annum and above, more US companies were in evidence. Around 15% of US companies grew at around 20% per annum, for instance, compared with only 7% of European companies. On the other side of the peak, at growth rate below zero (i.e., a reduction in the number of employees), more European companies are in evidence. 15% of European firms feature in the set of companies that lost around 10% of employees, compared to less than 5% of US firms.

The percentage of companies that increased employees from 2003 to 2004 and grew above a given rate. The area shows the excess performance of European companies over US ones. Thus proportionally more European companies grew at rates from -40% to +30%, but more US companies grew at rates above 30% per annum.



Source: Critical I Limited

Three important points should be drawn from these comparisons of company growth.

The first is that it should not be a surprise that European companies are having to undergo a certain amount of retrenchment. After investor-led and government-encouraged boom in new company formation and growth in the first few years after the turn of the millennium, it is "Europe's turn" to rationalise its industry. Critical I's 2005 report highlighted the wave of restructuring that started in the United States in 2002 and which was evident in the data for the UK that was made public during 2005. The progress in that wave across the rest of Europe is not evident in the data we show here. The rate of new company formation is, on the whole dropping across Europe, although it remains high in a number of countries: the shift in growth rates is another symptom of action being taken within individual companies to protect the available cash that companies still have.

The second important point is that the difference between European and US company performance is sufficiently tangible to be of considerable concern. If the patterns of year-on-year underperformance relative to a US benchmark continue for year after year, then the cumulative effects may be highly detrimental to the European sector. Later, in the section on biotechnology finance, the relationship between the growth of a company and its ability to secure the financial resources for its future development will become clear.

The third vital observation is that the growth story is not all doom and gloom for European companies. It is clear from the graph of company growth rates that a higher proportion of US companies do demonstrate high year-on-year growth (and a lower proportion appears to lose employees). Being domiciled in Europe does not mean that there is no prospect of rapid growth for a European biotechnology company. The data show that a number of European companies did manage 60%, 80% and even 120% annual growth in the period from the end of 2003 to the end of 2004. The proportion of European companies that achieve these high levels of growth were just not as high as they were in the USA.

Financial Picture

Investment in European biotechnology

For biotechnology companies in Europe, raising external investment from capital markets is by necessity not an option. Most companies never get a sniff of a venture capitalist, nor would they as much as contemplate an initial public offering. In the three years 2002-2004, only around 250 European biotechnology firms (12% of the 2004 total) have had any joy from venture capital investors: the comparable number in the USA is only 350 (18% of firms). In 2004, just over 100 European biotechnology firms received venture capital investment (although more may have received "soft" money from government backed seed funds or loan agencies). External investment is very much a minority activity from a biotechnology company perspective. Although a few companies have managed to raise money on stock exchanges through equity sales, the remaining 1900 European firms generate and run on revenues (or quietly fade away). However, in a global environment in which the competition consists of large corporations with significant innovation resources funded from revenues and other biotechnology companies that raise substantial external finance, Europe's biotechnology firms do need access to capital in order to stand a chance of competing.

In 2004, Europe raised approximately €3.9 billion in equity and debt, 19% of the €20 billion total raised across Europe and the USA. Around 30% of the venture capital invested in the firms surveyed for this report came to European firms, but high activity in US public equity markets meant that only 18% of the total equity capital raised came to companies on this side of the Atlantic. Europe's share of venture capital has gradually risen, from 26% in 2002, to 27% in 2003, and 30% in 2004. The amount of venture capital has risen, too: the €1100 million venture capital total for Europe was up 40% over the previous year.

The national and international biotechnology financing picture 2004

Country	VC	Total Equity	Public Equity	Debt
Austria	54	60		
Belgium	100	125		7
Denmark	41	129	87	6
Finland				
France	195	227		3
Germany	245	402	120	2
Ireland	13	5	1	850
Italy		31		
Netherlands	14	48		1
Norway	4	4		
Sweden	21	38	7	17
Switzerland	127	262	133	477
UK	295	749	133	461
USA	2551	9621	5262	6568
Europe	1109	2079	481	1823
Overall	3660	11700	5743	8391
Europe %	30%	18%	8%	22%

Source: Critical I Limited

	Finance available 2002-2004 (total)				
Country	VC	Total Equity	Public Equity	Debt	Total
Austria	103	108			108
Belgium	127	175	23	26	201
Denmark	187	339	98	102	441
Finland	11	26		34	60
France	476	670	53	52	722
Germany	602	885	142	8	893
Ireland	19	211	190	1233	1444
Italy	28	47			47
Netherlands	28	63		3	66
Norway	7	9		1	10
Sweden	125	208	51	20	228
Switzerland	171	306	133	975	1281
UK	866	1868	346	539	2407
USA	7205	22500	9735	16872	39372
Europe	2748	4916	1036	2994	7910
Overall	9953	27416	10772	19866	47282
Europe %	28%	18%	10%	15%	17%

Source: Critical I Limited

Public Offerings

Public equity markets in Europe are gradually re-warming to biotechnology after a period of distinct frostiness at the beginning of the millennium. In 2002, European companies raised only €160 million on public markets. That increased to nearly €400 million in 2003, to nearly €500 million in 2004, and to €530 million in 2005 *(see Table: Europe's 2005 Initial Public Offerings).*

Europe's 2005 Initial Public Offerings

Company	Country	€ million
Arpida	Switzerland	60
ProStrakan Group	UK	54
Intercell	Austria	51
Jerini	Germany	44
Paion	Germany	38
TopoTarget	Denmark	31
Orexo	Sweden	30
Ardana Bioscience	UK	30
Devgen	Belgium	27
BioAlliance Pharma	France	27
Galapagos	Belgium	20
Proximagen Neuroscience	UK	20
Gentium	Italy	18
Plethora Solutions Holdings	UK	14
Phoqus	UK	13
Abcam	UK	13
ReNeuron	UK	12
Oxonica	UK	11
Stem Cell Sciences	UK	8
ExonHit Therapeutics	France	3
NextGen Group	UK	3
Angel Biotechnology	UK	2
Total		**529**

Source: Critical I Limited

Most of the money raised in public offerings by European firms comes from Initial Public Offerings. To a large extent, the IPO is the end of the money-raising line for European firms: the issuance of more stock on the public markets in Europe is rare although Denmark's antibody specialist, Genmab, did go back to the market for more money this year. This is in distinct contrast to the situation in the USA where IPOs, although often still substantial in themselves are gateways to a larger pot of money available through secondary stock offerings and PIPEs (Private Investment in Public Equity).

Part of the renewed European stock market enthusiasm for biotechnology IPOs can be attributed to the good aftermarket performance of recent European offerings.

Many European stocks performed well after 2005 IPOs

Company	Price rise between issue and end 2005
Exonhit	+111%
Plethora	+96%
Oxonica	+77%
Intercell	+63%
Abcam	+48%
DevGen	+47%
Angel	+32%
Galapagos	+29%
Jerini	+8%
NextGen	+33%
Orexo	+36%
Prostrakan	+13%
Speedel	+10%
TopoTarget	+4%
Phoqus	+1%

Source: Critical I Limited

However, a good aftermarket performance does not necessarily benefit European companies. In the USA, a rise in stock price will encourage companies to make a secondary offering quickly and this is likely to be well received by the market. But European companies do not often have this option and may be left to wonder whether they shouldn't have sought a higher valuation at IPO.

Most venture capital is concentrated in a few regions

Ranges of individual investments

○ Below €10 million ○ €11-25 million ● Above €25 million

Venture capital

European companies attracted around 30% of the 2004 venture capital investments made in companies within our survey group, virtually the same proportion of venture investment as in 2003 and 2002. The number of European companies that received venture capital is about 70% of the US number: 250 compared with 350 over the period 2002-2004. This immediately suggests that the average amount received by European companies is lower, and this is indeed the case (*see Table: Average Average VC funding round 2004*). The average round in the US in 2004 was close to €17 million, a figure nearly matched by investors in Swiss companies. Elsewhere in Europe the average VC round is well down on the US benchmark, from the €13.5 million in Austria down to below €5 million in Ireland, Norway and Sweden. The Europe-wide average is €10.6 million, two-thirds of the US figure.

Average VC funding round 2004

Country	€ millions
Austria	13.58
Belgium	10.01
Denmark	10.23
France	12.19
Germany	12.89
Ireland	2.59
Netherlands	7.12
Norway	3.64
Sweden	4.28
Switzerland	15.83
UK	10.16
USA	16.78
Europe	10.60

Source: Critical I Limited

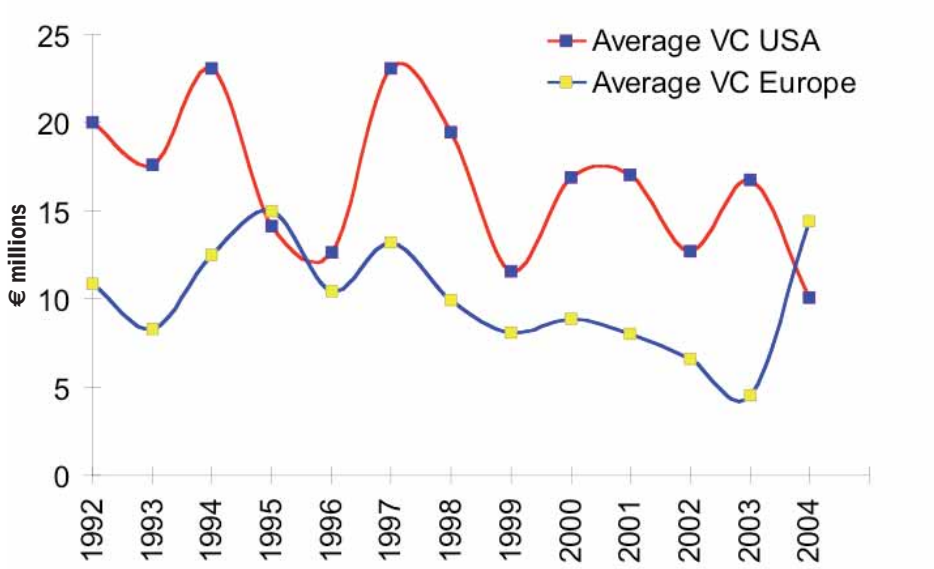
Country	Equity Average	% of companies funded
Belgium	3.5	24%
Denmark	7.2	6%
Finland	0.1	2%
France	11.6	10%
Germany	10.2	3%
Netherlands	4.8	3%
Norway	3.6	3%
Sweden	3.6	2%
Switzerland	11.9	10%
UK	8.7	13%
USA	15.3	12%
Europe	8.5	7%

Source: Critical I Limited

In our previous work, we have pointed out that far less money has been made available to European biotechnology companies at any stage of growth, and that the amount of money per investment is much lower. This has led to the position where investment is only readily available to European companies under 5 years old.

As part of this year's report, we have refined this analysis in order to look at the distributions of venture capital not only by age of company but also by their size (number of employees). By combining data from investments made in 2002, 2003, and 2004, we can examine the pattern in nearly 250 European venture investments and compare them with 350 cases in the USA.

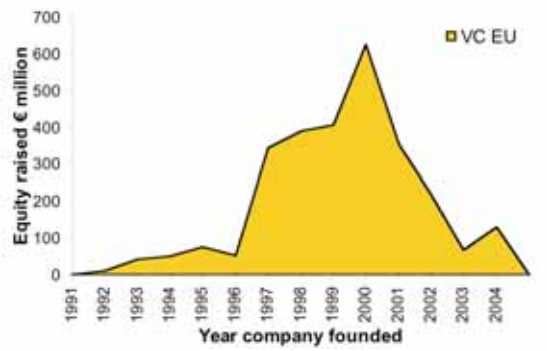
The average VC investment increases slightly with the age of the company



Source: Critical I Limited

The average amount that venture capitalists invest in a company does vary with the age of that company. However, US VC are roughly twice as generous, providing somewhere between €15 and €25 million to each company rather the €5-15 million that European companies receive.

Where the venture capital went



Source: Critical I Limited

In the chart "Where the venture capital went", we have plotted the total venture capital expenditure in the four years between 2001 and 2004 against the year that the receiving company was founded. This is a way of showing where the money went. Virtually all of the European venture capital goes into firms founded between 1997 and 2002, that is to say into company founded 5 or fewer years back from the time of investment. In fact, 60% of recent venture capital went to firms founded during Europe's boom in company formation, between 1997 and 2000. The equivalent number for the US is that just 40% of VC went to companies founded between those dates.

With the collapse of Europe's public equity markets for biotechnology in 2001/2002, companies were no longer able to raise finance through this route. The defensive but understandable response from venture capitalists in Europe was to "look after their older children" by reinvesting substantially in existing portfolio companies. In essence, 50-70% of venture capital in each of the four years between 2001 and 2004 went to companies formed in 1997-2000. This is the primary explanation of the exaggerated "hump" in funding patterns. In addition, the focus on existing companies has meant that the rate of new company formation has fallen strikingly in many European countries.

Europe's "hump" in venture investment can also be seen as a precipice over which many older companies have teetered. In the United States, two financing safety nets come into play as companies become more ancient. Firstly, US venture investors have a greater propensity for funding older firms. Over 14% of US venture capital invested between 2001 and 2004 went to firms founded before 1996; the European figure is just 8%. The main safety nets, however, are the public capital markets and the willingness of financial institutions to lend US companies relatively large amounts of money secured only by stock. This, and the contrasting situation in Europe is shown clearly in the figure overleaf.

The root of the problem?

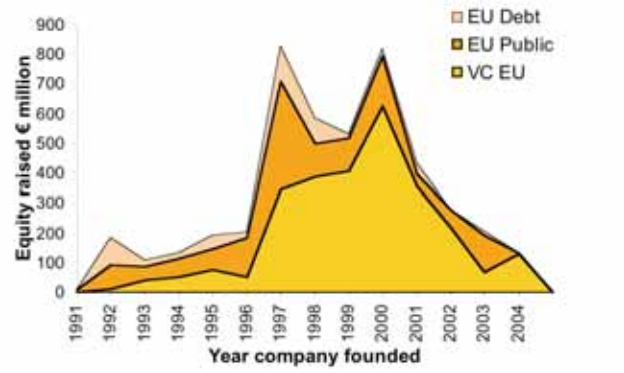
We had wondered whether there are distinct breeds of European and US investors, the one being giving and generous and the other, mean and stingey?

When the investee companies which received venture capital are classified according to their age (*Figures overleaf*), there appear to be some differences in investment patterns. Investors in European companies put a lower proportion of their money into companies of 0-2 years (22% versus 32% for investors in US companies) and more into companies that are 3-5 years year old (49% versus 38%). In other words, it appears that European investors have a preference for somewhat older companies.

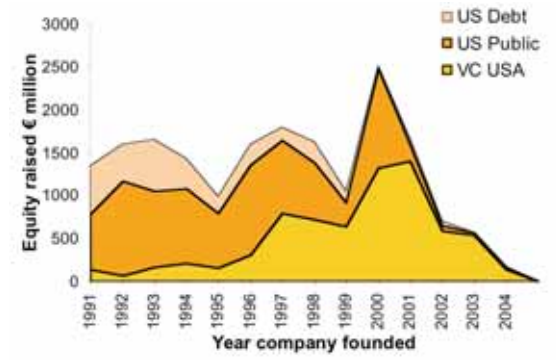
However, these differences all but disappear when the investee companies are classified by size rather than age (*Figure overleaf*). This suggests that investors on both sides of the Atlantic apply essentially the same set of criteria to their investments prospects. They are looking not only for newness but also a certain amount of substance and resourcing. The facts are these: venture investors in Europe have put money into only 9% of the companies that were founded between 2002 and 2004 while US investors have backed 22% such companies. However, European investors put money in 19% of companies that, although very young, had nevertheless grown to above 20 people. This comparable US figure is 26%.

Thus, while the density of venture capital investment differs, investors on each side of the Atlantic are not acting in dissimilar ways. By the same token, the low proportions of European private companies attracting investment has to be attributed to company performance. In other words, the apparent reluctance of investors in Europe is due to relative paucity of opportunity – fewer European companies are investable.

Europe's venture capital investment is not complemented by substantial public equity or debt.

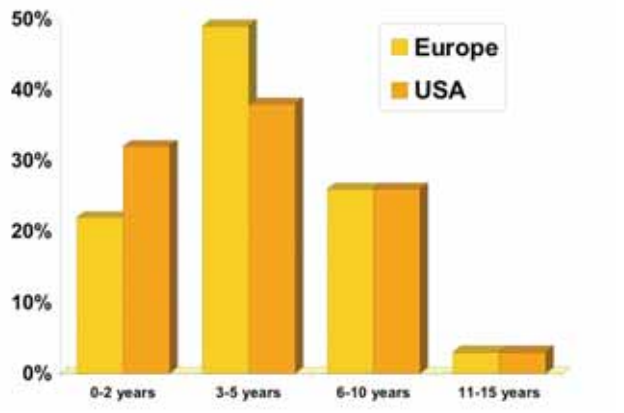


Debt provision and the public market smooth the US financing path

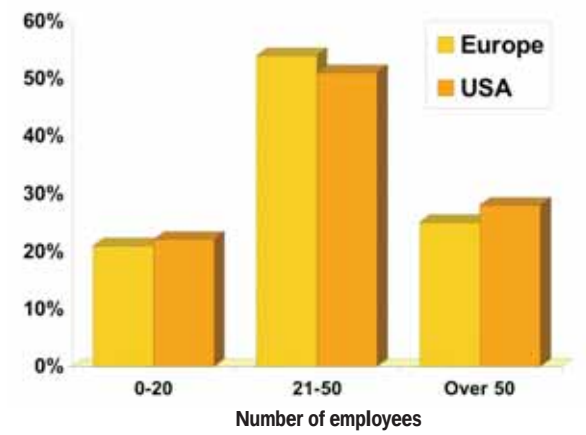


Source: Critical I Limited

Venture capital investment patterns in Europe and the USA differ when based on the age of investee companies ...



... but not on the basis of company size



Source: Critical I Limited

All 1900 of Europe's companies that did not receive investment could be said to have an investment problem. Some of the companies that have low-level seed funding also have an investment problem – that the magnitude of the investment may not have been sufficient to provide them with a decent chance of competing in the future in the markets for higher levels of investment.

However, it would appear to be inappropriate to blame investors for not matching the money that US investors put into their industry. The problem would appear to rest firmly with that large proportion of the European companies which have not managed to form themselves in to commercial entities that are backable.

Table: European venture capital rounds above € million in 2004

Company	Country	€ Million
Arpida	Switzerland	54
Arakis	UK	41
Novexel	France	40
Crop Design	Belgium	37
Addex Pharmaceuticals	Switzerland	33
Diatos	Belgium	31
Cyclacel	UK	31
ProStrakan	UK	31
Jerini	Germany	31
PowderMed	UK	28
Santhera Pharmaceuticals	Switzerland	28
Igeneon	Austria	27
CareX	France	25
Evotec Neurosciences	Germany	25
Ablynx	Belgium	25
Heidelberg Pharma	Germany	25
Domantis Limited	UK	25
Graffinity Pharmaceuticals	Germany	22
Biofrontera AG	Germany	22
Chroma Therapeutics	UK	21
Symphogen	Denmark	20

Source: Critical I Limited

Elite companies

Last year's report introduced the concept of the European Elite Company in order to reflect the fact that the outstanding performance of some of Europe's stellar performers can often get among the sector-wide crunching of numbers.

European companies, on average, appear to grow more slowly than their US counterparts, raise rather less capital, spend less on R&D and employ fewer people in R&D functions. The sector as a whole performs less well than the US sector. However, the sector is not the competitive unit in biotechnology: the company is. And there are competitive companies within the European sector. The search for the European Elite companies is a quest to identify them from basic economic and employment measures alone.

Looking for Elite companies is info-tainment. We do not expect that venture capitalists will consign the due diligence process to history and invest only in Elite companies (although we are happy to take the fees if they adopt that strategy). We would be quite surprised if the CEOs of companies that didn't get on our list were promptly sacked, or left their posts of their own volition in recognition that their fate was already sealed. We do, however, consider that the Elite company concept should be in the front of policy-makers and administrators minds. It is the leading 4-5% of companies in the field that contribute virtually all of the economic impact of the sector: they account for 60% of the R&D spending, 75% of the employees, and 90% of the revenues. It takes a huge number of start-ups to make one Amgen: Amgen employs more people than each of the national biotechnology sectors discussed here, with the exceptions of the UK, Germany and Denmark.

As we have tried to point out in this study, biotechnology sectors are highly top-heavy. Any strategic approach to building a biotechnology sector in Europe or in any of her component nations ought to give at least as much consideration to the rapid growth of existing companies as to the propulsion of fragile start-ups into a highly competitive environment. It is the Elite European companies, we hope, that have the capability to grow into the MegaBioCorps of the future.

What do Elite companies look like?

The Elite European Company is a continuum standard that applies to companies at all stages of the biotechnology growth cycle. That is to say, the precise definition of an Elite company is not fixed from year to year, but depends on the current performance of the biotechnology sector as a whole. As global standards in biotechnology improve, the benchmark for the Elite company rises, too.

It is very clear that there is a global market operating in biotechnology finance, and that competing in that market is key to ultimate success of the European biotechnology sectors. The laudable efforts of European governments to kick-start their biotechnology sectors through early-stage financing schemes may come to little if sufficient finance is not available to European companies once they have started. The biotechnology sectors both in Europe and the US are full of "also-ran" companies, companies that make up the numbers but make little overall contribution to the health of the sector.

For the purposes of this study, we will use a rather straightforward definition for the European Elite Company: it must outperform an appropriate benchmark by 100%. And the appropriate benchmark we have chosen is the Typical US company. The profile of a "Typical US company" is drawn from a composite of Critical I key performance data. In essence, for each of four age groups of companies, we strip out the best and worst 10%. The mean values employment, R&D employment, R&D spending, and Revenue of what remains becomes the profile of a "Typical" company (*see Table for data*).

A European benchmark would certainly not be suitable; it is of little virtue to be the best technology-based company in a country or a region when technology propositions are judged with reference to global peers. The Typical US company outperformed the Typical European company by 50-100% across a range of parameters. In asking the Elite European Company to outperform the Typical US benchmark, we are asking it to do 4 times better than the average European firm.

This exercise generated the following profiles for European and US "typical" companies. (*See Table overleaf*)

The Elite European Companies

Europe - the typical company (Financial data in €m)

Age (years)	*0-2*	*3-5*	*6-10*	*11-15*
Employees	9	17	28	41
R&D employees	9	11	17	18
R&D Spend	€0.69	€1.7	€3.3	€4
Revenue	€0.34	€1.01	€2.6	€6.07

US - the typical company (Financial data in €m)

Age (years)	*0-2*	*3-5*	*6-10*	*11-15*
Employees	15	28	49	77
R&D employees	9	18	27	47
R&D Spend	€1.66	€5.16	€8.74	€13.34
Revenue	€0.53	€1.51	€4.67	€7.63

European Elite Companies – Criteria for selection

Age (years)	*0-2*	*3-5*	*6-10*	*11-15*
Employees	30	57	97	155
R&D employees	18	36	55	93
R&D Spend	€3.32	€10.32	€17.48	€26.68
Revenue	€1.06	€3.02	€9.34	€15.26

In addition, the company must have expanded its employment register since 2003

The Elite European Company is a measure that applies to companies at all stages of the biotechnology growth cycle. It combines investor expectations of the biotech sector with the current standards of performance in the sector. It changes as financial markets change in order to reflect both the supply and demand for capital. And it changes to reflect biotech best practice. It is a rough guide to the likelihood that a given company will be able to raise a given level of finance at a particular time.

At the start of this chapter, we discussed the massive contribution of a mere 4% of companies to the sectors on both sides of the Atlantic. Attempting to define the concept of the Elite European Company is a mechanism for starting to think about what needs to be done in Europe in order to create more"4%" companies and to convert mediocre existence into stellar performance.

We have identified 33 European companies under 15 years old that meet the criteria. The number is lower than last year, partly because the selection criteria were more stringent as the US benchmark moved ahead.

Europe's Elite Companies at end 2004?

Company Name	*Country*	*Year Founded*
Biovertis	Austria	2003
Inyx Pharma Limited	UK	2003
Addex Pharmaceuticals SA	Switzerland	2002
CXR Biosciences Limited	UK	2002
Indivumed GmbH	Germany	2002
CMC Biopharmaceuticals A/S	Denmark	2001
TARGET HIT	Belgium	2001
Zentaris GmbH	Germany	2001
Argenta Discovery Limited	UK	2000
Basilea Pharmaceutica AG	Switzerland	2000
Genmab BV	Netherlands	2000
Henogen	Belgium	2000
Renovo Ltd	UK	2000
Astex Therapeutics Limited	UK	1999
Biolitec AG	Germany	1999
Galapagos Genomics BV	Netherlands	1999
Genfit SA	France	1999
Igeneon AG	Austria	1999
Solvias AG	Switzerland	1999
Artus GmbH	Germany	1998
Epigenomics AG	Germany	1998
GW Pharmaceuticals Plc	UK	1998
Actelion Pharmaceuticals Ltd.	Switzerland	1997
Biogemma S.A.S.	France	1997
Biotage AB	Sweden	1997
Intercell AG	Austria	1997
Vectura Limited	UK	1997
Cytos Biotechnology AG	Switzerland	1995
ProStrakan Group Limited	UK	1995
MediGene AG	Germany	1994
Advanced Medical Solutions Group Plc	UK	1991
Flamel Technologies S.A.	France	1990
Cerep SA	France	1989

Source: Critical I Limited

National & Regional Profiles

National profiles

The bulk of the commentary in this report has described the status of and outlook for the European biotechnology sector as a whole, using the comparable sector in the United States as a benchmark. The following pages of National Profiles describe the status (as of December 31, 2004) of the industry in the 19 countries which have been surveyed.

The national data show the financial and employment data for those companies in each nation which meet the inclusion criteria that Critical I uses to define its biotechnology universe. As detailed further in the Methodology section, the companies in this universe do not include pharmaceutical companies (except those whose main products are biological drugs) and other large companies which use biotechnology methods as a minority part of their business , clinical research organisations, general business and innovation support organisations, medical device companies, patient care organisations, or academic/government research institutes. The numbers we present here, therefore, are unlikely to tally exactly with other national sets of data based on broader definitions such as "life sciences", "healthcare", or "bioscience".

Furthermore, it would be simplistic to make direct comparisons between the headline figures for each nation without considering some of the basic national differences. It is certainly true that Germany has the largest number of biotechnology companies of the European nations, but then it is a populous country. The United Kingdom employs the most people in its biotechnology sector, but it became active in the field before most other countries. Denmark, Switzerland, and Ireland have a high proportion of biotechnology activity per capita, but they are small nations in which a dominant large company is active (Novo Nordisk, Serono, and Elan, respectively). The fastest growing national sectors are in countries such as the Netherlands, Austria, Spain, Italy, and Greece, but these are relatively recent recruits to the world of entrepreneurial bioscience and so their progress is measured relative to a small base.

The utility of the national profiles lies in certain key areas:

- **Trend data.** One year's data in a given country may be compared with the data for the next year, with the confidence that the two sets are based on the same definition.
- **Age profile.** The number of new companies formed per year as a percentage of the total indicates the newness of a nation's sector. Similarly, the number of companies which meet the criteria for "Young Innovative Company" status is an indication of the extent to which national governments could provide additional support to their industry through the adoption of tax and investment measures aimed at such companies.
- **Capital supply.** To a large extent, venture capitalists still prefer to operate within national borders in order to remain close to their fledgling investments, while larger biotechnology firms who are able to sell equity on public markets usually use the domestic stock exchange for their IPOs initial public offering. The amount of money raised in different countries therefore indicates the strength of local money markets.
- **Typical company data.** By dividing the overall national biotechnology universe into discrete age bands, the relative standing of companies of similar age can be compared. However, the presence of disproportionately large companies (for example, spin-off companies that have fallen fully formed from established firms) may unduly colour the picture.

In short, the National Profile data should be treated with care. Although comparisons between nations are valid because the inclusion criteria have been applied universally, internal comparisons on a year-to-year basis may be more instructive.

Europe - 2004

(Source: Critical I Limited: validated data 2004 and national sources as listed on national pages)

Status

(Financial data in €m)

2004 (2003)	
2163 (2198)	Companies
96459 (96228)	Employees
42512 (40756)	R&D employees
€7617 (€7592)	R&D Spend
€21644 (€20691)	Revenue
€2090 (€1451)	Total Equity (of which)
€1111 (€787)	Venture Capital
€322 (€178)	Private placements
€481 (€395)	Public Equity Offering
€1824 (€1019)	Debt

Europe - Age structure

Year founded	# Companies founded
2002-2004	517
1999-2001	728
1994-1998	470
1989-1993	231
Before 1989	217

Company growth

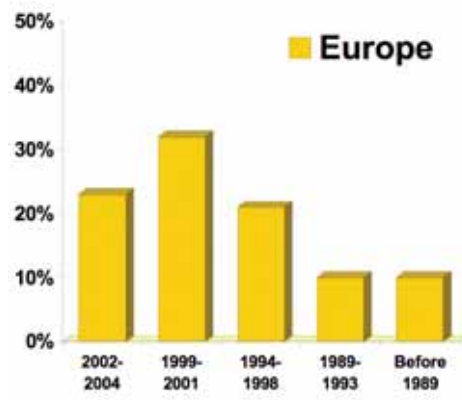
Companies formed in 2004 (% of country total)	119 (4%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	898 (42%)
Number of employees in growing companies (% of employees in country)	52477 (54%)
Young innovative companies – YIC8 (% of country total)	1275 (59%)
Innovative companies - YIC15 (% of country total)	247 (11%)
Total innovative companies	70%
Employees in companies of (% of country's employees):	
5 years or less	23369 (24%)
6-10 years	9236 (16%)
Over 15 years	57570 (60%)
R&D Staff in companies of:	
5 years or less	14068
6-10 years	9236
Over 15 years	19180

Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Europe - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	9	17	28	41	73
Revenue	€0.34	€1.01	€2.6	€6.07	€19.35
Research strength (personnel)	9	11	17	18	69
Research strength (R&D budget)	€0.69	€1.7	€3.3	€4	€4.69

Austria - 2004

(Source: Critical I Limited: preliminary data 2004 from http://www.bit.or.at/bioaustria and Venture Valuation (www.austrianbiotech.com))

Status

(Financial data in €m)

2004 (2003)	
44 (41)	Companies
2842 (2099)	Employees
1498 (1134)	R&D employees
€345 (€267)	R&D Spend
€481 (€314)	Revenue
€59 (€48)	Total Equity (of which)
€54 (€48)	Venture Capital
€0 (€0)	Private placements
€0 (€0)	Public Equity Offering
€0 (€0)	Debt

Source: Critical I Limited

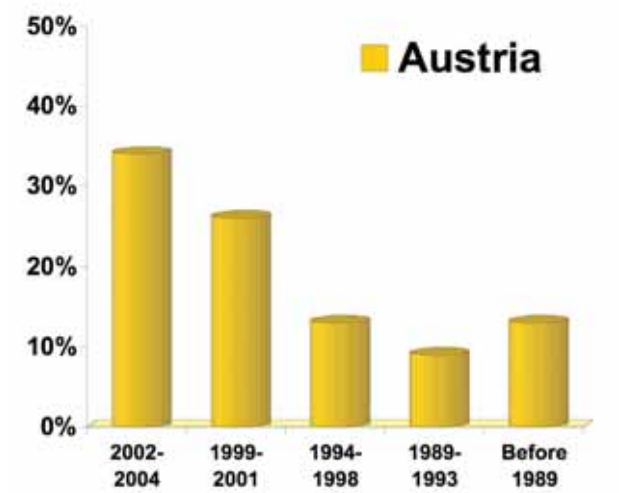
Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

Austria - Age structure

Year founded	# Companies founded
2002-2004	16
1999-2001	12
1994-1998	6
1989-1993	4
Before 1989	6

% of companies according to year founded



Source: Critical I Limited

Company growth

Companies formed in 2004 (% of country total)	3 (7%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	24 (55%)
Number of employees in growing companies (% of employees in country)	1902 (67%)
Young innovative companies – YIC8 (% of country total)	29 (66%)
Innovative companies - YIC15 (% of country total)	3 (7%)
Total innovative companies	73%

Employees in companies of (% of country's employees):	
5 years or less	452 (16%)
6-10 years	153 (13%)
Over 15 years	2022 (71%)

R&D Staff in companies of:	
5 years or less	308
6-10 years	153
Over 15 years	1036

Austria - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	23	23	23	23	47
Revenue	€0.42	€1.34	€1.64	€3.06	€6.46
Research strength (personnel)	6	16	13	4	10
Research strength (R&D budget)	€1.01	€2.35	€0.94	€0.68	€1.13

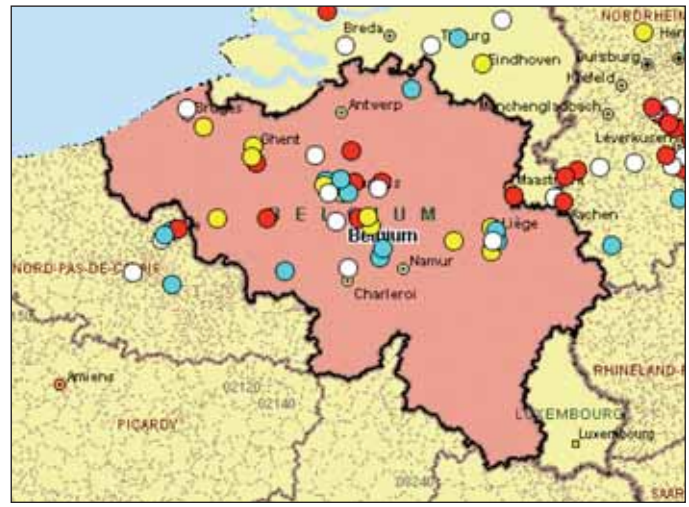
Belgium - 2004

(Source: Critical I Limited: validated data 2004: working with Flanders Bio)

Status

(Financial data in €m)

2004 (2003)	
84 (79)	Companies
3654 (3070)	Employees
1767 (1392)	R&D employees
€315 (€232)	R&D Spend
€606 (€357)	Revenue
€124 (€50)	Total Equity (of which)
€100 (€26)	Venture Capital
€0 (€0)	Private placements
€0 (€23)	Public Equity Offering
€7 (€18)	Debt



Source: Critical I Limited

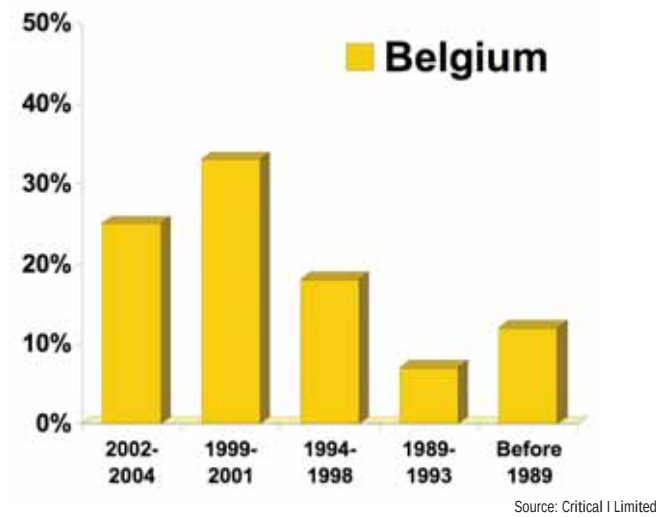
Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

Belgium - Age structure

Year founded	# Companies founded
2002-2004	22
1999-2001	29
1994-1998	16
1989-1993	6
Before 1989	11

% of companies according to year founded



Source: Critical I Limited

Company growth

Companies formed in 2004 (% of country total)	5 (6%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	48 (57%)
Number of employees in growing companies (% of employees in country)	2110 (58%)

Young innovative companies – YIC8 (% of country total)	43 (51%)
Innovative companies - YIC15 (% of country total)	14 (17%)
Total innovative companies	68%

Employees in companies of (% of country's employees):	
5 years or less	1005 (28%)
6-10 years	464 (22%)
Over 15 years	1860 (51%)

R&D Staff in companies of:	
5 years or less	561
6-10 years	464
Over 15 years	741

Belgium - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	29	29	49	25	128
Revenue	€0.55	€2.04	€8.51	€5.08	€33.64
Research strength (personnel)	7	15	29	9	54
Research strength (R&D budget)	€0.94	€4.29	€4.71	€1.06	€9.9

Denmark - 2004

(Source: Critical I Limited: validated data 2004: working with Dansk Biotek)

Status

(Financial data in €m)

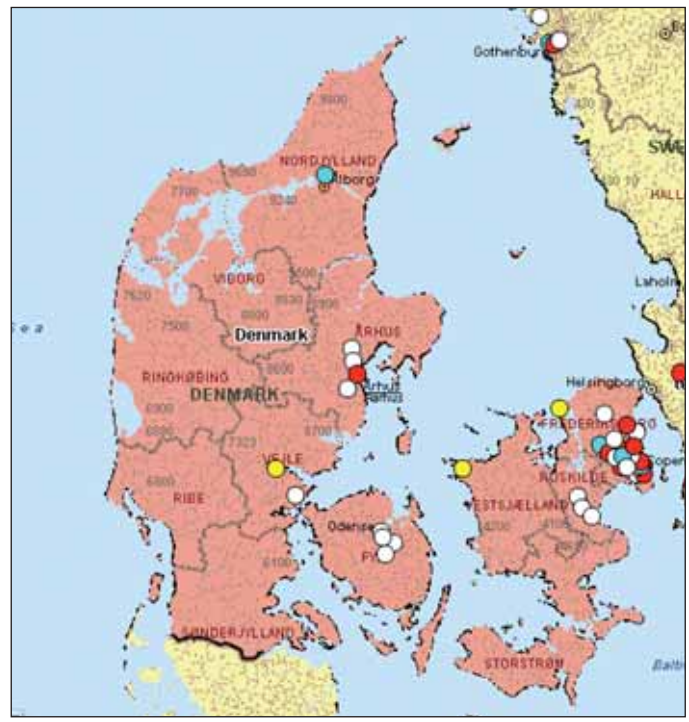
2004 (2003)	
117 (121)	Companies
18461 (17902)	Employees
4459 (4265)	R&D employees
€994 (€1002)	R&D Spend
€5396 (€5011)	Revenue
€129 (€54)	Total Equity (of which)
€40 (€41)	Venture Capital
€0 (€0)	Private placements
€86 (€1)	Public Equity Offering
€5 (€66)	Debt

Denmark - Age structure

Year founded	# Companies founded
2002-2004	33
1999-2001	48
1994-1998	16
1989-1993	9
Before 1989	11

Company growth

Companies formed in 2004 (% of country total)	6 (5%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	46 (39%)
Number of employees in growing companies (% of employees in country)	15244 (83%)
Young innovative companies – YIC8 (% of country total)	79 (68%)
Innovative companies - YIC15 (% of country total)	7 (6%)
Total innovative companies	74%
Employees in companies of (% of country's employees):	
5 years or less	3443 (19%)
6-10 years	340 (3%)
Over 15 years	14518 (79%)
R&D Staff in companies of:	
5 years or less	1522
6-10 years	340
Over 15 years	2596

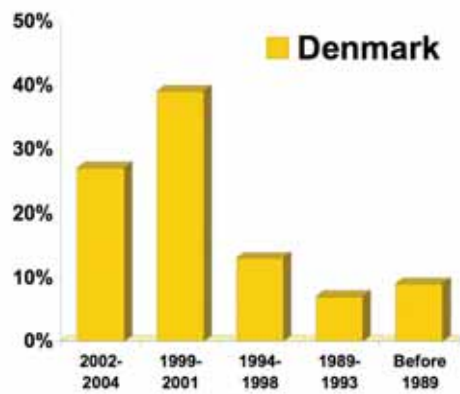


Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Denmark - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	16	16	28	41	122
Revenue	€0.28	€0.73	€1.99	€3.66	€44.31
Research strength (personnel)	6	13	19	27	44
Research strength (R&D budget)	€0.70	€1.82	€3.27	€4.23	€4.9

Estonia - 2004

(Source: Critical I Limited: preliminary data 2004 from Biotechnology in Estonia, published by the Estonian Genomics Foundation, 2005)

Status

(Financial data in €m)

2004 (2003)	
12 (12)	Companies
192 (191)	Employees
116 (83)	R&D employees
€10 (€6)	R&D Spend
€17 (€15)	Revenue
€1 (€1)	Total Equity (of which)
€0 (€0)	Venture Capital
€0 (€0)	Private placements
€0 (€0)	Public Equity Offering
€0 (€0)	Debt

Source: Critical I Limited

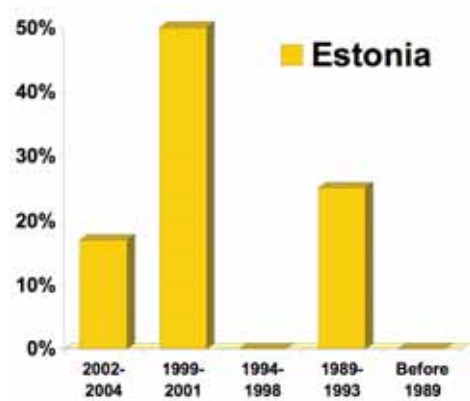
Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

Estonia - Age structure

Year founded	# Companies founded
2002-2004	2
1999-2001	7
1994-1998	0
1989-1993	3
Before 1989	0

% of companies according to year founded



Source: Critical I Limited

Company growth

Companies formed in 2004 (% of country total)	0 (0%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	1 (8%)
Number of employees in growing companies (% of employees in country)	8 (4%)

Young innovative companies – YIC8 (% of country total)	9 (75%)
Innovative companies - YIC15 (% of country total)	0 (0%)
Total innovative companies	75%

Employees in companies of (% of country's employees):	
5 years or less	132 (69%)
6-10 years	0 (0%)
Over 15 years	59 (31%)

R&D Staff in companies of:	
5 years or less	95
6-10 years	0
Over 15 years	21

Estonia - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	16	16	NA	20	NA
Revenue	€0.37	€0.88	NA	€3.62	NA
Research strength (personnel)	9	11	NA	7	NA
Research strength (R&D budget)	€0.63	€0.98	NA	€1.12	NA

Finland - 2004

(Source: Critical I Limited: preliminary data 2004 from the Finnish Bioindustries Index of Biotechnology Companies Organisations and Research Institutes in Finland)

Status

(Financial data in €m)

2004 (2003)	
66 (66)	Companies
2160 (2110)	Employees
907 (993)	R&D employees
€91 (€141)	R&D Spend
€568 (€503)	Revenue
€0 (€5)	Total Equity (of which)
€0 (€5)	Venture Capital
€0 (€0)	Private placements
€0 (€0)	Public Equity Offering
€0 (€0)	Debt

Finland - Age structure

Year founded	# Companies founded
2002-2004	8
1999-2001	18
1994-1998	19
1989-1993	13
Before 1989	8

Company growth

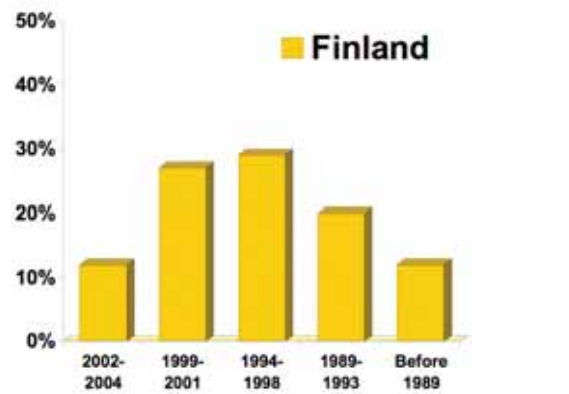
Companies formed in 2004 (% of country total)	0 (0%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	10 (15%)
Number of employees in growing companies (% of employees in country)	286 (13%)
Young innovative companies – YIC8 (% of country total)	30 (45%)
Innovative companies - YIC15 (% of country total)	12 (18%)
Total innovative companies	64%
Employees in companies of (% of country's employees):	
5 years or less	331 (15%)
6-10 years	245 (17%)
Over 15 years	1459 (68%)
R&D Staff in companies of:	
5 years or less	204
6-10 years	245
Over 15 years	456

Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Finland - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	14	14	19	24	122
Revenue	€0.67	€0.93	€1.36	€6.30	€47.78
Research strength (personnel)	6	9	13	9	32
Research strength (R&D budget)	€0.93	€1.37	€2	€1.51	€2.68

France - 2004

(Source: Critical I Limited: validated data 2004; working with France Biotech)

Status

(Financial data in €m)

2004 (2003)	
223 (225)	Companies
9142 (8373)	Employees
4246 (3651)	R&D employees
€589 (€516)	R&D Spend
€2197 (€1842)	Revenue
€226 (€155)	Total Equity (of which)
€194 (€90)	Venture Capital
€19 (€1)	Private placements
€0 (€52)	Public Equity Offering
€2 (€42)	Debt

France - Age structure

Year founded	# Companies founded
2002-2004	44
1999-2001	96
1994-1998	46
1989-1993	27
Before 1989	20

Company growth

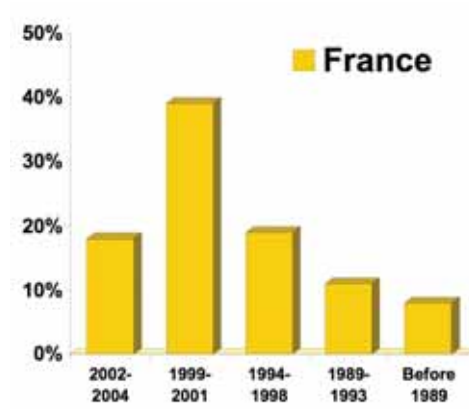
Companies formed in 2004 (% of country total)	13 (6%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	117 (50%)
Number of employees in growing companies (% of employees in country)	6127 (67%)
Young innovative companies – YIC8 (% of country total)	140 (60%)
Innovative companies - YIC15 (% of country total)	29 (12%)
Total innovative companies	73%
Employees in companies of (% of country's employees):	
5 years or less	2239 (24%)
6-10 years	825 (15%)
Over 15 years	5567 (61%)
R&D Staff in companies of:	
5 years or less	1447
6-10 years	825
Over 15 years	1972

Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

France - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	17	17	29	49	64
Revenue	€0.31	€0.93	€2.31	€6.9	€13.44
Research strength (personnel)	5	11	18	24	28
Research strength (R&D budget)	€0.57	€1.08	€2.7	€5.9	€2.87

Germany - 2004

(Source: Critical I Limited: validated data 2004; working with DIB)

Status

(Financial data in €m)

2004 (2003)	
538 (575)	Companies
16094 (18410)	Employees
8138 (9226)	R&D employees
€1507 (€1568)	R&D Spend
€2910 (€3101)	Revenue
€401 (€239)	Total Equity (of which)
€244 (€193)	Venture Capital
€36 (€27)	Private placements
€120 (€3)	Public Equity Offering
€1 (€2)	Debt

Germany - Age structure

Year founded	# Companies founded
2002-2004	92
1999-2001	210
1994-1998	133
1989-1993	64
Before 1989	39

Company growth

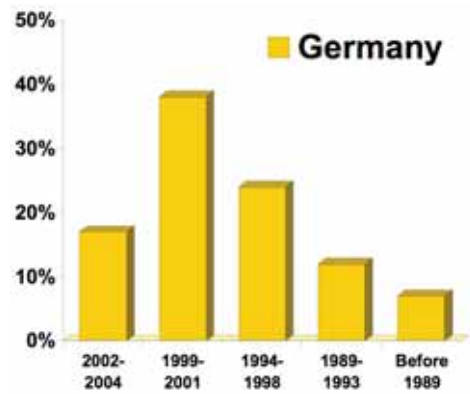
Companies formed in 2004 (% of country total)	11 (2%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	212 (39%)
Number of employees in growing companies (% of employees in country)	6603 (41%)
Young innovative companies – YIC8 (% of country total)	330 (61%)
Innovative companies - YIC15 (% of country total)	64 (12%)
Total innovative companies	73%
Employees in companies of (% of country's employees):	
5 years or less	5606 (35%)
6-10 years	2312 (25%)
Over 15 years	6394 (40%)
R&D Staff in companies of:	
5 years or less	3473
6-10 years	2312
Over 15 years	2353

Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Germany - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	14	14	27	26	64
Revenue	€0.46	€1.17	€2.56	€3.37	€15.23
Research strength (personnel)	7	9	16	10	20
Research strength (R&D budget)	€0.75	€1.36	€3.5	€1.81	€4.67

Greece - 2004

(Source: Critical I Limited: preliminary data 2004 from Bionova)

Status

(Financial data in €m)

2004 (2003)	
5 (4)	Companies
131 (125)	Employees
25 (21)	R&D employees
€2 (€2)	R&D Spend
€2 (€2)	Revenue
€3 (€3)	Total Equity (of which)
€0 (€0)	Venture Capital
€0 (€0)	Private placements
€0 (€0)	Public Equity Offering
€0 (€0)	Debt

Greece - Age structure

Year founded	# Companies founded
2002-2004	2
1999-2001	1
1994-1998	1
1989-1993	0
Before 1989	1

Company growth

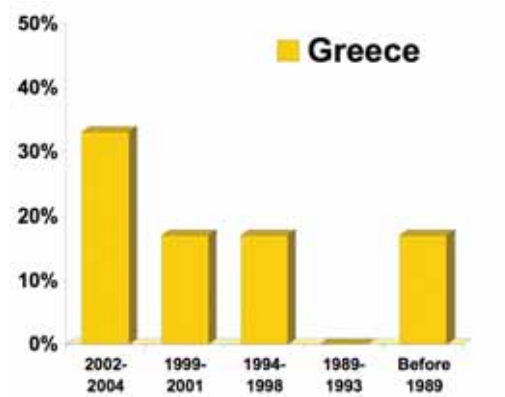
Companies formed in 2004 (% of country total)	1 (20%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	1 (20%)
Number of employees in growing companies (% of employees in country)	7 (6%)
Young innovative companies – YIC8 (% of country total)	4 (80%)
Innovative companies - YIC15 (% of country total)	0 (0%)
Total innovative companies	80%
Employees in companies of (% of country's employees):	
5 years or less	25 (19%)
6-10 years	1 (2%)
Over 15 years	104 (79%)
R&D Staff in companies of:	
5 years or less	19
6-10 years	1
Over 15 years	5

Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Greece - the typical company

Insufficient data - no Typical Company Profile

Hungary - 2004

(Source: Critical I Limited: preliminary data 2004 from the Hungarian Biotechnology Association's information published by PROVENTA Capital Advisors)

Status

(Financial data in €m)

2004 (2003)	
16 (16)	Companies
394 (389)	Employees
196 (176)	R&D employees
€19 (€22)	R&D Spend
€38 (€30)	Revenue
€0 (€0)	Total Equity (of which)
€0 (€0)	Venture Capital
€0 (€0)	Private placements
€0 (€0)	Public Equity Offering
€0 (€0)	Debt

Hungary - Age structure

Year founded	# Companies founded
2002-2004	2
1999-2001	5
1994-1998	6
1989-1993	3
Before 1989	0

Company growth

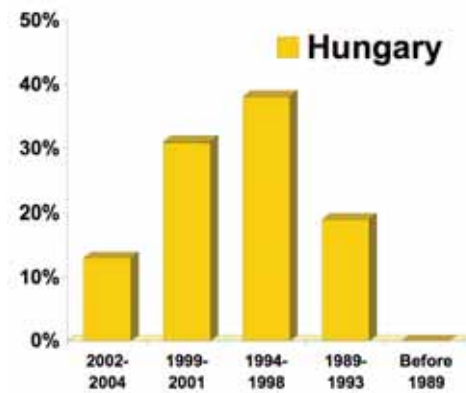
Companies formed in 2004 (% of country total)	0 (0%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	1 (6%)
Number of employees in growing companies (% of employees in country)	14 (4%)
Young innovative companies – YIC8 (% of country total)	9 (56%)
Innovative companies - YIC15 (% of country total)	5 (31%)
Total innovative companies	88%
Employees in companies of (% of country's employees):	
5 years or less	131 (33%)
6-10 years	48 (22%)
Over 15 years	178 (45%)
R&D Staff in companies of:	
5 years or less	83
6-10 years	48
Over 15 years	64

Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Hungary - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	22	22	14	59	NA
Revenue	€0.37	€1.53	€1.6	€6.87	NA
Research strength (personnel)	6	14	8	22	NA
Research strength (R&D budget)	€0.62	€1.3	€1.32	€1.61	NA

Ireland - 2004

(Source: Critical I Limited: validated data 2004)

Status

(Financial data in €m)	
2004 (2003)	
49 (42)	Companies
4436 (2941)	Employees
1839 (1080)	R&D employees
€284 (€288)	R&D Spend
€707 (€961)	Revenue
€7 (€198)	Total Equity (of which)
€15 (€1)	Venture Capital
€16 (€7)	Private placements
€1 (€189)	Public Equity Offering
€850 (€381)	Debt

Ireland - Age structure

Year founded	# Companies founded
2002-2004	11
1999-2001	9
1994-1998	11
1989-1993	10
Before 1989	8

Company growth

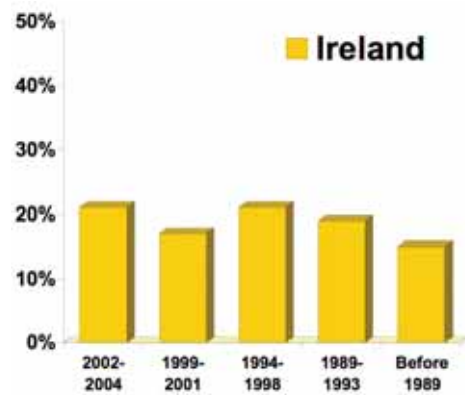
Companies formed in 2004 (% of country total)	3 (6%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	18 (37%)
Number of employees in growing companies (% of employees in country)	2474 (56%)
Young innovative companies – YIC8 (% of country total)	22 (45%)
Innovative companies - YIC15 (% of country total)	4 (8%)
Total innovative companies	53%
Employees in companies of (% of country's employees):	
5 years or less	191 (4%)
6-10 years	80 (4%)
Over 15 years	4061 (92%)
R&D Staff in companies of:	
5 years or less	129
6-10 years	80
Over 15 years	1629

Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Ireland - the typical company

	(Financial data in €m)				
Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	14	14	17	37	58
Revenue	€0.20	€0.6	€1.76	€10.94	€9.60
Research strength (personnel)	5	9	7	13	14
Research strength (R&D budget)	€0.91	€1.96	€0.95	€1.71	€0.97

Italy - 2004

(Source: Critical I Limited: preliminary data 2004; working with Assobiotec: additional data from Venture Valuation (www.italianbiotech.com))

Status

(Financial data in €m)

2004 (2003)	
51 (43)	Companies
2654 (1648)	Employees
1452 (814)	R&D employees
€284 (€180)	R&D Spend
€286 (€198)	Revenue
€31 (€15)	Total Equity (of which)
€0 (€27)	Venture Capital
€0 (€0)	Private placements
€0 (€0)	Public Equity Offering
€0 (€0)	Debt

Italy - Age structure

Year founded	# Companies founded
2002-2004	19
1999-2001	13
1994-1998	9
1989-1993	7
Before 1989	3

Company growth

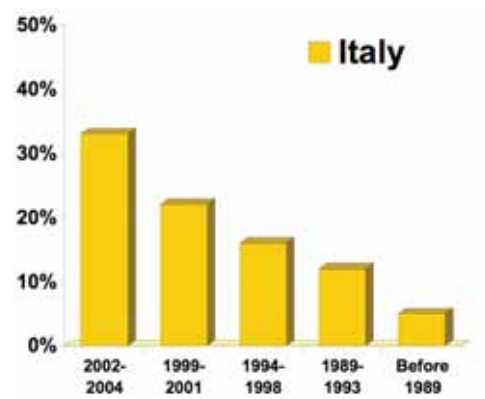
Companies formed in 2004 (% of country total)	7 (14%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	12 (24%)
Number of employees in growing companies (% of employees in country)	888 (33%)
Young innovative companies – YIC8 (% of country total)	28 (55%)
Innovative companies - YIC15 (% of country total)	11 (22%)
Total innovative companies	76%
Employees in companies of (% of country's employees):	
5 years or less	1220 (46%)
6-10 years	210 (13%)
Over 15 years	1100 (41%)
R&D Staff in companies of:	
5 years or less	789
6-10 years	210
Over 15 years	451

Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Italy - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	25	25	29	29	145
Revenue	€0.2	€1.59	€2.25	€4.91	€26.3
Research strength (personnel)	5	17	18	15	20
Research strength (R&D budget)	€0.57	€2.31	€4.92	€4.34	€5.36

Netherlands - 2004

(Source: Critical I Limited: preliminary data)

Status

(Financial data in €m)

2004 (2003)	
124 (116)	Companies
2837 (2761)	Employees
1282 (938)	R&D employees
€147 (€99)	R&D Spend
€308 (€175)	Revenue
€47 (€15)	Total Equity (of which)
€14 (€14)	Venture Capital
€0 (€0)	Private placements
€0 (€0)	Public Equity Offering
€1 (€1)	Debt

Netherlands - Age structure

Year founded	# Companies founded
2002-2004	42
1999-2001	43
1994-1998	18
1989-1993	12
Before 1989	9

Company growth

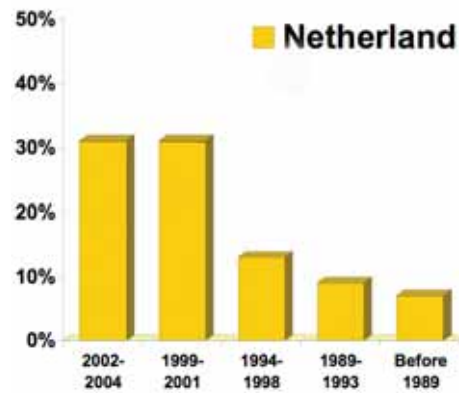
Companies formed in 2004 (% of country total)	13 (10%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	30 (24%)
Number of employees in growing companies (% of employees in country)	435 (15%)
Young innovative companies – YIC8 (% of country total)	79 (64%)
Innovative companies - YIC15 (% of country total)	13 (10%)
Total innovative companies	74%
Employees in companies of (% of country's employees):	
5 years or less	1079 (38%)
6-10 years	192 (12%)
Over 15 years	1408 (50%)
R&D Staff in companies of:	
5 years or less	695
6-10 years	192
Over 15 years	395

Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Netherlands - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	14	14	15	26	42
Revenue	€0.2	€1.12	€1.46	€3.14	€11.71
Research strength (personnel)	3	8	8	8	15
Research strength (R&D budget)	€0.46	€0.98	€1.43	€0.77	€2.93

Norway - 2004

(Source: Critical I Limited: validated data 2004; working with the Norwegian Bioindustry Association)

Status

(Financial data in €m)

2004 (2003)	
41 (43)	Companies
931 (1161)	Employees
519 (452)	R&D employees
€80 (€54)	R&D Spend
€81 (€144)	Revenue
€3 (€2)	Total Equity (of which)
€3 (€2)	Venture Capital
€0 (€0)	Private placements
€0 (€0)	Public Equity Offering
€0 (€1)	Debt

Norway - Age structure

Year founded	# Companies founded
2002-2004	6
1999-2001	13
1994-1998	12
1989-1993	4
Before 1989	6

Company growth

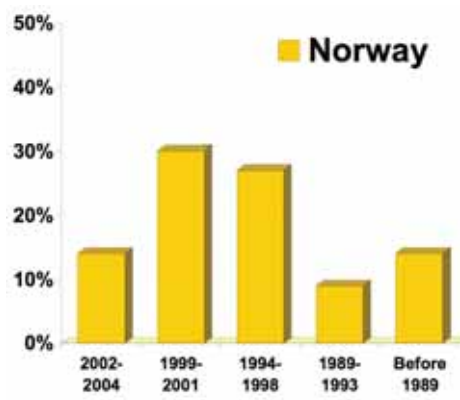
Companies formed in 2004 (% of country total)	3 (7%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	18 (44%)
Number of employees in growing companies (% of employees in country)	683 (73%)
Young innovative companies – YIC8 (% of country total)	19 (46%)
Innovative companies - YIC15 (% of country total)	4 (10%)
Total innovative companies	56%
Employees in companies of (% of country's employees):	
5 years or less	199 (21%)
6-10 years	102 (22%)
Over 15 years	527 (57%)
R&D Staff in companies of:	
5 years or less	194
6-10 years	102
Over 15 years	222

Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Norway - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	13	13	19	21	44
Revenue	€0.2	€0.65	€0.85	€10.49	€4.04
Research strength (personnel)	8	15	9	5	15
Research strength (R&D budget)	€1.06	€1.13	€2.08	€1.28	€0.94

Portugal - 2004

(Source: Critical I Limited: preliminary data 2004 from the Portuguese Biotechnology Directory)

Status

(Financial data in €m)

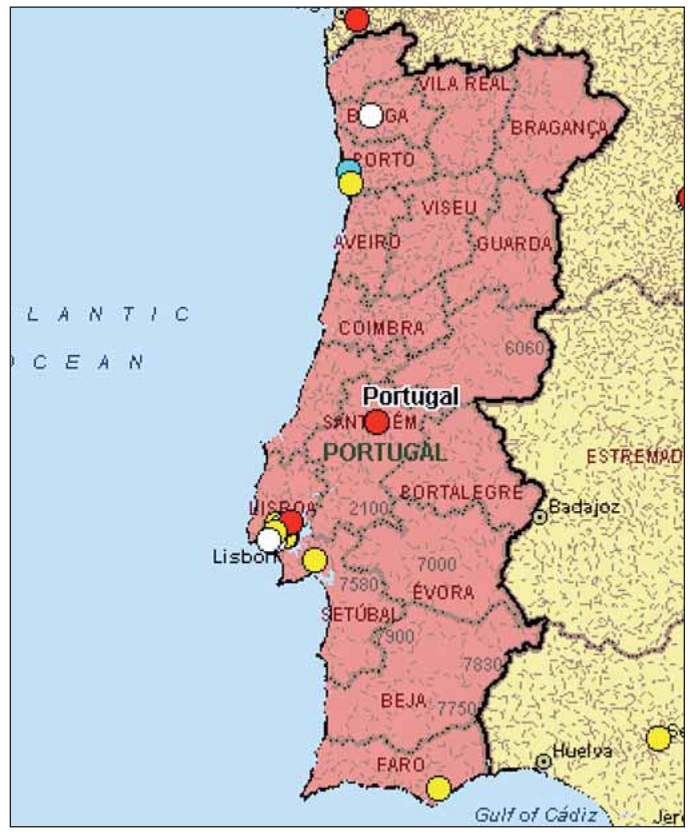
2004 (2003)	
17 (17)	Companies
256 (201)	Employees
129 (89)	R&D employees
€8 (€7)	R&D Spend
€36 (€20)	Revenue
€0 (€0)	Total Equity (of which)
€0 (€0)	Venture Capital
€0 (€0)	Private placements
€0 (€0)	Public Equity Offering
€0 (€0)	Debt

Portugal - Age structure

Year founded	# Companies founded
2002-2004	5
1999-2001	3
1994-1998	5
1989-1993	0
Before 1989	4

Company growth

Companies formed in 2004 (% of country total)	0 (0%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	6 (35%)
Number of employees in growing companies (% of employees in country)	136 (53%)
Young innovative companies – YIC8 (% of country total)	8 (47%)
Innovative companies - YIC15 (% of country total)	1 (6%)
Total innovative companies	53%
Employees in companies of (% of country's employees):	
5 years or less	55 (22%)
6-10 years	33 (25%)
Over 15 years	136 (53%)
R&D Staff in companies of:	
5 years or less	30
6-10 years	33
Over 15 years	64

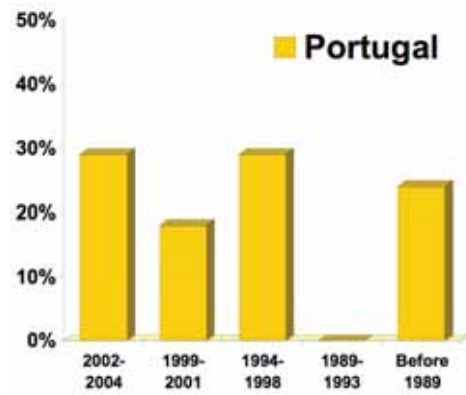


Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Portugal - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	8	8	13	NA	34
Revenue	€0.26	€0.54	€1.55	NA	€6.88
Research strength (personnel)	3	5	7	NA	16
Research strength (R&D budget)	€0.55	€0.2	€0.63	NA	€1.13

Spain - 2004

(Source: Critical I Limited validation of company status: preliminary data 2004 from Genoma Espana)

Status

(Financial data in €m)

2004 (2003)	
81 (74)	Companies
2201 (1961)	Employees
1170 (980)	R&D employees
€214 (€189)	R&D Spend
€260 (€230)	Revenue
€86 (NA)	Total Equity (of which)
€4 (€4)	Venture Capital
€76 (NA)	Private placements
€0 (NA)	Public Equity Offering
€1 (€1)	Debt

Spain - Age structure

Year founded	# Companies founded
2002-2004	37
1999-2001	23
1994-1998	9
1989-1993	6
Before 1989	6

Company growth

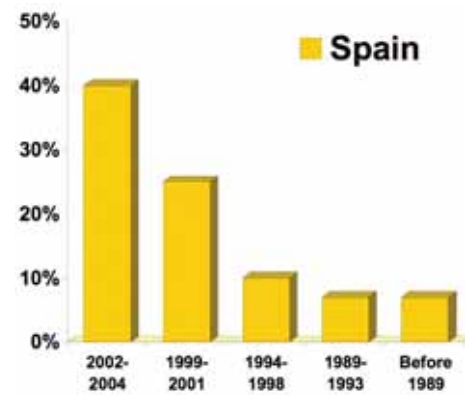
Companies formed in 2004 (% of country total)	11 (14%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	38 (47%)
Number of employees in growing companies (% of employees in country)	887 (40%)
Young innovative companies – YIC8 (% of country total)	49 (60%)
Innovative companies - YIC15 (% of country total)	6 (7%)
Total innovative companies	68%
Employees in companies of (% of country's employees):	
5 years or less	736 (33%)
6-10 years	179 (17%)
Over 15 years	1089 (50%)
R&D Staff in companies of:	
5 years or less	484
6-10 years	179
Over 15 years	506

Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Spain - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	15	15	30	29	139
Revenue	€0.46	€1.02	€2.16	€3.66	€27.44
Research strength (personnel)	7	9	19	10	67
Research strength (R&D budget)	€0.83	€1.7	€3.18	€1.06	€17.41

Sweden - 2004

(Source: Critical I Limited: validated data 2004: working with SwedenBIO)

Status

(Financial data in €m)

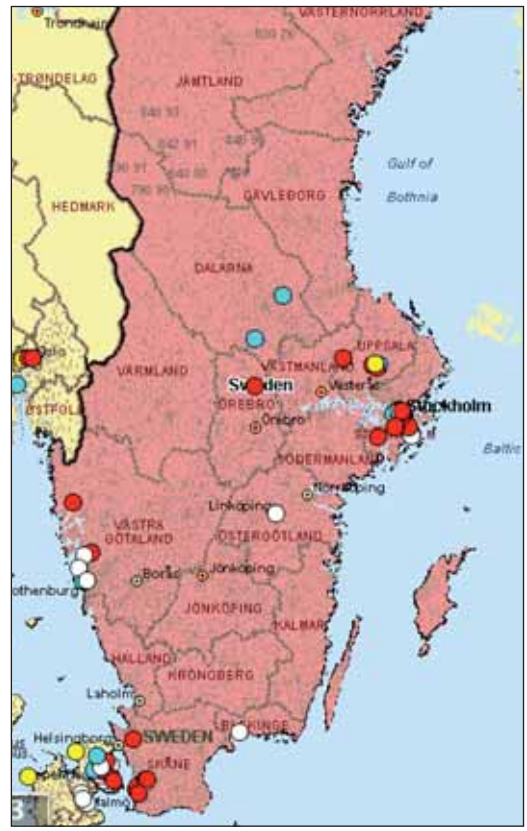
2004 (2003)	
138 (151)	Companies
3942 (4542)	Employees
2579 (2779)	R&D employees
€367 (€447)	R&D Spend
€854 (€766)	Revenue
€38 (€95)	Total Equity (of which)
€21 (€45)	Venture Capital
€9 (€0)	Private placements
€7 (€44)	Public Equity Offering
€16 (€1)	Debt

Sweden - Age structure

Year founded	# Companies founded
2002-2004	28
1999-2001	49
1994-1998	28
1989-1993	12
Before 1989	21

Company growth

Companies formed in 2004 (% of country total)	8 (6%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	71 (51%)
Number of employees in growing companies (% of employees in country)	2294 (58%)
Young innovative companies – YIC8 (% of country total)	84 (61%)
Innovative companies - YIC15 (% of country total)	20 (14%)
Total innovative companies	75%
Employees in companies of (% of country's employees):	
5 years or less	1355 (34%)
6-10 years	881 (28%)
Over 15 years	1493 (38%)
R&D Staff in companies of:	
5 years or less	1033
6-10 years	881
Over 15 years	664

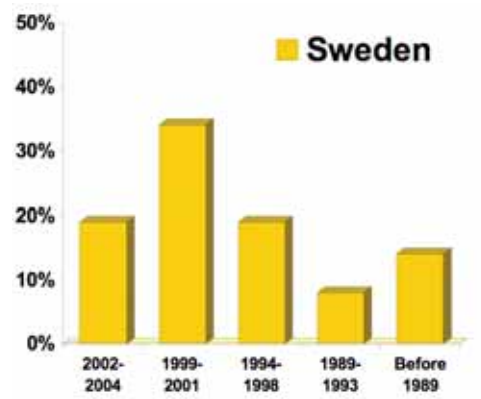


Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

Sweden - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	14	14	20	27	45
Revenue	€0.23	€0.9	€1.46	€6.0	€20.37
Research strength (personnel)	5	9	14	13	21
Research strength (R&D budget)	€0.57	€1.76	€2.31	€2.93	€2.96

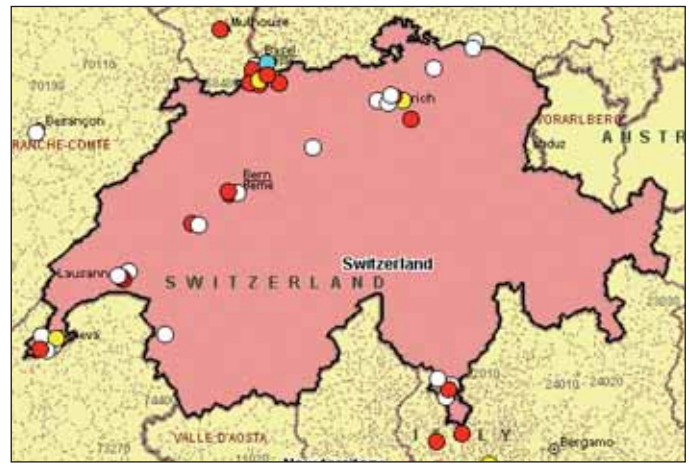
Switzerland - 2004

(Source: Critical I Limited: validated data 2004)

Status

(Financial data in €m)

2004 (2003)	
90 (93)	Companies
4990 (5503)	Employees
2796 (2778)	R&D employees
€795 (€736)	R&D Spend
€2367 (€1939)	Revenue
€261 (€43)	Total Equity (of which)
€126 (€43)	Venture Capital
€0 (€0)	Private placements
€133 (€0)	Public Equity Offering
€476 (€498)	Debt



Source: Critical I Limited

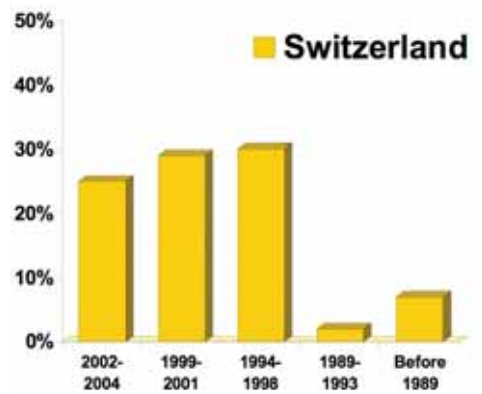
Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

Switzerland - Age structure

Year founded	# Companies founded
2002-2004	24
1999-2001	28
1994-1998	29
1989-1993	2
Before 1989	7

% of companies according to year founded



Source: Critical I Limited

Company growth

Companies formed in 2004 (% of country total)	6 (7%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	44 (49%)
Number of employees in growing companies (% of employees in country)	2381 (48%)
Young innovative companies – YIC8 (% of country total)	63 (70%)
Innovative companies - YIC15 (% of country total)	10 (11%)
Total innovative companies	81%
Employees in companies of (% of country's employees):	
5 years or less	1106 (22%)
6-10 years	1234 (38%)
Over 15 years	2002 (40%)
R&D Staff in companies of:	
5 years or less	623
6-10 years	1234
Over 15 years	938

Switzerland - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	17	17	33	18	57
Revenue	€0.41	€0.83	€3.41	€1.15	€11.94
Research strength (personnel)	7	9	18	7	18
Research strength (R&D budget)	€0.6	€1.87	€4.63	€3.87	€3.08

UK - 2004

(Source: Critical I Limited: validated data 2004)

Status

(Financial data in €m)

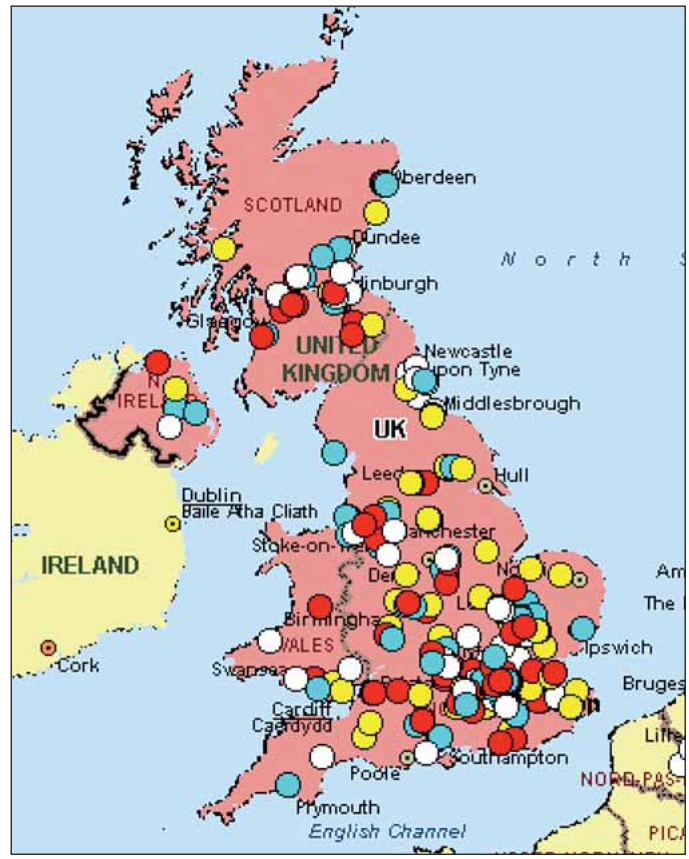
2004 (2003)	
457 (484)	Companies
21134 (22834)	Employees
9384 (9896)	R&D employees
€1557 (€1828)	R&D Spend
€4522 (€5073)	Revenue
€753 (€521)	Total Equity (of which)
€294 (€245)	Venture Capital
€239 (€141)	Private placements
€132 (€81)	Public Equity Offering
€461 (€5)	Debt

UK - Age structure

Year founded	# Companies founded
2002-2004	124
1999-2001	121
1994-1998	106
1989-1993	49
Before 1989	57

Company growth

Companies formed in 2004 (% of country total)	29 (6%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	201 (44%)
Number of employees in growing companies (% of employees in country)	9999 (47%)
Young innovative companies – YIC8 (% of country total)	250 (55%)
Innovative companies - YIC15 (% of country total)	44 (10%)
Total innovative companies	64%
Employees in companies of (% of country's employees):	
5 years or less	4055 (19%)
6-10 years	1937 (17%)
Over 15 years	13584 (64%)
R&D Staff in companies of:	
5 years or less	2379
6-10 years	1937
Over 15 years	5067

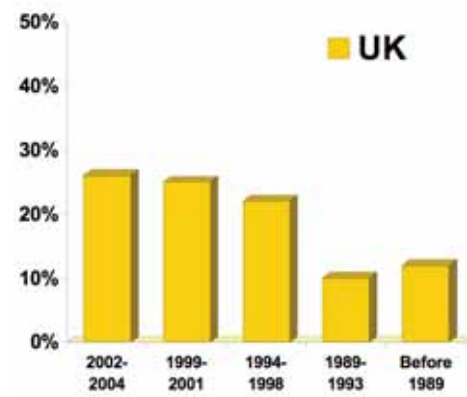


Source: Critical I Limited

Key to Map

● Agbio and Environmental ● Healthcare ● Diagnostics ● Service

% of companies according to year founded



Source: Critical I Limited

UK - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	16	16	26	54	70
Revenue	€0.31	€0.62	€1.52	€10.60	€16.51
Research strength (personnel)	7	11	16	15	26
Research strength (R&D budget)	€0.5	€2.14	€3.48	€6.44	€5.00

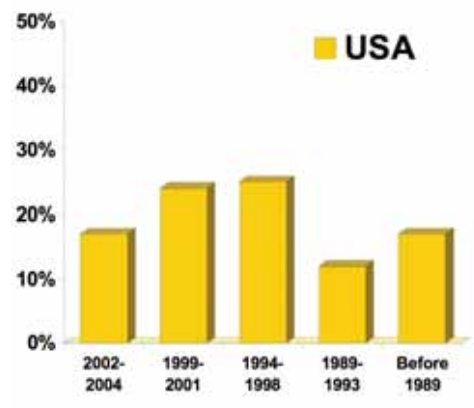
USA - 2004

(Source: Critical I Limited: validated data 2004)

Status

(Financial data in €m)	
2004 (2003)	
1991 (1975)	Companies
190462 (179657)	Employees
79344 (77119)	R&D employees
€20958 (€20016)	R&D Spend
€41514 (€40609)	Revenue
€9621 (€7437)	Total Equity (of which)
€2550 (€2171)	Venture Capital
€1792 (€1403)	Private placements
€5262 (€3495)	Public Equity Offering
€6568 (€6020)	Debt

% of companies according to year founded



Source: Critical I Limited

USA - Age structure

Year founded	# Companies founded
2002-2004	350
1999-2001	501
1994-1998	524
1989-1993	255
Before 1989	361

USA - the typical company

(Financial data in €m)

Age (years)	**0-2**	**3-5**	**6-10**	**11-15**	**16+**
Employees	15	28	49	77	109
Revenue	€0.53	€1.51	€4.67	€7.63	€20.92
Research strength (personnel)	9	18	27	47	41
Research strength (R&D budget)	€1.66	€5.16	€8.74	€13.34	€8.72

Company growth

Companies formed in 2004 (% of country total)	78 (4%)
Number of growing companies (more employees in 2004; includes companies founded in 2004)	863 (43%)
Number of employees in growing companies (% of employees in country)	124165 (65%)
Young innovative companies – YIC8 (% of country total)	0 (0%)
Innovative companies - YIC15 (% of country total)	0 (0%)
Total innovative companies	0%
Employees in companies of (% of country's employees):	
5 years or less	22258 (12%)
6-10 years	17376 (16%)
Over 15 years	137063 (72%)
R&D Staff in companies of:	
5 years or less	13241
6-10 years	17376
Over 15 years	48726

Appendix - Methodology

A consistently applied definition of biotechnology

Our method depends on the consistent application of a single definition of biotechnology throughout the study. We do not claim that this is the only definition that could be applied, nor that other definitions are in some way invalid or inferior. However, in order to be able to compare the "biotechnology" sector in one country with that in another (or with the same sector in subsequent years), Critical I has adopted a single definition. We thus know that we are "comparing apples with apples".

This definition that Critical I has adopted excludes some organisations that alternative definitions of biotechnology or life sciences often encompass. We exclude, for instance, clinical research organisations, suppliers of biological reagents for research purposes, medical device companies, and those drug companies which use little biology. We also exclude consultancies, technology transfer organisations, incubator centres, investors in biotechnology companies, and organisations that are active in biotechnology companies but which do but do not have a formal corporate legal identity.

Big pharma companies, other major corporates, and companies for whom biotechnology is an important but, nonetheless, minor part of their business are not included in this study. Dedicated biotechnology subsidiaries of major corporates are included, however. As a result, the study does not, and was not designed to reflect, the full scope and extent of biotechnology activity in the countries surveyed. This is particularly relevant in the Agricultural and Environmental sectors where the number of pure play biotechnology companies is extremely limited, albeit that biotechnology-based techniques are both a widespread and increasingly vital part of their technology mix.

Critical I's definition is not the only valid definition of "biotechnology". However, this comparative study of biotechnology across Europe is dependent on consistent adherence to a transparent definition of the sector. We apply one definition of biotechnology across all our data sets, and it is this that permits valid comparison between nations, between trading blocs, between regions, or between different time periods for a single geographical grouping.

Critical I can compare the data presented in this report with data gathered elsewhere by comparing the lists of companies included in each study, assuming that these are available. Thus it is possible to track the source of discrepancies, should there be any.

The definitions that Critical I uses stet are, for instance, broadly comparable with those put forward by the Organisation for Economic Cooperation and Development (OECD), with the decided advantage that we impose a number of subdivisions (24) within the biotechnology set. This means that not only are we comparing apples with apples, but we are comparing French Golden Delicious with French Golden Delicious, Granny Smiths with Granny Smiths, and Russets with Russets.

In this survey we include only companies whose **primary** commercial activity depends on the application of biological organisms, systems or processes, or on the provision of specialist services to facilitate the understanding thereof are included in the remit of this study.

A rigorous application of this definition, likewise, means that many companies who might, and indeed, often do feature in reviews of the biotechnology industry have been excluded from this study. By the same token, companies such as Novo Nordisk and Serono have been included, not withstanding their scale, because they do satisfy the definition above.

Sectoral analysis

Companies analysed in this study have been categorised by sector (e.g. healthcare, diagnostics, agriculture and environmental, service):

Activity	Includes
AgBio and Environmental	Veterinary healthcare, biopesticides, plant agriculture, food technology, biocleaning, bioremediation, water & effluent treatment, waste recycling, white biotech, green biotech
Biodiagnostics	Environmental diagnostics, industrial diagnostics, healthcare diagnostics
Human healthcare	Biomaterials, drug delivery, drug discovery, gene therapy or cell therapy, genomics, vaccines, red biotech
Service	Bioprocessing. chemicals, contract research, contract manufacturing; bioinformatics, functional genomics, high throughput screening

Companies were split into five age bands according to the year in which they were founded, namely:

2002-2004
1999-2001
1994-1998
1989-1993
Before 1989

The age-bands and sector categorisation allow Critical I to make comparisons between groups of companies of similar ages and activities, and thereby to "extrapolate" for metrics that may be missing for an individual company. Furthermore, the benchmarking we perform in this study and in other work uses the age and sector banding to permit comparisons with peer companies.

Data-gathering

To ensure that we included only companies that fall within the above definitions and sectors/sub-sectors, and that their data profile was complete as possible, an extensive data gathering process was undertaken, using the following approach:

- **Identification of companies for potential inclusion**
  Our starting-point in each country was the universe of well-known, readily identified biotechnology companies. Potential additional companies were identified through:
  - Directories and web-sites of university technology transfer offices, business incubators, regional development agencies, trade and industry bodies
  - Contact with, and searches of the promotional materials issued by, investor groups
  - Industry directory searches; and
  - Critical I's own network of industry contacts
  - For this survey, Critical I has worked with a number of representatives of national bioindustry organisations (and similar bodies) in Europe. These interactions have allowed us to use an additional source of "local knowledge" in order to identify and validate companies that should be included in the survey and to exclude those which should not. In some

cases, the national bioindustry associations have also helped in finding data on companies.

In 2004 for example, Critical I has updated around 4000 company records, and has considered a further 2000 companies for inclusion in the database.

- **Filtering of companies against the agreed definition of biotechnology**
  - Information on the companies' operations and activities was then scrutinised, recorded in a screening database (to provide a record of activity transitions year-on-year) and used as the basis for deciding whether or not a company should be included and, if so, to which primary activity category (i.e. sub-sector) it should be assigned.
  - Each selection and activity categorisation was approved by two or more members of our review panel.
  - The activities and primary activity category assigned to each company have been checked each year since to ensure that changes in company activity are tracked and accurately recorded.

A check was made with the relevant national authority to identify a company's trading status to ensure that insolvencies, liquidations, cessations of trading and dormancy were recorded.

- **Gathering raw data –** this phase involved the
  - Obtaining and analysis of **all** available company annual reports & accounts
  - The detailed review of company web-sites & other public information sources to gather the required metrics
  - Confirmation of each company's Activity classification
- **Validation of data –** this phase involved
  - Inviting CEOs/FDs to review and validate the metrics gathered on their company via a secure and password-protected website
  - Checking company submissions for accuracy/consistency/completeness
  - Clarifying those returns as required with each company, before accepting their data in to the database and incorporating it in to the analysis data-set

This process applied to the data gathered on company performance to the year ending 31st December 2003 for Denmark, France, Germany, Ireland, Norway, Sweden, the UK and the USA, and also the data for to the year ending 31st December 2004 for France, Germany, Switzerland, the United Kingdom, and the United States.

For Austria, Belgium, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, and Sweden, Critical I has undertaken an abbreviated data collection process for the purpose of this report. We have rigorously applied the same inclusion criteria as for the countries listed in the previous paragraph. However, neither our trawl of companies nor the gathering of data on companies that are included have been as comprehensive. It is possible that data may be under-reported in these countries as a consequence.

Currencies

All financial data are entered into the Critical I database in local currencies. All the financial data are subsequently converted into Euros using the exchange rates prevailing at the end of the time period being considered, in this case December 31, 2004 (see www.xe.com for rates).

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