

Vital growth

The importance of high-growth
businesses to the recovery



Executive summary

The uncertain recovery has put economic growth at the top of the political agenda. And in particular, high-growth businesses have become big economic news.

NESTA's 2009 research summary *The Vital 6 Per Cent*, highlighted the importance of the small number of fast-growing businesses that between 2002 and 2008 generated the lion's share of employment growth in the UK. These businesses can be found across all sectors, and include both established firms and start-ups, small businesses and large ones. This finding has attracted the attention of policymakers and commentators, and has become an important part of the debate on economic growth in the UK.

This new summary argues that high-growth businesses remain vital to the economy, despite the recession, and that the government's policy for fostering economic growth needs to have high-growth businesses and their particular needs at its heart.

Analysis of newly available business records shows that growth businesses still matter: a very similar number of businesses experienced high levels of growth in the period 2007–2010 as over the rest of the past decade. And these businesses continue to account for a disproportionate amount of job growth. What is more, businesses that had demonstrated high growth before the recession were less likely than other firms to become insolvent when the recession took hold. This suggests that some of the characteristics of businesses that achieve high growth may also be responsible for their resilience in tough times.

However, the new analysis highlights some challenges these businesses face. It suggests in particular that high-growth firms both have a greater need for capital than lower growth firms and may be assessed as having a lower credit rating by the kind of systems banks use to make commercial lending decisions. This is especially concerning given the sharp decline in risk capital funding seen in the UK since 2008.

The summary then goes on to ask what an economic policy geared to the needs of high-growth businesses would look like, based both on interviews with high-growth companies and economic research. In particular, it focuses on what policy can do to support one important factor that many growth companies have in common: their innovativeness.

The summary identifies several conditions associated with innovation and growth that should be priorities for economic policymakers. These include:

- Removing the obstacles to growth, such as excessive regulation of highly skilled immigrants and land use in dynamic clusters.
- Ensuring access to finance for growing businesses, especially venture capital and expansion capital, which are particularly important for growing businesses.

- Investing in a skilled and creative workforce.
- Using research and university funding, and planning policy, to encourage strong and wide-ranging networks between researchers and businesses that encourage the flow of knowledge and information.
- Harnessing government procurement to provide a market for innovative offerings from business.

Over the coming months, NESTA will be working with growth businesses, researchers, investors and policymakers to investigate these areas in more detail.

NESTA is the UK's foremost independent expert on how innovation can solve some of the country's major economic and social challenges. Its work is enabled by an endowment, funded by the National Lottery, and it operates at no cost to the government or taxpayer.

NESTA is a world leader in its field and carries out its work through a blend of experimental programmes, analytical research and investment in early-stage companies. www.nesta.org.uk

Vital growth

The importance of high-growth businesses to the recovery

The importance of high-growth businesses

The Chancellor of the Exchequer, in an article co-written with Google's Eric Schmidt in November 2010,¹ highlighted the importance of the small minority of fast growing companies that account for half of new jobs. This was echoed by the Prime Minister in his speech on economic growth in January 2011,² in which he argued that these businesses – the 'giants of the future' – were central to economic growth.

These comments are supported by a long tradition of academic research into high-growth businesses³ and a recent surge of interest in policies for how they can be encouraged from a range of developed countries, and international organisations such as the OECD.⁴

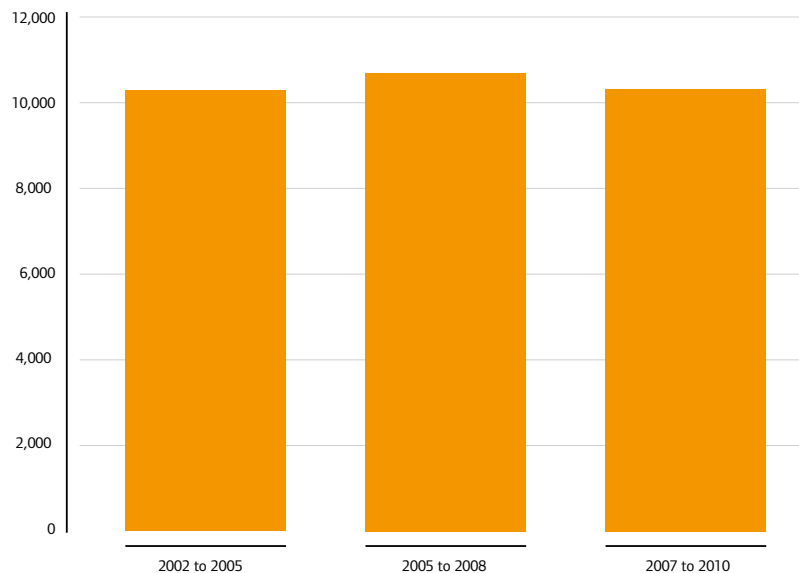
This should come as no surprise: the economic contribution of high-growth firms has been nothing short of remarkable. NESTA's 2009 research summary *The Vital 6 Per Cent* analysed the records of all UK companies between 2002 and 2008 and showed that the 11,000 businesses that generated 20 per cent or higher average annual employment growth⁵ over a three-year period were responsible for creating 54 per cent of new jobs.⁶

1. Osborne, G., Schmidt, E. Innovation is the secret of economic success. 'The Daily Telegraph.' 3 November 2010. See: <http://www.telegraph.co.uk/finance/economics/8108802/Innovation-is-the-secret-of-economic-success.html>
2. Prime Minister's speech on economic growth, 6 January 2011. Transcript at: <http://www.number10.gov.uk/news/speeches-and-transcripts/2011/01/prime-ministers-speech-on-economic-growth-58486>
3. See for instance: Acs, Z., Parsons, W. and Spencer, T. (2008) 'High-Impact Firms: Gazelles Revisited.' Washington DC: Office of Advocacy, US Small Business Administrations. Audretsch, D. (1995) Innovation, growth and survival. 'International Journal of Industrial Organisation.' 13(4), pp.441-457. Dunne, P. and Hughes, A. (1994) Age, size, growth and survival: UK companies in the 1980s. 'Journal of Industrial Economics.' 42 (2), pp.115-140.] and [Birch, D.L. (1987) 'Job Generation in America.' New York: The Free Press.
4. OECD (2010) 'High-growth enterprises: What governments can do to make a difference.' Report by the OECD Working Party on SMEs and Entrepreneurship. Paris: OECD.
5. This follows the definition of high-growth firms adopted by the OECD and Eurostat ([Eurostat-OECD (2007) 'Eurostat-OECD Manual on Business Demography Statistics.' Luxembourg: Office for Official Publications of the European Communities]). The OECD definition includes only firms with ten or more employees, since calculating percentage growth rates becomes less meaningful for micro-firms. However, the importance of high growth remains even if businesses of fewer than ten employees are included.
6. Specifically, 6 per cent of all surviving UK firms employing ten or more people at the beginning of the period accounted for 54 per cent of all jobs created by established firms employing ten or more people at the beginning of the period. Therefore this excludes (a) jobs created by surviving microenterprises (e.g., businesses with fewer than ten employees); (b) jobs created by new firms; (c) jobs created by the public sector; (d) self-employed. Note that all job creation measures here include all jobs gained by surviving firms, regardless of whether they are the result of organic growth or are gained through the acquisitions of existing firms instead.

Surviving the recession

Analysis of newly released UK business records^{7,8} shows the continued importance of growth businesses. Despite the deepest recession in 80 years, many companies still experienced high growth. In the period 2007 to 2010, the number and share of UK businesses growing at over 20 per cent per year remained broadly similar to that in the periods 2002-2005 and 2005-2008.⁹

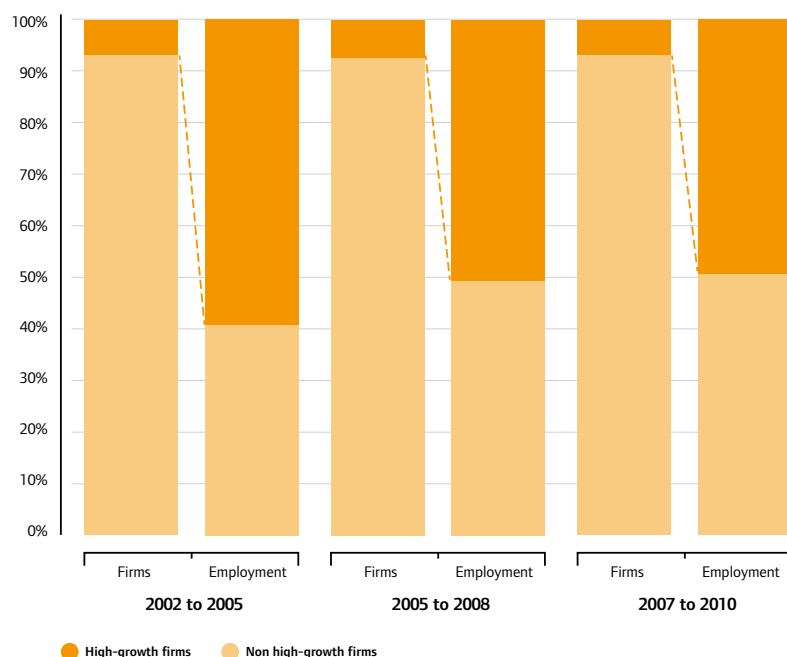
Figure 1: Number of high-growth firms



Source: New analysis of the ONS Business Structure Database.

What is more, we see that high-growth firms still account for a disproportionate share of job creation, generating half of new jobs created by firms of ten or more employees between 2007 and 2010.¹⁰ This suggests that this is a robust relationship that holds through good times and bad. Companies continue to find routes to high growth, even during the recession.

Figure 2: Percentage of high-growth firms and percentage employment



Source: New analysis of the ONS Business Structure Database.

7. Detailed business registry information for all UK business up to the year 2010 was extracted from the Office for National Statistics' Business Structure Database. This work was undertaken on behalf of NESTA by a research team from Aston University (Michael Anyadike-Danes, Karen Bonner and Mark Hart).

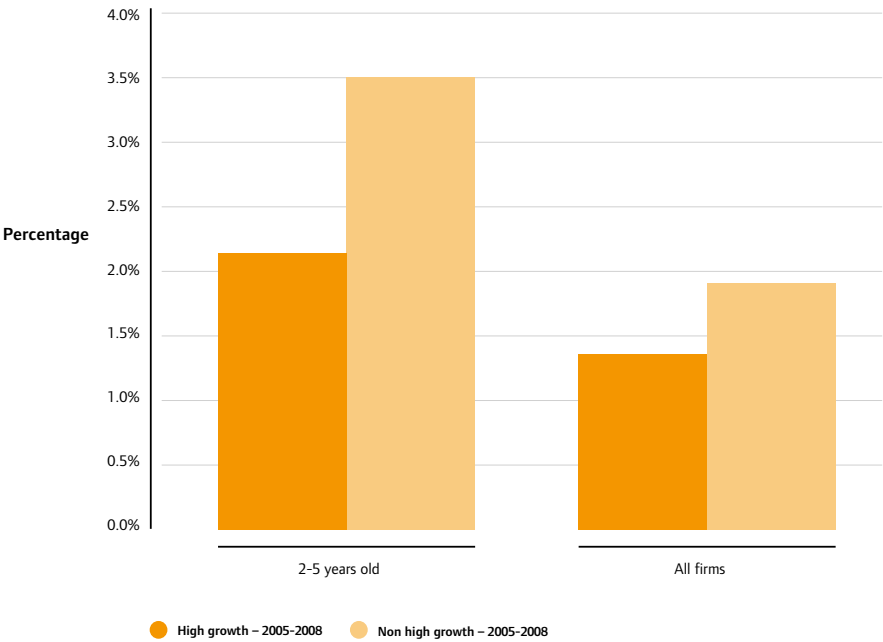
8. This work contains statistical data from ONS which are Crown copyright and reproduced with the permission of the controller of HMSO and Queen's Printer for Scotland. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

9. The Aston research team, which undertook the original research that led to NESTA's 'The Vital 6 per cent' research summary, has continued its work on the ONS Business Structure Database to improve its quality and accuracy, for instance, eliminating records for companies that were coded as active but were actually defunct. Using the most updated version of the database, high-growth firms in 2002-2005 and 2005-2008 would have represented 7 per cent of all firms rather than the 6 per cent reported in NESTA's 2009 summary, broadly the same share that they represented in 2007-2010. However, this does not affect the conclusions of the analysis.

10. Data for 2007-2010 is an early view, based on an extract of the 2010 data, which was released at the VML on 4 March 2011.

A separate piece of research using a proprietary database looked at high-growth businesses after their period of high growth, during the recession.¹¹ How did a track record of growth affect their performance in bad times? The analysis suggested that higher-growth firms were subsequently more resilient: they had markedly lower insolvency rates than their slower-growing counterparts during the recession. There is also some limited evidence that these firms are more likely to grow in sales in the two years after the growth period than non high-growth firms, consolidating their growth by improving productivity.¹²

Figure 3: Incidence of insolvency, 2008-2010



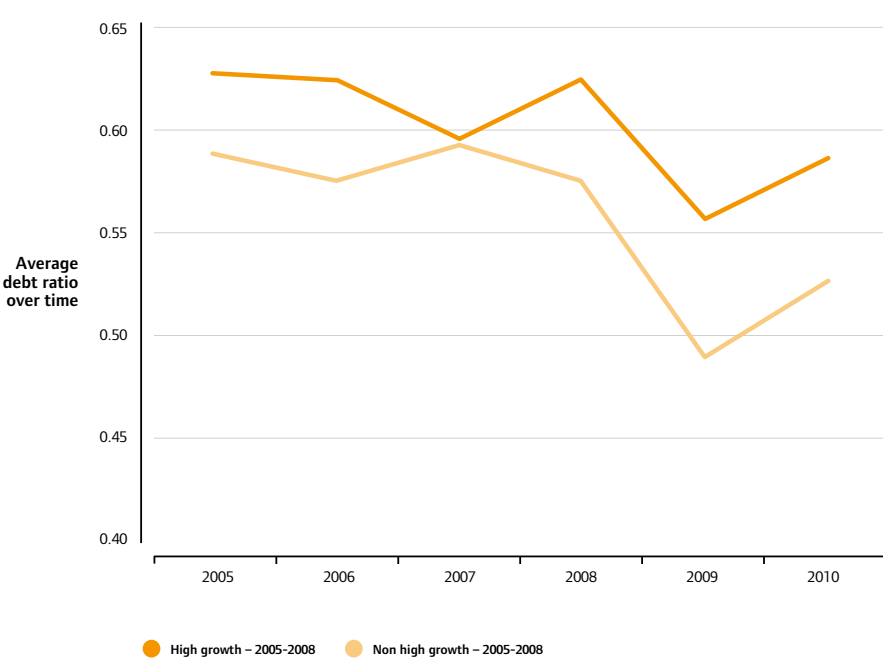
11. This research was carried on behalf of NESTA by Experian pH using its Megafire database of UK businesses. For more information on the underlying research, please contact info@phgroup.com

12. This is true of the companies where turnover growth is available, but most high-growth firms either don't or haven't yet registered accounts for the post-growth periods we examined.

Source: Experian pH.

However, businesses that had experienced high growth before the recession faced particular challenges during the recession, such as a greater need for finance: high-growth businesses operate with higher levels of debt than slower-growing ones.

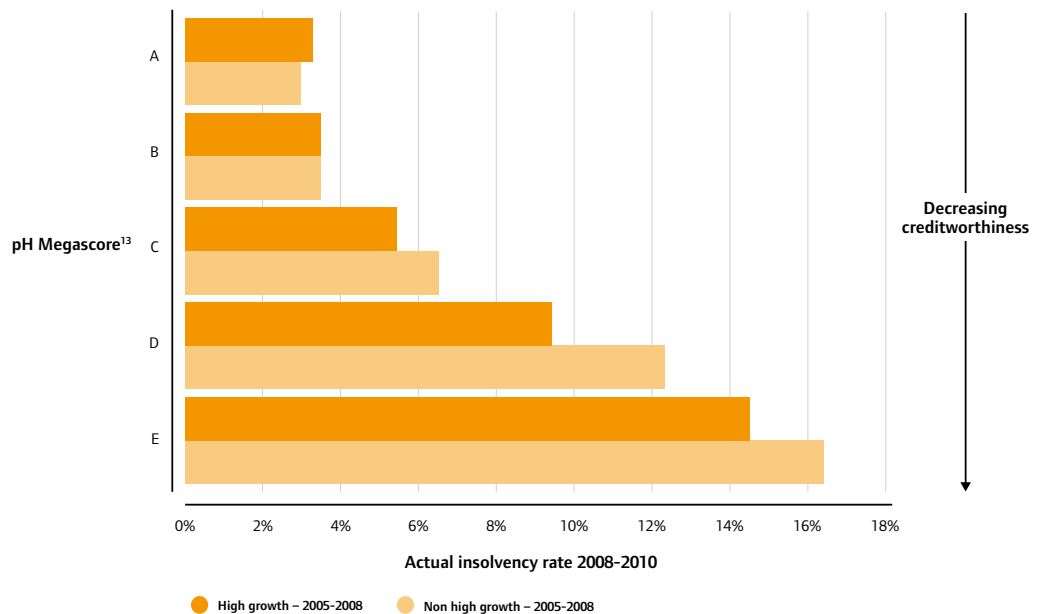
Figure 4: Comparison of debt ratios (total liabilities/total assets)



Source: Experian pH.

Not only do high-growth businesses appear to require more capital, there is some evidence that they may have difficulty obtaining it. When grouped with non high-growth businesses that have similar credit scores, high-growth businesses have lower insolvency rates than their non high-growth counterparts.¹³ This is true in particular for the lower grades, where credit is more likely to be refused or highly priced.

Figure 5: Insolvency rates by credit score categories



Source: Experian pH.

These findings suggest that a small number of fast-growing businesses represent the most important source of growth in recessionary times. But the analysis also suggests that these firms may have specific difficulties in accessing finance, particularly during the recession. Policies for high-growth firms should create an environment where more companies aspire to and are able to achieve growth.

What growth companies are – and aren't

Given the importance of high-growth businesses, it is unsurprising that policymakers are interested in doing what they can to encourage more of them and to help those that exist to grow further.

However, this is easier said than done. Developed countries have put in place many programmes geared at supporting the corporate success stories of the future, but few have delivered results.¹⁴ This is partly because of the vexed nature of government-provided business support in general. But it is also because of a deeper mistake: high-growth businesses are hard to characterise and identify, so it is easier to target companies based on some other characteristic, hoping it is a good proxy for growth potential. This may lead policymakers to direct their energies to unproductive areas, and miss the real opportunities.

They are not (just) tech companies

Some of the most startling high-growth businesses of the last decade have been technology companies, specifically internet companies. The allure of these businesses, and the goal of creating

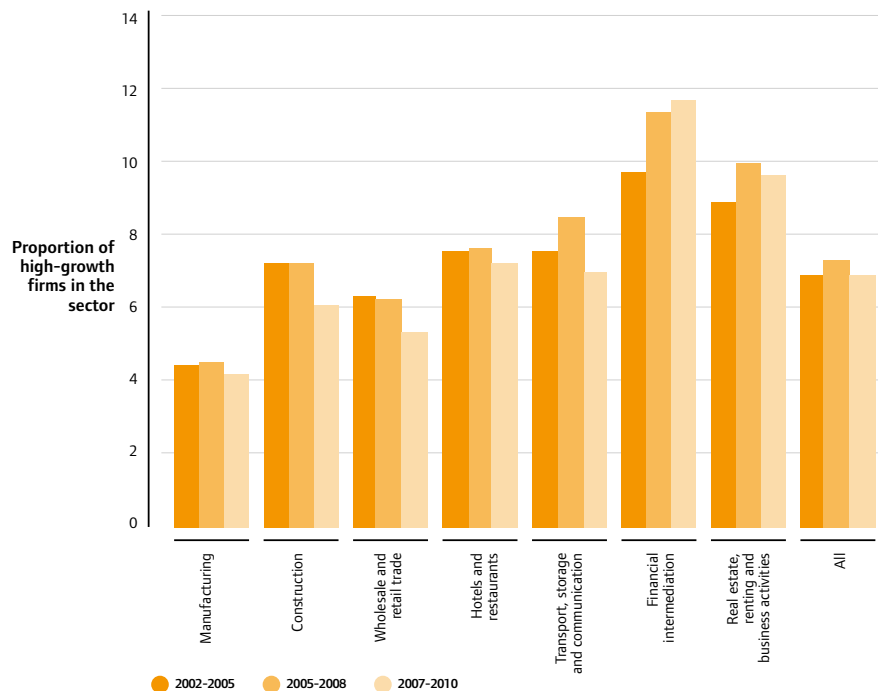
13. Experian pH's Megascor is a proprietary credit rating designed and calibrated to predict the probability of a company becoming insolvent over the following 12 months. It is based on financial figures and ratios from filed accounts, capturing measures of size, profitability, liquidity, gearing, cashflow, and trends therein, and also combines non-financial data such as speed of invoice payments and information on the directors of the business. The finding that credit ratings may be overestimating the default risk of high-growth firms is robust, controlling for the size and age of the firm.

14. See for example Lerner, J. (2009) 'Boulevard of Broken Dreams: why public efforts to boost entrepreneurship and venture capital have failed – and what to do about it'. Princeton, NJ: Princeton University Press.

a British Google or Facebook, is an admirable one. But the Silicon Valley tech company is not representative of the majority of high-growth businesses.

NESTA's analysis of growth companies from 2002 to 2010 shows that they are distributed across the economy, from mining to banking.

Figure 6: Share of high-growth firms in the UK by sector



Source: New analysis of the ONS Business Structure Database.

A cursory look at any listing of growth businesses – such as the Sunday Times Fast Track 100¹⁵ – confirms this. Alongside the odd company clearly identifiable as high-tech, you will find logistics providers, facilities managers, professional services firms and traditional-looking manufacturers. This is not to say that high-tech businesses are unimportant. Recent research by NESTA demonstrated the importance of healthy high-tech businesses to a sustainable recovery.¹⁶ The UK has many strong high-tech firms, which are occasionally overlooked in an excess of British self-deprecation, from Autonomy, to Imagination Technologies and Double Negative.

But they are only one part of an overall growth picture that depends just as heavily on businesses that innovate in other ways: new services, new business models, and new processes are often as important to growth businesses as new technology. Even within these high-tech companies, innovation in business models, services and processes may be just as important as the technology behind the products. The implication of this is that encouraging high-growth companies is not a matter of picking high-tech sectors and using public money to back them. Indeed, these sectors on their own are generally responsible for relatively small numbers of jobs.¹⁷ High-growth can come from anywhere, so the entire system needs to be responsive to the demands of innovative companies with the potential for growth.

They are not (just) start-ups

It is also important to appreciate that new companies are not the only ones that grow rapidly. For every burgeoning start-up, there are many growth companies that built the foundations of their growth over many years. Folding bicycle manufacturer Brompton, one of the high-growth firms profiled in this summary, is 30 years old.

15. The Sunday Times Fast Track 100 is compiled from profitable private companies with the highest sales growth rates. See: <http://www.fasttrack.co.uk/fasttrack/leagues/ft100programme.html>
16. Shanmugalingam, S., Puttick, R. and Westlake, S. (2010) 'Rebalancing Act.' London: NESTA.
17. Analysis by the McKinsey Global Institute suggested that new innovative sectors are too small to make a significant contribution to the economy as a whole (see: Manyika, J., et al. (2010) 'How to compete and grow: A sector guide to policy', McKinsey Global Institute). Even in the US, sectors such as biotech, semiconductors and cleantech employ just 1 per cent of the population. They point to services as the source of significant employment growth. Similarly, the latest titans of the Silicon Valley-based internet sector, Google, Facebook, Twitter and LinkedIn, employ fewer than 100,000 people between them. See: Cowen, T. (2011) 'The Great Stagnation: How America ate all the low-hanging fruit of modern history, got sick and will (eventually) feel better.' Penguin eSpecial.

Case study: Brompton Bicycles



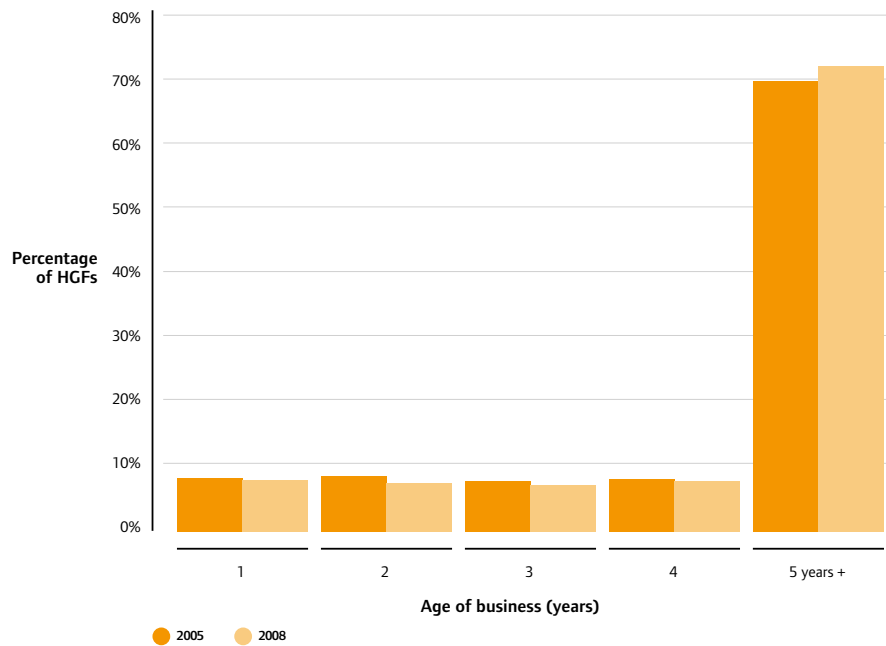
Will Butler-Adams, Managing Director of Brompton Bicycles

Brompton Bicycles is a type of company once thought extinct: a London-based manufacturing company. Based in Brentford, where they make the folding bikes for which they are famous, this 30 year old company has seen recent sales growth of 25 to 30 per cent per year.

Explaining their recent success, Managing Director Will Butler-Adams says: *"It's a combination of the right people with the right business in the right environment – few companies get all three. It's a great product and the reason it is good is because it is unique – the bike design is steeped in IP."* Despite this, the company is not a big fan of the recently announced Patent Box. *"That's fine for Glaxo down the road, but how do you attribute revenue from a bike to a patent anyway?"*

It has taken Brompton 20 years to build from 24 employees to 120, many of whom are trained on site – it can take 18 months to become a trained brazer, making the frames. Now the company is looking at another big change, a move from their current 22,000 sq ft site to a new 45,000 sq ft factory. *"It would cement the brand in Brentford, and it's a huge risk for us, but a risk we think is worth taking. The banks are willing to lend, but we have never wanted to give up control of the company. It's really important that the company is owned by engineers, and we're committed to the long-term. We could really do with some help to get us through this next period of growth."*

Figure 7: High-growth firms in the UK by business age



Source: ONS Business Structure Database.

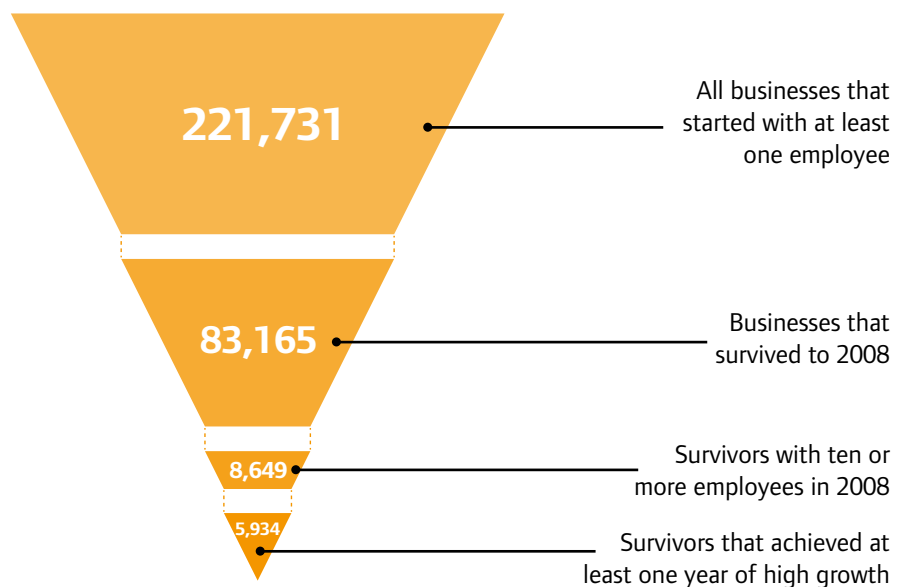
Note: 2002-2005 (n=11,369); 2005-2008 (n=11,530)

18. A company is considered to have achieved one year of high growth if it has increased employment by 20 per cent during the year.

Some of the world's most dynamic and disruptive high-growth companies have grown fast, right from their foundation. It is important that the UK does what it can to ensure it provides a supportive climate for these businesses. But most start-ups are not like this. Most start-ups start small and either stay small or die. They are not based on disruptive business plans and have little ambition to grow. Even those that do have ambition to grow often take a long time to build up the technology and support to finance that growth.

Analysis of the progress of all businesses founded in the UK in a single year bears this out. Of the 221,731 businesses founded in 1998, for instance, two-thirds had vanished by 2008, and of those that remained, only 10 per cent had more than ten employees, and 7 per cent had seen at least one year of high growth.¹⁸

Figure 8: Businesses started in 1998



Source: Anyadike-Danes *et al.* (2009) 'Measuring Business Growth'. NESTA Research Report. p.33, Table 6.

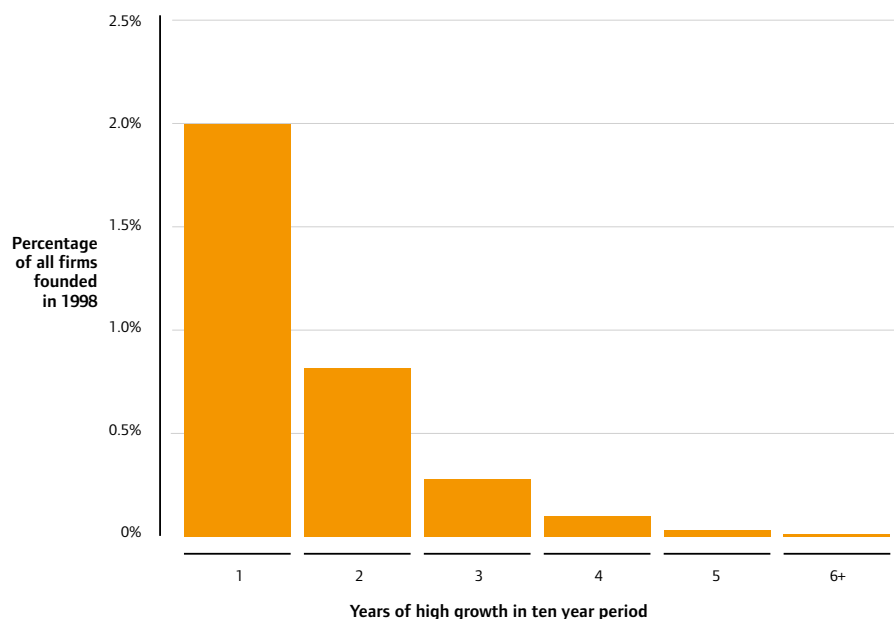
The 150,000-odd start-ups of 1998 that failed over the next ten years, and the 70,000-odd that did not grow beyond 20 people were generally not unlucky Googles. New work examining small businesses that fail to grow, or fail entirely, observes that the majority of these businesses lack the competitive positioning and underlying competencies to achieve it.¹⁹

This means that government needs to think very carefully about any policy that involves spending money to encourage new businesses indiscriminately. Such policies may have beneficial social and cultural effects (for example by encouraging people to start small businesses rather than being unemployed or take low value jobs). But even if such a policy works, generating more businesses that do not have the potential or ambition to expand is unlikely to lead to economic growth.

They defy prediction

If high-growth companies were easy to identify before they grew, the role of government (and for that matter, of venture capitalists and other private investors) would be simple. Unfortunately, this is not the case. We have already seen that the idea of betting on growth sectors is problematic. Past performance is also unreliable: today's high-growth firms are unlikely to be tomorrow's high-growth firms. Looking again at the 1998 cohort of start-ups, less than 40 per cent of all the start-ups that achieved growth above 20 per cent in a single year had another episode of high-growth in that decade.

Figure 9: Firms with at least one year of high growth



Source: Anyadike-Danes *et al.* (2009) 'Measuring Business Growth'. NESTA Research Report. p.33, Table 6.

This is a salutary reminder that high growth is not an intrinsic characteristic of some businesses, but a stage that some companies will go through, and others will not, either because they do not aspire to it, as is the case for the majority of single-person enterprises, or because they don't achieve it. This means that government's job is not to identify high-growth firms and then channel support to them, but to create the conditions where businesses that have the potential to grow can do so.

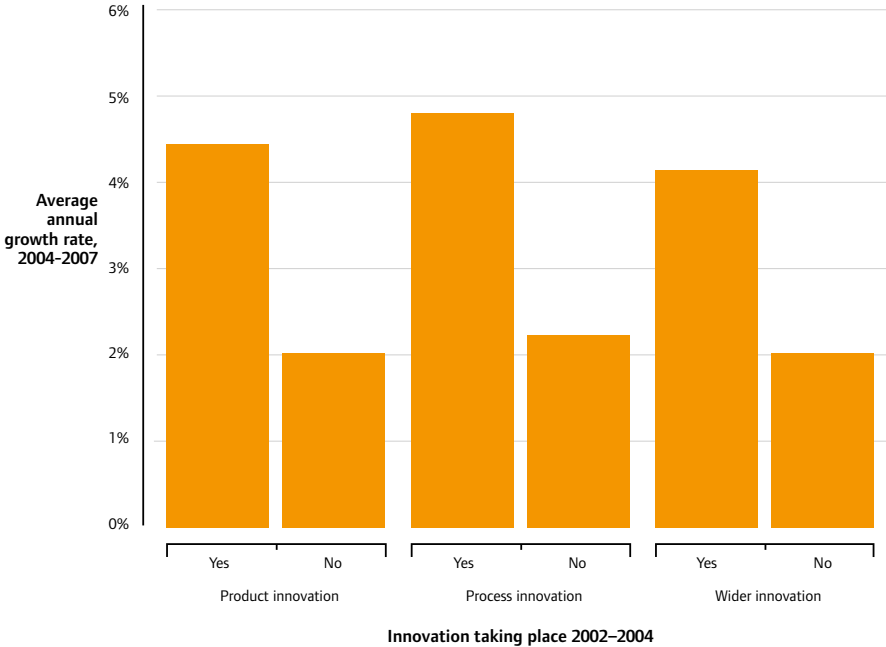
One common factor: innovation

If past performance and sector are not good predictors of high growth, what is? Researchers have made been a number of attempts to analyse this,²⁰ and have identified a few factors that may be associated with higher growth. These include the age of the firm, the human capital of the entrepreneur or their gender, the firm's exporting activity and its networks, or the degree of competition in the industry. But frequently these effects are small or questionable and even when

19. Nightingale, P. and Coad, A. 'Marginal Undersized Poor Performance Enterprises.' (Also known as MUPPETs.) (Forthcoming.)
20. For a review of the evidence, see: Coad, A. (2009) 'The growth of firms: A Survey of Theories and Empirical Evidence.' Cheltenham, Glos: Edward Elgar Publishing Limited.

they are clear, do not offer a clear guide for policy. An exception is innovation. Earlier work by NESTA and the National Institute of Economic and Social Research²¹ has shown that for UK firms, being innovative is strongly associated with high growth, with innovative businesses growing twice as fast as non-innovative ones (see Figure 10).

Figure 10: Employment growth



Source: Mason *et al.* (2009) 'Business Growth and Innovation'. NESTA Research Report.²²

The implication of this is that by improving the way policy supports innovation, we can help support high-growth firms, even if we know that government struggles to identify them. The finding is consistent with the specific policies recommended by many of the growth firms that NESTA works with and that we have interviewed in creating this summary. In the next section, we consider what government can do to create a favourable climate for innovation.

An economic policy for the growth businesses

One of the important factors that unites high-growth firms is their capacity for innovation. The importance of innovation is borne out both by our interviews with high-growth businesses, which conveyed vividly each company's hunger for innovation, for identifying new ways to satisfy customers and beat the competition, and also through more quantitative research. NESTA's Innovation Index, for example, shows that two-thirds of UK economic growth in the past 20 years was the result of innovation.²³

The remainder of this summary identifies five areas that government policy should target if it wants to create an environment in which innovative businesses can flourish and grow.

First, remove the obstacles

Removing the barriers and regulations is emerging as a clear theme of the Government's strategy for encouraging growth. There is a range of evidence to suggest that this applies particularly where innovation is concerned. The ability of innovative companies to thrive and grow is dependent on their ability to displace and in many cases, replace incumbents.

21. Mason, G., Bishop, K. and Robinson, C. (2009) 'Business Growth and Innovation: The wider impact of rapidly-growing firms in UK city-regions.' London: NESTA.

22. Innovation responses from the Community Innovation Survey. Product innovation: introduced new or significantly improved goods or services between 2002-2004. Process innovation: made use of new or significantly improved processes for producing or supplying goods or services between 2002-2004. Wider innovation: implemented new or significantly amended forms of corporate strategy, management techniques, organisation structures, or marketing concepts and strategies between 2002-2004.

23. See: Westlake, S., *et al.* (2009) 'The Innovation Index.' London: NESTA.

Case study: Double Negative



Paul ©2011 Universal Studios. All rights reserved.

Double Negative was perhaps less nervous than other nominees in the run-up to this year's Oscars. The Soho-based visual effects house worked on three of the five films nominated for best visual effects in 2011, including the winner, *Inception*.

Since its creation in 1998, Double Negative has grown to more than 890 staff in London and Singapore and developed an international reputation. CEO Alex Hope attributes their success to a single-minded vision of being the best in the world at visual effects for feature films, and developing relationships with key players in the industry over several years, including Christopher Nolan, director of *Inception*, and Edgar Wright, who they first worked with on *Shaun of the Dead*. He also recognises that the industry as a whole has grown significantly, and the UK is growing relative to the global industry. Nevertheless, he says: *"We are in a growth area, but we are also taking market share from competitors. We go after complex work on big films – complexity and scale means that few other companies in the world can do it."*

Double Negative has a separate R&D department to develop projects over a longer time frame than a client project. For example, their fluid solver, which helps to render more realistic smoke and water, was developed over three or four years and is still being improved. The company is a supporter of both R&D tax credits and the UK film tax credit. They also recognise the important role played by trade body, the UK Screen Association on such issues: *"It does great things, and has huge potential to bring together an industry that is largely made up of small companies. In a new industry, where government would like a joined-up voice, investing in these bodies will reap dividends – they can get to small companies in a very efficient fashion."*

A cross-country study conducted by NESTA and FORA showed this link clearly: countries and industries with more fast-growing businesses also had more rapidly shrinking businesses.²⁴ To put it another way, where regulations prevent creative destruction, innovation and growth are held back too.

This tendency of excessive regulation to discourage innovation has been demonstrated for a range of specific regulations, including labour market regulation,²⁵ barriers to setting up new businesses,²⁶ and even land-use.²⁷

24. See: Bravo Biosca, A. (2010) 'Growth Dynamics.' London: NESTA.
25. See for instance Bartelsman, E., de Wind, J. and Gautier, P. (2010) 'Employment Protection, Technology Choice, and Worker Allocation.' CEPR Discussion Papers 7806. London: CEPR. Also Bartelsman, E., Perotti, E. and Scarpetta, S. (2008) 'Barriers to exit, experimentation and comparative advantage.' Bonn: IZA and Amsterdam: Tinbergen Institute.
26. Hao, J. and Haskel, J. (2011) 'Intangible Investment and Product Market Regulations.' Mimeo.
27. See: Leunig, T., and Swaffield, J. (2008) 'Cities Unlimited.' London: Policy Exchange.

However, there are two important caveats to the argument that deregulation unlocks innovation. Firstly, it applies only up to a point: some regulation is required for businesses to invest in innovation. The most obvious example is intellectual property rights, without which many companies would be unwilling to invest in new technologies or creative content. But this also applies to other rules: the establishment of good technological standards has been shown to promote innovation, by providing a common base for innovators to build on, while in other cases market regulation has encouraged innovation (such as the role of Denmark's regulatory framework in encouraging the growth of the world's leading wind-power sector).

The second caveat is that although a reasonable level of regulation may be necessary condition for innovation, it is not a sufficient one.

Creating a supportive environment for innovators

Removing barriers to innovation is important, but on its own it is not enough. Our conversations with growth companies confirm the idea that innovation happens in an ecosystem, not in isolation, and that government has a role to play in constructing that environment. Innovative businesses need the support of customers, suppliers, researchers and backers to put good ideas into practice. Businesses told us of the importance of government in educating a strong supply of talented recruits, in supporting research, in encouraging a functioning financial system, and more beyond.

This is also borne out by economic history. Those countries that have given rise to large numbers of thriving innovative businesses have not done it by accident or inaction. Whether we consider *laissez-faire* America or social-democratic Finland; Israel or South Korea, in each case government policy has played an active role in creating the climate for businesses to innovate, harnessing public research, government procurement, finance and moral suasion to change the environment for the better.

This is not a question of establishing a command economy with a latter day National Economic Development Council or *Commissariat du Plan*. Rather, it rests on the recognition that many things that fall within the remit of government – from procurement to financial regulation to education to public research – play a role in innovation, and that countries with large numbers of high-growth innovative businesses have taken steps to get these policies right.²⁸

There are four key areas where government has a role to play in creating the right conditions for businesses to innovate:

1. Access to finance

We saw earlier that growth companies seemed to be viewed by banks as worse credit risks than their insolvency rate suggests they should be. It was not surprising to hear that several of the growth companies we interviewed had encountered difficulties obtaining the finance they needed to expand.

The problem of accessing finance applies not just to bank lending, but also to venture capital, the funding mechanism that many of the highest growth businesses have benefited from in the past. UK venture capital investment in 2009 was at its lowest level since before the dot-com bubble,²⁹ and the situation does not appear to have improved yet.

The examples of other countries suggest that government can play a role here. Israel's venture capital sector was kick-started by the investment of \$100 million into Yozma, a public-private venture capital 'fund of funds' that co-invested alongside private venture funds, providing them with leverage that enticed them into the market. Israel's venture capitalists are now some of the world's most active and successful.³⁰

In this example, the government steered clear of making direct investments, and relied on the expertise of the private sector to make investment decisions. It also structured the balance of risk and reward carefully: too stingy and the funds would not have been taken up, too generous and there would be little incentive for the private investors to make the underlying asset perform.

28. This distinction is discussed in Aghion, P., David, P.A. and Foray, D. (2009) *Science, technology and innovation for economic growth: linking policy research and practice in 'STIG systems'*. 'Research Policy.' Vol. 38 (4).

29. See: Pierrakis, Y. (2010) 'Venture Capital: Now and After the Dotcom Crash.' London: NESTA.

30. See: Pierrakis, Y. and Westlake, S. (2009) 'Reshaping the UK Economy.' London: NESTA.

2. A skilled workforce

Innovative businesses demand talented workers. This includes people with scientific and engineering backgrounds, but it goes much further than this. Growth companies rely on a diverse range of skills, from experience of managing start-ups to creative skills (the UK's creative industries are bigger – at 6.4 per cent of GDP – relative to the economy than any other country's).

This is partly a matter of investing in education. A detailed survey of US growth over the 20th century, in which its productivity grew dramatically, showed that an important driver of growth was the US education system, which in the century from 1880 to 1980 was the envy of the world,³¹ and which benefited from both public and private investment. Likewise, Finland's recovery from a deep recession in 1990 and rise to become one of the most innovative countries in the world began with a period of great austerity and public debt, where significant investments were made in higher education and publicly-funded R&D.³²

But when it comes to education and its contribution to innovative growth companies, quality matters as well as quantity. NESTA's analysis of the UK's world-leading video games and visual effects industries showed that a handful of university courses specialising in the fields were producing high-quality, employable graduates – but dozens more courses were teaching the wrong skills and robbing their alumni of employment prospects. The difference between the two was the extent to which the courses engaged with businesses – the successful ones were immersed in their industries, and had a rich understanding of the kind of skills that graduates need.³³

31. See: Goldin, C. and Katz, L. (2008) 'The race between Education and Technology,' Cambridge, MA: Harvard University Press.

32. See: Sabel, C. and Saxenian, A. (2008) 'A Fugitive Success: Finland's Economic Future,' Helsinki: SITRA.

33. See: Livingstone, I. and Hope, A. (2011) 'Next Gen,' London: NESTA.

Case study: Imagination Technologies



Tony King-Smith, VP Marketing of Imagination Technologies

Imagination Technologies is perhaps the biggest UK company you've never heard of. A £1+ billion market cap FTSE250 company employing more than 850 people, Imagination has offices in Hertfordshire, Chepstow and Leeds and designs graphics, video and communications processors and other key functions already shipped in around 500 million products from iPhones and iPads to Samsung smartphones and Dell notebooks – and shortly Sony games consoles. It also makes Pure digital and Wi-Fi connected radios, which are built using Imagination's receiver and processor technologies. They have continued to grow aggressively through the recession, increasing turnover 26 per cent in the financial year 2009–2010.

As Tony King-Smith, VP Marketing, describes it, this success was a long time coming. *"We started developing our graphics technology more than fifteen years ago, with the right fundamental principles: high performance at low power and everything on a single chip. We spent many years evangelising the technology, and growth wasn't that high. Then it started to take off when the ideas took hold with Tier1 semiconductor and OEM partners."*

Imagination says a key limiting factor of their growth is the availability of suitably qualified staff: 80 per cent of their employees are engineers with at least one relevant university degree. *"There is limited output of engineers by UK universities, and they bring in lots of overseas students, so working visas for non-European post-grads are a significant problem. The identity of engineering as a cornerstone of UK success has been lost. There is a tremendous academic base here, and outstanding world class engineering companies key to success of the biggest brands across the globe. This story simply isn't being articulated enough by government, and that's a crying shame."*

Imagination would like to see more ambition from both UK companies and the government that supports them. *"Having the confidence to engage with Tier 1 players from the start was vital to Imagination's success. Too much government support is built on the idea of starting small, and thinking big only when the ideas are proven – that's simply too slow to drive real success. We needed to go out and operate on the world stage right from the start – that's what government should be fostering."*

- 34. Mina, A., Connell, D. and Hughes, A. (2009) 'Models of Technology Development in Intermediate Research Organisations.' CBR Working Paper. Cambridge: Centre for Business Research. See: <http://www.cbr.cam.ac.uk/pdf/WP396.pdf>
- 35. Saxanian, A. (1994) 'Regional Advantage: Culture and competition in Silicon Valley and Route 128.' Cambridge, MA: Harvard University Press.
- 36. See for example: Casper, S. (2007) How do technology clusters emerge and become sustainable? 'Research Policy.' 36: 438-455.
- 37. See: Bhide, A. (1983) 'Entrepreneurship, Management and the Structure of Payoffs.' Cambridge, MA: The MIT Press.
- 38. See: Connell, D., (2006) 'Secrets of the world's largest seed capital fund.' Cambridge: Centre for Business Research, University of Cambridge.

3. Flows of knowledge and collaboration

Innovative economies are networked economies. For high-tech industries, networks connect research universities and businesses. The birth of the semiconductor industries in Taiwan and South Korea relied on these kind of links, brokered by so-called 'intermediate institutions' that sit between academia and business (South Korea's ETRI and Taiwan's ITRI), while Germany's Fraunhofer Institutes play a similar role for many manufacturing businesses.³⁴ In Silicon Valley, the links between business and universities are less institutionalised, but are nevertheless strongly entrenched, with a steady flow of start-ups emanating from research universities such as Stanford.

But connections between businesses are just as important. Innovations tend to build on other innovations, and so access to the ideas of others increases the value of a company's own ideas. For this reason and others, the informal links that flourish in clusters can be just as important a source of innovation as formal links based on intellectual property, or the commercialisation of research. Informal links and labour mobility between firms are major contributors to the success of clusters, including Silicon Valley³⁵ and the San Diego biotechnology clusters.³⁶

Government has an important role to play here, both by providing the infrastructure for successful clusters to grow (transport, planning permission) and by improving links between universities and the wider economy.

4. Demand for innovation

Good businesses respond to their customers. Customers who demand new and better products and are willing to pay for them encourage innovation. The success of Japan's electronics industry was partly driven by Japanese consumers' appetite for cutting edge gadgets.³⁷

This creates a further opportunity for governments to create the right conditions for innovators. The government is one of the largest customers in the UK, spending over £200 billion per year on goods and services. The US Government has led the way in this respect: through the Defense Advanced Research Projects Administration (DARPA), the Small Business Innovation and Research programme (SBIR) and other government procurement, it has been willing to spend money on innovative solutions to its problems, especially where technology is concerned.³⁸

Case study: Retroscreen Virology



Laboratory technicians at Retroscreen Virology

Started in 1990 as a spin-out from Queen Mary's Medical School, University of London, Retroscreen Virology provided laboratory testing and analysis as a consulting service for pharmaceutical companies, a so-called 'soft start', where the company is funded by customer income. Built on Professor John Oxford's expertise in viruses and vaccines, the company grew modestly for 15 years. In 2005, the company identified an opportunity to develop novel clinical testing services, working with patients and volunteers to reduce the cost and time to market for new therapeutics. At this stage, IP Group invested the working capital to allow the company to broaden into these higher value services.

Director Charles Winward represents IP Group on Retroscreen's board and explained some of the key drivers behind the company's rapid growth since 2005: *"There have been three main factors. Firstly, we are in what is being referred to as a 'second age of virology' with significantly increased pharma and biotech investment into new vaccine development, including therapeutic areas that would not have previously been contemplated for vaccines, such as HPV. Secondly, we are in an age of heightened threats to humanity and economic activity from virus pandemics, whether it be SARs, bird 'flu or swine 'flu, requiring organisations like Retroscreen to step up to provide the interface between science and commerce to react appropriately. Thirdly, Retroscreen has proven a proprietary model whereby we can reduce the time and cost to market for our customers, driving demand for our services."*

As a spin-out from Queen Mary's, they have maintained links with the university, and recently moved into a new centre in Whitechapel, purpose built to accommodate the Human Challenge studies that Retroscreen specialises in. The Queen Mary BioEnterprise Innovation Centre is the result of a £30 million, four-year partnership between Queen Mary, University of London and the London Development Agency.

This investment in the facilities needed for the clinical trials Retroscreen conducts is very welcome. But finding funds for other expenses can be harder. *"This company has to be at the sweet spot for UK plc objectives – a high-tech biotech firm, building upon UK R&D investment, with global pharmaceutical companies clamouring for its services. Yet if you look at potential sources of funding for this business, it hasn't been easy. Working capital is a particular issue – banks won't provide debt financing to a business this size, even with an innovative product, and there is limited venture finance available."*

The UK has made some small steps in this direction, restructuring its own version of the SBRI to make it more effective,³⁹ and making commitments to make procurement easier for small and medium-sized businesses with new ideas.

There is scope for the Government to advance each of these four agendas in the coming year as part of its ongoing Growth Review. Over the coming months, NESTA will be looking into a number of these areas to offer specific recommendations on what can be done to create the right conditions for sustained, innovative growth.

Case study: Mimecast



Peter Bauer, Chief Executive and Neil Murray, Chief Technology Officer of Mimecast

At first glance, Mimecast might look like an internet start-up, but the VC-backed enterprise email company is now in its ninth year. They provide cloud-based email services which displace a number of other systems that a company might run alongside their email server, including security and backup applications.

Chief Executive Peter Bauer emphasises the amount of development that has been needed to support the email traffic of 4,000 customers, including 60 per cent of the UK's top law firms: *"From the beginning, we knew that if we were successful we could have thousands of companies asking us to store a very large volume of data, so the software needed to be well thought through. Then came the long, hard slog of persuading many companies to trust us and adopt the cloud computing model – to put their data in our hands."*

Peter describes the *"scars and learning"* that you acquire as you grow, especially in hiring people: *"You need enough funding to afford the mistakes you will inevitably make growing a business like this. You need to be able to make the speculative hires that might work or might not."*

As someone who started his first company while he was in college (Mimecast is his third), Peter is a big advocate of young entrepreneurs: *"University can rob people of four years of their lives when they could be developing entrepreneurial experiences, at a time when they are most able to deal with risk. When they meet spouses and start having kids, they are less able to deal with that risk. Practice is what you need if you're going to create a company."*

As for what government could be doing, he remains a true entrepreneur, keen to get central government using Mimecast's systems: *"Central government has security standards based around an old model of computing. They need a more sensible way of certifying cloud-based systems that are run and provided by third parties so they can benefit from the savings that could be there. If we can provide a great service for the largest law firms in the world, why wouldn't government want to take part?"*

39. See: Bound, K. and Puttick, R. (2010) 'Buying Power?' London: NESTA.

Acknowledgements

This report was prepared by Stian Westlake, Louise Marston and Albert Bravo Biosca. It was based on two separate pieces of research commissioned by NESTA and undertaken by Professor Mark Hart, Dr Michael Anyadike-Danes and Karen Bonner of Aston University, and by Gareth Rumsey and Richard Woolf of Experian pH. We are grateful to all the growth companies we spoke to for giving generously of their time, in particular those who formed the basis of our case studies: Alex Hope of Double Negative, Will Butler-Adams and Emerson Roberts of Brompton Bicycles, Peter Bauer of Mimecast, Tony King-Smith of Imagination Technologies, and Charles Winward of IP Group. Special thanks are due to Sir Richard Lambert: this report was inspired by remarks that he made during his time as Director-General of the CBI, and has benefited from his insight.

NESTA

1 Plough Place
London EC4A 1DE
research@nesta.org.uk

www.nesta.org.uk

Published: March 2011