Europe's new economy

Charles Leadbeater

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1 What's the story?

Europe needs a new economic story because it faces a new economic challenge. The challenge is to transform European science and technology, knowledge and creativity, into jobs, growth and economic success. The generation, dissemination, application and exploitation of distinctive know-how is *the* driving force behind economic growth in a globally interconnected economy. That puts a premium on innovation, entrepreneurship and agility. To explain how Europe will make its way in the knowledge-driven economy is to answer the question that most worries many people: how will I, and my children, earn our living in future? Unless political leaders can give a clear and compelling answer to that question, they will lose credibility and trust. Yet it has become increasingly difficult to deliver a convincing answer because our economic lives are—more than ever before—in upheaval.

The new economy has emerged from the confluence of several factors.[1] Globalisation is opening companies up, on the one hand to competition from lower-cost producers, and on the other to pressure from more demanding investors and capital markets. The long-run shift from manufacturing to services has been accelerated and complicated by the pervasive influence of computing and communications technologies. Manufactured products are increasingly knowledge-intensive and technologically complex. The internet and mobile communications have given us an unprecedented capacity to store, retrieve, analyse and share information. Advanced societies are doing more scientific research more productively than ever before, and translating the results more quickly into new families of products and industries, such as biotechnology and genomics. This combination of forces means that intangible assets—research and development, brands, know-how and human capital—have become the fundamental sources of wealth and value. Innovation and entrepreneurship transform these intangible assets into products and services, thereby driving forward economic growth, creating jobs, meeting social needs and improving efficiency.

[1] *Charles Leadbeater, 'Living on Thin Air: the new economy' Viking, London 1999*

Europe has been slower to respond to the emergence of this new economy than the United States. That is one reason why its record of job generation is poor compared to the US, where the economy has been driven forward, in large measure, by entrepreneurship in new industries. As a senior EU official responsible for enterprise policy put it: 'Unemployment in the US is about five per cent. In Europe it is still about ten per cent despite strong economic growth in the past three years. Something is structurally wrong when Europe cannot translate such strong growth into more jobs to employ more people.'

In the 1980s the US generated ten million new jobs while the EU generated six million. Europe seems to be losing out in high-tech industries such as biotechnology and the internet. US companies are writing the rules of the game for their highly innovative industries; yet many of the US firms that now have global reach—3Com, Cisco Systems, Dell Computers, Yahoo—were small operations a decade ago.

This creative, globally interconnected economy poses huge challenges to the established economic order in Europe. There is no single route into it. There used to be one, or at most a few ways to forge steel, generate electricity or mine coal. But there are many different ways to generate and apply ideas. An economy based on know-how and creativity has a much larger menu of strategies for companies and societies to choose from. Societies will take different routes to occupy different parts of the new economic landscape, depending on their inherited economic strengths and the political choices they make. Thus Europe will not—*cannot*—follow the pure Silicon Valley model of rapid innovation, fuelled by stock options and venture capital, because too many Europeans would find the kind of inequality that has accompanied Silicon Valley's economic creativity unacceptable. We need a distinctive European model of the new economy.

Some of the ingredients are already clear. The EU is creating the foundations of a new model through the single market and economic and monetary union (EMU). The single market should create a much larger and more open market that will encourage entrepreneurs, just as US entrepreneurs are encouraged by the scale of its domestic market. EMU should promote greater stability and lower interest rates within the euro-zone, and should in time pave the way for deeper and more liquid

financial markets. So in principle some of the most important building blocks for a more dynamic economy are being put in place.

But Europe's new economic story must go well beyond this, to show how we Europeans can release talent, realise potential and unlock opportunity. Too much of the European Union's story at the moment seems to be about security at the expense of entrepreneurship and risk-taking. Europe needs to be rethought as an entrepreneurial and creative economic space, in which innovation and social inclusion go hand in hand. Europe needs a new mix that values both stewardship and entrepreneurship: social stewardship to protect the most vulnerable in society; entrepreneurship to develop creative responses to change. This economic story must be built upon the continent's wealth of talent and human capital, its long history of inventiveness and science, and a tradition of modernisation in the name of social progress. Europe is competing in a global market for talent. If it cannot offer a creative space in which young people can turn their ideas into businesses that provide them with a sense of independence and achievement, Europe will waste a rich stock of talent. Many talented young people will be drawn to the US; others will languish, their potential unrealised and undervalued, kept in check by outmoded regulations and cultures resistant to change.

Elements of a new European economic model—or models—are starting to show. One ingredient is an emerging policy consensus across Europe, among parties of left, right and centre, on measures to encourage the translation of know-how into jobs and growth. This includes the development of venture capital and new financial markets, closer links between universities and commerce and the promotion of entrepreneurship education in secondary schools and higher education. Yet government action alone cannot create a more entrepreneurial economy. As important is grassroots social and economic change. Europe's economic shift is also a generational one: there exists a new generation of entrepreneurs with a distinctly European economic identity. This generation shares common values and ambitions, whether working in a research park in Sweden, an e-commerce company in Barcelona, a biotechnology start-up in Munich or a semi-conductor company in Cambridge. These entrepreneurs are at ease with global competition and new technologies, but they have grown their businesses from distinctively European, often regional roots.

These European responses to the knowledge-driven economy are at an embryonic stage. They are overshadowed by much larger political and cultural questions that have yet to be addressed, let alone resolved.

Risk and reward

Entrepreneurship requires more risk-taking, and those taking higher risks need the incentive of higher rewards. The scale of wealth created by new entrepreneurs in the US is one reason why so many young people are attracted to entrepreneurship. In much of continental Europe attitudes to wealth are more complex. Europeans are generally more risk-averse than Americans.[2] In France it is widely regarded as unacceptable for a young person to acquire millions of dollars in a short space of time. This distaste for rapid wealth accumulation is one reason why stock options are so controversial in France. Many EU states are putting in place measures to promote small start-ups, but there is far less agreement about promoting high-growth companies which stand to turn their founders into multi-millionaires. Until countries such as France can grasp this nettle they are unlikely to be able to create many entrepreneurial high-growth companies.

[2] See World Economic Forum 'Global Competitiveness Report', 1996, poll of senior executives on attitudes to risk

Attitudes towards risk and failure

Entrepreneurial societies have to tolerate high rates of failure, an essential ingredient in the searching and learning that drives experimentation and improvement. Many successful entrepreneurs in Silicon Valley have been through two or three failed start-ups before they hit a 'home-run'. A society that cannot accommodate failure cannot be entrepreneurial. This is particularly a problem in France, where the most prestigious careers are still those in the civil service and large companies. As Michel Dubois, a venture capitalist in Lyon, put it: 'If you become an entrepreneur and fail in France you are dead, economically, socially and politically. There is no way back.'

Failure also matters in venture capital. John Doerr, the doyen of Silicon Valley venture capitalists, says it costs $20m-$30m to train a venture capitalist: that is the cost of their mistaken investments as they learn the ropes. A consistent criticism of European venture capitalists is that the quality of their judgement and advice does not match the scale of the funds they manage. Home-grown venture capitalists need to be allowed

to make mistakes. It is not clear that this message has sunk into societies such as Germany, where large amounts of state funding have been pumped in to subsidise venture capital.

Reinvigorating large companies

A more innovative economy will encourage a faster rate of change. Innovation only succeeds if new ideas, products, services and companies drive out the old, allowing resources to be transferred to other areas of the economy. In the 1950s and 1960s it took 20 years for one-third of the 500 largest US corporations to be replaced. In the 1970s it took a decade; in the 1980s just five years. The average US manufacturing company is three years old. This faster rate of change poses a challenge to many of Europe's established economic organisations. Innovation is not just about creating start-ups: it also involves the renewal of older, larger institutions and companies. That is why it is so challenging—and threatening. Policy-makers are enthusiastic about promoting start-ups in emerging industries. They are less enthusiastic about encouraging new entrants to challenge incumbents in traditional industries dominated by large companies.

The politics of solidarity

An innovative society must be committed to change. That sits uneasily beside a commitment to social cohesion and the limiting of inequality. The capacity to cope with change and exploit its opportunities is not evenly distributed; opportunities in the new economy will fall to better-educated, more mobile, flexible risk-takers. Because the costs of adjustment will fall disproportionately heavily on those who are less educated, mobile and adaptable, the potential for exacerbating inequality is considerable. More entrepreneurial societies also have more unequal distributions of income and wealth.[3] It is going to be hard to devise a recipe for a society that is highly entrepreneurial but also cohesive.

[3] *Paul D Reynolds, Michael Hay and S Michael Camp, 'The Global Entrepreneurship Monitor 1999', Babson College, Kaufman Centre for Entrepreneurial Leadership and London Business School*

How capable is the state?

The state plays a much more significant role in continental European economies than in either the US or the UK, providing welfare services, protecting people against risk and guiding economic development. Europe will only reinvigorate its economy if it can find a new economic role for the state. It is highly doubtful whether the

state, without significant reform, has the agility, incentives or capability to engage with rapid innovation. As a senior adviser to the French government put it: 'The state has played a leading role in mobilising resources for major infrastructure projects in the past, such as the TGV high-speed rail network. The state's great strength is scale and command over resources. But in the new economy speed and agility matter more.'

In Germany, too, policymakers believe they need a strong state, in part to deal with the social claims upon it, but also to drive the development of venture capital and new industries such as biotechnology. The German Minister of Economics and Technology, Werner Müller, explained: 'The state needs to be strong to come to terms with the competing claims upon it, but we also need the state to step back to give people more space to formulate and implement their own plans and responses to change.' [4]

[4] Speech at the Anglo-German Government Seminar on Innovation, London, 20 September 1999

One example of how innovation can be injected into the public sector is provided by Trillium, the innovative British property services company, that manages the Department of Social Security's entire property portfolio. By bringing a dynamic, entrepreneurial approach to the day-to-day management of the department's buildings across the UK, it is estimated that Trillium will save the British government close to £560 million over the next 20 years.

The European state

The need for radical innovation within the state sector extends to the European level. The European Union has been a vital modernising force in Europe, pushing national governments to adjust to change, and indeed making important changes itself. One example is the creation of a new directorate within the European Commission dedicated to enterprise, bringing together the former departments specialising in industry policy and small business. The single market programme and the arrival of the euro lay the foundations of a larger, more open and dynamic economy. EU measures to promote structural economic reform in financial services and labour markets will feed the entrepreneurial culture. But this is not enough: the EU needs to show where the process of economic integration is headed and what kind of economy it is creating. The European Commission needs to develop a flagship programme for entrepreneurship and innovation, akin to the single market programme. It is far from clear how this might be achieved.

Conclusion

A European response to the knowledge-driven economy is developing through a pragmatic consensus among policy-makers. A new breed of business is being created by Europe's younger generation of entrepreneurs. Yet these fragile signs of hope are overshadowed by larger political and cultural questions about European attitudes towards risk, wealth, failure, inequality, individualism and the state. We are seeking a hybrid, distinctively European model of the new economy that combines stewardship and entrepreneurship, inclusion and innovation, social cohesion and rewards for risk-taking. To create the conditions in which these new combinations are possible is as much a political task as an economic one. Europe needs a new political approach to renew its economy, one that can expand the modernising centre ground of European politics.

It is easy for people to focus on the immediate threats they face, rather than the opportunities the new economy creates. Politicians find it easier to mobilise people to conserve familiar routines and protect established institutions than to engage in the uncertain process of creating new ones. Those constituencies that fear a more fluid and open society are powerful, vocal and organised around a clear defensive agenda. The constituencies that stand to gain, at least in the short run, are far more diffuse, often lacking a common agenda or political voice. Change upsets powerful vested interests, particularly in trade unions, the public sector and the professions. It is not just the traditional left that is wary of the impact of change on its traditional supporters; much of Europe's right is genuinely conservative, tied to traditional rural and agricultural interests. As the 1999 elections in Austria showed, elements on the right are happy to play to fear of change by proposing closed, anti-cosmopolitan, anti-immigrant policies.

Europe's economic agenda must not become dominated by pessimism and anxiety. For if we adopt a defensive stance, we risk delaying, if not missing altogether, many of the opportunities the knowledge-driven economy will bring to improve well-being and people's control of their economic destiny. The promotion of a more entrepreneurial economy is part of a larger process by which Europe creatively and imaginatively responds to change. The story of how Europe will develop its new economy is not just about economic growth but about feeding social

renewal and modernisation. This report's central aim is to provide an optimistic yet realistic account of how Europe can compete in the knowledge economy, by making the most of its distinctive strengths, cultures and institutions. The goal is to map out a distinctively European path towards the new economy.

2 An entrepreneurial generation

Welcome to the Future Factory

Mattias Lindberg and Jonas Birgersson were drawn together in their late teens in 1989 by a shared fascination with computer games. Ten years later they run one of the fastest growing internet companies in Europe, the Swedish company Framfab, the Future Factory. Lindberg and Birgersson's original computer-games club had attracted Telia, the Swedish telecoms group, which wanted to use Birgersson to promote its high-speed digital networks. Pretty soon the two friends were playing around with the internet and then holding workshops and giving strategic advice to large corporations which had never heard of the net, let alone seen it in action.

Birgersson created the Future Factory in 1995, with Telia's backing, in a two-bedroom apartment he had borrowed from a friend in the southern Swedish university town of Lund. Lindberg was his fifth employee. The company is fuelled by a powerful vision of the emerging economy. Lindberg explained: 'We realised that we were in the midst of an enormous change in the economy, shifting away from industry towards a new order. We realised we would never have such an opportunity again to take part in that change, and just as the shift from agriculture to industry had created new companies, so this would, too. In addition we wanted to create a Swedish way into this new economy. If we do not do this for ourselves in Sweden, we said, the new economy will be dominated by US corporations. So we were fighting for our economic future against US domination.'

The Future Factory, in common with hundreds of young businesses like it across Europe, is an example of how young entrepreneurs are opening distinctive European routes into the new economy. Lindberg and Birgersson and their peers are at ease with new technology. They are prepared to learn from outside Europe, particularly from the US, which is both a commercial and cultural reference point. They use English as a business language. They want to create new kinds of business, replete with

stock options, employee ownership and an open, relaxed culture of self-management. The Future Factory, for example, is split into cells: no office has more than 50 people in it. The company employs 520 people and was floated on the Stockholm stock market in 1998 with a market capitalisation of SKr3 billion ($350 million).

At the same time as being committed to the global economy, the Future Factory is very much rooted in Sweden. The company did not go it alone. Its relationships with large Swedish multinational companies have been vital. It has succeeded through alliances with larger, older companies, providing them with services that helped them to chart their way into the new economy. The Future Factory was initially sponsored by Telia and got its big break after six months when it recruited Volvo as a client. Four years later it provides Volvo with a wide range of services, including planning, implementing and managing its web strategy world-wide. From the Future Factory's open-plan offices at the Ideon research park attached to Lund university, young programmers monitor activity on Volvo's sites in Japan, the US and Europe. Their most recent product allows a Volvo customer to put together a car on-screen by choosing accessories, colours, engine specifications and the like, and then to send the completed order to the company.

Lund has provided the Future Factory with a fertile base. 'It's a university town, where it's OK to be different,' explained Lindberg. Ideon research park was set up in 1984 when Lindberg and Birgersson were still at junior school. The park has attracted large companies and investors to the region, among them Ericsson, which started its mobile-telephone research in Lund 20 years ago. These days the Future Factory works with Ericsson to develop yet more sophisticated mobile telephones. Among the large Swedish companies investing heavily in the Future Factory are TetraPak and a bank linked to Ikea, the furniture group.

Thus while the Future Factory is the creation of the entrepreneurial talent of Jonas Birgersson and Mattias Lindberg, in fact it—like so many other young new-technology firms in Europe—emerged from an environment in which established institutions played a critical role. The Future Factory was born out of the interplay between old and new, large and small, public and private sectors.

The new generation

The Future Factory is one example of a new breed of company springing up across Europe. These businesses are taking shape in quite different local circumstances, governed by different laws and regulations. Yet they are remarkably similar. They seem to share common European characteristics lacking in older businesses, especially in traditional industries such as cars and engineering, where companies have had different national cultures of industrial relations, corporate governance and financing. In many traditional industries the national differences are far more striking than the similarities; the opposite is true of the new breed. The extent of this commonality is borne out by recent large-scale studies of high-technology firms in Europe.[5] These studies have found that new-technology firms tend to:

[5] *Gordon Murray, 'A synthesis of six exploratory, European case studies of venture-capital financed new-technology based firms', in 'Entrepreneurship Theory and Practice', 1997*

★ internationalise quite early in life to compete in global markets, rather than relying on a purely national market;

★ have flat management hierarchies and use incentive-based pay and reward systems, including stock options, which are rare in larger companies;

★ exist outside traditional structures for vocational education and training or collective bargaining;

★ rely on equity and venture-capital funding rather than borrowing from banks;

★ adopt an entrepreneurial and team-based approach to management and corporate governance, rather than a highly structured approach traditional in large companies or the founder-owner style that predominated in an earlier generation of small firms.

The reasons for this emerging common approach are not hard to find. Europe's new entrepreneurs are being driven by powerful forces:

★ *Competition*—these businesses operate in a common international or global market, subject to the same competitive pressures.

★ *Technology*—this is the first generation to be fully at ease with new technologies that migrate across national borders: telecommunications, software, even biotechnology.

★ *Culture*—they are happy to borrow and learn from the US. Many have either studied or worked in the US and regard developments there as one of their benchmarks. They tend to speak English fluently.

★ *Risk*—they are more open to entrepreneurship than previous generations, in part because they entered the job market in the early 1990s when many large companies were in the midst of downsizing, a process brought on by recession and the first wave of consolidation in global markets. As a result careers in large companies have become less attractive and the opportunities of entrepreneurship more alluring. Start-ups have become fashionable.

★ *Values*—this generation is more individualistic than its predecessor: it prizes independence, autonomy and choice.

The new generation is not only distinct from traditional large European companies, but also from earlier generations of entrepreneurs. The contrast is perhaps most striking in Germany, where entrepreneurship is associated with the traditional *Mittelstand*, small and medium-sized family-run engineering companies, where the founders are also the owners and managers. The new entrepreneurs, by contrast, want to grow their businesses rather than keep them small. They are prepared to dilute their ownership stake to fund growth by bringing in outside venture-capital investors. They are not trapped by the founder-owner mentality that holds back the *Mittelstand*. They are team-based and recognise the need to bring in outside talent, particularly experienced managers, to help to run the business. They believe in rewarding people for performance, unlike the paternalist *Mittelstand* founder-owners.

The Fahråeus factor

A good example of this new breed is Christer Fahråeus, a high-tech entrepreneur based in Lund. Fahråeus's career shows both the extent of the change that is taking place and how much further it needs to go.

Fahråeus has been up till 3am writing a business plan; he has not had any breakfast and he's unshaven. He has just moved into new offices and is surrounded by boxes and books. Some of his young staff perch on a sofa, wolfing down microwaved meals. In five years Fahråeus, 34, has created three businesses, all built on his inventions: a digital microscope, a fingerprint reader and a scanning pen. The pen looks rather like a text highlighter of the kind made by Stabilo. But Fahråeus's pen is an electronic device that will scan text so that it can be downloaded to a computer. As the price of the pen falls—it currently retails for $400—it could become an essential tool for students, journalists, civil servants and executives.

Fahråeus's companies have great strengths, which stem from their home base at the university of Lund. He explained: 'It is easier to get good technicians and scientists here than it is in the US. Europe has a good supply of science graduates.' All the companies have an egalitarian, open culture which he believes is quite Swedish. 'We are kinder to people here than they are in Silicon Valley,' he explained. 'And our investors here tend to be more patient than they are in the US.'

But Fahråeus believes that even in the most dynamic parts of the emerging European economy there is still an enormously long way to go before a truly entrepreneurial culture emerges. Going down that road will mean confronting controversial and difficult issues, he argues.

One is the treatment of stock options. 'It is impossible to recruit senior staff to these kinds of high-risk ventures unless you can offer them stock options which mean they have a good chance to gain from the success of the business,' Fahråeus said. However, he complains, Sweden still imposes a maximum limit of eight per cent on how much of a company's stock may be optioned to its employees. The tax treatment of stock options is unclear and they cannot be designed to encourage an employee to stay with a company for several years.

While venture capital is increasingly available, the quality of accompanying advice is questionable. It is difficult to get small amounts of seed capital when a company is very young. Sweden has few of the private investors and 'business angels' who provide informal start-up funding to most US entrepreneurs. Too many budding entrepreneurs in Europe are purely science- and technology-driven, rather than market-

and opportunity-led. Fahråeus reflected: 'In Europe we still tend to want to have an idea first and then work out how to build a business and create a market around it. In the US they are far more commercial: they spot the market and build the company around the market opportunity.'

Conclusion

Three main findings stand out about the new generation of entrepreneurs. First, a new business generation is emerging across Europe, with shared aspirations, values and outlooks. The common features among thirtysomething entrepreneurs across Europe are far more striking than the differences. They tend to create businesses with quite similar characteristics. Second, this generation differs quite markedly from its counterpart in older European companies both large and small. Third, this generation is committed to competing in the new economy, but from a distinctively European base. Many companies, such as the Future Factory, grew in alliance with traditional institutions and established large companies. Their European values make them different from their US counterparts: they tend to be less commercial, more egalitarian and more socially conscious. While they are trying to create new companies, they do not completely reject their inheritance, nor are they clones of Silicon Valley.

Another striking feature of this new generation is that they are still too few in number to make a real difference to the shape of the European economy. They are confined to pockets: clusters around universities such as Cambridge or in large cities such as Barcelona. They are not, as in the US, part of the mainstream business culture. That will require the development of a new policy framework that will foster their growth and spread their influence from the margins to the mainstream. It is a positive sign that at least some of the elements of the framework for a European entrepreneurial space are falling into place, as the next chapter shows.

3 The emerging consensus

Europe's ability to compete in the knowledge-driven economy will depend on how it translates science, technology and know-how into businesses, jobs and economic growth. The creation of start-ups is just one element in the far more complex process of innovation and entrepreneurship, which involves the education system and universities, large companies and financial markets. Europe will only develop a more entrepreneurial culture if it can address attitudes towards risk, reward and failure. The process of entrepreneurial renewal cannot be driven just by entrepreneurs from the bottom up. The legal and cultural framework within which they work matters hugely. To what extent is there a political and policy consensus on entrepreneurship?

The short answer is: a great deal, at least at the level of practical policies, if not in political rhetoric. The emergence of this new consensus about the centrality of entrepreneurship is unrecognised by much of the commentary on the European Union, particularly in the United Kingdom.

The new consensus has four main ingredients:

★ a recognition of the scale of the problem Europe faces in turning growth into jobs;

★ a shared diagnosis that one reason for this failure is a lack of entrepreneurial high-growth companies;

★ a common toolkit of measures to promote more entrepreneurship; and

★ an acceptance that the EU, steered by the European Commission, will have to find a new role and develop new capabilities to promote this agenda.

The job-creation problem

Although it is expressed in different terms in different capitals, there is a widespread concern that Europe is not creating enough jobs; and that it is falling behind in high-tech industries because of a lack of entrepreneurial dynamism.

Large companies in traditional industries such as cars and banking are likely to continue to shed jobs in the face of global consolidation and technological change. Given the convergence criteria for economic and monetary union plus widespread resistance to tax increases, it is unlikely that the public sector will be a major generator of jobs in future. The inescapable conclusion is that most new jobs will come from the private service sector, small companies and growth companies. An OECD study of job creation in developed economies, published in 1994, for example, found that the rate of job creation in Europe as a result of company start-ups between 1983 and 1992 was about four per cent per annum, less than half the US rate. Thus, overall levels of job creation were lower in Europe.

A related worry is Europe's competitiveness in high-tech industries, such as biotechnology and internet services. US companies seem to have captured first-mover advantage in these highly innovative industries, where an early presence can deliver market domination at a later stage. The two issues of jobs and competitiveness in high-tech industries are linked, but they are not the same. One of the best ways of boosting employment in continental Europe is to make it easier to create jobs in labour-intensive service sectors. High-tech companies often employ only small numbers of highly-skilled people—unless, as in the US, they can enjoy strong growth over a number of years.

A shared diagnosis

There is consensus about important elements of the diagnosis of Europe's lack of dynamism. Europe could both create more jobs and compete more effectively in high-tech sectors if it could breed more innovative, high-growth companies. In the 20 years between 1975 and 1995, about two-dozen biotechnology and information-technology companies in the US saw their turnover grow more than 100 times to nearly $250 billion, creating 1.5 million jobs in the process. Between 1991 and 1995, three per cent of US firms—'gazelles', which grow at more than 25 per cent a year for

several years—generated three-quarters of the additional jobs in the US economy.[6]

[6] *'Risk Capital: the key to job creation', Communication of the European Commission, 1998*

Europe does not have enough of these 'gazelle' companies because the obstacles to their creation are too great and the incentives to overcome them too feeble. Europe's problem is not the underlying quality of its human capital: its education systems are strong, especially compared to the US. But the incentives for bright young people to turn their talents into businesses are too limited. France produces 2,500 biology postgraduates a year, five times the number ten years ago. All are potential biotechnology entrepreneurs. Yet almost half of these graduates go to work abroad, many of them to the West Coast of the US (about 10,000 skilled French graduates are at work in Silicon Valley). Indeed, the list of Silicon Valley companies that have been founded by recent immigrants, many from Europe, is a telling commentary on Europe's limited opportunities for entrepreneurship.

Nor does Europe suffer a lack of scientific inventiveness. It scores well, for instance, in rankings of patents. Germany submitted 410 patents per million employed people to the European Patent Office in 1996, Sweden 417, the Netherlands 297, France 233 and Great Britain 153, compared with 175 from the US. Germany's patenting activity in 'triad' patents—where the patent is lodged in at least three countries, usually Japan and the US as well the host country—is impressive. In 1996 Germany lodged 216 triad patents per million people, compared with 206 for Japan and 161 for the US. Europe excels at generating knowledge in the form of bright people and scientific inventions, but it falls down on its commercial exploitation.

A common toolkit of measures required

There is widespread agreement among policy-makers and politicians from a variety of nations and political traditions on the mix of measures required to promote more start-ups. The elements of this common policy toolkit include the following:

★ *Education for entrepreneurship* Many member-states are promoting a more positive attitude towards risk-taking through the education system. One example is the German 'Junior Programme' to inculcate a more independent and entrepreneurial spirit among young people.

In the past year 2,000 secondary pupils on the programme have created 157 new businesses. Across Europe universities and business schools are promoting entrepreneurship programmes. Several university chairs in entrepreneurship studies have been created in German universities. In France business schools such as the Ecole de Management in Lyon have led the way in promoting entrepreneurship-training programmes on MBA courses as well as for budding entrepreneurs.

This approach reflects a concern that education and training may have become too abstract and specialised. As the German economics minister Werner Müller put it: 'Being able to do a basic business plan should be as important for an engineer as doing a theoretical dissertation.' The German government's assessment of the country's technological performance in 1998 concluded: 'The German training system is not yet suited to modern-day demands because the trend towards specialised training continues unabated.'[7]

[7] *'Germany's Technological Performance 1998', Report written for the Federal Ministry of Education and Research, January 1999*

★ *Universities as hubs* Inspired by the success of Stanford and MIT in the US and Cambridge in the UK, governments are developing programmes to turn universities into hubs for regional, knowledge-based industry clusters, by funding 'incubators' which provide support to academics trying to start a business, as well as business parks and entrepreneurship centres. A good example is the Challenge Fund in the UK, which has encouraged universities to make competing bids to commercialise research in different ways.

★ *Commercialising public research* Governments are keen to extract more value from their publicly funded knowledge base. One example is the recent French innovation law which will make it far easier for public researchers, who are civil servants, to take time off to set up their own businesses, with a guarantee that their jobs will be kept open for six years. Another initiative is designed to make it easier for private and public research institutes to form joint ventures. In Germany concern about the low pay-off from public research has prompted government reform. The research ministry, which was part of the education ministry, has combined with the

economics ministry so that more emphasis can be put on the commercial value of its output. There are more than 20,000 German researchers working in 16 federally funded research institutes with a combined budget of DM2 billion. Most of these institutes were founded in the 1960s and 1970s and it is widely thought that many—those devoted to nuclear research, for instance—have lost their mission. They are resistant to reform because their scientific staff are all on lifetime contracts.

★ *Easing business creation* A widespread recognition that it is administratively difficult to create new businesses in Europe, compared to the US and Canada, has led to schemes to streamline the process. One example is the French 'passport scheme', which provides new businesses with a single document to take to the many ministries that have a hand in regulating them. The aim is to cut the time it takes to register a new business from several months to a few days.

★ *Promoting seed and venture capital* All EU countries are taking steps to promote seed-capital funds, which invest small amounts in very young companies, and venture capital for investment in companies with growth prospects. This is part of a global trend, as governments seek to learn from the growth of the US venture-capital industry. The OECD estimates that its member governments are backing venture-capital funds to the tune of about $3 billion a year, in part to help fill gaps in funding for small high-technology groups.[8]

Europe's venture-capital industry is growing rapidly, albeit from a small base. The European Venture Capital Association estimated at the end of 1997 that accumulated venture-capital funds were worth €82.6 billion, up 41 per cent from 1996. The inflow of new funds into European venture capital rose by 151 per cent to €20 billion, with €6.7 billion coming from non-EU investors. During 1997 the number of new venture-capital investments in Europe increased by 10 per cent to 6,252, while the amount invested went up by 42 per cent to €9.7 billion. As a proportion of GDP the British venture-capital market is 5.6 times larger and the Dutch market 3.15 larger than the German market.

[8] *'Venture capital for technology-based firms', OECD, Paris 1997; 'Governments as venture capitalists', OECD Observer No 213, August-September 1998*

Measures to promote venture capital have taken a variety of forms. The UK government recently promoted the creation of a series of tax-efficient Venture Capital Trusts, which have raised about £500m for investment. The French government estimates that more than FFr200 million has been put into French seed-capital funds. In Belgium the Cooremann-Deckr Law allows tax deductions for personal investment in shares and special tax incentives for new and expanding companies; 26,000 Belgian companies have benefited from these provisions. Since 1995 the Dutch government has introduced two tax-incentive schemes focusing on small and start-up companies. In Finland the Suomen Teollisuus-sijoitus Oy, a state-owned venture-capital fund, was created in 1994. In Denmark the VaekstFonden (Business Development Finance Loan Programme) provides loans for small-technology funds with generous write-offs in the event of failure.

★ *Structural reform of labour markets* It must be made easier for people to be able to respond flexibly and creatively to change. Entrepreneurs have to be able to form and reform teams of people around companies to exploit emerging opportunities. This fluidity is more difficult in highly regulated labour markets. The case for labour flexibility is not to drive down wages, but to make the economy more responsive to change.

★ *Reform of financial markets* Financial markets with more relaxed listing requirements have been created to provide venture capitalists with a way to realise the value of their investments. Typically a venture capitalist invests in a growth business in stages over a period of five years. Venture capitalists earn a return on their investment by selling their holding to other investors, either by selling the business to a larger company or by floating the company on the stock market. However, some of Europe's financial markets make demands upon companies that young entrepreneurial firms cannot meet. In Germany, for example, the main stock exchange in Frankfurt insists that a company should have a track record of five years' profits before seeking a listing. As a result between 1970 and 1993 there were 189 initial public offerings (IPOs) of shares in German companies. The US economy is about 3.5 times the size of the Germany economy but over the

same period there were 8,195 IPOs in the US, over 40 times the number in Germany.

Europe will only create a more vibrant venture-capital industry if its financial markets are flexible enough to accommodate young companies with little track record but high potential. Nasdaq has played this role in the US and has become synonymous with high-growth entrepreneurial companies. In the 1990s a flurry of innovation in European financial markets has created the Neuer Markt in Germany, the Nouveau Marché in France, AIM and TechMark in the UK, and the Brussels-based Easdaq market. The mixed track record of these volatile and fragmented markets underlines why Europe will need to go farther and create a single high-risk capital market if it is to match Nasdaq's scale and sophistication. Nasdaq's decision to open a European arm creates an added sense of urgency: unless the EU can accelerate the creation of its own single market, companies will increasingly be drawn to the Nasdaq market, with the US focus that entails.

★ *Stock options* Most countries are reviewing their policies on stock options and other incentives for entrepreneurs. There is widespread agreement that start-up companies need to be able to offer stock options to recruit staff. However there is considerable confusion about many of the details, not least because for many countries the whole concept of stock options has been alien to their conventional methods of rewarding staff. In Germany, for example, a federal court ruled recently that stock options, which were illegal until 1998, should be taxed as labour income at 53 per cent, rather than as a capital gain, at about 20 per cent.

In most EU countries options are taxed when they are granted to the employee or taken up, rather than when the shares are sold. This means an employee will face a tax bill before having a chance to sell his or her shares. That creates a strong incentive for employees to sell their shares as soon as possible. In November 1999 the British government announced a scheme for companies worth less than £15 million to exempt up to ten staff from paying income tax or social security contributions on stock options worth £100,000. Eligible staff must wait up to ten years to cash in their shares. Their

capital gains will then be taxed at ten per cent instead of the full 40 per cent rate of UK capital gains tax. Stock options are most controversial in France, where they have become symbolic of the government's attitude to wealth and inequality. France has created the Bons de Souscription de Parts de Créateur d'Entreprise (BSPCE), which are akin to stock options, for young growth companies listed on the Nouveau Marché. However, attempts to extend stock options to other companies have provoked opposition. It is only slowly becoming understood that creating a society where stock options are widely owned can actually increase social justice and inclusivity. Entrepreneurship is not necessarily only about making a few people rich, it is also about extending the rewards of wealth creation to everyone who has played their part in the process.

★ *Promoting new industries* Governments recognise the importance of pushing the development of innovative industries, nowhere more so than in biotechnology. The number of specialist biotechnology companies in Europe has more than doubled in the 1990s, but it is still half that of the US, with a third of the number of employees. Several governments have 'e-ministers' to co-ordinate policy to promote internet usage. One of the most ambitious initiatives is the French Lorentz programme, driven from the prime minister's office, which aims to promote e-commerce by encouraging businesses to use online systems for VAT and tax. Europe has a stronger position than the US in mobile telephones, based on strong companies in equipment supply (particularly Ericsson and Nokia), high penetration rates among consumers, increasingly deregulated markets and innovative service providers such as Vodafone, Orange and One 2 One. Ericsson estimates that there are more than 70 million mobile subscribers in Europe and that there could be more than 1.3 billion around the world by 2002. Third-generation mobile telephones will allow consumers access to the internet, control of domestic appliances and the use of a range of other services, such as electronic banking. The mobile-telephone industry has created 300,000 jobs in Europe and could create a further 300,000 in the coming decade, according to Ericsson.

★ *The regional dimension* Knowledge-based industries often develop in clusters where complementary assets, skills and tacit know-how

can be exchanged. That is why regional policies matter so much. Entrepreneurial companies increasingly rely on 'collaborative competition goods': shared pools of talent, know-how, finance and marketing.[9] There are many different examples of how these goods can be provided, from the informal and co-operative networks among craft producers in northern Italy, through to the more formal Steinbeis institutions for technology transfer in Baden-Württemberg and the French Technopole science parks.

[9] *Patrick le Gales, Helmut Voelzkow et al, 'The governance of local economies', forthcoming*

★ *Large companies* Innovation is a complex activity, invariably involving large companies as well as small start-ups. In the US many large companies have become markedly more entrepreneurial in the past ten years, in part through their own venture-capital investments, but also through reorganisation driven by competition. Europe's large companies will play a critical role in bringing about a more innovative economy, through research and development, by providing the managerial talent that entrepreneurial companies need in order to expand and through their global distribution systems which give smaller companies access to international markets.

★ *Social inclusion* The final ingredient in the European policy mix is a concern for social inclusion. At the most basic this is evident in policies to promote public access to information technology, such as the British 'IT for All' programme, and the scheme to link all schools to the internet. However, the social inclusion agenda goes far wider. Policy-makers increasingly recognise that people will find security in a more turbulent economy not by relying on state protection but by becoming employable. That means shifting the focus of welfare and employment programmes towards active labour-market initiatives designed to encourage people back into work.

This policy agenda is being pursued at different speeds in countries with different institutions, politics and inherited sources of competitive advantage. The Conservative government in Spain, the Swedish social democrats, the German SPD, the French socialists and Britain's New Labour speak with varied political tongues. Yet judged by their actions they increasingly share a common agenda on entrepreneurship.

The depth of agreement on this agenda should not be overstated. Many measures have been taken only recently and doubt still clouds much of the detail. Many of the new institutions of entrepreneurial Europe—the new financial markets and venture-capital industry among them—are fragile and may be vulnerable to economic downturn. European businesses complain that regardless of growth-promoting policies, they still face over-regulation, excessive corporate taxation and restrictive labour laws. There is agreement on the need to promote more start-ups and small companies, but far less agreement on how Europe should promote fast-growing companies. Europe is a long way from enjoying an entrepreneurial renaissance. European policy-makers have decided they must dip their toes in the water. But they have not yet decided to swim.

A new role for the European Union

The EU has played a key role in promoting modernisation, through the integration of the European economy since the second world war. Now it must take on the role of promoting Europe as an entrepreneurial economic space, built upon the following elements:

★ *The completion of the European single market* will be vital to provide European entrepreneurs with a larger, stronger home base. When an entrepreneur has a hit in the large US market, it tends to be a very big hit, which can then sustain the growth of a large company. Europe's markets are still too fragmented to support this kind of ambitious growth.

★ *Competition policy* must ensure markets are as open as possible, if entrepreneurs are to see opportunities to create new businesses. Measures to clamp down on state aid and subsidies, and to speed product-approval procedures, are essential.

★ *Ambitious financial-market reforms* are needed to encourage venture capitalists and entrepreneurs. There are 33 different stock market listing requirements in the EU. The US, by contrast, has just two main financial markets and a single coast-to-coast regulator. Europe will need simpler, bolder capital-market architecture and regulation if it is to create a financial market as vibrant and ambitious as Nasdaq.

★ *The patenting system* in the EU is arcane; competing and overlapping procedures for registering patents impose heavy costs on knowledge-based businesses. Europe has three different patent systems: national patent laws, a European Patent Convention system and the Community Patent Convention. One leading multinational which makes 1,000 patent applications a year in the EU estimates the annual cost of translation alone to be €20m to €30m. The unitary European patent proposed by the Commission in February 1999 is thus an important step forward.

★ *In world trade negotiations on e-commerce*, the European Commission will need to play a delicate role to achieve a fair framework for a borderless e-commerce market without stifling it. Consumer groups want to enshrine the right for people to take to court, in their own country, using their own law, a company that has broken a contract to sell goods and services over the internet. Without this guarantee, they argue, consumers will be unwilling to buy goods over the internet: it will be prohibitively costly for them to take a company to court in the country where it is registered and based, if that is different from their own. Business advocates argue that such a high level of consumer protection would threaten small companies. A small company based in say, Seville, could find itself facing legal action under Swedish law in Stockholm, German law in Mannheim and French law in Lyon. It would act as a real barrier to small companies exploiting the full potential of e-commerce across the EU.

  The way forward will almost certainly turn on innovations in the conduct of such disputes to allow them to be resolved without recourse to the courts; or by bringing different legal systems together. The risk, however, is that e-commerce in the EU will get tied up in a maze of different laws and regulations, slowing its development compared with the US. If the development of the EU market for e-commerce is delayed, so will the development of European companies capable of exploiting it and taking their products to the global market also be delayed.

★ *The EU's own research programmes* need to place greater emphasis on engaging and promoting small companies, and on commercial outputs—as Brussels already acknowledges.

Some of these issues, for example controls on state aid, require the European Commission simply to use existing powers and competences. In other areas, such as the creation of pan-European financial markets and patent systems, a mixture of legislation, political agreement and institutional innovation will be required. Elsewhere, however, the Commission's role will be to promote 'soft convergence' by encouraging member-states in the Council of Ministers to benchmark and adjust their policies around agreed priorities and illustrative targets. For example, such a process could help to remove barriers to the creation of companies, or to narrow the differentials in rates of capital-gains tax.

The recognition that the EU needed a step-change in its enterprise policy lay behind the creation in 1999 of a merged Enterprise Directorate-General, which brought together the directorates previously dealing with industry policy and small business. The new directorate marks a shift away from traditional industrial policies, often designed for large companies, towards an approach that addresses the needs of large and small businesses; this new approach includes, for instance, access to risk capital, competition policy and links to universities and research centres.

The commissioner responsible for the new directorate, Erkki Liikanen, told the European Parliament in August 1999: 'Europe's unemployment rate is far beyond any acceptable level. Let's not overlook the simple fact that unemployment is double in Europe compared to the United States and Japan. Why are we lagging behind? There are many reasons. We don't have enough new small enterprises. We have too few young people willing to become entrepreneurs. We have an excessive administrative burden, especially in starting a new enterprise. We lack a single risk-capital market for high-growth, high-tech companies. We have fallen behind in internet services, software production and electronic commerce. We need to create a new European enterprise culture.'

One example of how policy-makers are attempting to promote a new European enterprise culture is the recent emergence of high-tech sectors in Germany.

4 A new German economic model?

The German economy was one of the great success stories of the second half of the 20th century. Its success underpinned the European economy. That is why it is worth exploring in detail what signs there are of a new enterprise culture emerging in Germany.

Post-war economic success

The post-war German economic model was based on specialisation in well established but relatively complex products, involving large-scale production processes and extensive after-sales service that consolidated close relationships with customers, suppliers and banks. Innovation in these advanced-technology industries—machine tools, engineering, engines, automobiles and chemicals—is continual but moderate. There is a growing fear within Germany that this economic model, built on long-term relationships, formal education and training, and incremental innovation, is exhausted. Germany is being squeezed at both ends: US companies seem to be capturing the high ground in risky, high-technology sectors such as software, the internet and biotechnology; while rapidly industrialising, low-cost nations from east Asia threaten to eat into Germany's manufacturing base.

One sign of this squeeze has been cuts in employment among large companies. Siemens, for example, increased employment outside Germany by 50 per cent from 108,000 in 1984-85 to 162,000 in 1994-95. Over the same period the company's employment *in* Germany fell by 12 per cent. Between 1984 and 1994, Volkswagen increased employment outside Germany by 24 per cent and cut its German workforce by ten per cent to 141,000. The same story is true of most large German companies, Hoechst, Bayer, BASF, BMW, Thyssen and Bosch among them. This contraction in Germany, combined with the inflexibility of the service sector, pushed unemployment to 13 per cent, or 4.8 million people, at the start of 1998, the highest level since the pre-war Weimar Republic. Some

commentators worry that radical restructuring within traditional industries is undermining the social contract between finance, management and labour that underpinned German innovation.

At the same time as traditional German industries are under more pressure, the US has pulled ahead in high technology. California has replaced hundreds of thousands of jobs lost in aerospace and defence in the last few years by spawning gazelle companies, especially in software and computing. Germany is not spawning these gazelles and the reasons are not hard to find. They lie at the heart of Germany's labour market, its education system and the way it provides finance for companies.

German scientists and technicians tend to have long-term careers with a single employer, during which they build up firm-specific know-how. The active labour market for scientists and technicians is very limited. The costs of laying-off personnel are very high. This makes it hard for entrepreneurs to form and reform teams to work on high-risk projects, some of which will fail. Pay systems tend to be governed by collective bargaining agreements and professional norms. Incentive- and performance-based pay are rare. Stock options were illegal until 1998. Bank and debt financing for companies were far more common than equity financing, in part because German engineering firms have high capital-equipment costs that require long-term but relatively low-risk financing.

As Professor Frieder Meyer-Krahmer, director of the Fraunhofer Institute, explained: 'The strengths and the weaknesses of an innovation system are interrelated. That is why it is very difficult to change approaches to innovation in a piecemeal fashion. The German innovation system is highly competent, especially in advanced technologies in existing markets for manufactured products. We are weak in more radical innovations which require flexibility and agility in companies, aimed at services and retailing. But our strengths are also the source of our weaknesses, including our approach to education and training, and financing industry. It is difficult to correct our weaknesses without risking undermining our established strengths.'

The German model appears to be marooned. Its traditional manufacturing base is being attacked by a rising tide of competition from

low-wage countries. Yet it is unable to make its way to the higher ground of high-growth, high-tech sectors.

Signs of entrepreneurial growth

However, such a pessimistic assessment of German prospects is too hasty. In the economy's undergrowth there are signs of revival. A new generation of German entrepreneurs is trying to find a distinctively German source of comparative advantage in the new economy. New-company formation is growing at a rate of five per cent a year. In 1997 half a million new businesses were formed. That same year the number of new businesses in knowledge-intensive manufacturing industries rose by 1.6 per cent and in service sectors by 6.5 per cent. Almost 20 per cent of graduates are self-employed. The state, at federal and regional level, is trying to create a more favourable environment for entrepreneurs.

The state's orchestration of this entrepreneurial renewal has encompassed policies to promote education in entrepreneurship and to link universities more closely to business creation. The EXIST programme, launched in December 1997, is a competitive programme for university-based regional networks of high-tech entrepreneurial ventures. The one competition held to date stimulated 109 proposals from 200 of Germany's 326 universities. Five of the 12 finalists received DM45m in federal government funding.

But the centrepiece has been a state-sponsored programme of financial innovation to create a German venture-capital industry. There are 131 providers of risk capital in Germany, including about 40 corporate funds run by large companies and 30 recently founded high-tech funds. At the end of 1997 the funds held by members of the German venture-capital association had risen by 46 per cent from 1996, to DM13.6 billion, with a stock of DM7 billion invested in more than 3,500 companies and DM6.6 billion available for investment. The number of new investments by German venture capitalists rose by 50 per cent to 965 in 1997, and the amount invested in them went up by 143 per cent to DM1.92 billion. The number of companies approaching venture capitalists for funds rose from 11,300 in 1996 to 16,500 in 1997.

The structure of German venture capital is as striking as its growth. About 45 per cent of new commitments by German venture capitalists

have been to early-stage developments. The German venture-capital industry is smaller than its British counterpart, yet German venture capitalists in 1997 invested €190m in early-stage deals, compared to €100m in Britain. This focus on early-stage investments has been supported by the federal government's main 'BTU' programme, which helps reduce the downside risk for a venture capitalist investing in a company less than five years old. Under this programme, not only does the state bear the lion's share of losses should the company fail, but the venture capitalist also has first claim on the returns if the project is a success. A German venture capitalist, by combining federal subsidies with those provided by regional governments such as Bavaria, can get two euro of public money to support every one euro of private money invested.

If these subsidies have helped stimulate investment at the start of the pipeline, the creation of the Neuer Markt in March 1997 has provided an outlet at the other end. Two years after its launch about 70 companies had already listed on the Neuer Markt.

These developments are striking because Germany is starting from such a low base. The German venture-capital industry is still small compared to that of the US, and would be even smaller without state subsidies, which on some estimates account for 40 per cent of funds invested. Only seven per cent of German venture capital is invested in high-tech companies, and three per cent in risky early-stage investment. According to 1998 data from the European Venture Capital Association, German venture capital is worth 0.07 per cent of German GDP, about the same proportion as in Portugal, compared to 0.39 per cent in the UK and 0.13 per cent in the EU as a whole.[10]

While the euphoria among some German venture capitalists and policy-makers is premature, there are signs that the country is starting to stake out a distinctive position in some high-tech sectors. An example is the emerging biotechnology industry.

A new biotechnology sector

There was very little start-up activity in biotechnology in Germany in the 1980s. Large German pharmaceuticals groups invested in biotechnology research in the US. In the past two years, though, some of these companies

[10] I am grateful to Professor Phil Cooke from the school for advanced studies at Cardiff University, for pointing this out

have started to invest in laboratories in Germany, and there has been a wave of venture capital-funded start-ups. A recent survey by Ernst & Young found more than 440 small biotech firms in Germany. In the last three years 17 regional biotechnology centres have been created, often close to university medical centres or Max Planck scientific institutes, under federally orchestrated 'BioRegio' programmes. These centres have enjoyed extensive subsidies from Länder governments. The BioRegio programme, like so much German government policy in the last three years, has been an attempt to use public policy and institutions as a surrogate for market-based mechanisms to stimulate innovation. These support programmes typically involve: free consulting services to help entrepreneurs draw up business plans, market analysis, subsidies to cover patenting costs, provision of low-cost lab space in business 'incubators' and space in nearby technology parks for growing companies. Most biotechnology companies also have the state as a silent partner, through a new federal risk-capital programme, the Deutsche Ausgleichbank. To cost the BioRegio initiative is difficult, but more than DM2 billion has been spent on the Munich biotech park alone, and there are slightly smaller projects near Cologne and Berlin.

The structure of the German biotechnology industry is as significant as its scale. Biotechnology is not an industry in any conventional sense, still less a set of products. It is an overlapping series of technologies. Thus, in addition to a few very highly publicised areas of 'blockbuster' drugs research, there are many other less glamorous segments. German firms are congregating in a sector known as platform technologies. While therapeutics firms apply a variety of genetic manipulation technologies to the discovery or design of chemical compounds to treat disease, platform-technology firms create the research and bio-engineering tools used in therapeutics, such as drug screening, product-automation techniques and genetic sequencing.

Germany's most successful biotechnology company, Qiagen, is a platform-technology company that holds a near monopoly position in cheap kits used to replace labour-intensive processes in DNA filtration. Qiagen's workforce has risen from a few dozen in the early 1990s, to more than 700. The company, which is quoted both on Nasdaq and the Neuer Markt, is one of the most profitable small biotechnology companies in the world.

According to a study by Steven Casper, Mark Lehrer and David Soskice, from the WZB Institute in Berlin, German firms specialise in platform technologies because this sector of the new economy best fits with German institutions and traditions. Drug discovery in biotechnology is highly volatile and requires considerable corporate flexibility, as companies need to move out of one field and into another. This entails high employee turnover, which is difficult for companies to handle within Germany's highly regulated labour markets. The failure rates in drug discovery are very high, so the financial risks are daunting for most German investors. Platform technologies, on the other hand, suit the German system because they can be built up cumulatively and the risks are lower.

To put it crudely: the Germans are attempting to become the machine-tool makers of the biotechnology sector. Whether they will succeed is another matter. There is growing international competition in platform technologies. Radical innovation will be required to lower production costs, which may drive German biotech companies towards higher-risk drug discovery, for which they are less well suited. One industry estimate is that it would take venture-capital investment of DM35 billion to create 50 drug discovery biotechnology firms. The amount of venture-capital available for investment in biotech is nearer DM1 billion.

A new German model?

The development in only a few years of a vibrant, if small and fragile biotechnology sector, in part through state-sponsored investment and financial innovations, suggests that the German economic model is far from exhausted. German firms will continue to find a competitive niche within the new economy in segments that play to the inherited strengths of German institutions in promoting cumulative learning and investment in production technologies, particularly those aimed at a business market. In the process these traditional institutions will be forced to adapt. What we are witnessing, in other words, is not the collapse of the German model but its slow, uneven adjustment and evolution. In Munich, Karlsruhe, Aachen and Berlin, this evolution is rapid. It is creating a hybrid business culture in which new companies are deploying distinctive German strengths to compete in emerging global industries.

Many older German companies have learnt to think in global terms only in the past 20 years. They were German first and global companies

second. The new companies are German *and* global in outlook and culture from the outset. These hybrids represent the future of the German model. As yet, however, it is far from clear whether these forces of modernisation and change within the German economy will flourish. To do so they will have to force far-reaching changes in established institutions and routines. It is just as possible that these traditions will smother the early signs of entrepreneurial growth.

Developments in Germany are symptomatic of the position in the EU as a whole. Europe is reaching a critical juncture. The forces for change to create a more entrepreneurial and open economy are powerful. In the second half of the 1990s policy-makers have put in place policies to promote entrepreneurship in high-tech, high-growth industries. But there is a long way to go before a new entrepreneurial culture puts down solid roots in Europe. The aim for the EU must be to go beyond pragmatic policy development towards a larger, more ambitious goal: the creation of a distinctively European entrepreneurial model. An entrepreneurial Europe would aim to match the creative energy of US business, while maintaining the public safeguards and social cohesion that European societies prize. The creation of a dynamic mix of innovation and inclusion, and of stewardship and entrepreneurship, should lie at the heart of the EU's economic agenda.

5 The European road ahead

Politicians and policy-makers have only just begun to focus on what is needed to turn the EU into an entrepreneurial economic space. Far more radical steps will need to be taken if these early initiatives are not to run into the sand. The policy framework for the new economy should build on four themes:

★ expanding the opportunities for entrepreneurship;

★ building entrepreneurial capacity throughout society;

★ forming entrepreneurial networks to bring together talent, ideas and money; and

★ creating a legal and fiscal framework that encourages innovation.

These four themes should govern the European Union's project for the next decade. In each area the EU has a critical role to play.

Expanding opportunities for entrepreneurship

Entrepreneurs are attracted by market opportunities to create businesses and sell a product. If product markets are closed, over-regulated or cartelised, then no amount of investment in entrepreneurship will create high-growth new businesses. Thus the EU has a central role—through single market legislation and competition policy—to create larger, more competitive product markets.

Examples abound of how product-approval and retailing regulations fragment European markets and slow innovation. One is the fate of Luvox, an anti-depressant drug developed by a Belgian company, Solvay, in co-operation with Dutch universities. The drug-development project, which started in the 1960s, is estimated to have cost $600 million at current prices. Solvay was the first company in the world to patent the product in 1975. It was registered initially in Switzerland in 1983 but registration throughout

Europe was not completed until 1987. The drug was only registered and approved in the US in 1995. The US firm Eli Lilly also patented a very similar drug, Prozac, in 1975. However, because Prozac was launched far more quickly in a much larger domestic market, it gained both market share and brand recognition far more quickly than Luvox. In 1997 Prozac's sales world-wide were $2.5 billion, 14 times those of Solvay's drug.

Another salient example is the recent development of the pharmaceutical industry itself. Although the modern research-based industry traces its origins to Germany and Switzerland in the mid-19th century, the balance of innovation has shifted markedly in recent years to the US. (It is estimated that by 2002, three of the world's 25 top-selling new medicines will have been discovered and developed in Europe. Ten years ago, half were European.) This is due in large part to the failure to create a true European single market in pharmaceuticals, which are still subject to a patchwork of national pricing and reimbursement regimes. The interaction of these national rules for administering prices and the free movement of goods creates market distortions. It also makes Europe much less attractive for investment in innovation by an increasingly global industry. The result is widespread delays and disparities in patient access to new medicines—and a less competitive European pharmaceutical industry. Similar problems hold back innovation in other markets.

However, Europe also has its own best practices, which show how product-market regulations can be used as a lever to spur innovation. Liberalised telecommunications markets have opened opportunities for scores of new entrants in both mobile and fixed-link systems. Changes in environmental regulations, for example in Germany, have been an important tool in forcing companies into environmental innovation.

Three issues are vital:

★ *How open are product markets?* The EU must pursue a rigorous and proactive competition policy, not simply clamping down on state aids or anti-competitive behaviour, but promoting competition to spur innovation. Two good test cases will be the liberalisation of European broadcasting markets to spur on innovation among independent producers, and the completion of the single market in pharmaceuticals through price liberalisation.

★ *How quickly are new products approved?* Product-approval processes are still too cumbersome and open to arcane national interpretations. Europe needs swifter, simpler procedures, based on mutual recognition of standards. European performance in this field should be benchmarked against the US. Biotechnology products are approved three times as quickly in the US as in Europe.

★ *How large are markets?* The extension of the single market is vital, in order to provide entrepreneurial high-growth companies with a European base, from which they can aim to take on global markets. Fragmented national markets are the enemy of modern innovation.

Building entrepreneurial capacity

Opportunities for entrepreneurship are worth nothing unless people are able to spot them and take them up. A concerted programme to open opportunities needs to be matched with sustained investment in the entrepreneurial capacity of Europeans. The EU's role is to promote the spread of best practice in this field and to use its own spending to stimulate investment in entrepreneurial capacity.

★ *Older entrepreneurs* European entrepreneurs tend to be aged 25 to 44 years old. The larger the share of the population in this age group, the more entrepreneurs a society is likely to create. Ageing societies such as Italy face particular problems in promoting entrepreneurship. They have to find ways either to import entrepreneurial talent from elsewhere or to create more entrepreneurs later in life. The EU should encourage European best practice in promoting entrepreneurship among the over-50s.

★ *Gender* European entrepreneurs tend to be male. In the US and Israel, where entrepreneurial cultures are more developed, the proportion of women who become entrepreneurs is 60 per cent of the male rate. This falls to 30 per cent in Italy, 17 per cent in Germany and 10 per cent in Denmark. To expand the population of entrepreneurs, European programmes must get more women involved, which means attacking the social structures and prejudices that make it especially difficult for women to form their own businesses. The EU should sponsor research in this area, extending

to the creation of networks for female entrepreneurs and investors, and best practice for training female entrepreneurs.

★ *Basic education* It will be near impossible to succeed in the knowledge-driven economy without sound literacy and numeracy. In several EU member-states the basic education infrastructure still needs heavy investment to extend and improve those skills. Moreover, the curriculum in junior and secondary schools needs to promote creativity, problem-solving, teamwork and agility, all key capabilities for the new economy. Member-states are taking a wide range of initiatives to promote creative problem-solving within the core curriculum.

Eight out of ten Scottish schools, for example, have participated in the 'schools enterprise programme' for students aged five to 14 years, and 60 per cent of 14 to 18-year-olds have been offered experience in setting-up or running a business. The highly successful US National Foundation for Teaching Entrepreneurship is about to bring its approach to the UK. There is huge scope here for the EU to be involved in promoting these developments and in helping member-states learn from best practice within and outside its borders.

★ *Higher education* Expansion of access to higher education is probably one of the most important policy steps that EU states need to take, for three main reasons. First, it is at university that young people learn independence, incubate ideas and form a more self-confident sense of themselves as autonomous individuals, which can enhance their awareness of career opportunities. Education broadens people's horizons and encourages mobility, and while university teaching and courses are not always creative, universities can engender an innovative atmosphere simply by bringing young people together. Second, there is growing interest in the formal teaching of entrepreneurship at universities. Seven Scottish universities offer modules in entrepreneurship to students in every faculty. Europe should aim for this to become the norm at all universities: every student should be able to opt-in to a course in entrepreneurship and self-employment, no matter which degree they are studying. In some disciplines, such as engineering and sciences,

it should be compulsory. Third, universities provide the knowledge base for many (though far from all) new high-tech industries. Investment in universities thus helps to raise the general level of a society's knowledge base.

Here, again, European universities need to benchmark their performance against the best in the US. The success stories of Stanford in California and MIT in Massachusetts are well known. More telling is the performance of the University of California in San Diego. Nineteen per cent of private-sector jobs in the city of San Diego are in businesses that have direct links to the university. The city's largest employer, a new telecommunications group, was created by a professor at the university.

★ *European Commission research programmes* The European Commission should use its research programmes to encourage more mobility among researchers and to promote centres of excellence as hubs of the European knowledge economy. The Fifth Framework Research Programme, which will run until 2002, contains elements designed to encourage links between researchers and small businesses. However, the themes of the research are still centrally governed by quite detailed regulation. After 2002 the European Commission should adopt a model similar to the German 'BioRegio' competition, or the UK's Challenge Fund, in which universities and private-sector partners bid for funds to create university-based research and enterprise centres.

★ *Releasing human capital* Too much of Europe's prime human capital is locked up in large company hierarchies or in the public sector. It will be vital to introduce measures to promote mobility out of the state sector and large companies, and into start-ups. This will entail pension reform, and also better use of stock options to create incentives for executives to move. One simple step would be for the European Commission to create an EU-wide Entrepreneurship Challenge or award scheme to recognise the most dynamic and creative enterprise among young people, women and older entrepreneurs.

★ *Widening horizons* One feature shared by many of the most

successful young European entrepreneurs is that they have spent some time studying or working in the US. This helps them at an early age to think beyond national boundaries, to experience some of the entrepreneurial buzz around US campuses. The EU should consider an entrepreneurship scholarship programme to help students, especially from more disadvantaged areas, to study in the US.

★ *Attracting mobile talent* Europe needs to become a more attractive meeting place for entrepreneurial talent from across the world. At present the cream of the mobile, educated young global workforce is attracted to the US and its West Coast in particular, not just because the rewards are so lucrative but because US society is in many ways more open and cosmopolitan than older European societies. In a knowledge economy, in which human capital and talent are critical, immigration policy needs to be seen, in part, as an arm of industrial policy. Europe should aim to be as attractive as the US to young entrepreneurs from other countries.

★ *Family entrepreneurship* Family policy may take on a new significance in a more entrepreneurial economy populated by small firms because family members are often the first sources of financial help in setting up a business. A huge amount of 'business angel' activity in the US is undertaken by a family's older generation investing in the businesses of the younger generations. The EU institutions should conduct research in this area with the aim of encouraging member-states to adjust policy accordingly, for example by providing tax incentives to invest in family firms.

Forming entrepreneurial networks

Entrepreneurship requires both a capability and an opportunity, but the two things rarely come together in an individualistic and atomised marketplace. As a rule entrepreneurs acquire ideas, money and information about opportunities through networks, which link them to venture capitalists, partners, competitors and universities. These networks, which are often highly localised, are rarely the creation of self-interested individuals. In the US, venture capitalists, large companies and universities all play a role in creating these networks.

Policy in this area should have three main goals. First, Europe needs a larger, stronger and more capable venture-capital industry. Reforms are needed to pension-fund legislation, to allow more funds to be put at the disposal of venture capitalists. In 1999 about 2.5 per cent of EU pension-fund assets were invested in venture capital, compared with 7.3 per cent in the US, according to a study by Goldman Sachs. And as the quantity of venture funding increases, it is vital that the quality of venture capitalists improves. Europe needs more skilled venture capitalists, who can help entrepreneurs by providing not just money, but business advice and contacts too. US venture capitalists should be encouraged to come to Europe as part of this process.

Second, Europe's large companies have an important role to play. In mobile telephony, Ericsson and Nokia are both investing heavily in their own research and orchestrating a network of complementary, innovative small companies, which are developing products such as software for their telephones. Large companies should be encouraged to move into corporate venture-capital funds and to make it easier to second executives to start-ups.

Third, other institutions, such as universities and chambers of commerce, need to be encouraged to become more entrepreneurial themselves. Europe has too few meeting places where people with ideas can meet investors with money. The EU should sponsor experiments with different kinds of meeting place where investors and entrepreneurs can get together, akin to the venture fairs run by *Red Herring* magazine in the US.

Creating a framework

The EU will need to take measures, for instance through directives, to put in place an adequate legal, fiscal and financial framework for entrepreneurship.

★ *Financial markets* Europe's financial markets are highly fragmented. European stock markets are smaller and less liquid than in the US, making it harder for venture capitalists to diversify the risks in their portfolios. Many European entrepreneurs still prefer to list their companies on Nasdaq in the US because there are more and better-informed stock analysts there. European entrepreneurs claim that, as a result, their companies get higher valuations in the US, their

shares are worth more and they can more easily fund their plans for expansion and acquisition. Europe needs a single, pan-European risk-capital market,[11] something the EU should take up as a priority. Reform will need institutional innovation as well as legislation.

[11] *'Risk Capital: the key to job creation', Communication of the European Commission, 1998*

★ *Business law* Too much of Europe's corporate law and regulation is aimed at large companies rather than tailored to the needs of smaller firms. In 1998 the 'BEST' taskforce of industrialists reported to the European Commission on how to simplify regulations for small companies, and recommended a series of measures. One obvious benchmark would be to reduce the time it takes to set up a business. According to OECD research, it takes about a week to set up a business in the US, compared to 12 weeks on average in the EU. And where the cost of setting up in the US is €500, in the EU it is closer to €2,000.

★ *Fiscal policies* These are largely the responsibility of member-states rather than the EU. However, the EU, and particularly the Commission, will have an important role to play in encouraging convergence among member-states. Capital gains tax, for example, varies from a high of about 58 per cent in Denmark to 40 per cent on some investments in the UK, and zero on minority holdings by private investors in Germany and the Netherlands. The taxing of share options is similarly confused: they are generally treated as income for tax purposes rather than as a capital gain. So, with the exception of Finland and Italy, share options are taxed when an employee buys the shares, rather than when he sells them. This simply encourages employees to sell their shares as quickly as possible.

Stock options and capital-gains taxes are controversial areas of public policy. However the EU could encourage a process of soft convergence among member-states towards a tax rate of 20 per cent or less on capital gains on investments in small, young companies. It should seek a European model of stock options in small companies that allows them to be taxed as a capital gain on the sale of shares.

★ *Intellectual property* It is painfully slow to file European patents, and expensive to maintain them. The bureaucratic log-jam of patenting in the EU will matter increasingly, as more knowledge-based businesses seek to protect their intellectual property. The unitary European patent proposed by the Commission in February 1999 is thus a vital step forward.

The case of broadcasting

Policies for opening opportunities for entrepreneurs, spreading capacity for entrepreneurship, forming networks and providing a supportive framework need to be applied across the board. The example of broadcasting and multimedia illustrates the crucial role of policy in the development of a more open, dynamic industry.

European broadcasting is still largely dominated by highly regulated national champions. Although services are increasingly available across Europe, there are very few genuinely pan-European products or channels, other than those imported from the US, such as MTV. An entrepreneurial independent production sector has emerged in the UK in the past ten years, in large part to supply programmes to Channel 4 and latterly the BBC. Yet such a sector has not developed to the same extent elsewhere. Traditional broadcasters still dominate the industry.

Digital technology is, however, about to bring forth a huge transformation in broadcasting. This will allow the creation of many more channels and of entirely new services which combine data, information and e-commerce. In the near future consumers sitting at home in their living rooms will be able to move seamlessly between television, the internet, home shopping and electronic banking. This should expand the market for television, but also fragment it. The digital world will create new services, but also new competitors for incumbent broadcasters. Markets for broadcast products will become more global but also more complex.

The entire structure of EU broadcasting needs to be overhauled for European companies to exploit these opportunities. In particular, more entrepreneurial independent producers will be needed to create the multi-media, internet-to-television services that future viewers might want. The most advanced independent production companies, such as GMG

Endemol and Tiger Aspect in the UK, already see themselves as sellers of programme formats and software, rather than just programme providers. This shift in strategy will also require a different approach to financing, bringing venture capital to the television business for the first time.

6 Targets for a new European economy

The ingredients of a new, entrepreneurial, European economic model are coming into focus. A fresh generation of entrepreneurs, with similar values, outlooks and experiences, is starting to create a new generation of businesses. These businesses are hybrids, rooted in Europe but international in outlook and ambition. They are committed to exploring emerging markets and technologies, but often rely on traditional institutions for support. This emerging model is distinctively European in two senses. First, the similarities between its young business people outweigh their national differences: they constitute perhaps the first European business class. Second, they are strikingly different from their counterparts in the US. Less ruthlessly commercial and ambitious, they espouse European virtues and their businesses are supported by European institutions; they want to combine innovation and inclusion, entrepreneurship and stewardship.

It is easy for politicians to agree in principle on the merits of a new model. And indeed, the pragmatic policy mix to promote more entrepreneurial start-ups will no doubt continue to develop. For Europe to go beyond that, however, will require agreement on ambitious targets to create a more entrepreneurial economic space. The new model needs to combine inclusion and innovation. It needs a first-class and egalitarian education infrastructure, combined with public safety nets to prevent social exclusion and to help people cope with life in a more turbulent economy. How to create the political and cultural space for this new model to emerge is a political task. Europe needs a political leadership that can create a distinctive way forward into the new economy.

To move beyond exhortation and pious principles requires bold commitment. Here, then, are some tangible commitments and targets against which Europe's progress in creating an entrepreneurial economic space may be judged.

★ Ensure that entrepreneurship and creative problem-solving is a significant component of the junior and secondary schools curriculum in all member-states by 2010.

★ Broaden access to higher education so that at least 50 per cent of the EU cohort of 18-year-olds go through some form of higher education in 2010.

★ Provide entrepreneurship- and business-training for all undergraduates and make an entrepreneurship module compulsory for all engineering, science and economics undergraduates.

★ Challenge Europe's top 50 universities to spin-off as many businesses in the next ten years as their counterparts in the US have in the past ten.

★ Review all EU and member-state financial instruments that support innovation to ensure cost efficiency, prevent duplication and enforce the principle of subsidiarity.

★ Create a single, pan-European risk-capital market by 2005.

★ Create a European venture-capital industry which invests as much per capita as the US, and more in start-ups. By 2010, European pension funds should invest about 5 per cent of their assets in venture-capital funds.

★ Embark on a Union-wide reduction in capital-gains taxes for investments of five years or more, in young, small businesses, to less than ten per cent.

★ Provide a model European stock-option law in which options for executives in young companies are taxed as capital gains, and only at the point when shares are sold.

★ Introduce a single European patent.

★ Make it as easy and cheap to set up a business in the EU as it is in the US.

★ Remove barriers to competition within Europe, following the successful models of telecommunications and electricity, by completing the single market in those sectors that still face market distortions as a result of the effects of restrictive national regulations. For example financial services and public procurement should be targeted.

★ Raise the average participation rate of women in business start-ups from 30 per cent of the male participation rate to 60 per cent within ten years.

★ Benchmark barriers to new entrants to make sure no significant European markets are more closed to new entrants than the comparable markets in the US by 2010.

★ Use EU funds to create 20 centres of excellence throughout Europe, linked to university enterprise centres.

★ Index the flows of human capital into and out of the EU to ensure that by 2010 Europe is seen to be as attractive to mobile talent as the US.

Appendix: List of interviewees

In the course of the research we interviewed the following people:

John Alty, EU Affairs, UK Department of Trade and Industry

Luc d'Auriol, Geneopol Industries, former founding partner Genset

Pierre André Buiges, Head of Unit Telecom Policy, DG COMP, European Commission

Stéphane Boujnah, Counsellor on Technology to the Minister, Ministry of Economy, Finance and Industry, Paris

Benoit Battistelli, Deputy Under Secretary for Industry, Ministry of Economy, Finance and Industry, Paris

Mathias Bucksteeg, Economic Adviser, Chancellory, Berlin

Steven Casper, WZB, Berlin

Manish Chande, Chief Executive, Trillium, London

Mike Coyne, Small Business Policy, Enterprise Directorate, European Commission

Gilles Copin, Director of Entrepreneurship Programme, Chamber of Commerce, Lyon

Michel Dubois, Venture Capitalist, Lyon

Dr Reinhard Felke, International Economist, Ministry of Economics and Technology, Berlin

Christer Fahråeus, Founder, C Tech, Lund, Sweden

Yves Guyon, Director, Lyon Chamber of Commerce

Alexis Jacquemin, Principal Adviser, Forward Studies Unit, European Commission

Galway Johnson, Head of Unit, Services & Enterprise Aspects of Employment, DG Enterprise, European Commission

Dr Hans-Peter Lorenzen, Direct Technology and Innovation Policy, Ministry for Economics and Technology, Berlin

Dr Georg Licht, Centre for the European Economy, Mannheim

Mattias Lindberg, Project Manager, Future Factory, Lund, Sweden

Benoit Metais, Senior Manager, Siparex Venture Capital Group, Lyon

Pierre Michel, Innovation Service, Lyon Chamber of Commerce

Dr Gordon Murray, London Business School

Jean François Puech, Managing Director, Siparex Venture Capital Group, Lyon

Olli Rehn, Chef de Cabinet, Commissioner Erkki Liikanen

David Soskice, Berlin Centre for Social Research, WZB

Wolfgang Streeck, Director, Max Planck Institute for the Study of Societies, Cologne

Isabelle Servais, Assistant, School of Management, Lyon

Sigmund Vittols, WZB, Berlin

Helmut Voelzkow, Max Planck Institute, Cologne

David Wright, formerly in President Santer's cabinet, now Adviser, Forward Studies Unit, European Commission