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PREFACE

There is concern across Europe that the Venture Capital Industry is not functioning successfully. This study by Euro-CASE shows that these concerns are well founded but that the causes are complex and vary from country to country.

In particular it is noted that:

- There is money potentially available for investment in new technology based firms (NTBFs) but the access to it is poor.
- There is often confusion between the terms Venture Capital and Private Equity investment.
- Insufficient use is made of informal investment (by Business Angels). This is often the best source of funding for seed and start-up companies.
- Cultural attitudes in Europe often discourage investment in NTBFs.
- Whilst individual countries and the European Union have a wide range of incentives to encourage entrepreneurs, these are not well understood or used.

Unless we can rationalise our institutions, fiscal policies and regulatory systems across Europe and change our cultural attitudes, we shall not achieve the growth in new technology based firms nor the increase in highly paid jobs that they bring, on the scale exhibited in the United States over the past twenty years.

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Chairman, Euro-CASE Venture Capital Steering Group

Paris, 16 October 1998

1. SUMMARY

1.1 Introduction

For some years now, it has been recognised that innovative companies are major generators of new employment and therefore contributors to the economic development of the European Union. In general, new engineering or technology-based firms have the highest potential for growth but also have considerable difficulty in finding adequate financing for start-up and expansion.

Although many studies of this problem have been made during the last few years and both national and pan-European initiatives have been launched in attempts to ameliorate the situation, none of these, in the opinion of the Engineering Academies which contribute to the European Council of Applied Sciences and Engineering (Euro-CASE), have addressed the problem from the point of view of the engineering industry itself while not overlooking the interests of other professionals from academia and the financial sectors.

The Euro-CASE approach has been to bring together, in a series of workshops, more than a hundred experts from the engineering industries, universities, research institutions, venture capital and other financial institutions to debate the problem of raising finance for new technology-based firms. The proposals and suggestions in this Report are the results of this debating process.

The five workshops, which are described elsewhere in this Report, were each organised by the relevant national Engineering Academies and Euro-CASE is very grateful for their efforts. Comments and contributions from those Academies which were not directly involved in the project have been incorporated in the Report[a].

In addition to the Workshops, mention should be made of the visit of the Conseil des Applications de l'Académie des Sciences (CADAS) to the Royal Academy of Engineering in London in 1995 to hold discussions with British Venture Capitalists and other parties. It was, in part, the interest shown at this meeting that sparked the decision to initiate the present project.

1.2 Euro-CASE: who we are and why we are interested in Venture Capital

Euro-CASE, the European Council of Applied Sciences and Engineering, is a European non-profit organisation created by the Academies of Applied Sciences and Engineering from seventeen European countries. Euro-CASE acts as a permanent forum for exchange and consultation between European Institutions, European Industry and Research. Through its member Academies Euro-CASE has access to the most distinguished experts in Europe.

[a] See Appendix VII for a list of the Engineering Academies

The main objectives of Euro-CASE are to provide impartial, independent and balanced advice on research, development and the resultant technology, and to assure its appropriate diffusion. Euro-CASE promotes the development of consensus views on issues with a European dimension. Euro-CASE may also take concrete actions of common interest where its unique constitution can bring an added value or an original solution to important issues. For details, see Appendix VII.

Many of Euro-CASE's activities are conducted in the form of workshops organised by our member Academies and gathering experts from all over Europe. This allows us in a very pragmatic way to collect the contributions of hundreds of experts. For details, see Appendix II.

Of other current Euro-CASE activities can be mentioned the organisation, together with the Esprit programme of the European Commission, of the European Information Technology Prize, open to innovative companies in 29 European countries, a series of workshops on "Air Quality and Human Health", a seminar on "European Industrial PhD" and a project on Freight Logistics and Transport Systems. For details, see Appendix VII.

Euro-CASE's interest in "Engineering and Venture Capital in Europe" derives from a previous Euro-CASE study and a workshop organised in Paris in October 1994 on "Technology Transfer and Diffusion". The conclusions showed that it was necessary to address, from the point of view of engineering, the problem of finding the adequate financing for start-up and expansion of new technology-based firms, as innovative companies with high growth potential are major generators of new employment. On reading that report, the Commissioner then responsible for enterprise policy, Antonio Ruberti, requested that Euro-CASE follow up the work with a study of the problems surrounding venture capital in Europe. The European Commission DG XIII has sponsored one of the five workshops on Venture Capital.

In the late seventies and early eighties, the majority of what was known as venture capital was concentrated in the early stages of the development of a company, the risky end of the investment scale. Many of the fund management companies of those times misjudged the risks and failed to make the level of returns expected by their own investors. This resulted in a trend towards larger deals in more established companies, perceived to be less risky, and today more than half of all risk investments are made at the expansion stage or later, start-up and seed investment (including other early-stage) accounting between them for only 23% of cases. In terms of the amount invested, start-up and seed investment together accounted in 1997 for ECU 711 million - less than 7.5% of the total venture investment of ECU 9.6 billion[b]. Thus, in spite of the great size of the private equity sector, the amount channelled towards companies at the early stage is small and the percentage among those that would be classified as engineering or technology-based companies is smaller still. Accurate figures are hard to come by but a report in the Financial Times[1] suggested that the amount invested in technology during 1996 in Europe was about ECU 550 million (compared with ECU 6.6 billion in the US).

[b] See Appendix I

Prior to 1996, the percentage amount available to the seed, start-up and early-stage segments had shown an annual fall of around one percentage point for several years, reflecting the general trend away from venture capital to the private equity area. In 1996 there were signs that the trend had stopped and in 1997, a significant improvement was in evidence. While this is encouraging, the improvement was small and there is a very long way to go before the money supply meets the demand from the target sector.

The success of the series of five workshops on "Engineering and Venture Capital in Europe: a Euro-CASE pragmatic approach" has shown a very large interest, not only from our own Academies, but also from the European Commission and from the many external experts who have participated.

1.3 Summary of Conclusions

The Euro-CASE study led to the following conclusions:

CONCLUSION 1: **There is a great need to encourage venture capitalists to increase their investments in NTBFs.**

CONCLUSION 2: **Informal investors (Business Angels) are a valuable source of venture capital. Incentives are needed to persuade them to invest in NTBFs and at the same time, there is a need to introduce measures to improve access to them by entrepreneurs.**

CONCLUSION 3: **There is a variety of incentive schemes across Europe but they are often not well understood and the situation needs clarification**.

CONCLUSION 4: **The development of corporate venture capital throughout Europe is of potential interest specifically to NTBFs and should be encouraged.**

CONCLUSION 5: **The expenses associated with the "due diligence" process are a major deterrent to potential investors.**

CONCLUSION 6: **Cultural differences, including attitudes to entrepreneurs and new businesses, raise problems across Europe.**

CONCLUSION 7: **Public sector support for NTBFs can greatly enhance the credibility of the small company and thus assist its marketing efforts.**

CONCLUSION 8: **Entrepreneurs are generally not well trained in management and this makes venture funds reluctant to invest in start-ups.**

CONCLUSION 9: **The role of science parks and incubators in assisting the business planning process is important and a common standard of best practice would help to overcome doubts about entrepreneurs and entrepreneurship.**

CONCLUSION 10: **The cost of patents, especially the cost of litigation, deters small businesses from protecting themselves and their technology adequately. This lack of protection in turn deters potential investors.**

CONCLUSION 11: **The alternative stock markets are important both in the raising of finance and in the providing of exit routes for investors but a degree of confusion exists as to the most appropriate vehicles for particular cases.**

1.4 Summary of recommendations

These conclusions lead us to a number of recommendations for action[c], which may be summarised as:

RECOMMENDATION 1: **Introduce measures to encourage venture capitalists to invest in NTBFs and to increase public awareness of this form of finance.**

RECOMMENDATION 2: **Introduce greater harmonisation of fiscal and other incentives to encourage investment by Business Angels.**

RECOMMENDATION 3: **Improve investment support schemes; examine American and other practices with a view to introducing a pan-European scheme.**

RECOMMENDATION 4: **Stimulate corporate venturing; publicise its benefits to large and small companies.**

RECOMMENDATION 5: **A Europe-wide Technology Rating service should be established which would, by formalising the due diligence process, help to reduce the costs associated with the process.**

RECOMMENDATION 6: **Changes in the image of entrepreneurs to reflect their value to society should be fostered by developing and promulgating success stories via the media.**

RECOMMENDATION 7: **Governments should take measures to ensure that small firms receive an adequate share of public**

[c] For full recommendations, see section 5

sector contracts.

RECOMMENDATION 8: Universities should be encouraged to include business management courses in their engineering departments. Contacts between universities and small business, especially NTBFs, need to be strengthened.

RECOMMENDATION 9: Recognise the role of science/technology parks and business incubators in assisting small business.

RECOMMENDATION 10: Improvements in the systems relating to patents and other intellectual property are required to reduce the costs of maintenance and the imbalances caused by litigation costs.

RECOMMENDATION 11: Encourage the acceptance of "junior" markets such as EASDAQ and other national markets.

Specific recommendations for carrying out these actions are included at Section 5.

The role of Euro-CASE in contributing to the achievement of these recommendations is described in section 6.

NOTE: Throughout this Report, the word **technology** is used substantially interchangeably with **engineering**, in the sense of *the practice, description and terminology of any or all of the applied sciences which have practical value and/or industrial use*[d].

2. VENTURE CAPITAL

2.1 What is Venture Capital?

Venture capital provides financial support to unquoted companies in the form of a participation in the equity of a company or of a loan with an option to convert into equity; the relatively high risks are offset by the possibility of high returns. It has a strong risk-bearing character, focusing on industries with high growth potential.

In one form or another, venture capital has been around for centuries. The merchants who financed the great trading voyages of mediaeval times were venture capitalists, seeking a return from the cargoes of precious metals, jewels or spices brought back; the King and Queen of Spain were engaged in a venture capital exercise when they financed Christopher Columbus's first voyage and Columbus himself was, of course, an early entrepreneur. In Britain the phrase "when my ship comes home" is still used to indicate the expectation of future wealth.

[d] Chambers Science and Technology Dictionary

In the 19th century it was the railways which carried the concept of speculative, venture investment forward. While railroads in settled countries were built between towns and cities with a reasonable expectancy of revenue, the great transcontinental lines of North and South America were often financed by risk investors in the hope of the future development of trade. The boom in railroad building made fortunes for many but it may have been the last such opportunity for a long time; engineering processes and manufacturing techniques were becoming ever more complex and expensive and investors became ever more prudent, requiring assurances of feasibility and of markets.

Eventually the wheel turned full circle and after the second World War the demand for industrial and consumer goods and the diversity of these products led once more to the possibility of making fortunes from speculative investments.

In its modern form, however, venture capital has existed only in the last fifty years or so, although it did not really become the major financing instrument it is today until the late seventies. The American Small Business Investment Company (SBIC) scheme, launched in 1958 and operated by the US Government's Small Business Administration (SBA), has been very successful in creating companies and employment, to a degree where it is widely credited with having founded the whole venture capital industry. It is still in operation today in an improved form and will be discussed later in this Report.

In Europe, the longest established - and one of the largest - venture capital companies is Britain's Investors In Industry (3i), founded, as the Industrial and Commercial Finance Corporation, at about the same time as the SBIC scheme in the US.

An overview of the European venture capital industry and some comparisons with the industry in the USA and in Asia, will be found at Appendix I.

Today, there are hundreds of venture capital companies managing billions of ECU of funds, investing in a vast range of enterprises throughout the world. Yet the venture capital sector, important though it is, is still not clearly understood even in the United Kingdom, the biggest in Europe.

We propose to start this Report, therefore, by defining our terms.

2.2 Definitions

2.2.1 Private Equity and Venture Capital

The European Venture Capital Association (EVCA) offers the following distinction between Private Equity and Venture Capital[2]:

Private equity provides equity capital to enterprises not quoted on a stock market. Private equity can be used to develop new products and technologies, to expand working capital, to make acquisitions, or to strengthen a company's balance sheet. It

can also resolve ownership and management issues - a succession in family-owned companies, for example, or the buy-out or buy-in of a business by experienced managers may be achieved using private equity funding.

Venture capital is, strictly speaking, a subset of private equity and refers to equity investments made for the launch, early development or expansion of a business. Among different countries, there are variations in what is meant by venture capital and private equity. In Europe, these terms are generally used interchangeably and venture capital thus includes management buy-outs and buy-ins (MBO/MBIs). This is in contrast to the US, where MBO/MBIs are not classified as venture capital.

In this Report, the term **Venture Capital** is used to refer primarily to the early stages of equity investment but, because of the "interchangeability" mentioned above, the statistical analysis which follows in a Appendix I sometimes uses it to mean the whole investment sector. This will be clear from the context.

2.2.2 Investment Stages

The term "venture capital" refers, as we have seen, to risk investment in unquoted companies and several financing stages can be identified in relation to the stages of development of a venture-backed company.

Table 1: Investment Stages

Seed:	Financing provided to research, assess and develop an initial concept before a business has reached the start-up phase
Start-up:	Finance provided to companies for product development and initial marketing. Companies may be in the process of being set up or may have been in business for a short time, but have not sold their products commercially
Other Early Stage:	Finance to companies that have completed the product development stage and require further funds to initiate commercial manufacturing and sales. They will not yet be generating a profit
Expansion:	Finance provided for the growth and expansion of a company which is breaking even or trading profitably. Capital may be used to finance increased production capacity, market or product development and/or to provide additional working capital
Bridge finance:	Financing made available to a company in the period of transition from being privately owned to being publicly quoted
Management Buy-Out:	Financing provided to enable current operating management and investors to acquire an existing product line or business
Management Buy-In:	Financing provided to enable a manager or group of managers from outside the company to buy-in to the company with the support of venture capital investors
Turnaround:	Financing made available to existing businesses which have experienced trading difficulties, with a view to re-establishing prosperity
Replacement Capital (secondary purchase):	Purchase of existing shares in a company from another venture capital investment organisation or from another shareholder or shareholders
Purchase of quoted shares:	Purchase of shares on a public stock market

EVCA Yearbook 1997

This Report is concerned solely with the first three categories in this Table.

2.2.3 Venture Capitalists

The venture capital industry is made up essentially of "formal" and "informal" investors. By "formal," we refer to conventional funds provided by corporate and financial institutions and managed by **professional venture managers**. "Informal" investors, on the other hand, are individuals or groups of individuals, often known as **Business Angels**. Although on average business angels invest relatively small sums the total amount available from these sources is estimated to be very large and the informal sector is therefore very important in the context of this report. (In the United States, where the Business Angel phenomenon is well developed, most investment in new technology-based firms comes from this source.) Note that the term "informal" does not imply that these people are anything less than professional in their approach to investment. However, because they do not, as a rule, have shareholders or an investment committee to answer to, they can often make decisions much more quickly than "formal" venture funds do.

A relatively under-developed but potentially important segment of the formal venture capital industry is that of **corporate venturing**, very large in the United States but comparatively unknown in Europe. A number of major companies in the US, such as Intel, provide finance for start-ups with new technology, often in collaboration with more conventional venture capital management companies. For example, Hambrecht & Quist has corporate venture capital partnerships with Adobe Systems and Texas Instruments. In the UK, Rothschild Asset Management in partnership with Johnson & Johnson Development Corporation has set up Healthcare Ventures to fund the earliest, high-risk, stages of drug development. In France, Innovacom, the venture capital subsidiary of France Telecom has recently launched a new, ECU 38 million fund directed at IT start-ups. A third of Innovacom's business is outside France and the company has an important partnership with Deutsche Telekom's venture business, T-Venture. But these are relatively rare examples of European corporate venturing.

The benefit to the corporate sector is, of course, to open a "window" on new developments, but corporate venturing can work in the opposite direction to encourage spin-outs from larger manufacturers. In America, companies such as 3M and Control Data were at the forefront of this activity; in Europe, British Telecom, Deutsche Telekom, France Telecom and Siemens, among a number of others, have all engaged in this activity. Much of this has been driven by downsizing and a need to find jobs for redundant workers, but the process is often used by companies to "spin off" non-core activities[e].

2.2.4 The Target Companies

This report is targeted to the study of the problems of capital investment **for Small and Medium-Sized Enterprises (SMEs)** and in particular, **to New Technology-Based Firms (NTBFs)**. SMEs are defined as companies having fewer than 250 employees, ie, some 99.8% of all companies in the EU are SMEs and of those, 91% have fewer than 20 employees[3].

[e] In the UK, an example is Renishaw, which came out of Rolls Royce some years ago and has prospered with the development and manufacture of high-tech measuring instruments and sensors.

In this sector, it is the NTBFs, at the seed, start-up or early-stage phase of development which have the greatest potential for growth and at the same time, the most difficulty in raising capital.

It is to the problems of these companies that this report is directed.

3. THE Euro-CASE PROJECT

The chosen method of conducting this enquiry was to set up a series of five "workshops" in different European countries to examine different aspects of the financing of innovative companies by venture capital investment. Participation in these workshops was by invitation only and limited to about 25 people at each event.

Those invited included representatives of industry (including entrepreneurs), finance, academia, government and, of course, the venture capital industry itself. Between four and six participants were invited to make a short presentation of the subject under discussion, but the majority of the time available was dedicated to in-depth discussion of the subjects.

The five workshops and their associated themes were:

1.	Zürich	Risk Management and the Venture Capital Industry
2.	Amsterdam	What Kind of Venture Capital do we Need?
3.	Düsseldorf	Environmental Conditions to Favour Venture Capital
4.	Milan	Entrepreneurship and the Role of Universities and Research Institutes
5.	London	Overcoming the Starvation of Innovation

These workshops are briefly summarised in Appendix II; the full reports on each Workshop are available on request.

In addition to the workshops, considerable assistance was received from other organisations such as the European Venture Capital Association, which provided much of the statistical data on the industry; The Price Waterhouse Coopers website which carries information on the US venture capital sector; the Asian Venture Capital Journal and Asia Pacific Communications for venture capital in south-east Asia, as well as personal contact with specialists whose input is acknowledged in the appropriate places within the text. The European Commission was an important source of information, especially on its own initiatives in the field.

From all of this, it became possible to create a picture of the venture capital industry in Europe as it is experienced by companies seeking investment as well as those providing it.

Euro-CASE found many problems relating both to the nature of financial institutions and to the characteristics of entrepreneurs and, while it is not claimed that they are

newly discovered[f], the Euro-CASE approach has enabled a re-appraisal of those problems. In the light of this, a number of practical solutions to the problems are proposed.

4. CONCLUSIONS

That there are problems in financing innovative companies is not in question and the Euro-CASE project has shown that these consist on the one hand of the difficulties in persuading investors to pay attention to NTBFs; and on the other, to the need to assist entrepreneurs and the NTBFs themselves to survive in the difficult early years.

In this section we consider the fundamental problems in attracting investment to the sector; at general and specific measures to improve the situation and at the needs of entrepreneurs themselves.

4.1 The fundamental problem in equity financing for innovative firms

4.1.1 Venture Capital

Venture capital funds are, first and foremost, for-profit entities whose shareholders, the investors in the fund, expect to see a positive return on their investment. Their interests lie, therefore, in developing a portfolio of investments in companies which have potential for growth with minimum risk of failure. It follows that the first objective of any venture fund is to create wealth.

Public sector authorities, on the other hand, look to national or regional development by job creation and tax revenues from new companies. The interest of these authorities in the activities of the Venture Capital sector arises directly from the fact that the creation of wealth by investment in growing companies generates employment opportunities and thus contributes to the economic development of the region or state.

The European Commission recognised this in a recent paper on Risk Capital[4] in which it is acknowledged that "Developing risk capital in the European Union, leading towards the development of pan-European risk-capital markets is essential for major job creation in the EU."

This has been very clearly demonstrated in the United States, where jobs created by NTBFs and financed by venture capital have in recent years greatly outnumbered jobs lost by redundancies in large firms.

But although investment in growing companies offers great potential returns, it is also, undeniably, the most risky segment of the whole process of investment in new unquoted companies and unfortunately, technology-based firms are perceived as the most risky of all[g], and the most expensive[5].

[f] The problems of financing technology-based businesses have been well documented, not least in the BEST report recently published by the European Commission

A recent study for the European Commission on the returns achieved in the European venture capital industry illustrates this point[6].

Table 2: Average Internal Rate of Return[h] by stage

	SAMPLE SIZE	AVERAGE IRR	UPPER QUARTILE
Early Stage	19	2.6%	12.9%
Development	19	3.8%	15.7%
MBO	27	19.4%	33.8%
Generalist	27	6.1%	13.1%

Source: Graham Bannock & Partners Ltd

The Table shows the IRR, averaged over the funds' portfolios of investments, for venture capital groups concentrating on specific stages of investment. Funds focused on early-stage investment in technology-based firms achieved very low returns, compared, for example, with those of MBO specialists. MBOs, which typically have the shortest investment cycles, perform best, while early-stage investments, which require significantly longer to build returns, show poorly. Generalist funds (ie, those with no specific sectoral focus) also managed to achieve only fairly poor results.

(Note that this was the first study of its type and as such, the methodology was not fully developed. However, it does show the relative viability of the different stages and future studies on larger samples should improve the accuracy.)

However, the situation is substantially improved at all stages when the upper quarter only is considered. It follows from this that it is possible to achieve good results from seed, start-up and other early-stage investments if care is taken to evaluate the opportunity and to minimise the risks. As an example, we can cite a Cambridge (UK) fund[i] specialising in early-stage, technology-based investments, which attained an overall IRR in its second fund of about 43% over seven years.

Venture capital investment is about risk management and about the opportunity cost of money. These two factors are inextricably linked; a venture fund manager will weigh up the advantages and disadvantages offered by the Business Plan in front of him/her and will compare it with other opportunities available. The investment decision will be based on the probability of making the required minimum return on the investment and the actual cost of the investment relative to its size.

Inevitably, this means that most venture capital funds will choose what they perceive to be the lower risk, less costly opportunities and this is the fundamental problem in the equity financing of NTBFs.

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[g] This is the *perception*, but there is evidence in Europe that NTBFs have a better survival rate than other manufacturing companies. It is still a difficult sector, however.

[h] The ***Internal Rate of Return (IRR)*** is the discount rate at which the present value of the future cash flows of an investment equals the cost of the investment. It is found by a process of trial and error; when the net present values of cash outflows (the cost of the investment) and cash inflows (returns on the investment) equal zero, the rate of discount being used is the IRR. When IRR is greater than the required return, called the "hurdle" rate, in capital budgeting the investment is acceptable. The IRR is the most usual measure of the success of a venture capital investment.

[i] Prelude Technology Investments

CONCLUSION 1: There is a great need to encourage venture capitalists to increase their investments in NTBFs

The European Commission's I-TEC scheme, mentioned elsewhere in this report and described in Appendix V, provides for a contribution from the European Investment Fund (EIF) to the capital of a venture capital fund, to be used for investments in NTBFs. This not only encourages the participating funds to make this kind of investment; it increases their credibility in the market-place and helps to attract good-quality deals.

Another approach, which has proved extremely successful in the United States, is to match private sector investment cash with government-backed soft loans. The Small Business Investment Company (SBIC) programme has been in place since 1958 – though much changed in 1992 – and has been described as the "godfather" of the venture capital industry. It is described in Appendix V.

In Germany, the BTU programme *(Beteiligungsfonds für kleine Technologie-unternehmen)*, also a matching scheme and described in the same Appendix, is one of the most generous in Europe and must have played a part in the growth of the early-stage investment sector in that country in the last two years or so.

Both of these are schemes designed to enhance the return on the investment to the investors and have been successful in so doing. Euro-CASE suggests that these programmes should be examined to see if they could be adapted to a pan-European environment.

Other support schemes initiated by the European Commission include:

- **European Technology Facility** (ETF), created by the European Investment Bank (EIB) and the European Investment Fund (EIF), providing venture capital for technology-oriented SMEs, using established venture capital funds as intermediaries;
- the **ETF Start-Up**, a risk capital extension of the European Technology Facility (ETF) managed by the EIF;
- the **Joint European Venture** (JEV) supporting transnational joint ventures within the EU between SMEs;
- **SME Guarantee Facility**, designed to leverage the capacity of guarantee schemes operating in the EU both in underwriting investment losses and loans from financial institutions.
- **CREA**, a new Seed Capital pilot action designed to help strengthen the European seed capital industry and train fund managers through an exchange of experiences. A network of such funds will be set up.

An interesting initiative has recently been put in place in France:

The 1998 law of Finance for France provides that life insurance contracts which include a 50% investment in equities, at least 5% being in unlisted shares, will be exempt from tax if the investments are held for 8 years. This is a deliberate attempt to

achieve a fundamental change in investor behaviour, at the same time raising additional funds for investment[7].

Although only a small share of the funds raised will be turned into venture capital for high technology, the amount of money available will be significant as the sums involved are large. These life insurance contracts will provide a powerful risk-pooling tool.

Another measure complementary to the above life insurance contracts is the deferral of taxes on capital gains reinvested in start-ups.

This is a new approach to the raising of funds for venture capital and Euro-CASE would urge that such schemes be used to help direct investment to innovative, technology-based SMEs where the capacity for growth, and hence for job creation, is greatest.

4.1.2 Business Angels

In the informal sector of venture capital, individuals, or groups of individuals, invest with the same intention of making a return on their capital, but their motivations may have a somewhat different focus. Business Angels are almost exclusively male, between 40 and 60 years old and with business backgrounds[8]. The majority are themselves entrepreneurs, having started, developed and usually sold one or more businesses; others include business professionals and retired executives of large companies. Their investments are usually quite small, between 75,000 and 150,000 ECUs, but by syndicating with others the amounts raised from them for firms can be substantial. While they do not wish to lose money on their investments, profit is not the only motive; social benefit (helping people) and "having fun" score quite highly.

Most Business Angels operate in a "hands on" fashion and therefore tend to invest close to home, but a significant proportion are willing to invest further afield, even across borders if the conditions are right. There is some evidence that this trend could grow given a harmonised and transparent EU market.

It is hard to estimate just how great the pool of money available for investment from Business Angels is. By definition they are individuals or, at best, small groups of individuals, and are not very "visible" to entrepreneurs. In the US the informal sector is the largest "single" source of equity finance for SMEs and the number of active business angels is much greater than in Europe. It is common practice for ordinary citizens to invest in small, neighbouring companies. It has been estimated that the amount from informal sources may be as much as five times that of the institutional venture capital sector. In the UK, Mason and Harrison have estimated that the total available from "active" Business Angels probably lies between £4 billion and £8 billion. There are probably some 18,000 active and potential Business Angels investing annually about £500 million in 3,500 businesses[9]. How much of this actually goes to the NTBF segment is unclear.

An examination of the American business angel scene to ascertain the key influences which give rise to this major difference in size would be valuable.

Little research has been done in other countries but, at least in the more industrialised areas, it is likely that the figures are of much the same order relative to the size of the country.

But "active" Business Angels form a relatively small proportion of all potential informal investors. "Virgin" angels, that is, individuals of high net worth who have not yet made any venture investments, may control as much as ten times the amounts invested by active angels.

It is clear that the informal sector, probably throughout the European Union, is potentially a major factor in the financing of small businesses – particularly in the engineering sector.

CONCLUSION 2: Informal investors (Business Angels) are a valuable source of venture capital. Incentives are needed to persuade them to invest in NTBFs and at the same time there is a need to introduce measures to improve access to them by entrepreneurs.

Investors, formal and informal, are, as we have seen, reluctant to invest in high-risk companies (or, it should be said, in companies where the risks are perceived to be high – not necessarily the same thing!), but it has been shown that there are means by which the environment for such investment can be improved. Because of the important part that growth-oriented firms can play in regional and national development, many countries have introduced schemes to encourage investors.

a. Fiscal and related measures to encourage investment

Income tax and capital gains relief have been shown to be very popular in encourage investment in innovative companies and the companies themselves can benefit from loan guarantee schemes designed to encourage the banking system to make loans to small business. The EVCA Special Paper cited above[10] describes many of these.

So far as we are aware, no comprehensive survey of all these schemes and their efficacy has been published.

Taking a few examples:

- In France, shareholders in a FCPI (Innovation Investment Fund) are entitled, subject to a number of restrictions, to a tax reduction equal to 25% of their investment;

- In Britain, tax relief at 20% is available on qualifying investments under the Enterprise Investment Scheme (EIS) and capital gains on such investments are exempt from tax;

- Tax relief for investments in companies in designated regions is available in a

number of countries;

There are wider issues concerning the taxation and legal systems, which affect both venture capital funds and the informal sector.

b. Harmonisation of tax and legal systems

Although the single European market has been a reality for several years, there is no consistency among the fiscal or legal systems of the countries of the Union.

The effect of this is to make small venture funds and business angels, ie, those most likely to be concerned with the early-stage, unwilling to invest beyond national boundaries. Many larger funds have overcome the problem by opening offices in other countries but this is not an option open to others.

New companies, and perhaps particularly those engaged in any form of engineering or technology, cannot in these times find a sufficient market locally for their products; their business is of a truly global nature. Many specialised venture funds, on the other hand, should be able to invest in their preferred industrial sectors wherever they find them but are deterred from so doing by the lack of transparency in company structures, laws and taxes of the domicile of their target investments.

An additional problem is different accounting systems across Europe. While it is not particularly difficult to interpret accounts in different formats, it is an extra time-consuming requirement.

This lack of a true single market has also limited the opportunities that SMEs might otherwise have of raising money on the stock exchange. Until the advent of EASDAQ (European Association of Securities Dealers Automated Quotation system), there was no pan-European exchange available to smaller companies with short track records. This same lack also limits the options for realising their investments that are open to the venture funds.

None of these schemes operates on a pan-European basis; all are strictly national and some are available only to investors and investees both resident in the country concerned.

This creates issues of market distortion by attracting companies to specific regions and by disadvantaging investors who might be unaware of local conditions. This is particularly important when dealing with NTBFs because these are very much the kind of firm which can benefit most from cross-border investment and enhanced access to wider markets.

CONCLUSION 3: **It would be desirable to clarify the situation within the Union, identifying those schemes which appear to be the most successful in encouraging SMEs and investors, and examining the possibility of harmonising them nationally and extending them beyond their national borders.**

In addition to this there is the important fact that Business Angels are individuals who by their very nature are disinclined to advertise their existence. This raises the important question: How do entrepreneurs and others get access to them? The answer appears to lie in the growth of networks, or introductory services, bringing together such investors in a fashion which allows them to retain their anonymity if they so wish. There are benefits to the Angels, who get improved access to the potential deal flow, as well as to the entrepreneurs who widen their potential sources of finance.

Such networks exist in some countries (UK, Scandinavia, for example) and are developing elsewhere. In addition, the European Commission (Enterprise Policy Directorate, DG XXIII) commissioned a study[11] in 1997 of Business Angels networks in the EU which concluded that the formation of networks should be encouraged in all countries and a European Business Angels Network has been formed as a "network of networks" to encourage the exchange of information and expertise.

4.1.3 Corporate Venturing

There is very little information available on corporate venturing, that is, minority investment in small, unquoted firms by industrial companies, as a sub-set of the venture capital industry. Indeed, a study carried out in the UK suggested that most NTBFs looked upon corporate venture capital as just a part of the overall funding scene.

As we have seen, a prime motive for corporate investing is the identification of windows on new technologies and this being the case, NTBFs should be targets for companies seeking such windows.

Despite the potential benefits, even in the large venture capital sector in the UK, few major industrial firms have played any part in it. A 1990 report[12] by the Government's Advisory Committee on Science and Technology (ACOST) said that there was "an almost complete absence of corporate venture capital in the UK." The situation has changed little today and is probably much the same in continental Europe, though it is known that a number of firms, such as Siemens (mentioned above) in Germany and Thomson-CSF in France do have active venture activities, the latter as an independent subsidiary of the industrial group.

It is interesting to speculate on the role which corporate venturing might play in those parts of Europe where the conventional venture capital sector is less well developed. Many countries of southern Europe, though lacking venture capital, do have major industrial companies, often subsidiaries of non-resident, non-European firms, but little is known of their attitudes to investment in small companies.

In some developing countries of Asia the benefits of spinning out parts of a business have been well demonstrated. American and, to a lesser extent European, firms have long encouraged their local employees to set up their own companies, initially as sub-contractors with guaranteed levels of business; subsequently extending their operations to other customers. This "good neighbour" programme has had significant benefits to local economies, not least in the training of a skilled workforce.

It is clear from the US experience that corporate venturing has an important role to play particularly in supporting NTBFs with new technology as well as in encouraging spin-outs of non-core activities.

CONCLUSION 4: The development of corporate venture capital throughout Europe is of potential interest specifically to NTBFs and should be encouraged.

The corporate venture segment of the venture capital industry is important and measures should be introduced to encourage investment in NTBFs.

4.2 Evaluating the Opportunity

There are risks inherent in any investment and the *perceived* risks of investment in start-up engineering or technology-based companies are manifold. The following table itemises the risks seen from the investors' point of view and the fundamental problem is how to manage these risks in such a way that the investment proves successful and the desired profits are returned to the fund in due course.

Table 3: Sources of Venture Capitalists' Risk in an NTBF Investment

Source of Risk	Internal (I) or External (E) Risk	Characteristics of Risk:
Management Risk	I	the entrepreneur and management team possess insufficient skills to grow the company effectively and profitably
Market Risk	E	the product/service introduced by the firm is insufficiently attractive to the market place to generate the necessary sales revenues, the target market is too small, or competitors react vigorously eroding away potential sales and profits
Technology Risk	E	the proposed novel technology or its application proves unsuccessful by either not working or producing insufficient benefits to potential users
Pricing Risk	I/E	the investor over-estimates the terminal value of the enterprise and, thus, underprices the contribution of equity provided
Finance Risk	I/E	the enterprise does not generate the scale of revenues or profits to meet the investment return targets of the investors and/or cover debt interest
Liquidity/Exit Risk	E	the investors are unable either to find a buyer for the company or to undertake a market flotation at a termination price which will return a sufficient capital gain to meet the investment targets of the investors

Source: Dr Gordon Murray, Warwick Business School

Management of the risks involves understanding what the risks are and how they can be minimised. The process of doing this is known as carrying out "**due diligence**," a phrase drawn from legal circles to signify that the investor has used his/her best efforts to ascertain that the facts in the Business Plan are substantially as stated.

Analysing the opportunity enables the investor to make an informed judgement of the chances of making a successful deal and also to rate those chances against other investment opportunities on his/her desk.

The main cost of the due diligence process in NTBF investment lies in this need to analyse the opportunity by evaluating the technology and engineering expertise of the company and its management in relation to the market and in particular, to the competition, both commercial and technological. Few investors have the in-house capacity to carry out such investigations and they will therefore tend to commission studies from experts.

Of course, the process does not end with the investment itself; a programme of continuing follow-up and "hands-on" advice is needed to keep the risk manageable.

The sizeable costs of these studies discourages investment in NTBFs and it would therefore be desirable to seek ways in which such costs might be reduced.

Due diligence is an expensive process. It appears particularly expensive in smaller investments, where the costs may reach a sizeable percentage of the investment itself. This is one of the major factors which limit the availability of seed and start-up capital.

CONCLUSION 5: a reduction in the cost of the due diligence process, leading to an overall reduction in the cost of the investment and an improvement in the understanding of the risk, would increase the willingness of venture funds and others to invest in NTBFs.

Reference to Table 3 shows that there are six identified sources of risk and it is by understanding these risks and eliminating as far as possible elements of uncertainty that the prospects of making a successful investment are improved. This in turn should lead to a greater availability of capital for investment in this sector.

We therefore believe that the importance of the NTBF as a promoter of national and regional development merits intervention by the public sector as well as the financial institutions to reduce the costs of investment to acceptable levels.

Several possibilities exist:

4.2.1 Subsidies

This approach has been used in a number of countries by the public. In the UK, a scheme, operated by the Dept of Trade & Industry, covered up to 50% of the costs of the work, provided it was carried out by certain accredited consultancies. Similar schemes have been used in other countries. The British scheme applied to the SME, rather than the potential investor directly.

Euro-CASE believes that such schemes have much merit in reducing the early-stage investment costs and in helping to increase the expertise of the consulting bodies accredited to carry out the work. But for them to have any significant effect, the cost to the public sector is likely to be high and the whole process remains an *ad hoc* approach which does little to establish any form of "best practice."

4.2.2 Technology Rating

In recent years there has been growing interest in the formalising of the procedure for evaluating a company's engineering or technological assets. Technology Rating, as the process has come to be known, uses a standard procedure to create an assessment of the technology recognisable by, and acceptable to, potential investors, financial institutions and others interested. The process is somewhat analogous to the ratings carried out by banks and others on the financial aspects of firms.

To have any real value as a measure of a company's expertise, any such process should not be limited to the engineering alone; it must include most, perhaps all of the assessments which concern the investors.

Ideally, Technology Rating should result in an unbiased, independent standard evaluation available for use by non-specialist investors and others interested in the technical performance of the company. To do this, the process would need to be developed by a body representing the engineering industry as a whole and applied by consultancies trained and licensed to use it.

A survey carried out on a small sample of investors in 1997 by Mason and Harrison[13] suggested that a technology rating service would be welcomed by smaller investment funds and by individuals (business angels) who would be prepared to pay part of the cost; larger organisations were in general less interested because they have in-house expertise or established procedures.

Two groups known to be studying the concept; ANVAR in France and a consortium of, ING Bank in the Netherlands, the National Westminster Bank in the UK and the Deutsche Bank, together with a number of other organisations.

The two groups take somewhat different approaches but each is attempting to formalise the due diligence in ways that could be understood by potential investors

Euro-CASE recognises that the acceptability of technology rating needs to be established but believes that a properly-developed technology rating system could provide benchmarks for the performance of a company more comprehensive than the finance-based systems currently in use. It should be possible to provide full due diligence studies at a lower cost than is presently the case by virtue of the standardised format, although public subsidy might still be needed to assure proper take-up of the service that would be offered.

4.3 Cultural factors concerning entrepreneurs and entrepreneurship

Several cultural factors inhibiting the provision of capital to small firms were noted.

Perhaps the most pressing of these concerned attitudes to entrepreneurship and to entrepreneurs. It appears to be a pan-European problem that entrepreneurs are not well thought of; the term is often used in a pejorative sense to denote one whose only interest is in making money, by whatever means are available. This is in stark contrast to the American situation, where entrepreneurs are valued and where their contribution to society is recognised. Bill Gates is vilified in Europe but is a hero to the Americans.

Arising directly from this, there is the difference between European and American attitudes to failure. Whereas failure in the US is generally considered to be part of the learning experience, in Europe it is often seen in a negative light and venture funds are reluctant to invest in an entrepreneur with a failure in his track record. In sum, we have two problems:

- Attitudes to making money
- Attitudes to failure

Negative attitudes towards entrepreneurs must surely inhibit potential entrepreneurs from taking the step into building their own businesses and perhaps contributing to the unwillingness of investors to consider the potential of innovative companies.

CONCLUSION 6: Since these perceptions appear to be widespread, action should be taken to counteract them as a matter of urgency and to use all possible means to turn them to positive and encouraging images.

There is clearly, therefore, a need to raise the confidence of the would-be entrepreneur and to educate the public on the role of the entrepreneur in business and society.

Successful American entrepreneurs are widely admired for their ability to make a profit and this undoubtedly affects the willingness of individuals to take the chances offered by self-employment or starting-up companies; In similar vein is the American attitude to failure, seen rather as experience and not stigma as is all too often the case in Europe – even in the UK, which is in many other ways the closest in spirit to the US.

Euro-CASE believes that this goes a long way towards explaining why the US venture capital industry is so much more willing to invest in the technology sector and why the industry is so much larger than it is in Europe.

It is essential to change this attitude if we are to see the same growth of the technology sector in Europe and there are several approaches which could be taken:

- Educate the Public

The use of role models and case histories to raise the status of entrepreneurs and the development of prize schemes, such as the European Information Technology Prize,

to raise awareness of entrepreneurs and again, to raise the confidence of the entrepreneurs themselves.

- Provide high-quality support for entrepreneurs during the early stages of their endeavours;

- Provide incentives for managers to join NTBFs;

- Creation of entrepreneur networks to raise the confidence of entrepreneurs and allow exchange of experiences;

A start has already been made on many of these activities. EFER, the European Foundation of Entrepreneurial Research, based in Brussels, has produced with the support of the European Commission and others, a listing of Europe's top entrepreneurs[14] selected from the fasted-growing, job-creating companies between 1991 and 1996. This will be complemented in 1998 by a publication on Success Stories. Additionally, EFER has promoted the creation of an Association for Dynamic Entrepreneurs to facilitate the exchange of experience between successful young businesses[j].

The European Information Technology Prize, organised by Euro-CASE and involving a technology assessment exercise, attracts hundreds of innovative new companies each year and it seems appropriate to consider other competitions of this type, perhaps including a European Entrepreneur of the Year event.

But these initiatives, valuable though they are, are not especially well-known to the public at large and Euro-CASE believes that steps taken to raise the public awareness of them would help substantially to improve the image of entrepreneurs.

A recurring theme in the course of the Euro-CASE workshops was the difficulty, in Europe, of attracting suitably qualified management to NTBFs. Throughout Europe, employment practices encourage management to remain with their companies for long periods – even whole careers. This is especially true of those working in large, established companies. There seems to be a reluctance to leave for a smaller, less reliable company, even in these days of "down-sizing" of large firms.

Euro-CASE believes there is a need to create incentives for people to join new companies. One of the most promising of such incentives is the offering of share options; these are already in place in some countries but in others there is no such provision or there may be disincentives in the fiscal system. Share options are also valuable tools for attracting retired but experienced managers to join NTBFs at minimum immediate costs to the firm.

[j] Compare the formation in the USA of the American Entrepreneurs for Economic Growth (AEEG), which now brings together 10,000 emerging growth companies averaging 153 jobs per company. It serves as a united voice for entrepreneurs on public policy issues, strengthening support through education about the critical role emerging growth companies play in the US economy.

It goes without saying that these incentives should be extended to include key non-managerial staff who might otherwise be reluctant to leave relatively secure employment for the more "exciting" life of a new company!

Governments should consider special tax arrangements for companies, and perhaps the managers themselves, employed in innovative firms, to offset the smaller salaries and lower security of employment often seen by staff of newly-established firms.

New companies, of course, need not only money but customers and contracts for their products and this is not always easy, since potential buyers may be understandably reluctant to place orders with a firm without a track record. There have been attempts to address this problem; the European Commission developed a scheme, Technology Performance Financing (TPF) designed to encourage banks to act as intermediaries in financing customers for new firms. TPF provided a safety net to limit the banks' exposure in case the technology failed to perform. However, the scheme was unpopular with the financial intermediaries and was withdrawn.

A different approach has been taken in the United States. **The Small Business Innovative Research** (SBIR) programme requires federal agencies with more than $100 million in R&D funds to set aside a proportion of those funds for competitive small business grants. It was estimated that in 1997 this would result in a pool of some $1 billion available to NTBFs. The scheme, originally introduced in 1977 by the National Science Foundation, has been very successful and a point of special interest is that it has encouraged larger companies to form partnerships with the smaller ones in order to reap some benefit from the SBIR grant.

CONCLUSION 7: Public sector support for NTBFs can greatly enhance the credibility of the small company and thus assist its marketing efforts.

There are also cultural differences within Europe. Venture capital, in the sense we are using it in this Report, is largely confined to central and northern Europe. In the South it is almost non-existent, although there are signs that the sector may be growing slowly, as in Italy, for example. Elsewhere in this report we have commented on the influence that an increase in corporate venturing might have on this situation.

A harmonised environment for venture capital throughout the Union would certainly help, while a key factor here may be the need for training would-be entrepreneurs. This is undoubtedly linked to the perception of entrepreneurs as amateur business men and the perception is generally fed by the often poor quality of business planning that is seen by potential investors[k].

This in turn points to an insufficient understanding of the mechanics of running a business, something which might be corrected by providing some training for those starting businesses, possibly linked to the provision of capital investment or grants.

[k] It should be noted that most entrepreneurs come from industry, not universities or research institutes. According to studies conducted in the UK a few years ago, two-thirds of NTBFs located in science parks were founded by entrepreneurs from industry, while 80% of those not located in parks came from industry. The situation today is not very different, but it should be borne in mind that in many cases, the entrepreneurs may have originally studied in the university/research sector but then moved into industry before launching their own businesses.

CONCLUSION 8: Entrepreneurs are generally not well trained in management and this makes venture funds reluctant to invest in such start-ups. The problem is exacerbated by the difficulties many entrepreneurs have in writing good business plans.

One way to improve the situation is to let experienced (often retired) engineers and entrepreneurs act as mentors or advisers to young high-tech entrepreneurs. This is an activity which has been initiated in by Academies of Engineering and other professional societies in many parts of Europe, following the model widely used in the UK.

The question of training managers in business studies at any level is a wider one than simply training entrepreneurs to become managers. This is important because, according to Professor David Storey[l], Director of the Centre for Small and Medium Sized Enterprises at Warwick University Business School (UK), there is no reliable evidence that links training to any enhancement of the subsequent performance of new company.

However, this is not the whole story and the subject needs to be considered in two parts, with overlaps.

a. Courses in entrepreneurship

In the first instance, there is the general subject of formal courses in Entrepreneurship, offered by universities and polytechnics, either as stand-alone subjects or as part of an engineering curriculum. Although such courses are offered by several universities (including some which have established Chairs of Entrepreneurship), good quality research has not shown that companies run by alumni of such courses perform any better than other firms.

This does not mean that such programmes have no value. Euro-CASE believes that universities have, in fact, an important part to play by providing serious management studies, albeit not necessarily to full business-school standard, for all engineering students; this would help to ensure that those of an entrepreneurial bent would have the necessary intellectual tools to understand the problems of running a company and encourage them to take the first steps into business.

Three examples of recently-established university/SME collaboration:

The **European Consortium of Innovative Universities** (ECIU) brings together ten universities from (mostly) northern Europe with the intention of developing international programmes affecting curricula, research and regional development, including:

- A joint European master's programme in innovative management;
- A joint European doctoral programme;

[l] In a private communication

- Joint research projects that coordinate with the Fifth Framework programme of the EU;
- Joint SME/University schemes for regional development;

- Joint recruitment of non-European students.

Another example of SME/university cooperation on a pan-European scale is **NEICO**, a technology transfer network bringing together German, Italian, French and Spanish institutions.

Most recent of these collaborative programmes is **EXIST – Entrepreneurs from Higher Education Schools**, a pilot scheme in the Karlsruhe region of Germany, supported by the German Ministry for Education, Science, Research and Technology (BMBF) and the Commission's Joint research Centre. Ultimately, over 80 institutions will collaborate to develop initiatives aimed at creating spin-off companies from universities and research institutions. These initiatives will include:

- Training and education in entrepreneurship
- Mentorship schemes
- Support for the development of prototypes and business plans
- Innovation financing

b. Innovation centres and Business incubators

In the second instance, there is the assistance offered by innovation centres and business incubators in the preparation of business plans and the general setting up and running of a new company. This should more properly be called *management assistance* and is of considerable assistance to the newly-active entrepreneur in simply getting started.

At several of the Workshops held during this project, it was pointed out strongly that properly organised, science/technology parks were capable of providing major support to entrepreneurs.

- **Science or Technology Parks**

In recent years, science parks or technology parks have proliferated throughout Europe. Originally intended to facilitate contact between R&D-oriented companies and university staff – and in some cases to accommodate companies set up by members of the university – many have no formal connections with any institution and are, in practice, little more than property developments.

Estimating just how many there are is complicated by differences in definition between countries but there are certainly more than 300. The UK has the longest established science parks (Heriot Watt and Cambridge). Employment in French science parks is more than double that of all other European science parks combined[15].

An example of particular interest was that of Aachen where the Innovation and Technology Transfer Corporation (AGIT) an arm of the regional economic development agency, set up a Technology Centre, one of 60 such centres in Germany.

Each year, AGIT provides assistance to about 16 young entrepreneurs over an intensive six-month period, during which the student entrepreneur is offered comprehensive training through seminars, support groups, personal coaching, financial partners and almost all other matters relating to the setting up and running of a company. Particular attention is given to the preparation of a comprehensive Business Plan, including financial forecasts.

AGIT claims that they expect about 15 of their annual 16 protégés to move on to start their enterprise.

The Aachen Technology Centre is financed largely by the public sector but some science and technology parks are co-financed with industry. Zürich's park, for example, is partly financed by the Sulzer group and some if the Israeli incubators mentioned below are financed in the same way.

In the UK, an initiative based around the Cambridge Science Park and involving the University, a venture fund and others, under the name of The Cambridge Network, has fairly recently started. This will include a "school" of entrepreneurship.

• Business Incubators

While Technology Centres and Science Parks are beginning to carry out this function on behalf of new companies, this is also the function of more specialised organisations called business incubators, which are set up to provide accommodation and services, including counselling, on a shared basis for NTBFs. Examples include Servitec (Servizi per l'innovazione tecnologica) in Bergamo, St John's Innovation Centre in Cambridge and several operated by members of the European Commission's Business & Innovation Centre Network. Finland has been particularly active in this field and we have included a paper on their experiences in Appendix VI.

A particularly interesting and highly successful model is the Technological Incubators Programme of Israel. This government-sponsored programme is not a job-creation enterprise; it stresses entrepreneurship only. However, it has emerged as one of the most efficient and productive job creators countrywide. It offers participating entrepreneurs a promising future and a real chance of continuing[m]. Increasingly, this programme is encouraging industrial cooperation in managing the incubators with companies such as Dow Chemical.

This provides a model worthy of consideration. Israel has concentrated on the high-tech sector, recognising that it constitutes a major element of the economy. The Israeli

[m] There is considerable evidence from the US that as Science or Technology Parks grow, their very size attracts venture capital. Silicon Valley has probably thousands of high-tech companies, small and large, and hundreds of venture funds are located in the Valley. Similarly, the concentration of high-tech in the Boston area has attracted large numbers of venture capitalists. No European science park has achieved the critical mass necessary to create this effect; Cambridge and perhaps Munich may be closest.

government has consistently supported the industry with direct financial help, fiscal mechanisms for the promotion of the private sector venture capital business and government structures such as the Technological Incubator mentioned above.

Within the past few years, this activity has led to:

- The creation of 2500 high-tech start-ups and the associated growth in employment;
- 80 venture funds managing US$3 billion dedicated exclusively to high-tech investment;
- More companies on NASDAQ (nearly 100) than any other country outside of North America.

It has also attracted a massive presence of American investment banks specialising in high-tech investment and thus greatly increasing the amount of money available for investment in new technology.

Because of the growing use of business incubators, whether or not associated with science and technology parks, it is becoming important that they should provide services to the highest standards and that they should be staffed by people who have some experience of starting companies, not bureaucrats. In the UK there has recently been established the **UK Business Incubation Centre**, set up with strong Government support to develop best practice among incubator initiatives and to encourage cooperation between existing and new organisations. A brief note on this will be found at Appendix VI.

- **Business Plan**

Potential investors, be they banks, venture funds or individuals, almost always require a business plan before they will consider an investment. While they recognise that a new company with a new product or technology cannot be expected to produce a comprehensive and accurate prospectus, the typical plan serves to show to the investors the potential of the company to achieve results which will allow those investors to make a satisfactory return on their investment. It should also show that the founding entrepreneurs have thought the project through carefully and considered all the problems.

Unfortunately, few entrepreneurs produce good plans without assistance and it is here that the services offered by technology parks and incubators can be of value.

Science parks and incubation centres can specifically help with the business planning process, as we have seen with the AGIT case. The decision whether or not to consider an investment is almost always based on reading the company's business plan. A well-produced plan can assist with the due diligence process by providing clear and accurate information, enabling the reader to access the data needed with a minimum of difficulty.

CONCLUSION 9: The role of science parks and incubators in assisting the business planning process is important and a common standard of best practice would help to overcome doubts about entrepreneurs and entrepreneurship.

The Business Plan is one of the most important features in the development of the start-up. It should serve two functions:

- It should assist the founding team of managers to clarify their thinking about the development of their company and its products;
- It should act in a sense, as a guide to potential investors.

In at least two countries of the Union, Germany and Ireland, business plan competitions are organised, with prizes for the best in various categories. Prizewinners often achieve funding, at least in part because of the exposure they receive.

Euro-CASE has experience of running similar competitions and can confirm that they play an important role in improving standards.

4.4 Intellectual Property

Because venture capital investment is unsecured, investors like to see assets in the company, other than the management itself. In a NTBF, the main asset may very well be the intellectual property owned by the firm, in the form of patents, know-how, trade marks, design registrations or copyright. Of these, the most valuable, because they grant a monopoly on the invention and accurately describe the technology, are patents.

The patent system, however, is not very well understood and is deemed to be both complex and expensive. Small companies, not appreciating the skill which goes into draft a patent text, are sometimes unwilling to pay for the expert help need from Patent Agents and may well have some difficulty in paying the search and grant fees (although the initial application fee is not high).

While it is true that obtaining international protection is expensive, mainly due to the necessity of having the text translated into the languages of the countries in which it will be granted, this is not, however, the main problem.

Those uncertain of the system are aware that a patent application involves disclosure of the invention and while the grant of the patent confers a monopoly of the use of the invention on the holder, it also opens the possibility of infringement. It is the cost of litigation that is seen as the main deterrent to a patent application.

Because the litigation costs are so high, the patent system favours large companies with deep pockets over small ones with little money.

CONCLUSION 10: The cost of patents, especially the cost of litigation, deters small business from protecting themselves and their technology adequately.

Among the most important assets of any innovative engineering or technology-based firm is its patent portfolio. However, particularly for NTBFs and their potential investors patents present problems because the process of obtaining and retaining them is not well understood (this is a generalisation; there are many exceptions to the rule).

The cost of obtaining a patent is often perceived to be high, but in fact, the cost of the application itself is low enough to be open to everyone. But a patent which applies in one country only is of little value and it is the total cost of filing in all countries of interest which has to be taken into account. Typically, filing a patent in all European countries plus Australia, Canada, USA, Japan and China would cost about ECU 25,000, including translation costs but not including examination costs or the annual maintenance fees which become due after grant. These can be substantial.

However, in practice it is not these filing costs which are the problem (and which can in any case be staggered over a period of up to 30 months), but the cost of litigation in case of infringement which can be crippling. Few small companies can afford these costs and the system is therefore heavily biased in favour of the large companies which can afford to take the risk of infringing the patent.

These problems, and the fact that the grant of a patent requires disclosure of the invention, persuade NTBFs in some cases not to apply for a patent but to rely on secret know-how, or to abandon patents when the expenses grow.

Euro-CASE believes that much could be done to ameliorate this situation and make the patent system more accessible and fairer to all parties. Some of the following suggestions should be considered in respect of the proposed European Community patent:

- **Translations**

The requirement for patent texts to be translated into all languages should be removed or confined to the abstract alone. The language of technology is English and this should be the common language of the patent;

- **Litigation**

The costs of litigation should be limited. This could be accomplished in a number of ways:

- Provide for interim injunctions to control the alleged infringement pending investigation;
- Introduce a new approach to drafting patent texts so that the basis of the invention is more clearly defined: “what is not claimed is disclaimed.”
- Introduce a system of patent guarantees.

- **Fees**

Consideration should be given to the introduction of reduced fees for small companies. This could be accomplished either by a special fee structure or by the re-

introduction of the utility (petty) patent, a less complex format with a shorter life span of, say, seven years.

4.5 Stock Markets

Stock markets affect companies and their investors in two ways:

- They provide a means for raising capital
- They provide an exit route for investors

The conventional, mainstream stock exchanges such a those of London, Paris, Frankfurt and so on are not open to small and new companies and for years, Europe has suffered from the lack of exchanges geared to the needs of the smaller, and particularly, technology-based firms.

In the United States NASDAQ has proved an outstanding success at raising money for such firms and providing an exit route for the investors in due time. Observing this, the European Commission and the European Venture Capital Association backed the creation of EASDAQ, the European Association of Securities Dealers Automated Quotation system, to repeat the success of NASDAQ in Europe (NASDAQ itself has a substantial minority equity holding in EASDAQ).

EASDAQ was launched at the beginning of 1997, but almost simultaneously, a number of other, yet smaller exchanges were created on a national basis. They include, for example: Alternative Investment Market (AIM)(UK); Nouveau Marché (F); Neuer Markt (D) and several others. Some of these have come together in an alliance known as Euro-NM.

While the launching of these markets at about the same time as EASDAQ was launched may have been coincidental, it has created some confusion.

The main stock markets in the major financial centres of Europe continue to fulfil their traditional roles of trading in quoted securities of established companies, but are also beginning to form alliances (cf London-Frankfurt) which may herald the creation of one or two pan-European Stock Exchanges.

EASDAQ is consolidating its position as the pan-European market for smaller companies, while a plethora of smaller markets, AIM, Nouveau Marché etc cater for the smallest companies. These "alternative" markets operate generally on a national scale, but there are signs of alliances (eg Euro-NM) forming among these too.

CONCLUSION 11: The alternative stock markets are important both in the raising of finance and in the providing of exit routes for investors but a degree of confusion exists as to the most appropriate vehicles for particular cases.

Euro-CASE welcomes the developments, which offer new exit routes for investors in smaller companies and reduce the trend towards flotation in the United States.

However, it does seem that the roles of each of these tiers of exchanges needs to be clarified. Euro-CASE would like to see:

- The traditional exchanges catering for the established company;
- EASDAQ providing a vehicle for floating technology companies with limited track records but having reached a certain size (assets at least ECU 3.5 million; capital reserves ECU 2 million, or growth companies with market capitalisation in excess of ECU 50 million);
- The Alternative markets catering for small, new or relatively new companies. Since many of these are also technology-based, it would be an advantage if these national markets were to establish themselves on a pan-European basis

5. RECOMMENDATIONS

It is clear that all engineering and technology sectors welcome the availability of venture capital as a means of financing new technology-based firms and would support measures taken on regional, national and European scales to promote the sector. Euro-CASE stresses the importance of supporting the venture capital sector of the private equity industry in Europe

The size of the venture sector in the United States and its role in financing growth companies leading to increased employment is a measure of the importance of this form of financing. In the period 1989 – 1993, the average annual employment growth rate among venture-capital-backed American companies was more than 25%, while that of the 500 hundred largest companies actually fell by 3%.

Even in Europe, with its less well-developed venture sector, the figures are encouraging: between 1991 and 1995, the employment growth rate of venture-backed firms was 15%, compared to less than 5% at the 500 largest companies[16].

However, as the present study and other have shown, there are problems in ensuring that sufficient funds reach the new technology-based firms which not only offer the greatest potential for employment growth but also:

- Generate tax revenues;
- Invest;
- Increase employee income;
- Generate exports;

and therefore make a large contribution to local, regional and national economic development.

Euro-CASE has considered the needs of both NTBFs themselves and of the venture capital industry and now makes the following recommendations:

RECOMMENDATION 1:

Venture Capital, is a major source of finance for business but is largely "risk-averse." Strong efforts are needed both to encourage increased investment in NTBFs and to increase public awareness of the benefits of this form of finance.

Introduce measures to encourage venture capitalists to invest in NTBFs and to increase public awareness of this form of finance.

RECOMMENDATION 2:

Although taxation remains a matter for national governments, the possibility of achieving greater harmonisation of fiscal incentives to encourage individual investors (Business Angels) to widen the scope – geographically and sectorially – of their investments should be examined and implemented wherever possible. Measures such as these may assist the growth of the venture capital industry in southern Europe.

Introduce greater harmonisation of fiscal and other incentives to encourage investment by Business Angels.

RECOMMENDATION 3:

The investment support programmes, including I-TEC, BTU and SBIC, currently in use in the European Union and elsewhere should be examined and consideration given to introducing a pan-European scheme incorporating the best features of these and other programmes, to encourage both the formal and informal sectors of the venture capital industry to increase their investments in innovative companies.

Improve investment support schemes; examine American and other practices with a view to introducing a pan-European scheme.

RECOMMENDATION 4:

A strong effort should be made to stimulate investment by larger firms in smaller ones. The benefits of such corporate venturing should be widely publicised.

Stimulate corporate venturing; publicise its benefits to large and small companies.

RECOMMENDATION 5:

The cost of making small investments in innovative firms, combined with the greater risks, is a disincentive to such investments. Euro-CASE believes that initiatives such as Technology Rating, which has the potential to formalise the due diligence process and thus reduce the costs of evaluation, are worthy of further research to determine

their acceptability. Associated with the establishment of a Technology Rating service would be a system of subsidies to offset the costs of the rating service.

A Europe-wide Technology Rating service should be established which would, by formalising the due diligence process, help to reduce the costs associated with the process.

RECOMMENDATION 6:

Euro-CASE believes that a concerted effort to improve the image of entrepreneurs and to encourage potential founders of NTBFs should be made. Such efforts should include:

- The dissemination of "success stories" demonstrating the viability of innovative companies;
- The development of networks of entrepreneurs to promote the improved image and to lobby for support measures;
- Develop the concept of an "Entrepreneur of the Year;"
- Use personal taxation and other incentives to encourage experienced managers to join new innovative companies.

Changes in the image of entrepreneurs to reflect their value to society should be fostered by developing and promulgating success stories via the media.

RECOMMENDATION 7:

Governments should ensure that small firms receive an adequate share of public-sector contracts. The American SBIR scheme, referred to above, is an interesting model which needs to be examined for possible application in Europe.

Governments should take measures to ensure that small firms receive an adequate share of public sector contracts.

RECOMMENDATION 8:

Universities should be encouraged to include business management courses in their engineering departments, perhaps allied to the establishment of a Chair of Innovation Management and supported by industry. Contacts between universities and small business, especially NTBFs, need to be strengthened and should include support of the transfer of technologies from the R&D phase to the commercial phase.

Universities should be encouraged to include business management courses in their engineering departments. Contacts between universities and small business, especially NTBFs, need to be strengthened.

RECOMMENDATION 9:

Science/technology parks and business incubators have a role to play in assisting new firms with business, but it is important that they have management teams with experience of starting and running small businesses. There is a need to develop "best practice" in these activities.

Recognise the role of science/technology parks and business incubators in assisting small business.

RECOMMENDATION 10:

The patent system needs to be simplified for small companies and made more accessible to them. In particular, Euro-CASE recommends:

- Reduce costs be removing the need to provide translation into all languages and replacing this by the use of English (the language of technology) and one other language;
- Limit the potential for and costs of litigation by introducing a "what is not claimed is disclaimed" rule by simplifying the text;
- Introduce the possibility of obtaining temporary injunctions against alleged infringement;
- Introduce a "utility" patent for small companies with shorter life and reduced fees.

Improvements in the systems relating to patents and other intellectual property are required to reduce the costs of maintenance and the imbalances caused by litigation costs.

RECOMMENDATION 11:

Euro-CASE welcomed the introduction of the pan-European EASDAQ stock market and encourages its continuing growth. However, EASDAQ is not accessible to the smallest companies and it is believed that a third-tier market, also pan-European or alternatively, a network of national markets including AIM, Nouveau Marché, etc is desirable. The "third tier" system would provide a logical progression for growing companies whose immediate, early-stage needs might well be regional rather than international, but could move to EASDAQ or the senior stock exchanges at the appropriate time.

Encourage the acceptance of "junior" markets such as EASDAQ and other, national, markets

6. THE SPECIFIC ROLE OF Euro-CASE IN ACHIEVING THE RECOMMENDATIONS

Euro-CASE can contribute to achieving the above recommendations in the following ways:

- With the network of the members of its seventeen Academies interested in the development of innovative and successful new technology based firms and their financing , **Euro-CASE uses its influence to help improving institutional and regulatory matters, taxation, human resources and cultural barriers.**

- Euro-CASE takes the opportunity of its activities in the new technologies **to explain the benefits of venture capital/equity participation and promote the role of entrepreneurship in society.**

- Placing itself squarely on the interfaces between science, academia and industry, Euro-CASE induces co-operation with the best scientists, engineers and industrialists in a wide variety of fields. **The unique network of the Euro-CASE Academies is a reliable and efficient tool to link the networks of experts of the Academies and the networks of other experts involved in Euro-CASE's activities, such as Venture Capital.** The above networks enables Euro-CASE to develop on-line contacts with SMEs

- Due to its unique constitution, Euro-CASE has been entrusted since 1995 by the European Commission DG III to organise the European Information Technology Prize (EITP), a competition open to innovative companies in 29 European countries.

One of the results is a database of innovative products and companies and a pool of experts, both from Academia and Industry.

The success of EITP gives an incentive to organise other prizes in various fields of engineering and applied sciences, such as materials, industrial processes, bioengineering and biotechnology…

- To take advantage of all the above activities and strengths, to stimulate innovation and investment, to promote competitiveness, to open new markets and to help to start up new companies, Euro-CASE has embarked in a project named **FIMCASE** which would enable **its unique network to Finance Innovation and enhance the Marketing and the Competitiveness of the products in the field of Applied Sciences and Engineering. FIMCASE would be recognised as the most reliable and efficient tool to link** the networks of experts of the Euro-CASE Academies and the networks of other experts involved in Euro-CASE's activities.

APPENDIX I: Venture Capital in Europe

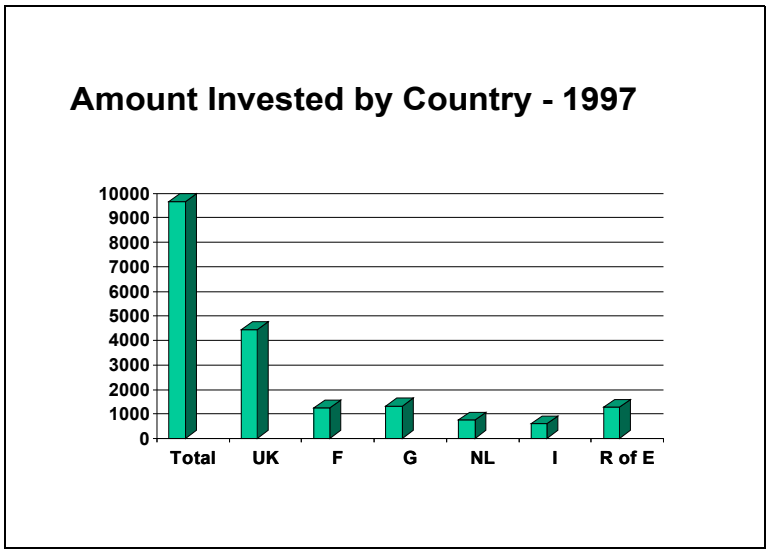
I.1 Overview

For a variety of reasons - fiscal, legal and cultural - the formal European venture capital sector has not developed as a single homogeneous entity and major differences in practice exist between countries. This is reflected in the sizes of the individual national sectors and in the nature of the investments made, both in terms of preferred industrial/commercial sectors and in the stages of development of the investee companies.

The private equity sector is a major player in financing business. The European Venture Capital Association, which represents the interests of the sector throughout Europe, produces annual industry statistics which show that the 1997 portfolio value, measured by the cost of the investment, net of divestments, stood at nearly ECU 33 billion, up from ECU 27 billion in 1996. Of this, 45% is accounted for by the United Kingdom.

The following chart shows the totals of investments made by the leading countries in 1996 which confirms this.

Chart 1: Annual Investment by Country - 1997 (ECU x 1000)



EVCA Yearbook 1998

Out of a total investment during 1997 of 9.6 billion ECU, the UK accounts for almost 4.5 billion ECU, or 46%.

The reasons for this dominance of the market by the UK are probably partly historical, partly cultural. Institutional venture capital started years ago in the fifties with what is now known as Investors In Industry (3i) - then owned by a consortium of banks but now privatised - set up to provide capital for industry and has grown from there.

The Rest of Europe (RoE in the Table) accounts in total for only about as much as Germany or France

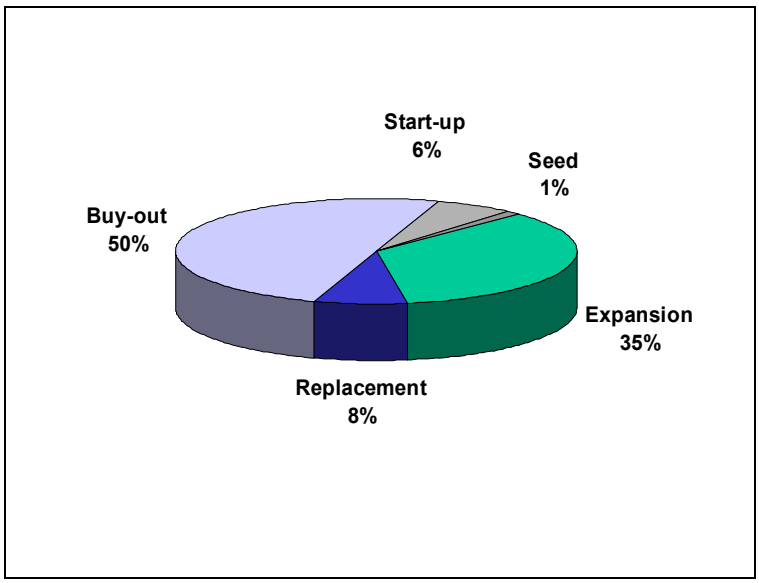
Culturally, the Anglo-Saxon tradition of entrepreneurship flourished in the United States, where venture investment rapidly became a major part of business, at least in part due to the setting up in 1958 of the Small Business Investment Company (SBIC) scheme to encourage such investment.

In the rest of Europe, the private equity sector was much slower to develop and still has a long way to go, although change is now occurring fast as funds become established and governments install incentives to encourage investors.

I.2 The Investments

Collectively, the European Venture Capital sector (that is, private equity investment and venture capital) is a 27 billion ECU industry but as we have seen, there are many different stages of investment and by no means all of this money is available to small or new businesses. A breakdown of preferred stages of investment looks like this:

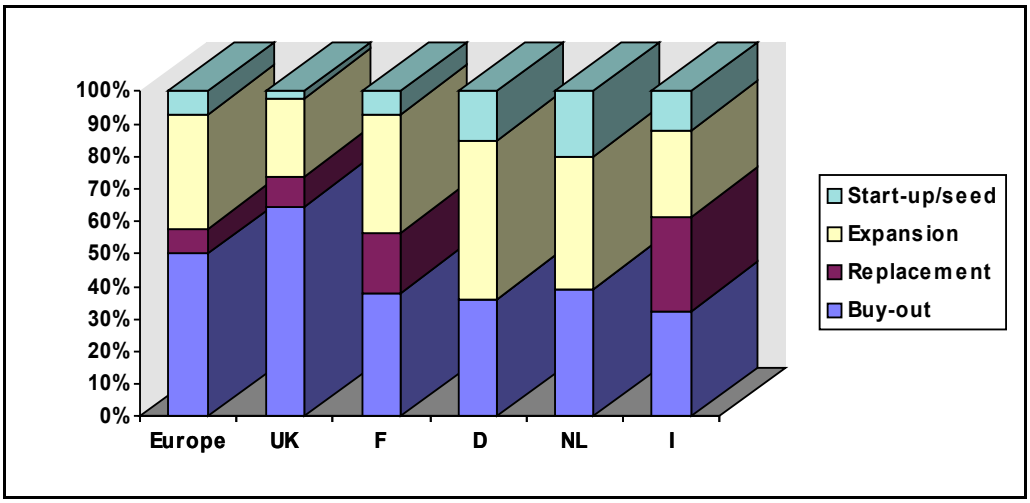
Chart 2: Stage distribution by percentage of amount invested – Europe 1997



Source: EVCA Yearbook 1998

It can readily be seen that the lion's share of the investment goes into buy-outs and expansion capital; "Classical" venture capital, which is of most interest to new technology-based firms accounts for under 7.5% of the total. If we break this down by country, it can be seen that, while in some countries the situation is better than this, there are some, including the United Kingdom, which have a much poorer record in this respect.

Chart 3: Stage distribution of investment in 1997 by percentage of amount invested



EVCA Yearbook 1998

An average of 7.5% disguises the fact that the figure in fact varies from a very low 2.2% in the UK to a creditable 20% in the Netherlands.

It is instructive to look at this point at where the investment went.

The largest single category of investment, according to the EVCA statistics, was "consumer-related," amounting in 1997 to 22.2% of the total. The "technology" sector, which includes communications, computer-related, other electronics, biotechnology and medical/health related, had 23.8% of the total invested; up, in percentage terms, from 20% the previous year.

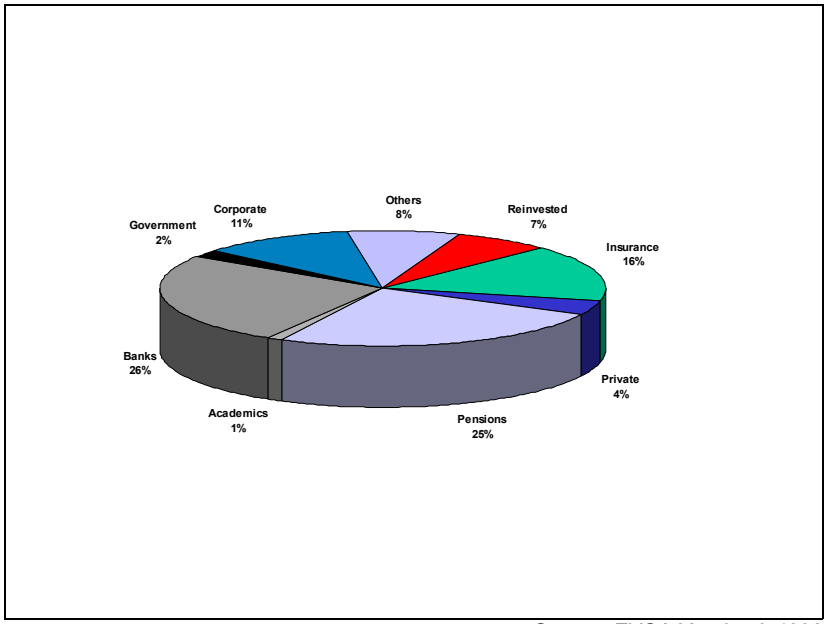
The amount invested in the technology sector in 1997 was therefore about 2.2 billion ECU. The statistics do not estimate the percentage of these technology investments going into early-stage, but given the reluctance of most investors to finance NTBFs, it is likely to be well below the average 7.5%.

Thus, of all the money raised for private equity investment in 1997, a very small proportion, well below ECU 165 million finds its way to the venture capital, early-stage technology, sector.

It is relevant, at this point, to consider where the money comes from.

Investors in venture capital management companies vary widely from a small number of pension funds to banks.

Chart 4: Sources of new funds in 1997 (Europe)



Source: EVCA Yearbook 1998

Nearly 70% of all private equity investment is sourced from banks, insurance companies and pension funds and this lies at the heart of the problem. All these institutions are, naturally enough, *risk averse*; their primary aim is to make safe investments and the proportion of their investment in the riskier, venture capital end of the spectrum is therefore small.

I.3 Europe v. USA and Asia

The venture capital sector in the United States is very well developed and very large. According to the Price Waterhouse quarterly survey of Venture Capital, in 1997, new funds equivalent to about 11 billion ECU were raised and the total investment in that year was in the order of 14 billion ECU. 66% of that was invested in technology firms. Almost all this kind of investment is concentrated in California (Silicon Valley) and New England (Boston) and in a few other regions.

Management Buy-outs and other forms of financial engineering, ie, private equity investing, are not included in the venture capital statistics in the US, so comparisons between that country and Europe are not straightforward; most of the investment goes into firms in the expansion phase of growth, but companies in start-up and early-stage phases received 32% of all investment and accounted for 46% of all companies receiving investment.

Chart 5: Europe vs USA (percentages)

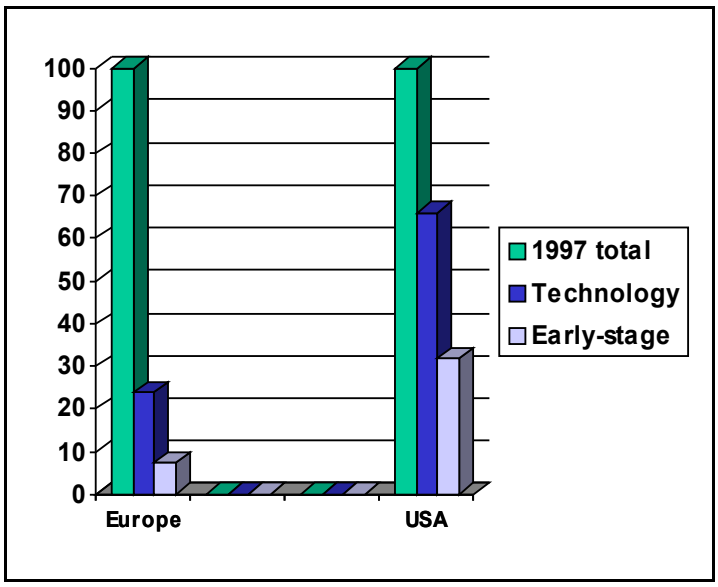


Chart 4 shows very clearly how the sectors of the European and American markets have diverged.

But this is not the whole story. The average size of new funds created in 1997 was $100 million and the average venture capital investment in the Silicon Valley area was nearly 6 million ECU, the majority into companies in their expansion stages. Smaller investments into new or very early-stage companies is now the province of the informal sector of venture capital, the Business Angels.

(Note that detailed comparisons between Europe and the USA are liable to error because of different methods of analysis.)

It is thus clear that a far greater proportion of private equity investment in the United States has been successfully directed to the high-growth business sector, which includes new technology-based firms.

This is precisely the situation that needs to be encouraged in Europe.

Cultural differences between Europe and the USA and Asia are very marked and there are few lessons to be drawn. The following comments may be useful, however.

The situation for venture capital in Asia is difficult to qualify. The industry has existed for less than fifteen years and a Financial Times article in 1996[17] estimated that there was still only about US$6 bn available for investment (not including Japan). In 1998, the Asian Wall Street Journal estimated that in Singapore the sector, helped by government support schemes to encourage early-stage investment was in the region of S$7.3 bn.

As for Japan itself, the Business Guide to Japan 1997 commented:

Although a brief spurt in the creation of venture capital investment funds occurred in the mid-1980's (with a large element of foreign money invested), essentially there exists no significant venture capital industry. Compared to the USA, the position is stark.

In 1990 it was estimated that there were about 100 venture funds, almost all set up by securities companies and banks and they were much criticised for favouring low-risk, established mid-sized businesses over developing firms[18].

In the current chaotic state of the Southeast Asian economies, it is difficult to forecast how the venture capital industry will be affected in the long term.

The venture capital sector in Asia is in any case very different from that of either Europe or the USA. There is little interest in leveraged buy-outs – a symptom of family-owned structures – and there is a tendency to focus on Chinese businessmen. The reason for this is clear: the ethnic Chinese may be a minority, but they account for over half the GDP of their countries (Thailand: 15% of the population; 50% of the GDP. Malaysia, 30% and 60% respectively).

Furthermore, because of the very high savings rate in these countries, entrepreneurs can usually find the money for start ups without difficulty and most investment is therefore aimed at the expansion phase.

I.4 Do we have the kind of venture capital industry we want?

It has been shown that new technology-based firms (NTBFs) are collectively a major source of innovation. They are prime sources of technological advance and are capable of very high growth. That this is so can be seen from the following table:

Table 4: Comparative Performance of Venture-Backed NTBFs in Europe and the United States

	Europe 1991 - 1995		USA 1990 - 1994	
	EURO-NTBFs	**Top 500 (Eur)**	**US - NTBFs**	**Fortune 500**
Employment Growth %	15	2	20	- 0.9
Sales Growth %	35	14	35	2
R&D/Sales Ratio	8.6	1.3		
R&D/Equity Ratio			30	14.7

Coopers & Lybrand Economic Impact Surveys of the US and Europe, 1996

I.5 Other Countries

Reference to Chart 1 in this Appendix shows that the five countries most active in venture capital (UK, France, Germany, Netherlands and Italy) together account for nearly 90% of the total of venture capital raised in the EEA all of the rest accounting for the remainder. It is interesting, nevertheless, to see how these countries are developing:

COUNTRY	INVESTMENT IN 1997 (ECU X 1000)	PERCENT INCREASE ON PREVIOUS YEAR
Austria	18,700	2200%
Belgium	181,450	170%
Denmark	22,055	-34%
Finland	111,000	295%
Greece	15,080	-49%
Norway	155,150	200%
Portugal	62,575	190%
Spain	261,300	140%
Sweden	340,220	85%
Switzerland[n]	55,950	-54%

Some of these countries do have financial or other incentives to intended to encourage venture capital investment but in some case, such a Greece and Portugal, there have, at least until recently, been disincentives in the local finance laws which made it difficult or impossible to establish small venture funds (as opposed to setting up large funds).

More detailed analysis of the individual countries is given in the annual statistics produced by EVCA (from which the figures in the above table are taken).

[n] Although not a member of the EEA, Switzerland is included in recognition of the fact that the first workshop examined the situation in that country.

APPENDIX II: The Euro-CASE Project

THE PROJECT

II.1 Summary of Results

Each of the workshops highlighted a number of points, some specific to the country concerned or the subject under discussion, but many reflecting what appear to be general problems throughout Europe. The most important of these points are summarised below.

II.2 Zürich

So far as Switzerland itself was concerned, it was said that there was no real venture capital in the country and that entrepreneurs were often told by bankers to look elsewhere for venture funding. The Swiss Venture Capital Association counts a total of over one hundred members, including individuals and associate members, but it is clear that a large proportion of these are bank-related and engaged in large deals at the expansion or buy-out stages. It is interesting that a few years ago, many British, American and a few other European funds had offices in Switzerland, but few of these now remain.

A number of points came out of this meeting which were to recur throughout the rest of the project. They included:

- The great difference between the venture capital sectors of Europe and the United States, and between the United Kingdom and the rest of Europe.
- The need to stimulate the provision of seed money for the start-up of companies with the potential for growth.
- The potential for exploiting the unused intellectual property of larger companies by smaller ones, under licence or by some other arrangements.

The need for harmonisation of the rules governing intellectual property rights and cultural differences were also mentioned, though not discussed in detail.

II.3 Amsterdam
(sponsored by the European Commission DG XIII)

The Netherlands is one of the most active and sophisticated countries in Europe in venture capital terms, although the size of the industry is small, reflecting the small size of the country. Nevertheless, many of the venture funds based there maintain offices in other European countries as well as in the United Sates and other funds do not limit their activities to the Netherlands.

Among the points raised were:

- The difficulty in obtaining seed investment.

- The problems of SMEs in attracting qualified personnel, especially at management level
- The need to encourage spin-outs from universities
- Cultural problems, esp. the approach to making money.
- Intellectual property problems
- The importance of business angels at the start-up stage
- The difficulty of assessing high technology ventures (due diligence problems)
- The importance of the new markets
- The need to encourage entrepreneurship

II.4 Düsseldorf

Until the last two or three years, Germany has not been notable for the amount of seed/early-stage capital available, although the public sector offers investment incentives (eg BTU scheme) which are among the most generous in Europe. It is said that this growth is due to a change in the attitude of entrepreneurs, particularly those facing the problems of succession, which has made them more willing to accept equity partners in their companies.

The following points were noted:

- The need for training in entrepreneurship
- The need to provide management assistance (via technology parks)
- The importance of spin-outs
- Insufficient seed capital (though more than had been believed
- The importance of the business angel sector and the need to create an encouraging environment for them to invest

II.5 Milan

Venture capital in Italy is largely bank related and seed/start-up investment has in the past been somewhat neglected. Although some 40% of investment by number was in this stage, only 12% of the total amount went into start-ups and this figure was distorted by their having been one large investment in this stage. The relationship between universities and research institutes are seen as important but there is little incentive to spin out and a shortage of available investment. There are, however, a number of initiatives linking universities and SMEs in their regions.

Points raised:

- The need for improved understanding of the patent system
- The problems involved in transferring technology from lab to industry
- Cultural differences between university and industry
- Tendency to concentrate on core business to the detriment of new research
- The need for training of management
- The need for public sector incentives to investment
- The role for EIB and EIF
- The need to identify and make use of business angels

II.6 London

This meeting was intended to look at the European scene as a whole, bearing in mind the points raised in previous meetings, and to look more closely at what had emerged as the major problems in the provision of capital to NTBFs. The points raised were therefore very similar to those of previous workshops.

They included:

- The need to understand the relationships between entrepreneurs and investors
- Cultural issues, esp. concerning failures and crises and across regions
- Tax and legal considerations
- The need to create a "silicon valley" type of infrastructure
- The importance of exit routes
- The need to internationalise
- The need for seed capital
- Intellectual property problems
- The importance of business angels

An interim report summarising the findings of the Zürich and Amsterdam workshops has been published and disseminated. Summaries of the workshops in Düsseldorf, Milan and London have been published and disseminated. The reports are available at the Euro-CASE Secretariat,
28 rue saint Dominique, 75007 Paris
Tel: (33) 1 53 59 53 40, Fax: (33) 1 53 59 53 41
E-mail up to 1 December 1998: euro-case@institut-de-france.fr
E-mail from 1 December 1998: mail@euro-case.org
Web (under construction): http://www.euro-case.org

APPENDIX III: Programmes of the Workshops

Euro-CASE

European Council of Applied Sciences and Engineering

Engineering and Venture Capital: a Euro-CASE pragmatic approach
Workshop on Risk Management and the Venture Capital Industry

Organised by the Swiss Academy of Engineering Sciences – SATW
Zürich, 19 September 1997

Agenda

1. Welcome
Prof. Dr. Hans Leuenberger (CH), Vice President SATW

2. Short introduction to Euro-CASE and the workshops on Venture Capital
Mr Basil Butler CBE FEng, Chairman of Euro-CASE, Chairman of the Euro-CASE Steering Group on Venture Capital

3. Risk Management and the Venture Capital Industry: European Commission initiatives

Turning into Business the results of the Esprit programme
Mr Attilio Stajano, Adviser, European Commission, DG III, Industry, Directorate F, R&TD: Information Technologies

4. Risk Management and the Swiss Venture Capital Industry

The American Model: Creation of Corporates, Seed Money, NASDAQ
Mr Xavier Comtesse (CH), Attaché Scientifique; Swiss Embassy, Washington

Venture Investments through Mutual Funds, Lombard Odier's Strategy
Mr Jean-Philippe Tripet (CH), CFA, Senior Investment Officer, Lombard Odier Zürich AG

Risk Management in Venture Capital
Mr Hans van den Berg (CH), Senior Partner, Venture Capital Partners AG

Converting new Technologies into new Businesses – what are the requirements?
Dr. Branco Weiss (CH), Dipl. Ing. ETH, Bewatol AG

Start-up initiative for technology and Innovation (CTI)
Prof. Dr. Beat Hotz-Hart (CH), Bundesbank für Konjunkturfragen

5. Risk Management and the Venture Capital Industry: Experience of representatives of other Euro-CASE Academies

A bilateral experience: Visit of CADAS to the RAEng, November 1995
Mr Alain Mongon, CADAS and Euro-CASE

Risk Management in Venture Capital Industry. From Risk Avoidance to Collaboration in Learning. A Finnish Experience
Prof. Eino Tunkelo (FIN), Finnish Academies of Technology, FACTE

A Venture Capital Group
Mr Peter Dohrn (UK), Invotech Ltd

6. Risk Management and the Venture Capital Industry: Views from Swiss SMEs in fields of information technology

Archibald, an intelligent electronic assistant, looking for Venture Capitalists
Prof. Zlatka Dimcovski (CH), Intellart SA

7. Discussion, conclusions

Euro-CASE

European Council of Applied Sciences and Engineering

Engineering and Venture Capital: a Euro-CASE pragmatic approach
Workshop on "Evaluation and Dialogue – What kind of Venture Capital do we need ?"

Organised by the Netherlands Society of Technological Sciences & Engineering, NFTW
Amsterdam10 October 1997

Agenda

1. Short introduction to Euro-CASE and the workshops on Venture Capital

2. Subjects, short introductions of views and cases by participants

- Capital needs of entrepreneurs: e.g. before the first going to the market money
- Evaluation of biotechnology projects :

  view from venture capitalist, what kind of opportunities does he need, what kind of entrepreneurs?

  view from entrepreneur: what kind of venture capital(ist) does he need?
- How to decide on abilities of an entrepreneur, on the competencies of a venture capitalist?
- The dialogue between venture capitalist and entrepreneur after investment: monitoring, coaching (mentor-schemes e.g.), think also of comparison of their aims and time horizons: stepping in and stepping out.

3. Discussion, conclusions

The workshop was chaired by Mr Basil Butler, RAEng, Chairman of the Euro-CASE Steering Group on Venture Capital and Dr. Pieter Strijkert, Introgene, member of the Steering Group.

The participants: Basil Butler CBE FEng, J. ten Cate, Henk Dits, R.J. van Duinen, Per Gjelsvik, Cyril Hilsum, Ir Drs. T.W. den Hoed, Waldemar Kütt, Binno Louwerenburg, P. Maes, Christian Marbach, Alain Mongon, B. Robino, N. Rossdorp, M.I. Spangenberg, Rolf Staufenbiel, Pieter J. Strijkert, Eino Tunkelo.

Euro-CASE

European Council of Applied Sciences and Engineering

Engineering and Venture Capital: a Euro-CASE pragmatic approach : Environmental conditions to favour Venture Capital

Organised by the NordRhein-Westfälische Akademie der Wissenschaften and the Norwegian Academy of Technological Sciences (NTVA)
Düsseldorf, 13 February 1998, 10.00 -16.00

Agenda

1. Chairman's Opening Statement, welcome addresses
Mr Basil Butler CBE FEng, Chairman of the Euro-CASE Steering Group on Venture Capital
Representatives from the Ministerium für Wirtschaft und Mittelstand, Technologie und Verkehr des Landes NRW (D) and the NRW-Academy of Sciences (D)

2. Tasks and Objectives of Technology Centres - example AGIT
Dipl.-Kfm. H. Pagel (D), Geschäftsführer AGIT

3. Research Park and a New Private/Public Seed Capital Fund
Mr. Torp (N), Managing Director Forskningsparken

4. "GO!" Gründungs-Offensive NRW. A private-Public Partnership Initiative for more independent business opportunities in NRW : objectives, organisation, activities, success factors,achievements
Dr. Rolf-Peter Thürbach (D), Matrix GmbH

5. Market Failure in Venture Capital Markets for New Medium and Small Enterprises
Prof. Dr. W. Gerke (D), Lehrstuhl für Bank- und Börsenwesen, Universität Erlangen-Nürnberg

6. Trends in the German Capital Market
Dr. Gert Köhler (D), Technologieholding VC

7. Tax Comparison between European Countries and USA
Dipl.-Kfm. T. Eckerle (D), Zentrum für Europäische Wirtschaftsforschung, ZEW, Mannheim

8. Seed and Start-up Capital for the Foundation of Innovative Companies
Direktor H. Lux (D), Kreissparkasse Köln

9. Conclusion

Euro-CASE

European Council of Applied Sciences and Engineering

Engineering and Venture Capital: a Euro-CASE pragmatic approach: Entrepreneurship and the role of Universities and Research Institutes

Organised by Italian Council of Applied Sciences and Engineering, CISAI, Milan, 28 April 1998

Agenda

Welcome address and Introduction
Dr. Alberto Pieri (I), CISAI, FAST
Mr Basil Butler (UK) CBE FEng, Chairman of the Euro-CASE Steering Group on Venture Capital

PART I : Universities and Institutes

Universities and Science Parks
Prof. Mauro Pezze (I), Politecnico di Milano
Technology Transfer : the experience of Politecnico di Milano

Mr Freddy Dezeure, European Commission, JRC
Access to the European Commission's Research Centre

Prof. Dr-Ing. Rolf Staufenbiel (D), Nordrhein-Westfâlische Akademie der Wissenschaften
Is the environment at German Universities helpful to Ventre Captial enterprises ?

PART II : Entrepreneurs

An entrepreneur's experience
Prof. Franco Forlani (I), Enriecerche (Enigroup Research Centre)
How to interface efficiently University with industrial laboratories

Know-how transfer
Dr. Ennio Denti (I), Confindustria, Sniaricerche
Know-how transfer and SMEs : a difficult task

Encouraging entrepreneurs
Dr. Sergio Treichler (I), CIRC
How to realise scientific spin-offs in Italy

PART III : Venture Capital

Venture Capital in Italy
Prof. Anna Gervasoni (I), AIF, Italian Industrial Finance Association, AIFI
Venture Capital and private equity in Italy

Dr. Fabio Sattin (I), Private Equity Partners Spa
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Dr. Elserino Piol (I), Picienne Italia Spa
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Euro-CASE

European Council of Applied Sciences and Engineering

Engineering and Venture Capital - a Euro-CASE pragmatic approach

The Fifth and Concluding Workshop, organised by the Royal Academy of Engineering, RAEng London, 23 June 1998

Agenda

1. Introduction

Mr Basil Butler CBE FEng (UK), Senior Vice President of the Royal Academy of Engineering, Chairman of the Euro-CASE Steering Group on "Engineering and Venture Capital"

2. Summary of the Findings of the Previous Workshops

Mr Michael Russell (UK), Adviser

3. The European Venture Capital Scene

Chairman: Prof. Cyril Hilsum (UK), Euro-CASE Venture Capital Steering Group
Speakers: Mr Jim Martin, 3i plc (UK)
Mr Michael Geary, Euroventures BV (UK, NL)

4. Obstacles to Innovation

Chairman: Prof. Rolf Staufenbiel (D), Euro-CASE Venture Capital Steering Group
Speakers: Mr Jonathan Blake, SJ Berwin & Co (UK)
Mr Donal O'Connor, Cruikshank & Co (IRL)

5. The Way Forward

Chairman: Dr. Pieter Strijkert (NL), Euro-CASE Venture Capital Steering Group
Speakers: Mr Robert Drummond, LINC (UK)
Mr Jonathan Freeman, Beeson Gregory (UK)

6. Conclusion

APPENDIX IV: List of people involved in the Euro-CASE study on "Engineering and Venture capital in Europe: a Euro-CASE pragmatic approach"

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Mr Jan Alessandro Damiani, European Commission DG XII
Mr Freddy Dezeure, European Commission DG XII
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Mr David Wright, European Commission Cabinet of Mr Santer
Mr Dov Zerah, European Commission Cabinet of Mrs Cresson

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APPENDIX V: Public and Private Sector Support Schemes

IMPORTANT NOTE: *Although I-TEC was discussed at some length in one of the Workshops, SBIC and BTU were mentioned only in passing. Euro-CASE considers, however, that these support schemes are of great potential value and the information in this appendix is relevant to the project.*

V.1 The I-TEC Initiative

Innovation and Technology Equity Capital (I-TEC)
For Technologically Innovative SMEs

European Commission - DG XIII

What is I-TEC?

The I-TEC pilot project is an initiative to encourage early stage investments in technologically innovative SMEs. I-TEC is supported by the European Commission through its INNOVATION Programme and is implemented in collaboration with the European Investment Fund.

I-TEC aspires to help build, within venture capital operators, a lasting capability to appraise and manage those early-stage projects, in technologically innovative SMEs, which, in spite of their economic viability and inherent quality, would otherwise not be taken into account.

Who is to benefit from I-TEC?

I-TEC is open to European venture capital operators who aim at developing experience with early stage investment in technologically innovative SMEs.

Ultimately, I-TEC will benefit European innovative SMEs in which these venture capital operators invest, developing business projects which have a high degree of innovation in technology, product, service or process, and which exhibit a potential for high growth and new job creation.

What are the benefits of I-TEC?

Venture capital operators participating in I-TEC can benefit from:

- a financial contribution from the European Commission up to ECU 500 000 towards the costs of initial appraisal and hands-on management of early stage investments in technologically innovative SMEs;
- access to all possible future activities to stimulate the exchange of good practice and competence among participating venture capital operators.

These activities may include, for example:

- access to specialised information services on the status of technologies, European and global markets, and intellectual property rights;
- access to a network of like-minded investors for professional development, joint project appraisal, finance syndication and refinancing purposes.

What is expected from venture capital operators?

I-TEC benefits can be awarded to those venture capital operators who:

- have organised a fund-raising effort to mobilise new capital
- have submitted to the European Investment Fund an investment proposal that has subsequently been validated by the European Investment Fund, according to its investment guidelines and after an economic evaluation;
- undertake to devote at least 25% of the new capital raised to early stage investments in technologically innovative SMEs, in particular, to those resulting from Community-funded research or in the less favoured regions of the European Union. Investments must be made in at least five different companies.

Venture capital operators who have built a certain capability in this type of investment will be required to increase the overall amount invested in such protects by a factor of 1.5.

Which investment projects qualify for I-TEC support ?

Investments must be made with the specific aim to support early stage investments in technologically innovative SMEs active in the European Union and the Associated States (i.e. Iceland, Israel, Liechtenstein, Norway).

Investments must be made in SMEs (as defined in the Recommendation of 3 April 1996: OJ. no L107 of 30.04.1996. p.4)

Investments must provide long-term equity or quasi-equity capital (subordinated or participative loans, convertible bonds ....). Whatever form they take, the investments must be made freely available, in full and in money, to investee companies.

Investments may not serve to replace the obligations, commitments and engagements of existing long term financiers of the SME, or to merely refinance the company's debts.

Investments must lead to the incorporation of a company, and must be initiated during a period beginning 12 months prior to the date of incorporation and ending 36 months after this date.

Investments must pertain to an extension of the existing operations, the development of new activities or the introduction of new methods or systems of production, based on innovative technology or products. To qualify as innovative technology projects,

investments made under this action should comply with at least one of the following criteria:

- projects which represent or lead to a market application of RTD results obtained through participation in European Community or national research programs;
- projects which show a high degree of innovative technology in product, service or process, as evidenced by at least one of the following:

  - the establishment of intellectual property rights, owned by the company or obtained under an exclusive licensing agreement;

  - recognition of the innovative character by a national authority, either by award of subsidy, tax benefit under the national scheme or other certification;

  - recognition as a key technology under a national technology foresight exercise;

  - any other convincing demonstration of the innovative character of the project deemed acceptable to the Commission.

What will be the I-TEC contribution?

The European Commission has earmarked for I-TEC an amount of ECU 7.5 million. The I-TEC contribution per selected venture capital operator will be as follows.

• The European Commission can contribute up to 50% of the costs related to initial appraisal and hands-on management.

• The total I-TEC contribution per venture capital fund will net exceed 5% of the investments effectively made, with a maximum of ECU 500 000.

The I-TEC contribution will be made available only after actual investments have been made.

V.2 Small Business Investment Company Scheme

The following is a shortened version of a talk given in Paris in 1995 by Paul Kelley, a partner in a leading US early-stage venture capital fund, Zero Stage Capital, and a member of the US Government's Working Group on the revised SBIC scheme.

One of the key objectives of the long-standing 'SBIC" (Small Business Investment Company) programme in the U.S., which helped the growth of companies such as Apple, Intel and Federal Express, is to enhance the return to investors and thereby facilitate new fund-raising efforts by early-stage funds

The new SBIC programme, which has been developed in conjunction with venture capital operators in the United States, has undergone a radical transformation, which

has added significant new dimensions to the original scheme and could be a tried-and-tested model for Europe to emulate to support its early-stage funds.

The new SBIC scheme enables an established early-stage fund with a track record to leverage its basic capital by a factor of 200%, ie. The new money is raised by issuing 'Participating Preferred Securities' (PPS) to the Government's Small Business Administration (SBA). These securities are then grouped together by the SBA and offered as a bond issue on Wall St., backed by the guarantee of the U.S. Treasury.

The original programme, launched in 1958, was 'godfather' to the U.S. venture capital industry. But changes to capital markets in the 1980s considerably reduced its effectiveness and there were even thoughts of discontinuing the program.

A working group drawn from the VC industry, policy makers and a number of entrepreneurs was assembled in Washington to redirect the outdated SBIC program towards today's market needs.

What the new program has done is to address some of the problems that occurred during the 80s,' said Paul Kelley. "The Participating Preferred Security eliminates the original mismatch between the SBIC s funding system centred on 'current-pay' debentures and the long-term equity nature of how these funds were used. With the PPS there is a deferral on the repayment of the leveraged capitol."

The ability to leverage up the basic capital of a fund enables it to have follow-on finance to develop its portfolio companies further and avoid excessive by subsequent investors.

A fund three times as large also triples the chance of having high flyers in the portfolio. . The revised program is structured so that it increases the internal Rate of Return to private investors by about one third and it increases their cash return by up to three times. As a result of this there is an incentive for private investors to get involved in a fund which is structured as on SBIC and it makes it less difficult for managers to raise money.

The maximum leverage under the revised scheme is $90 million. A fund with $45 million in private capita , could have $90 million in leverage or investible capital, producing a pool of $135 million. SBICs which have a combination of the PPS and the current-pay feature can have a leverage of three to one. The minimum capital for a fund to be eligible for an SBIC licence is $10 million.

When the scheme is fully operational there will be 100 - 150 venture funds in the U.S. that will be structured as Small Business Investment Companies. In the first year, 25-30 firms became licensees of this program and when the program is fully operational an additional one billion dollars is expected to be put into emerging small companies in the US on an annual basis. Zero Stage was one of the first licensees.

"The success of the program is going to be directly related to the success of the delivery mechanism, how the delivery mechanisms ore managed and the competence of the individuals who are managing the SBICs," Paul Kelley stressed.

The programme puts the emphasis on backing proven venture capitalists. The requirements for obtaining on SBIC licence are very stringent. and are based on track record and experience. "Ours is the only business where the basis of learning is from your mistakes. Because so many people have been involved in this already, the level of expertise is orders of magnitude greater than it was 10 years ago."

'The program is going to be very good for the SBA because since it will have people with experience running SBICs," Mr Kelley said. "It will be good for investors because they will get a higher rate of return both from a cash-on-cash standpoint (IRR) as well as from a cash return. Finally it is good for venture capital managers because we are able to leverage each dollar of private capital with two dollars from the public sector. And under the scheme, it is the venture fund which decides what to invest in, when to invest and when to exit."

The new SBIC scheme permits funds to obtain one third of their base capital from state or local government agencies. The intention here is to encourage the formation of SBICs in regions where capital is scarce, or in disadvantaged areas.

The Participating Preferred Security provides a return to the SBA, but not on a pro rate basis. Though the SBA guarantees two thirds of the capitol, it skews the distribution of value added towards the investors whose return is increased by a factor of two while the IRR is increased by one third. A management fee on this leveraged capital has been agreed and set at 2.5% of the leverage that is called down.

The "participating preferred security" developed for the new SBIC system is a new type of security. It has a preference position and participates in the success of the fund but not on a pro rate basis and, as a result, it is beneficial to providers of the base capital.

The money is available to the SBIC funds as and when they call it down. It con be wired directly into a portfolio company or called down into the fund.

The SBA groups together the PPS from the SBIC funds on Wall Street. In the first example, $73 million was raised by the SBA in an issue underwritten by Goldman Sachs, Chemical Security and First Boston.

The new scheme is an ingenious piece of financial engineering. The risk associated with the SBIC fund's base capital is diminished because the number of potential high flyers in the portfolio is increased by a factor of three. This significantly increases the upside of funds as does the fact that the funds are managed by experienced managers with a track record. This essentially guarantees the private capital which becomes the basis for the leverage.

"Classic or seed investing is basically local investing," Paul Kelley said. It is important from a policy standpoint to find ways to come up with some delivery mechanisms which can take the billions available in institutions and put them through funnels, so that the investments con be overseen properly and the portfolio managed. The 'Participating Preferred Security' mechanism was expected to be attractive for

Pension Funds in the U.S. who have never invested in SBICs prior to 1995, essentially for fiscal reasons. Fiscal disincentives have now been removed and a certain amount of Government leverage is being exerted on pension funds to put a relatively small percentage of their funds into SBIC companies.

Mr Kelley believed that the revisions in the program would bring a lot of institutional investors into the classic' venture capital type funds, The 'merchant' funds in the U.S. that are raising $100-300 million through pension funds were not particularly interested in the old SBIC system. For the classic VC funds similar to the ones that you operate here in Europe, this is a major advantage.

"If you have a fund of $20 million, you do 5 to 8 deals on that money. As the firms grow you have got a fund of $40 million to invest in those companies to take them to a flotation."

Paul Kelley went on: “This is the type of system which will enable small amounts of equity capital to be made available in a way that meets both the prudent man test as well as the market test. It is the type of program that might be replicated here in Europe since a lot of time and energy has gone into this particular program and many of the 'bugs' have been ironed out. It could have a significant impact here as it has in the US.

Capital is but the fuel and to make this work, there has to be a delivery mechanism. You need early-stage venture capital funds. Imagine what could be done here in Europe if the EU would guarantee the downside of this institutional pool - a hybrid SBIC programme could be the right mechanism."

V.3 The German BTU (Beteiligungskapital für kleine Technologie-unternehmen) Scheme

This article, by Roger Bendisch and Douglas Smith of LLB Seed Capital Fund Berlin, first appeared in Start-Up in 1995.

The BJTU or *Beteiligungskapital für junge Technologie unternehmen (*"Venture Capital for Technology Start Ups"), sponsored by the German Ministry of Education, Science, Research & Technology (BMBF), came to a close after five years of activity at the end of 1994. A follow-up programme, the BTU (*Beteiligungskapital für kleine Technologieunternehmen)* was approved by/ the EU and represents an expansion of the former programme's R&D support strategy to include larger, later-stage projects.

The program was started in March 1995 end will run until December 2000. The BMBF Minister, Dr. Jürgen Rüttgers, hopes that the programme will stimulate DM 900 million (500 million ECU) of early-stage capital in Germany.

The funds will continue to be disbursed by two government banks; the *Kreditanstalt für Wiederaufbau* in Frankfurt and the *Deutsche Ausgleichsbank* in Bonn. Each bank sponsors the BTU programme using a different model. The KfW lends funds directly to a venture capitalist while the DtA channels funds through a captive venture capital

fund of its own, the tbg or *Technologiebeteiligungsgesellschaft* - in Bonn, which makes mezzanine investments exclusively in cooperation with a lead investor who has invested a matching amount.

Both sources offer venture capitalists risk reduction for technology engagements. KfW loans don't have to be repaid if the venture fails. KfW loans can cover up to *75%* (85% in former East Germany) of the total financial engagement of the refinanced fund.

The DtA, on the other hand, guarantees that tbg will buy at most *50% (70%* in East Germany) of the lead investor's shares at book value if the company fails in the first five years of the venture. The lead investor is not liable for the tbg's investment.

Through either institution, the total engagement is effectively guaranteed to 75% (85% in former East Germany) in the event the venture fails. Engagements were formerly guaranteed between 80% end 90%.

Formerly, investors refinanced through the KfW were required to share income on refinanced engagements (before management costs) with the KfW. The profits were distributed 40% to the KfW and 60% to the refinanced fund. The new KfW model does not impose any income sharing. Instead, the KfW charges interest and may impose income ceilings depending on the stage of the venture:

For seed stage investments the KfW charges the fund 5% interest on the loan. The fund's income from refinanced investments cannot exceed 12% p.a.

For the financing of later-stage high-tech production start-ups, the KfW would currently charge 8.33% interest (pegged to prevailing interest rate at contract signing). No income ceiling is imposed in this case.

The tbg charges the venture 6% fixed interest plus a negotiated income participation and imposes no income limits on the lead investor. Seed-stage and marketing launches are financed in cooperation with the tbg under the same conditions.

The KfW loans have a maximum term of ten years and may be repaid at any time without penalty. The tbg's mezzanine engagements have a maximum term of 10 years or the term of the lead investor's engagement, whichever is shorter. A 25% premium is charged for early repayment of the tbg's engagement - payable by the venture, not by the fund. In either model, capital payments do not come due until the end of the term.

The admission criteria for high-tech companies have been changed to accommodate a larger, more established group of technology companies:

- The current maximum amount for KfW refinancing, 1 million DM, or for tbg investments, 1 million DM with a matching million DM investment from the co-operating venture capital firm, will be raised to 3 million DM from either source (the tbg model could thus result in 6 Million DM total financing).

• The age and size limitations for eligible ventures will be raised in the new program. While BJTU recipients could be three years old *at most,* the new program will extend to firms up to 10 years of age with up to 10 million DM annual sales, 4 million DM total assets and 50 employees (in former East Germany up to 40 million DM , sales, 20 million DM total assets and 250 employees).

While former recipients could finance only one project at a time through the BJTU, the new programme will allow financing of parallel R&D projects as well as parallel financing through both models.

Firms meeting the above criteria cannot be owned to more than 25% by industrial companies not meeting these criteria, with the exception of the sponsoring venture capital company.

Admissible firms must furthermore demonstrate the ability to develop innovative technology. The venture must involve the development or innovative enhancement of technology that is new to the supported firm. The technology does not have to be new to the industry in general.

The innovative core of the development must be carried out or planned by the firm itself.

The developed product, process or service must represent a meaningful enhancement of, or addition to, the firm's existing products, processes or services.

The development must demonstrate the potential for a commercially exploitable competitive advantage for the firm.

Venture capital firms eligible to receive KfW loans must have equity of at least 2 million DM. Lead investors co-operating with the tbg must be prepared to provide further financial support if the situation warrants. Firms using either refinancing model must have management who are, in the long term, willing and able to support high-tech firms meeting the BTU requirements. Funds with certain investors may be inadmissible.

Investments under either model may be equity or unsecured mezzanine engagements and must have some financial participation in the gains and losses of the company.

APPENDIX VI: Incubator Services

IMPORTANT NOTE: *The information in this appendix became available after the completion of the five Workshops. However, Euro-CASE feels that initiatives described are of considerable interest and important to an understanding of current activities in support of new businesses.*

The three examples taken here represent many initiatives in this field. In the UK, a private sector initiative, supported by the government, has been set up to establish "best practice" for incubators; **Servitec, in Italy,** is trying to encourage and develop innovative new firms in the Bergamo region, while in Israel, the Ministry is making the best use of the highly educated immigrant population to build its technology base.

VI.1 UK

UK BUSINESS INCUBATION LTD

The Centre is a private sector led initiative, strongly supported by Government, which acts as a catalyst and facilitator to extract the maximum benefit from the business incubation process in the UK and ultimately to improve the formation, survival and growth rates of early stage businesses, particularly those with the potential for growth.

Business incubation is a process or "tool" which can deliver stronger new businesses, create jobs and produce firms developing new ideas and technology. Incubation helps small firms to counter the reasons for most failures or inability to reach full potential: lack of breadth of business skills and lack of finance. Business incubators select firms best able to benefit from support, combat the loneliness and stress of setting up a business and its early development, give access to a range of business skills and training to help the business grow, provide access to finance and enable new enterprises to stand on their own feet more quickly. They provide a focus for improving networking and co-operation, corporate venturing, particularly in the form of business mentoring, the commercialisation of research and technology transfer.

The Reasons for the Centre
In 1996 the Treasury's Enterprise Panel report *Growing Success* highlighted the potential benefits of incubation, particularly in the USA, in growing small firms, commercialising research and promoting regional economic development; the report proposed a centre to promote the development and effectiveness of incubation in the UK. This was endorsed by the Bank of England's report *The Financing of Technology-Based Small Firms* and in 1997 by the CBI's report *Tech Stars-Breaking the growth barriers for technology-based SMEs* and the House of Lords Select Committee report *The Innovation-Exploitation Barrier.*

In the UK while there is a lot happening (the Panel's report identified over 30 new incubator projects planned for development over the next 2 - 3 years) there is a lack of networking of best practice amongst business incubation initiatives planned or under way as well as a lack of co-operation between the number of existing organisations

seeking to support this sector. The Centre will directly address these shortcomings, it will aim to leverage the effects of business incubation initiatives, combine the expertise of existing organisations and make a significant contribution to the growth of entrepreneurial activity in the UK.

The Purpose of the Centre

The Centre will promote business incubation practices, particularly business mentoring, better networking and the encouragement of private sector involvement. It will promote technology transfer and the commercialisation of research. The overall objective being to reduce the failure rate in start-up companies and increase the success rate of the small proportion of such companies which achieve real growth. The Centre will seek to achieve its objectives within 3 years, any longer term role will be reviewed towards the end of that time.

Specifically, the Centre will:

- Aid the setting up of new business incubation projects in the UK and support existing ones by providing advice and contacts/shared experiences;
- Identify and promote best practice for new and existing incubation projects, in terms of finance, management and marketing skills and technology transfer;
- Explore and encourage partnerships in incubation, e.g. involve universities, business schools, venture capital companies and commercial companies in mentoring;
- Raise the profile of business incubation, inter alia by involving relevant organisations in the Centre's work;
- Ensure incubation projects are fully integrate into local business support networks and technology transfer networks;
- Set standards and training for and raise the profile of incubator directors;
- Assist in the innovation of funding of new technology based firms;
- Explore new business formats, e.g. networked companies, joint ventures, strategic alliances, viz. corporate venturing and corporate alliances;
- Provide a central store of knowledge and advice to a wide range of private and public sector parties interested in business incubation;
- Establish appropriate methods to monitor the performance of incubators by liasing with industry, finance as well as academics, e.g. ESRC, to increase understanding of the incubation processes;

The main activities of the Centre:	**The target audiences for the Centre:**
Interactive Web site	Incubator directors/promoters
Best practice data bases	Incubation project directors/promoters
Network of incubation projects	Government
Membership	Universities/research organisations
Specific events	Large companies/corporate venturers
Publications	Venture capitalists
Annual Report and Conference	Angel syndicates/networks

Details of the Centre

The Centre will be a small unit of three staff based in the Innovation Centre at Aston Science Park with an office in central London. The Chief Executive will be Malcolm Buckler, the author of the Enterprise Panel's report, on secondment from the Treasury. The Centre is a private sector led initiative, with substantial support from Government. Its costs, £500,000 over the first three years, are to be met from a 50/50 split between public and private finance. The public finance will be provided from the DTI's Sector Challenge, while private sector sponsorship has been secured from Midland Bank, the Prudential, Birmingham Technology Ltd. which operates the Aston Science Park and Innovation Centre, Aston University and possibly the UK Science Parks Association.

To promote and combine the expertise of existing organisations the Centre will aim to work in partnership with and complement existing related business support organisations, e.g. Scottish Enterprise, Welsh Development Agency, UK Science Park Association, UK Business Innovation Centres, TEC National Council, Business Link Network Company, and when established English regional development agencies. These organisations will be encouraged to take a seat on the Enterprise Panel and work closely with the Centre to ensure it achieves its objectives.

The Enterprise Panel will oversee the progress of the Centre, offer advice and give strategic direction to its activities. The Panel will include representatives of business support organisations, representatives from the Treasury, DTI, Bank of England, as well as those with a range of experience in early stage business development, e.g. entrepreneurship, incubation projects, venture capital, business angel finance and corporate venturing.

(Information provided by UK Business Incubation Ltd)

VI.2 Italy

SERVITEC - SERVICES FOR TECHNOLOGICAL INNOVATION

The incubator of innovative companies represents an important presence in the POINT system. The function of this structure is to accommodate and support enterprises resulting from. POINT initiative, or that are present in the Bergamo territory, and that can become opportunities of innovative high tech entrepreneurial development. The purpose of the incubator is also that of offering protection in the most difficult, initial steps of the foundation and early growth of companies, in order to reduce the high mortality rate of the small, new, innovative concerns in their first years of existence.

To provide support during these difficult early phases, POINT will offer hospitality to emerging businesses in quarters specially equipped for the technical needs of the firms, as well as technical counselling and logistic, administrative, legal, financial and

commercial services. Once the company has achieved stability, it will withdraw from POINT to create room for other new entrants.

The businesses assisted must have the following characteristics:

- be established for not more than two years,
- be active in innovative high tech sectors
- have a project of entrepreneurial development which outlines technological and financial growth as well as market prospects,

The Servitec Board will decide to accept the new business in the incubator after experts nominated by same company validate the entrepreneurial project. The incubator is run directly by Servitec.

Servitec offers the services described below to the companies which are accepted.

a. Introductory phase (feasibility analysis)

The entrepreneur, before launching the company (or even after its foundation but before the operational stage) can benefit from the following services:

- *logistic support* for the feasibility analysis and for the presentation project, based on a preliminary programme, validated by experts, for carrying out a feasibility analysis to be presented within one year;
- *counselling* for the realisation of the feasibility analysis, aimed at verifying the prospects of the enterprise as to technological, commercial financial and legal aspects, and in terms of marketing and patenting.

b. lncubation phase

The company is accepted in the incubator on the basis of a plan of entrepreneurial development or of a feasibility analysis validated by Servitec with the help of technical marketing and financial experts. Once accepted, the concern is accommodated in the specially equipped quarters of the incubator and receives the following services:

- logistic (like the other organisations in POINT), i.e. custodian, surveillance, switchboard, caretaking, mail, heating and air conditioning, electricity, parking;
- communal (meeting rooms, classrooms, press hall, organisation of events, eating facilities, workshop, etc.);
- informatic (computer network, memory, server, access to the Internet, possibility of displaying home page on the POINT site);
- administrative (accounting, taxes, etc.);
- legal and patent protection (trademarks, models and forms, defence from imitations and forgery, etc.);
- technological support.,
- market analysis;
- contact with firms in the territory of Bergamo through industrial associations;
- assistance in developing the *business plan;*

- financial aid (access to regional, national or EU funds for research and development projects, innovations, support for new ventures);
- search for industrial partners (in Italy or abroad);
- access to special funds for plant investments in POINT.

c. Monitoring phase

Servitec has the right /duty to monitor and survey the development of the activities of the guest businesses. These must supply Servitec:

- confidential semi-yearly report about the evolution of the business, which will be discussed and assessed in technical, commercial and financial terms;
- the annual budget.

On the basis of the findings, Servitec can recommend measures aimed at improving the business prospects of the company.

Servitec reserves the right to rescind in advance the accommodation contract in the following circumstances:

- the activity undertaken by the company ceases to possess the requisites necessary to be considered a guest of the incubator;
- the prospects of success cease to exist;
- in the case of arrearage;
- the measures recommended by Servitec are disregarded to the point of jeopardising the success of the initiative.

Transition period

In the period 1997/98, until the renovation of the POINT area is completed, the incubator will work *virtually:* Servitec assists the growth of the young businesses even if they are temporarily located elsewhere, provided that they have signed an agreement to enter the incubator as soon as the equipped quarters are available.

Teleincubator

Servitec can operate as an incubator even for companies which are not physically present in the POINT area, but, for various reasons, are located somewhere else in the province of Bergamo. In particular, the teleincubator can serve for those firms which, although already established elsewhere, will transfer into POINT, or those which, having completed the initial stage in the incubator, transfer out but retain a working contact with Servitec.

(Information taken from the website of Servitec srl – Servizi per l'innovazione tecnologica, Bergamo)

VI.3 Finland

INCUBATORS IN THE FINNISH SCIENCE PARKS

There are ten Science Parks in Finland. The first of them established 1982 in Oulu was the first science park in Scandinavia. During the latter part of 1980s science parks were established in all the Finnish university cities. In most of them the local government was a strong supporter and financier of the initiative. The leading role in most cases was played by the university in collaboration with the industry. The Finnish Science Parks provide companies and investors with working environments including premises, assistance, support and encouragement. Among the services and activities created, an incubator was established in most of these parks at an early stage of the development. The establishment of the incubators was financed by the government (Ministry of Trade and Industry). They are operated as independent companies within the Science Parks.

The Finnish Science Parks and their incubators are:

Science Park (year of establishment)	incubator	established	number of companies 1998
Teknopolis, Oulu (1982)	OuluTech	1995	14
Innopoli, Espoo (1984)	Spinno	1991	50
Kareltek, Lappeenranta (1985)	CarelNet	1987	13
Hermia, Tampere (1986)	Yrityskehitys	1988	33
Teknia,Kuopio (1986)	Incubator	1990	51
Teknologiakeskus, Jyväskylä (1987)	Incubator	1992	60
DataCity Center, Turku (1989)	DIO	1989	50
Merinova, Vaasa (1989)	Incubator	1990	3
Tiedepuisto, Joensuu (1990)	BIC Carelia	1997	15
Viikin tiedepuisto, Helsinki (1992)	Incubator	1997	25

The financing of the administrative costs of the incubators comes from the science parks themselves, local community, central government (Ministry of Trade and Industry) and other sources (enterprises). The financial support to the companies in the incubators covers 35-50 % of their costs. It comes mainly from the Ministry of Trade and Industry though some of the Science Parks have start-up funds of their own. The budgets of the incubators for 1998 are:

Science Park (incubator)	administrative budget total (1000 ECU)	local sources (%)	central government (%)	other (%)	support to the enterprises (1000 ECU)
Teknopolis, Oulu (OuluTech)	170	29	47	24	140
Innopoli, Espoo, (Spinno)	630	41	19	40	100
Kareltek, Lappeenranta (CarelNet)	110	15	77	8	25
Hermia, Tampere (Yrityskehitys)	70	50	50		250
Teknia, Kuopio (Incubator)	7	54	16	30	70
Teknologiakeskus, Jyväskylä (Incubator)	2	100			340
DataCity Center, Turku (DIO)	170	59	8	33	340
Merinova, Vaasa (Incubator)	1				
Tiedepuisto, Joensuu (BIC Carelia)	320	85	15		
Viikin tiedepuisto, Helsinki (Incubator)	240		50	50	40

The Finnish Science Park Association FISPA was founded in January 1988. It has sixteen members, of which most are located in Finnish university cities. The FISPA members are known as Finnish Centres of Expertise, which means that they are tools for developing regional technology industry. They employ more than 10 000 people in about 1000 companies and other organisations.

The technological expertise and working models offered by Finnish Science Parks are of an impeccably high standard with diversified interests specially designed to appeal to foreign investors. Each of the science parks have created their own profile giving preference to some fields of science and business areas.

FISPA is a network with several international partners and co-operation channels. FISPA encourages Finnish technology centres and science parks to work efficiently to develop high technology business and to ensure its international competitiveness. The co-operation between business life, universities and research institutes as well as venture capital organisations is encouraged.

FISPA is also connected with ministries and other government organisations as well as with research institutions. Finnish Technology Development Centre TEKES, the National Fund for R&D SITRA, and regional development organisations, are important partners, too. FISPA offers services also to municipalities, national organisations and different entrepreneur organisations in Finland.

VI.4 Israel

NURTURING NEW IDEAS

The technological incubators program was set up in 1991 following mass immigration from the countries of the former Soviet Union. Established by the Office of the Chief Scientist (OCRs) of the Ministry of Industry and Trade, the aim of the program is to provide a sheltered environment in which scientists who have potentially marketable new inventions, both new immigrants and veteran Israelis, can nurture their innovative ideas, while receiving financial support, expert business advice, subsidised office resources and exposure to interested investors.

There are today 26 technological incubators from Kiryat Shemona and Katzrin in the north to Dirnona and Sde Boker in the south. In accordance with government policy to encourage Israelis to settle in peripheral regions, 13 of the incubators are in the Galilee and Negev. Three incubators are in Jerusalem, including one privately fielded technological incubator.

During 1996 the 26 incubators of the OCS housed 200 research projects which received funding of $32 million. Although the incubators were not designed specifically for new immigrants, it has turned out that about half of these projects are based on the ideas of new immigrants and the other half on ideas of veteran Israelis. Virtually all of the projects are export-oriented and the ultimate aim of the incubators is to boost the nearly $20 billion worth of goods (of which 70% has high-tech or technological components) that Israel exports annually. The projects underway in the incubators reflect the countless traditional technological strengths.

The incubators, although they belong to the OCS network, are each individually-owned non-profit organisations. Public bodies participate alongside the government in the expenses of running the incubators. In addition, private donors, local authorities, universities and high-tech business enterprises are involved.

About 5 0% of these projects "succeed." The OCS's definition of success is the ability of the fledgling project to attract outside investors and thus be able to leave the protective environment of the incubator after two years. It is too early to predict what percentage of incubator-bred start-ups will ultimately enjoy commercial success, but indications are that it will be considerably higher than the 10% success rate registered in high-tech start-up s in the United States.

SHARING THE RISKS

Israel's technological incubators are a unique adaptation of the American model, where incubators serve as community self-help programs in which budding local inventors receive aid and advice from entrepreneurial professionals. In the Israeli model the government is a full partner in the incubator process. Within the framework of the technological incubators the entrepreneurs are provided with subsidised premises, financial resources, project tools, professional guidance and administrative assistance. During its tenure in the enclosed environment of the

incubator, a start-up company is meant to turn its abstract ideas into products of proven feasibility, innovative advantage and competitiveness in the international marketplace.

The entrepreneurs stay in the technological incubator gives him a sense of legitimacy, and considerably enhances his prospects of raising the financial investment required for locating strategic partners and emerging from the incubator with a viable business. Most importantly, the OCS provides financial grants, including 85 percent of the inventor's approved budget, up to a ceiling of $145,000 annually for a period of two years.

In return, the OCS allows the incubator to take up to 20 percent of the shares in the start-up company and receives royalties of 3 percent of eventual sales or consulting fees, which are reinvested in the incubator. if the start-up never makes it off the ground, the entrepreneur is not required to pay back anything. Seventy percent of the start-up's shares are owned by the developer/entrepreneur and 10 percent by project team employees. By sharing the risks involved in the pursuit of R&D, the government has enabled start-ups to flourish. The effectiveness of the policy is evident, as many of these companies have found major investors from both Israel and abroad.

Rigorous acceptance procedures keep success rates high. Each project is first looked over by an expert in the relevant scientific field to investigate its feasibility. Then business experts examine every aspect of the project's commercial implications, including potential markets, pricing, investment overheads and competitors. The inventor must also undergo extensive interviews to check that he or she has the type of personality conducive to success. Applicants must ultimately be approved by both the steering committee of each individual incubator and a national coordinating committee of the OCS. Applicants thought to have serious potential are accepted for two years and, in certain circumstances, the project remains in the incubator for a third year. After leaving the incubators, companies may qualify for other government incentives, such as the regular OCS programs, which offer R&D support for start-ups, with a ceiling of $250,000 for each of two years; the government's export promotion funding; grants from the Israel-US Bi-national Industrial Research and Development Fund (BUM) and other bi-national R&D funds; and the services of the Israel Export Institute.

THE INVOLVEMENT OF ACADEMIA AND INDUSTRY

Some technological incubators are also strategically located near the country's universities, where researchers work hand in hand with the budding entrepreneurs at the incubators and the university graduates are often the inventors whose patents are being developed. Most of the universities in Israel have developed or are partners in technological incubators.

Israel's high-tech industry has also been supportive of the program The Rad-Ramot incubator is partly owned by the Rad Data Communications Company, while the ELTAM - Technology Incubator was set up and is partly owned by

Elron Industries, Israel's largest high-tech holding company. which owns Elbit and Elscint, manufacturers of leading-edge medical electronics equipment.

Israel's only non-OCS incubator, the HiTEC-Technology Entrepreneurship Centre at Har Hotzvim in Jerusalem, was established in 1992 by Intel Israel and Teva Pharmaceuticals. Eleven more local businesses, as well as the Hadassah Medical Organisation, have also lent their support.

So far, more than 300 projects have left the OCS incubators. Of these graduates, 165 (56%) have continued under their own steam. Over three-quarters of these successful projects have attracted outside investments from both Israel and abroad, ranging in size from $100,000 to $8 million. On the average, projects attract investments of $500,000. The total investment in projects that have left the incubators today stand at more than $80 million. Moreover, nearly 800 professionals serve on the project teams at the incubators. Most of them are recent immigrants with academic training, often master's or doctoral degrees. In addition, some 700 new immigrants, also academics including many postgraduates, are employed by those project companies that have left the incubators.

(Official publication of the Israel Ministry of Foreign Affairs)

APPENDIX VII: The objectives and activities of Euro-CASE

The objectives of Euro-CASE

The main objectives of Euro-CASE are to provide impartial, independent and balanced advice on research, development and the resultant technology, and to disseminate its viewpoints and positions appropriately.

Euro-CASE aims to promote a common point of view on applied science and engineering issues with a clear European dimension.

Euro-CASE can also initiate concrete actions of common interest where its unique constitution can bring an added value or an original solution to important issues.

How does Euro-CASE work?

Through its member Academies, Euro-CASE acts as a permanent forum for exchange and consultation between European Institutions, Industry and Research. Euro-CASE has access to many of the most distinguished experts in Europe and deals with technological issues with a clear European dimension.

Euro-CASE is governed by a Board consisting of senior representatives from each member Academy. An Executive Committee is elected from the Board.

The Euro-CASE Executive Committee

Prof. Sergio Barabaschi (I), Italian Council of Applied Science and Engineering
Mr Basil Butler CBE FEng (UK), - Royal Academy of Engineering – RAEng, Past Chairman
Dr. Henk Dits (NL), Netherlands Society of Technological Sciences and Engineering, Treasurer
Mr Pierre Fillet (F), Council for Applied Sciences of the National French Academy of Sciences, Secretary General
Dr. J. R. Irisarri (E), Spanish Academy of Engineering, Vice Chairman
Prof. Dr. Ing. Dr. H. C. Mult. Günter Spur (D), German Council of Technical Sciences
Mr Helge Sørensen (DK), Danish Academy of Technical Sciences, Chairman

The permanent secretariat, based in Paris, co-ordinates Euro-CASE's activities.
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E-mail up to 1 December: euro-case@institut-de-france.fr
E-mail from 1 December: mail@euro-case.org
Web (under construction): http://www.euro-case.org

Current Euro-CASE activities

Transport

Euro-CASE has published a report on:

" Mobility, Transport and Traffic in the perspective of Growth, Competitiveness, Employment " (Paris, June 1996).

During 1996 and 1997, national symposiums have been organised with politicians, government officials, and high level representatives from other relevant bodies in order to raise awareness amongst decision makers in the transport sector and to act as catalysts for national initiatives.

In late 1998 a follow-up study will be launched in the field of Freight Logistics and Transport Systems.

Environment

The Euro-CASE Academies have decided to organise a series of workshops on the following issues :

- **"Air Quality and Human Health "**

" The air I breathe and my Health ", Paris, 24 April 1998

"Does the Public have the right information ? Assimilation (collection, validation, processing and interpretation) and management of data ", London, 16 October 1998.

"Indoor air pollution - the " enemy " within "
Mainz, 5 March 1999.

"Regulations for Community and City - What do I need ? "
Portugal 1999

- **"Sustainable Use of Water in Europe"**

A series of workshops will be organised in 1999.

Information Technology - The European IT Prize

In 1998 Euro-CASE organises for the fourth year, jointly with the Esprit Programme of the European Commission - DG III, Industry, the European IT Prize, open to companies and institutions in 29 European countries and Israel. The Awards Ceremony will take place in Vienna on 1 December 1998.

More information on the European IT Prize is given on the web-site :

http://www.it-prize.org

European Industrial PhD

An European meeting will be organised in early 1999 to discuss the state-of-the-art and the future of a European Industrial PhD degree.

The Euro-CASE Academies:

Austria: Österreichische Akademie der Wissenschaften
Dr. Ignaz Seipel-Platz 2 - 1010 Wien
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APPENDIX VIII: References

VIII.1 Addresses

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   Tel: +1 703 524 3743; Fax: +1 703 524 3940; E-mail: sgreen@aeeg.org
3. European Foundation of Entrepreneurship Research (EFER), Bd St Michel 15, B-1040, Brussels
   Tel: +32 2 743 1588; Fax: +32 2 743 1550;
   E-mail: europes500@associationhq.com
1. European Venture Capital Association (EVCA), Minervastraat 6, Box 6, B-1930 Zaventem
   Tel: +32 2 715 0024; Fax: +32 2 725 0704;
   E-mail: evca@evca.com; Website: www.evca.com
2. European Commission maintains a number of websites, of which CORDIS is perhaps the most useful:
   - Home Page: www.cordis.lu
   - Innovation home page: www.cordis.lu/innovation/home.html
   - Finance for innovation: www.cordis.lu/finance/home.html
   - Awareness of innovation: www.cordis.lu/awareness/home.html
   - Tech. Transfer and validation: www.cordis.lu/tvp/home.html

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