

Financial Services

The Sector

The financial services sector is changing rapidly and may undergo radical restructuring during the years ahead, for example, through the convergence of retailing, telecommunications and retail financial services. Technology Foresight activities focused on banking, insurance and financial markets but did not employ a precise definition of the sector. Depending upon which activities are included in the sector, its contribution to GDP ranges from 8 percent up to a figure in excess of 15 percent.

The Future

Much of the technology required by the financial services industry over the medium term already exists - the focus is on how that technology can be used effectively.

Expansion of the free world is bringing unprecedented international competition. The cost of capital will continue to be an important determinant of competitiveness. Financial engineering techniques which can reduce the cost of capital will be used more widely.

The financial services environment of the future will have, inter alia:

- widespread use of multimedia for delivering retail financial services;
- a continuing burden from fraud;
- more sophisticated customer profiling;
- greater choice of financial products; and
- substantial reduction in the use of cheques.



Recommendations

The Technology Foresight Programme is an ongoing exercise in an ever-changing industry. The findings of the Financial Services Panel will need to be updated periodically to reflect developments in the sector.

Recommendations arising from the Foresight Programme address key educational and regulatory issues which will have a long term impact on the financial services sector. They also promote a higher level of research activity.



Forward with Foresight

In summary, the Technology Foresight Panel on Financial Services recommends the following actions.

To Improve IT Education

Financial institutions (perhaps through one of the trade associations or professional bodies) and IT companies should sponsor teachers, awards and appropriate hardware and software.

To Promote Competence In Finance

The DTI, the Economic and Social Research Council (ESRC) and the Higher Education Funding Councils (HEFCs) should launch a new research programme in collaboration with financial institutions. The programme might cover areas such as the design of financial instruments, quantitative asset management and psychological responses to risk and uncertainty.

The DTI, OST, ESRC, HEFCs and professional bodies should establish a working group to develop more detailed proposals.

To Promote High Standards In Finance

There should be a common minimum standard in finance which provides a foundation for the development of a widely recognised qualification in finance. Professional bodies, large employers and academic institutions should develop and launch undergraduate courses in finance which meet the academic requirements of the minimum standard.

To Combat Fraud

There should be a research programme to explore scientific and technological approaches for detecting and preventing fraud. The programme might cover areas such as data encryption, biometrics, transaction monitoring and analysis, artificial intelligence techniques for analysing behavioural patterns and high security for smart cards.

Government Departments such as the Treasury, DTI and OST should jointly commission a survey of relevant ongoing research before potential participants in the programme are canvassed and outline proposals are prepared.

To Promote Telecommunications Infrastructure

The DTI, and OFTEL should, at the earliest practical opportunity, describe the regulatory framework which will be introduced for the telecommunications industry as existing Government commitments to franchisees expire.



Progress through partnership (Key points): Financial Services, Page 1

Progress Through Partnership: 3 Financial Services



Contents

[Preface](#)

[Foreword](#)

1.	EXECUTIVE SUMMARY	1
2.	INTRODUCTION	3
	(i) The financial services sector	3
	(ii) The panel and its programme of work	7
3.	FOUNDATIONS	10
	(i) Descriptions of the financial services sector in the UK and overseas.	10
	(ii) Working assumptions for scenario planning	12
4.	TOPICS AND PRIORITIES	16
	(i) Trends and market opportunities	16
	- introduction;	16
	- impact of multimedia and telecommunications;	16
	- telecommunications infrastructure;	17
	- impact of IT and computing;	18
	- IT skills and awareness;	18
	financial education and awareness	
	- new institutions and services;	20
	- fraud, malpractice and regulatory oversight;	22
	- regulation and technological change;	23
	- risk assessment and management; and;	23
	- finance for small companies	25
5.	RECOMMENDATIONS	31
6.	CONCLUSIONS AND FUTURE ACTIVITIES	34
7.	REFERENCES	36
	Annex A	38
A(i):	LIST OF ORGANISATIONS CONSULTED BY INTERVIEW	
A(ii):	LIST OF ORGANISATIONS WHICH COMMENTED ON DRAFT RECOMMENDATIONS	
	Annex B	40
B:	QUANTITATIVE STUDIES OF THE FINANCIAL SERVICES SECTOR IN THE UK AND OVERSEAS	



Progress Through Partnership: Preface

The Technology Foresight Programme is a major initiative which was announced in the 1993 White Paper 'Realising Our Potential'. The Programme brings together industry, academia and Government to consider how the UK can best take advantage of opportunities to promote wealth creation and enhance our quality of life. The Programme has been driven forward with great energy and enthusiasm by the 15 independent Technology Foresight panels. The Programme has reached out to over 10,000 people.



I believe that the current findings from the Technology Foresight Programme will prove invaluable. They will help businesses, academic institutions and policy makers to **Progress Through Partnership**. I know that, encouraged by the Office of Science and Technology, several other organisations are embarking on the Foresight approach. Only by bringing together science and business more effectively will we secure the economic performance necessary to maintain our competitiveness.

The Foresight panels have generated visions of the future which will lead to more informed decision-making in both the public and private sectors. I would like to thank them for their wholehearted devotion to this important mission. We now look forward to a busy and exciting period as the results of Foresight are drawn together and the Foresight process moves forward.

The Rt Hon David Hunt MBE, MP Cabinet Minister for Science and Chancellor of the Duchy of Lancaster

Progress Through Partnership: 3

Financial Services



[Contents](#)



Foreword

The financial services industry has been indeed growing rapidly, both within the UK economy and as a source of overseas earnings. It is one of the success stories of the British economy. Our investigation into the likely developments affecting this industry revolved around two major considerations, namely developments worldwide and the effects of technology.

First, the demise of Communism and the liberation of world trade and capital flows has effectively tripled the size of the 'free world'. The resulting international competition unleashed by these developments is unprecedented. This makes the cost of capital an even more important determinant of competitiveness than has been the case previously. A greater awareness of financial market innovation both within and outside the industry can reduce the cost of capital and is therefore imperative if the UK's position is to be at least maintained.

Secondly, most of the technology likely to be used in financial services over the medium term already exists. The greater issue is how it can be used to deliver financial services accurately and securely.

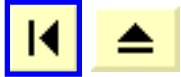
Each of these considerations featured prominently in our approach to this report. The structure of our work has also reflected the peculiar attributes of the area under investigation. The very nature of the financial services industry requires any planning to be based on a series of working assumptions, not an inflexible long-term plan. Non-technological factors such as regulation can have an important influence on developments in this field.

It is important not to underestimate the impact of telecommunications innovation on financial services. They are comparable to the impact of an enhanced electricity supply on manufacturing industry during the first quarter of this century. This expanded the number of products and suppliers while impacting significantly on life-styles. The greater availability of telecommunications and lowering of prices reduces the barriers to entry to potential new competitors. The UK financial sector must not be complacent about the changes technological developments can bring.

The degree and complexity of the changes faced by the financial services industry led this panel to focus its attention on a few key issues in this report. Others may deserve similar attention. It is also a prime recommendation that an ongoing review be established to update, extend and implement the recommendations reached in this first report and to promote opportunities for improved communication between the financial and scientific communities. The success of the financial services industry in an increasingly competitive world depends on its willingness to continuously re-examine its regulatory, educational as well as its technological foundations.

MICHAEL HUGHES

BZW Securities Ltd and Chairman Financial Services Panel Technology Foresight Programme



1. Executive Summary

1.1 This report describes the finding of the Technology Foresight Panel on Financial Services.

1.2 The panel consulted widely during the course of its work using questionnaires (including a Delphi survey), face-to-face interviews and visits to companies and institutions. The strengths and weaknesses of the financial services sector were considered, drawing on data compiled by the DTI, research commissioned from the London Business School and inputs from other organisations.

1.3 Two main considerations arose:

- much of the technology required by the financial services industry over the medium term already exists - the focus is on how that technology can be used effectively; and
- the cost of capital is, and will be, an important determinant of competitiveness - awareness of finance and familiarity with new "financial engineering" techniques can reduce the cost of capital.

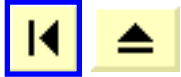
1.4 The panel identified a range of trends and potential market opportunities in areas such as multimedia and telecommunications, IT skills and awareness, financial education and awareness, combatting fraud and malpractice, risk assessment and finance for smaller companies. Obstacles to the realisation of these opportunities were also considered.

1.5 The panel has recommended action in the following areas:

- (i) improving IT skills;
- (ii) a new research programme on finance and financial engineering (including techniques for the design of financial products and the management of financial risks);
- (iii) establishing a minimum professional standard in finance;
- (iv) a new research programme into technological approaches to combat fraud;and
- (v) clarifying the regulatory framework which will be introduced for telecommunications as existing Government commitments to franchisees expire.

1.6 Brief proposals for the implementation of these recommendations are contained in the report.

Progress Through Partnership: 3 Financial Services



[Contents](#)



2. INTRODUCTION

THE FINANCIAL SERVICES SECTOR

What are 'financial services'?

2.1. There is no universally accepted definition of the financial services sector. Speaking colloquially, different people mean different things when they refer to 'the City' or 'the financial sector'. At a quantitative level, the 'City' is fairly elusive: information is compiled on various fields of business in the financial services sector according to the interests and motives of the compiler.

2.2. This report focuses on the way in which the financial services sector might develop over the medium to long term. The structure of many sectors will change quite substantially over that time.

This report does not adopt a rigid or precise definition of financial services. It has its prime emphasis on banking, insurance and the financial markets rather than on areas such as law or accountancy.

The regulatory structure

2.3. In brief, the Treasury has wide ranging responsibilities in the financial sector but very few responsibilities for direct oversight of financial institutions. A range of bodies are empowered to regulate financial institutions and markets under legislation administered by the Treasury. The Bank of England, as one of its responsibilities, supervises authorised banks. The Building Societies Commission supervises building societies and the Securities and Investments Board has oversight of the Self Regulatory Organisations which supervise investment business.

2.4. The DTI is responsible for the legal framework for the insurance industry and for the authorization and supervision of insurance companies and Lloyd's.

2.5 Regulatory organisations and two Government Departments therefore have distinct, but overlapping, interests. This may not be an optimal arrangement as financial institutions become more integrated.

A major force in the UK economy

2.6. By most available measures [1], UK output in financial services grew considerably during the 1980s. The sector has experienced more rapid growth in the UK than in any other leading OECD country. It is difficult to measure precisely the contribution to the economy which is made by the sector but it is at least 7% of GDP.

2.7. According to the Department of Employment, the financial services industry is one of the largest employers in the UK. For example, more people are currently employed in insurance than in the defence and aerospace industries while banking and finance employs more than three times as many people as IT and electronics.

2.8. The financial services sector also makes a major positive contribution to the balance of overseas trade. One estimate^[2] puts the net contribution in 1993 at over £5bn. British Invisibles^[3] include earnings from investments and overseas assets in their analysis. On that basis, the figure rises to £15bn.

Customers

2.9. Consumers of financial services can be grouped conveniently into retail and wholesale market places.

- The retail market place includes personal investors, small business and smaller corporate clients. This group is spread across the UK and, with the exception of expatriate clients, contains relatively little overseas business. This part of the market is likely to see widespread technological change in future years as multimedia and other technologies become established mechanisms for service delivery - reducing the size of high street branch networks in many cases.
- The wholesale market place includes large and more financially aware corporate clients, public sector industries and governments. The client base is spread across the globe. Major corporate clients are using the industry differently as they become more sophisticated - for example, raising finance directly on the capital markets rather than through intermediaries.

2.10. Business between one financial institution and another forms an important sub division within the wholesale category. Generally speaking, financial institutions are the most sophisticated users of financial services.

Inter-institution business is one of the more sophisticated and technologically advanced areas of financial services business, both in terms of the products and services which are used and in the ways in which customers and service providers communicate and transact business.

Geographic clusters

2.11. The wholesale financial institutions and the head offices of other organisations which make up the sector are almost all located in geographic clusters. Clusters vary significantly in size and business emphasis.

(i)

London contains by far the largest and most diverse of the clusters. It has world dominance in many areas of international wholesale financial services, including cross-border equity trading, international insurance and foreign exchange. Many overseas financial institutions (including over 500 foreign banks) are represented in London.

(ii)

Scotland contains the UK's second largest cluster of financial services activity. Like London, it has a long history as a financial centre. It has a strong focus on fund management, life assurance and retail banking but relatively little securities trading or foreign exchange.

(iii)

A significant cluster of financial services activity is present in the Yorkshire area. While building societies are the longest established institutions in this cluster, there are also significant numbers of other institutions including one of the earliest direct (telephone) banks.

2.12. Smaller clusters are present in other areas of the UK for example around the South West of England.

A large user of technology

2.13. The sector is a very large user of technology. According to Price Waterhouse, IT spend by the UK financial services industry in 1993 was more than double the average for UK industry and IT expenditure by the UK financial sector rose by 7.5% in 1993. However, we should keep this in perspective by noting that, according to another survey, IT expenditure per employee in the UK is much less than that in the USA and Japan.

2.14. The use of technology in the financial sector is expanding rapidly.

Most of the technology which could be used in the medium term by the financial sector already exists. The greater issue is how this technology can be used to deliver financial services accurately and securely.

Until recently, interest was focused on telecommunications and the use of computers for storing and processing information about customers, markets and investments - with an emphasis on wholesale business. Technological change is becoming more evident in retail financial business. The use of interactive multimedia for delivering retail services, the development of smart cards and the more widespread use of artificial intelligence are three of the new areas in which technology is making inroads. Greater acceptance of technology in the customer base and competition from other retailing firms seem to be adding to the pressure for new technological approaches to the delivery of retail financial services.

Technological manpower and links with academia

2.15. The panel's consultations indicated that the sector is employing a progressively larger number of people with IT, mathematical and technological skills. Many of these people are employed in 'conventional' roles such as IT systems design and support. Others are employed in the design of financial products and services, some of which are underpinned by sophisticated mathematical techniques. Growing numbers are employed in the quantitative analysis of market trends. This development is supported by the activities[4] of several professional institutions and societies, such as the International Association of Financial Engineers, which foster technological solutions to problems in finance.

2.16. The financial sector does not, however, appear to have extensive links with the academic institutions responsible for producing graduates in IT and other technologies. Compared with many other sectors, there appear to be relatively few examples in financial services of firms collaborating with academic scientists, engineers and technologists, either bilaterally or (as one might expect) in consortia which include companies supplying technology to the sector.

THE PANEL AND ITS PROGRAMME OF WORK

The panel

2.17. The Technology Foresight Panel on Financial Services has fifteen members, including its chairman, Michael Hughes of BZW. Seven members of the panel come from the financial industry, four from academia and four from other organisations. Members of the panel are listed inside the front cover of this report.

Consultation

2.18. The panel consulted extensively throughout the programme and the contents of this report are influenced more by the views of consultees than any other factor.

2.19. At an early stage of its work, members of the panel identified about sixty individuals who represented a broad spread of interest across the financial services sector and the technologies it deploys. These people made up an "expert pool" of consultees. Most members of the pool come from the UK financial services industry but there is significant representation from:

- (i) the academic sector;
- (ii) the information technology industry;
- (iii) large corporate customers of the financial sector;
- (iv) organisations which can represent the interests of small and medium corporates and partnerships; and
- (v) trade associations and professional institutions from several areas of the sector.

2.20. Each consultee was briefed personally by a member of the panel before being asked to give views on:

- (i) the trends and issues, and their underlying causes, that may influence the financial services sector 10-20 years into the future;
- (ii) new market opportunities foreseen from the trends, issues and driving causes;
- (iii) new products and services foreseen to serve the market opportunities; and
- (iv) new technologies or other innovations foreseen to underpin the new products and services.

Over 80% of the expert pool responded to this survey.

The Delphi survey

2.21. Responses from the expert pool were used by the panel to identify 68 topics on which to consult more widely. These topics formed a basis for a two-stage "Delphi" survey on the financial services sector which was circulated to a larger pool of consultees[5]. The Delphi survey had two stages. In the first phase, respondents were asked to give their initial views. In the second round, respondents were given the opportunity to revise their responses in the light of opinions expressed during the first round. The method has formed the basis of successful foresight programmes in other countries.

2.22. A number of trade associations, professional institutions and the expert pool were invited to nominate further individuals who might be involved in this wider consultation. Their responses allowed the panel to assemble a list of about 600 people, most of whom could be invited to give their views on a personal basis and some of whom could be invited to collate views from an institution or other organisation.

2.23. The Delphi method has already served as the core of several overseas foresight programmes and several similar studies in industry. Each of the topics identified earlier was presented in the form of a statement about the future. For example:

- mass market financial services (eg credit/debit accounts) are routinely tailored to customers' individual requirements; and
- a combination of smart cards and telecommunications will enable 'electronic cash' to be obtained widely, including in most homes and places of work.

2.24. Respondents were invited to give structured reactions to each statement, including quantified assessments of:

- the impact of the topic on wealth creation and the quality of life;
- over what period of time, if ever, they predicted that the development would first be realised;
- the UK's current position with respect to other countries in scientific and technological capability, innovative capacity, service delivery and commercialisation potential.

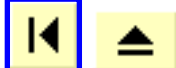
2.25. Views on regulatory, educational, technological and other factors which might inhibit occurrence in the UK were also canvassed. The detailed results of the Delphi survey and statistical data on the respondents will be published separately. Individual firms and other organisations will then have the option of carrying out their own analyses, perhaps on specific areas within the survey.

Involving a wider community

2.26. Other forms of consultation and information gathering were also employed. Members of the panel interviewed senior representatives of financial institutions and other organisations with an interest in the development of the financial services sector. The panel met representatives of 11 organisations in financial services and information technology during a visit to Edinburgh. A list of the organisations included in face-to-face consultations is shown at Annex A.

2.27. Presentations from telecommunications companies helped to draw in views on some of the technological opportunities for the future. Meetings with representatives of the Technology Foresight Panels on Communications and Retail & Distribution, written input[6] from the IT & Electronics panel and participation in the workshop on "Technology in the Service Industries" [7] helped to draw in the views of technology suppliers and customers. A UK perspective

2.28. A large majority of our consultees were located in London. This is consistent with the concentration of financial services activity in the City. However, liaison with Scottish Financial Enterprise, the choice of consultees and input from the Scottish Foresight initiative[8] has helped to ensure that the work has a nationwide perspective.

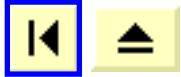


[Contents](#)



Progress Through Partnership: 3

Financial Services



[Contents](#)



3. FOUNDATIONS

DESCRIPTIONS OF THE FINANCIAL SERVICES SECTOR IN THE UK AND OVERSEAS

Introduction

3.1. In a forward looking study such as this, we must take account of current strengths and weaknesses when considering how the future might unfold (and how we might wish to see it unfold) for the financial services sector. An overview of current strengths and weaknesses also helps to define priority areas in which action should be taken soon if we are to exploit opportunities in the medium to long term.

Difficult comparisons

3.2. Comparing the performance of UK financial institutions with their overseas counterparts can be difficult. National variations in Government policy, regulation, business practice and market development are among the factors which determine the business carried out by institutions. A French banque d'affaires does not cover quite the same field of business as a UK investment bank or a US securities house. The relationship between general and life insurance companies in the UK is not precisely the same as in many other countries.

3.3. Several organisations have measured or compiled statistics on the size of the financial services sector, its contribution to the UK economy and its comparison with similar sectors in other countries. Information has been gathered and analysed to serve a variety of different needs and it is, perhaps, not surprising that there are inconsistencies in the definitions used and the range of coverage of the various studies. Some statistics cover 'financial and business services' (which includes accountancy, legal services, estate agency and several other services). Other figures cover 'international financial markets' and yet more are available for overlapping sub-sectors such as banking and insurance.

Recent research

3.4. The Technology Foresight Panel on Financial Services commissioned a report^[1] from the London Business School into the use of technology by the financial services industry and the impact of technology on the competitive position of the UK financial services industry. The report provided an overview of the business issues facing the financial services sector and the ways in which technology is being used to address them.

3.5. We have drawn on this work and other studies, such as those^[3, 9-14] summarised in Annex B, in the preparation of this report. Characteristics of the UK financial services sector

3.6. The financial services sector in the UK has many great strengths. The sector has:

- a diversity of deep and liquid markets;
- a regulatory structure which allows free flows of capital and which encourages overseas institutions to locate in the UK and participate in our markets;
- a highly educated and highly motivated workforce with an international perspective;
- world class legal, actuarial and accountancy services and public relations consultancies;
- many institutions with successful track records of handling new initiatives, such as privatisation of utilities, and the financing of major capital projects; and
- English as a first language.

3.7. These may explain why the sector is large, successful and dynamic at present. They do not guarantee future prosperity. Provision of global financial services is a rapidly growing activity in overseas financial centres, including those in the newly developed economies.

Some of our existing providers of financial services face significant threats to future business, such as those described in section 4.2 of this report.

Other potential threats to existing institutions can be identified within the trends and opportunities described in section 4.1.

WORKING ASSUMPTIONS FOR SCENARIO PLANNING

A vision of the future

The financial services environment of the future will

- widespread use of multimedia for delivering retail financial services;
- a continuing burden from fraud;
- more sophisticated customer profiling;
- greater choice of financial products; and
- substantial reduction in the use of cheques.

Introduction

3.8. Many consultees underpinned their responses to the panel with views or predictions about the future. We have drawn many of these together and added some of our own to produce the following list of working assumptions. These assumptions can be packaged into a wide variety of "mini-scenarios" as an aid to developing recommendations for short term action.

3.9. The list is not intended to cover the full range of factors which may influence the development of the financial services sector. It contains fairly conservative descriptions of some of the ways in which the future might unfold.

Working assumptions

(i)

The UK's Position as a Global Financial Centre

(a) The UK's global position will be enhanced in areas such as fund management and banking

where restructuring and the adoption of new technology will provide foundations for growth.

(b) Existing UK life insurance companies will be threatened with substantial loss of business to competitors with more responsive corporate structures and stronger technological capabilities - even if overall demand for life insurance products increases. New competitors may come from both within the UK and overseas.

(c) Deep and liquid markets will remain vital.

(d) The UK's success as a financial centre will continue to depend heavily on free movements of capital and a regulatory structure which promotes open markets.

(e) The UK's continued success will depend even more than at present on our telecommunications infrastructure being competitive with that in other major countries.

(ii)

Macro Background

(a) Low inflation will continue to be a priority for Government. Low inflation will continue to provide the most favourable environment for the financial services industry.

(b) It is unclear what impact European Monetary Union would have on the financial services sector.

(iii)

Restructuring

(a) Two types of financial services institution will evolve. The first will be characterised as global, largely orientated towards wholesale markets. The second will be domestic, a specialist provider of retail services. These two types of organisation may exist within the same commercial group.

(b) The existing structure of the financial services industry, particularly at the retail level, will be rationalised. Current distinctions between banks, building societies, insurance companies, friendly societies etc. will fade away.

(iv)

New Entrants to Financial Services

(a) High street retailers and other companies currently outside the financial sector will provide a growing proportion of retail financial services. New providers of integrated retail services will evolve, some entering the UK from overseas. They will integrate financial and non-financial products.

(b) Competition for retail savings flows will intensify. Unit Trust charges will fall. Investment Trust usage will rise.

(v)

Savings Propensity

Demographic trends and reduced state benefits will encourage discretionary saving independently of incentives such as tax relief and the level of interest rates. This will bring increasing demands for savings products, notably retirement and health cover schemes. Financial assets will be preferred to real assets (especially real estate).

(vi)

New Sources of Credit

Emerging economies will seek to invest their new wealth in a wider range of products. They will prefer financial instruments, such as government bonds and international equities, to real estate. Issuance of new debt and equity for emerging economies will be concentrated on existing global markets.

(vii)

Derivative Products

The use of derived products (such as futures, options and swaps) for risk management will grow and will be accompanied by developments in the regulatory infrastructure.

(viii)

Telecommunications

(a) The volume of information which can be passed between financial institutions and between institutions and their clients will continue to grow quickly. Much more sophisticated information displays will become widespread.

(b) The pace of development of communications technology will not create substantial barriers to the development of the financial services sector.

(ix)

Information Technology and Electronics

(a) The real cost of information processing and computer memory will continue to fall. We cannot be confident that the base-level cost of computers will fall substantially.

(b) The performance and cost of computer hardware will not create widespread barriers to the development of wholesale financial services business. The position is less clear in the retail area.

(c) Inadequate supplies of trained IT and financial engineering manpower and the relatively narrow range of indigenous suppliers of software for financial applications may inhibit the development of the financial services sector.

(x)

Fraud

(a) Financial fraud will continue to impose a burden on the reputations and balance sheets of companies and financial institutions around the world. Individuals and institutions will continue to be defrauded.

(b) Advances in telecommunications and automation, the globalisation of financial services and the wider use of electronic money will create additional challenges for regulatory and law enforcement agencies.

(xi)

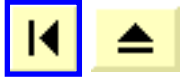
Replacement of Cheques

Cheques will be used less frequently as a form of payment. Instead, there will be greater use of direct debits and electronic money.



[Contents](#)





4. TOPICS AND PRIORITIES

TRENDS AND MARKET OPPORTUNITIES

Introduction

4.1. There was strong agreement between the various forms of consultation on the issues and developments which will exert the greatest influence over the financial services sector during the next 10-20 years.

Very few consultees foresee the introduction of radically new technology to the sector during this time horizon. Very few people see purely technological barriers to progress in the sector.

4.2. However, there is widespread belief that we shall see improvements in the management and cost-effectiveness of existing technology or the evolutionary development of science and technology which is currently under research. There is a wide consensus that the introduction of existing and emerging technologies will enable, and in some cases drive forward, radical change in the sector.

4.3. Responses to the Delphi questionnaire and other consultation allowed us to identify a number of trends and opportunities for the future. Some of these will be difficult to exploit unless action is taken soon to strengthen our technological capability, amend certain regulations and enhance the skills base. Detailed data from the Delphi survey will be published separately.

4.4. On the basis of our consultations, we have identified the following generic issues:

Impact of multimedia and telecommunications

4.5. Extensive changes in the delivery of financial services in the retail sector will be made possible by the:

- development of improved telecommunications
- falling cost of computing power
- widespread use of multimedia systems; and
- continued growth in computer literacy.

4.6. These will be underpinned by developments in data encryption and other techniques for secure communication and the development of advanced computational techniques which ensure effectively error-free communication (eg for funds transfer).

4.7. For example, over 80% of Delphi respondents think that the telecommunications infrastructure will allow the sale of goods, services and information to every home and place of business in the UK within

the next 10 years. They feel that the UK is at the leading edge of scientific and innovative capability in this field and that it has a strong ability to deliver services and exploit commercial potential in this area. However, respondents also feel that the social acceptability of multimedia, its economic viability and regulatory issues are all significant constraints on the development of this area.

4.8. Respondents also foresee the development of more advanced and user friendly automated banking tellers. These will incorporate multimedia techniques to put customers in a 'virtual banking' environment. These machines may be located in homes and workplaces as well as high streets. On a longer time horizon, they may be portable.

According to most respondents the UK is on a scientific and innovative par with other countries in the introduction of virtual reality techniques to the financial sector.

4.9. We are given a similar rating in the key enabling technologies of voice and face recognition (which could be used to verify transactions). However, substantial numbers of respondents question the cost effectiveness and technological feasibility of these developments.

Telecommunications infrastructure

4.10. The telecommunications infrastructure in the UK is vital to the future development of the financial sector. This issue is not particularly acute in wholesale financial business where extensive technological change has already occurred and where the communications infrastructure is very highly developed.

4.11. In the retail area, however, financial services providers want access to national broadband communications networks over which they can offer virtual reality banking, financial advice and other services.

4.12. There is a strong and widely held belief that these services will be affordable and profitable only if the cost of the network and the user interfaces (TV set, computer or some other device) are shared between the providers of a variety of services which can reach a nationwide customer base. These might include:

- education
- entertainment;
- travel, weather and other information
- news;
- retailing; and
- telephony,

as well as financial services. The panel received representations that uncertainty about the shape of the regulatory structure beyond the year 2000 is limiting confidence in investment in new products and services.

The impact of IT and computing

4.13. The impact of IT and computing will be pervasive.

4.14. There is a strong consensus that within 10 years computer programmes will regularly outperform human beings in the management of investment portfolios. Some observers would argue that they already do. Most of our consultees believe that the UK is in a very strong position, both in its scientific and innovative capacity and in its commercial ability to deliver services. Many people believe that organisations can take forward this work without any form of collaborative activity and some people see collaboration as a disadvantage - they wish to protect their software against plagiarism by rivals.

IT skills and awareness

4.15. Most organisations across the financial services sector reported difficulty in recruiting staff with adequate IT skills. Much of the undergraduate education and training in IT fails to meet the requirements of the financial services industry. Insurance business seems to be the exception to this rule - most of the insurance companies we consulted claim to be broadly content with the current availability of IT skills in the workforce.

Many undergraduate degree courses on IT are regarded by the financial community as "computer science in disguise"- not what they need.

There appears to be adequate provision of postgraduate education and there are a number of very highly respected centres of research in IT. One body of opinion suggests that this might be used as a foundation for building up the critical mass of professional expertise, teaching material and methods to allow the development of new undergraduate courses. High quality education and training in IT is also vital at school and further education levels.

4.16. There is strong concern that lack of IT awareness in the wider community and a general apprehension of high technology might foster consumer resistance to multimedia for service delivery. Technology suppliers are, however, using the falling cost of memory and computing power to make more improvements to the user friendliness of telecommunications and computers.

Financial education and awareness

4.17. The University sector appears to have adapted to the increasing complexity and technological sophistication of the financial services sector by providing a number of postgraduate courses offering Masters Degrees in investment, finance, and related topics. There are also a large number of continuing education courses on various aspects of finance.

4.18. However, there is a demand from students and employers for more relevant high quality courses at undergraduate level.

Major employers in the financial services sector are recruiting finance graduates from overseas universities because they are dissatisfied with the output from the UK educational system.

4.19. UK courses in accountancy and economics include some elements of finance and related technology, but there is no generally available degree course which leads to a career in the financial services sector (as there is, for example, in accountancy or law). There is also a widely perceived need to establish a minimum standard in finance to raise overall standards and improve the skills

base. A similar initiative has already been proposed, in the context of a wider agenda, by the President of the Chartered Institute of Bankers[15].

New institutions and services

4.20. Restructuring of the financial services sector will be both driven and enabled by:

- developments in telecommunications;
- much better information about customers and their needs and preferences;
- growing international competition; and
- deregulation.

4.21. This will break down the current distinctions between types of financial institution. In the longer term, it will also break down the distinction between many financial services firms and other retailers.

4.22. One-stop shopping (either in the high street or through telecommunications) for a wide range of financial and non-financial products will further develop, along with closer relationships between financial services providers and the retail sector. This may be accompanied by the development of universal financial management systems which integrate the functions of, for example:

- insurance brokers;
- tax advisers;
- pensions and investment managers; and
- retail bankers.

4.23. This will be accompanied by the continued success of firms which focus on more specialised activities. The growing complexity of financial products may encourage specialisation in some areas, including those above.

4.24.

Over 80% of Delphi respondents believe that, within 10 years, advances in computer technology will make it possible for relatively unskilled personnel to use expert systems and other computational techniques to offer adequate investment advice to retail customers, under a suitable regulatory framework.

In the longer term, many respondents believe that reduced regulatory oversight will be available to firms which provide financial services only on the basis of advice generated by approved computer systems.

4.25. Other developments in the quality and diversity of services are also foreseen. Many of these will be stimulated by:

- a changing demographic structure;
- increasingly volatile employment; and
- growth in the private provision of pensions and health care.

4.26. Mass market financial services may be tailored to individual customer requirements, combining lifestyle data and personal information with sophisticated computing techniques to perform on-the-spot

product design, insurance risk assessment, credit rating, etc.

4.27.

Almost everyone we consulted thought that financial institutions will offer one-stop shopping for financial and certain non-financial products within the next 10 years.

UK institutions are seen as very well placed commercially and technologically to introduce this form of business. No strong constraints stand in the way although, in the longer term, these changes in business may bring pressure for rationalisation of the regulatory system.

4.28. When combined with the developments which are foreseen in the telecommunications field, one-stop shopping will bring significant changes in the nature of retail financial services business. Two thirds of Delphi respondents feel that financial institutions will aim to maintain customer loyalty through the supply and maintenance of computer terminals, although the economic viability and social acceptability of this development are called into question by significant numbers of respondents.

4.29. The combination of telecommunications and changing cultural attitudes may stimulate international business. Over 70% of Delphi respondents thought that these factors would bring "a massive increase in the volume of cross-border business" in retail financial services within the next 10 years. Cultural attitudes and regulation were viewed as the greatest constraints on the development of this area of business.

Fraud, malpractice and regulatory oversight

4.30. Losses through fraud can impose major burdens on financial institutions and their clients. Effective protection against fraud is therefore a competitive weapon. A substantial proportion of our consultees expressed concern that financial institutions will, in future, find it increasingly difficult to protect themselves and their clients against sophisticated financial fraud. We understand that some retailing companies also feel growing vulnerability to 'professional' fraudsters. There is a widespread belief that progressively more invasive and sophisticated approaches will be used to conduct and combat fraud. Many freely available, and apparently innocuous, technologies can be used to facilitate fraud.

The American Bankers Association blame desk-top publishing for a huge increase in the number of bogus cheques in the USA.

4.31. The growing use of telecommunications for service delivery, the introduction of more automation and further globalization will change the face of regulation and law enforcement in the financial sector. Financial fraudsters can already exploit telecommunications for their own ends. If telecommunications systems are used to deliver a larger range of financial services, then the scope for fraudulent activity may well increase. More research may be necessary into cost-effective ways of enhancing the security of telecommunications systems for use in financial applications.

4.32. The widespread use of smart cards which carry personal financial information is foreseen by a large majority of consultees. These cards will combine with telecommunications to enable electronic cash to be obtained in most homes or places of work. They might inhibit many types of crime, particularly if combined with a reliable form of personal identification. However, they will inevitably

provide new opportunities for fraud unless they include total safeguards against counterfeiting (or 'cloning') of cards, the use of stolen cards to impersonate individuals (thereby allowing further fraudulent activity) and other abuses.

4.33. Half of our Delphi respondents believe that resistance on social and ethical grounds will mean that it will never be mandatory to have such a card. The UK is seen as having reasonably strong scientific and innovative capabilities in the field of smart cards but its commercial capabilities are no better than average.

4.34. The security of existing smart cards appears to be unproven. Members of the panel were sceptical about the degree to which existing smart card technology protects against fraud and more research in this area may need to be undertaken.

4.35. The development of advanced biometric techniques such as the automated recognition of voices, faces, palm prints, even DNA, would open the way to more reliable identification of clients and trading counter parties. This would be a significant deterrent to many potential fraudsters. A substantial majority of our consultees believe that these developments will occur within 15 years. However, there is great concern about the social and ethical acceptability of these forms of personal identification.

4.36.

Many people feel that DNA testing is at least 15 years away from social acceptability as a means of authenticating transactions, even if technological obstacles could be overcome.

About a quarter of Delphi respondents feel that this use of DNA testing will never become socially acceptable.

4.37. There is a strong belief among our consultees that, during the next 10-15 years, periodic monitoring and auditing will be replaced by continuous, real-time, flows of information into the regulatory system. Real-time analysis could then be used to highlight suspicious events. There is not quite so much confidence that these measures will provide an effective deterrent against fraud and malpractice. More research into computational techniques for the analysis of regulatory information may be necessary. Respondents feel that the UK is very well placed technologically and commercially compared with other countries to take advantage of this type of development. Most of our consultees do not believe that social or ethical acceptability will constrain developments in this area.

Regulation and technological change

4.38. From an early stage in its work the panel heard concerns that, as the pace of technological change accelerates and as market structures evolve, regulatory bodies and financial institutions are finding it ever more difficult to maintain an appropriate regulatory framework. Laws and regulations which were drafted with one technological environment in mind sometimes become difficult to apply when technological developments stimulate changes in business practice. Of course, many other factors stimulate change in laws and regulations - technology is not the only driving force.

4.39. Whatever the motive behind the changes, they impose a substantial burden on many parts of the sector. Several financial institutions claim that amendments of IT systems in response to regulatory

change consumes substantial resources.

One major insurance company claimed that 60% of its annual IT budget was devoted to updating systems in response to regulatory changes.

4.40. Even if 1994 proves to be an unusually dynamic time for insurance regulation, this seems to be a very high figure.

4.41. Some developments in technology may lead to particularly difficult regulatory and policy issues. For example, if improvements in accuracy of insurance risk assessment make it possible for insurers to identify reliably very high risk individuals then some people could, in effect, become uninsurable for certain risks. If this happens then most respondents feel that public subsidy will be used to provide a "safety net". This safety net might, for example, guarantee a minimum level of pension and medical insurance for those who would otherwise be uninsurable.

4.42. It is quite possible that, at some time in the future, cash will be replaced by electronic alternatives as a common form of payment. Some individuals, such as those who presently find it difficult to open or maintain a current account, might in future be excluded from conventional forms of financial transaction. There was a strong divergence of opinion among our consultees on whether the regulatory framework would guarantee universal access to payment and money transmission systems in the event that cash disappears as a common form of payment.

Risk assessment and management

4.43. Several developments in different areas of science and technology appear to be combining to improve the assessment of risk. Some of these may bring scientific capability into conflict with social, ethical and regulatory acceptability.

4.44. For example, almost two thirds of Delphi respondents believe that, although technological constraints must be overcome, genetic testing and the analysis of lifestyle and behavioural data will provide the technological ability for personal insurance risk and credit risk to be assessed with high accuracy within 15 years. But almost a quarter of respondents feel that this approach will never work for assessing credit risk.

4.45.

A majority of respondents believe that the UK is in a strong position, both technologically and commercially, to take advantage of genetic testing and lifestyle analysis for insurance and credit risk assessments. However, over 90% of respondents believe that social or ethical issues will constrain developments in this area.

This view supports the findings of a recent study by the Nuffield Council on Bioethics [16] .

4.46. Improvements in risk assessment may lead to less controversial long term developments in the design of financial instruments. A large majority of respondents foresee that the ability to standardise and classify insurance liabilities will result in risks being quoted and traded on financial markets. Risk managers, meanwhile, will require new designs of traded security, the prices of which reflect economic indicators such as inflation and GDP. Most collective investments (unit trusts, investment trusts, etc)

will be offered with guarantees on risk and return. Although regulatory changes would be required, and the commercial viability of these ideas is untested, there appear to be no overwhelming constraints on their occurrence.

4.47. The panel recognised that other developments, for example in meteorology and mathematical modelling of the environment, could have substantial impact on risk assessment and management in some areas of insurance and the agricultural commodities markets. More Foresight work could be done in these areas.

Finance for smaller companies

4.48. Shorter investment cycles and the consequent increase in the significance of start up businesses will bring increasing demand for finance for smaller companies. Developments such as:

- improved risk management;
- better quality information on the performance of venture capital investments; and
- new designs of investment product (intellectual property bonds and collective investment products, for example)

4.49.

Over three quarters of the Delphi respondents foresee that within the next 15 years it will be easier to bring together smaller businesses and equity investors.

Respondents believe that this will come about through much less expensive standardised assessments of funding proposals from smaller businesses. These might include analyses of the background and past achievements of the company directors as well as analyses of their current business plan. Even more respondents foresee the securitisation of small business equity bringing a major expansion in the flow of funds into unlisted companies.

4.50 A significant number of respondents question the economic viability of standardised assessments of funding proposals, even though the UK is seen as having a fairly good capability in the scientific, innovative and commercial areas which would underpin such developments in smaller company finance.

CHALLENGES FOR THE FUTURE

Introduction

4.51. Many constraints and uncertainties on the financial services sector have already been touched upon in this report. In this section, we shall draw these together with subjective impressions of the sector which were formed during our consultative work. This allows us to identify some of the longer term threats facing the financial services sector as new technologies are introduced.

Brief impressions of the financial services industry

4.52. This study did not look in depth at the preparations which the financial services industry is making for the impact of new technologies. During the consultative work, however, we formed two

quite strong impressions of the way in which different parts of the retail financial sector (where new technology will have most impact) are preparing for the future. Some of these impressions were confirmed by third parties with wide experience of the financial sector.

4.53. Several clearing banks appear to be trying to seize the initiative by launching new forms of service delivery which take advantage of emerging technology. For example:

- the Bank of Scotland offers its "Home and Office Banking System" - using telecommunications for service delivery
- Midland and NatWest Banks are collaborating on the Mondex electronic cash system;
- NatWest and BT are collaborating on the trial of a multimedia banking system; and
- Midland and the Royal Bank of Scotland each have subsidiaries (First Direct and Direct Line, respectively) which offer mass market financial services by telephone.

4.54. Some clearing banks retain in-house R&D teams specialising in IT and communications technology. Some banks maintain links with scientists and technologists in Universities.

4.55. We found wide variation in the levels of technological awareness in insurance companies.

Some key players in the insurance industry have a relatively low awareness of existing technology.

This is surprising because the life insurance industry was at the leading edge in the use of computers in the 1950s and 1960s [17, 18].

4.56. Although there are notable exceptions, some people with responsibility for IT in insurance companies and in the reinsurance business seemed to have almost no awareness of current research activity in IT and communications technology and only a meagre understanding of the current state of the art in these areas. In one major organisation, for example, the person responsible for IT Policy had not heard of neural networks (one of the most publicised areas of research in advanced computing).

Longer term threats

4.57. In wholesale business, France and Germany are trying to challenge the UK's position as the Global financial centre in the European time zone. At the same time, emerging economies around the Pacific Rim and in South and Central America are establishing financial markets. Companies and financial institutions in these regions now have local alternatives to Tokyo, New York or London.

4.58. Increases in the size of the free world have brought unprecedented competition. The cost of capital is becoming an even more important determinant of competitiveness. Financial engineering techniques which can reduce the cost of capital will therefore continue to grow in importance.

4.59. The introduction of new technology has lowered many of the entry barriers to new participants in the financial services sector.

Effective use of new technology increases the speed with which new entrants can win market share from existing players.

4.59. Derivatives exchanges in Switzerland, Spain, Belgium and Germany have been established in the last few years - all of them relying on screen-based trading rather than open outcry. Some of these exchanges have bought their trading systems virtually off-the-shelf.

4.60. Retail financial business in the UK is facing upheaval as retailers and others outside the financial sector compete for business with banks, building societies and insurance companies. For example, General Motors is now a major credit card operator. Direct Line insurance is already the largest provider of motor insurance in the UK, having been established only a few years ago.

4.62. This may lower some of the entry barriers to new service providers as well as providing an opportunity to improve the profitability of retail banking operations. We may well see telecommunications companies becoming major providers of retail financial services, buying in the expertise they need to offer services to their existing customers.

SETTING PRIORITIES

4.63. The panel used a qualitative approach to identify priorities from the trends and opportunities which were identified during the consultative process. The panel was guided by a detailed checklist of prioritisation criteria which was available to all Foresight Panels[19]. The panel looked for priorities which had the potential to develop the following characteristics:

- (i) a substantial impact on the financial services sector
 - for example, through wealth creation or as a means of improving the quality of life for people in the sector;
- (ii) a wider impact on wealth creation and the quality of life outside the financial sector
 - for example, on retail and corporate customers of the sector, suppliers to the sector or the wider community; and
- (iii) a relatively high level of feasibility
 - bearing in mind that a range of social, technological, regulatory, educational, commercial and policy factors could influence the feasibility of each recommendation.

4.64. In essence, the panel tried to identify opportunities which:

- (i) have the potential for a high level of impact and could be made feasible if certain actions are taken; or
- (ii) have a relatively high level of feasibility and could make a substantial impact if certain actions are taken.

4.65. Opportunities which have both a relatively low level of feasibility and relatively little impact have not earned a high priority in this report. Opportunities which have both a relatively high level of feasibility and a relatively high level of impact may already be receiving adequate attention. This report may reconfirm their significance.

4.66. No measure of impact or feasibility carries unique authority. Companies or institutions operating

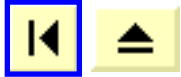
in particular market segments might make different assessments of high impact topics to those identified by the panel. A scientific research group and a regulatory authority might take different views on the feasibility of a specific area of development.

4.67. In practice, five issues were put forward by the community with much greater force and frequency than any others. After due consideration, these formed the basis of our recommendations. Discussions with representatives of some of the other Technology Foresight Panels showed that some of these issues have significant impacts on other sectors, particularly Retail & Distribution, IT & Electronics and Communications.



[Contents](#)





5. RECOMMENDATIONS

5.1 The education sector and employers in the financial sector should put more emphasis on IT education at all levels. This should span the teaching of keyboard skills in primary schools to improving awareness at Board level of the strategic impact of IT, particularly in the financial sector. This might be achieved by:

- a)** large IT companies and financial institutions sponsoring IT teachers and appropriate software, hardware and communications systems in schools and universities; and
- b)** financial institutions (perhaps through one of the trade associations or professional bodies) sponsoring awards for excellence in IT training at a senior level in the financial sector.

5.2. Financial institutions, professional bodies, the DTI, the Economic and Social Research Council (ESRC) and the Higher Education Funding Councils (HEFCs) should work together to increase competence in financial services and business decision making by launching new research programmes. The programmes might cover areas such as the design of financial instruments, tools for quantitative asset management, financial modelling and psychological responses to risk and uncertainty. This might be achieved by:

- a)** members of the Financial Services Panel canvassing potential participants and, with DTI, OST, ESRC and professional bodies establishing a working group to prepare outline proposals and monitor progress; and
- b)** the DTI, the ESRC and the HEFCs agreeing at an early stage to launch a new research programme (eg "The Innovative Finance Initiative") in collaboration with financial institutions and professional bodies if proposals of sufficient quality emerge.

5.3. There should be a common minimum standard in finance which is reached through a combination of degree-level education and approved professional experience. The minimum standard should provide a foundation for the development of a qualification which is recognised throughout and outside the financial services sector.

This minimum standard might be established by:

- a)** members of the Financial Services Panel working with professional bodies, large employers and major academic institutions to develop a specification for the content and standards for undergraduate courses;
- b)** the resulting specification being communicated to the academic sector, through the Higher Education Funding Councils, the Committee of Vice Chancellors and Principals and directly to the Heads of University Departments; and
- c)** the development by academic institutions of widely available undergraduate courses, leading to degrees which meet the academic requirements for the new minimum standard and which count towards membership of the major professional institutions in the financial sector;

The academic sector should also establish finance more widely as a subject in university degree courses in areas such as accountancy, economics, engineering, law, languages and management.

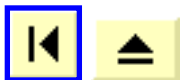
5.4. There should be a research programme to explore scientific and technological approaches for detecting and preventing fraud. The programme might cover areas such as data encryption, biometrics, transaction monitoring and analysis, artificial intelligence techniques for analysing behavioural patterns, high security for smart cards etc.

This might be achieved by:

- a)** Government Departments such as the Treasury, DTI and OST jointly commissioning a survey of relevant ongoing research in the UK and overseas;
- b)** Members of the Financial Services Panel canvassing potential participants in the programme and, with OST support, establishing a working group to draw up outline proposals and monitor progress; and
- c)** Public funding bodies agreeing at an early stage to make funds available (under the 'LINK' scheme for collaborative research, perhaps) if proposals of sufficient quality emerge.

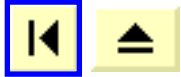
5.5. The regulatory framework should promote strong national infrastructures for telecommunications in the UK. The regulatory environment for telecommunications should encourage nationwide and local service providers to offer financial and other services (including education and entertainment) in combination with telephony, data transmission and video communications. To promote these developments over the longer term:

The DTI and OFTEL should, at the earliest practical opportunity, describe the regulatory framework which will be introduced for the telecommunications industry as existing Government commitments to franchisees expire.



[Contents](#)





6. CONCLUSIONS AND FUTURE ACTIVITIES

6.1. The Technology Foresight Programme provides a unique opportunity to consider the long term implications for the financial services sector of technological and related changes. The financial services industry is a large and successful component of the UK economy and has become a major user of technology. Long term foresight activities are well established in some industries but relatively unusual in the financial sector. The work was therefore timely.

6.2. This report focuses on the trends and market opportunities which were identified during the Programme and on the recommendations for short term action arising from these. The recommendations are important and we, and others, shall work vigorously to promote their implementation. But they are not the only outcomes from the work. The Programme has also:

- (i) stimulated new thinking in many organisations about the implications of technological change;
- (ii) started to promote improved communication between the financial services community and related sectors such as retailing, IT and communications; and
- (iii) allowed a constructive new dialogue to begin between some financial institutions and the industrial and academic scientists whose work could underpin the investment proposals of the future.

6.3. We believe that these developments will bring lasting benefit to the financial services sector. As the recommendations in this report are taken forward, there will be further opportunities to promote dialogue and long term thinking.

6.4. The Technology Foresight Programme was never intended to be a one-off exercise which would wind down with the publication of reports such as this. In our recommendations we have identified a number of actions. Some of these could be undertaken, coordinated or overseen by a new body which had its membership drawn from a number of different sectors of business and a number of different academic disciplines. In many respects this might be a successor to the current Technology Foresight Panel on Financial Services.

6.5. We, or our successors, might also return to the results of the Delphi survey and other consultations to update them periodically. In the longer term, we shall be among the many people who are interested to see how many of the detailed events foreseen by the community come to fruition.

Acknowledgements

We wish to acknowledge the vital contributions which were received from participants in the Delphi survey, respondents to our earlier questionnaire, interviewees and others. Without the benefit of their

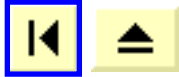
views and expertise we could not have prepared this report. We also wish to acknowledge the practical assistance which was given by many organisations in providing venues for meetings and other generous hospitality.



[Contents](#)



Progress Through Partnership: 3 Financial Services



[Contents](#)



7. REFERENCES

- *1. Jenny Ireland, Report to the Technology Foresight Panel on Financial Services, London Business School, July 1994.
2. Technology Foresight Programme: Statistical Indicators for Financial Services, Department of Trade and Industry, October 1994.
3. The City Table 1993, British Invisibles, September 1994.
4. For example, the forthcoming Conference on "Computational Intelligence for Financial Engineering, New York April 9-11, 1995, sponsored by the IEEE and the International Association of Financial Engineers.
- *5. Delphi Questionnaire on Financial Services, Cabinet Office, 1994.
- *6. The Technology Demographics Roadmap in IT and Electronics, Office of Science and Technology, 1995.
7. Proceedings of the Foresight Forum, Office of Science and Technology, HMSO, 1994.
8. Proceedings of the Conference "Technology Foresight: The Scottish Dimension", IBM and Scottish Enterprise, Glasgow, 1994.
9. Robert L Carter and Peter Falush, The London Insurance Market: Issues and Responses, 1994.
10. Jim Bannister, The London Non-Marine Insurance and Reinsurance Company Market - Retrospect and Prospect, DYP Group, 1994.
11. World Invisible Trade 1994, British Invisibles, 1994.
12. Statistical Indicators were prepared by the DTI for each of the 15 panels in the Technology Foresight Programme.
13. The Competitive Advantage of Law and Accountancy in the City of London, Subject Report XE, The City Research Project, London Business School, September 1994.
14. Anthony D Smith, International Financial Markets - The Performance of Britain and its Rivals, Occasional Papers XLV, National Institute of Economic and Social Research, Cambridge University Press, 1992.
15. Andreas Prindl, The Case for a Financial Services Institute, Presidential Address to the

Chartered Institute of Bankers, 1994.

16.

Genetic Screening: Ethical Issues, Nuffield Council on Bioethics, 1993.

17.

A C Baker, Ordinary Life Office Organisation Using A Large-Scale Electronic Computer, 1955, Journal of the Institute of Actuaries, vol81, pp 203-237.

18.

C A Lundie and A D Wilkie, Possible Applications of Computers to Life Assurance Problems, 1968, Transactions of the Faculty of Actuaries, vol 30, pp 261-272.

19.

Prioritisation Criteria: A Paper to the Foresight Steering Group, April 1994, SQW Ltd and PREST.

*

Copies of these documents are available from the Office of Science and Technology.



[Contents](#)



Progress Through Partnership: 3 Financial Services



[Contents](#)



Annex A

(i) SENIOR REPRESENTATIVES OF THE FOLLOWING ORGANISATIONS WERE INTERVIEWED DURING THE CONSULTATIVE PHASES OF THE PROGRAMME

Association of British Insurers
AT&T
Bank of Scotland
Barclays Bank
BBC
BT Laboratories
CSC Index
First Direct
Halifax Building Society
Hewlett Packard
Ivory & Sime
J Sainsbury
Legal & General
London Insurance and Reinsurance Market Association
London Business School
Mercury Communications
Mondex
Noble Grossart
Reuters Holdings
Royal Bank of Scotland
Science Policy Research Unit, University of Sussex
Scottish Provident
Scottish Equitable
Spider Systems
Standard Life
The WM Company

(ii) SENIOR REPRESENTATIVES OF THE FOLLOWING ORGANISATIONS COMMENTED ON A DRAFT OF THE RECOMMENDATIONS CONTAINED IN THIS REPORT

The Chartered Institute of Bankers
The Chartered Insurance Institute
The Engineering and Physical Sciences Research Council
The Institute of Chartered Secretaries and Administrators
The Natural Environment Research Council
The Securities Institute

Progress Through Partnership: 3 Financial Services



[Contents](#)



Annex B

QUANTITATIVE STUDIES OF THE FINANCIAL SERVICES SECTOR IN THE UK AND OVERSEAS

The following studies are among those which were considered by the TechnologyForesight Panel on Financial Services during the preparation of this report:

- (i) A report 'The London Insurance Market: Issues and Responses' commissioned by the Association of British Insurers, the Institute of London Underwriters and the London Insurance and Reinsurance Market Association (LIRMA). As well as providing a concise description of this important part of the financial services sector, the report provides data on the changing size of the market and provides many international comparisons. It also identifies macroscopic issues facing the market now and in future.
- (ii) A study, commissioned by the London Underwriting Centre and LIRMA, on 'The London Non-Marine Insurance Market - Retrospect and Prospect'. This includes a description of the LIMNET electronic market network and gives an assessment of the future of the market.
- (iii) 'The City Table' and 'World Invisible Trade 1994' which are published by British Invisibles. These contain substantial amounts of data on the overseas earnings of the financial services sector and compare the international performance of various parts of the financial services industry with overseas counterparts. The data is compiled on a different basis to some other analyses.
- (iv) 'Statistical Indicators' from the DTI. These cover contribution to GDP, employment, output, trade and international comparisons of trade in financial services.
- (v) 'The Competitive Advantage of Law and Accountancy in the City of London' is published by the London Business School. It is part of their study into the competitive position of the City of London. The report covers both the performance of legal and accounting firms in their own right and as important suppliers to the financial services sector.
- (vi) 'International Financial Markets: the performance of Britain and its Competitors'. This reports the results of a study which was funded in the early 1990s by the Bank of England, Government Departments and private sector institutions.