COMMISSION OF THE EUROPEAN COMMUNITIES

FAST

1984 - 1987

OBJECTIVES AND WORK PROGRAMME

BRUSSELS, February 1984

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INTRODUCTION

This document presents the draft work programme of FAST II, drawn up after consultation with the other Commission services concerned and a first exchange of views with the Advisory Committee for Programme Management.

The **first part** (GENERAL OVERVIEW) recalls the agreed programme and briefly sketches the conceptual framework and the division into priority research themes. It also contains a presentation of the operational steps applied, the 'products' in view and the methods of working.

The **second part** (RESEARCH THEMES AND WORK PLANS) puts forward a detailed description, for **each priority theme**, of :

- the field of analysis (why ? its meaning and its interest for community actions)
- the specific subjects to be studied
- the methods of work proposed ("in-house" activities, contracts, network activities...)
- the expected "products"
- the proposed calendar

The **third part** (RESOURCES AND ORGANISATION) describes the human and financial resources available, the role of visiting scientists (fellows), the nature of the tasks to be undertaken by the "10+1" network, and other operational aspects.

Such as it is, the draft programme seems ambitious. Nevertheless it is written within the framework defined by the Council of Ministers, taking into account the opinion of the European Parliament and the Economic and Social Committee.

PART ONE

GENERAL OVERVIEW

THE PURPOSES OF THE NEW PROGRAMME

The main aim of the FAST programme remains the multidimensional analysis of scientific and technological change so as to highlight their implications and consequences for the common R+D policy and for other Community policies.

The new programme should therefore propose timely priority options for new long-term orientations for Community action in the fields of research chose by the Council of Ministers, namely :

1. relations between technology, employment and work
2. transformation of services and technological change
3. the emergence of new strategic "industrial" systems in the fields of communication and of food
4. integrated development of renewable natural resources

FAST's other major task during the coming four years is to strengthen the foundations of prospective thinking in Europe by multiplying European cooperative networks between centres of research in Community countries and national institutions responsible for long-term work.

THE CONCEPTUAL FRAMEWORK (Outline)

1. Points of departure

Research carried out under the first FAST programme has shown that a long-term Community strategy for science and technology should adopt anintegrated approach to problems of industrial change, in the framework of an economy that is more and more acquiring world-wide dimensions; and to problems of social change, most particularly those concerning employment and the metamorphosis of work.
Providing this is done science and technology can be powerful factors in **relaunching economic and social development.**

A "new development". The growth that used to be the order of the day during the 50s and 60s has slowed down or even ceased altogether, and a new wave of technical innovations, linked in particular to microelectronics, leads one to think that the advanced countries are undergoing a "third industrial revolution" (*). Changes at the level of attitudes and behaviour, albeit less spectacular because less visible than the technological changes, also confirm the usefulness of the concept of "new development" as a guiding concept for the

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* The impression of undergoing a transformation of society was present prior to the appearance of the new technologies. For the past 20 years there has been discussion of the "leisure society", the "post-industrial society", the "programmed society" ...

study of the evolutionary developments or abrupts changes possible in our societies during the coming years.
From the viewpoint of a European analysis, these evolutionary developments and abrupt changes are the outcome and cause of transformations which merit study at several levels : namely,

a) the societal system
b) the European system
c) world society.

a) The societal system

Industrial society is in crisis because its material basis (technology stock, resources, productive equipment) and the aspirations of individuals (transformation of work, living conditions, values ...) are in course of structural transformation.

We can discern the nascent profile of a new generation of goods and services, stimulated in particular by the multiple and rapid applications of the new technologies of information and communication. We are witnessing strategic repositioning by the actors, sometimes spectacularly : new protagonists come into being, amongst the "organisers" of the "growth". The rules of the game are changing, new practices are developing and imposing themselves.

b) The European system

In this context, and for other reasons specific to the process of European integration, Europe is in search of a

new visibility. Between the "national system" seeking to maintain and redefine its autonomy and functions, and the growing "transnationalisation" of the economy, Europe exists only with difficulty : the Europeans do not play the "European card" where it is needed, and at the appropriate time.

It is indeed rarely that **within** the Member States people think in European terms of the "new development", the European dimension being still thought of and perceived rather as a dimension which belongs to the universe of foreign policy.

However, some authoritative voices are increasingly being raised within the Member countries - particularly following the setback of the latest Athens summit - in recognition of the strategic importance of **European solutions**, acknowledging that Europe is a dimension essential for the "new development", whether one is speaking of research, new technologies or North-North relations. It is within this context that the implementation of **new Community policies** derives its strategic validity for the long term development of European societies.

c) <u>World society</u>

The reorganisation of world society by new actors, around new geo-economic, technological and political data, has acquired a new dimension. The internationalisation of the economy, along with the explosive development of the world technologies (microelectronics, nuclear energy, satellites, telecommunications ...) is facilitating the production,

distribution and consumption of mass products and services at world scale. This contributes to a "unification" of the world through the market-place, while any new "public sector" organisation of world society faces difficulties in its conception and implementation. Here lies the paradox of the "new development" at world scale : the problems of our societies are more and more frequently global, but there is a mismatch between the globality of the problems, the transnational action of the private actors, and the "localised" action of public authorities.

2. The priority themes

In the light of the above, a fundamental problématique lies at the heart of the activities of the new programme : what can and should be the role of European science and technology in the search for "new development" ? (See Diagram 1).

FAST I demonstrated certain major challenges for Europe, related to the transformation of the production system and the metamorphosis of work. The programme studied, at macro-economic level and for certain specific aspects, the implications and consequences of the pervasion of society by information technology. Similarly also with the major possible transformations associated with the development of biotechnology, particularly in land use, energy, health, the chemical industry ...

The task with which FAST II is charged is to make use of and add to these analyses and results, in order to identify the

significant elements, the favourable factors and possible and desirable processes of the "new development" for the long-term future of European societies. On this basis, there have then to be formulated proposals for Community actions to be undertaken during the coming 5 to 10 years, both within the science and technology field, and in view of the growing interactions between this field and other Community policies (*).

Figure 1 provides an overall view of this focussing of the field of analysis and its inter-linkages, around new priority themes, linked by several logical principles. It is clear that there are close links, for example, between the themes TWE (Technology, Work and Employment), SERV (the transformation of service activities) and SIS-COM (the new strategic industrial system built around the function "communication").
Similarly closely related are SIS-ALIM (the niew strategic industrial system built around the function "food supply" (or "alimentation") and RES (integrated development of renewable natural resources).

The link between the themes TWE and RES is at first glance less obvious. However, the FAST studies have demonstrated that medium and long-term policies for employment in Europe demand the consolidation and renewal of Europe's industrial base, in particular arond the "agro-chemo-energy" axis, that

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* For example, see inter alia **Technological Change and Social Transformation**, communication from the Commission to the Council of Ministers, COM (84)6, Brussels, January 1984.

is based upon an integrated development of our natural resources. The following sections will show in detail how some of the research activities planned in the context of the TWE theme are complementary to other activities in the RES and SIS-ALIM themes (for example, the studies on the future of the farm workers).

The second part of this document provides a detailed description of each theme, the rationale for its choice, the specifically European research activities, their execution etc.

Before this, it is appropriate to describe the operational approach chosen, the products envisaged and the proposed working methods.

PROBLEMATIQUE AND THEMES OF ANALYSIS OF FAST II

Towards a conceptual framework

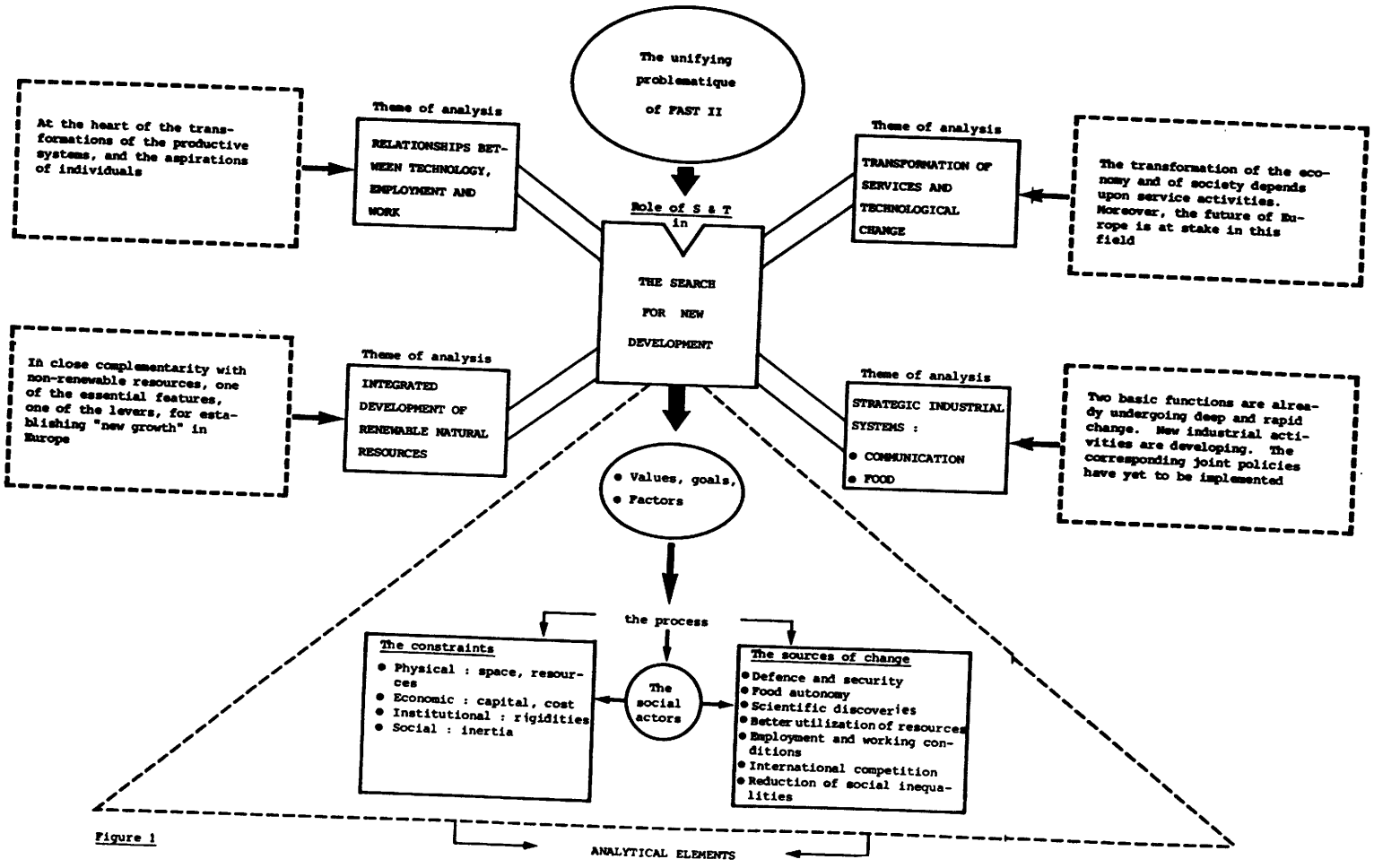

Figure 1

THE OPERATIONAL APPROACH

1. Basic principle

FAST I was an opportunity for experimenting with a tool : prospective research as an intrument for identifying new priorities for European R&D. For this purpose, it promoted collective deliberation by about a hundred of the Community's research institues on the long-term development of European science and technology. This led to one **major product** : the Final Report, bringing together the results of 36 research projects and making recommandations for new directions for common R&D (*).

So far as the new programme is concerned, at the request of the Community it has been given a more operational character signified by greater interaction with the users (the other Commission services, the European Parliament and the Economic and Social Committee, and many related requests in the member countries).

Thus FAST II will place more emphasis on the "continuous process" aspects (through the development of networks); but above all, instead of devoting all its efforts to the production of just one final product (the report), FAST II will aim at producing **many products,** each one addressing some specific need of the Community institutions.

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* Europe 1995", ed. Futures, 1984, London

This general principle is justified for three specific reasons :

a) one of the main tasks of FAST's activities is to provide inputs to the periodic revisions of the "programme framework of the Community's scientific and technological activities". This role requires that finished products become available from time to time throughout the whole duration of the programme.

b) as required by the programme decision, the Commission must submit a first report to the Council and in the European Parliament by mid-1985. As a consequence visible usable results must be produced between now and 1985. Moreover, these first products will be needed to allow the new Commission which will be convened in 1985 to form its own opinion on the usefulness and validity of FAST's activities.

c) the new programme is based on a much greater emphasis on working through networks, (particularly the 10+1 network), which itself implies the necessity to prepare diverse and "immediate" products with which to feed the networks so as to obtain their reactions.

2. Identification of the products

In addition to the FINAL REPORT, and the research reports, the work of FAST will be expressed by THREE TYPES OF PRODUCT, namely :

- proposals for initiatives by the Community (PIC)
- strategic dossiers (DOS)
- "new openings" (NOV)

Proposals for initiatives by the Community (PIC)

A "community initiative" should be understood as a coherent collection of different actions (economic, industrial, financial, institutional, R+D) to be undertaken by the Community.

As its title suggests, this will be a document containing a series of proposals submitted for attention by the Commission authorities, with the supporting reasons, main guidelines and principal contents of a possible Community Action Programme. This will, of course, still have to be defined in precise and operational terms by the responsible services of the Commission. The function of the FAST programme will be limited to that of formulating the concept of a programme and the justification of why it is opportune.

Strategic dossiers (DOS)

These will be dossiers (30-40 pages + annexes) giving a factual statement of the matter under consideration and of the challenges posed for the Community and the member states, suggesting the broad lines for alternative joint actions at European level.

This "product" might be compared to an expert report ordered by a national government on, say, available options for introducing computers in schools; or by a cement company wanting to know whether, and in which possible directions, it might be appropriate for it to diversify into the new biotechnologies. Unkike the PIC, the DOS does not formulate proposals but is limited to the examination of current options, and for each option the clarification of the implications and consequences for Europe.

Thus, one or more DOS will constitute the raw material, or semi-finished product, for a PIC.

New openings (NOV)

These will be specific analyses, designed :

a) to provide new avenues of reflection drawn from the works of FAST (I and II) and from research conducted by other organisations both within and outside the Community.

b) to highlight the opportunity for certain initiatives (particularly in R&D) in domains new for the Community or at the interfaces between several sectoral policies.

A NOV forms part of the function of "watchtower","monitoring", or "stirring of ideas" which is the role of any prospective deliberation. The boundary between a NOV and DOS is fairly

easily established : the former is a product whose purpose is theoretical, methodological, informative, pedagogic. Its to "attract attention". The latter's role is to provide a purposeful, operational product, in practical and "political" terms. Its function is to "clarify the field of choices".

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* *

In addition to these three categories of product, it is intended that **six FAST conferences** be organised, each being at once both raw material for a DOS or a NOV, or even a PIC, and a final product complete in itself.

Each conference will have a central aim, namely :

- to determine the current state of knowledge and to identify priority needs for new knowledge, or
- to provide a timely "watchtower" on some major problem, or simply to "toss about ideas".

In order to ensure that these conferences are of practical interest and operational value, and at the same time to reinforce the cooperative and horizontal (cross-linking) character of the FAST activities, each conference will be organised in collaboration with :

- other Directorates-General of the Commission, or
- a Member-state Government, or
- the European Parliament, or

- the Economic and Social Committee (*)

3. The research activities - the "How ?"

Each priority theme is the object of a series of research activities, bearing on specific aspects, but inter-related. These activities will provide the ingredients for the various PIC, DOS and NOV.

The title and content of these activities are described in the following section, which also specifies the linkage between the activities and the "products".

In order to carry out its research activities, FAST will use three "instruments"

- in-house research by members of the FAST team, and "scientific visitors" or "fellows", seconded to the FAST team for a limited period (12-24 months) and a well-specified task (responsibility for a "product" or a research activity)

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* The first of the conferences took place on 10-12 January 1984. This was jointly organised with the Commission's Directorate-General for Social Affairs, and in collaboration with the European Centre for the Development of Vocational Training (CEDEFOP) and the Foundation for the Improvement of Human Living and Working Conditions (Dublin Foundation), and its theme was "Technology, Work and Employment". The main goal of this conference was to review the state of existing knowledge within the Commission and elsewhere, on the relations between technology, work and employment; and to establish a "basic framework" for the accumulation of further knowledge.

- external research (via contacts with outside bodies)
- research via **ad hoc networks**, particularly in the framework of the "10+1" network.

When the required value added, in teams of knowledge, can be produced by pooling and circulating throughout the Community existing knowledge, the most appropriate means will be to work by network. By "networking" on a specific subjet is meant work involving several researchers and research centres in Community countries coordinated by a member of the FAST team or a "fellow", based on exchange of information and working papers, small working meetings of 2-3 days, bilateral agreements, and the final drafting by one on more members of the network of a synthesis document.

When, on the other hand, the knowledge desired or deemed necessary does not exist, use will be made of external contract research.

In all cases (including in house research and that of the fellows) the FAST team will operate in conjunction with a "collaborative network" of colleagues in the other interested services of the Commission, through specific "clusters" (each being an association of two or more Commission colleagues relating to a FAST "product").

FAST - GENERAL OVERVIEW

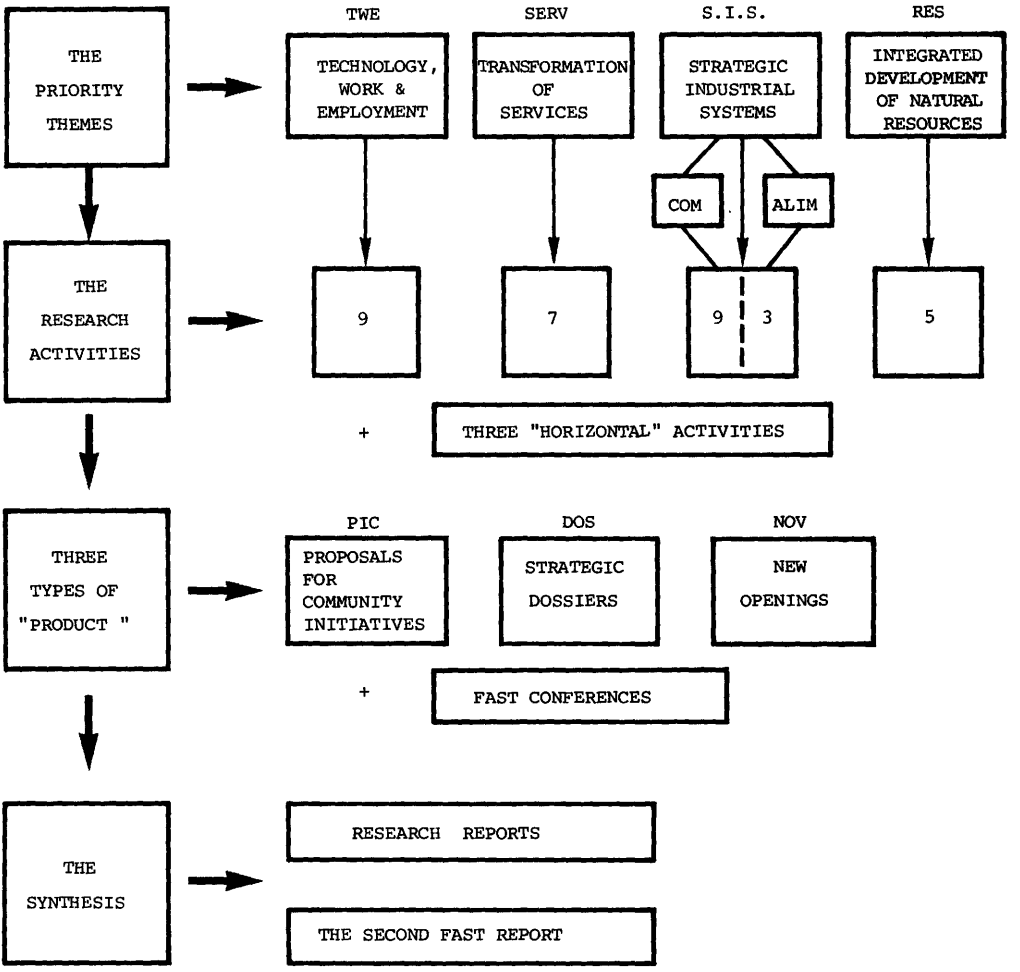

Figure 2

PART TWO

RESEARCH THEMES AND WORK PLANS

THE RELATIONSHIPS TECHNOLOGY, WORK AND EMPLOYMENT (TWE)

1. Why this theme ?

The introduction of the "Work and Employment" theme in FAST I gave rise, as will be recalled, to a number of objections. For many people, such a theme had no place in a programme of forecasting and assessment in science and technology.

To-day it is no longer necessary to "defend" such a choice, as the theme is now within the priority category of national study programmes on research and technology.

However, it remains necessary to specify the reasons why it is felt that FAST activities in this field will contribute a specific and useful addition to knowledge as a basis for action, taking into account other work in course and envisaged by the other services of the Commission (*) and by "Community" institutions such as the European Foundation for the

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* Particularly by DG V (Employment, Social Affairs and Education), the Task Force for Information Technologies (ESPRIT programme, Telecommunications) and DG III (Internal Market and Industry) who are launching in 1984 a major study of the European machine-tool industry.

Improvement of Working and Living Conditions (Dublin) and CEDEFOP in Berlin (*).

One essential element of the reply lies, it seems to us, in the major fact highlighted by FAST I :

- the **employment crisis** in the countries of the Community is a **European problem,** in the sense that while it may be true that joint and coordinated strategies at European level for "re-industrialisation" of our economies do not necesssarily guarantee a solution to the employment crisis in the short or medium term, it is no less true that the absence of such strategies will cause national strategies to be precarious and risky;

- there is no hope of a return to traditional "full employment" : it will not be enough to dose our economies with powerful shots of technological innovation to see unemployment rapidly mopped up, for over the next 5-10 years technological innovation will offer fewer new jobs than can be created by thoroughgoing transformations of the productive systems of advanced industrial societies.

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* The Foundation is currently elaborating its new 4-year plan, 1985-88. CEDEFOP is the principal centre for analysis and discussion, at the disposal of the European Communities, in professional training (including relations with technological change)

The FAST studies have posed the problems and outlined some routes to their solution; but in truth, **prospective study of the technology - work - employment relationship remains to be done (*).**

The TWE sub-programme therfore has a **triple objective.**

a. to pursue **deliberations on the future of employment and unemployment** over the next 15 years and the **role of technological change,** particularly with a view to improving the theoretical and methodological bases for prospective work in this field.

b. to identify the **current options for benefitting from new technologies** with a view to an effective transformation of the European productive system and the reorganisation of work.

c. to outline the **fields of possible long-term action at Community level** in the light of the results obtained under a) and b).

2. Key Aspects

Through all the employment changes, what appears as one of the dominant facts in the current evolution of western society is

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* This statement was accepted by all participants at the January 1984 conference previously mentioned.

the **transformation of work** (in particular, a transition from the standard "block" working pattern to the "open" pattern) (*). This "transformation" is only in its earliest stages : but there are several signs which suggest that, partly because of new technological factors, the nature and the reality of work are liable to change within the next 15-20 years.

In order to assess the future possible developments, it seemed to us desirable to give priority to :

- the construction of **European scenarios for work**

- analysis of the future of certain categories of workers and employees with a view to highlighting the **critical occupations**

- study of the **transformation of industrial sectors**, starting from the scientific and technological innovations in progress and in prospect between now and the year 2000, particularly in the fields of robotics and automation, "photonics", and new materials.

2.1. <u>European scenarios for work</u>

This concerns the construction of a European **"basic framework"** for possible and foreseeable changes in the links between technology, work and employment.

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* cf. Chapter III.

In what way will this transformation of work become apparent? Through what new working patterns ? Will we see the emergence of common patterns in all European societies, apart from the inevitable and desirable factors specific to local and national conditions ?

What will be the direction and rhythm of the transformation ? Is it possible to conceive a "no unemployment" European economy within the next 5, 10, 15 years ?

What will the structures of job distribution look like in the member states ? Where are the opportunities, where the major risks ? How can we go about ensuring that within the various sectors of the world of industry and work, there can be active participation whereby everybody concerned may take an active part in the development and mastery of the new technologies ?

2.2. People and their jobs : contrasting futures

Whether or not one is unemployed, the employment problem is henceforth a living reality for the majority of Europeans (*). Perceptions of the problem and attitudes towards the future vary with individual situations. A poorly-qualified young man of 20, a migrant worker, or a 40-year-old woman, unqualified and burdened with children, all have reasons for fear about their present and near-term future.

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* This emerges from many national and international equiries. cf. that carried out in 1982 in the framework of the "Eurobarometer" survey, on the theme "Unemployment and job-seeking"

On the other hand, there is justifiable hope for those who have the qualifications for working with increasingly automated or computerised production workshops or service activities.

Thus there are some **"critically placed"** careers which may be profoundly altered (as will be the case for **agricultural workers** during the next 30 years), or whose nature and role will be at the heart of a major debate over the next 10-15 years (one thinks of **teachers**). The turbulent changes involving these two groups are due not to new technologies alone, but the latter act as catalysts for the abrupt changes which are in gestation, or as amplifiers of other types of transformations already under way.

There are also careers in the ascendant (as is the case for "brainworkers").

One problem specific to Europe is that posed by the ageing of our populations. The growing number of over-50-year-old workers and employees in our firms poses considerable problems. Although this concerns people who are capable and often desirous of playing an essential role in the functioning and the future of firms and offices, have we to suppose that the "over-50s" are in the near future going to become a heavy burden on the European economy ?

Finally, the **organisation of remunerated work and the places in which we do it** could undergo significant changes between

now and the start of the 21st century, for a growing number of people : one might refer to **tele-working** and, in particular, to the "return" of work to the home. Which categories of persons might be the most affected ?

2.3. The transformation of industrial sectors

Several "families" of new technological tools are at work and are transforming the universe of machines, systems and technical networks which serve to support the material and immaterial activities of man.

This involves :

- electronics and its development in informatics office systems, telecommunications, robotics, flexible manufacturing systems
- new and alternative energy systems
- new materials (including composite materials)
- new technologies of light (the laser, fibre optics, systems for the acquisition, treatment and classification of images).

Their impact on production systems requires no further emphasis; whole sectors of industry are being transformed as we watch. However, not evenything will change as quickly as is believed. It will, for example, take several more years for the steel industry to re-establish a new equilibrium and a new

outline. The same is true of the textile industry, and of all the other sectors said to be "mature". Nor will everything be so profoundly affected as is suggested. The car industry has certainly been shaken by the oil "shock" and by anti-pollution regulations, but an apparent tranquillity appears to have been regained. Nevertheless it can expect to enter a period of major turbulence in the 1990s, through the introduction of highly advanced production systems, the development of integrated "on-board" electronic systems, of new materials, new fuels, new engines. The same is true for the chemical industry, machine-tools, agro-food.

The study of the industrial and economic impacts of the new biotechnology was a central activity in FAST I. We return to this topic, but limited to the analysis of renewable natural resources, and the function "food supply".

As for the new information technologies, they are to be further considered in FAST II in order to advance the study of their relationship to work and employment, as well as their impact on the transformation of services, and their role in the emergence of the new strategic industrial system built around the function "communication".

In the field of new and alternative energy systems, significant prospective work is being carried out for the Commission under the direction fo D.G.XVII (Energy) and in collaboration with D.G.XII (Science, Research and

Development), through the construction of "European energy scenarios for the year 2000". FAST has been associated with this work from its beginning. Moreover, a wide-ranging R&D programme on non-nuclear energy has been proposed by the Commission. For these reasons, study of the European energy system in FAST II is confined to certain future developments considered in the context of theme 4 (renewable natural resources).

Given these "basic data", it seemed appropriate and useful to concentrate the work of FAST II on areas of turbulence created in industrial sectors as a result of innovations in the following three technological "families" :

- robots and the new automated production systems (integrated, flexible, etc ...)
- the new "technologies of light"
- new materials.

3. The research activities

There are nine of these :

- European scenarios for work (TWE1)
- The end of the farmworker (TWE2)
- The teachers : transformations and prospects (TWE3)
- The "brainworkers" (TWE4)
- The over-50s (TWE5)
- Tele-working ("distance" working) (TWE6)
- Robots and new production systems : work in the factories of the future (TWE7)
- Industrial prospects and "technologies of light" (TWE8)
- New materials : an industry in transformation (TWE9).

* TWE1. European scenarios for work ($)

The objective of this activity is to provide a coherent view of the prospects for the development of the relationships technology-work-employment in European societies, through the construction of a limited number of alternative scenarios.
For this purpose, the point of departure will be the elements contained in the scenarios created in the context of FAST I, as well as the scenarios available in the member states.
(Including in particular macro-economic analyses, and studies on the reorganisation of working time and the development of the "informal" economy).

($) This sign means that research activity will to be the subject of a contract

This activity has a triple objective :

- to characterise the system of work in the Community (in its diversity, by the various actors who participate, and their medium and long-term strategies ...)

- to identify the tensions and the sources of change in existing regulatory mechanisms, and to "project" possible developments of the system, particularly in connection with technological change (*).

- to highlight the implications and consequences for work and employment of coherent alternative policies, integrating at European level industrial and technological policy and social policy.

Based on the in-house work carried out within the FAST team (by a "fellow"), and on the network activities, this research activity could be the subject of a contract research study of about 6 months' duration, starting late '84/early '85, and for which the Commission contribution would amount to 30.000 écus.

(*) In doing this, account will be taken of the analyses carried out in the context of the "horizontal" research activity on "Macro-economic and technology" (see pp 184)

* TWE 2. The end of the farmworker - New farmworkers ($)

Between 1960 and 1980, agriculture in the countries of the Community shed about 17 million jobs. In 1981, there remained only some 8,5 million "farmworkers", or 7,9% of total civilian employment in the Community.

And yet the rural exodus is not over : one can expect new reductions in rural numbers in Italy, Greece, Spain, Portugal ... How many million ? Where will they go ?

Agriculture remains the sector characterised by the highest number of independent workers (71,6% of total agricultural employment). This percentage has come down over the years. What will it reach over the next 20 years ?

Our **starting hypothesis** is the following :

The farmworkers who "stay" will probably not be the farmworkers as we know them. The growing interaction between agriculture, chemicals and energy (see also Theme 4 - Resources, and Theme 3B - Food) will force the farmworkers towards becoming rather "bio-managers" integrating various land uses for multiple purposes. Changes which have taken place in nutritional science and food processing technologies are already posing strategic problems as to the choice of processes and products : where, and for whom.

The same is true for the new technologies of information and communication : new possibilities are opened up for the processes of production, maintenance, control, storage and distribution. In these circumstances, the obsolescence (both economic and social) of the equipment and machinery in current use may become increasingly significant over the next 20-30 years. This will not be without consequences for regional disparities between Northern and Southern Europe, and in each Member State of the Community.

What then are the possible perspectives for development ? Where do the major critical challenges for the Community lie, in which producer or user sectors for this equipment and machinery, and in which regions of the Community ?
In short, what sort of people will these "new" farmworkers be, who will be capable of using biological fertilisers and pesticides, of using a panoply of new tools both in the fields and in the "office" ? Is it sufficient to suppose that they will be like to-day's U.S. farmers ?

It is also possible that agriculture (in the widest sense) could again become a major source of job creation, through new products and services that it might be capable of generating. Is such a hypothesis plausible ?

To implement this research activity, it will be necessary to have a multidisciplinary European team (ideally comprising an agricultural economist, a rural sociologist, a biotechnologist, a specialist in information technology ...)

Duration of the research : July '84 - June '86
Commission contribution : 80.000 écus (contract) + 10.000 écus to finance network activities.

* TWE 3. The teachers : transformations and prospects

From the growth years of the 70's (up by around 50%), the number of teachers is apparently destined to fall during the 80's (if it follows the data for the population of students). "Forecasts" for the year 2000 (just 16 years away !) are more uncertain.

But apart from the quantitative aspects, what is at least as important is the possible transformation of the function of education and training itself, and not only through the tools of informatics (see "Communication and Education" in the framework of the Theme "Communication").

Our **starting hypothesis** is, in effect, that the reform of teaching methods, at all levels, will be at the core of the debate over the next 10 years on how European societies are to get to grips with the so-called "Third industrial revolution". The adaptation of school and of training to new scientific and technological data has already become quite banal as an imperative - or a slogan. For many, to remedy Europe's scientific and technological backwardness accumulated over the past 30 years demands a "revolution" in the teaching, before, within, and in alternating periods with periods of paid activity in employment. There is much talk also of a second

cycle of re-education around 40-50 years old, or of continuing education on an "open" system such as that of the "Open University" in Britain.

There are other factors which also point to the need for "reform" : in 15-20 years' time the cabling of our towns and villages, linked with direct broadcasting (by satellite) and the ever-increasing pervasion of informatics tools and equipment in the factory, the office and the home, will create the foundations for new forms of individual learning, complementing, alternating or conflicting with the education system currently the responsibility of our institutional system.

The **goal** of this research activity is to study how far and in what ways the **teaching function** will be modified, as a result of these developments, and what new demands will be created for the **teaching of teachers.**

In defining the precise **content** and **results expected** of this activity, account has to be taken of the work currently in progress under the direction of DG V (education sector) and at CEDEFOP in Berlin in the field of professional training and teacher training.

The **approach adopted** will have to be based upon as wide an assessment as possible of innovative experiments in course or planned in the countries of the Community. Given the complexity of the theme, resulting also from national and

locally specific features, this activity will be carried out by networking

Period of execution : September 1984 - February 1986.

* TWE 4. The "brainworkers" ($)

The starting hypothesis is as follows : whether one considers computer manufacture (mainframe, mini, micro ...), the design of software, custom-built or for general use, the implementation (management, control and revision) of large complex programmes or numerous small programmes simultaneously executed by multiple users;

- the design and operation of flexible workshops and expert systems;
- the communications/opto-electronic networks which will develop in the 1990s;
- the numerous applications in which the new information technologies and the new biotechnologies converge (in both biology and pharmaceuticals);
- the new ceramics or organic "metals",

one is brought to realise that a new generation of professions and capabilities, based upon an ever-increasing integration of "grey-matter", is already with us. It can only increase in the coming years, through further ramifications and through interactions between several fields.

The goal of this research activity will be to enquire into the prospects, challenges and problems relating to this category of people; and, for this purpose, the **resulting product** should specify :

- the characteristics of these "new" workers (how many of them ? have many in 15 years ? Who are they ?)

- their significance in industrial and service activities (what is their role ? what their terms and conditions of employment ?)

- the foundations and the "networks" associated with their training.

This activity is closely linked to activities TWE7, TWE8 and TWE9. As with the previous activity, it has to be executed in cooperation with CEDEFOP.

——→ Period of execution : July '84 - December '85.

——→ Commission contribution : 60.000 écus (contract) + 20.000 écus for finance of networking.

* TWE 5. The "over-fifties"

The age structure of the European populations over the coming decades will undergo a profound and unprecedented transformation (an ageing of the demographic structure).

This senescence will affect particularly the population group described as "of active age", i.e. between 20 and 60 years old, in the sense that in 20 years' time, we shall (apart from Greece and Ireland) see an active population no longer containing a majority of young adults, as in recent years, but rather of mature adults, with the most numerous age-cohort in the active population being those in their fifties.

This situation is already constituting a problem for many firms. It strongly affects their personnel policy. Thus, the "over 50s" risk having to pay the cost of the persisting economic crisis.

The ageing of our populations will have other consequences for work. Towards the year 2000, between 15 and 20% of the population will be over 65. If these men and women are sent into retirement at 60, or 55, or even at 50 to make room for younger people, it is almost certain that we shall see the development of new forms of work (semi-active, voluntary, and above all unreported clandestine, "black" working).

Will it therefore be necessary to establish new laws and measures to prevent the emergence of illegal working practices ? Will we have to abandon the idea of a fixed retirement age ? (*)

Structured around the organisation of a **conference,** this activity will seek to answer **four main questions :**

- What will be prospects for employment and work for over-50s active and capable of remaining so far another 15 or 20 years ?

- Is it any longer possible to think of spending one's whole active life in the same career or by the same methods, when one knows the scale and speed of technical changes at present and during the next 20-30 years ?

- What effect does age have in learning new knowledge, new patterns of logic, new techniques ? What do we know in this field ?

- What can be done at European level to present and/or counteract the effects of certain apparently "inevitable" phenomena ?

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* On these points, see inter alia the work presented at the "Age and Activity" conference organised by the European Centre for Work and Society (at Maastricht) in 1983, directed by Evelyne Sulleyrot.

———→ Conference date : early '86

———→ Commission participation : 30.000 écus.

* TWE 6. Distance Working ($)

The return of teleworking, particularly in the home, through informatics and telecommunications has in recent years provoked a great deal of interest, and above all a multitude of speculations. Research project B5 of FAST I emphasised that there is no question of waiting until 1995 for a social transformation of the organisation and conditions of work, thanks to the spread of teleworking (*).

Other studies have similarly insisted on the difficulties of discerning realities from the various myths which are gathering around the teleworking theme.

Amongst these myths, those concerning the consequences of teleworking for women (within the context of the larger

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* cf FAST series nr. 10 "Vie quotidienne et nouvelles technologies de l'information, 1983 par P.A. Mercier, F. Plassard et V. Seardigli.

problématique of the relations women-employment-technology (*), and the possibility of greater individual working autonomy, have been the most rich and controversial (**). The underlying questions, however, deserve the allocation of serious effort going beyond the current stage of speculations, to perceive the realistic possible forms within the "myths", the most probable and the most desirable.

For this purpose, and taking account of the fact that this theme should naturally be one of the main lines of work at the Foundation for the Improvement of Living and Working Conditions, Dublin, it is for the moment envisaged to execute a specific, short-term (8-month) activity, centering on **an inventory of experience of full-scale teleworking in Europe.**

Based on this inventory, it will then be possible :

- to identify the experiments which merit further "multiplication"
- to formulate detailed hypotheses on possible and desirable developments in terms of a certain number of key variables.

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* Cf. FAST FOP 54 **New Technology and Women Employment** 1983, by Chris Zmroczek and Felicity Henwood

** Cf. inter alia, E. Monod, researcher at CESTA (French Centre for the Study of Advanced Sciences and Technologies) "le télétravail ou l'arbre qui cache la forêt", in **"Les Temps Modernes"**, No 447, October 1983, pp 671-690, and C. Liprig Mummé, **"La Renaissance du travail à domicile dans les économies développées"**, in **"Relations industrielles"** ,No. 3., 1983.

→ Period of execution : November 1984 - June 1985

→ Commission participation : 35.000 écus (contracts) + 15.000 écus for networking.

* TWE 7. Robots, and new production systems : work in the factories of the future ($)

Progress in electronics and information technology has made possible a new approach to the problems of manufacturing production. Beyond the use of new machines or equipment, even more sophisticated and automated (CAD, CAM, NCMT, robots ...) lies the possible application to manufacture of the concept of "integrated flexible systems", as revolutionary as the introduction of the assembly line.

Our **starting hypothesis** is that the concept of the "flexible manufacturing system" (FMS) (*) implies a radical revolution relative to pre-FMS industry : FMS integrates instead of chopping into elements; it is flexible, instead of locking the process into a fixed sequence.

At present, there are known to be 45 installations in Japan of flexible integrated manufacturing systems, some thirty in the USA and some 30 in Europe (17 of them in the FRG)

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* The current term used in French is "ateliers flexibles" (flexible workshops)

It would appear that the UK is the Community country in which industry and government circles have shown the greatest interest in FMS : it is estimated that around 25 systems will be installed in the next few years (*).

As FMS are closely dependent upon industrial robotics, this activity will also involve a prospective analysis of the development of robots (the world population of robots has been estimated as around 31.000 units at end of 1982, 42% of this in Japan forecasts of the world population in 1990 lie in the range 230.000 to 330.000 for industrial robots).

The problems relating to the long-term industrial and technological development of FMS, particularly those concerned with R&D, are already the subject of ongoing activities in the ESPRIT programme (European Strategic Programme for R&D in Information Technologies). Also within the Commission services, a major investigation on the future of the European machine-tool industry has been ordered by D.G.III (Internal Market and Industrial Affairs), while certain aspects of professional training are or will be studied by CEDEFOP.

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* Information provided by a study on the state of the art in FMS in Europe, currently in progress, in the framework of the FAST programme.

Hence the **content** on which this research activity should focus is the following :

- the main "driving forces" and their method of operating, for the development of robots and FMS in the Community (opportunities, constraints and challenges to Europeans) and, more particularly, the place of the Community in the processes of innovation (who innovates ?), of production and of utilisation (who buys them ?) (*)

- the problems of control, maintenance and repair of these highly complex technical systems
- the implications for management
- the implications and consequences for the economy, for employment and for work, in the next 15 years
- the new forms of work organisation which these new techniques allow, and which are sought after by those drinving the process of change.

The research activity will start in April 1985, for a period of 18 months. It is desirable that the contract team should comprise an engineer, an industrial economist and a socioligst of technical systems, the **main objective** of this research being to identify the new nature of the conception of work (work design), and the analysis of the opportunities for, and

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* In his recent work, "L'Usine du Futur Proche" ("The Factory of the New Future"), (Agence de l'Informatique, Paris, 1983), J. le Quesiment describes the position of Europe as follows : "strategies which are ambitious but scattered".

the obstacles to, participation by the persons concerned in the process of designing new systems.

Period of execution : April 1985 - October 1986.

Commission participation : 75.000 écus (contracts)

* TWE 8. Industrial prospects for the "technologies of light"

By "technologies of light" (or **photonics**) is understood every method, process, product or system whose function is to study, measure, transform or transit by means of light. This technological "family" includes :

- lasers and their accessories
- fibre optics and their accesories
- systems for the capture, processing, classification and exploitation of image data (in particular, technologies for visualisation)

As with any "family" of new technologies, these new technologies of light are both intrinsically and extrinsically combinatory. Progress achieved in any one of the three fields will have repercussions on the others. This is equally true for significant progress within other technological "families".

These three technologies are in their infancy as regards both technological maturity and industrial applications, and hence as regard their capacity to satisfy economic and social needs.

The **objective** of this activity is to contribute to laying the foundations of a **European prospective in this field,** by highlighting :

- the creative potential which the new technologies represent, in terms
  of process innovation (continuing, for example, to future progress in robotics), and of product innovation (in the biomedical field, amongst others);
- analysis of the abilities of the European industrial system as regards the production, transfer and utilisation of these technologies;
- opportunities for the creation of European public markets in the next 10 years
- training aspects, and university-industry links
- secondary effects (economic and social) of the most significant applications of these technologies.

Amongst the **products expected** will be

- proposals for European R&D actions
- assessment of the "foreseeable" impact an employment during the next 15 years.

Having regard to the "consciousness-raising" role attached to this research activity, it will start in June 1984 and will be executed via networking.

* TWE 9. Industry on transformation : the new materials ($)

Prospective studies an new materials are numerous in all countries of the Community - and for good reason, since materials have entered a prolonged period of transformation, the beginnings of which are already of major significance. For instance

- a new generation of steels (biphasic, with dipersides, rephosphorated ...) is under development

- more and more "plastic" metals are being made
- nuclear and space technologies have given rise to a new generation of ceramics
- "exotic" mixtures are starting to appear and demonstrate their reliability and usefulness (metallic glasses, organic "metals").

Many authorities see this as the start, as in the case of informatics or biotechnology, of custom-built, or made-to-measure, "materials". If this be true, it would indeed represent a fundamental technological "evolution", for it would imply a real reconception of the products towards which

we are progressing in the coming years : not simply a question of substituting composite materials for metals, but of entirely redesigning each element, and hence of rethinking the very way in which the structures of a product are designed and created.

This "transformation" is of fundamental importance, because in order for it to take place, it will be necessary for the whole of the economy to undergo profound modifications, from the studies and engineering offices to the financial and marketing departments of enterprises.

For this reason, the main goal of the FAST research activity on new materials will be to **identify the nature and sources of obstructions and obstacles to diffusion of new materials during the next 15-20 years** and to specify the principal options for their development which are available at European scale (*).

Regarding the **content** of the research, it will have to focus on :

- the creative potential associated with the new materials, particularly in terms of product innovation
- the strengths and weaknesses, from now to the year 2000, in European industrial capacity, particularly as regards the transfer and diffusion of innovation **within** and **between** the countries of the Community.
- The future of the European public markets
- potential effects on employment

- implications and consequences for the European research system

——→ Period of execution : October 1984 - February 1986

——→ Commission participation : 75.000 écus (contracts)

4. The Products

The results of the nine research activities described above will be brought together in

- two "strategic dossiers" (DOS1 and DOS 2)
- two "new openings" (NOV1 and NOV2)

The date envisaged for the delivery of each "product" by the FAST team is mentioned, indicatively, in parentheses; the links between research activities and products are shown in Table 1.

- DOS 1. Man-machine relationships (mid - 1986)

This is a major theme for the 1980s and 90s. The goal of this DOS is to identify and to set in hierarchical position the technical, economic and social challenges of the increasing

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* For this purpose, use will also be made of the research work on materials in course and envisaged in the context of the European Community's Joint Research Centre.

automation of human activities - since the field of man-machine relationships is not pre-determined, it will be the aim of the DOS to clarify the possible choices between the different options for long-term development.

- DOS 2. Industrial sectors in turbulence (October 1986)

For the sectors shown to be of major importance for growth and employment in Europe, what is required is a **synthesis** of national and European studies of the implications and consequences of the new technologies, and an identification of the "options", at European scale, for alternative developments; taking account of national and international factors (constraints and opportunities).

- NOV 1 Transnational and local technologies
(september 1986)

For every region (country or continent) a balance between the mastery of transnational and of local technologies is a condition for success. How are production systems to be organised in relation to these two different categories of technologies ? The significance of Europe as the **scale** at which possible equilibria may be sought.

- NOV 2 - Self-employment (early 1987)

Paid employment is becoming the almost universal pattern of remunerated work (even in the agricultural sector, the trend is towards a continuing decline in the number of independents). On the other hand, we are witnessing the surge of "informal" work. Questions are also being asked about the "return of work to the home", linked to the new technologies ... which it is suggested might facilitate new "independent" patterns of employment.

Questions are asked about the future of voluntary workers - the "voluntariat". There is talk also of "new entrepreneurs" and new patterns of economic relationship, what in fact are the prospects for the development of new patterns of self-employment ?

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As will be seen from Table 1, it did not seem necessary or appropriate to "produce" a proposal for initiative by the Community (PIC), as there are already a number of significant action programmes in this field.

It will probably in 1984 and 1985 be the subject of new communications and proposals to the Council of Ministers.

Amongst the four products proposed, two occupy a special place : indeed, it is around the options to be analysed in connection with these two products that will be redefined, on the one hand, the re-industrialisation of Europe; and on the other, the development of a new synergy between man and machine. Along with the research activity on European scenarios for work, these constitute the fundamental basis of the TWE sub-programme. The diversity and richness of the subjects makes evident the significance of the work to be entrusted to specialised research centres, as well as the role of the network activities.

Tables 2 and 3 provide a summary of the resources envisaged for each research activity, and the time schedule of the activities.

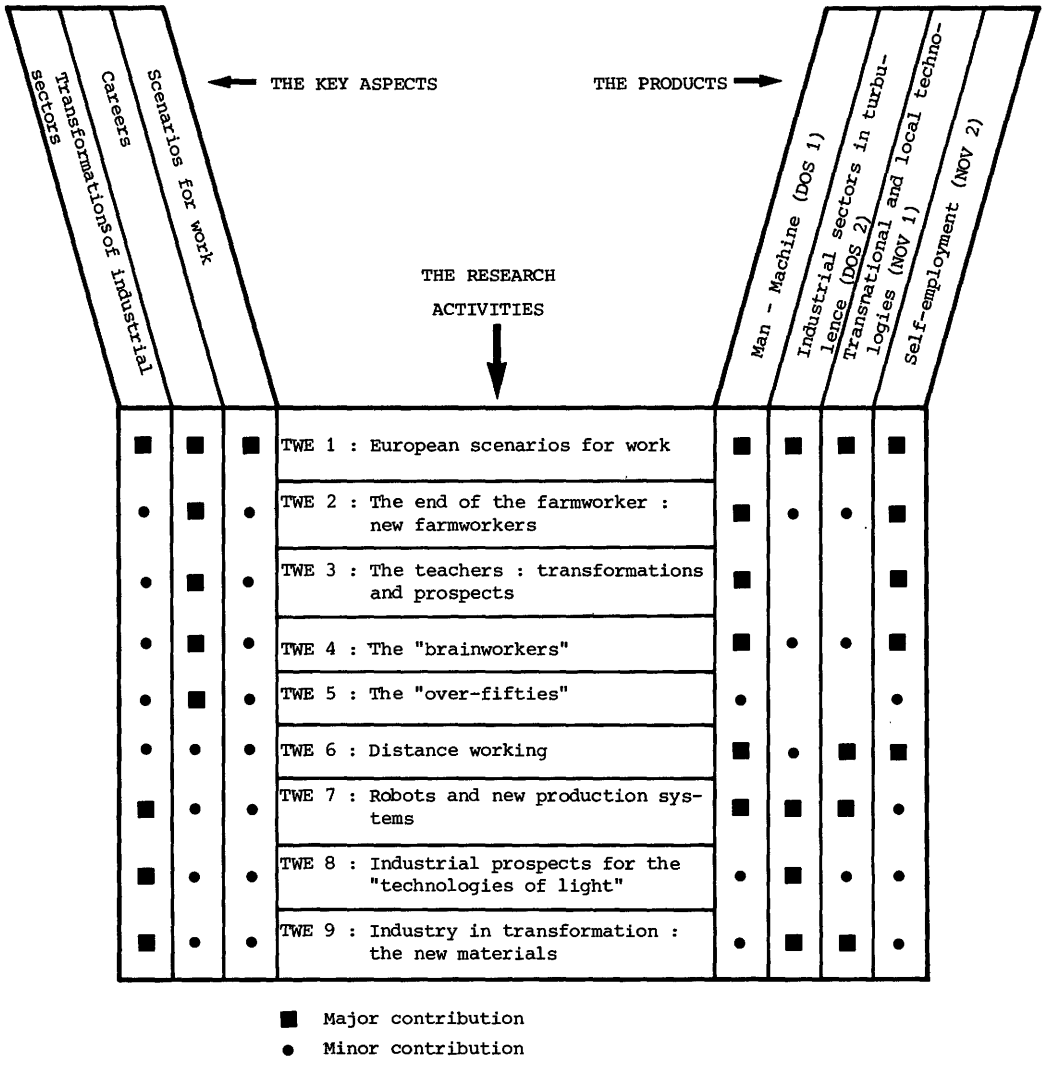

Table 1 : Technology, work and employment (TWE)
(Overall picture)

Table 2. Technology, Work and Employment (TWE)

Budget (in ecus)

Research Activity		Total	Contract work	"Networking"	Other resource
TWE1	European scenarios for work	60.000	30.000	30.000	F and ///
TWE2	The end of the farmworker: new farmrworkers	90.000	80.000	10.000	///
TWE3	The teachers : transformations and prospects	60.000	-	60.000	*
TWE4	The "brainworkers"	80.000	60.000	20.000	*
TWE5	The "over-fifties"	30.000	Conference		*
TWE6	Distance working	50.000	35.000	15.000	*
TWE7	Robots and new production systems	75.000	75.000	-	///
TWE8	Industrial prospects for the "technologies of light"	60.000	-	60.000	
TW9	Industry in transformation: the new materials	75.000	75.000	-	///
	Total	580.000	355.000	195.000	

Key : F = Fellow

/// = "In-house" inter-service network

* = Work of CEDEFOP and the European Foundation, Dublin

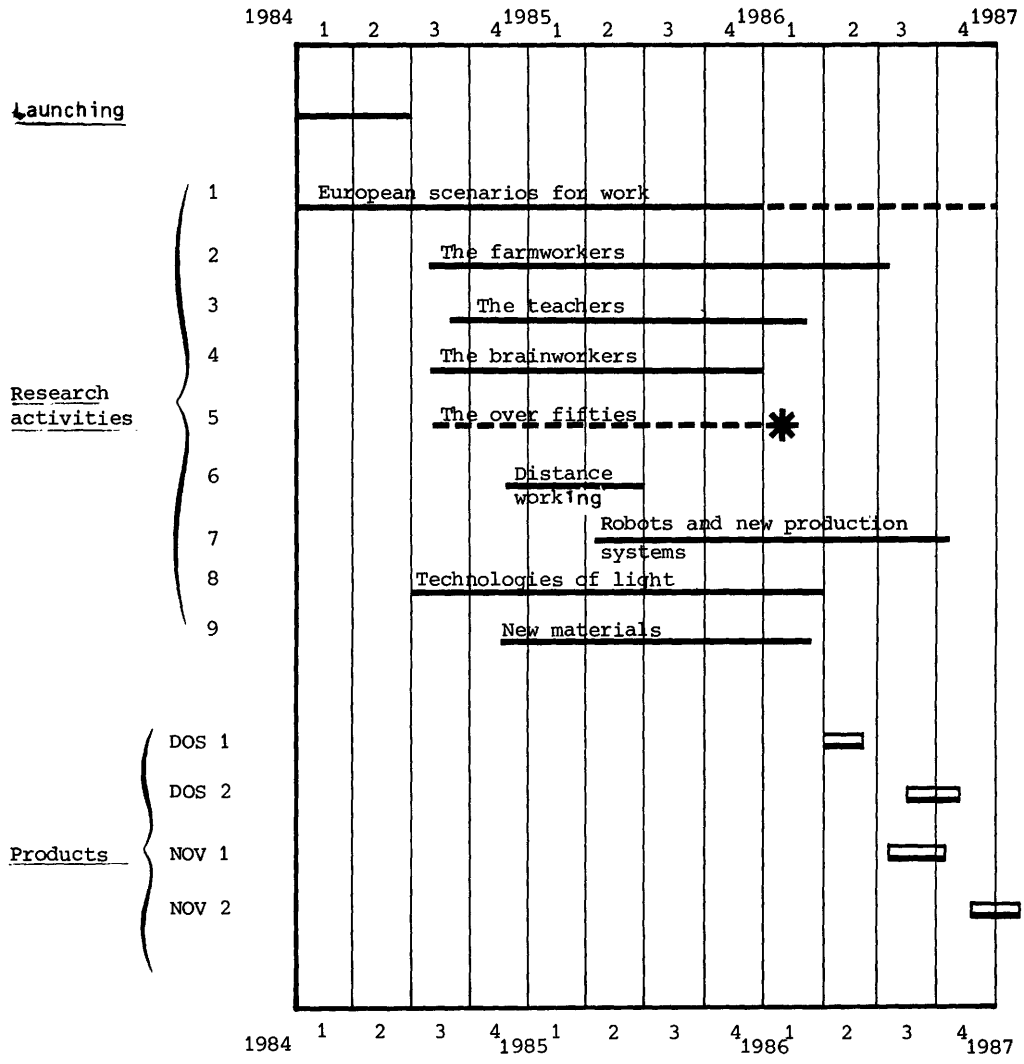

Table 3 : Technology, work and employment (TWE)
Schedule : January 1984 - start of 1987

THE TRANSFORMATION OF SERVICES AND TECHNOLOGICAL CHANGE (SERV)

1. Programme Rationale

A number of research activities undertaken in FAST I drew attention to the challenges posed to the Community by the development of service activities. They have demonstrated that service activities represent the greatest part of employment and value added (i.e. output) in Europe (*). To this considerable economic and social significance has recently been added a major new phenomenon : the current technological chages are contributing to a transformation of the very nature of production tasks, and it seems increasingly probable that service activities are also (perhaps especially) going to play a major role in the organisation and operation of production systems (**).

These technological transformations also affect the nature of the objects produced. They are becoming more complex, more "active", and in short they provide an ever-growing range of services (cf. for example the electronic items related to the

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* Cf. project A4 : research on the determinants of employment - the role of the SMEs (in particular)

** Cf. projects A1-PRESTO, A2-Chemicals, A2-Construction, A2-Repair.

development of "bureautique" (office information systems), or of audio-visual materials (*).
And going further, the **life-style** of Europeans is itself linked to the development of services, both in their professionnal working environment and in the home.

Moreover, two important facts have become apparent :

- the services sector is little known. Its heterogeneity, the absence of appropriate statistical data, and the absence of operational analytical tools undoubtedly explain the lack of exploratory research efforts in this sector. It now appears high time to remedy this deficiency.

- the service sector is little considered. It does not receive from the many leading political and economic figures the attention it deserves. This collective myopia no doubt derives from the fact that we still confuse **productive** activities and **manufacturing** activities; and that we view services as support activities, of low or zero productivity **.

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* Cf. FAST FOP43 : **The future of service employment in Europe** by J. Gershuny and I. Miles, Publ. F. Pinter - London 1982

** Whereas in fact the statistics, albeit inaccurate, indicate that the share of "non-productive" services (public administration, education, health, public transport, etc...) is clearly the minority (of the order of 25 to 30 % of the total reckoned as service activity)

Whatever the reasons, the services are not sufficiently treated in an integrated way, either in investigations or in policy, either at national or at Community Level. (Yet the first FAST programme showed, amongst other things, the strategic importance of a policy for R&D applied to service activities ...).

In these circumstances, it appears to us that it will be useful to bring part of the research effort of FAST II to bear upon the theme of the **transformation of service activities,** which seem very likely to constitute one of the essential elements of the process leading European societies towards the "new development". This effort should lead to the formulation of a series of proposals to ensure that Community policies can take account of this major fact : the rise of services.

2. The Challenges

If the long-term development of European societies depends upon **mastering the design, production, distribution and consumption of services,** it is essential to ensure the pre-conditions for such mastery. The major objective of this programme is to identify how far **the Community as such should be a participant in this process.** So what will be the implications for Community policies ? Is it appropriate to prepare a "European dimension for service activities" ? What form should this take, what actions should be initiated, in particular for innovation, for R&D ?

To tackle this central question, it seems to us necessary to adopt a long-term position in relation to two distinct challenges (without ignoring the linkages which unite them) :

- the structural challenge (for individuals, groups, firms) : transformation of services and new society

- the territorial challenge (for regions, countries, continents) : transformation of services and the inter-regional division of labour.

a) The structural challenge : transformation of services and new society

Broadly speaking, we way take it that service activities are divided between trading services to firms (40%), trading services to individuals (30%) and collective services (30%).

To these categories, which are duly analysed within the framework of the national accounts, should be added all the "informal" activities of the domestic economy (*).

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* Households in fact "produce" predominantly services for their own consumption (maintenance and repair of the home inheritance (capital stock), education, administration, transport, leisure ...). It is estimated that the volume of this "production" represents, in industrialised countries, almost half of gross national product, i.e. an amount equivalent to that of services within the "format" economy.

But a **prospective** analysis of service activities cannot limit itself to studying separately these different fields. For the demands made upon the trading sector, the collective sector and the domestic sector are not independent. They are capable of influencing one another, and it is probable that the technological changes in progress may modify the boundaries between them, for two essential (and related) reasons :

- through the appearance of technical objects capable of modifying the nature of current services and the ways in which they are provided, or of offering new services,

- through the evolution of **real productivity** in the production of services.

What is needed therefore is an understanding of how far the transformation of service activities could constitute one way of emerging from the crisis, and of its consequences for socio-economic structure; with a view to proposing alternative options for the management of this transformation of European societies.

b) <u>The territorial challenge : transformation of services and the Inter-regional Division of Labour (IrDL)</u>

The ways in which individuals, firms and public authorities will divide between them the roles in the production and consumption of services in industrial societies will certainly be a characteristic feature of the perspectives for "new

development" in Europe. But there is another fundamental dimension : that of the location of service activities, which will undoubtedly contribute massively to the increase or reduction of the inequalities between Europe's regions (*), and between the regions of the world.

It is probable that within the domain of the market economy, economic actors (firms, public authorities) are going to adopt the same approach as for manufactured goods : Taylorisation, globalisation, specialisation. We might witness the progressive establishment of a new IrDL, organised around specific comparative advantages. The regions which will have at their disposal these advantages (telematic equipment and networks, satellites, data banks, appropriate institutional framework, expertise, trained work-force, small and medium-sized enterprises, etc.) will control the invention, production, distribution and consumption of the services of the future.

The establishment of this "new world order for services" poses a whole series of fundamental questions :

- what are the implications for the North-North and North-South challenges ?

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* Cf. in particular the results of the PRESTO studies, and of the project "Employment in service activities" within the framework of the FAST II programme.

- what place will Europe be capable of securing ? What therefore should be the role of the Community ? Should it implement a "Common Market for service activities", or should each Member State rather play its own card on the world market for services ?

- what should each of the regions of Europe be doing to improve its chances of deriving benefit from the potential of the "new development" opened up by service activities ?

- considering the public authorities, or various social groups, are they not rather going to seek to preserve the status quo, or indeed to oppose the "globalisation" of service activities, in order to retain control of their development ?

Prospective analysis of these challenges and answering these questions will require first of all a series of studies and research activities, to clarify certain crucial points (*).

3. The research activities

What will be needed are activities which will bring together existing information, provide a conceptual and methodological

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* These points were developed in a workshop on the future of service activities, organises by FAST at Brussels in June 1983, involving participants from the various services of the Commission and a dozen national experts.

basis for the programme, or clarify the prospects through the construction of scenarios. These activities will focus upon :

- productivity in the services (SERV1)
- technical tools for the "new" services (SERV2)
- household and services (SERV3)
- the international division of labour and the organisation of markets (SERV4)
- services to the manufacturing sector (SERV5)
- the role of services in regional development (SERV6)
- the future of banking activities (SERV7)

* SERV 1 - Productivity in the services ($)

According to many economists, productivity in services has grown much less rapidly than in the manufacturing sector. This situation may limit the development of tradeable services (while encouraging recourse to "do-it-yourself" at household level) and of non-tradeable services (through causing their costs to reach levels insupportable by the Community).

What will be needed will be :

- to define the concept of productivity within each of various service activities, and to elaborate indicators;
- to review the evolution of productivity in various service activities (chronological series, international comparisons);
- hence to deduce the significance of various comparative advantages;

- to review how technological changes in progress might modify the situation over the medium or long-term;
- hence to deduce, as necessary, proposals for improving the effectiveness of the European services production system, guided by the analysis of the determinants of productivity in service activities.

Such a research activity will be the subject of a contract with a specialised institution. It could be undertaken on the basis of analyses of some branches (banks - consultants - administration, for example).

To carry out such a research activity, there will be needed a good socio-economic knowledge of the services sector, mastery of statistical data and tools, and an ability to manipulate concepts inasmuch as the traditional approach to productivity will have to be significantly modified (particularly by taking qualitative factors into account).

Such a research activity will be the object of a **contract with a specialist institution.** It could be conducted by starting from the analysis of some branches (for example, in banks, consultancy or administration).

——→ Planned duration of the study : 9 - 12 months (starting september 1984)

——→ Commission participation : 40.000 écus.

* SERV 2 - Technical tools for the "new" services

A wave of technical objects (often associating "hardware" and "software") is currently breaking over our societies. The portable telephone, the pocket TV set, the active memory card, the home computer, etc. are unquestionably going to transform both our professional activities and our leisure activities.

Which of these are amongst the most significant, in terms of their socio-economic impact over the next 10 - 15 years ? To what new service activities will they give rise ? Who will develop them ? Who will adapt them to the needs of Europeans ? What are the opportunities for them, or the brakes on their diffusion ?

The object of this research activity is to clarify routes for the prospective analysis of the services of the future (NOV 8), and to specify :

- the possible content of an innovation policy covering both products and services
- R&D requirements on the technological items considered.

It will be conducted essentially via the **FAST networks** (through workshops)

——→ Planned duration : 12 months (starting June 1984)

——→ Commission participation : 50.000 écus.

* SERV 3 - Households and services ($)

We have already noted the major role played by households, both in the consumption of collective and traded services, and in the production of services for themselves. Moreover, several studies have emphasised the fact that any prospective view of services demands a simultaneous view of household activities (*).

A certain number of key points will in fact largely determine the conditions for the development of several services, and in particular

- the comparative evolution of the price of services (a cinema place, for example, or a laundry) and of the price of equipment enabling households to provide for themselves an equivalent service (video equipment, or washing-machine),
- the free time available to households and the division of roles within the households,
- technological evolution (networks, home computers), and the consequent possible transformation of "proximity services" (which demand face-to-face contact between people) into telematic "distance services",

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* Cf. in particular "The future of service employment in Europe", doc. FAST FOP 43, and "New Information Technology and Women's Employment", doc. FAST FOP 54.

- the role of the public authorities (privatisation/collectivisation).

Hence, various scenarios are possible, with the corollary of correspondingly diverse development strategies. Their development constitutes the object of this research activity. Hence there will have to be deduced the **implications for the Community policies concerned** (social and economic policies, consumer protection, infrastructures, etc ...), and to be clasified the **new interdependencies** which appear, linking these various policies. It will therefore be necessary to show a good mastery of the prospective approach, and **to have analysed household economics.**

The research activity will be implemented jointly :

- via a **research contract** with a European group of research centres,

- via the activities of the **FAST network** of national units (the "10 + 1" network).

——→ Planned duration : 18 months (starting November 1984)

——→ Commission contribution : 60.000 écus (contract) + 30.000 écus (network)

* SERV 4 - The international division of Labour and the organisation of markets ($)

Services to-day are overwhelmingly produced and consumed on a national basis, with certain notable exceptions (tourism and transport, for example). In many cases, de facto situations or regulatory measures limit the possibilities for export or transfer of various service activities.

This situation might change during the coming years, for at least two reasons :

- technological change (particularly progress in telecommunication, telematics, software etc.) making possible the production **elsewhere**, at lower cost and more easily, all or part of many services (*);

- growing political pressure for the liberalisation of trade in services (**).

Hence one has to ask if we are not going to see a **sharpening of the movement towards the international division of Labour in services**, with a simultaneous reorganisation of markets.

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* For example the case of editing of text or images, consultation of data banks, advisory activities etc.

** Cf. in particular the studies and discussion in progress at the OECD and within FAST.

What will be the key factors determining the location of service activities ?
What the necessary infrastructures, particularly at international level ?
Who will be responsible for them ? What regulations will be necessary ?
What are the various conceivable scenarios ? What their consequences ? What will be the Community's role in these ? What lessons are to be derived from them, particularly for action by the European public authorities ?

The Commission services have already undertaken significant work on some aspects of these questions (*). Others have already been embarked upon in the activities of research centres working on international questions.

It is envisaged that the execution of this research will depend upon the "**in-house network**"and on a **contract study with a specialist institution.** This institute will need to be familiar with the problems related to the international division of labour. Through the evaluation of recent and current work, it will have to confirm or invalidate the central hypothesis of this research activity, to show where the possible conflicts between the actors of the international system may arise, to analyse the possible medium and long-term implications for the European economies, and to deduce the

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* Particularly through the interservice group "Interna-tional Trade in Services", launched on the initiative of Directorate-General I (External Relations).

proposals necessary to stee Community action towards deriving the maximum benefit from the developments envisaged.

——→ Planned duration of the contract : 9 months (starting January 1985)

——→ Commission contribution : 50.000 écus.

* SERV 5 - Services for the manufacturing sector ($)

Services to firms constitute the largest part of service activities. What is needed is an evaluation, for the next 10 - 20 years, of the evolution of the needs for services in various types of firm, along with the evolution of the services available.

This research activity could be constructed on the basis of **case studies** of some significant sectors, both on the side of demand for services (vehicle industry, chemical industry) and on the supply side (advisory services to firms, engineering, catering, ...). In each case study there must be an analysis of how the phenomena of "dematerialisation" of production activities take place and are anticipated, with a presentation of the resulting problems, for the firms both providing and using services. By way of example, one may mention :

- finance of "non-material" investment;
- training, qualification;
- adaptation of the structure of the enterprise, the effect of scale, the reorganisation of tasks;
- small and medium-sized enterprises and services;
- innovation and R&D in and for services, etc.

Finally, the research activity should indicate the necessary policies and measures (particularly at Community level) for accompanying the adaptation of the European economic capabilities to the conditions of this "new development".

For its implementation, it is planned to rely on the **FAST network** of national units ("10 + 1" network), and to place a **contract** with a research centre, whose main role will be to provide a framework for the network activities.
The centre will in particular have to organise workshops, working seminars, will have to solicit expert contributions, etc ... in order to bring together and make use of European expertise on these questions.
There will be needed a thorough knowledge of the European industrial scene and of the service activities for industry and required by it, as well as the ability to mount and inspire working seminars.

——→ Planned duration of contract work : 12 months (starting September 1984)

——→ Commission contribution : 60.000 écus (contract) + 20.000 écus (network)

* SERV 6 - Role of service activities in regional development ($)

The object of this research activity is to review the way in which service activities have contributed and could contribute to the development of various European regions.

- What are the key functions determining the location of service activities (services to firms, to households, to collectives bodies) ?

- What are the comparative advantage with which the regions should equip themselves in order to profit from utilising the development potential displayed by service activities?

- What could be the contribution of the services produced and consumed within the framework of the "informal" economy ? What are the complementarities, the synergies, or the possible conflicts between the services of the market economy and those of the informal economy ?

- How can regional policies integrate the "services" dimension ? In particular, how are they to favour the mastery of using the new technologies for the development of services, particularly in the medium and small firms ? What infrastructures (physical and non-material), what networks, have to be promoted ?

- Above all, how is one, at Community level, to guard against the possibility that services development strategies may lead to new regional inequalities ? Through distortions of competition ?

This research activity particularly requires a decentralised approach to the analyses and studies. It will therefore lean

heavily on the "10 + 1" network, and on a series of contracts passed with various European research centres.

The contractors will have to be familiar with the problems of regional development and new technologies (information, communication, etc ...). They will have to assess the service activities, both public and private, within their region(s), and derive the outlook for these. It will also be necessary to tackle the questions raised above, and in particular to formulate proposals for regional policy.

In their proposal, they should specify their method of working.

——→ Planned duration of contract mode : 9 to 12 months (starting during November 1984 - January 1985)

——→ Commission contribution : 100.000 écus (possibly to be divided between several centres) + 40.000 écus (FAST network).

* SERV 7 - The future of financial services

Financial services demand that they alone should be the subject of a specific research activity, for several reasons, in particular :

- their role is eminently strategic

- technological change is in this sector the bringer of major innovations (both of processes and of products)
- they represent a major sector of employment
- there are substantial scientific bases (statistics, studies ...) to provide material for analysis.

The object of the research is to analyse the nature and scope of technological change (telecommunications, telematisation, electronic cash, ...), to study the long-term perspectives for financial services (integration or diversification of existing services, new services, new relations with clientele), to investigate the future role of Europe in the movement towards **internationalisation** of financial services.

In particular it will be necessary to envisage various scenarios for the evolution of the role and nature of financial institutions (*), taking account of the possible strategies of the various actors (clients, equipment suppliers, public authorities, ...).

It should lead to proposals designed to ensure that Europe can retain or consolidate its natural advantages in the medium and long-term, and can benefit as well as possible from the opportunities provided by the Community. In particular, it should be possible to appreciate how far the current regula-

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* Such as, for example, the development of the "financial supermarket", a hybrid network with multiple entrypoints offering to those who have access (for example with a memory card) numerous services going well beyond the traditional financial ones.

tory system should be adapted to the developments, and should indicate fairly clear directions for technological research.

The research will depend mainly upon :

- an analysis of the current situation (status of the various banking systems in the Community countries, comparative advantages between countries, comparative advantages of Europe vis-à-vis the rest of the world, etc...)

- identifiable prospects for technological change (new products and services, infrastructures and networks, data banks ...)

- the organisation of an international conference (approximate data : late 1985 - early 1986)

- complementary activities ("ad hoc" workshops, expert contributions, etc ...)

It will be executed with the support of the "10 + 1" network, the "in-house" network (*), and a fellow.

——→ Planned duration of the activity : 24 months (starting September 1984)

——→ Commission contribution : 70.000 écus (networking plus conference organisation).

(*) Particularly the services of Directorate-General XV (Financial Institutions and Taxation)

4. The products

The various research activities described above will naturally lead to specific research reports. They have also to lead to the elaboration :

* of 4 intermediate products

- two strategic dossiers (DOS) : "Services and firms"
  "Services, infrastructures and regions"
- one new opening (NOV) : "The services of the future"
- one conference (CONF) : "Financial services 2000"

* of 1 synthesis product : a proposed initiative by the Community (PIC) : "The Community and services"

It will be useful for this whole sub-programme to be organised around the concrete objective of a proposed initiative by the Community (PIC), aiming to encourage the integration of the various aspects relating to a Community approach in the field of services.

This PIC will rely upon two DOS which evoke aspects particularly strategic from the viewpoint of Community action, and

on a NOV aiming to clarify the "long-term aspects of the transformation of services" (complemented by a CONF on one specific aspect).

4.1. The "intermediate products" (mid-85)

* DOS 3 - Services and firms

This will seek to specify the nature and scope of the double phenomenon of "tertiarisation" of the secondary sector (the manufacturing sector is consuming more and more service activities), and of "secondarisation" of the tertiary (the tertiary sector is integrating more and more activities of manufacturing type, and operates like the secondary), which characterise the transformation of the production system.

It will also aim to review methods of implementation and consequences, for the Community, in terms of "industrial" policy (how is it to be redefined ?), policies for investment, innovation, research and development, employment and training.

* DOS 4 - Services, infrastructures and regions (early 86)

This dossier will indicate for the Community :

- the implications of the development of services for regional development
- how regional policies could be adapted to the phenomenon of the transformation of services

- the needs, in terms of material infrastructures (cable networks, etc.) and immaterial (legal and regulatory framework, expertise, data banks, training centres, ...)
- in particular, the needs in terms of scientific and technological research in order to develop these infrastructures.

* CONF 2 - "Financial services 2000" (early 86)

The object of this conference is to bring together various points of view concerning the future of financial services (particularly in relation to technological change), and expressions of view by the various actors, in order

- to inform the actors within the financial system about the different possible analyses
- to identify the interactions between various phenomena (technological change, new services, new needs, competitive pressure, integration, diversification, regulations, etc ...)
- to provide an "input" to the research activity "the future of financial services", particularly for the construction of scenarios.

* NOV 3 - Services of the future (early 86)

The aim will be to provide a view, as anticipatory and precise as possible, of what might be the principal "new services" to

which there is such frequent reference but of whose definition little is stated; and to review how and why they might contribute to a change in Europeans' life-styles and work.

4.2. The "synthesis product"

* PIC 1 - The Community and services (mid-86)

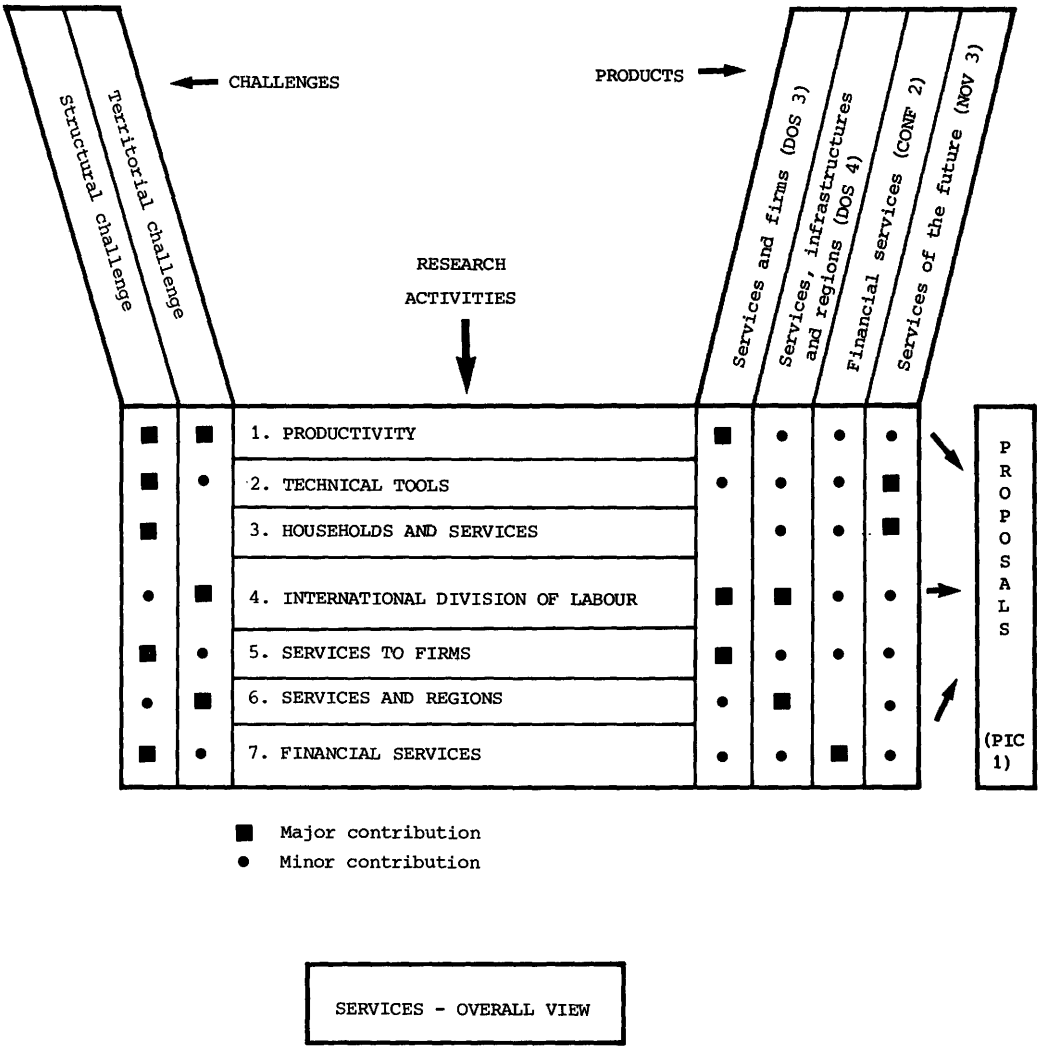
This proposal will focus upon the specific priority initiatives to be undertaken, jointly, in order to provide a long-term response to the structural challenge and the territorial challenge mentioned previously.

It will be elaborated on the basis of DOS 3, DOS 4, and CONF 2, but also drawing on DOS 5, DOS 6, NOV 5, HOR 1 and NOV 9; it will then be possible to set the **Community dimension** within the perspectives of the development of a new growth in which services will have to play a central role, and hence to deduce the implications for different Community strategies :

- industrial strategy
- employment and training strategies
- trade strategies
- investment and infrastructure strategies
- market strategies
- innovation and research strategies

and hence to propose a **coherent plan for Community initiatives,** in support of a major clear and comprehensive project for the modernisation of the Community.

The following tables repeat, in summary fashion, the various elements of the "Services" programme (overall view, budget, schedule).



SERVICES - OVERALL VIEW

Table 4

TABLE 5 : SERVICES : Budget (Ecus)

		CONTRACT STUDIES	FAST NETWORK ACTIVITIES	
SERV1.	PRODUCTIVITY	40.000	-	
SERV2.	THE TECHNICAL TOOLS	-	50.000	
SERV3.	HOUSEHOLDS AND SERVICES	60.000	30.000	
SERV4.	INTERNATIONAL DIVISION OF LABOUR	50.000	-	(*)
SERV5.	SERVICES TO FIRMS	60.000	20.000	
SERV6.	SERVICES AND REGIONS	100.000	30.000	(**)
SERV7.	FINANCIAL SERVICES	-	70.000	(**)
	TOTAL	310.000 Ecus	200.000 Ecus	

(NB) The "products" are the responsibility of the FAST team. Where appropriate, specific supplementary studies will be financed with the remaining resources (of the order of 100.000 Ecus)

(*) : + in-house network

(**) : + fellow

SERVICES - SCHEDULE

(January 1984 - June 1986)

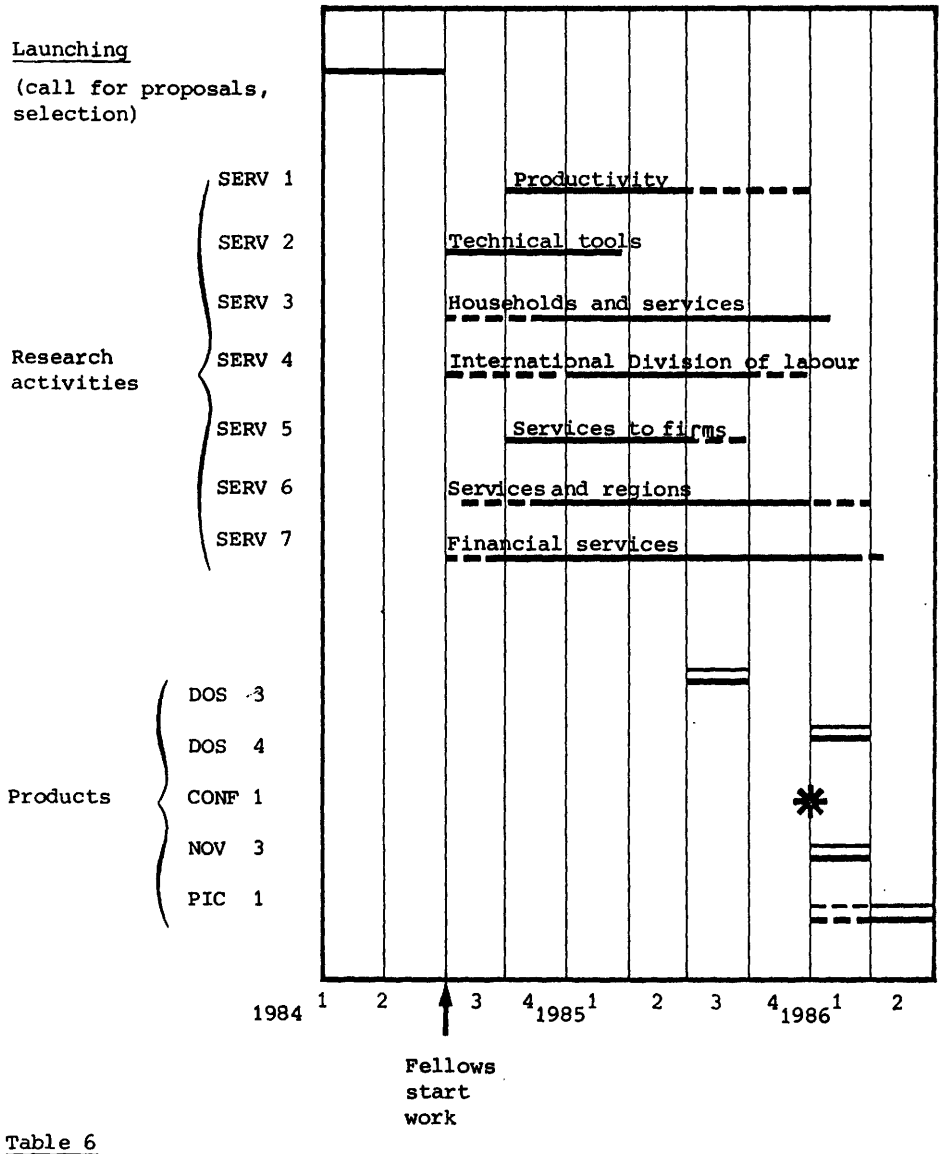


Table 6

STRATEGIC INDUSTRIAL SYSTEMS. TWO FIELDS IN TURBULENCE : COMMUNICATION AND FOOD

By "strategic industrial system" is understood the emergence of new groupings of activities highly diverse, but closely related around some **basic socio-economic function,** of vital importance for every region or economy (a country, a continent) since its long-term **autonomy** depends upon this.

Communications and **food** are the two functions chosen for detailed analysis.

One has only to think of the central role of the new communication system in the transformation of industrial society (or of interaction between technological progress and the development of new services); and of that of food provision in the context of transformation of the system of natural resources, renewable and non-renewable (cf. the reform of the common agricultural policy). It is clear that the destiny of many sectors (in terms of employment, investment and products) will depend upon the changes which take place in these two sectors.

3.A. - STRATEGIC INDUSTRIAL SYSTEM "COMMUNICATION"

1. Rationale

Information and telecommunication technologies are two subjects which have already given rise to many investigations. The result of this extensive work has led in particular to national and Community programmes, both social and industrial.

These studies now allow us to take as understood the absolute necessity of mastering information and telecommunications technologies, for the whole of economic activity (*).Political leaders have been convinced; the means deployed for the purpose vary according to local conditions ("directed" restructuring of telecommunications producers in France, liberalisation of network management in the U.K., extra-European links in the Netherlands), and in the tools and skills deployed by the institutions concerned (e.g. finance of pre-competitive research by the Commission).

The necessity for rethinking education and training is another conclusion drawn by many experts and decision-makers.

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* Cf. Gizycki, Schubert : **Microelectronics : A Challenge for Europe's Industrial Societies.** Oldenburg Verlag, Munich and Vienna, 1984.
Arthur D. Little : European Telecommunications : Strategic Issues and Opportunities for the Decade Ahead, Study for the EEC, 1983

Here again, the solutions vary from country to country, but we can take it that the basic "awareness" is widely shared (*).

The employment effects of these technologies are the subject of several reports, but the decision-makers find they are less able to respond to their conclusions. The most promising approach appears for the moment to be to link the problem to that of training (**).

Public opinion is also conscious of being on the threshold of major changes. People wonder what is going to happen to their working and home environments, under the impact of technologies whose implications are not easily foreseeable, but of which it is repeatedly stated that they may change the nature of inter-group and inter-personal relationships.

One cannot help thinking that short-term decisions are too often being imposed upon us from outside, that one is so busy with the "urgent" that the important is neglected, one attempts to keep one's position in the rat-race, and that

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* Cf. "Education and N.I.T. the situation in the Member States",(Note from the Commission services); and ISCOL : "Continuing Education and Information Technology : Needs and Opportunities", 1981 (FAST Occasional Paper 17).

** Amongst others, "Telecommunications, pressures and policies for change", OECD, Paris 1983 (p. 27); and ISCOL: "Information Technology and Job Creation Potential; Synthesis of Specific Studies : Conclusions and Recommendations"(FAST Occasional Paper 27).

visibility is lacking. Too often we look at our future across the Atlantic, or in the direction of the rising sun. The common denominator in our stock of studies of information technology and telecommunications is that they all, implicitly or explicitly, take this fact as a fixed and immovable basic datum.

In these circumstances, there is a grave risk that Europe will to-day deprive itself of the motive force which some future vision could provide, through faiture to generate such a vision. Others write the text which we have then to read. The installation of new communication networks, better management of the communication function, could undoubledly allow new images of future possibilities to blossom, and restore to each of us the capacity to conceive his own future and hence to exercise control over it.

Such is the starting point for FAST, to being new calue added, by posing the following question : what one the challenges for the societies of Europe, in grasping the communication function in its many dimensions, industrial, economic, social and finally politically ?

2. The Problematique

2.1. From product to function

Until recently, the function of communication was provided by the juxtaposition of simple networks which complemented direct communication :

- the telex : discrete source network with low data rate = 50 bits/sec
- the telephone : continuous source network (3.1KHZ Band with)
- radio broadcasting : continuous source network with a bandwith which for television reaches 5 MHz
- publishing.

What we are now witnessing is an integration of these networks into a single network complex. In effect, time commutation, digitalisation of continuous sources, multiplexing techniques, the development of higher performance transmission media (monomode fibre optics) are all technical advances which make possible :

- broad-band interactive communication
- sharing of the same network by image data and voice, since all are converted into the form of binary digits.
- the multiplication of terminals capable of being "hooked up" to the network (telephone, computer, word processor, telecopier, payment systems, cellular networks, ...)

The shift from the juxtaposition of simple networks to a single integrated network complex (*) radically changes the attitude of the user. In the former case (juxtaposition of simple networks), he chooses for himself the best combination of products to satisfy his needs; while in the other situation he delivers to the network what he wants to transmit, in whatever form it may be, and it is left to those who manage the network to optimise his use as a function of data rates and destination. He no longer makes a choice of product/service; he is provided with the function.

2.2. The function : produced and operating

In order to clarify terms, we shall start by distingvishing two systems, before going an to re-integrate them :

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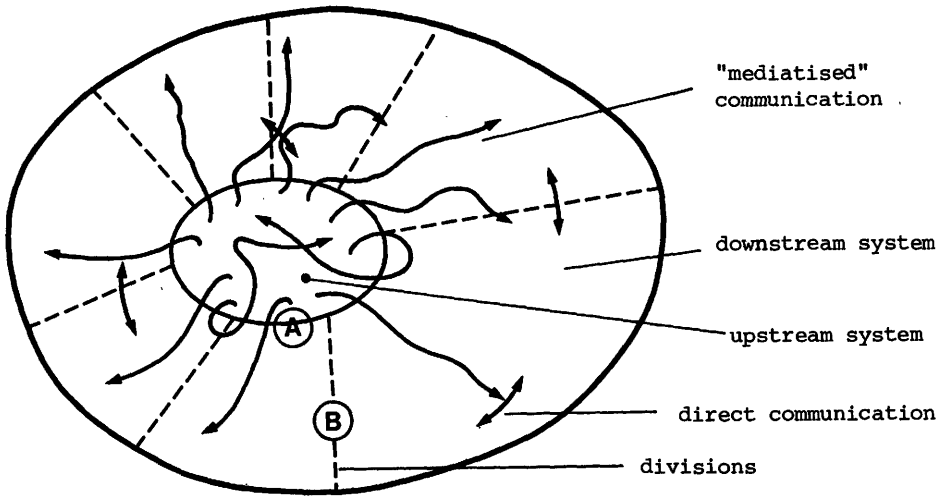
* We are not unaware of the existence of specialised networks, in particular packet-switching networks, but access to these networks is via the classical network and is user-transparent.

The **upstream system**, whose purpose is to **produce** the function communication and the **downstream system** which is the system at whose level the function is operative.

The upstream system is what we call the strategic industrial system of communication. It involves several groups of actors, classically considered to be the produrcers, the users and the public authorities. The roles of these groups, their relationships and the degree of mutual influence they exert are all undergoing transformation.

The downstream system is the world of our daily lives. Our objective is not to define it, but to study how the function of communication is evolving, and is capable of leading to restructuring of the system.
Communication partitions a system by several types of division (by activities, by reference space, ...) and the evolution of communication leads to evolution of these divisions.

The following diagram may assist in understanding the framework of the argument :



At this stage we note the following :

* the upstream system is evidently a sub-system of the downstream system

* the boundary A between upstream and downstream systems moves as a result, for example, of the interpenetration between telecommunications and informatics (the software content of telecommunication equipment, commutation in particular, is going to increase so much that it will not be long before IBM and ATT become direct competitors).

* The structuring of the downstream system B is being modified (change in the nature of tasks, of careers, of qualifications, of work organisation, ...).

2.3. Two systems, two questions

A) Knowledge and mastery of the upstream system is **the "sectoral" question**

The "sectoral" question is already frequently posed in various forms (cf. Rationale). Going on from this, FAST's contribution can be in two respects :

1. to analyse new forms and content of the communication function as conceived and put into practice by its main producers.

2. to set in perspective the long-term conditions for mastering the comunication function. What R&D structures need to be established ? What could be the form of the enterprises which are to-day involved in this industry ? What their relations with the public authorities ? What the role of the public authorities ?

B) Knowledge and identification of options for the effects of the communication function on the downstream system : this is **the "structural" question.** This question, unlike the sectoral question, is rarely posed.

When economic actors make a decision on their communication systems, they have made their costbenefit studies for

themselves. Much less clear, on the other hand, are the aggregate results which these cost represent for individuals, social groups, for the whole of our societies, and for European society in particular. In this area there is an important unknown for each society : in what way does the flow of activities and services, intensified by the installations of communication, affect the cohesion of a society ? What sort of socio-economic effect are these flows having ?

Moreover, the development of communications networks in the downstream system may imply or intensify a "conflict of authority" between politics in the broadest sense and economics. Communication techniques offer the technical means for creating a global marketplace in more and more products. The reference space within which an economic agent will maximise his objective function (utility, profit, ...) is being extended, while his "living environment" remains more or less the same (it remains rare for people to commute daily by plane, or for friends to meet by means of a videophone). Men travel more slowly than data and are more sensitive to their immediate environment : the enlargement of the economic reference space and the relative stability of the socio-political reference space pose problems of organisation and of priority.

These two questions - sectoral and structural - evidently demand a multi-disciplinary or transdisciplinary approach, which makes them operationally more difficult. There is

therefore a risk that the division into individual research activities results in failure to cover some aspects.
To minimies this risk, the various teams will be brought into contact, ans small seminars will be organised around the points of intersection of the research activities.

3. The research activities

There are 9 of these.

In order to address the sectoral question :

- Telecommunications industry : technological options and industrial challenges (COM 1)
- The media industry (COM 2)
- Conditions of market operation (COM 3)

In order to address the structural question :

- Final demand (COM 4)
- Structuring effects of the communication function on other industries (COM 5)
- The communication function : retrospect and prospect (COM 6)
- Education in a "communications society" (COM 7)
- Consequences of a global network on the autonomy and relevance of the national dimension. (COM 8)

To illustrate the transformation of the communication function :

- The telematic press (COM 9)

COM 1 ($) : Telecommunications industry : technological options and industrial challenges

The goal of this study is to review, refine and advance our understanding of the influence of R&D cost on the telecommunications industry.

The significance of R&D costs results from two effects : the intensity of progress, and the speed of progress.
These two effects together oblige the industry to aim at large-scale markets in order to recover rapidly the R&D costs they are committing.
How do they cope with this demand ? What are the elements of their strategy, for example in terms of product differentiation ? What choices confront them ? What consequences do these choices import for restructuring costs, R&D and competition ?

How much will it cost to develop the next generations of switching devices (broadband, optical switching), and which European and non-European enterprises are capable of supporting these ?

For network integration, some firms are going to try to establish themselves as "setters of standards" (for example, ITT's slogan at Telecom '83 was "ITT setting the standard". Which firms in Europe are capable of doing this, and with what consequences ?

For the development of space technologies, is the home market sufficient to create a supply industry capable of exporting ?

It will be necessary so far as possible to think of the explanation of operations and of industrial structurel from the starting point of technology input.

——→ Commission contribution : 60.000 écus.

——→ Completion : early 1986.

At the same time, the network will undertake a "survey" of the industrial models which have demonstrated in what is judged to be an appropriate manner the role of the technological input in an industry. Budget 10.000 écus.

COM 2 ($) : The media industry : press, television, data banks, advertising, radio ...

This industry, which might also be termed the "information industry" or the "quasi-communication industry", is directly downstream from the telecommunications industry. Telecommunications technologies affect not only its organisation but its very nature. It is this industry which together with telecommunications forms the communication industry.

The study will tackle this industry by addressing the following questions :

a) which are the new technologies which concern it ?

b) What is the influence of these new technologies

- on the nature of the product
- on the structure of the industry
- on the demand (and on the effect of the return to "local" scale)

c) what will be the relationships between these various products ?

d) what will be the structuring effects of the various innovations (prices, broadcasting, trans-border data flows) on industry ?

e) what is foreseen to be the significance of this industry relative to the total European production system.

Practical details

This study will be the subject of a contract, and will lead to the production of a report. It will be conducted in close contact with the "fellow" responsible for preparing CONF 4 : the telematic press.

——→ Commission contribution : 60.000 écus

——→ Completion : early '86

COM 3 ($) : Conditions of market operation

The telecommunications market has special characteristics. At base, this is for two major reasons :

- a general one : the necessity, in order to recover the heavy R&D costs, of having a large-scale market

- a European one : the role of the public authorities. They are the sole clients of telecommunications producers. As such, they enjoy considerable market power. Their purchasing behaviour leads to the **fragmentation** of the European market and to **strong concentration** within national makets (to minimise transaction costs). Moreover, their exclusive position leads to their playing the role of mediator between the supply and demand sides, and they can thus determine the strategies of the other actors.

The multiplicity of possible applications of the telecommunications network and extra-European competition create a strong **pressure** in favour of **liberalisation** of telecommunications services. National administrations respond in various ways to these pressures. Two oft-cited extreme cases are France, which is increasing the powers of the DGT in all matters of infrastructure, and the U.K. which "liberalises" (cf. the "Mercury" system).

In this context, there seem to be three fundamental questions :

a) Strategy of the administrators

What are the future plans of the administrations ? What is their "objective function" to be optimised ? How do they intend to respond to demand ? What are their even means of action ?

b) Consequences of possible liberalisation

Who would be the beneficiaries, and on what time time-scale ?

c) Advantages and limitations of market solutions

for communication products, in terms of economic efficiency on the one hand and guarantee of "public service" on the other.

Beyond the conventional wisdom, it is necessary to highlight the long term consequences for Europe of adopting a position for or against liberalisation. Besides, one can question the idea that this is really the major problem.

Practical details

For question a) (strategy of the administrations), we shall use the network, based on studies in progress in DGs III and XII.

——→ Commission contribution : 20.000 écus

Questions b) and c) will be the subject of contract research.

——→ Commission contribution : 50.000 écus.

——→ Completion : early '86.

COM 4 ($) : Final demand

While intermediate demand (by firms and organisations) is strong, and has the means to influence the public authorities (internal networks, transnationalisation, threats to the economy ...), final demand seems at present to be relatively stagnant.

This is, however, in the long term a lever of the first importance for the development of communication techniques. To take up a distinction drawn by FAST I, final demand stands in relation to intermediate demand as product innovation does to process innovation; the shift of emphasis (or "re-balancing") advocated by FAST I between these two types of innovation is equally necessary in this case. But final demand is poorly assessed, both in what it is seeking and in how it expresses itself.

Three sections are envisaged for this study :

a) review of the various social experiments. There have been many such trials (Prestel, BIGFON, Bildschirmtext, Teletext, Biarritz, and hundreds of "anonymous" experiments). National reviews exist. It would be interesting for the "10 + 1" network, on the basis fo existing materials, to create a synthesis of this work, as well as an assessment of the results of these experiments. With his work will be associated the studies in the social research area (D.G. XII-A-1).

b) estimation of a "utility function", whose arguments would be dependence, interactiveness, diversity, transparency ...

- dependence : the complexity of the medium and its technical characteristics cause the user to be dependent upon its operation. The intensity of this dependence varies with different media and their incidence of breakdown, dependence being most severely felt during periodes of dysfunctioning. Is there in the user any reserve or self-limitation in the acceptance of this dependence ?

- interactiveness : it may be said of the media that they are characterised by a certain "degree of interactiveness" (e.g. maximum degree = audiophone communication; minimum degree : television broadcast;

intermediate degrees : newspapers + readers' letters or TV broadcasts with live phone-in). How great in fact is the "demand for interactiveness" ?

- diversity : cable television and direct broadcasting by satellite (DBS) as well as the debate in France on the law of the press show clearly enough that, on the supply side, there is concern about diversity. How much is there at the level of the consumer ? Does he seek to obtain several opinions, or does he make use of this diversity which is offered to him in order to choose "his own thing" ?

- other characteristics : transparency, support ...

The study should allow to clarify the possible evolutions for the next 15 to 20 years, of the "utility function" of communication that will be build.

One must also develop the equivalent notion of marginal rate of substitution between the different "variables". For example, how will our societies react to a greater interactivness that might imply also a greater dependence toward the tool ?

What will be the institutionnal mechanisms in the different member states that will be needed to face the new equilibria between the different variables of the utility function ?

What new "dialectique" between the micro and the macro, between the "local" and the "global", does this function determine ?

c) means of ensuring the security of the coding of the network itself (number of wrong connections ...); measure of the phenomenon of criminality, based on subversion of the use of the network; review of work on the evolution of the concept of 'proof' in informatic transactions.

Practical details

Point a) : networking : 10.000 écus
Points b) + c) : contract research :
——→ Commission contribution 50.000 écus
——→ Completion : early '86.

COM 5 ($) : Structuring effects of the communication function on other industries.

In what way does the penetration of communication technologies affect the other industries - its share in the creation of added value, the average number of establishments per company, the minimum optimal size of the companies, the geographical displacement, specialisation and sub-contracting, the creation of cartels, the degree of competition ? the employment ?

The long term being the results, inter alia, of microdécisions taken in the short terms, how do the costs implied by these technologies inpinge upon price ? How and over what time period will a company seek to amortise its investment ? The answer to these questions together with the analysis of the way industrialists recuperate their investments into communication's equipment (getting rid of people, expanding activities, expanding market shares, ...) is an indicator of the actor's expectancies with a view to the development of European communications networks. Those expectancies are a major input for a reflexion on the long term and so must be defined within the framework of this study.

The study should also identify the various degrees of penetration of the communication technologies.

Two specific types of industry will be selected for case studies. The choice of industries will be discussed with the contractor in the light of his proposals and FAST's interests.

Practical details

This activity will be the subject of contract research.

——→ Commission contribution : 80.000 écus

——→ Completion : mid - '86.

COM 6 ($) : The communication function : retrospect and prospect

This historical-sociological study has as its aim to "learn from history".

What role have communication tools played in historical evolution ? From the Middle Ages to modern times ?
In the organisation of Taylorism, or of trade unionism ?
In colonisation and then in independence ?

Have communication networks been neutral (merely reflecting the currents of their age), or have they encouraged or constrained certain patterns of development ?

Will various social groups and their comparative advantages be overthrown ? What of the analogy drawn by Prigogine and Stengers (*) between a biophysical and a social system, according to which the stability of a system is directly proportional to the speed of communication in its interior ?

Starting from a historical review on which the contractor should seek to impose some coherence, various scenarios should be developed in which what we have termed the "downstream system" would interact with the development of the communication function.

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* I. Prigogine and J. Stengers, "La Nouvelle Alliance", Paris. Gallimard, 1979, pp. 177 et seq.

Practical details

This study will be a subject for contract research.

——→ Commission contribution : 40.000 écus

——→ Completion : end of '85.

COM 7 : Education in a "communications society"

The transaction which takes place between "producer" and "consumer" of communications is not purely economic. Nor is it technologically neutral.

It appears that in exchange for the satisfaction of his need (to know the news; obtain primary data; ...) the user, individual or collective, places himself in a situation of dependence.

This dependence is not determined only by the users and the transactions. Its form and content change as functions of the economic and technological data. It is "filtered" by individuals' behaviour. Will the years of the 80's and 90's be in this respect a period of superficial transformation or of profound change ? And in what direction ?

Within society (in terms of inter-personal and inter-group relations), **education, in the wide sense,** counts for a lot in the development of patterns of dependence. Moreover, communi-

cation technologies considerably widen the range of possible modes for transmitting knowledge, and profoundly modify the nature of the knowledge to be transmitted.

The ultimate role of education being to render the individual capable of functioning in society, how do the communication networks affect the content of this "mandate" and the manner of its accomplishment ?

This research activity will draw upon the results of work by D.G.V. (Employment, Education and Social Affairs), CDEFOP and EURYDICE as well as "10 + 1" network.

——→ Commission contribution : 10.000 écus.

COM 8 : Consequences of a global network on the autonomy and relevance of the national dimension

The development of a global network will enable any economic agent to locate his activity in a manner totally independent of the community for which it is destined. That means that the labour market would become as vast and as flexible as that for capital, in respect of a growing number of jobs : a doctor might have have his secretary in Singapore, for example. The consequences of this fact are enormous.

They pose the fundamental question of the relationships between entities organised on political principles and the

dimensions of economic transactions. What will be the significance of the new possibilities for separating the physical environment from the "relational" ? If the constraint of physical proximity is abolished, what becomes of the notion of "society", or of "belonging" to a society ?

Can we expect increased concern about locally specific issues as a reaction against the standardisation to which transnational economic operations would lead ? What sort of feedback would there be from the local units concerned to influence the economic operations ? Will we witness the emergence of new relations between economics and society (towards "Small is beautiful", or even towards a multiplicity of cloistered protectionist areas) ?

Is the possible erosion of old patterns of solidarity based on a national economy going to bring into question, 15-20 years hence, the legitimacy of some of our current mechanisms of socio-political regulation ? One might, for example, consider on what basis and in what way the nation state will undertake the distributive role which it fulfils to-day (in education, social security, unemployment benefit, ...)

Practical details

The speculative nature of this study leads us to believe that it would be more interesting to have several minor contributions rather than a single contractor. Therefore there will be recourse to several experts via the network. One might conceive thereafter a working meeting of these experts where their respective contributions would be discussed.

——→ Commission contribution : 50.000 écus

——→ Completion : end '85

COM 9 : The telematic press : A Conference

The telematic press symbolises the unifacation of the field of communication and the integration of networks.
The capacity for total decentralisation of the activities of editing, publishing and printing (up to the point where this function can be individualised on the printer each household will possess) clearly poses the problem of location (cf. the study COM 7).

The role of this conference would be a "watch-tower", to review the strategies and approaches adopted hitherto in this process, and to identify Europe's needs and possible responses over the next 10 to 15 years.

Practical details

It is envisaged that the Commission would invite a Member State government to co-organise this conference of which the preparatory work and results' analysis will be taken care of by a fellow.

——→ Commission contribution : 50.000 écus.

4. The products

These will be 4 number :

DOS 5 : The communications industry
DOS 6 : The communication function
NOV 4 : The challenges of space
NOV 5 : Communication and development

DOS 5 - The communications industry (mid-86)

The industry is undergoing of a spate of transformations in its technologies, its infrastructures, the products or services offered and, consequently, its markets. For the moment, the producers (including intermediate demand) and the public authorities are "leading the game". What about the consumers ?

This dossier has a triple objective :

- to establish the current and future profile (for the next 10 to 15 years) of the industry and the "consumption" pattern in Europe

- to identify the industrial and societal challenges for Europe which are associated with the alternative technological and economic prospects.

- to assess the implications and consequences of alternative options for European industrial policy relating to communication in the 90ies.

DOS 6 - The communication function (early 87)

Within this dossier, one will question the potential evolution of the communication function as well as its images within european societies in the 90ies.

The role of this function with a view to

- economic activity
- political organization

will be particularly studied and hence ~~and hence~~ the options and challenges facing Europe to reinforce her position as a major actor of the 21st century. This dossier is the focal point of the communications sub-programme.

NOV 4 - The challenges of space (mid-87)

Communications (and especially TV), even more than **meteorology** or **defence**, has created widespread awareness of the intrusion of space into our activities.

Evidently the three fields are inter-connected. While the militarisation of space may lead the imagination to speculate on "star wars", our imagination should focus rather on the

field of the peaceful uses of space; but still without falling into futuristic speculations which, however attractive, have little probability of realisation in the next 20 years.

Starting from an integration of the major available works on the subject (particularly those of the European Space Agency), the objective of this DOS is to illuminate three or four of the main fields of significant interest for the European Community, e.g. experiments in zero gravity, or space stations.

NOV 5 - Communication and development

The whole problem-complex (or "problematique") of development is clearly at the heart of the "structural" question posed above.

Communication networks are at the intersection of several development strategies : from self-sufficient development to increased dependence. They represent a tool of critical importance for development.

Hence one finds, on the one hand, the South, representing a major market for telecommunications equipment, press agencies and data banks. On the other, the North, which needs this market, less protected than the home markets (save where it can be commanded).

The South represents a conditional demand ('yes'to the hardware, but 'no' to dependence for data and information, a situation viewed increasingly as intolerable), and the North, an unconditional supply (except so far as concerns the solvency - or potential future solvency - of the demand).

How are these transactions to be organised, in which economic, political and societal challenges contend in intensity ? In what way are the power relationships expressed ?

Will the path followed by North-South relationships during these last 30 years be significantly altered and/or redesigned by the new facts of communication ? What are the new prospects ? What the new challenges ?

Should the Community, or could it, consider a "Communications Lomé" ? (Why and how ?)

Questions		RESEARCH ACTIVITIES	Means			Budget ('000 écus)		TIMING	PRODUCTS			
Sectoral	Structural		Contract	Fellow	10 + 1 network	Contract	10 + 1		DOS 5 Industry	DOS 6 Function	NOV 4 Space	NOV 5 Development
●		COM 1 : Telecommunications industry	✓	✓	✓	60	10	1/86	✓	•	✓	•
●		COM 2 : The media industry	✓	✓		60		1/86	✓	•	✓	•
●		COM 3 : Conditions of market operation	✓		✓	50	20	1/86	✓	•		
	●	COM 4 : Final demand	✓		✓	50	10	1/86	✓	✓		•
	●	COM 5 : Structural effects ...	✓			80		6/86	•	✓	•	
	●	COM 6 : The communication function...	✓			50		12/85	•	✓		✓
	●	COM 7 : Education ...			✓		10	6/85		✓		•
	●	COM 8 : Consequences of a global network			✓		50	12/85	•	✓	•	✓
●	●	COM 9 : The telematic press		✓	✓		50	6/85		✓		
									✓		✓	✓
									✓	✓	✓	✓
										✓		
									mid '86	early '87	mid '87	early '86

MEANS: Fellow; Cluster; In-House — Timing

Table 7 : Strategic industrial system "COMMUNICATION" : Overall view

Key : ✓ major contribution
• minor contribution

As is shown by **table** 7, dossiers 5 and 6 constitute the programme's central "products". It has not been thought opportune or desirable to envisage the implementation of a PIC, since the Commission has already been struggling for many years to develop a European policy for telecommunications. It is therefore to be hoped that between now and mid-86, considerable progress will have been achieved in his area.

It may also be noticed that there is a concentration of the schedule of research activities in the first half of 1986. In fact the knowlege available within the Commission services in the field to be studied, as it has been defined in FAST II, is limited. It is therefore necessary to undertake major and extensive studies, which take time. This also explains why study contracts predominate over network activities, and the important role to be played by fellows.

3B - STRATEGIC INDUSTRIAL SYSTEM "FOOD"

1. Rationale

Food supply is one of the most basic human needs, historically closely related to man's interactions with the renewable natural resource system.In the conditions of modern industrial societies, with their developed infrastructure for processing, storage and distribution of the outputs of a highly productive agriculture, the links between growth and consumption are more complex. There has developed a greater separation in time, distance and physical characteristics between food as it is grown and food as it is consumed.

Modern technology in food production and processing thus widens enormously the range of choices open to society. This enlarged freedom may be exercised in many different ways : illustrated by the following list, which also hints at some of the related strategic implications :

- sustaining a larger population
- increased per capita consumption
- security of supply, through greater home production
- security of supply, through diversity of sources
- low cost food, by purchase from cheapest supplier worldwide
- higher value added downstream from the farm gate, enhancing functional properties such as flavour,

texture, packaging/convenience/availability ease of preparation

- changes within diet, e.g. towards greater meat consumption.

More choices could be added. The whole complex from food production to final consumption constitutes the agro-industrial system; in speaking of it as a "strategic industrial system", one implies the existence of strategic choice - as reflected in the range of options mentioned above - whether or not that choice is consciously exercised.

It is the role of FAST to explore alternative options for such strategic choice, particularly in areas so intimately linked to Community policies as food production, distribution and consumption. The breadth of choice is itself a reflection of sucessful R&D over many years past; but the diffusion of this R&D and the efforts of R&D elsewhere (e.g. in the USA or Japan) create a competitive pressure which appears, under open conditions of trade, to narrow the economically feasible range of choice. Political decisions to modulate the conditions of production and trade in food illustrate the exercise of choice in the management of Europe's "strategic industrial system : food".

2. Technology, Innovation and Competitiveness

The long-term future of the food industry will be heavily influenced by the technological changes studies in FAST I. The impacts of both microelectronics and biotechnology upon this industry have so far been relatively limited, but their potential future impact is likely to be major.

In spite of its significance for employment and output, the sector has been relatively neglected in terms of expressions of public concern about its strategic future, and corresponding actions by public or private sectors. For example, the level of expenditure on agricultural research through the public sector is 10 or more times greater than expenditure on food research (through this is now changing in some countries); yet in most parts of the EEC, the food, drink and tobacco industries (i.e. processing) contribute substantially more output to GNP than does agriculture. While it may be objected that the food processing industry should fund its own research, this is unlikely to be possible on a significant scale in the many SME's in the industry. Even for the larger firms, the industry in general suffers from low profitability (the pressure from well organised retail chains is a factor), and is consequently "starved" of funds for investment.

The future competitiveness of this industry must be of major concern, for the industry itself, for Member State governments and for the Community.

A recent and valuable pilot study (*) has been undertaken by the U.K. Technical Change Centre, at the initiative of the Science and Engineering Research Council, based on but going beyond an earlier SERC brief on "biotechnology and the food industry". Drawing upon a number of very useful and pertinent earlier reports, the TCC study amplifies the above points in the specific context of the U.K. To illustrate the relatively low added value of the U.K. industry when compared with its European competitors, the study quotes the following figures from Eurostat :

Gross value added per head in food (a), drink and tobacco manufacturing (b), 1979, indices UK = 100

France	210
Netherlands	175
Belgium	170
West Germany	150
Italy	130
United Kingdom	100

(a) Figures for food alone are available only at five-early intervals

(b) Gross value added at factor cost per head of employed population in food, drink and tobacco manufacturing

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* UK Food Industry : Report on the Pilot Study , by Peter Schroeder and Lesley Crossley, Technical Change Centre, London

To this picture of the apparent problem of productivity, lack of technological innovation or lack of competitiveness in the U.K.'s industry (some reserves should be expressed about the interpretation of the figures above), one may juxtapose a French Government (*) report's no less anxious concern about the innovativeness of that country's food industry : "avec un taux moyen de R&D cinq fois inférieur à celui des principaux pays concurrents, l'industrie alimentaire française risque de rester à l'écart du lancement des innovations majeures qui toucheront l'alimentation des années à venir". The low level of R&D financing in the industry - 0,18% of turnover - was similary the subject of critical comment in the Pelissolo report (**) on biotechnology.

Thus while the value per head figures quoted above might reflect differences in consumer perceptions and priorities on price/quality ratios in food - differences satisfactorily confirming Gallic views of British food habits - the French report rightly emphasises the strategic need for greater technological innovativeness as the basis for continuing competitiveness.

(The recent appointment of one of the authors of the Technical

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* Industrie alimentaire et alimentation de l'avenir, N. Girain, G. Joulin et V. Worms; rapport nr. 5 - mai 1981 - de la Mission de l'Innovation du Ministère de l'Industrie.

** La biotechnologie, demain ? J.C. Pelissolo, rapport au Premier Ministre, documentation française 1981.

Change Centre study to responsibility for a strategic programme of R&D in the major Italian group of food companies, SME, reflects a similar perception in that country of the need to upgrade the industry's capabilities).

The strategic dossier (DOS 7) on the future of the food industry must therefore contain a major technological dimension. This should be relatively straightforward to establish, given the studies cited in the previous section and many other sources - for example, a number of excellent review articles in **Chemistry and Industry** over the last two years, and the many recent reports on biotechnology often containing significant sections on food.

Review of such developments in the context of other strategic policy factors should enable the dossier to contribute to the definition of R&D priorities for future Community programmes, complementing and building upon, for example, the projects in the currently proposed Biotechnology Action Programme (*).

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* COM (83) 672 - final/2, and annex, 4 October 1983 : Biotechnology in the Community.

We also note at this point the important and continuing work of the COST programmes 90 and 91 (*) on the effects of food processing on the physical properties, quality and nutritive value of food.

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* COST programmes are "concerted action" R&D activities - i.e. funded by the participating countries, with only minimal support from the Community - involving both E.C. Members and non-Member States. COST project 90 (started 1978, extended 1982 as "90 bis") concerns "Effects of processing on the physical properties of foodstuffs". COST project 91 (started 1979) concerns "Effects of thermal processing and distribution on the quality and nutritive value of food", and concluded with the November 1983 Athens seminar; a proposal was submitted to the Council of Ministers in July 1983 (COM (83) 446) for its extension (as "91 bis") into three new areas :

1. HIST process (high-temperature, short-time processing) and other new thermal processing systems.
2. Qualitative and nutritive properties of foods obtained by biotechnology
3. Chilling and refrigerated storage

3. Structural aspects

Reference has been made above to such aspects as low profit margins, lack of technological innovativeness, and the need to upgrade the industry's capabilities. It is clear that such characteristics are closely associated with industry structure : only relatively larger organisations (whether companies or co-operatives) have the market and financial strength to fund significant research and innovation, and to develop the large-scale marketing and distribution logistics necessary for the sales volume to support the central overhead : it is a "chicken and egg" situation.

A question to be addressed, in the context of Community policies for food supply, the food processing industry, competition, research and innovation, is whether and how the policy stance should seek to promote structural change in the food industry. For example, promotion of co-operative structures may facilitate technology transfer; experts in agricultural extension appreciate the value of promoting an innovation not through a single farmer, but through a "club" of several, who can then provide mutual learning and support effects.

The evaluation of alternative paths for the structural evolution of the food industry, and the impact of alternative public policies on such evolution, has to be made within the scenario and technological assessments referred to previously. This will form part of the strategic dossier described below.

4. The "products"

The two "products" of the programme are briefly described and define the framework to which the constituent reserach activities described in section 5 must relate : a **strategic dossier** on the industry (DOS 7) and proposals for a **"new opening"**, NOV 6.

DOS 7 - The future of the food industry (late 85)

From its inception, the Community's Common Agricultural Policy has aimed to provide security of supply in temperate products, while at the same time sustaining farm incomes. Such autonomy, which remains one of the pillars of agricultural policy, has largely been achieved; with the major exceptions of vegetable oils and animal feeds, of which a substantial proportion is still imported. As foreshadowed in its "Guidelines for European Agriculture" (*), between now and 1988 even these products should be increasingly supplied from domestic sources as adjustments to Community cereal prices progressively reduce the competitiveness of "substitutes", and as domestic oilseed production (in the short term particularly of colza) is increased.

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* COM(80)608, 23 October 1980

Community policy now seeks to go beyond autonomy of food supply and the Commission has already emphasised (*) that a common agricultural policy, in the context of modern economic conditions, can only exist as part of a broader concept of a "common food policy", related more closely to industry both upstream and downstream from the primary producer. Such a policy will be the more important because the food industry remains one of the major sectors of the economy for employment. The coming years will be marked by continuing rapid development in the life sciences and biotechnology, with considerable consequences for agriculture and for food; technological and innovative capacities will be significant influences on competitiveness, and hence on the structure of the industry. Recognising the elements outlined above FAST seeks to make a long-term assessment of the potential and future of the food industry, with particular emphasis on the policy choices to be exercised by the Community.

The main aim of strategic dossier DOS 8 is precisely to contribute to the identification and assessment of priority options for a "common food policy". A major role in this context is going to be played by current and future technological changes : the food industry will respond to new demands and food practices, in conjunction with existing opportunities for the transformation and conservation of food products (fractionation and recombination of constituents, extrusion, dehydration, irradiation). New relationships (not entirely of

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* COM(83)500, 28 July 1983

economic nature) will have to be established between producers, industrialists, traders and consumers - and public authorities.

The research activities required have therefore to cover this wide range of political, technological, economic and behavioral aspects.

On training, the aim will be to assemble the dossier by late 1985.

NOV 6 - Food and health (late 84)

Alongside the progress in the life sciences and biotechnology, major advances have taken place in medical sciences, particularly in the understanding of the role played by various dietary factors in individuals' health.

Furthermore, it is to be expected that there will be changes in food habits, under the pressure of the food industry and supply systems, and as a consequence of changes in the "time budget" of individuals and households (e.g. "fast food" in the home). In some cases, consumer resistance blocks the industrialists' possibilities for innovation and for developing new markets. This may reflect conservatism in eating habits, or unacceptable quality or flavours; but it increasingly concerns real or suspected health problems (cf. the controversies over the use of hormones, pesticides and other chemical agents, or concerning diet and carbohydrate consumption, fats, etc ...)

The subject is particularly timely in the context of recent national reports on diet and health (*). In view of the Community's dual role as promoter of European agriculture and food, and regulatory authority on food standards, it is essential that its policies be framed on the basis of best possible understanding of relationships in this area.

Over the longer term, these changing relationships are likely to require significant revision of the public policies bearing on food production, health and consumer protection; and in the process by which policies are formulated and updated, at Community and Member State level. This possible need for innovation in policies and in the policy-making process leads to the choice of a 'NOV', 'new opening' for a long-term oriented assessment of the possibilities and needs for change.

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* e.g. note the controversy preceding the final release of the report in the U.K., "Proposals for Nutritional Guidelines for Health Education in Britain", prepared in 1981 by Professor Philip James for the U.K. National Advisory Committee on Nutrition Education, and released for publication October 1983 by the Department of Health and Social Security.

5 - Research activities

Three reseach activities will be implemented :

- Technology, innovation, economics and public policy (ALIM 1)
- Food and Health (ALIM 2)
- The food consumer (ALIM 3)

Each activity touches on one or more of three key aspects (i.e. technology, legislative and regulatory, the consumer) affecting the future of the industry.

ALIM 1 : Technology, Innovation, Economics and Public Policy : options for the future structure of the European food system ($)

The object of this activity is to identify alternative scenarios for the future evolution of the European food system; to identify the key factors likely to influence the actual outcome; to focus in particular on those potentially under control at national and European level; and hence to contribute (via strategic dossier 8) to the debate on the strategic re-orientation of Community agriculture, food and related policies.

Such scenarios will be the outcome of a complex interaction between choices exercised within the Community, and events largely outside its control in the global context. The wide range of possible developments in the later is illustrated by the wide divergence of opinion between such relatively pessimistic projections as those of "Global 2000" (*), or other forecasts of growing world cereal shortages and European protein deficits; and the comparative optimism of, for example, Kahn and Simon ("Global 2000 revisited" (*)), based on a greater confidence in market mechanisms and timely technolo-gical innovation, stimulated by the prospect of shortages into providing the means to avoid them.

Scenarios to be developed should encompass this range of long-term projections (and base assumptions) for the global supply/demand balance in food resources: and should assess within the contexts provided by such projections the results of alternative Community policies. The latter would include not only greater on lesser degrees of "protection", but also technological options such as the deliberate maintenance - even if uneconomic under current conditions - of alternative crops and technologies, in order to enhance the strategic flexibility of the European food system.

The scenario evaluations should include not only the food system within the Community, but its export markets and the

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* See references under RES 2 description.

role of food aid in development policy. As has been pointed out,

> " ... world policy makers face an unusual dilemma. Production controls and reduced stocks in exporting nations work against food security of developing countries. Yet, if production is not controlled, developed nations may be forced to dump their surpluses on world markets in ways that will discourage long-run production goals of developing country importers". (*)

One answer to this dilemma may be provided by the use of biotechnology to widen the range of options, either at the short-term stage of conversion or storage of surpluses arising; or on the longer term by offering alternative useful outputs producible from the "surplus" land. Hence these (bio) - technological evaluations have to be made in relation to the scenarios, as well as to the global assessments made under the SYRENA theme (see following section).

The activity may be the subject of several complementary contracts, and will include consideration of the following aspects, discussed above :

- technological developments, innovation and competitiveness in the industry
- possible structural developments in the industry and determining influences

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* in World Food Trade and U.S. Agriculture, 1960-1982, The World Food Institute, Iowa, Agust 1983.

- current and potential future public policies, at national and European level, and their impact.

Through the network, the comprehensivenes and accuracy of the information obtained would be checked; and interlocutors identified for critical appraisal and discussion of the alternative scenorios.

——→Resources : Commission contribution 50.000 écus

——→Timing : draft report by end of 1985 (allowing time for significant inputs from SYRENA theme).

ALIM 2 : Food and Health : new perceptions, problems and opportunities ($)

Tehnological progress in analytical detection methods broadens the possibilities for the testing and definition of toxicity. At the same time, understanding of the human system is advancing. Toxicity relates to acute risks, but our gradual accumulation of epidemiological research has progressively enabled more and more relationships to be established between diet and health.

Both the need and the opportunity are therefore developing for a fundamental and objective review of Community policies relating to food and health. Such a perspective will touch

upon many existing areas, from assessing research trends in medicine and biotechnology, to the objective and rational assessment of the criteria currently applied for the acceptance of toxic agents in both novel and traditional foodstuffs. ALIM 2 will review the available data and reports, and the policy implications for the Community.

Going beyond the technological, it is clear that there is an important area for research studies, relatively little understood, and particularly relevant to the responsibilities and policies of the Community. In the Technical Change Centre study cited, the authors were asked to identify the major issues for further study; in their report, they group these under six headings :

1. Scientific issues
2. Technological issues
3. Economic issues
4. Legislative and Regulatory Issues
5. Consumer Issues
6. Industry/Government/Research Communications and Enabling Mechanisms

Of these, items 4 and 5 are particularly relevant to the Community in its role as regulator. Indeed these were themes stressed in Chapter 1 of the FAST Final Report, "Towards a Bio-Society ?" as essential to the long-term development of biotechnology in the Community. On the one hand, emphasis was

laid upon general education and public information (including, e.g., the use of audio-visual materials). On the other, it was pointed out (admittedly int the context of regulations for pharmaceuticals) that the establishment and review of regulations had to be seen as the management of a long-term, societal learning process, under conditions of partial uncertainty, and under the influence of the attitudes and beliefs of the general public and their political representatives.

From the Technical Change Centre list, one could define "Euro-aspects" appropriate for studies in the FAST II Food programme within all six issue groups; but the issues listed under item 4 are of relevance to the research activity ALIM 2. These include :

- the real requirements for food safety testing (the TCC report notes the "strong argument, well propounded in the ACARD Report (that the current approach to food safety testing is neither cost-effective nor relevant to the needs of the industry or the consumers right to protection)";

- the role of labelling regulations in informing the consumer;

- the proper benefits of EEC and Codex (WHO.FAO) harmonisation

- the incidence of the use of regulations as "non-tariff" barriers and the impact this activity has on the health of the industry (this topic would fall more under ALIM 1);

- the impact of regulations on consumer attitudes and habits (see ALIM 3, below).

Although the U.K. report is extensively quoted, the similarity of conclusions and recommendations to those of the Girain report is striking.

Figure 3 illustrates a simplified conceptual model of the major contenders in the "societal learning process" referred to. The picture is simplified in that the "regulatory bodies" box represents not only the E.C., but its 10 Member-States (whose autonomy on health-related matters is reserved by Article 36 of the Treaty of Rome and the regulatory agencies relevant to export markets - e.g. the U.S. Food and Drug Administration, the shadow of whose regulations falls well beyond the boundaries of the U.S.A.

From these technical studies and review of the leterature, and from the long-term scenarios being developed in ALIM 1 and

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* Report on the Food Industry and Technology, ACARD (Advisory Council for Applied Research and Development), Her Majesty's Stationery Office, London, Sept. 1982.

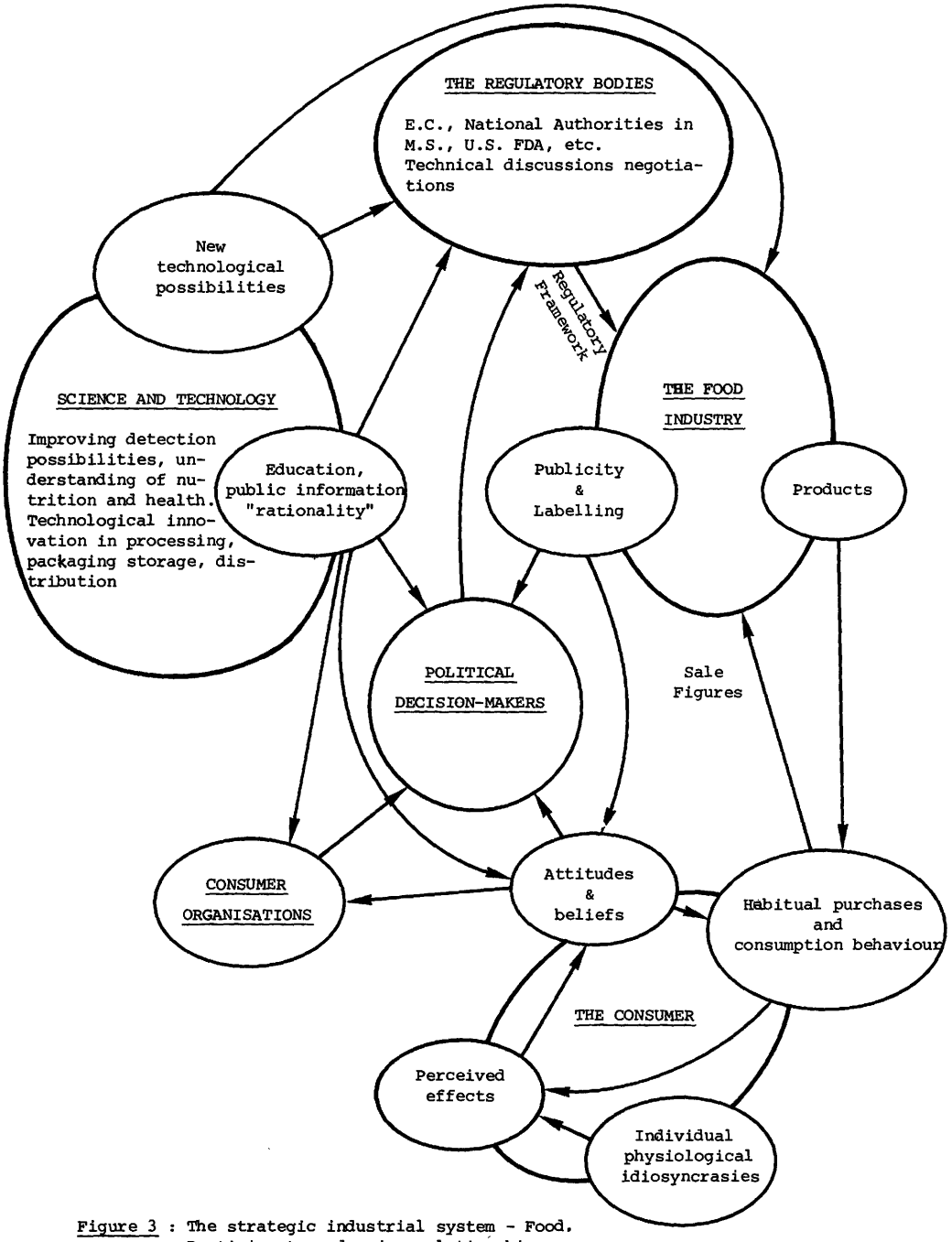

Figure 3 : The strategic industrial system - Food. Participants and major relationships in the "Regulatory Game" and the "Societal learning process"

From these technical studies and review of the literature, and from the long-term scenarios being developed in ALIM 1 and SYRENA, the materials and analyses will be brought together for an more imaginative extrapolation of long-term evolution of public policies bearing on food and health : leading to the synthesis to be presented as NOV6 (see above). Some provision is budgetted for network involvement although the work will be predominantly by contract study.

——→ Resources : Commission contribution 25.000 écus.

——→ Timing : draft report by end of 1984.

ALIM 3 - The Food Consumer : attitudes, influences and organisation ($)

Fundamental to the future of both the industry and the public policies relating to it are the behaviour and interests of the final consumer. Within the time and resources available, it is unrealistic to envisage undertaking significant survey work; the scope of this activity will therefore depend significantly on trying to build on existing survey and research work, interpreting and extrapolating its results as necessary.

The aim will be to consider the behavioral and consumer aspects of strategic significance for the future of the industry and for Community policies. As noted in the TCC report previously cited, these include :

- the awareness of and attitudes towards food products produced by the application of new technology;
- the role of the consumer organisations
- the impact of present education on the attitudes of young people towards food, health and nutrition;
- future educational needs.

A propos consumer issues, the TCC report usefully includes as Annex 4 the "Outline proposals to explore consumer attitudes to biotechnology as it impacts on food", a proposal prepared by staff of the Anglo-Dutch firm, Unilever. No less relevant, of course, would be proposals in such an area from consumers' organisations at European or national level. If such studies are to be conducted, the character of the co-sponsors will evidently be crucial to public confidence in the objectivity and integrity of the scientific work and its presentation.

The behavioral and cultural aspects implicit in such topics also demand local sensitivity and knowledge. It is therefore envisaged that the network would figure significantly in this research activity. Its results should contribute both to the strategic dossier (DOS 7) and the new opening (NOV 6)

——→ Commission contribution 25.000 écus.

——→ Timing : conclusions should be available by July '85 for incorporation in dossier DOS 7; it would be desirable if the health-related aspects could be ready by late-84 to contribute to NOV 6.

Table 9 gives a summary picture of the research activities planned as the means by which the two products described above will be obtained.

A half full-time equivalent researcher from the FAST team will be assisted by one specialist fellow, with knowledge of the food industry and its regulatory environment, for a period of 18 months.

The total amount allocated by the Commission to this sub-programme in order to cover the activities under contract as well as the network needs will be 190.000 écus.

Table 8 summarises the provisional budget estimates for the ALIM research activities.

Table 8 - SIS "Food" : - Indicative Budget for Research Activities

Nr	Research Activity	Contract Study	Network
1.	Technology, innovation, economics and public policy : options for the future structure of the European food system	50	25
2.	Food and health : new perceptions problems and opportunities	25	15
3.	The food consumer : attitudes, influences and organisation	25	50
	Total Commission contribution	100	90
		= 190.000 Ecus	

+ one fellow, associated with all activities

TABLE 9

SUMMARY - STRATEGIC INDUSTRIAL SYSTEM "FOOD"

KEY ASPECTS			RESEARCH ACTITIVES	WORKING MEANS			PRODUCTS ENVISAGED	
1. Technology	2. Legislative & regulatory	3. The consumer		"In-House" + "FELLOWS"	EXTERNAL CONTRACTS	NETWORKS	DOS 7 Future of the food industry	NOV 6 Food and health
✓	✓		ALIM 1 : Technology, innovation, economics and public policy : options for the future structure of the european food system	■	■	●	●	○
✓	✓	✓	ALIM 2 : Food and health : new perceptions, problems and opportunities	●	■	●	○	●
✓	✓	✓	ALIM 3 : The food consumer : attitudes, incluences and organisation	●	■	■	●	●

■ Principal working means

● Additional working means

● Important, direct relations

○ Complementary relations

THE INTEGRATED DEVELOPMENT OF RENEWABLE NATURAL RESOURCES - "SYRENA" (RES)

SYRENA is the acronym for a programme of activities focussed upon the integrated development of Europe's renewable natural resource systems. The following sections outline the rationale for the choice of this theme ; the planned products ; and the research activities which will lead to these.

1. THE SYRENA RATIONALE

1.1. "Bio-System Management"

The FAST Report(*), in summarising the conclusions of the Bio-Society Sub-Programme, spoke of the need for man, i.e. effectively the relevant public authorities, to recognise and move towards a new type of responsibility : for "bio-system management". The concept rests on a recognition

(a) of the increasing impact of man's activities upon the biosphere ;

(b) of the increasing range of technological abilities by which these impacts can be assessed, and adverse activities possibly modified or replaced.

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* Here and elsewhere, this refers to the two-volume Final Report of the first FAST programme, December 1982.

In short, we have to live with the consequences of our actions ; and where these are major, long-term, and at least partially foreseeable, the responsibility should be consciously accepted for their management in a long-term perspective.

The theme of man's interaction with the biosphere was implicit from the start of FAST I, in the choice of the sub-programme title, "Bio-Society" ; and although the activities focussed apparently more narrowly upon the development of a Community strategy for biotechnology in Europe, the final recommendations emphasised the need for a broad reconsideration of land use patterns in Europe.

1.2. Natural Resources and Community Policies

The SYRENA theme is particularly appropriate under the new FAST mandate, with its increased emphasis upon relating FAST activities and outputs to the actions and responsibilities of the other services of the Commission,

(a) not only in science and technology, but in other policy areas ;

(b) not only from a long-term perspective, but considering also the 5 to 10 year time horizons.

For example, FAST studies on integrated management of the renewable natural resource systems are taking place at a time of major debate and Community initiatives on the reform of the

agricultural structures policy (*).
The Commission's intention is to place greater emphasis on **long-term structural action**, as opposed to market intervention and price support, to alleviate social and income problems in agriculture.

Under the new policy, expenditure (particularly under the Guidance Section of the EAGGF(**)) could amount to some 7500m. écus in the first five years, as compared with the 3750m. écus allocated for 1980-84. To this should be added estimated expenditure of some 3000m. écus for improving agricultural structures under the integrated Mediterranean programmes.

The objectives of the reform of the agricultural structures policy include a number closely related to the areas proposed by FAST for detailed examination in the context of the SYRENA theme ; in particular :

- greater account to be taken of environmental protection constraints and the conservation of natural resources (see references below to Environment policy) ;

- stimulation of the processing of agricultural products to add greater value, with priority for new products and new technologies (note, in this respect, the emphasis placed on

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* COM (83)559, 16 September 1983.

** European Agricultural Guidance and Guarantee Fund

the potential of biotechnology (*) ;

- strong emphasis on the importance of forestry related to the encouragement (see below) of the production and marketing of timber through producer organisations.

Similarly, reference should be made to the Community's 10-year-old Environment Policy, which encompasses all the natural resources (the natural environment, raw materials and land) damaged or over-exploited as a result of economic and social development. Of particular relevance to SYRENA will be the proposed (**) implementation of an information system on the state of the environment and the natural resources in the Community (1984-87).

Industry policy involvement in the SYRENA theme is illustrated by the recent proposal on objectives and lines of action for Community policy regarding forestry and forest-based industries (***).

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* COM(83)500, "The Future of the Common Agricultural Policy", para 2.10, 30 July 1983.

** COM(83)528 : "Proposal for a Council Decision on the adoption of a work programme for the first phase of the implementation of an information system on the state of the environment and the natural resources in the Community (1984-87"), 10 October 1983.

*** COM(83)222 "Proposal for a Council Resolution concerning objectives and lines of action for Community policy regarding forestry and forest-based industries", 2 June 1983.

More exemples could be cited, but these are sufficient to illustrate that the FAST II programme is entering a crowded field, in which it must :

a) relate to these activities, avoiding duplication, deriving inputs from them, and ultimately contributing to their development or modification ;

b) avoid becoming too influenced by short-term policy considerations and constraints, since the "added value" which may be contributed by FAST depends critically upon its maintaining an independent and long-term-oriented standpoint.

1.3. On modelling and Policy Relevance

Natural resources are regarded in SYRENA as a "system", which implies dynamic connectedness. "Management" of these resources demands a "total system" or "model-based" approach, ideally based upon an adequate understanding of the whole inter-connected system. Even where understanding is inadequate, the use of a preliminary model to make explicit predictions of the expected or possible consequences of action taken, followed by monitoring and measurement, effectively offers the possibility of creating a "learning system". Thus the original model can be progressively improved.

Attempts to model natural ecosystems or (taking account of man's impacts, agro-ecosystems), are inevitably limited by

incomplete knowledge. Nonetheless the progress made in the technologies of measuring, monitoring and detection ("date capture" technologies - e.g. teledetection), in computing capacity and in software skills, give increasing scope for continuous improvement through systematic learning.

Our hypothesis then - to be explored in the context of the FAST II SYRENA theme - is that there is a promising gap between potential and current practice in the application of long-term modelling to the analysis of public policy. This approach is suggested by the understandable rejection by policy makers of the first wave of grandiose and oversold attempts at global modelling.

Community policies mentioned in the context of the SYRENA theme (forestry, environment, agricultural structures, information services), are essentially long-term and multinational in character. The issues are on a time-scale such as might be considered in the "strategic environment groups" of the large multinational companies, which routinely invest in technologies (e.g. plant biotechnology) and assets (e.g. gene banks) whose potential profitability may lie 10 years or more ahead. Through network activities and possibly project co-finance, links should be encouraged with long-term forecasting activities in the private as well as the public sector.

Of earlier, and largely rejected models or activities, the massive Global 2000 effort (*) put together a number of smaller models individually developed by various U.S. Federal agencies and concerned with different aspects of population, resources and environment. In working with the separate models, key inter-sectoral connections went unrecognised, but as connections were made, and as the interactions were recognised, previously unperceived policy constraints began to come into focus - e.g. water shortages and other environmental constraints. Recognition of such interactions will be an important feature of SYRENA.

For SYRENA no new model construction is envisaged. The need is to try combining in dialogue the sectoral long-term models already in existence - work well suited to the 10+1 network structure. This need is illustrated by the "multi-system" picture of Figure 4.

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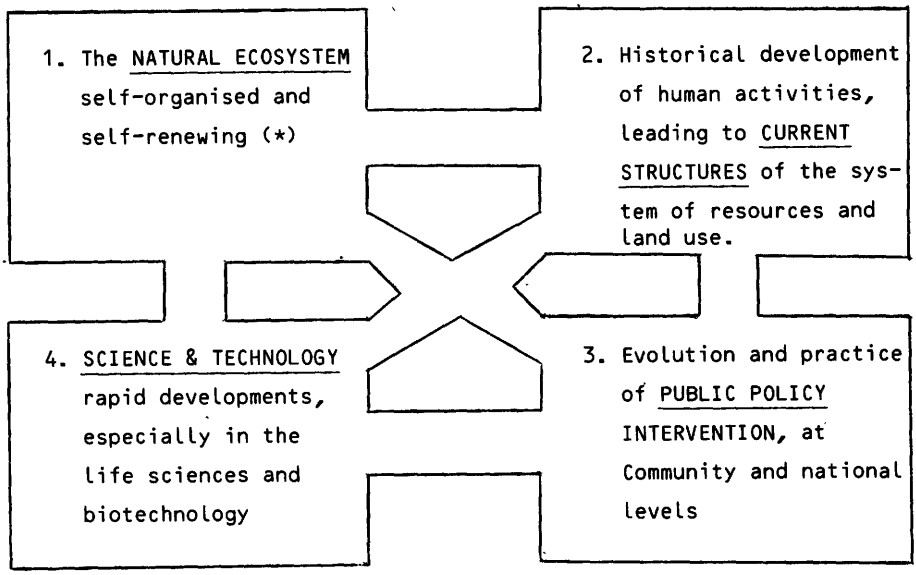
* The Global 2000 Report to the President - A report prepared by the Council on Environmental Quality and the Department of State (USA) - 1980.



* The "Natural ecosystem" becomes a rather theoretical concept in an environment long subjected to human intervention, and therefore more strictly an **"agro-ecosystem"**.

Figure 4 : Management of the renewable natural resource system in Europe : four interactive sub-systems.

The representation and assessment of such a system must be able to take account of :

- growing interactions between the different renewable resources, and between these and non-renewable resources ; the result, inter alia, of scientific and technological progress (life sciences, biotechnology, automation and information technologies ...)

- both old and new constraints and needs at various levels (the Mediterranean system in crisis, reform of the CAP ...).
- the implications and consequences of changes in the strategies and behaviour of the public and private "actors", in relation to different areas of activity and the integration of resources.

1.4. Scale : Global, Community and National

Figure 4 may be interpreted at many different levels, from a small farm to a small planet. The choice of system boundaries for a study is often arbitrary, dictated by chance or convenience. Global modelling has the advantage of being clearcut in this respect. But at sub-global level, any choice is to some extent arbitrary.

The hypothesis of the SYRENA studies is that for at least some purposes, the European Community (or such related multi-national aggregates as "The Mediterranean Basin" or the North Sea) forms a relevant space for the analysis of physico-politico-economic problems of significance. Examples :

- the evolution of the Common Agricultural Policy
- EC balance of trade in timber and forest products
- pollution or enhancement of the natural environment, monitored/promoted by politically agreed mechanisms of measurement and control.

The European Community is the space within which we "live, and move, and have our being", to use the Biblical phrase (Acts of

the Apostles, XVII, 28). It is within the institutional environment of the Community that we are most consistently and energetically developing the mechanisms for integrating the political, economic and socio-cultural dimensions : the regulatory regimes, the free trade area within which seeds, chemicals, fertilisers etc .. are diffused and the questions of land use influenced if not determined. We are 300m. human beings of a given age distribution, for the next few decades relatively predictable, living within a geographical region across whose external boundary little net migration is expected in the foreseeeable future.

What is aimed at in the SYRENA theme could be described as "a study of policies - agriculture, industry, environment etc. - as though Europe's renewable resource system mattered", to paraphrase Schumacher's famous title (*).

1.5. The Variables

The traditional "production functions" of economics contain three variables : land, labour and capital (Figure 5). The choice of terms within the 3 large boxes is intended to emphasise the long-term cycles, dynamics and sustainability. In the centre is shown also a small entry, "diversity", whose links to the other boxes are not easy to quantify, but which is a reminder that there are variables outside the conventional models which we ignore at our peril. In the particular context of CONF 3 (see below), one dimension of diversity is treated.

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* "Small is Beautiful : a study of economics as if people mattered".

THE PHYSICAL, THE ECONOMIC AND THE HUMAN

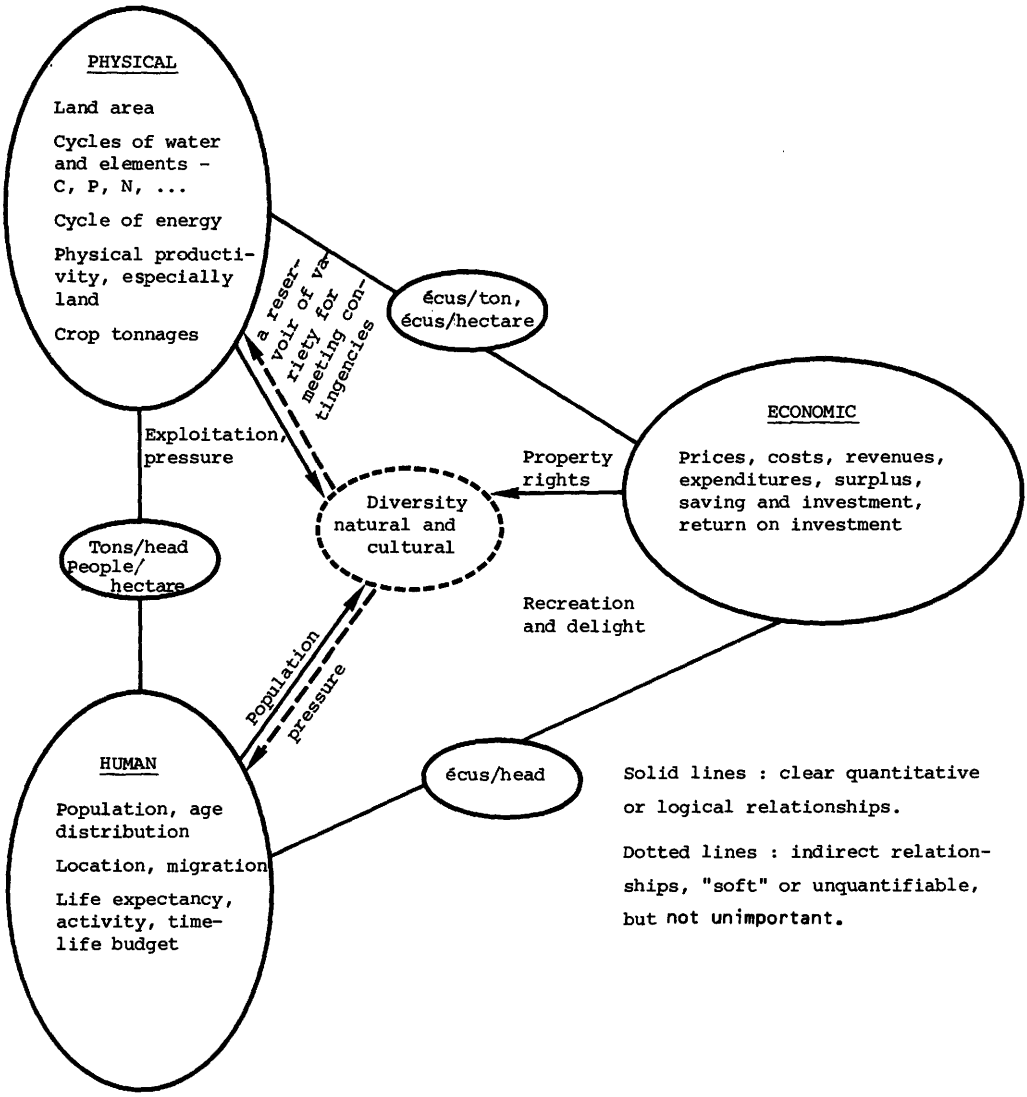

Figure 5 : Variables to be studied in the SYRENA dossier

2. THE PRODUCTS

The two major products towards which the research activities of the SYRENA theme will be directed are a strategic **dossier** - DOS 8 - assembling the information base for "managing" the natural resource system of the Community ; and a "Proposal for initiatives by the Community" - PIC 2 - which will draw together from the research activities and the strategic dossier the implications and recommendations for public policy at European level.

Supporting these two major products will be two "new openings" - NOV 6 and NOV 7 - of somewhat narrower focus. One will relate to all aspects of **forestry** ; the other, to the management of the aggregate of resources and policy areas summarised in the FAST Final Report by the term, the "**agro-chemo-energy** complex".

The four products are described in the following sections, followed by the description of the research activities on which they will be based.

DOS 8 - Resources (mid-85)

The concept of a dossier "describing the renewable natural resource system of the Community" would evidently be ridiculous if it were merely an attempt to bring together and summarise the vast range of information available. A struc-

tured approach is necessary, determined by the programme objectives. Nor is it easy to design a simple hierarchical approach to grouping the information in a "dossier of dossiers", progressively entering more details at the lower levels ; for the dossier must serve as a tool for different services, policy interests, and Member States ; the emphasis placed by Luxembourg on marine biology will differ from that of Greece.

The purpose of the dossier is to provide **a basis and a tool for exploration and analysis of alternative Community policies,** drawing upon all the available relevant information about and understanding of, our natural resource systems ; and considered in a long-term perspective.

It will be the work of FAST II to develop and refine this concept ; using the ideas and capabilities of its contractors, its networks and past experience. Some of the most sophisticated study and thought must go into the organising principles, or **architecture** of the dossier.

In some well-developed areas of organised knowledge, or in plans for developing their long-term organisation, the information functions can be thought of as these four :

(i) data **capture** : the basic activities of observation, measurement and recording (based upon theories and models whose needs determine what shall be observed and measured) : cf. "ecological mapping" ; or, of great

importance for SYRENA, satellite teledetection ;

(ii) data **storage** : information (or physical samples selected for the information they contain), stored in an organised manner to facilitate its subsequent retrieval or manipulation - in books and libraries, computer tapes and databanks, or other media : cf. the growing infrastructure of data banks and information networks, within Europe and worlwide, supported inter alia by Community Action Plans on information and documentation (*) ;

(iii) **data manipulation** : relationships, hypotheses incorporated in **models**, enabling new deductions, predictions, generalisations to be made from the stored information - thus deriving new information : models are discussed in 1.3 above;

(iv) **Knowledge based systems** : a term which may be employed in a narrow and a broad sense. In the broad sense, it may represent the entire structure of people, institutions, the knowledge available to them (however stored), the assumptions or models which summarise and organise this knowledge, and the communication systems by which these can provide policy advice to, and answer

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* Advice on the implementation of these Action Plans is provided by the Committee on Information and Documentation in Science and Technology (CIDST) ; note in particlar the activities promoted by the Environmental Working Group of CIDST.

the questions of, decision-makers. In the narrow sense, the term is used for sophisticated computer software and systems, allowing interrogation of a database or databases, interactively, using various models or programmes as judged appropriate by the sytem, with much of the knowledge of the database structure and how to interrogate it itself incorporated in the system ; the whole interfacing the user in high-level, close-to-natural, language.

Although the hierarchy of functions : data capture, data storage, data manipulation, knowledge based systems is such as characterises well organised domains, e.g. of scientific and technical knowledge, the functions are basic to any system of knowledge, including that less easily organised and broader domain required as a basis for policy analysis and advice. DOS 8 may be viewed as an attempt to conceive and work towards the creation of the **knowledge system necessary for policy analysis in domains impinging upon the renewable natural resource system in the European Community.**

The research activities necessary to construct such a strategic dossier and system are described in section 3 below.

PIC 2 - Resources (mid-86)

From the strategic dossier and the supporting research activities, FAST has to draw together the implications for public policy at European level, and formulate proposals for initiatives by the Community.

Among the Community policies that have a major influence on the natural resource system, the most important, at the moment, is probably the CAP (Common Agricultural Policy). In its communicaton to Council following the request of the European Summit at Stuttgart (*), the Commission affirms that "the adaptation of the CAP must not ignore the consequence of agricultural activity for the industries upstream and downstream of agriculture itself. The development of agriculture must necessarily be integrated more fully into the overall chain of economic activity" (p. 6).

Recognising that land is no longer a limiting factor, particularly for animal production, the Commission also emphasises the need to "promote the most efficient use of its resources of land and labour" for the production of organic chemicals, and the development of biomass and of wood products (p. 6).

Such is the scope of the long-term strategic challenges for the development of the European economy and the natural resource system associated with the CAP and with its evolution.

However, other policies also play a very important role in this domain :

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* COM(83) 500 final, 28 July 1983,**Common Agricultural Policy : The Commission's Proposals.**

- industrial policy (in particular agro-food, chemical industry, energy, and transport ...)
- infrastructure policy (data banks, information services, communication...)
- "regulatory" policies (institutional measures, prices, patents ...)

Taking into account DOS 8 and DOS 7 (see 3B) as well as NOV 6, NOV 7, NOV 8 and NOV 10, this PIC will seek to show the priority actions to be taken at Community level in the different sectors to implement an integrated management of European natural resources.

New Opening NOV 7 : Forestry (end 85)

The management of forest resources is one aspect of bio-system management particularly appropriate to select for detailed treatment, for a range of reasons, some already cited in the introduction.

Forestry, and therefore the industries "downstream" from it, are activities whose natural cycles demand a long-term-oriented approach ; particularly if the forest resource systems are to be "managed", on a sustainable basis, rather than exploited in a transient and destructive manner.

Forestry features significantly in any discussion of long-term global resource trends, being the energy source (fuelwood) of much of the world's population, and consequently much at risk under the pressure of growing populations, with consequent adverse consequences for destabilised ecosystems (especially in the tropics),soil erosion through more rapid run-off, and increased flood risk downstream.

The "Global 2000" report emphasised the long-term problem : "if present trends continue, both forest cover and growing stocks of commercial-size wood in less developed regions (Latin America, Africa, Asia and Oceania) will decline 40 % by 2000".

These projections are uncertain, based perhaps on a viewpoint too narrow and reflecting specific Scandinavian bias ; others

(e.g. Stanford Research Institute's Forest Service) would argue differently. But there is certainly a grave risk in the tropical forests (*) of loss not only of the timber, the vegetation and therefore the soil productivity ; but most irreplaceably, the genetic diversity.

Within the EC, the economic and technological challenges of forestry have already been documented in a dossier assembled by the relevant Commission services (principally D.G.VI, Agriculture). (Timber and forest products account for a deficit of 12,000 m ECU in the Community's external trade).

A major R & D programme (Wood as a raw material) is currently being carried out by the Commission, (DG XII : Science, Research and Development), while DG III (Industry) and DG XI (Environment and Consumer Protection) are also executing significant work in the sectors for which they are responsible.

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* See Research Priorities in Tropical Biology , by U.S. National Academy of Sciences, 1980 ; and Conversion of Tropical Moist Forests , by N. MYERS for U.S. NAS, 1980.

The objective of this NOV is to examine in depth the constraints and difficulties, present and future, economic, technological and socio-institutional which prevent the countries of the Community from managing the "forest complex" in the most effective possible way.

NOV 8 : The Agro-Chemo-Energy Complex (end 85)

We are starting to recognise the necessity for better organisation of the close and fundamental relationships between agriculture, energy and the chemical industry. However, the measures recently adopted within these three sectors have not succeeded in reducing significantly the scale of Europe's problems, characterised by :

- an energy system still largely externally dependent
- a chemical industry similarly dependent on imports of raw materials, and "threatened" by growing imports of finished products
- an agricultural system which produces unwanted surpluses of some products while not meeting Europe's needs for other essential products.

The concept of the "agro-chemo-energy axis" was advocated in FAST I (*). This must be developed through more thorough,

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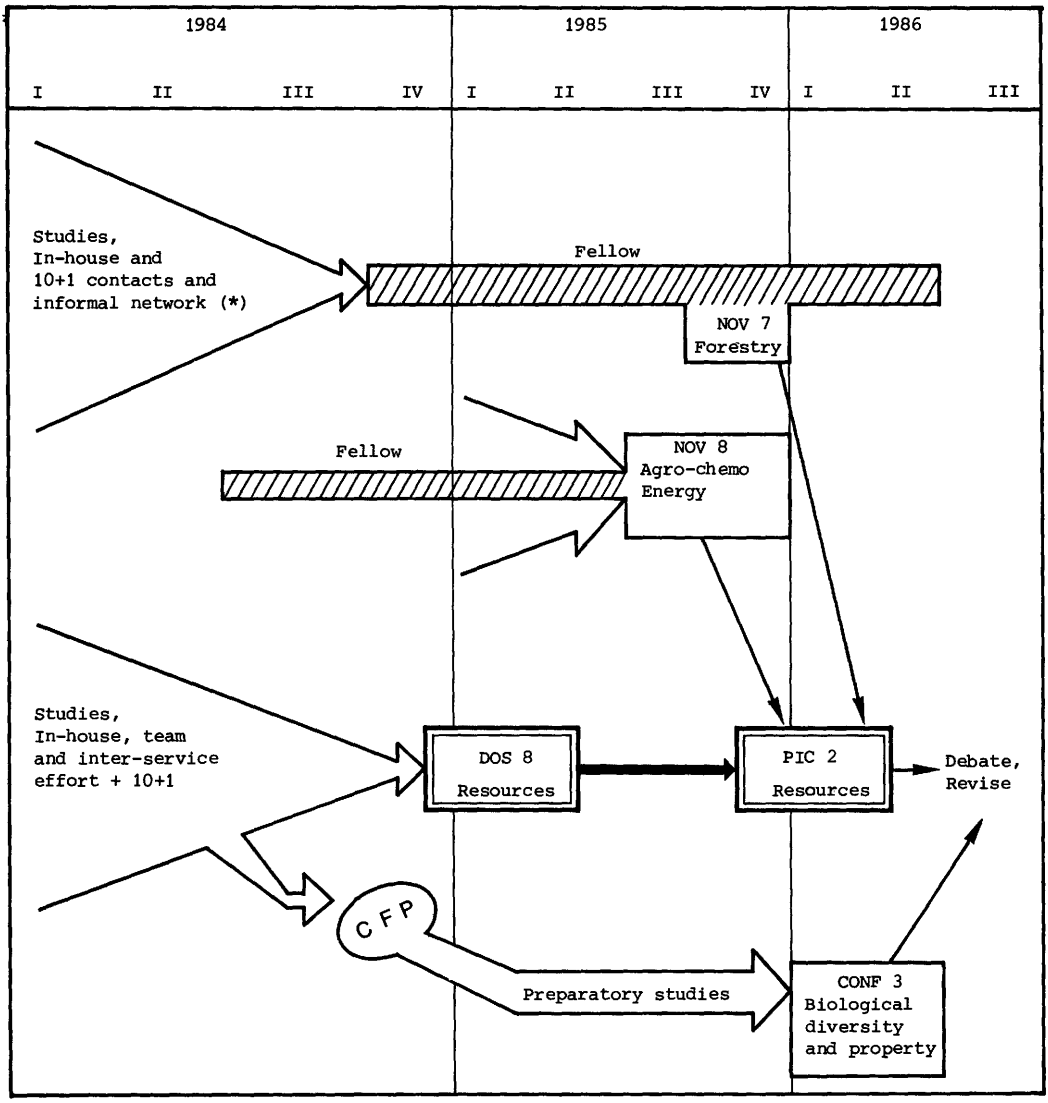
* See in this respect the FAST Final Report ; also D. Gibbs and M. Greenhalgh, Biotechnology, Chemical Feedstocks and Energy Utilisation , Frances Pinter, London, 1983 ; other FAST I and CEC reports on biomass energy ; and L. Munck and F. Rexen, Cereal Crops for Industrial Use in Europe , study report for CEC, 1984.

quantitative studies in FAST II, in terms of land area, energy flows, tonnages and costs. What could the European land area give us, particularly in conjunction with continuing progress in plant genetics, or high intensity agriculture ? Is land a constraint ? If it is not a physical constraint on food supply - and for growing categories of intensively raised meat and vegetable products it is capital or energy, rather than land, that is limiting - then what is land for ? The objective of this NOV, for which the basic factual and strategic elements will be provided by DOS 7 and DOS 8, is to highlight the potential connections, both technological and economic, which could developed between the three sectors over the next 15-20 years ; and to suggest priority research areas to make the exploitation of this potential feasible.

The product schedule

Figure 6 summarises the outline schedule for the five products, and their inter-relationships.



* These words can be applied to all activities shown

Figure 6 : Indicative schedule for SYRENA activities

3. RESEARCH ACTIVITIES

3.1. Description

*** RES 1 : Measurement, Detection and Protection Technologies ($)**

The basis of all the information systems needed for the dossier DOS 8, must be the technological processes of measurement - whether at gross level (e.g. land use areas measured by satellite), or at the microscopic level (e.g. analytical methods for detecting trace quantities of pollutants or nutrients in soil or water). A technological assessment and long-term forecast in these areas is proposed (RES 1).

The **objective** is to describe current measurement capabilities and practices, and their future potential and/or desirable evolution ; with reference to the physical variables of current and potential relevance to public policy in the SYRENA areas. Particular attention should be given to areas where policy is limited or hampered by measurement problems. This should include, for example, mapping or assessment of soil and climatic potential, to facilitate consideration of alternative land uses. It should include the many aspects of environmental monitoring - of land, air and water, of the ecosystems, agro-ecosystems and food systems - so that disasters such as the

impact of acid rain on trees may be sooner detected, and so that policy options such as research or remedial measures can be implemented befor potential disasters materialise.

Diagnosis is of limited value unless followed by prescription : it is therefore logical within this research activity to include some assessment of the technologies for **protecting** ecosystems, and the prospects for innovation and improvement in technologies contributing to such protection.

The results should contribute one of the key technological dimensions to scenarios envisaging a more effective "management" of bio-systems - for example, better "early warming" systems, or improved bases for rational establishment of directives and standards related to environmental and health protection. The emphasis should again be on **long-term** variables - the gradual build-up of atmospheric CO_2, or nitrate in water supplies, or trace residues in the food chains and in man ; rather them, say, the immediate dimensions of an oil spill or a radio-active leak.

It is envisaged that one or several contract studies will be co-financed.

——→ Commission contribution : amounting to 60.000 écus.

* RES 2 : Inventory and Assessment of Projections (including scenarios) and Projection Capabilities (including models) in the SYRENA areas ($)

Emphasis has been laid in the preceding sections upon the sales of both formal models, and competent institutions. The latter, their experience embodlied in people, resources and organisation, constitute the major capability for systems analysis and projection, and contain the knowledge essential to the resources dossier. Each institution has some capacity to contribute from its knowledge to some dimensions of scenario projection. The term "model" implies a rigorous and coherent statement of such accumulated knowledge, organised in a manner designed to facilitate repeated calculations and deductions on a wide range of alternative assumptions about data and policy choices.

The "Global 2000" (*) experience illustrated the problems, but also the value and importance, of bringing together for comparison and study of interactions the projections, assumptions and long-term forecasting models of various agencies. The very different assumptions and interpretations of "Global 2000 revisited" (**) illustrate the range of

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* The Global 2000 Report to the President - a report prepared by the Council on Environmental Quality and the Department of State, USA, 1980

** By H. Kahn and J. Simon of Hudson Institute : see article by C. Holden in Science, 221, 22 July 1983.

uncertainty involved in long-term projections of resource and environmental questions.

Among the objectives of the complex of **inventory, assessment** and **projection** activities embraced under the heading of RES 2, three classes of questions can be distinguished :

a) **models :** what models are available, of relevance to long-term assessment of the variables relevant to SYRENA : what inputs do they require, what assumptions are built into them, what variables are used, what alternative policies can be evaluated, what outputs are produced, for whom and for what purpose was the model developed, what projections have been made with it and what is its current use ? These questions, and the focus of the inventory, will be considered :
   - at European scale and smaller (e.g. national or regional)
   - at global scale, with reference to Europe's position in, and relation to, global systems ;

b) **institutional** (or, where appropriate, individual) **capabilities** of relevance to long-term projection of SYRENA variables : an effect, "who knows what ?". Who does what ? What are the main ongoing research projects ? Are there new appproaches to the issues ?

c) **What forecasts or projections have already been made,** by whom, for what variables, for what purpose ?

The work of RES 2 will include the inventory and assessment of models and institutional capabilities and where models and their supporting date bases are sufficiently ready and easy to use, projections and forecasts should be made as part of the project.

By assembling such projections, RES 2 will contribute to the creation of alternative long-term scenarios for the renewable natural resource systems of relevance to Europe(whether within Europe, or elsewhere, or at global scale). Analysis of the differences between alternative scenarios should identify how far the differences are dependent on different assumptions about public policy and the bevavious of key social actors, how far they rest upon differences of scientific assumption, in principle resoluble by further research.

It is envisaged that a significant role will be played in RES 2 by the 10+1 network, including assistance with the collection of information on national capabilities and policies, and the appraisal from a national standpoint of projections and reports.

Since it is unlikely that a single contractor will have adequate capability in all aspects and areas, it is expected that several contracts will be supported. As in all FAST projects, local (national) co-finance will be considered highly desirable.

——→ Commission contribution : 140.000 écus (contrats) + 60.000 écus (network).

* **RES 3 : Designing a knowledge-based expert system for policy evaluations and scenarios assessments in the SYRENA areas ($)**

The key concepts have been outline in section 2.1. above.

A structure for exploiting the knowledge base of models and institutions - providing linkage, access, interactive dialogue - is a difficult and demanding task to create, but one which will become increasingly necessary. A feasibility and outline design study for such a system, RES 3, will provide a starting point for debate. The interactive access should assume multiple users, and the network "10+1" should be actively involved in discussing the design.

The research activity will include assessment of the necessary software and communication structures to link the capabilities (institutional and model-based) cited above. Do adequate systems exist ? If not, what further types of development are necessary ? Are there major technical incompatibilities to be resolved at the level of compunter protocols ? Or between the types of data required and/or produced by the different models ?

The end-point of this work should be a judgement of the steps required to attain feasibility, and a preliminary design, of the main features and parameters of such a system. It should describe the necessary changes and upgrading of the models and information sources on which it draws. The system would initially be conceived as a support for policy analysis at European level, but its open availability for use by governments or any other groups or individuals who wished to use it - e.g. to test the effects of alternative assumptions or policies - should be an important objective (cf the open access to the U.K. Treasury 's economic forecasting model).

It is probable that overall design responsibility will be the subject of a single contract, althrough the possible need for one or more sub-contractors is not excluded.

→ Commission contribution : 60.000 écus (contracts) + 30.000 écus (network).

RES 4 : Forestry ($)

In order to prepare the new opening "forestry", at least three types of activity are envisaged within RES4 :

- technological forecasts of progress in forestry research, from plant genetics, cloning and propagation techniques, through all aspects of the management, harvesting and processing/conversion of forest bionass;

- inventory and assessment of Member State and E.C. forestry policies - an activity involving the 10+1 network, plus central coordination by the fellow in Brussels ;

- long-term economic assessment of forestry as a use of land.

It is possible that separate contracts will be awarded for the technological, the policy assessment, and the economic approaches. The project details are at this stage less than fully specified, so that proposals received can reflect the existing capabilities, and the integration to meet FAST needs may be the subject of further negotiation after proposals are received.

——→ Commission contribution : 60.000 ecus (contracts) + 30.000 ecus (network).

* RES 5 : Alternative uses for land = the agro-chemo-energy complex ($)

The basic statement of the need for new land use policies was given in the FAST I Final Report. An inventory of non-food land uses on economic and other policy-relevant criteria, forms the core of research activity RES 5. Is has to include reference to energy, fibre, chemical foodstocks, and amenity use of land. For forestry, the inventory and assessment should draw upon the work of RES4.

The work will especially focussed on

- the assessment of the impact of scientific and technological innovations on the alternative uses for land in Europe (10 + Spain, Portugal and Nordic Countries)

- the elaboration of a set of alternative european scenarios for land uses in the 90ies based on the analysis of possible medium and long term strategies from agricultural, chemical, transport ... industries and governemental institutions.

This research will be carried out and coordinated by one fellow. The 10+1 network will be significantly involved, for analysis and hypotheses on fakteur prospects for national land use policies within the Community.

———→Commission contribution : 30.000 ecus (contract) + 30.000 ecus (network).

*** RES 6 : Biological Diversity and Property ($)**

Finally, in addition to the products and research activities described, there will be organised in early 1986 a major **conference**, co-supported, it is hoped, by the Parliament, on a subject of increasing importance which lies at the interface of science and policy : **a conference (CONF 3) on biological diversity and property.**

The long-term maintenance of the Earth's biological resource base has received growing attention in recent years. This has included concern about the survival of many plant, animal and microbial species and the implications of a diminishing biological resource base for worldwide agriculture, public health, economic growth, and social development.

A major Strategy conference on Biological Diversity took place in November 1981 (*), and this and other similar events have highlighted the role and importance of public policy ; most of the conclusions remain valid and of increasing importance, such as the following :

"as stated in the programme document "World Conservation

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* Proceedings of the U.S. Strategy Conference on Biological Diversity, November 16-18, 1981. U.S. Dept. of State Publication 9262 ; April 1982

Strategy (*), the preservation of genetic diversity is both a matter of insurance and investment, necessary to sustain and improve agricultural, forestry, and fisheries production ; to keep open future options as a buffer against environmental change ; and as the raw material for much scientific and industrial innovation. Many would also see it as a matter of moral principle".

Recommendations included the following :

"A coordinated international programme to analyse the current status of the Earth's ecosystems and the rates of conversion from a wild to an altered state should be developed".

There will by end of 1985 be a need to restate and update this type of strategy conference, and to relate it specifically to the context of public policy in the European Community. It will also be appropriate to relate to the issues of biological diversity the analyses and policy proposals prepared for DOS 8 and PIC 2, and to communicate these to a wider public.

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* This programme, launched in 1980, brings together 34 countries, and a large number of societies. Several important national reports are available, including some relating to E.C. Member States.

In a document already cited (COM (83) 500) on the reform of the CAP, the importance is equally recognised of maintaining and enhancing the genetic diversity of the ecosystems on which we depend : "the development of agriculture must continue to be made in a way which reconciles the interests of human recreation, and the protection of habitats and species, with the economic interests of those who live and work in the country".

The linking of the subjects of biological diversity and property reflects a recognition of the growing signifiance of intellectual property rights in biotic material for bio-technology (e.g. patenting of micro-organisms, the various legal systems for protection of plant varieties, and the potential corresponding case for establishing animal breeders' rights).

Technological advances in genetics are raising new challenges to the legal system. Monopoly rights over varieties, seeds, or portions of genetic material may face increasing challenge, not least from less developed countries which may have been the original source of some of the strains from which the new varieties have been developed.

The situation in the developing countries gives greatest cause for alarm, and should probably be considered in the context of Community Development Policy, including the programme of science, technology and training for development. The FAO meeting in Rome in November 1983 established some basic agreements, setting up an intergovernmental committee to oversee the conservation and use of the genetic resources of plants, and approved in principle the free worldwide exchange of plant breeding stocks ; but eight countries (including Britain, W. Germany, France, the Netherlands, the U.S., Canada and Japan) have "reserved" their position.

Meanwhile, the serious situation, particularly in the tropics, continues to deteriorate ; its complexity is emphasised by the warning of Peter RAVEN, an eminent American botanist (*) :

> "Even though the rich fabric of tropical communities is manifestly composed of millions of kinds of organisms interacting in ways that are imperfectly understood, governments and other agencies dealing with develpment tend to ignore this fact and to assume that, even though the principles are not understood, they can simply manipulate the system as a whole and derive from it the results they desire. They thus tend to speak of the "management of tropical forests" as if the forests were a resource like water or petroleum in the ground which can be mined at will, altered to given specifications, and utilized to produce economic benefit indefinitely".

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* Keynote address on Natural History Museums at meeting of the International Council of Museums, Mexico City, 27 October 1980.

The conference has be a major occasion for public and political information, and support will be sought from the European Parliament. In order to ensure its quality and interest some, 6 "keynote papers" based on studies will be funded with a Commission contribution not exceeding 10.000 écus per topic. The following is a provisional list of topics; additions or modifications to this list can be considered, provided they contribute to the overall objectives of the conference :

1. Assessment of the genetic situation for signifiant plants and animals within Europe (drawing upon EUCARPIA - the European plant breeder's association - and EAAP, the European Association for Animal Production, inter alia).

2. Assessment of the potential significance for Europe of the loss of genetic diversity worldwide.
3. Survey of collection, conservation and manipulation techniques for germplasm ; and their implications.
4. Review of policy stances and proposals in Third World countries relating to conservation of genetic patrimony.
5. Review of Plant Variety Protection legislation and its genetic impact.
6. Review of industrial activities in germplasm collection and exploitation : "who's got what, and why ?".

Contribution of the Commission : 60.000 écus (conference) + 60.000 écus (keynote papers).

For all the research activities and the conference, table 10 provides an indicative budget breakdown.

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TABLE 10 : Indicative Budget for SYRENA Research Activities

('000 écus)

Research Activity		Contract	Network
Nr.			
RES 1	Measurement, detection and protection technologies	60	
RES 2	Inventory and assessment of projections and projection capabilities in the SYRENA areas	140	60
RES 3	Feasibility/outline design study for interactive structure to exploit knowledge base for RNRS policy evaluation	60	30
RES 4	Forestry technology, policy and economic studies (+ 1 fellow)	60	30
RES 5	Inventory and assessment of non-food land use (+ 1 fellow)	30	30
RES 6	Conference : Biological Diversity and Property	6 keynotes: 60 Conference: 60	
Total Commission finance		470	150

Note : Relation of theme RES to theme SIS-ALIM

The research activities on the SYRENA problematique will contribute to, and be helped by, some of the activities proposed under the heading "Strategic Industrial System : Food". The approach is, however, rather different : SYRENA theme is centred upon a physical and (comparatively) fixed reality (the natural resource system) and upon a coherent approach to the public policy activities which impinge upon the : "bio-system management".

The use of the natural resource system as the source of food is one major aspect of land use, and as such will be included within the SYRENA activities (particularly RES 2 and RES 3).

In SIS-alim, however, the focus is on the functional aspects of food supply and nutrition, on the structural aspects of the supply side, and on the strategic aspects of how food supply is ensured and organised ; with emphasis on corresponding aspects of public policy.

A second Note : The long-term perspective : the most distinctive aspects of the FAST programme are the emphasis placed by its mandate on **long-term** assessment, and the corresponding independence from current policy commitments or related structures. Although within and part of the Commission services, intellectually it has to stand back a little from them, and feel free, e.g. to reconsider the Treaty of Rome or the structure of Community institutions, recognising that on some time-scale these can be rewritten or changed, and should not be viewed as being as immutable as the law of gravity.

The long-term orientation is of particular importance in the context of the long cycles pertinent to some aspects of bio-system management. Forestry has been chosen partly for this reason, but it is no less relevant to consideration of long-term effects such as soil erosion/reconstitution, or the rehabilitation of an agro-ecosystem. A thorough understanding of man's interactions with ecosystems usually demands a deep historical perspective, particularly in the "Old World" of Europe ; e.g. as displayed by Thirgood on the Mediterranean Forest (*). This aspect is illustrated suggestively by Figure 7.

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* Man and the Mediterranean Forest. A history of resource depletion. J.V. Thirgood, Academic Press, 1981.

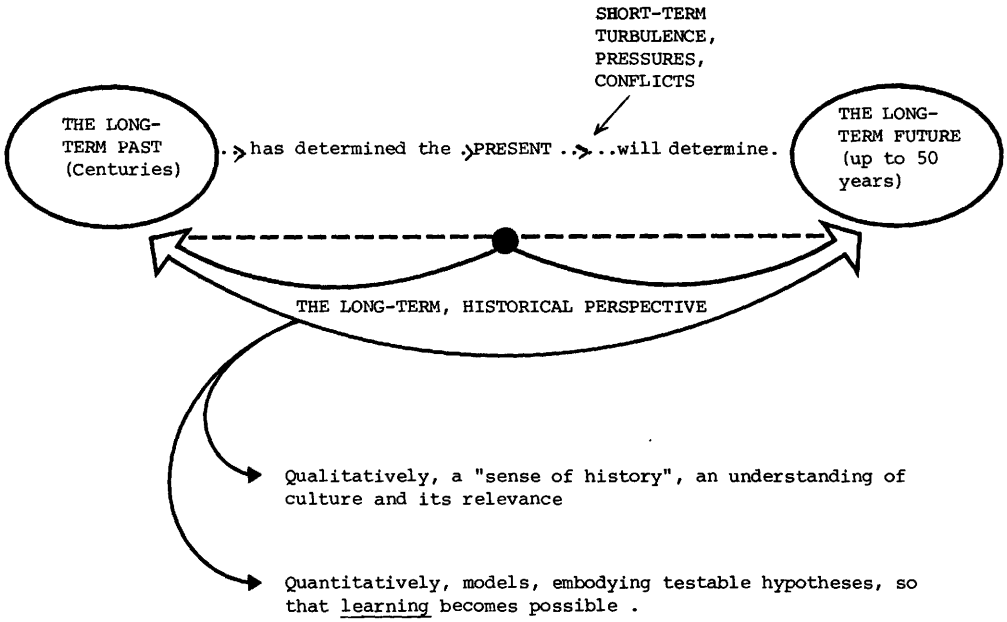

Figure 7 : The importance of the long-term perspective

It is of interest to note the consistency of this ecological argument with economic theory : as Solow expressed it shortly after the first oil crisis,

> "The unusual factor that the theory of exhaustible resources brings to the fore is the importance of the long view ... Indeed it might be enough to have the government engaged in a continuous programme of information-gathering and dissemination covering trends in technology, reserves and demand (*)".

Studies may be limited to specific topics or aspects, for example by region, by sector or subject, or in other ways, provided they can contribute to the overall objectives, either directly or via the planned products. The presence of fellows for two specific topics should not be viewed as an obstacle, but rather an encouragement, to the submission of proposals in these areas.

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* Robert M. Solow, The Economics of Resources or the Resources of Economics, Journal of the American Economic Association, May 1974.

Table 11 gives an overall picture of the research activities on which the products described in section 2 will be based. Each of these research activities touches upon one or more of the four basic sub-systems introduced in Figure 4 : (agro-) ecosystems, human history and structures, public policy interventions, and science and technology.

Finance of the order of 470.000 écus will be available for funding **external work under contract**, typically at up to 50 % support. The nature and interests of co-sponsors will be a significant criterion - i.e. favouring those with active experience/responsibility in some aspect of "bio-system management". The resources provisionally planned for the research activities are summarised in Table 11. They also include an amount of 150.000 écus for supporting network activities. 1 1/2 full-time-equivalent researchers from the FAST team will be assisted by two specialist fellows on secondment, for forestry (18 months) and agro-chemo-energy (12 months).

TABLE 11

SUMMARY OF RESOURCES THEME

KEY ASPECTS				RESEARCH ACTIVITIES	WORKING MEANS			PRODUCTS ENVISAGED			
1. Natural eco-system	2. History and current structures	3. Public policy	4. Science and technology		In-House + Fellows	External Contracts	Networks	NOV 6 Forestry	NOV 7 Agro-Chimo Energy	DOS 8 Resources	PIC I Resources
			✓	1. Measurement, detection and protection technologies		■		○	○	○	○
✓	✓	✓	✓	2. Inventory and assessment of projections (inc. scenarios) and projection capabilities (institutional and model-based) in the syrena areas	●	■	■	○	○	●	●
		✓	✓	3. Feasibility / outline design study for interactive structure to exploit knowledge base for RNRS policy evaluation	●	■	●	○	○	●	●
✓	✓	✓	✓	4. Technological, policy and economic assessments of forestry	■	■	●	●	○	●	●
✓	✓	✓	✓	5. Alternative uses for land : the agro-chemo-energy complex	■	●	●	○	●	●	●
✓		✓		Conference : biological diversity and property : preparation of keynote papers	●	■				●	●

■ Principal working means
● Additional working means

● Important, direct relationship
○ Complementary relationship

TOWARDS A UNIFYING "PROBLEMATIQUE"

As shown in Diagram 1, FAST has centred its new programme around one major question : what can and should be the role of Europe's science and technology, in the coming years, in the search for a "new development" ?

For this purpose, and in order to ensure **coherence** and **integration** between the results of the analyses conducted within the context for each research theme, we have judged it necessary to carry out **three research activities of horizontal character,** and have programmed **three products situated at the points of intersection between the results of the activities of FAST I and FAST II.**

1. Horizontal" research activities (HOR)

These concern the following subjects :

. macro-economics and technology

. society and technology : images and attitudes

. the prospects for the "cognitive sciences" in Europe.

* HOR 1 : Macro-economics and technology-greater understanding needed

The least that one can say is that the various conceptual frameworks currently used in macro-economics do not permit a

satisfactory appreciation of the relationships between technological change and the major macro-economic variables such as investment, employment, external trade and final consumption. Current models in fact have difficulty in "grasping" the new relationships and the resulting complexities, the qualitative jumps and the structural modifications introduced into the technological and economic systems by the **new technologies.**

One of the major qualitative leaps which springs to mind as an example, is that of the emergence of a new generation of "non-material" goods and services, which require "non-material" investment, and which raise new problems for the management of international economic relationships (GATT etc...).

The objective of long-term-oriented deliberation in this field, to be conducted in close cooperation with the Commission's Directorate-General for Economic Affairs, will be relatively modest and limited. It will involve "in-house" work in particular, to gather together the greatest possible number of theoretical and analytical contributions which may help the Commission towards a better appreciation of the nature and significance of the changes in the relationships between the principal macro-economic variables and technology.

This will be sought through :

- the analysis of work carried out in the Member States to measure the economic effect of technological change

(particularly via models, widespread national enquiries, ...)

- analysis of the factors which can influence the way in which Europeans derive benefit from technological changes

- specific sectoral analysis (econometric tests, where the data exist, starting for example with the MEDEE model)

- the study of global scenarios (see also below).

This activity also involves the organisation of one of the six **conferences** mentioned previously. The conference is envisaged for late '85 - early '86. It will enable the available information to be brought together for the construction of an analytical and methodological "dossier" on the subject.

*** HOR 2 : Society and technology - images and attitudes**

As has been emphasised in a FAST study (*), there are few fields in which so many prejudices and stereotypes make play as that of the relationships between society, science and technology. The great debate on 'technology and employment" is one obvious proof. However, over the past 2-3 years, a new

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* J-J. Salomon, Prométhée Empêtré - La résistance au changement technique, Pergamon Press, Paris, 1982.

phase seens to be taking shape : the new technologies no longer provoke merely simplistic and emotional reactions (for or against) (*) ; rather, these is a growing number of protagonists of change (industrialists, trade unionists , researchers, public administrators, users ...) who display more balanced attitudes and adopt a more open approach, seeking to resolve problems through dialogue and not by prejudged "excommunications".

The aim of the deliberation envisaged here is :

a) to detect the principal characteristics of this new way of "living with technological change"

b) to evaluate its long-term implications for science and technology policy.

Based on in-house activity and the network, this activity will take account of the lessons emerging from the other FAST research activities, as well as work carried out in this field, particularly by the working group "Technology, Growth and Employment" (the Versailles Group) and many other opinion surveys conducted in the countries of the Community by public and private organisations.

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* Therefore also transcending strategies merely aiming at the acceptance of new technologies.

* HOR 3 : The prospects for the "cognitive sciences" in Europe

The "cognitive sciences" constitue a new scientific "branch" or "approach", having as its object the study of human intelligence, including its mathematical structure, its psychological realisation, and its neuronal basis. The research methods and analytical models of the "cognitive sciences" derive from neuropsychology, from experimental psychology, from theoretical linguistics, fron analytical philosophy, and from cybernetics.

The "cognitive sciences" have undergone rapid development in the United States since the seventies, in connection particularly with the considerable progress achieved, both technological and industrial, in automation and information technologies (in the broad sense).

Indeed, the "cognitive sciences" have an important role to play in the futher development of advanced information technologies, and in the societal impacts of these technologies. As was demonstrated in FAST I by the study on the "mis-matches" between man and machine (*), in order that new computerised systems produce results "intelligible" to human users, it is necessary for the new systems to have a deeper understanding of the "cognitive" capacities of humans. Hence the "cognitive sciences" are important, for future

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* See FAST series No 9, D. Kopec and D. Michie, **Mismatches between Machine Representation and Human Concepts : Dangers and Remedies**, 1983.

technological developments, in such fields as :

- robot vision (automatic systems for guidance and visual recognition)

- machine usage of natural language

- "expert systems", i.e. automatic interactive systems to aid scientific analysis and decision.

These aspects are taken into account in certain R & D activities being undertaken or planned in the context of the ESPRIT programme. The objective of this activity, which will be executed via **networking**, is to establish contacts between researchers and institutions from the Community countries who are interested in this multidisciplinary "new science" ; to identify the strenghts and weaknesses of the European scientific Community in this field ; and to suggest priority actions to be undertaken at Community level in order to avoid accentuating the possible "mismatches" between man and machine.

The results of this exploratory activity will also be used for the creation of DOS 1 (Man-machine). The research will be undertaken between September 1984 and December 1985.

———→Commission contribution : 25.000 écus (networking).

2. Three products at the intersections of the FAST I and FAST II activities.

These are represented by :

. a NOV on "Scenarios for Europe"

. a PIC on "Human Resources"

. a NOV on "Product innovation - PRO NOVO".

*** NOV 9 : Scenarios for Europe**

During the FAST I programme, alternative scenarios were developed in different projects. One might mention, for example, the three macro-economic scenarios ("Protection", "Opening", "Promotion") of the PRESTO project (*), as well as the exploratory scenarios constructed for appreciating the possible relationships, in 1995, between the new information

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* See **"Trois scenarios pour l'Europe"**, FAST Occasional Paper nr 56, Brussels, 1982, by P. Hanappe and A. Antunes. These scenarios served as point of departure for the exercise "Energy scenarios 2000" undertaken by the services of the Commission.

technologies and daily life (*).

The relevance and use of these exercises having been confirmed, what is needed is to pursue the prospection work thus undertaken with the aim of providing an **analytic framework of European reference,** with a major section devoted to technological and socio-economic data.

This prospective deliberation will draw upon the FAST network ("10+1" and in-house inter-service network), starting from a first preliminary survey by the "fellow" in change of the European scenarios for work. At the start of 1985 we shall check whether it is necessary to place an external research contract in order to complete the activities of the networks.

*** PIC 3 : Human resources**

The "optimal" utilisation of scientific discovery and technological innovation must surely seek to reduce the

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* The scenarios were as follows :
- crisis without change
- living through the crisis thanks to new technologies
- growth through information technologies
- the inform action society, thanks to growth,

For further details see FAST series No 10, **Vie quotidienne et nouvelles technologies de l'information", EUR 8551, Brussels, 1983, by P. Mercier, F. Plassard and V. Scerdigli.**

sources of imbalance between, on the one hand, the evolution of technology and the economy ; and on the other, people (with their aspirations) and the institutions charged with looking after their general interests. To achieve this, a significant portion of national revenue has to be invested in activities to stimulate and give value to human resources, individual and collective, at all levels and throughout life. Such was the historical role played in the past by the institution of a free and compulsory education system. Such, on a smaller scale, has been the function discharged since the second world war by the general system of professional and vocational training.

It is, however, becoming more and more apparent that the education and training systems will have to be thoroughly reformed during the coming years. The same is true, for example, for the methods of exploiting individual and group creativity within firms, offices and other places of activity : they must change (the fact that there is so much talk of "quality circles", as in Japan and the United States, is a clear sign that the need exists).

This PIC consequently has a double objective :

- to highlight the reasons for a Community initiative in this field

- to identify the priority action areas, evaluate the difficulties and obstacles to be overcome, clarify existing options and suggest specific actions to be undertaken,

particularly in the light of the results of the research activities in the context of the themes TWE, SERV, SIS-COM and RES.

*** NOV 10 : Product innovations - PRO NOVO**

European industry must continue to invest in process innovations to increase its competitiveness. In order to achieve stable new development, however, it has to increase investments aiming at product innovations. Such an aim demands a better understanding of present and latent societal needs and anticipation of future needs ; a task which industry by itself does not have the knowledge to take up and fulfil. Given this, how then can one accelerate, by joint action, this development phase of product innovation ?

The exercise proposed under this heading aims to enable a European group of engineers, scientists, designers and managers to develop the concepts of a series of families of product innovations, possible and desirable, in four major areas of change, namely :

- basic human needs, such as food, accommodation, transport, communication

- the use of time

- the natural resource base for economic activity

- the services.

These concepts should provide the basis for the possible launching of a series of "European innovation competitions" ; a task which, however, goes beyond the framework of the NOV in question.

PART THREE

RESOURCES AND ORGANIZATION

RESOURCES

1. The permanent staff

- 6 grade A research staff, responsibilities allocated between the various themes

- 1 technico-scientific assistant

- 5 members of the secretarial staff

The permanent staff by themselves are insufficient to undertake the whole of the activities envisaged. For this reason the Council of Ministers approved the idea of seconding from the Member States a certain number of "fellows" (or "visiting scientists").

2. "The fellows" (Scientific visitors)

Each "fellow" will be seconded to FAST to carry out a definite research activity or finished "product", appropriate to his qualifications and areas of interest. The following subjects are envisaged for the "fellows".

Theme TWE

- Research activity TWE 1 - European scenarios for work
- DOS 1 : Man-machine
- DOS 2 : Manufacturing sectors in turbulence.

Theme SERV

- DOS 4 and SERV 6 : Services, infrastructure and regions
- CONF 1 and SERV 7 : The future of financial services.

Theme SIS-COM

- DOS 5 : The communications industry
- CONF 4 : The telematic press
- NOV 4 : The challenges of space
- NOV 5 : Communication and development

Theme SIS-ALIM

- DOS 7 : The future of the food industry.

Theme RES

- NOV 7 : The forest resource
- NOV 8 : The agro-chemo-energy complex.

3. The financial resources

The resources available to FAST II for the period 17 August 1983 - 31 December 1987 amount in total to 8.5 m.écus.

The credits allocated for contract research are of the order of 1.6 m.écus ; those estimated necessary for the "networking" research activities are of the order of 0.9 m.écus.

The credits in the former category represent the contribution of the Commission of the European Communities to financing contract research activities, in accordance with the principle applied for "indirect action" programmes with costs shared (50/50) with other public and/or private national sources.

Organisation

1. The "10+1" network and internal network

The council decision envisages (Item 4 of technical annex) the development of the programme's activities on the basis of a **network linking 10 national research units** (one per country) and the Community research unit FAST.

This cooperation-communication structure, to be **progressively implemented** meets a triple objective :

- to provide **institutional relays** for information, so that the national administrations concerned can follow FAST activities and make direct use of the results, compare their own analyses, etc ...

- to act as a **research tool**, enabling expertise and information on specific subjects to be brought together, through contacting rapidly the experts or centres concerned ;

- **Interface with users :** to ensure communication to and from other partners (particularly the social "partners" such as industrialists and trade unionists, and to discern and make clear the needs in the field of prospective research.

2. The "inter-service" network brings together the specific Commission services responsible for or concerned with the fields studied.

Its principal function is to ensure close cooperation between the Commission services around deliberation on technological change and its long-term consequences, in order the better to integrate these in the elaboration of the various Community policies.

More specifically, it implies :

- benefitting from the cooperation and expertise of the Commission services, in both the preparation and the execution of the programme FAST II ;

- making the other services aware of the problems and questions tackled in the FAST activities ;

- ensuring the diffusion of information in order to enable the other services to take into account the proposals of FAST.

3. The external network

This comprises research centres or researchers who participate

in or follow, closely or occasionally, the FAST activities.

This network, much more "informal" than the two previous, may be activated

- etheir directly, through research contracts, working meetings or ad hoc workshops, organised by FAST, by the "10+1" network, or by the "interservice" network ;

- or indirectly, through participation in a conference, specific contracts, or exchange of information, documents, publications, etc ...

ANNEXES

*. TABLE 12 : Summary table - research activities

*. TABLE 13 : Global overview - The prducts of the programme

*. The Council decision adopting the FAST II programme.

TABLE 12

SUMMARY TABLE - RESEARCH ACTIVITIES

ACTIVITIES			WAYS AND MEANS			
			Contracts	"10-1" Network	"In house" Network	Key dates
TECHNOLOGY WORK EMPLOYMENTS (TWE)	TWE 1 :	European scénarios for work	30.000 écus	30.000 écus	- (*)	Jan 85-June 85
	TWE 2 :	The end of the farmworker - New farmworkers	80.000 écus	10.000 écus	-	July 84-June 86
	TWE 3 :	The teachers : transformations and prospects		60.000 écus		Sept 84-Feb 86
	TWE 4 :	The "Brainworkers"	60.000 écus	20.000 écus		July 84-Dec 85
	TWE 5 :	The "over-fifties"	conference	- 30.000 écus		Debut 86
	TWE 6 :	Distance Working	35.000 écus	15.000 écus		Nov 84-June 85
	TWE 7 :	Robots and new production systems	75.000 écus		-	Apr 85-Oct 85
	TWE 8 :	Industrial prospects for the "technologies of light"		60.000 écus		June 84-
	TWE 9 :	Industry in transformation : the new materials	75.000 écus		-	Oct 86-Feb 86
SERVICES	SERV 1 :	Productivity in the services	40.000 écus		-	Sept 84-Dec 85
	SERV 2 :	Technical tools for the "new" services		50.000 écus		June 84-June 85
	SERV 3 :	Households and services	60.000 écus	30.000 écus		Nov 84-Apr 86
	SERV 4 :	International division of labour and markets	50.000 écus		-	Jan 85-Oct 85
	SERV 5 :	Services for the manufacturing sector	60.000 écus	20.000 écus		Sept 84-Sept 85
	SERV 6 :	Role of services in regional development	100.000 écus	40.000 écus	- (*)	Nov 84-Nov 86
	SERV 7 :	The future of financial services	conference	- 70.000 écus	- (*)	Debut 86
S.I.S. COMMUNICATION	COM 1 :	Telecommunications industry : technological options and challenges	60.000 écus	10.000 écus	(*)	Sept 84-Jan 86
	COM 2 :	The media industry	60.000 écus		(*)	Sept 84-Jan 86
	COM 3 :	Conditions of market operations	50.000 écus	20.000 écus		Sept 84-Jan 86
	COM 4 :	Final demand	50.000 écus	10.000 écus		Sept 84-Jan 86
	COM 5 :	Structure effets of communication on other industries	80.000 écus			Sept 84-Jan 86
	COM 6 :	The "communication" function : retrospect and prospect	50.000 écus			Sept 84-Nov 85
	COM 7 :	Education in a "communication society"		10.000 écus		Sept 84-June 85
	COM 8 :	Consequences of a global network		50.000 écus		Sept 84-Nov 85
	COM 9 :	Telematic press	conference	- 50.000 écus		June 85
S.I.S. FOOD	ALIM 1 :	Technology, innovation, economics and public policy	50.000 écus	75.000 écus	(*)	Sept 84-end 85
	ALIM 2 :	Food and health : new perceptions, problems and opportunities	25.000 écus	15.000 écus		June 84-end 84
	ALIM 3 :	Food consumer : attitudes, influences and organisation	25.000 écus	50.000 écus		Sept 84-July 85
RENEWABLE NATURAL RESOURCES	RES 1 :	Measurement, detection and protection technologies	60.000 écus			Sept 84-June 85
	RES 2 :	Inventory and assessment of projection capabilities	140.000 écus	60.000 écus		Sept 84-Sept 85
	RES 3 :	Designing an expert system for policy evaluation	60.000 écus	30.000 écus		Sept 84-June 85
	RES 4 :	Forestry	60.000 écus	30.000 écus	- (*)	Jan 85-Dec 85
	RES 5 :	The agro-chemo-energy complex	30.000 écus	30.000 écus	- (*)	Sept 84-June 85
	RES 6 :	Biological diversity and property	120.000 écus	(conference)		Debut 86
HORIZONTAL ACTIVITIES	HOR 1 :	Macroeconomics and technology			-	Conf. end 1985
	HOR 2 :	Society and technology-images and attitudes		-	-	mid 85-Dec 86
	HOR 3 :	The prospects for the "cognitive sciences" in Europe		25.000 écus	-	Sept 84-Dec 85
TOTAL			1,585.000 écus	865.000 écus		

(*) Research assisted by the participation of a fellow

GLOBAL OVERVIEW - The "products" of the programme

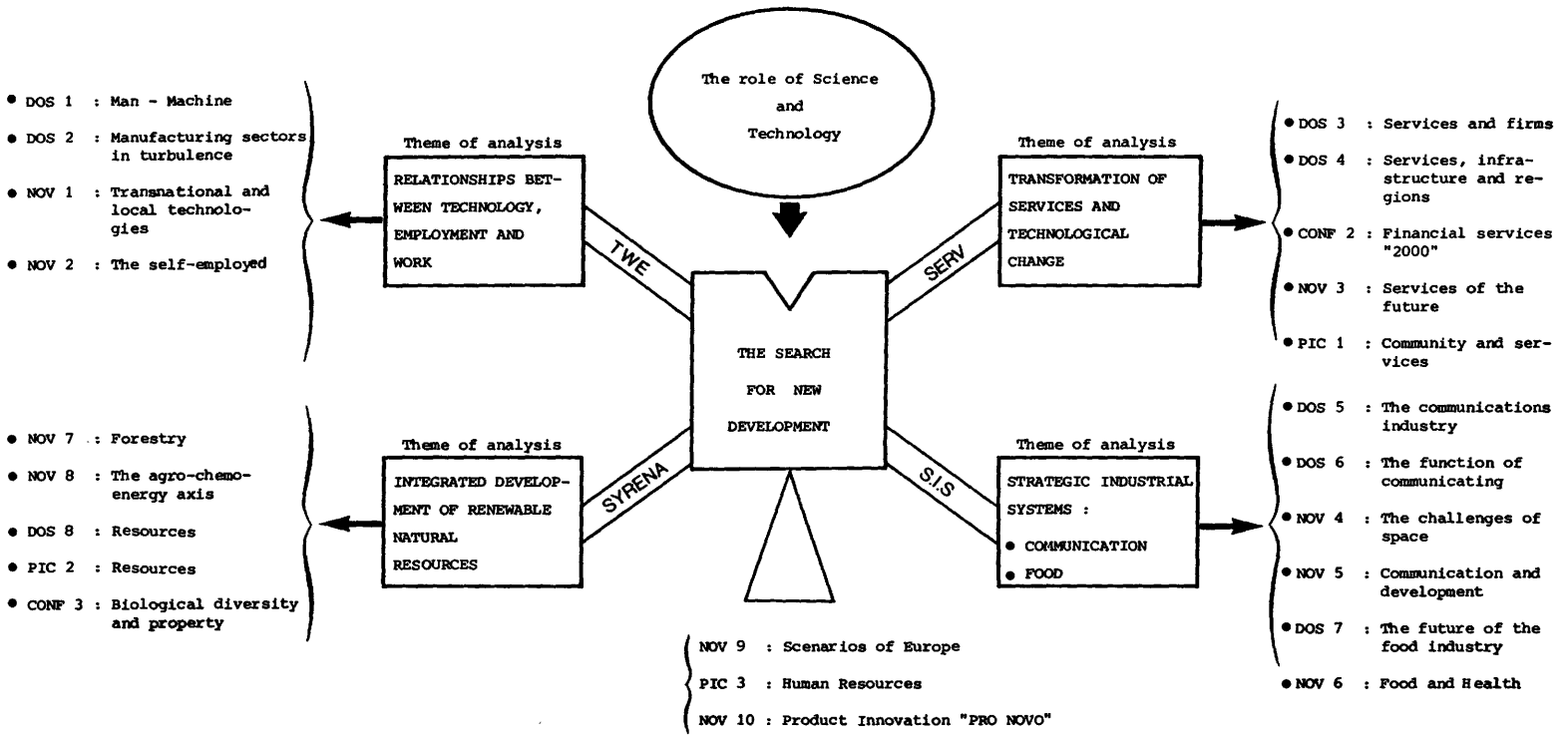

Table 13

COUNCIL DECISION

of 17 October 1983

adopting a research programme of the European Economic Community on forecasting and assessment in science and technology (FAST) 1983-1987

(83/519/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 235 thereof,

Having regard to the proposal from the Commission (1),

Having regard to the opinion of the European Parliament (2),

Having regard to the opinion of the Economic and Social Committee (3),

Whereas Article 2 of the Treaty assigns to the Community the task inter alia of promoting throughout the Community a

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(1) OJ No C 89, 31. 3. 1983, p. 9.
(2) OJ No C 184, 11. 7. 1983, p. 147.
(3) OJ No C 211, 8. 8. 1983, p. 9.

harmonious development of economic activities, and a continuous and balanced expansion and an accelerated raising of the standard of living;

Whereas the mobilization of science and technology constitutes one of the possible mechanisms for stimulating a resumption of growth in the Member States;

Whereas, by its resolution of 14 January 1974 on the coordination of national policies and the definition of projects of interest to the Community in the field of science and technology (4), the Council entrusted to the Commission the task of defining actions of Community interest and of selecting the ways and means appropriate to the implementation of these actions;

Whereas research and development activities (R & D), integrated in an overall concept of social and economic policies, have become one of the essential strategic means for realizing the long-term objectives of the Member States and of the Community;

Whereas one of the instruments for the regular revision of the programme framework for Community R & D and the adjustment of its priorities in response to current and foreseeable

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(4) OJ No C 7, 29. 1. 1974, p. 2.

developments is the analysis of possible long-term scientific, technological and socio-economic changes ;

Whereas, by its Decision 78/668/EEC (5), the Council approved a research programme of the European Economic Community on forecasting and assessment in science and technology, designed to test, over a four-year period, the usefulness of such an activity for the selection of broad long-term directions for Community R & D; whereas this programme ends on 16 August 1983;

Whereas the results of the aforesaid programme, known as FAST, have demonstrated the inherent usefulness and particular need in these difficult times of reflective study on long-term scientific, technological and socio-economic developments in the Member States as a basis for definition of long-term objectives and action priorities, particularly in science and technology;

Whereas the effective utilization at Community level of the results of significant forecasting and assessment activities in science and technology carried out in the Member States, by various new public and private research agencies among others, requires the reinforcement and multiplication of cooperative European networks;

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(5) OJ No L. 225, 16. 8. 1978, p. 38.

Whereas the Treaty does not provide the specific powers of action required for the adoption of this Decision;

Whereas the Scientific and Technical Research Committee (CREST) has delivered its opinion on the Commission's proposal,

HAS DECIDED AS FOLLOWS :

Article 1

A second research programme of the European Economic Community on forecasting and assessment in science and technology, FAST, as defined in the Annex, is hereby adopted. The duration of the programme shall be from 17 August 1983 to 31 December 1987.

Article 2

The funds estimated as necessary for the execution of the programme shall be 8,5 million ECU including expenditure on a staff of 12. In addition, Member States will be invited to second visiting fellows to the FAST unit up to 20 man/years for the whole duration of the programme under the conditions defined in the Annex.

Article 3

The Commission shall be responsible for the implementation of the programme. It shall be assisted in this task by an Advisory Committee on Programme Management to be set up by the Commission.

Article 4

The Commission shall inform the Council and the European Parliament by two interim reports (mid-1985 and at end of 1986) on the state of progress of the researh activities.

The Commission shall arrange for the results of the programme to be evaluated by an independent group, and shall make a report to the Council and to the European Parliament at the end of the programme.

Article 5

The dissemination of information resulting from the execution of the programme shall be in conformity with Regulation (EEC) No 2380/74 (1).

Done at Luxembourg, 17 October 1983.

For the Council
The President
G. VARFIS

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(1) OJ Mo L. 255, 20. 9. 1974, p.1

ANNEX

1. The main aim of the FAST research programme is the analysis of scientific and technological changes in order to highlight their long-term implications and consequences for the Community's R & D and other policies over the next five, seven and/or 10 years and to propose timely policy options.

2. The activity will concentrate on three main fields of investigation :

   1. New forms of 'growth' for Europe
      1.1. Technology, employment and work
      1.2. Integrated development of renewable natural resources

   2. New strategic industrial system
      2.1. Communication
      2.2. Food

   3. Transformation of service activities and technological change

3. To achieve the aim defined in point 1, the programme has two principal tasks in the three areas envisaged in point 2 :

a) to highlight the prospects, problems and potential conflicts which may affect the long-term development of the Community, and hence to propose new long-term orientations for Community action, particularly in the field of science and technology;

b) to make use of long-term research studies undertaken within the Member States.

4. The execution of these tasks will be mainly through the following modes of action :

- development of the activity of the programme on the basis of a network of some 10 national research units identified in cooperation with the Member States. The form and functioning of these networks will be defined with these units,

- association of Community centres or research teams with capability in the analysis of technological change with the execution of the scientific work of the programme.

- promotion of ad hoc networks for information and collaboration at Community level. These networks to be as flexible and informal as possible. The participation of representatives of industry, labour and associated movements is to be sought,

- secondment to the programme by Community and national institutions (governmental, academic or professional) of visiting fellows.

  By 'visiting fellow' is meant a person who is seconded to the Commission of the European Communities to work as a member of the FAST unit for a limited period of time. A visiting fellow may be :

  (i) a civil servant professionally involved with the analysis of long-term problems and prospects, particularly in the fields of science and technology

  (ii) a senior university researcher or professor of outstanding competence in a particular area of science and technology;

  (iii) a junior researcher beginning his career or preparing his Ph. D or engaged in post-doctoral specialization.

In the cases referred to in (i) and (iii), Community rules adopted by the Commission on 19 January and 23 December 1976 as regards covering the costs associated with the secondment of national experts to the Commission services (category XI, item I, heading No 11.73 of the research programme budget) will be applied.

In the case referred to in (iii), special grants made available by the Commission to enable scientists and engineers at various levels of training to collaborate in the implementation of the different Community research programmes and to acquire specialist knowledge in the fields covered by these programmes will be granted.