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# EUROPEAN CONGRESS ON TECHNOLOGY ASSESSMENT

(Amsterdam, February 2nd-4th 1987)

## REPORT ON BELGIUM

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## Introduction

The introduction of new technologies in the fields of information, production and experimentation has societal implications which it is essential to take into consideration when establishing science and technology policy.

And the very concept of technology assessment leads one to reconsider the role of science and technology in society : it means a careful study of the effects of the different technological options, an understanding of technical innovation in all its complexity and finally an opening-up of the expertise process to the economic and social agents involved.

Given the technological advances that have been made and the radical transformation of society which they are generating - problems now are increasingly complex and transverse whereas policies and political structures remain sectoral and vertical - there is a clear need for institutional innovations to place the authorities in a better position :

- to identify the technological changes that are gestating and to anticipate their probable positive or negative effects by producing a diagram representing the technology-society couple in the medium and the long term;

- to manage technological change by ensuring greater concordance between scientific know-how, technological developments and social needs.

The purpose of this report is to provide the reader with the necessary data to form an idea of the situation in Belgium, from the point of view of both assessment practices and the institutions involved in assessing scientific and technological choices.

# 1. SCIENCE AND TECHNOLOGY POLICY IN BELGIUM

## 1.1. Structure of the institutional framework

An essential factor in the competitiveness of the economy, in the same way as the defence of the currency, the balance of trade or safeguarding the rules of competition, policy in matters of science and technology reached a decisive turning point in 1959.

The national Commission to study the problems raised for Belgium and its overseas territories by scientific progress and its economic and social repercussions (called the "Commission nationale des sciences"), set up at the beginning of 1957, issued recommendations at the end of its work in 1959 which form the basis for the organization of Science Policy (*).

Three bodies with different functions were created by Royal Decree of September 16th 1959 :

- the Comité Ministériel de la Politique Scientifique, the policy-making body;
- the Commission Interministérielle de la Politique Scientifique, the administrative co-ordination body;
- the Conseil National de la Politique Scientifique, a consultative body within which university representatives meet economic and social milieux.

The secretariat of the last-mentioned body was the embryo of the Services de Programmation de la Politique Scientifique, formed into a State Administration in 1968.

These services belong to the Services du Premier Ministre, whilst being under the authority of the Ministre de la Politique scientifique, a post created in 1968 and entrusted to Minister Théo Lefèvre.

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(*) Min. Affaires Culturelles, Rapport de la Commission des Sciences, Brussels, publ. Goemaere, 1959.

However, various ministerial departments have research services and budgets of their own.

Within such a context, "the Minister for Science Policy therefore appears to be a linchpin in controlling incentive operations both in new sectors and in sectors to be revived (*)".

The role of the Minister for Science Policy and the nature of the bodies created in 1959 show that their essential function is that of co-ordination between different institutions and administrations.

As mentioned in the report submitted to the Senate by the Commission for education and science on the occasion of the vote on the science policy budget for 1982 (**), "science policy activities are extremely decentralized whilst, on the other hand, co-ordination is pursued by the Minister for Science Policy and his services through the elaboration and follow-up of the budgetary programme for science policy".

In effect, the credits granted to the various ministerial departments in relation to scientific activities are functionally grouped within the budgetary programme for science policy.

The "budget" service of the Services de Programmation de la Politique Scientifique collect each year the budgetary proposals from the departments concerning university education and scientific activities. The programme resulting from consideration of these proposals is examined by an interministerial science policy committee. The programme is then passed on with the proposals of the Minister for Science Policy to the Ministerial Committee for Science Policy, which decides.

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(*) Philippart A., "L'aide publique à la recherche, sa répartition entre le national et le régional" La recherche scientifique au service du pays, Report to the Fondation Roi Baudouin, Brussels, 1985, p. 95.

(**) Sénat 5-V (1981-1982), No. 4, p. 29, Report drawn up on behalf of the Commission for education and science by Mr Pecriaux.

This procedure enables the government to decide each year on the overall amount and the destination of the means allocated by the State to scientific and technical activities.

The Minister for Science Policy reports to Parliament, during the discussion on the budget for the Services du Premier Ministre, on the credits allocated to science policy.

Finally, one must not understimate the scope of the institutional reforms of August 1980, which defined the fields of competence of the Communities and the Regions (*).

Essentially, the competence of the Communities lies in cultural and social fields (so-called personalizeable matters) and that of the Regions in economic and allied fields (regional development, regional economic expansion, town planning, etc.).

The Communities and the Regions are then responsible for so-called "applied" research in the sectors falling within their competence.

### 1.2. Analysis of national R&D policy

Both the public sector and the private sector are making efforts in the field of research and development. Within the context of these global efforts total public expenditure on science policy in 1985 was 58,800 million BF (**).

It is estimated that the public sector's contribution represents 44.22%, whilst the private sector provides the other 55.78% (***).

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(*) Since the revision in 1970, the Belgian Constitution recognizes the existence of three communities (French, Flemish and German-speaking) and of three regions (Wallonia, Flanders and Brussels).

(**) With operating allocations calculated over 12 months.

(***) G. Verhofstadt, Vice-Premier, Minister for the Budget and Science Policy, and L. Bril, Secretary of State for Science Policy, Note sur la politique de recherche scientifique et de développement, Brussels, May 4th 1986, p. 4.

The State bears 89% of the financing of university research, whilst industry contributes 1%, with the remaining 10% coming from various sources, international in particular, according to figures dating from 1983 (*).

As regards the financing of industrial research, a distinction must be made between research conducted within companies and that carried out in industrial research centres.

The State contributes 9% on average to this first kind of research (this percentage varying from one sector to another), whilst it absorbs 40% of the expenditure of the collective industrial research centres.

In order to reach the target of 2% of GDP as the global research coefficient, the present government is calling upon the private sector to make a special effort.

In so far as applied scientific research is concerned, companies will have to depend more on incentives than on subsidies (tax deductible entitlements for research efforts, introduction of R&D limited partnership, venture capital).

The major financers of science policy are to be found in the following ministerial departments :

| | | |
|---|---|---|
| - | Education and Culture | 57.90% |
| - | Economic affairs | 15.45% |
| - | Science policy | 11.84% |
| - | Public health | 4.66% |
| - | Agriculture | 4.25% |
| - | Foreign affairs and co-operation | 4.00% |

Source : Chambre des Représentants, 4-V (1984-1985), N° 4, Rapport fait au nom de le Commission de l'éducation, de la politique scientifique et de la culture par M. Moors, p. 18.

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(*) See "La politique scientifique, ses objectif et ses instruments", Services de Programmation de la Politique Scientifique, Preface by Minister Ph. Maystadt, Brussels, no date, p. 11.

Expenses relating to the educational assignment of the universities (included in the table above) represent over half of all science policy expenditure : for this, they are accountable to the Ministers for Education.

Through the Prime Minister's budget, therefore, the Minister for Science Policy has a budget which represents only about a tenth of the total budget for science policy and a fifth of the part of this budget allocated to research.

The State is bound by the laws and regulations to allocate financial resources essentially for the personnel and operating costs of a large number of institutions, to ensure their intangible and scientific investments.

Consequently, the part played by institutional financing (appropriations to research institutions) is considerable, for both university research and industrial research.

As for the credits from the Minister for Science Policy, they serve as a strategic "reserve fund" for the pursuit of priority promotional objectives in the field of science and technology.

These credits allow more finalized and selective drives undertaken in accordance with scientific or technological objectives predetermined at governmental level. In this way, they are used particularly for the financing of research teams (promoting teams of excellence in fundamental research and stimulation of use of their know-how), for the financing of programmes in research fields of general interest which are likely to have significant effects on the country's economy or on the development of international co-operation.

This greater flexibility in decision-making and implementation procedures allows the Minister for Science Policy to act according to the real needs to be met. And it must be noted that this stimulation function has been growing stronger over the years.

## 1.3. Analysis of regional and community R&D policies

Since the reformation of the Belgian State, the Regions and Communities of which it is composed now have the right of initiative in research concerning matters over which they exercise their competence with full autonomy.

In the field, however, a dual problem has sometimes been encountered connected with the allocation of competence on the one hand and the transfer of resources on the other.

To give an idea of the size of the financing of science policy, the table below describes the approximate situation in 1985 :

| | |
|---|---|
| Belgian State | 58,800 million BF |
| Flemish Community | +/- 600 million BF |
| French Community | +/- 500 million BF |
| Walloon Region | +/- 1,400 million BF |
| Flemish Region | +/- 2,100 million BF |

The specific nature of the regional and community R&D policies is due to three factors :

- greater efforts in favour of SMEs;

- special attention to the innovation climate;

- financing of projects rather than institutional financing.

In this way, the regional and community authorities are increasingly asserting their awareness of the complex nature of the innovation process, bringing numerous agents into play (researchers, institutions, companies, etc.), developing within a given social fabric and largely conditioned by the technological culture.

## 2. TECHNOLOGY ASSESSMENT IN BELGIUM : PLACES, FUNCTIONS AND IMPACTS

The purpose of this chapter is to identify the factors of a structural or conjunctural nature arising for Belgium in the institutionalization of Technology Assessment and therefore conditioning the profile of assessment structures, their working method and their scope.

We shall successively examine the situation at national level, at the level of the Flemish region and community and at the level of the Walloon region.

### 2.1. Analysis of Technology Assessment at national level

To examine the forms of Technology Assessment applied at national level, we shall analyse :

- the driving role played by the Conseil National de la Politique Scientifique (CNPS);
- the national research actions in support of FAST managed by an operational directorate within the Services de Programmation de la Politique Scientifique.

#### 2.1.1. The driving role played by the Conseil National de la Politique Scientifique

Made up of representatives of the various milieux concerned with research (universities, industry, researchers, professional and social organizations), the Conseil National de la Politique Scientifique is a consultative body which is not involved in decision-making or in the practical implementation of initiatives taken by the government as a whole or by individual Ministers, but whose advice and recommendations constitute an important reference for government decisions.

Every year, the CNPS examines the major trends in the budgetary programme for science policy in order to advise the government on the major choices which should guide a policy of scientific and technological innovation allowing essential adjustments to be made to education, research and economic and social structures.

In this way, in its report on "a new university strategy" approved in 1976, the CNPS proposed a number of essential adaptations in the organization and financing of university education and research.

In 1979, the CNPS published a report concerning "policy in the field of technological research", in which emphasis is placed on the importance of technological research in the current crisis.
In its 1972-1979 progress report, faced with the prospect of growing budgetary restrictions, the CNPS asked for priority to be given to stimulating research in the budgetary programme for science policy and argued in favour of separate financing for research at universities.

In the middle of 1982, the CNPS gave its approval to the "Premier rapport et premières recommandations sur la politique de recherche en micro-électronique et ses conséquences sociales".

At the beginning of 1984, the CNPS published "l'avis de tendance (*) relatif aux priorités scientifiques et budgétaires en matière de politique scientifique pour la décennie à venir et au-delà (1980-2000)".
In 1984, the activities of the CNPS were mainly concerned with extending the "avis de tendance" and were focused more particularly on two specific points :

- the problem of the status and career prospects of research personnel;
- a more detailed examination within the framework of the specific opinion on orientated research and technological development.

In 1985 and 1986, the CNPS centred its working programme on :

- continuing and finalizing the "Avis de tendance";
- continuing and developing its examination of the policy for orientated research and technological development, especially from the point of view of its regional dimension;
- updating the report on a new university strategy, taking due account of the community dimension of the policy in this field;
- analysing the development of R&D policy at European level.

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(*) opinion expressing general current of thought.

Within the CNPS, the special commission on orientated research and technology (COT) prepares specific opinions on its own field, on the basis of audits which it organizes itself.

The special commission on university education and fundamental research deals with questions relating to the purpose, organization, structure, co-ordination and financing of university education and fundamental research, adapting higher education to meet the needs of the economy, and promoting the mobility of the researcher.

In this way, therefore, the CNPS conducts an evaluation, in the generic sense of the term, of national R&D policy. However, in its report on "Politique de recherche en micro-électronique et ses conséquences sociales" (*) and in its "avis de tendance" on the "Priorités scientifiques et budgétaires de la politique scientifique(1980-2000)" (**), it can be seen that steps are being taken in the field of Technology Assessment.

Moreover, in its memorandum concerning policy intentions relating to the budgetary programme for science policy for 1986 and 1987, the CNPS recommends an interdisciplinary approach and interdisciplinary research with regard to the importance of new technologies for society (***). This recommendation is one of three priorities set out for science policy, under the heading of "Assurer la maîtrise et l'accompagnement de la révolution scientifique et technologique".

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(*) CNPS, Politique de recherche en microélectronique et ses conséquences, premier rapport et premières recommandations du CNPS, Brussels, 1983.

(**) CNPS, Priorités scientifiques et budgétaires de la politique scientifique (1980-2000), Brussels, 1984.

(***) CNPS, Communication concernant les intentions politiques en matière de programme budgétaire de politique scientifique pour 1986-1987, Brussels, June 27th 1986, CNPS/517.

2.1.1.1. Examination of the report on "la politique de recherche en microélectronique et ses conséquences sociales"

On June 24th 1980, the CNPS decided to set up an interdisciplinary working party on the social and economic consequences of the introduction of microelectronics in Belgium.

This interdisciplinary working party has met 29 times, either in the form of a select drafting committee or in plenary session. The meetings have been attended by up to 45 people. Furthermore, through the creation of 12 subgroups, over 150 people from various sectors have contributed to the efforts of the central group.

The examination concerning the introduction of microelectronics has been centred on four fields :

a. scientific research;
b. the economic consequences : the application of microelectronics in branches of the economy connected or not connected with the market;
c. the social consequences of the application of microelectronics in Belgium (from the quantitative and qualitative points of view)
d. the consequences for education.

Ten sectors have been examined by specific subgroups :

1. metal manufactures;
2. electronics;
3. textiles;
4. chemicals and pharmaceuticals;
5. distribution;
6. finances;
7. medicine;
8. education;
9. telecommunications;
10. small businesses and the self-employed.

A special meeting was organized with a group of sociologists which drew up an inventory of societal research concerning the introduction of microelectronics in Belgium and abroad.
The Bureau du Plan conducted a few simulations to examine the effect of a sudden acceleration in the rate of technological development.

When the CNPS decided to set up an interdisciplinary working party responsible for studying the economic and social repercussions of the development of microelectronics in Belgium, it proposed that the activities of the working party should be centred on the following three themes :

1. Microelectronics as a new technology : what does it mean from the scientific and technological point of view ? How is Belgium situated from the point of view of scientific research ?

2. The application of microelectronics in company life.

3. What are the social consequences of the introduction of microelectronics in Belgium (impact on value added, on employment and on working conditions) ?

When it received this assignment, the working party considered that it had to define its task by first of all establishing a precise description of what was understood by the concepts of "microelectronics" on the one hand and "economic and social consequences" on the other.

The concept of "social consequences" can be considered from a very specific point of view or can be examined from a much wider angle. The working party focused its attention primarily on the repercussions on employment.

In this, the following four points were analysed :

1. The effects of microelectronics on the evolution of value added, together with the resultant modifications in its composition and distribution.
2. The consequences for the volume of employment.
3. The consequences for the quality of work.
4. The social framework which will demarcate the social consequences of microelectronics, namely : what can be dealt with at national level and European level and what depends on the international balance of power.
   The broader social and cultural consequences constituted a subsidiary item on the agenda.

To carry out its task, the working party based itself as far as possible on the technique of "strategic planning" :

1. The starting point was Belgium's situation within the European and international context, and observable developments in the world economy.
2. The working party also considered it useful to fix its starting point at the general objectives which our country has set itself with regard to the economic, social and societal aspects in the broadest sense.
3. From there, it tried to define the adjustments to be made to our present system (social, economic and educational).
4. Finally, it endeavoured to determine the steps to be taken and the means required to attain the desired goal in the most advantageous manner possible.

The real assignment of this working party consisted in bringing to light the possibilities offered to us, specifying the means and strong points that could be developed and pointing out the limits that had to be taken into account in determining the path - or possibly alternative paths - which had to or could be followed in order to attain the pre-established objectives and the necessary structural adjustments.

To do this, it used the diversification and the complementary composition of the working party and the ten subgroups. The complexity of the problems under study, the essential co-operation among the different partners and limitations in terms of time did not allow all the stages to be followed or all the prior calculations to be effected within the strategic planning method.

Attention must be drawn here to the relatively non-empirical nature of the work carried out; in fact, all that has been done in this regard has been to call in experts for consultation.

In June 1982, the CNPS examined and approved the draft recommendations, subject to the addition of a minority text from a trade union, the FGTB (*)

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(*) Fédération générale des travailleurs de Belgique.

In substance, the CNPS recommended the government considerably to increase the research means made available by the authorities for the development of microelectronics in Belgium, to ensure a qualitative balance between technological research proper and social research (covering the social, economic, cultural and political aspects), to provide for the uninterrupted development of orientated fundamental research and to adapt technical and vocational training. The qualitative balance between technological research proper and "social" research was to allow the overall viability of the technological process to be measured, the rejection phenomena to be avoided, the prolonged effects in financial terms to be controlled and the essential co-operation for the introduction of new technologies to be facilitated.

A few comments should be made on the follow-up to and utilization of this report :

- The report published in 1983 announced the preparation of a second report developing the themes already tackled in the first report, namely the economic consequences, the social consequences and the impact on education. This second report has not yet been produced.

- It was decided to set up a special commission for micro-electronics within the CNPS to help it in its task of advising, assessing and prospecting. It was also thought desirable to enlarge the framework of the CNPS secretariat, but this proved to be impossible for regulatory reasons.

- In the meantime, the debate on this subject was partly taken over within the joint "New Technologies" committee set up by the Conseil Central de l'Economie and the Conseil National du Travail. In particular, this committee was called upon to express its opinion on the collective agreement concerning the introduction of new technologies signed in December 1983 and on the needs in terms of quantitative and qualitative data relating to the socioeconomic consequences of information technology (development of the statistical apparatus).

- The CNPS report has certainly had an influence in Flanders, where it contributed indirectly to the creation of the STV.

2.1.1.2. Examination of the "avis de tendance" on "les priorités scientifiques et budgétaires en politique scientifique"

On June 17th 1982, the CNPS Board decided to prepare a basic opinion on long-term research priorities and on medium-term budgetary guidelines, instructing the chairman and the secretariat to draw up the preparatory texts. Preliminary draft opinions and additional documents on the development of the budgetary programme for science policy, together with an international comparison of R&D efforts, were submitted to the Board and to the CNPS. In May 1983, the Minister for Science Policy expressed the wish that the "avis de tendance" be submitted to two statutory commissions and returned with their specific opinion. The opinion was approved by the CNPS on December 8th 1983, by a unanimous decision with no abstentions or minority notes. It was passed on to the Minister for Science Policy on January 5th 1984.

Of particular note are the CNPS recommendations relating to the need to "develop societal research in parallel with technological research proper and to set aside 10% of public aid for R&D in microelectronics for this purpose. This percentage should be seen as an example for all advanced technologies".

2.1.2. National research actions in support of FAST

2.1.2.1. Factors involved in implementing this programme

In 1982, following the opinion of the CNPS on the policy for research in microelectronics which stressed the need for 10% of the public R&D budget to be devoted to forward economic and social studies, the authorities stepped into the debate, via the Minister for Science Policy. In its desire to implement a microelectronics research programme, the government has not lost sight of the following aspects :

- the impact of new technologies on overall economic balances (employment, savings and investment, external trade balance, State budget);
- the market prospects for new products and systems;
- adapting the production system to new technologies;
- adapting the lifestyle and attitudes of households;
- adapting the educational system;
- adaptations of an institutional and legal nature.

It is a question of examining the economic and social consequences of microelectronics by combining the contributions of the different methods available (economic theory, macroeconomic models and corporate models, case studies, surveys and studies on behaviour).

Within the context of the decision by the Council of Ministers on November 19th 1982 approving the programme of actions based on microelectronics, with particular reference to the section concerning the analysis of economic and social consequences, the national R&D programme on the economic and social consequences of new technologies was drawn up within the Interministerial Commission on Science Policy. No political agreement was reached on this programme within the Ministerial Committee for Science Policy.

On the other hand, within the context of the European FAST II programme (1983-1987), Belgium has launched national research actions in support of FAST.

The aim of the FAST II programme is to analyse the scientific and technological changes taking place and to cast light on their long-term implications and consequences for the Community's common research and development policy and for its other policies.

The four themes selected by the Council of Ministers of the European Community for FAST II are :

- technology-employment-work relationships;
- the transformation of services and technological change;
- new strategic industrial systems in the fields of communications and food;
- the integrated development of renewable natural resources.

FAST, like the other Community research programmes, is designed, through its overall coherence, to have a fertilizing and integrating effect on each country's assessment potential by placing it straight away within its European perspective. The national actions have been designed and implemented so that, functioning in synchronization with the FAST II programme, they can provide both public and private decision-makers with results which can be translated into operational terms.

In considering the national Actions in relation to the European programme, there are some specific characteristics which should be underlined (*).

Unlike the European programme, which is now in its second stage (FAST I having covered the period 1979-1983), the national actions constitute a first integrated effort to stimulate research into the economic, social and legal conditions relating to technological innovation.

It was for this reason in particular that it seemed wise to spread the resources available over a wide range of subjects and research teams.

The national actions are also of a limited duration of two years. Some priority problems have been picked out and the results of the programme will consist in tangible and usable products and also in indications as to fields where additional efforts are to be envisaged.

In so far as the themes covered are concerned, the elaboration of the national FAST programme was based on the structure of its European counterpart. There are some differences, however :

1. The national programme gives more weight to horizontal research concerning the impacts of and conditions for innovation, because this is likely to allow better integration of research into the other aspects.

2. The accent is placed more on the legal and regulatory context within which new information technologies and biotechnologies are spreading.

3. The range of research subjects has been fixed taking into account the fields of analysis which seem to be of interest at Belgian level and also the expertise available to bring these studies to a successful conclusion.

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(*) SPPS, National research actions in support of FAST, Progress report of the 20.12.1986.

2.1.2.2. Fields of investigation

The objective of the FAST actions is to contribute, through the research conducted and the promotion of the results obtained among the professionals concerned, towards a knowledge of the conditions allowing and favouring innovation and technological change in Belgian society.

To attain this end, they are aimed at establishing scenarios giving the widest possible consideration to the interactions between the technical, economic, social and legal factors involved in technological innovation.

With this in mind, the following fields of research have been selected :

- scenarios concerning work and the absorption of underemployment, education and new technologies, and ergonomic conditions for more appropriate man-machine interfaces;

- development prospects for the service economy at national and international level; market prospects for new information and communications technologies for home use; legal and regulatory conditions for the production and distribution of data processing and telematics systems (protection of software, penalization of computer fraud, and telematics contracts);

- alignment of supply and demand for highly qualified personnel in the fields of information technology and biotechnology;

- prospects for the Belgian production system in the field of food and renewable natural resources, legal and regulatory conditions for the development and utilization of biotechnological processes and products, and consumer attitudes towards and market prospects for foodstuffs processed by biotechnological means;

- analysis of the conditions and impacts of technological innovation at macroeconomic level and from the points of view of the financing of innovation, university-industry transfers of technology and corporate organization.

2.1.2.3. Organization of the work

The first national FAST research activities commenced in autumn 1984, the latest in autumn 1985. Most of the FAST research activities will not be completed until the beginning of 1987. Within the SPPS, the operational directorate for the national FAST actions is responsible for co-ordinating and following up research activities which comprise 41 research contracts, equivalent to 87 man-years of research spread over 2 years.

The actions are distributed as follows among the major research themes :

| | |
|---|---|
| Technology-employment-work | 31 man-years |
| Services and communications | 24 man-years |
| Food and renewable natural resources | 18 man-years |
| Impacts of and conditions for technological innovation | 14 man-years. |

In addition, the national actions benefit from the results of seven research activities carried out by Belgian teams within the context of the European programme (co-financing) and research conducted by two Belgian teams in connection with the OECD (ICCP Committee) relating to the development of coherent and internationally comparable economic indicators in the field of information, computers and communications.

2.1.2.4. Financial means

The initial programme of research into the economic and social consequences of new technologies provided for a sum of 653 million BF covering a period of three years. In the absence of a political consensus, it was not until 1984 that the programme of national actions in support of FAST was adopted, with a drastically reduced budget of only 170 million BF over a period of two years (*).

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(*) Berleur J., Lobet-Maris Cl., Valenduc G., "Computers and society", Research in the Belgian Context, in : Comparative Worldwide National Computer Policies, Hal Sackman publ., North-Holland, 1986, pp. 83-110.

2.1.2.5. Results of the research instigated through the programme

A distinction must be made between :

- the results proper of this research (a);
- the impact of this programme on the Belgian scientific world (b);
- the impact of this programme on the authorities and the private sector (c).

a. Results of either an applied or a conceptual nature can be picked out provisionally at this stage in the work. From the diversity of the research emerge certain converging themes, amongst which particular mention should be made of questions such as the availability of human capital at different levels of qualifications, the developments taking place with regard to the organization of work and of the company, and the economic and regulatory conditions for strengthening the potential for innovation among Belgian companies.

b. There is clear evidence of consolidation of the Belgian network working on the technology-society interface. In their analyses, the teams have also had to test out their concepts in the face of material facts, especially recent scientific and technological developments. It can also be seen that with limited resources and in a relatively short period of time, research in social science is in a position to provide a significant contribution in the field of the conditions for technological innovation.

   Furthermore, this consolidation is having a knock-on effect at European level since the research teams involved have been able to play an active part in the network activities of the European programme and thereby benefit from exchanges of information and establish their reputation at international level.

c. The research themes and results are already arousing interest among the authorities and in the private sector. However, since no final report has yet been made on the assessment of the research results, the programme has so far had only a very slight effect on political decision-making.

One can only underline the importance of these national FAST actions being continued, so as to preserve at least the expertise formed or strengthened over the last two years.

### 2.1.3. Other assessment agents

The assessment conducted by parliamentarians on the occasion of the vote on the budgetary programme for science policy is more concerned with what one would call traditional criteria (ideological balance, community balance in the financing of R&D, etc.), often concealing the more long-term issues involved in such and such a scientific and technological option.

It should be pointed out, however, that two bills have been tabled concerning the creation of a parliamentary technological assessment unit. They have not been examined to date.

The plan to set up an Advisory Board reporting to the Minister for Science Policy, composed of people whose scientific qualifications are generally recognized, is more a question of prospecting than of assessing scientific and technological choices.

If it seizes in good time the new development opportunities which are emerging, this Board should in some way provide the continuation of the project conceived by the CNPS in 1982, to form a forward study group dealing with the development of science and technology.

## 2.2. Analysis of Technology Assessment at regional and community level

### 2.2.1. The situation in Flanders

The objective of the Flemish government (responsible for both regional policy and community policy) in launching the "third industrial revolution in Flanders (DIRV)" action is to promote the development, utilization and transfer of new technologies, and therefore first of all to employ and increase scientific and technical know-how in pre-selected fields and then to accelerate the industrial exploitation of the knowledge acquired.

In order to ensure constant scientific support for the DIRV action, four working parties consisting of university professors, representatives of employers' and workers' organizations, scientific institutions and the administration were given the task in 1982 of providing the Flemish Executive with their opinions on the scientific basis of the DIRV strategy at both the development and the implementation stage.

These working parties were organized on the basis of the following fields of interest : microelectronics, biotechnologies, new materials and socioeconomic implications.

Gradually, the Flemish Executive has taken a number of institutional and organizational measures to define the exact roles of the different prime movers in innovation technology, whilst preserving the necessary dialogue.

At present, the Flemish Executive has the following science policy advisory bodies :

- The "Vlaamse Raad voor Wetenschapbeleid" (*)

  This Council - which started work in February 1986 - has the task of issuing advice and formulating proposals with regard to the broad lines of science policy, the priorities to be followed and the means to be employed to put this policy into concrete form, of examining the preliminary drafts of decrees and orders concerning science policy and of expressing a reasoned opinion on the budgetary policy to be implemented in the field of scientific research.

  The composition of the Council is such that it provides a balanced representation of university education and scientific research establishments and of socioeconomic milieux. It is also ensured that the Council is a multi-disciplinary body.

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(*) Cf. Besluit ven de Vlaamse Executieve houdende Oprichting van een VRWB, Belgisch Staatsblad, 7.9.85, p. 12836.

- The Vlaamse Commissie voor industrieel wetenschappelijk onderzoek

  This Commission is responsible for advising the Flemish Minister for the Economy and Employment on dossiers relating to the Fonds voor Industrieel Onderzoek Vlaanderen (FIOV).

As regards the consultation bodies not specifically centred on science policy but nevertheless playing a decisive role in the matter, mention must be made of the work carried out within :

- The Vlaams Economisch Sociaal Overlegcomité (*), which brings together the members of the Executive and the two sides of industry and can demand consultation on measures taken by the Executive having a socioeconomic dimension.

- The Sociaal-Economisch Raad voor Vlaanderen, which brings together management and labour, particularly within the Stichting Technologie Vlaanderen.

  As the cornerstone of Technology Assessment in Flanders, this foundation merits a few lines on its origins, its legal status, its composition, its tasks, its operating method and the means placed at its disposal.

2.2.1.1. Factors involved in the creation of the Stichting Technologie Vlaanderen

This foundation was set up as a result of four developments :

- the formal account taken by the DIRV-aktie of the socioeconomic issues involved in the introduction and diffusion of new technologies;
- the report drawn up by the CNPS on the policy for research in microelectronics and its social consequences, recommending that 10% of research in a new technology should be devoted to examining its social consequences, a report which, despite its relatively non-empirical nature, definitely found an echo in Flanders;

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(*) Besluit van de Vlaamse Executieve van 17 juli 1985 houdende oprichting van een VESOC

- the growing awareness among the trade unions of the importance of this issue in the medium and the long term;
- finally, the pressure from a group of Flemish scientists expressing the need to take into account the negative or uncertain aspects of technological innovations.

2.2.1.2. Creation of the STV, legal status and composition

On the basis of the work carried out within the GERV (Gewestelijke Ekonomische Raad van Vlaanderen) allowing the representatives of employers' and trade union organizations to reach a consensus on the creation and modus operandi of such a foundation, the Vlaams Economisch en Sociaal Overlegcomité (VESOC) devoted four working sessions (11.03.1983 - 10.06.1983 - 08.07.1983 - 27.10.1983) to examining this question. The Flemish Executive then met the GERV board and the latter took the necessary measures to determine the details for the creation and operation of the STV.

An agreement was finally reached on these details within the VESOC on October 27th 1983.

The Executive gave its final agreement on December 7th 1983.

The Stichting Technologie Vlaanderen became operational on May 16th 1984 within the GERV, which has since changed its name to the SERV - Sociaal-Ekonomische Raad van Vlaanderen).

The resistance encountered during this process came primarily from the university milieux - fearing that their freedom of action would be impeded in this way - and from non-traditional political groups not having established links with either side of industry.

The Stichting Technologie Vlaanderen has no legal status since it forms part of the SERV. Its structure is closely modelled on that of the SERV :

| Composition of the SERV | Composition of the STV |
|---|---|
| Raad | Beheerscomité |
| - 20 representatives of professional and trade union organizations.<br>- 7 experts having no political mandate. | Made up of 20 members of the Raad representing the professional and trade union organizations. |
| Dagelijksbestuur | Beperktcomité |
| President and members elected by the Raad from amongst its own members.<br>Balanced representation of professional and trade union organizations. | Members appointed with the approval of the Dagelijks bestuur :<br>- 6 members selected by the Beheerscomité<br>- 6 experts. |
| Feitelijke sekretariaat-generaal | Diensthoofd STV |
| + deputy<br>+ services | 5 members (including 1 documentalist). |

This arrangement allows a smooth flow of information from and to the two sides of industry.

It is also regarded as being economical.

2.2.1.3. Tasks assigned to the STV

The STV has been given six priority tasks :

1. to develop an information and documentation centre on the social aspects of technological innovations;
2. to develop and implement social research programmes;

3. to circulate the research results among the authorities (executive and legislative), the two sides of industry, the groups of scientific researchers and the general public (publications, seminars, press conferences, etc.);
4. to co-ordinate research (taking account of the establishment of a coherent research programme, the STV obtains information on the research initiatives in course in the field of social innovation and thus avoids unnecessary duplication of work);
5. to help management and labour, who can make use of the STV's information and expertise;
6. to advise the authorities on the basis of the documentation compiled and the research results.

2.2.1.4. Working methods

To examine the processes of social change connected with technological innovations, the STV has established a long-term research framework which takes into account the diversity of the social aspects of technological innovation. The choice of annual priorities is made in line with this long-term planning, so that the projects are interlinked and have a cumulative effect.

Research is centred on the Flemish region, although the national and international context is not neglected.

The field of investigation has thus been limited to the following component parts :

- type of technological innovation

| Basic technologies | Applied technologies |
|---|---|
| - microelectronics | - telematics |
| - biotechnology | - computers |
| - new materials | - robotics |
| | - aerospace technologies |
| | - agro-industry |
| | - new forms of energy |
| | - medical technology |
| | - engineering |

- stage of the process of social change

  - discovery and development of a new technology
  - decision-making on the subject of a new technology
  - introduction of a new technology
  - consequences of a new technology
  - assessment of a new technology

- area of society in which such a change is occurring

  - work and employment
  - training and education
  - economic development
  - political system
  - cultural environment
  - legislation

- discipline involved

  sociology, economics, psychology, ergonomics, pedagogy, history, political science, demography, communication sciences.

The STV has taken charge of some research work by way of an example, to ensure its credibility vis-à-vis scientific circles; it has no intention of competing with research centres but wishes to establish solid links between scientific circles and the two sides of industry.

When research is conducted on a subcontract basis, a follow-up committee is set up : management and labour appoint ad hoc experts, and two members (1 full, 1 deputy) of the STV executive committee are given the task of following up the work and reporting to the STV management committee.

2.2.1.5. Financial means

Within the SERV's annual grant from the Flemish Executive, a certain amount is intended to cover the STV's personnel and operating expenses (ceiling of 10 million BF).

To this are added the subcontracting expenses, which must be provided for in an annual budgetary programme by the SERV management bodies (ceiling of 40 million BF).

As an illustration, the 1986 budget provides for expenditure broken down as follows :

| | |
|---|---|
| Documentation costs | 8,750,000 BF |
| Research costs | 24,280,000 BF |
| Management and labour follow-up costs | 2,000,000 BF |
| Executive consultancy costs | 970,000 BF |
| Operating expenses | 3,307,000 BF |
| Overheads | 7,692,000 BF |
| Computerization | 3,000,000 BF |

2.2.1.6. Research instigated by the STV

One of the first research activities of the STV was to draw up an inventory of research in Flanders on new technologies and the process of social change which they generate.

This inventory, allowing teams to be located and research material on the subject to be catalogued, gives a detailed summary of the research results and the methodology applied for each project considered.

The aim of this inventory was ultimately to provide a synthesis of the way in which technological dynamics is envisaged in Flanders and of the problems which arise when collecting and processing data (material and methodological gaps in the research material available).

The research themes selected for 1984 were CAD (analysis of its quantitative and qualitative consequences on employment) and telematics (survey on computer aided instruction and out-of-school vocational training).

In 1985, the STV promoted studies on the themes of "work" (e.g. assessment of the legal and contractual provisions surrounding new technologies and, in particular, collective labour agreement No. 39), "education" (analysis of the transition from education to the labour market, with a view to studying the trend in the qualifications required), and "economic development" (e.g. survey on biotechnologies in Flanders, exploring the social consequences of their introduction on employment, health and eating habits).

In 1986, priority was given to the following questions :

- the role and place of social aspects in the implementation of science and technology policies in Belgium and abroad;
- the preventive safety policy implemented in companies with regard to new technologies;
- the ITEC experiment (GB) and whether could it be copied in Flanders;
- the preparation of prospective sectoral documentation on a technological innovation.

For the way in which the research work is organized, refer to what has been said previously. It should be noted that great attention is attached to :

- the cumulative nature of the research undertaken, allowing coherence in the constitution of the STV's know-how,
- the practical usefulness of research results, especially for the two sides of industry;
- the multi-disciplinary composition of the research team.

The STV circulates information among management and labour, the authorities (executive and legislative) and the general public through four channels :

- publication of
  - . final research reports
  - . periodical news
  - . STV brochures
  - . specific dossiers
- the media
- study days
- presence at the Flanders Technology Fair and organization of seminars on the social implications of new technologies.

2.2.1.7. Comments

As an expertise tool essentially designed to be used by the two sides of industry, the STV has given priority in its research matrix to process innovations and analyses of the the changes which they bring about from the point of view of the social sciences.

For a technology assessment body designed more as an instrument to assist the authorities in their decision-making, it would be desirable to promote research into product innovations too and not to call upon the social sciences alone.

Having said that, however, the value of the work undertaken by the STV is undeniable.

Such an undertaking is unique in Europe : formally, this foundation is part of an economic and social consultation body, but the tasks assigned to it include the obligation to circulate research results among the authorities and to advise them on the basis of the documentation material compiled and the results of the research instigated.

2.2.2. The situation in the Walloon Region

Within the Executive of the Walloon Region, each member is competent for applied research linked with the implementation of his other competences. This allocation, reproducing the logic of the law on institutional reforms, makes applied research an accessory of competences of substance. Only competence for applied research in economic matters is assigned not to the Ministre régional de l'Economie et de l'Emploi but to the Ministre des Technologies Nouvelles. At decision-making level, therefore, the "research" component is dissociated from the other elements of industrial policy. However, this distribution of competences is tempered by the highly developed collective responsibility within the Executive.

As an expression of a voluntarist policy with a concern for a clearly targeted strategy, the action conducted by the Ministre des Technologies Nouvelles is the subject of consultation within the commission for research and technological innovation policy of the Economic and Social Council of the Walloon Region, which brings together both sides of industry.

To date, this commission has essentially taken into account questions of an organizational nature, such as the allocation of competences and resources or the creation of a para-regional body for applied research, or even questions such as innovation in SMEs or European actions in the research field.

More recently, it has examined the contribution of the "filière" concept to research policy and industrial policy. This new type of approach shows a willingness on the part of both sides of industry to employ both an instrument for defining strategy and an instrument for assessment of innovation policy.

As regards consultation between members of the Executive, representatives of employers' and trade union organizations and representatives of university circles and non-university higher education, this has not taken place so far in a formal manner.

With the creation, by decree of the Executive of October 30th 1986, of the Conseil Supérieur des Technologies Nouvelles, responsible for expressing opinions on everything concerning the general direction and priorities to be established for R&D policy in the Walloon Region, the Walloon Regional Executive will receive an annual report containing reflections on :

- the work accomplished by Walloon scientific and industrial milieux in the field of new technologies;

- the insertion of these milieux into the process of European technological co-operation;

- the contribution of the public sector and the private sector.

Aware of the need for democratic assessment of technological choices, the Ministre des Technologies Nouvelles gave the Centre de Recherches Informatique et Droit (University of Namur) the task, in October 1985, of formulating concrete proposals concerning the creation of an assessment unit in the Walloon Region.

In this, it has been a question of :

- examining the risks of a "technocratic fait accompli";

- analysing some foreign experiences in technological control in order to determine the conditions required for satisfactory institutionalization of Technology Assessment and to provide methodological reference points for organizing the work of the OTA;

- conducting a socio-legal analysis of the decision-making agents and mechanisms in the field of new technologies in Belgium;

- elaborating concrete proposals for the creation of a Walloon OTA, taking into account the ability of this office to meet the requirements of Technology Assessment, the Belgian institutional configuration and Walloon technological culture.

The synthesis report was submitted to the Minister-President of the Walloon Region on September 30th last. The proposal put forward places the accent on the following requirements :

- it must be ensured that Technology Assessment is not diluted by other tasks traditionally assigned to a science policy consultative body;

- one should preserve the explicit nature of Technology Assessment and therefore the clearer perception that the general public will have of its objective;

- The Executive, the Legislative and the two sides of industry are partners in innovation : it is therefore extremely useful for them to be provided with a tool to help in decision-making and for a bridging mechanism between these three poles to be created from the point of view of Technology Assessment.

The objective assigned to this assessment body would be to provide a model of the technology-society interface in the medium and long term, bringing out the probable positive or negative impacts of technological applications and the alternatives that can be envisaged.

This task will entail :

- the establishment and updating of an inventory of the Technology Assessment expertise network in French-speaking Belgium and the development of co-operation with larger networks;

- the collection of pertinent information concerning the implications of technological innovation and the tools for their analysis;

- support for in-house or external research activities (choice of the themes to be explored, financial backing, methodological support, documentary support, monitoring and co-ordination);

- the utilization of research results (publications, symposiums, seminars, press conferences, etc.).

Both the logic of the internal structuring and the right of initiative should make it possible to stimulate a demand for exploratory and assessment studies on the part of the Executive, the Legislative and the two sides of industry.

With its light structure, this body should function with a limited multi-disciplinary nucleus of people fully acquainted with the issues involved in innovation and should have sufficient means to finance assessment studies and disseminate the results.

Broad consultation whilst the research is in progress has been strongly recommended. One cannot try to save on this consultation procedure (through surveys, experiments, etc.) if the objective of such a body is to create a model of the technology-society couple in the medium and long term.

Then, in so far as the research reports are concerned, one must ensure that they can be read by a technically untrained public and clearly indicate the implications of a technological innovation, the risks that it involves and the possible political options.

The dissemination of these results will be seen from an open angle (the authorities, management and labour, the media and the groups involved will benefit from this expertise, without exception).

Modelled in this way, the Observatoire des Technologies Nouvelles will act as a favoured interlocutor vis-à-vis similar bodies. This Observatoire could play a pilot role in the establishment and operation of a European network of inter-regional co-operation in the field of Technology Assessment.

Close attention will have to be paid to the action taken on the proposals put forward.

We must underline the value of such an initiative : from the very beginning, the Walloon Region wanted to join in the international movement by taking note of developments over the last 20 years in the concept of Technology Assessment, in the methodologies applied and in the institutional forms which it has been given, in order to surround itself with the necessary guarantees for setting up a satisfactory OTA from the point of view of scientific quality and political efficacy.

CONCLUSION

At the end of this report, whose field of analysis was limited to the public sphere, we should recall some of the main points.

In so far as the institutionalization of Technology Assessment is concerned, two specific Belgian characteristics must be emphasized :

- the importance of the regional aspect, in that within the near future two regional institutions will be exclusively responsible for promoting research and debate on the assessment of technological choices;
- the coexistence in Belgium of assessment units conceived in many different ways at the prompting of different partners in innovation (for instance, national action in support of FAST is in the hands of the administration for science policy, whilst the Stichting Technologie Vlaanderen forms part of an economic and social consultation body and the Observatoire Wallon des Technologies Nouvelles should create a bridging mechanism between the Executive and the Legislative and the two sides of industry).

As regards assessment practices, the following factors should be borne in mind :

- in the national actions in support of FAST, the research matrix has given a predominant place to analysis of the impact of technological innovations whilst reserving a substantial place for determination of the conditions necessary for innovation (including the regulatory conditions);
- within the Stichting Technologie Vlaanderen, the accent has been firmly placed on analysis of the impact of process innovations, focusing on certain stages of the process of social change.

It is certainly premature to state a position on the impact of the assessment units which exist at national and regional level :

- in effect, the national programme of actions in support of FAST is only just coming to an end; no final report has yet been prepared and therefore one has so far been unable to find any follow-up among the public decision-makers;

- the research programme launched by the Stichting Technologie Vlaanderen began in 1984 and first of all concerned itself with drawing up an inventory of research activities at the technology-society interface in Flanders; it is too early to analyse the dissemination of the research results among the two sides of industry, academic circles and the authorities (executive and legislative), although one thing that is certain is that the scientific credibility of the work is already recognized.

Finally, if we look at the state of the public debate in Belgium concerning the issues and risks involved in scientific and technological choices, we can see that the debate is notional and is often taken over by debates on more traditional problems (e.g. regionalization of competences and means with regard to R&D policy).

It is therefore essential to continue and step up Technology Assessment, a process which should be determined by the following parameters :

- a more sustained link between the places where science and technology policy is assessed (CNPS, VRWB, CSTN, ad hoc commissions of the parliamentary assemblies) and the units responsible for Technology Assessment;

- an option of referral for the OTA, a consultation mechanism and a system for disseminating the results of research designed for all the partners in innovation (including parliamentarians);

- a bigger place being granted to the early-warning system and to very long term analysis.

**ANNEX : List of authorities and/or research centres playing a decisive role in the field of R&D policy and/or in the field of Technology Assessment.**

At national level :

- Cabinet du Ministre de la Politique scientifique
  rue de la Loi 26
  B-1040 BRUXELLES (02/237.93.11)

- Cabinet du Secrétaire d'Etat à la Politique scientifique
  rue du Commerce 31
  B-1040 BRUXELLES (02/513.88.40)

- Services de Programmation de la Politique scientifique
  Direction opérationnelle "Actions nationales de soutien à FAST"
  rue de la Science 8
  B-1040 BRUXELLES (02/230.41.00)

- Conseil National de la Politique scientifique
  rue de la Science 8
  B-1040 BRUXELLES (02/230.41.00)

In Flanders :

- Cabinet van de Voorzitter van de Vlaamse Executieve
  Dirv-aktie
  Jozef-II straat 30
  B-1040 BRUSSEL (02/218.12.10)

- Vlaamse Raad voor Wetenschapsbeleid
  Palmerstonlaan 6
  B-1040 BRUSSEL (02/230.66.47)

- Stichting Technologie Vlaanderen
  Antwerptower
  De Keyserlei 5 bus 16
  B-2000 ANTWERPEN (03/231.28.30)

In Wallonia :

- Cabinet du Ministre-Président de la Région Wallonne
  avenue des Arts 13
  1040 BRUXELLES (02/211.55.11)

- Centre de Recherches Informatique et Droit
  Facultés Universitaires Notre-Dame de la Paix
  Rempart de la Vierge 5
  5000 NAMUR (081/22.90.61)