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West Europe Report

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WEST EUROPE REPORT

SCIENCE AND TECHNOLOGY

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AEROSPACE

CNES OF FRANCE RESEARCHES REMOTE CONTROL SYSTEM FOR SPACE

Paris REVUE GENERALE DE L'ELECTRICITE in French Nov 84 pp 724, 728, 729

[Article by Jean-Michel Guilbert, National Center for Space Studies (CNES), Toulouse: "Application of Remote Control in the Space Field"]

[Excerpts] Mission analysis studies show that the needs for remote control fall into two broad categories:

- needs for intervention, repair and maintenance;
- needs for deployment, assembly and construction.

Depending on the missions and on whether the operator is on board the remote-controlling craft or on earth, the remote-control system will have more or less autonomy of decision.

This paper describes the field of application of remote-control in space and presents a few projected or completed systems illustrating the interest of remote control, with or without a man on board.

Specific constraints in the field of space have led the CNES to start some research; the first stage is in progress and assumes that the operator is on earth.

6. The CNES Program

For all orbital intervention missions and whether the operator is on earth or in orbit, capture was identified as the basic elementary operation and adopted as a major theme of study by the CNES.

The scenario considered involves a sun-synchronous orbit, the operator being on earth. The characteristics of the satellite to be captured, the "target," are very much like those of the French SPOT satellite [earth observation satellite]. It is stabilized roughly, i.e. $\pm$ 2° along the three axes, with angular velocities remaining below 5.10^{-2}°/s. The satellite that will capture it, the "hunter," is compatible with future versions of the Ariane launcher (mass in orbit: about 4 tons). The capture operation begins when the two vehicles are in the immediate vicinity of each other and under control

with respect to their relative position, with an approximation of 0.2 m. The hunter is equipped with an attitude control system whose performance is identical to that of the target. It is equipped with a deployable organ of prehension. The target being passive, the whole detection system is carried by the hunter. Communications between the operator and the space system transit through a relay satellite introducing a delay of at least 0.5 second.

The research theme adopted offers all the characteristics and problems specific of remote control in space. The manipulator is working in a weightless condition; the dimensions of the structure and motors are determined solely by the inertia of the hunter and target. To minimize the mass in orbit, the manipulator has to be very light and flexible. Piloting a flexible articulated linkage is the first specific problem of space robotics. Another characteristic lies in the fact that, not just the target, but the manipulator support too is mobile. Since the relative motions of the vehicles are not well known, it is necessary to make a direct measurement of the gripper handle vector by means of a specific detector, either an optical or a microwave detector. Finally, the remoteness of the operator on earth does not make possible direct remote control of the master/slave type.

The goal is to simulate realistically the capture operation. To do this, the program involves two main stages:

- use of an "existing" arm serving as a test platform for the system and subassemblies;

- development and testing of a functional laboratory mockup representative of the space manipulator.

The final operation consists in achieving a capture under conditions when all the constraints inherent to the space field are present (Figure 3).

Research started three years ago and was oriented mainly along the following lines:

- theoretical studies: study of control and control-systems stability;

- simulations:
  - artificial increase in the flexibility of the laboratory manipulator (MAT.1 from Calhene);
  - completion of a three-axis moving target controlled in real time; all movements of the space systems are transferred to the target so as to achieve correct simulation.

Near-distance measurement sensors: two methods are studied simultaneously, optical and microwave sensing. Two mockups are currently being developed; they will be integrated into the organ of prehension for functional tests in a realistic perturbed environment.

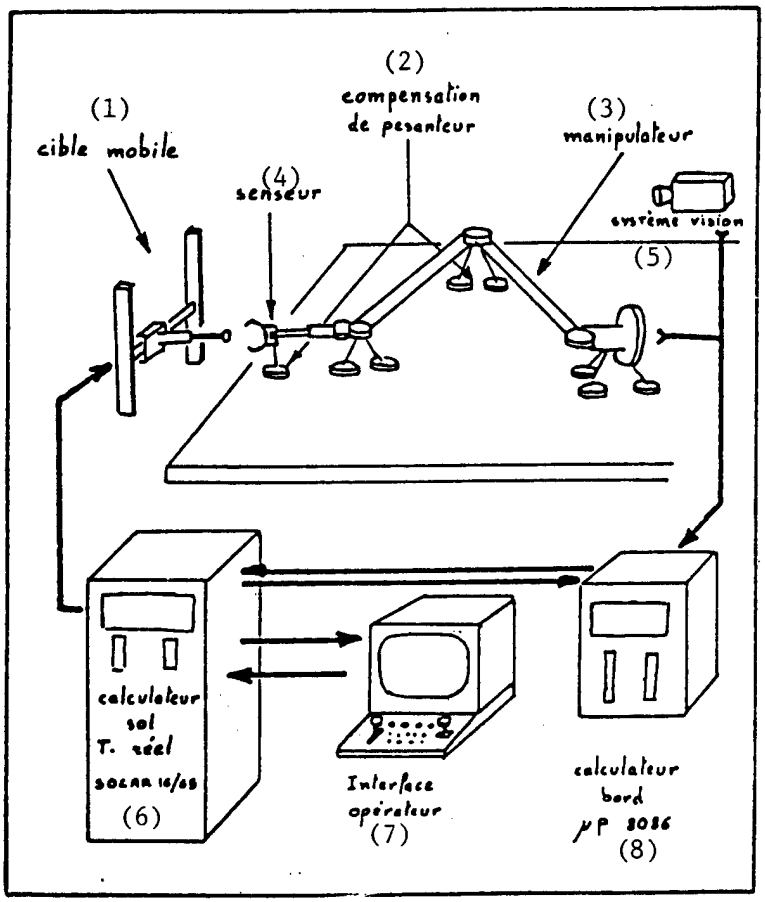

Figure 3. Organization of the Space Robotics Laboratory

Key:

1. Moving target
2. Gravity compensation
3. Manipulator
4. Sensor
5. Vision system
6. Solar 16/65 real-time earth computer
7. Operator interface
8. On-board computer - 8086 microprocessor

Manipulator dimensions: research was done to design and dimension the manipulator that could be used for the capture mission. When deployed, it is 6 m long; is has 6 degrees of freedom and weighs about 40 kg. Its motor(s) are of the decentralized electric type. Design work is now completed for the articulated sub-assembly and in progress for the terminal organ of prehension.

Simultaneously with the work briefly mentioned above, a laboratory was set up; it is equipped with the real-time simulation means necessary to make capture simulators.

The current CNES research program should make it possible to acquire expertise in the methods and technologies necessary for space remote control, an essential factor in the implementation of an orbital intervention system.

9294
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AEROSPACE

SNECMA OF FRANCE FUNDS PROGRAMS AT SEP

Paris ELECTRONIQUE ACTUALITES in French 25 Jan 85 p 15

[Article: "SNECMA Is Contributing FF 46.2 Million to Finance the Expansion of SEP"]

> [Excerpts] Quite recently, SNECMA [National Aircraft-Engine Study and Manufacturing Company] subscribed FF 46.2 million to a bond issue designed to ensure the expansion of SEP [European Propulsion Company]. For the latter, 1985 will be an important year as far as ballistic and space activities are concerned; in addition, its president, Mr Lesgards, is expecting a revival of the demand for space remote-sensing earth stations.

SNECMA, which owns 50.1 percent of SEP's stock, recently contributed fresh capital to its subsidiary, SEP, for a total of FF 46.2 million in convertible bonds that would increase the stockholders' equity of the Ariane motor manufacturer in 1985. This year will be that of the first stage--to last two years--of development of the Ariane-5 motor, the HM-60 (to be called Vulcain). The space sector, which in 1985 should represent 60 percent of all SEP activities (45 percent in 1984), will be marked by an increased production of Viking motors, reflecting the rate of 7-8 annual launches of the European launcher.

As far as ballistic missiles are concerned, a segment that accounted for 45 percent of 1984 activities, in 1985 the manufacturer will ensure series production of the M4 that will equip the submarine "Inflexible" next April. The Hades program will also be continued this year. In order to be ready when the government arrives at a decision as to the future ballistic missile, the company continues to develop jointly with the army the basic technologies that will be used.

1985 will also see the start of a basic research program on technologies related to liquid-fuel drives (turbopumps and magnetic bearings in particular). A budget of FF 10 million, half of which provided by the CNES [National Center for Space Studies], will be allocated for the first year of these studies and, according to Mr Lesgards, could be increased to FF 30-40 million in the near future.

Invitation to Bid For Remote-Sensing Stations

The image processing division experienced an in-between year in 1984. Now that the continuation of the French Spot remote-sensing satellite program is assured and that a consortium has been created in the United States to operate future Landsat satellites, people at the SEP say they are more optimistic concerning the future market for satellite-image receiving and processing stations. Yet, this is an activity that accounted for only 5 percent of the company's sales in 1984 and that has not yet reached financial balance. That will be done in 1985, Mr Lesgards assured, and 1986 should show a profit. In this sector, the SEP is continuing its diversification efforts, especially toward hospital and documentary imagery.

The SEP's 1984 sales amounted to FF 1.8 billion, compared with FF 1.4 billion in 1983, and its president is expecting similar growth in 1985. The net profit, which was FF 5 million in 1983, should be twice that for last year.

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AEROSPACE

SPEED UP HERMES TO GIVE EUROPEANS SPACE ACCESS, DUCROCQ SAYS

Paris SCIENCES & AVENIR in French Feb 85 pp 82, 84-86

[Article by Albert Ducrocq: "France and Manned Flights"]

[Excerpts] After the commercial success of Ariane, the French aerospace industry actually has a new goal: manned flights. In 10 years, the Ariane 5 launcher should be putting the European spacecraft Hermes into orbit.

The French aerospace industry is recruiting... For the third time, the National Center for Space Studies [CNES] has actually started looking for would-be astronauts, but this time with greater ambition than before. The first operations were punctual: in 1977, on the occasion of the Spacelab-1 mission, the Americans had promised to put one European astronaut on the Shuttle during the first Spacelab flight. On this occasion, the European Space Agency [ESA], assuming that this flight of a European would be followed by a few others, had decided to constitute a small team and asked its member countries to provide five candidates. For its selection, the CNES had written to some 150 organizations, asking for French citizens aged 47 at most, measuring between 1.59 and 1.90 m, with 5 years of professional experience. Applicants had to be fluent in English, possess a scientific or technical diploma and be of strong constitution.

In 1979, the French-Soviet flight called for a second recruitment. This time, the CNES decided to publish the names of only two winners: the cosmonaut and his substitute. Political officials wanted the French cosmonaut to be a woman, but there were six times fewer women applicants than men... As a result, the men selected were Jean-Loup Chretien, who boarded Soyuz T6 on 24 June 1982, and Patrick Baudry, who should fly on the shuttle during mission 16, devoted to technical and medical experiments ("echography" and "pocket").

For the third recruitment, the rules remain essentially the same. Applicants are subjected to physical tests, which are not a 100-percent guarantee of good behavior in space, as no reliable criteria have yet been found to evaluate adaptation to weightlessness based on experiments carried out on the earth.

Nevertheless, training conditions will be more flexible: for instance, previous professional aerospace experience is only desirable; its length is not specified. The upper age limit was slightly reduced--to 45 years--considering that some of the subjects accepted are not likely to fly before 6 or 8 years. And a lower age limit was set: 25 years; the youngest applicant--a MATRA [Mechanics, Aviation and Traction Co.] woman engineer--falls just above this limit.

What program should these future cosmonauts expect? First, the principle of a second French-Soviet flight has now been definitely accepted. The flight will take place in 1987 or 1988, using second-generation "Posture" and "Echograph" instruments. This will be a one-month flight, and the only indication provided by the Russians is that it will take place on board "a" Soviet space station, but it is not known whether the French cosmonaut will fly on the present Saliut-7 or on the modular station of which Saliut-8 is presumed to be the central element.

Current negotiations with the Americans also seem to indicate that, around the same time, another place on the shuttle will be offered to a French astronaut.

In addition, new opportunities cannot fail to arise, and this is something about which the CNES is very pleased; its first requirement was the commercial success of Ariane and it now has other goals: manned flights. However, there are two prerequisites to carry out a manned-flight program: to have astronauts; to possess vehicles on which they could fly.

As far as the first condition is concerned, there is no shortage of applicants. Far from diminishing, the prestige of space is increasing with time. Also, experience shows that the Soviet Union, the United States, Czechoslovakia, Poland, East Germany, Bulgaria, Vietnam, Hungary, Cuba, Rumania, West Germany and Canada were able to find at home men that behaved very well in space. We fail to see why this would not be the case in France too. Of course, they would have to be trained, and this is where the problem lies.

When it has completed its current examination of applications, the CNES should appoint 10 astronauts: 5 flight engineers and 5 experimenters, so as to constitute a "pool of astronauts," for the subjects selected will continue to go about their business. There is no question of setting up in France the equivalent of the City of Stars, or another Houston where spacemen would live, train, take courses, in a word do nothing else but prepare for going into space, a preparation that requires at least three years for an astronaut that will have to handle the controls of the shuttle. The CNES is planning its detachment of astronauts as a field troop of firemen, i.e. men who each have their own jobs but who can be counted on whenever a fire will start. Thus, when opportunities arise, we shall know whom to choose.

This approach is most wise: indeed, flight opportunities will be few during the next few years. Of course, four Frenchmen will have gone into space by 1990, i.e. about one French astronaut every other year. But they will never be given a pilot's position.

Actually, there are several categories of astronauts. The Soviets are now distinguishing between pilots, flight engineers and scientists, in addition to the distinction between members of a visiting crew--who work hard for a rather short time--and members of a maintenance crew--who do not overtax themselves so as to be able to work for a long time.

In the United States, after the pilots and mission specialists, there appeared payload specialists who are responsible for carrying out specific experiments. All pilots are American. On the other hand, one of the three current astronauts of the European Space Agency--the Swiss Claude Nicollier--was accepted as mission specialist, truly an event! A fourth category was recently created: "observers." And, probably, it will take some time before anyone in the world can just apply directly and expect to become such an observer. There is every indication that observers will be selected through negotiations between governments.

As a result, as long as the Europeans do not possess a manned space vehicle, if they want their men to fly they will have to rely on the political goodwill of one of the two major space nations, and they will be unable to choose their mission and their representatives will be unable to pilot the spacecraft.

Therefore, they will have to produce a European vehicle, and we can already imagine that Patrick Baudry will pilot it one day.

That leaves the problem of making this European space vehicle. In 1973, when they chose Ariane which was proposed by the French, the Europeans put their stakes on a rocket that was not designed for manned flights.

This means that if, in 1973, when the program was launched, a "manned flight" option had been chosen, it would have been relatively easy to design the European launcher accordingly. In other words, if we had wanted, European manned flights could now be a reality, with all the resulting benefits for the Old Continent, to begin with much greater autonomy and the possibility of orienting space commercialization in our own way, not just in the field of communication satellites--a field where the Old Continent is the undeniable champion today--but also in that of materials processing and drug production in space, a market that is expected to be especially promising after the next decade.

Could the present Ariane rockets be altered into cabin launchers? No, for that would involve structural problems having to do with the very design of the launcher. Yet, the Ariane-5 rocket is now being designed for manned flights. Its payload in low orbit will amount to 17 tons, a luxury as the launcher will thus be able to accomodate much more than a cabin, namely a spacecraft. Ariane-5 will be the vehicle of European manned flights. Unfortunately, we shall have to wait 10 years--which, at the present stage of astronautic development, is a rather long time; the Europeans are probably not anticipating all that will take place during the next decade--until that Ariane-5 is available. Indeed, the first flight of that launcher is expected to take place only late in 1994, and it will be operational early in 1996, but it is not sure that it could put a vehicle into orbit right away.

Actually, logic would require that, simultaneously with the construction of the Ariane-5 rocket, the Europeans develop the manned vehicle that it could place into orbit, a vehicle already famous before being built, even before being designed, a vehicle of which we already know that it will be a spacecraft: Hermes.

In a strong position because of their remarkable aeronautical technology, the Europeans should also be in a good position to build a spacecraft of a larger size and higher performance. Designing this spacecraft will actually require a major contribution from aircraft manufacturers--in France, Aerospatiale and Marcel Dassault--as the problems of a spacecraft are essentially aerodynamic problems. Those who, in the range of traditional aircraft, were able to create the--military--aircraft with the highest speeds are obviously the best qualified to design a plane capable of flying at 28,000 km/h.

Drawing up plans for Hermes should take about three years. As for construction time, it will depend on budget and political considerations; there appears to be considerable divergence in Europe, where specialists are divided into two camps.

Indeed, for the reasons we just mentioned, some would like to see Hermes fly as soon as possible, i.e., on the basis of the present tentative schedule, by 1996. The French are of that opinion. During the past decade, the CNES may have been reluctant when it came to manned flights, but it is now just as eager to proceed as fast as possible, even if that means sacrificing scientific programs for the sake of Hermes. To the great displeasure of astronomers.

We heard quite a different story at the ESA, where a majority in favor of a "slow calendar" is emerging. Many member countries consider that, in the immediate future, it makes more sense for the Europeans to continue their cooperation with the United States and acquire the technology of orbital stations, even if it means accepting the dependence such a situation will imply. According to this point of view, the next decade would essentially focus on cooperation to the U.S. orbital station program, the Europeans building a "super-Spacelab" suitable for this station. Such is the meaning of the Columbus program which, on a European scale, will be given priority over Hermes; France accepted to go along with this policy, but in the hope that, in the next few years, the other European countries would soon return the favor and support the Hermes program. All the same, administrators will have the last say.

Now, with the means currently available to it, the ESA cannot carry out more than two large programs simultaneously. During the past decade, the two programs were Ariane and Spacelab: they both were a remarkable success. This being said, for the period 1984-1994, the two new large programs are, on the one hand, Ariane-5 and, on the other hand, the contribution to the U.S. orbital station. In other words, the Hermes program would start receiving priority in 1994 and would be completed by 2004!

But things could turn out differently if--as the French now hope--the cooperation program with the orbital station could be compressed and reduced to the

period 1984-1990, or if at least most of the expansion it will require could be concentrated over this period, so that the Hermes program could be started as soon as possible.

Indeed, it was a mistake to offer that choice. It was imposed by financial imperatives. The latter could disappear if the Europeans would at last accept to devote reasonable amounts to space instead of the ridiculous amounts they are now devoting to it--ridiculous compared with what is at stake; they would like to harvest the fruits of space without making the investments required.

Obviously, French [as published] budgets should be increased very soon by at least 30 percent in France (the country presently making the largest effort although it is spending less on space than on dog food) and by 50 percent in the rest of Europe just to face the situation, based on current data; and these projections stand every chance to be revised upward again during the next few years, as new requirements cannot fail to appear as a result of the development of space activities.

Therefore, the Hermes program may well become the cornerstone of Europe. Economically, Europe is now going through a critical stage. We can feel that it is on the knife-edge. We suspect that it would not take much to tip it over onto the road to decline--the torch of progress would then be carried by the United States and Japan followed by the cohort of young countries--or onto the road of "regaining control" over the intellectual and industrial fate of the Earth, which could be achieved only through advanced technology, of which space activities are the privileged vector, manned flights also promising to be the keystone of this edifice. It is as logic as it is simple. But will European countries understand in time that, in this context, much is at stake with Hermes?

9294
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COORDINATION OF MEMBRANE TECHNOLOGY RESEARCH IN FRG URGED

Duesseldorf VDI NACHRICHTEN in German 12 Oct 84 p 3

[Article by H. Strathmann: "The Key to Biotechnology Products. The Coordination of R&D Activities in the Federal Republic of Germany is Urgently Needed"]

> [Excerpts] What distinguishes synthetic membranes is the fact that they allow different components of a mixture of substances to pass under the driving force of a pressure or concentration gradient while holding back others more or less completely. Since their properties can be adapted extremely well to the most diverse problems encountered in the separation of substances, they are particularly well suited for separating molecular mixtures. Today, their use is at a stage where this technology has obtained considerable technical and economic significance and where above-average growth can be expected in the future as well.

The fact that work in the three areas of membrane technology is given different weight and generally takes place in very small working groups which are physically far removed from one another makes the situation even more difficult in the Federal Republic. Today there is no central body to coordinate, document or evaluate these efforts. The situation is similar when it comes to government support for R&D work in the membrane field. In the BMFT [Federal Ministry for Research and Technology] projects in membrane technology are supported in different sections and by different project sponsors. Here too, coordination is insufficient, similar to the situation in the actual research.

In our country as in the United States and Japan, a large part of membrane research and development takes place in industry. In contrast to the United States, however, this percentage is much lower here, and the emphasis is different as well. In the United States, a very large part of the work is done in small and medium-size firms with public financial support. Furthermore, there are close connections between industry and universities or between governmental and private research institutions. In the Federal Republic, on the other hand, very few small and also medium-size firms have the research facilities for meaningful membrane development. Cooperation between these firms and universities and large research institutions is

rare. Government support of R&D efforts in small firms is hardly possible due to the complicated application process, the reporting required and the complicated method of cost accounting. On the other hand, membrane technology is better suited for small and medium-size firms due to the highly diversified applications, where many applications yield only relatively small sales, at least for the time being. Therefore, the large chemical companies which would have the necessary means and qualified personnel are interested in only relatively few aspects of membrane technology where adequate sales can be expected already today, examples being the artificial kidney or desalization. Due to this overall state of affairs, applied research in the field of membrane technology in particular has fallen behind considerably in Germany compared to other industrial countries such as the United States or Japan. In these countries where a comparable situation exists with regard to difficulties in coordinating different scientific disciplines appropriate measures have been taken already. At present, the establishment of a "National Membrane Technology Center" is being discussed in the United States. In Japan, membrane technology was declared a high-priority technology for the nineties, and the R&D activities have been combined in an MITI-program (Ministry of International Trade and Industry).

Support Determines the Course

In order to remain on a level with the other industrial nations which are leading in the field of membrane technology or, if necessary, to catch up with them again it seems necessary to coordinate in one body all R&D activities in membrane technology which are currently going on in universities, large research institutions and in industry and to combine them in a government-sponsored program. This program should set the priorities which are necessary for meaningful development, make the individual areas of membrane technology more transparent and provide a stimulus for necessary cooperation.

Among other things, such a program should:

--provide a survey of the current activities in the field of membrane technology in the Federal Republic and abroad and make this survey available to all interested parties in Germany;

--point out gaps where R&D activities are required to maintain competitiveness or where they appear to be particularly promising;

--prepare centralized documentation for all work being done in this and other countries, to the extent it is accessible, and make it available to all interested parties in the Federal Republic;

--work out a strategy to promote R&D activities in the field of membrane technology which extends from pure basic research to the establishment of pilot and reference facilities;

--and prepare a key for distributing the R&D resources available among the individual areas of membrane research.

Committee to Coordinate Projects

In addition to general documentation one of the essential tasks of a central coordinating body would be to make the results of the basic research of the universities and Max Planck Institutes better known and more accessible to the more application-oriented research institutions such as the Fraunhofer Society and above all to industry. On the other hand, the central coordinating body should see to it that problems and opportunities in the application of membrane and membrane processors resulting from the practical experience of industry will be passed on to the appropriate places in basic or applied research.

The structure of the central coordinating body poses a major problem since its effectiveness will have a decisive influence on the future development of membrane technology in this country. It could consist of a permanent staff affiliated with a research institute or an interest group which would carry out the necessary work in the form of projects and a committee with advisory function.

The members of the advisory committee must be willing to participate in the development of concepts and in the coordination of individual projects, either individually or in groups.

12831
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NETHERLANDS PROMOTES MONOCLONAL ANTIBODIES USE IN AGRICULTURE

Rotterdam NRC HANDELSBLAD in Dutch Supplement 6 Mar 85 p 4

[Article by E.J. Boer and Wubbo Tempel: "The Unknown Biotechnology -- Industry Slow To Respond to New Development"]

> [Excerpts] Tomorrow, a new laboratory will be opened in Wageningen for the diffusion in agriculture of the so-called monoclonal antibody technique, an unknown but successful development in biotechnology. Research into this technique is going very well, but as far as the profits Dutch business could be making from it are concerned, things are different.

What is good comes quickly, is a saying which does not hold much truth for a number of biotechnological developments. It does apply, however, to a rather unknown technique, which was discovered only 10 years ago in a laboratory in Cambridge and is already widely known.

We are talking about the so-called monoclonal antibody technique, with which primarily many protective substances can be made, to be used for example in medical diagnosis. In terms of practical application, the new technique is quickly going beyond its much more famous little brother in biotechnology, the recombinant DNA-technique. It was not for nothing that the Cambridge researchers, Cesar Milstein and George Kohler, were given the Nobel prize for medicine last year.

This knowledge is also spreading in the Netherlands, at least in research. Good results have already been achieved in the medical area: a company like Organon has a yearly turnover of a few tens of millions of guilders in pregnancy tests based on that technique. Veterinary medicine and cattle raising have also developed as research areas and promise soon to yield marketable products. As a final bombshell, tomorrow the Institute for Phytopathological Research [IPO] in Wageningen will open a service laboratory which is supposed to increase the accessibility of the monoclonals to the world of agriculture.

Thus, the monoclonals have found their way into Dutch research. Last year the small Sanbio company in Nistelrode (Brabant), which focuses on supplying monoclonals to the research world, had a turnover of 156,000 guilders in monoclonals, approximately 10 percent of its total turnover. The small company,

which does not deal in products based on monoclonals but in monoclonals themselves, has active contacts with six universities and institutes and exports monoclonals abroad for them. A university which has at its disposal cells which produce antibodies, produces extra amounts, and other potential users are sought for those which it does not need for itself. Conversely, the firm itself represents about 30 foreign manufacturers of monoclonal antibodies and supplies the monoclonals for them in the Netherlands.

Not Too Late

It is true that the service laboratory to be opened tomorrow in Wageningen comes late in the game, admits Dr Piet Boonekamp, who as researcher for the Laboratory for Flower Bulb Research is stationed with IPO, but not too late. In the laboratory researchers for agricultural colleges, institutes, business and industry are expected to receive training in producing monoclonals. These could be very useful for Dutch agriculture. As an example, Boonekamp mentioned the food inspection services which are currently carrying out 3 million tests a year on potato diseases and 500,000 on tulips. It is possible that with the aid of monoclonals a cheaper or more specific technique could be developed in this area.

But it is not all roses either. According to TNO [Netherlands Central Organization for Applied Scientific Research] researcher Dr Joost Haaijman, Dutch business and industry have been lax in taking hold of the potential of the monoclonal antibody technique. In particular, less obvious applications remained unrecognized by virtually all companies. And according to the story told by Peter Booman, an engineer with the Institute for Cattle Research "Schoonoord" in Zeist, there is no interest in products based on monoclonals either. He first peddled his research results among Dutch business and industry, received hardly any response and then ended up selling his results in America.

Dr Joost Haaijman, who works in the Institute for Experimental Gerontology at TNO in Rijswijk, returned from the United States in 1980 with the new revolutionary technique: instead of producing scanty measures and only obsolete antiserums of limited specificity, he was able to make infinite amounts of very specific antibodies. The advantages of the technique are great for certain applications. Not only in the area of medical diagnostics, where the quickest and simplest results were to be expected, but also for other applications such as analysis and purification. As a matter of fact, a number of substances could be indicated and recovered very accurately with this technique.

Green Thumbs

TNO started a kind of monoclonal antibody center, intended to familiarize researchers from government and industry with the technique. As a matter of fact, this technique requires a certain "green thumb," a researcher must get a firm grasp of practical matters simply through personal experience. Haaijman is disappointed by the industrial response. All told, a single company, specifically Unilever, actually had some researchers trained by him.

Furthermore, according to Haaijman only Organon and the Tilburg company Nordic Immunological Laboratories have picked up the technique. They went their own way and consequently they now have a goodly number of products based on this technique. But there is really nothing more. It should be noted here that Haaijman does not count companies such as Sanbio and Eurodiagnostics in Apeldoorn, because they add knowledge only in terms of marketing and distribution.

Haaijman's criticism is directed primarily toward companies which could use the technique, for example to check their production processes, but do not do so. "They have taken too much of a wait and see attitude with regard to introducing new techniques. The feeling is: let it prove itself first."

8463
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CIVIL AVIATION

DFVLR DEVELOPS NEW KIND OF WALLS FOR WIND TUNNEL

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 4 Mar 85 p 7

[Article: "More Precise Measurements in Wind Tunnel. DFVLR Introduces Three-Dimensional Adaptive Test Section"]

[Text] (RE) Frankfurt--The first sample measurements using an adaptive test section were made recently by the German Research and Testing Institute for Aviation and Space Flight (DFVLR) in their high speed wind tunnel at the Goettingen Research Center. Today wind tunnel measurements are a matter of course in the design of aircraft, motor vehicles and even in the planning of buildings. Many of the problems associated with applying the test results to the finished product were able to be solved. One problem, however, still concerns wind tunnel measurement and aerodynamics engineers today--interference between the test model and the wall of the wind tunnel.

This interaction is nearly entirely responsible for the imprecise measurements which have posed serious problems for many aerodynamics engineers. It is possible that these problems are now a thing of the past. At the Institute for Experimental Fluid Mechanics of the DFVLR in Goettingen a three-dimensional adaptive test section was developed whose walls--to put it simply--adapt to the air flow during the test.

There have long been attempts to reduce interference using slotted or even perforated walls in the test section. According to the DFVLR this new development which they have now introduced represents a real step forward. Initial calculations showed that a thick-walled, flexible rubber tube was found to be the most adaptive kind of material to air flow. The rubber tube, which has been produced in the meantime, is 240 cm long, has a diameter of 80 cm and a wall thickness of 6 cm. A total of 64 spindles--each controlled by a positioning motor--make it possible to reduce the cylindrical test section or also --if required--to increase the test cross-section by a maximum of 40 mm.

This adaptive test section, also called "thinking walls," in addition has 128 pressure holes connected to tiny sensors which permit precise determination of existing pressures directly on the test section wall. Without this exact information no conclusions about interference factors on the model could be made. The first sample measurements have been made in the high-speed wind

tunnel of the DFVLR in Goettingen, to the full satisfaction of the scientists and technical experts involved. The measurements were made on various so-called calibration models. The results achieved have already exceeded all expectations--they have proven identical to the test values which were previously arrived at by computer calculation.

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CIVIL AVIATION

ADMINISTRATION PRESSURING IBERIA TO BUY AIRBUS

Madrid TIEMPO in Spanish 18 Mar 85 pp 54-60

[Article by Jesus Rivases]

[Text] A new commercial war is being waged in which the initial booty amounts to some 100 billion pesetas or more. In the years ahead, Iberia, the Spanish national airline company, must replace part of its fleet, part of which has an average age of over 14 years, as in the case of the DC-9's made by McDonnell Douglas. That company also manufactures the F-18 A's which the Spanish Air Force has purchased.

Five manufacturers: three European and two American, are competing for the contract in question, which involves the sale of some 25 aircraft to Iberia. The American companies are Boeing and McDonnell Douglas, while the European firms are British Aerospace, the Dutch Fokker and the European consortium Airbus Industry, with English, French, German and Spanish participation, the latter through The Aeronautical Construction Enterprise (CASA), with approximately 5 percent interest.

Renewing the Fleet

At the present time, Iberia has a fleet of 85 planes. Six of these are the Boeing-747 Jumbo jets, with an average age of 3.2 years; eight DC-10's, with an average age of 8.3 years; six Airbus-300B's, 2.7 years old 35 Boeing 727-200's with an average age of 9.5 years; and finally, 30 DC-9's, the oldest, with an average age of 14.5 years.

In principle, as part of its plans to renew the fleet, Iberia deemed it of prime importance to replace its DC-9's with other models that would make it competitive on both the national and international markets. The DC-9 is a short- and medium-range aircraft whose first prototype flew on 25 February 1965. It can carry between 100 and 110 passengers, although some of the more modern versions have a larger capacity. Iberia would like to replace these aircraft with others having the same characteristics with respect to range of action and capacity, but that consume less fuel. The DC-9, an aircraft designed when there were no energy problems, presents the specific problem of high fuel consumption, despite modifications and the fact that it has only two engines. This reduces profits.

There are now on the market at least four different aircraft that present suitable features for replacing the DC-9: They have a capacity of about 100 passengers, more or less, acceptable fuel consumption and a short and medium range of action. These aircraft are the British Aerospace 146-300, the Dutch Fokker-100, the American Boeing 737-200 and the American MD-87, a new version of the DC-9. There are three more with a little greater capacity and also a greater range: the 300 version of the Boeing 737, the MD-80 and the Airbus Airbus 320. However, the latter is still not on the market and estimates indicate that it could begin to fly at the end of this decade or in the early 1990's.

Iberia has not announced what model it prefers and everything seems to indicate that it will not do so until it finally comes time to sign the contract. In addition, this purchase must be authorized and confirmed by the National Institute of Industry (INI), the public holding company that controls the majority participation in the company, with over 95 percent of the shares.

Political Decision

According to all sources consulted by this weekly, the decision on the purchase will be a political one that may not respect the strictly technical and commercial plans of Iberia. This would not be the first time that such a thing has occurred, since the purchase of the current Airbus-300's which the Spanish company has was the fruit of a political decision that deemed it fitting to support the operation, among other reasons, because CASA, another enterprise under the INI, participated in its manufacture. Iberia now has problems in making an aircraft having the features of the Airbus-300 profitable, for it has a large capacity -- over 250 passengers -- and a short and medium range of operation.

It would also appear that the Airbus option has the greatest possibility of being chosen. To CASA's participation in its construction, one has to add the fact of the negotiations with the European Economic Community and the interest of the Spanish delegates in grouping many of the issues being negotiated in single packages. In one of these packages, the purchase of new Airbuses could be the complement of other actions or measures in other fields. Furthermore, following the purchase of 72 F-18 A's from the American McDonnell Douglas Corporation, going against the European Tornado option, Spanish authorities are now said to be inclined toward a European solution, especially when one realizes that the Americans refused to buy the Aviocar made by CASA and decided on the Sherpa -- $1 million more expensive -- made by British Aerospace, a company that also wants to sell Iberia its five-engine BA 146-300. In addition, the purchase of new Airbuses, according to the manufacturer, would mean the continuation of or an increase in current jobs in the Aeronautic Construction Company, an argument used by certain trade union leaders. Everything would seem to point to the Spanish Government's forcing Iberia to buy new aircraft manufactured by the Airbus Industry.

What has already begun, with a virulence that will soon be public knowledge, is the commercial war between possible vendors. If in the purchase of the F-18 A's in the FACA [Future Attack Fighter Aircraft] program, there were numerous attempts to influence the decision, with high commissions for the middlemen, the different staffs involved in the issue are already hard at work.

For example, Airbus Industry presents its bid at the headquarters of the National Institute of Industry, which might, at first glance, appear to be institutional support since Iberia is under the INI. British Aerospace has launched a major publicity campaign and organized a trip for newsmen in the BA-146-300 a day after the presentation of the Airbus bid. Boeing plans to organize a visit to its central headquarters in Seattle, on the American Pacific Coast, in order to describe the excellent features of its aircraft. Fokker and McDonnell are planning similar action, all this without forgetting other more important influence, such as contacting important officials close to specific government circles with decision-making capabilities. There are even rumors that a well-known person from the Spanish nobility might be involved in the issue.

Price and Time

Nevertheless, despite the pressure, there is one important technical aspect, which is time. Commercially speaking, the replacement of the DC-9's of Iberia should begin in 1987 in order to gradually phase out the entire fleet and then continue with the replacement of the Boeing 727's. The Airbus Industry bid does not provide for immediate replacement of the Iberia's DC-9's, which have performed so well. The European consortium has made an overall offer that consists in having Iberia maintain its fleet of DC-9's, considering that it could operate for 8 or 9 more years, especially if, according to its argument, one realizes that the spare parts, which are usually very expensive, were purchased at a low price, basically because of the exchange rate of the peseta compared with the dollar. Airbus Industry proposes to delay replacing the fleet because it does not yet have the necessary plane and needs time to have it ready. It proposes beginning to replace the Boeing 727's and the DC-10's by the long-range Airbus 310 and the Airbus 300, which will be the most modern plane in the world. Later, when the Airbus 320 is operative, renewal of the DC-9 fleet will begin with that plane or another deriving from it, although by that time, the DC-9's of Iberia would be over 20 or 25 years old.

Iberia's problem is that it needs a new plane with 10 or 110 seats by 1987. The Airbus offer seems good, but it might come too late. Boeing and McDonnell Douglas, with its 737's and DC-87's respectively, could be the ideal solutions, especially when one considers that it is a matter of continuing with practically identical models, although improved, of the ones existing and it would not be necessary to retrain pilots or modify maintenance systems. The British proposal of the BA 146-300 does not seem to have the support of anyone. The Dutch, with their Fokker 100, having already made their offer, have the enormous advantage that their plane would cost $13 million each, compared with $20 million or $22 million for any other model of its competency. Furthermore, they would have a suitable aircraft at the right time, since delivery could begin in 1987.

European Bid

In spite of everything, according to all sources in the sector consulted by this weekly, with the exception of the manufacturers -- all say that their model is the best -- agree that on this occasion, Spain should decide on a European model. It will be a basically political decision in which the previous purchase of

American aircraft for the air force will have played a part, as well as the fact that the United States did not decide to buy the Spanish Aviocar and preferred the Sherpa, which is made by British Aerospace, now trying to promote its commercial aircraft in Spain. Nor does the Dutch Fokker, despite its magnificent price at first glance, seem to have much chance among the competition. Consequently, only the Airbus solution is left. It will be necessary to wait several years for it, since the models it offers and that would suit Iberia are still in the project phase.

This possibility would also agree with the view of specific experts on the matter and with the policy of fleets which are now followed by some of the main airline companies in the world, such as American Airlines or Trans World Airways (TWA). It would be a matter of maintaining the current DC-9's as long as possible and beginning replacement with the Boeing 727's, which, along with their greater capacity, combine the fact that the three engines consume much more fuel. The same experts see some points against replacing the DC-9's rapidly. "A great deal of money is involved in these contracts," they say. "And the lobbies have begun to go to work. You cannot forget that the commissions are very juicy."

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COMPUTERS

BACKGROUND, STRUCTURE, FUNCTIONING OF ESPRIT PROGRAM

Paris DEFENSE NATIONALE in French Feb 85 pp 7-32

[Article by Andre Danzin, president of the French Association for the Development of Systems Analysis: "ESPRIT and the Technological Vulnerability of the European Community"]

> [Excerpts] At a time when computers are a fad--maybe too much of a fad, since some could see it as the birth of a "computer myth"--newspapers informed us that the European Community Commission was launching the ESPRIT program. What is it, and what can we expect from it? Mr Andre Danzin, president of the French Association for the Development of Systems Analysis, consultant of the European communities for this program, is answering these questions in the article below, which is very complete and quite clear.

ESPRIT, What Is It All About?

ESPRIT can be deciphered as "European Strategic Program for Research in Information Technology." This offspring of the European Community Commission was declared viable by the Council of ministers of research and industry, held under French chairmanship on 28 February 1984, which endowed it with a budget of 750 million ECUs [European currency units] for the 5-year period 1984-1988.

A decision was made to concentrate efforts on three specific fields of generic technologies:

- microelectronics
- software technology
- artificial intelligence and expert systems (advanced information processing)

and two fields of application:

- office systems and
- flexible workshops and robotics (computer integrated manufacturing).

In addition, it was decided to make a sixth effort through the creation of a data transfer network for European laboratories, called the "exchange information system."

The Rule of the Game

ESPRIT is therefore a structured research program midway between basic research and development, and covering a number of critical data-processing fields. This program is funded by the Community Commission to the extent of 50 percent of all expenditures, with beneficiaries paying for the rest as a token of their interest and an assurance of their commitment to a process of industrial and commercial success. Under no circumstances does ESPRIT purport to be a system of subsidies for difficult or desperate causes.

The usual criteria concerning the technical quality of proposals and the chances of success linked to the competence of those who will carry them out are complemented by two other requirements which constitute the singularity of the program: research must be carried out by several teams working in several states of the Community; efforts must involve an association of basic research resources and their object must be new applications of technologies.

The characteristic of ESPRIT is therefore its intra-European and intersectorial character. The goal is thus to achieve an evolution of cooperation structures between public university laboratories, specialized private industry and users, so as to tighten the weaker links in the "innovation chain" and the trend is to carry out these types of cooperation simultaneously beyond state borders, within the continental dimension.

The impetus provided will extend well past the 12 large companies associated to the "round table." ESPRIT aims at invigorating the whole European scientific and technical community, and particularly the academic world, nonprofit study and research associations and public research means, with a very keen interest in small and mid-size firms (PME).

To draw an equitable line between the "share of large companies" and that of "small companies"--these terms of large and small referring only to company size and implying no judgment of value on the qualitative elements of their innovation power--it was decided that about 75 percent of the credits would be allocated to contracts of strategic import of more immediate interest to the 12. These contracts are called "A-type contracts" as opposed to "B-type contracts" reserved for innovations of a lesser scope, more imaginative and therefore more of a venture, such as could be proposed by smaller teams marked by originality. Even then, we should point out that A-type contracts must include ties with partners selected among public laboratories and small or mid-size firms. Overall, about half the credits should be used as an incentive to creative will through a capillarity effect on small and mid-size actors, while the other half would be used to promote growth of the arterial tissue of the 12 larger companies. Of course, there is nothing to prevent regroupings of small or mid-size companies to reresent A-type contracts, and the 12 are allowed to compete for B-type contracts.

Implementation of ESPRIT

The experiment has already started well enough to enable us to deduce its course. A first stage, the so-called "pilot project" stage, was started already in 1983 with a budget of 11.5 million ECUs from the commission. Since this represents only half of the funding, the first stage therefore involves the appreciable total of 23 million ECUs. The invitation to submit proposals of February 1983 was a complete success, demonstrating that asking European manufacturers to set up intersectorial and intracommunity projects was not utopian. The proposals far exceeded the funds available, by a factor of about 5, justifying broader ambitions. The difficult task of selecting contractors was soon completed, without raising any objections worth mentioning. The first contracts, signed already in October 1983, led to results that were initially presented at the "ESPRIT Technical Week" organized in Brussels in September 1984 and attended by a large audience of specialists. These results are encouraging.

To fulfill its responsibilities, the Commission had the merit of innovating with respect to organization. It created a "task force for information technology" which acts like a specialized agency endowed with large autonomy. The task force is headed by a general director, Mr Michel Carpentier. It is supervised by the Commission's DGIII [expansion unknown]; it consists of a core of prominent specialists in the field and is designed to be light, flexible and responsible, neither bureaucratic nor technocratic. Each critical stage--preparing the annual "work plan," writing invitations to submit proposals, examining the proposals received from applicants for contracts, follow-up--is a period of hectic activity which is met by calling on outside experts taken from within the scientific and technical community of the 10 EEC member countries. This explains why the task force, as a core, can ambition to remain at the same time hard in exercising control, flexible in adapting to technical changes, and small so as to retain its homogeneity and avoid being lured into a Parkinson-type growth.

In 1984, the task force demonstrated its dynamism. Late in February, it saw its "1984 work plan" approved by the Council of ministers, and it was authorized to signed contracts for an amount of 207 million ECUs. It immediately sent out invitations to submit proposals. It spent July and August studying and classifying 441 proposals, on which over 50 experts were working.* In September, it selected 110 contractors representing about 400 facilities in the 10 countries of the Community, and in most cases these formed groups of 4, 5 or 6 rather than just 2 partners. In October and November, all parties were asked to sign the contracts which were then ready to be carried out. Who would still dare to say that the Community Commission is a lethargic bureaucracy incapable of any reaction? Here, as in other circumstances, when the "politicians" give them the means to try and win a wager when a major challenge presents itself, international officials can give an example of enterprising spirit.

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* The very definition of the program was the result of the cooperation of over 400 experts.

Does ESPRIT Measure Up to the Challenges?

When the ESPRIT program was studied, the overall environment of industrial operations as far as information technologies in the EEC were concerned could be summarized as follows:

1) Sudden increase in the burden placed by electronics, data processing and telecommunications on the balance of trade of the 10 countries. Although the export-import trade balance still showed a small surplus in 1979, it had become negative already in 1980 and was heading for a deficit of 10 to 12 billion ECUs for each of the years 1985 to 1987.

2) Extremely serious job losses, as Europe suffered from tragic under-employment. Based on direct and indirect effects, various sources estimated in 1982 that 2 to 4 million jobs had been lost as a result of an inability to compete in information technology.

3) Threats of technological dependence, in particular in the fields of microelectronics, certain microwave devices (involving in particular the capability to design weapon systems) and certain software.

4) Generalized lag behind the United States and Japan in transforming industries, services and education, due to the excessively slow introduction of the applications of information technologies.

This situation, which was critical for the European economic system as a whole, had to be faced taking into account that Japan was announcing a revival of its ambitions with the fifth-generation computer program. We can understand why, in spite of budget problems, the decision of the EEC member countries was a positive one. But will ESPRIT be enough to reverse the trend, even if it is continued at the present rate for 10 years, as planned?

ESPRIT in the Context of Worldwide R&D Efforts in Information Technologies

The first judgment we must make concerns the level of ESPRIT compared with the worldwide research and development effort being made in the field of information technologies. In 1983, considering only countries with a market economy, i.e. excluding the Soviet space and China, overall sales in information technologies, including in the broader sense electronics, data processing and telecommunications, amounted to U.S.$ 330 billion. During that year, the research and development effort that accompanied this production amounted to about $36 billion (i.e. 11 percent) distributed approximately as shown in Table 1.

The funding of ESPRIT by the Community Commission--750 million ECUs over 5 years, i.e. an average of $135 million per year*--therefore represents an intervention level of about 4 per thousand compared with the effort made wordlwide. Compared with IBM alone, whose total research and development expenditures are said to be close to $2 billion, ESPRIT represents only

* The U.S. dollar here is assumed to be worth FF 7.65 (1983).

Table 1. Information Technologies: R&D Efforts in Countries With a Market Economy in 1983

Countries	$ Billion
United States	18.5 to 23
Japan	6 to 7
EEC	10 to 13
(France)	(about 2.2)
Total	about 36

Note: Figures differ according to sources; the values indicated are the extreme values provided by various sources.

7 percent. We must keep these orders of magnitude in mind. To some, they will seem enormous. If they are frightening, we should not hesitate to compare them with the amounts spent by the Europeans to ensure the survival of some ill-adapted farms and industries: what is lacking is not yet money, but the will to allocate resources to prepare the future rather than devoting them to prolong a past that is doomed anyhow.

ESPRIT in the Overall Precompetitive Research Effort

However, an important correction must be made in the above figures concerning ESPRIT, for the program covers only precompetitive research, which represents about 10 percent of the total research and development effort. After this correction, we can see that, in the domain that is strictly its own, ESPRIT does not account for 4 per thousand, but for 4 percent, which is a significant and satisfactory level of intervention. What must be taken care of, therefore, is the rest; the medicine suggested seems likely to be effective on the segment of the innovation stage considered, i.e. precompetitive research, but it will in no way correct recognized deficiencies as far as basic research and industrialization of research results are concerned.

However, even in precompetitive research, i.e. acquisition of knowledge on generic technologies, we have cause for concern. Indeed, since ESPRIT was in gestation, the Reagan administration has renewed its armament effort and certain programs of the Department of Defense (DOD) curiously coincide with the technical fields to which the ESPRIT promoters decided to give priority. Table 2 gives the order of magnitude of the EEC and DOD programs for similar subjects.

Considering that European manufacturers are contributing an amount equal to the community funding, we can say that the volumes of efforts are comparable. But that is precisely where there is a huge difference. The U.S. Department of Defense does not require any financial participation from its contractors. U.S. private companies receiving contracts can therefore use their self-financing potential--which as a whole is far greater than that of the Europeans--to achieve other goals. Surplusses can thus be allocated to the fundamental mechanism of evolution of the U.S. economy

Table 2. Compared Annual Resources of ESPRIT Allocations and DOD Programs (1 dollar = 1 ECU), in Millions of Dollars With a 10-Percent Approximation

Types of Generic Technology	ESPRIT	DOD
Microelectronics	40	120[1]
Software Technology	35	100[2]
Advanced Information Processing	35	90[3]

(1) VHSIC [very high speed integrated circuit] Program: 7 years, $500-700 million. and AsGa program: 5 years, $100 million.
(2) STAR [expansion unknown] Program started in 1976, constantly increasing its resources and ambitions.
(3) Strategic Super-Computing Program.

as a whole, the mechanism transferring to new civilian applications the discoveries made during defense research and development.

ESPRIT as a Catalyst for Intra-European Research Cooperation. In Time or Too Late?

We need not conceal the fact that one of the sources of inspiration of ESPRIT was the MITI.* Indeed, the MITI was able to convince Japanese industrial groups, which otherwise fiercely compete with one another, to pool their efforts in certain fields of scientific and technical research. In its rule of the game, ESPRIT introduced the necessary condition of an intersectorial and intra-European effort, and it should therefore act as a powerful catalyst in the creation of cooperative structures.

Apart from the partnerships set up to obtain ESPRIT contracts, several signs are there to show that catalysis is working on cooperation structures:

- An English-speaking laboratory under a French general director was created in Munich to do research on artificial intelligence and expert systems (Siemens, Bull, ICL [International Computers Ltd.]). Late in 1983.

- The 12 major European groups made public their agreement to adopt common technical standards and to participate jointly in standardization policies. April 1984.

- A preliminary program on telecommunications was developed by representatives of public monopolies and manufacturers. Year 1984.

ESPRIT therefore initiated a trend toward the creation and development of cooperation within the EEC. The question is whether this trend will go far enough or whether it will be disturbed or destroyed under the influence of

* MITI: Minister of International Trade and Industry. Already mentioned in Jean Esmein's article: "Large National R&D Programs in Japan," DEFENSE NATIONALE, January 1985.

the alliances made between European and foreign companies. These alliances may be necessary to conquer a part of the U.S. market, where tremendous business can sometimes be expected, especially due to the overvaluation of the U.S. currency, but where it is difficult to succeed without local support. These alliances can also take the form of a take-over of European industrial and commercial operations by U.S. and Japanese multinational companies. The price of the dollar and the inadequate stock-exchange capitalization of European companies are working in favor of this loss of ownership of their own market by the Europeans. We should wait before judging, but it is undeniable that the offensive of U.S. giants--AT&T, IBM, ITT, etc.--in Europe, as an expression of their competition worlwide, will have a considerable impact on the future of industries in the 10--and soon 12--countries of the Community.

Curiously enough, while the Brussels Commission was working on a policy of incentives to cooperative research among European competitors, U.S. companies were forging ahead in the same direction, but on an incomparably more dense, more vigorous and more active scale of implementation. In the case of Europe, we can speak of a reversal of practice: Europeans have always looked for collaboration on research, but they used to find it on other continents. For the United States, the champions of competition and industrial property, this is truly a reversal of philosophy.

Thus, in the race to acquire knowledge in generic technologies, i.e. technologies forming the basis of families of technological evolution, ESPRIT should not be analyzed as an original decision, but as a parallel response to the new rules of the game inaugurated by Japan and followed by the Americans. Success or failure is contained in this question: to what extent do the managers of European companies and their staffs understand the importance of their personal commitments in building up intra-European cooperation? Basically, do they see ESPRIT as an opportunity, a chance to adopt a modernistic philosophy, or just as another source of subsidies well suited to feed their definitive inability to become truly competitive? Only the future will tell.

ESPRIT in the Turmoil of Telecommunications Deregulation

We cannot describe here, even in their outlines, the origins, means and consequences of the phenomenon which, in Anglo-Saxon countries, is called telecommunications "deregulation," translated into French as "dereglementation." The decision was made by President Reagan's administration during his first mandate. It amounts to breaking the de facto monopoly that had been constituted in favor of AT&T. At first, this decision was viewed by many information technology manufacturers, as well as by major users of the telephone, telex and data transmissions, as a potential source of failures and anarchy in an essential field that constitutes the nervous system of American society. After three years, the actors are now changing their mind. The operation is viewed as a chance to revive initiative as far as new telecommunications-related services are concerned, as a source of reduction of some tariffs, as a takeoff toward new developments to which small and mid-size companies can have access. Problems are also emerging. Some will have to make

sacrifices, especially among users who used to benefit from the standardization of tariffs and may well, tomorrow, have to pay the price of being marginal.

Anyhow, we cannot be wrong if we say that what was felt as a blind roller in the United States will break over Europe as a tidal wave. To give just one example, under the protection of national monopolies, 9 European companies are sharing a market representing about 25 percent of the world volume. Opposite, four multinational companies, three of them American (AT&T, IBM, ITT) and one Japanese (NEC), are about to share among themselves 60 percent of the free-world market. This situation is reminiscent of that of steelmaking and is fraught with threats of restructurings just as serious socially and financially, with the basic difference, however, that steelmaking was a declining market while information technologies are at stake in an extraordinarily active climate of development.

In principle, ESPRIT has nothing to do with telecommunications deregulation, since it covers precompetitive research in the fields of microelectronics and data processing. But the ground on which ESPRIT operates is entirely related to the perturbations that telecommunications are about to experience. The matter is serious enough to deserve priority rank among the concerns of the Brussels Commission, where many studies on the subject are now in progress. The complexity of the problem is increased, but that was unavoidable, by the opposite trends emerging within governments and union forces. As is known, Mrs Thatcher took up a leading position, following the U.S. model and reselling on the stock exchange the shares of one of the companies issued from the Post Office monopoly, and which had been nationalized until now. On the continent, within the EEC, people are wondering. Beyond Europe, Japan appears inclined to take an open attitude, but at the same time it is taking all necessary measures to retain control of all operations on its territory, while showing itself quite eager to take advantage of the opportunity to penetrate foreign markets. These trends are normal in foreign competition; they will be extensive and it does not seem that they can be left to themselves without great danger. We must intervene through an adequate strategy, for European industries are now much the weakest and they may well bear the brunt of redistributions of the international division of labor, which will be decided on the basis of positions in telecommunications.

Of course, these will be financial and stock exchange battles. Technical battles, too, especially in the fields of space, optical cabling, microelectronics and software.

ESPRIT and Major Economic and Political Forces

All that was just said conjures a picture of mobile warfare. The development of information technologies is taking place as a seism capable of reshaping the geotechnical image of the world. It is right now and during the next 10 or 20 years that the "Himalayas" of technological development and major depressions will appear. Can we analyze the forces in presence? Where are they? How do they express themselves? Can they be directed, or are we dealing with an uncontrollable evolution, with mankind recognizing

that it cannot act upon itself any more than upon the continental drift or solar activity? Regulation forces can be classified into four major families: the market, multinational companies, governments, cultural patterns of behavior.

Market Forces

Corporate wealth is the result of a plebiscite by customers. If customers are many, rich and ready to pay the price of an innovation that interests them, development will experience the phenomenon of "creative destruction" described by Schumpeter. If customers are lethargic, or excessively divided by tight restrictions on the freedom of exchanges, no amplification effect will take place; the "resonance filter" will not act as an "invisible hand."

The U.S. market is a pioneer because of its size, its diversity and the spirit of enterprise of potential customers as well as the initiative of inventors. The Japanese market, both immense and homogeneous, reacts as a sounding board and is used as a springboard to conquer international positions. The European market is fragmented by national particularism; as a result, it is deaf to resonance and does not nourish the pioneering spirit. If nothing is done to take advantage of the fact that the community market still represents close to 25 percent of the world market for information technologies, if everyone strives to protect its national champions in an economic space which, at best, does not exceed 6 percent of the overall market and has already been partly conquered by foreign multinational companies, then Europe will have to give up any ambition in the race to world leadership. Market forces are far more powerful than ESPRIT, no matter what the ambitions or successes of this program may be.

It is the market, its ability to react, its solvency and its scope that modeled the geotechnical positions of the various geographical zones. If we take as an index of development in information the following ratio:

$$\frac{\text{Percent of information technologies in world production}}{\text{Percent of population in world population}}$$

we obtain the following classification for 1983:

- United States 8
- Japan 6
- Western Europe. 2.5
- USSR. . . . . 1 (approximately)
- Rest of the world 0.15

For France, the index is 3.7. These figures show that Europe does not yet know whether it will remain at the evolution stage of industrial society or whether, like the Pacific zone, it will switch over to the "civilization of communication."

The political answer is obviously the actual opening of the Common Market to intra-European competition, especially in the case of public contracts which

represent 17 percent of the gross industrial product and are of far greater importance in advanced technologies. But, apart from speeches to that effect, when will the necessary measures actually be taken?

The Regulating Power of Multinational Companies

Of course, the market is not the only force regulating commercial positions. Other power relations play a part. Actually, especially in the case of sophisticated products as varied as computers, navigation radars or transmission systems, the client does not buy a product, but a service. When the supplier delivers the equipment, he also provides instructions for installation and use, sometimes even a veritable user's training school; he sets up financial packages for renting or leasing; he provides maintenance and he supplies certain consumable products; as time goes by, he suggests improvements, especially in the case of software which, like Russian dolls, will fit inside one another. Thus, lasting ties are formed between the seller and the buyer, and it is not in the interest of either of the two parties to break them in a fit of temper or because another product is more tempting. These constraints of interdependence are far from fitting in with the scenario of reciprocal freedom proposed by theoreticians of the free market economy. They constitute strong interactions based on which stable and durable commercial empires are built.

Price and performance are also linked to production volume, as total cost prices include considerable amounts for research-development-demonstration, computer-aided design and manufacture (CAD/CAM), depreciation of special tools used for production or performance tests, basic software. Because these initial costs are fixed, the unit price is determined by the denominator, i.e. the quantity of equipment sold. This iron law of mass production makes it a necessity to conquer an appreciable part of the world market, which is the only yardstick of competition. For that reason, whenever there are no protective political provisions--defense equipment is a good example of such an exception--the only structure that can be viable in the long run is that of multinational companies. In fact, major operational models and standards are set by very powerful international groups. Many small and mid-size companies are operating in their wake; they use appropriate application software to deal with local situations, or are suppliers to the large groups and more or less assisted. Of course, independently of large companies, there also pioneers whose initiatives, especially in the United States, are milestones on the road to new objectives. But, after a while, either they, too, achieve multinational status, or they are absorbed by the powerful groups, or, after a short period of prosperity, their ideas are taken over by their competitors who are better equipped for mass distribution.

The problem for the EEC is that there is no reciprocity between the potential of multinational companies of U.S. or Japanese origin and that of European companies. Table 3 shows to what extent the French market already belongs to only a minority of companies of French origin, and what a second-rate part large companies of the so-called "Common" Market are playing.

The situation in Japan offers quite exactly the reverse picture of a market that has remained nearly impervious to outside influences. In the United States, 85 percent of the domestic market are supplied by national industries. Most of the remaining 15 percent is supplied by imports, especially from the Far East. In 1983, Western European supplies to the U.S. market did not exceed 4 percent of the total volume of electronic goods consumed, and only one European company, Philips, held a position somewhat in excess of 1 percent.

The conclusion is that it is becoming necessary to review the European philosophy with respect to industrial agreements, which should be vigorously promoted instead of being hindered by anti-trust type regulations, and that fiscal measures must be taken to encourage multinational companies of non-European origin to develop research laboratories and product design departments in Europe.

It would be a mistake to fight the phenomenon of multinationality. In a cabled planet dominated by interdependences, the organization of multinational companies is an answer--of a biological nature--to the thrust of forces of universality. It is the counterpart of the situation described by Daniel Bell, according to whom the governments of Nation-States have become too big for small things and too small for big things.

Table 3. 1983 Coverage of the French Domestic Consumption of Electronic, Data-Processing and Telecommunication Goods; Breakdown by Geographic Origin of Imports or Companies Operating Industrial Facilities in France.*

Origin or Control	Percent	Type of Main Operations
France		Production in France by French companies (however, part of the components is imported).
United States	22	Imports and products manufactured on French soil.
Japan	7	Mostly imports.
West Germany	7	Predominantly imports; a few French products manufactured by subsidiaries of German companies.
Netherlands	6	Products essentially manufactured on French soil by Philips.
Other countries, including United Kingdom, Italy, Sweden and Southeast Asia	10	Mostly imports

* Analysis involving a domestic market of $17.5 billion.
Source: French Telecommunications and Electronics Council, New York.

Government Policies

European governments thought at a rather early stage of intervening to lead the game: France already in 1964-1965, when Bull had its problems; Great-Britain around the same time, when ICL was formed; Germany a little later, to support AEG-Telefunken. During subsequent years, considerable aids were granted by the three governments to their research systems and their manufacturers. The object of this article is not to describe all episodes of these ventures, most of which were rather unfortunate, but we can summarize in three sentences the reasons of the failures experienced:

- the scale of means required was grossly underestimated, in particular because of the prevailing mistaken idea that a country's territory provided an adequate springboard to success;

- philosophies of action, structures, men and alliances suffered from instability, and uncertainty prevailed as to financing, due to the fact that national budgets are annual;

- a large proportion of customers gave their preference to solutions originating in the United States, and this obstacle to endogenous developments was compounded by the incentives granted by the regions for the establishment of foreign multinational subsidiaries.

Failures did not discourage the governments' determination to intervene and, in the past few years, the ambitions and means of programs everywhere have tended to increase. This accounts for the size of the overall European research and development effort, estimated at 50 or 60 percent of the U.S. effort. The motivations of governments are no longer based on considerations of independence and defense autonomy alone; as we shall see now, they are also economic, social and cultural.

ESPRIT can be the keystone of the efforts of EEC member countries by helping them to build up their complementarities. Then, the scale for a possible success shall have been found. This is one of the best-founded hopes that accompany this community program. We can indeed assume that the lesson from past experience has been drawn and that no one can contemplate succeeding in the splendid isolation of a national egoism that would ignore its own best interest.

However, continuity is the necessary condition. Nothing will be achieved without much patience and in the turmoil of "stop-and-go" policies which may result from the evolution of the economic crisis. This is why it would be advisable to devise an assurance of continuity, that would probably have to be based on appropriate fiscal provisions.

Intellectual and Cultural Background

Conditions of intellectual and cultural environment play about the same part in economic and social development as what doctors call "diathesis" in receptivity or resistance to diseases.

It has become fashionable today to say that the modernization of a country depends on the extent to which it uses computers. This idea is sometimes carried to the point of caricature, so that some might believe that if all Europeans knew how to use microprocessors, competitiveness would be regained and the crisis overcome. At the other extreme, fears are expressed concerning the dangers of data processing, that will reduce liberties and gobble up jobs. There is no such introspection in the United States, where situations are created without preliminary psychosociological analyses, nor in Japan, which quite openly displays its glorious calling to show mankind the way to the "civilization of communication." We certainly cannot blame the Europeans for their humanistic concern about the impact of new technologies; the greatness of this social value deserves respect. But we must recognize that, while we are hesitant, the others are going ahead without entertaining any doubts. And if they win, their victory will prevail over any moral consideration. Will ESPRIT make it possible to change this climate and still respect the cultural reflexes of old Europe? In itself, it is a significant sign of determination to recover, which could provide a more positive component to the psychological climate.

If we take a closer look at predispositions to accept new technologies and make good use of them, we discover another cause for concern, i.e. the failure of the school systems of nearly all 10 EEC countries. Analyses made around and on the occasion of the launching of ESPRIT have brought to light the serious deficiencies of European education, in particular at secondary and higher level. There is no doubt that the quality of the "human resource" is determined in the schools; job skills and intellectual and cultural abilities will decide of the future position of our continent in the severe competition it must face. For the moment, ESPRIT will find the highly specialized experts needed to implement it. But its success will generate far greater subsequent additional needs to develop the precompetitive research that will have to bear fruit. It is right now that we must provide the training programs corresponding to this probable demand. The problem is still far more formidable when it comes to training the users of data processing, office systems and robotics. Indeed, it is estimated that in 5 to 10 years close to two thirds of all jobs will be directly or indirectly linked to the correct use of data-processing technologies.

Conclusion: ESPRIT and the Stakes of Civilization

The launching of the ESPRIT program, and all that surrounds it, must be placed in the perspective of the current mutation of civilization, of which the present crisis is a manifestation much more than the effect of a transient economic depression.

Man has experienced a first stage of slow development, that of hunting and gathering, during which his energy and his time were essentially devoted to satisfying his most basic survival needs. The transition to the civilization of agriculture and trades enabled him to go beyond that and to begin answering the aesthetic, intellectual and religious aspirations that were in him. The acquisition of new knowledge and the improvement of means of communication and information-memorization, especially through printing, enabled mankind to reach the industrial age. Thus, new economic surpluses became

available. These surpluses were invested to meet several goals: aspirations to safety, comfort and health on the one hand; desire for knowledge on the other hand, which thus led to the huge development of science and its applications. With the results obtained in this movement, we are entering a fourth stage of mankind's history. This new era is marked by the widespread use of knowledge and by the fact that a new threshold of increasing social complexity has been crossed; depending upon the authors, it is called civilization of the information, or of communication, or of creativity. I would prefer calling it civilization of knowledge, or speaking of a relational era, for phenomena will now be dominated by interrelations between individuals and groups, more so than ever before. New surpluses will become available thanks to the prodigious productivity increases achieved by agriculture and industry. These surpluses, where they already exist, are invested, as they always were in the past, to meet the need for services that appear to answer illimited desires in human beings. There is nothing to allow us to say today that the post industrial civilization will be a civilization of underemployment. On the contrary, it seems to generate many new tasks to meet new needs, all based on information, knowledge, communication. Under this assumption, European under-employment could therefore not be explained by the consequences of the high productivity of technologies, but by a lag in implementing them, and the loss of ability to generate reconversion surpluses.

In this respect, the evolution of the situation of the manufacturing industry is quite demonstrative. The following diagram [not reproduced] shows the development of employment growth and reduction during our century, in the field preceding work preparation, in the central field of manufacturing proper, and in the subsequent field, i.e. the interface of relations with customers, which has now become very complex.

The diagram clearly shows that we are looking at two different civilizations, especially because of the nearly total disappearance of what we used to call the "working class." If Europe is lagging behind, it may be due essentially to its inadequacy in "managing" human systems of such complexity, rather than to any specific weakness in new technologies. I think we should ponder this question, which has serious implications for the future.

In itself, ESPRIT is an example of how to deal with complexity. Reduced to its subsidizing power alone, even if precompetitive research subjects were perfectly chosen, defined and treated, it would not deserve much attention. ESPRIT must be understood as a catalyst for the evolution of structures and behaviors. If this is the case, it will play its role in helping us go over from one civilization model to the next. But it is clear that, alone, it cannot be enough. As a symbol of our determination to achieve a reversal, ESPRIT deserves to be hailed as the forerunner of other decisions. If these decisions are made at the right levels and at the right time, there is every indication that Europe will remain in the leading pack, among the countries that will be the spearhead of evolution in the adventure of mankind. If ESPRIT is an excuse to do nothing else, then nothing will prevent our continent from becoming one of the dropouts in this race to progress. Instead of fulfilling its calling of helping the Third World get out of its own underdevelopment, Europe will join it in economic and social poverty.

From the European Assembly, so profoundly helpless, and from European summits, always so burdened by inadapted national egoisms, we are receiving messages of inexorable decadence. But all we have to do is immerse ourselves in the "task force for information technology" in Brussels, or visit the laboratories where ESPRIT is being carried out to restore our optimism. Everything is still possible; the worst has ceased to be the most likely; there are still in Europe men who will fight, who will be remembered as winners at the turning point of civilization where we now find ourselves.

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COMPUTERS

ALCATEL-THOMSON GIGADISC'S STRATEGY, FINANCING FOR MEMORIES

Product Strategy Outlined

Paris REVUE GENERALE DE L'ELECTRICITE in French Dec 84 p 829

[Article: "Alcatel-Thomson-Gigadisc"]

[Excerpts] This new company, a 100-percent subsidiary of Thomson Telecommunications, was created to manufacture data-processing and office-automation storage peripherals and sell them to hardware manufacturers and assemblers.

Its financial organization is of the "venture capital" type, and it associates industrial and financial partners and the State. Thomson-Telecommunications, however, retains 32 percent of the stock.

ATG [Alcatel-Thomson-Gigadisc] intends to take advantage of the expected exceptional development of this market and its position as a technological leader to achieve a very high rate of growth: it expects its sales to grow from FF 14 million in 1984 to FF 100 million in 1988-1989 (including 95 percent of export sales), and its personnel from 150 to 800 people. It is contemplating getting listed on a French or a foreign stock exchange by 1988.

ATG is orienting its market along two lines of hardware: recorders/readers and media, with three main goals: worldwide distribution (the objective is to get 15 percent of the world market); sale to original-equipment manufacturers; sale of products instead of systems.

A 10,000-m^2 plant is under construction in Toulouse. To-date, the backlog of orders represents FF 35 million (150 firm orders), and 50 clients, including 10 European distributors. The objective for 1985 is to get orders for FF 310 million (1,250 recorders-readers) through 30 distributors, including 15 in Europe, 8 in North America and 7 in the rest of the world (in particular Japan).

The Gigadisc GD 1001 is a computer peripheral using semiconductor laser technology for data storage. It is of the WOM [write-once memory] type (see Figure 1). The recording density is 33 Mbits/cm^2, i.e. over 10 times more than can be achieved with the traditional magnetic technology. The 12-inch

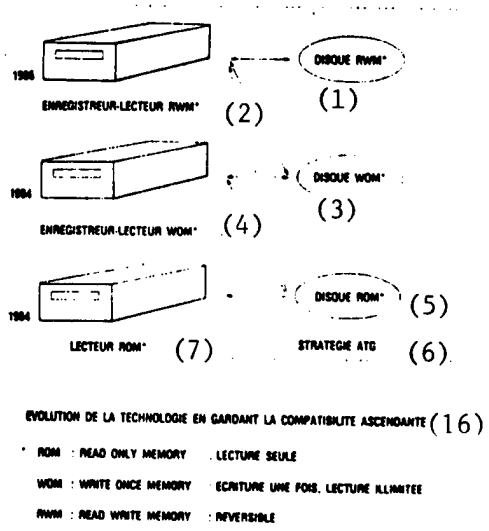

Figure 1. Master Diagram of Technological Evolution

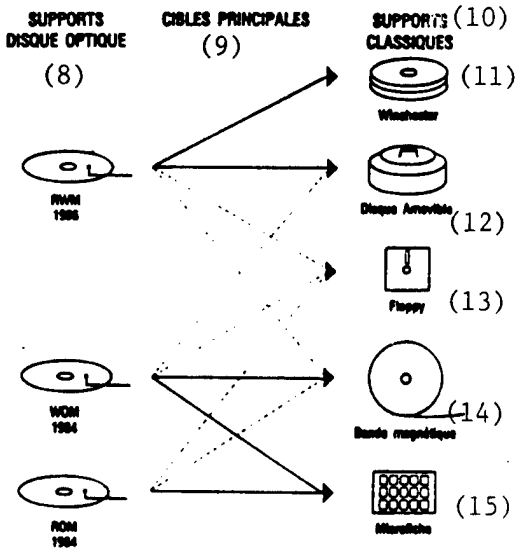

Figure 2. Evolution of the Memory Market

Key:

1. RWM disk
2. RWM recorder-reader
3. WOM disk
4. WOM recorder-reader
5. ROM disk
6. ATG strategy
7. ROM reader
8. Optical disk supports
9. Main targets
10. Traditional supports
11. Winchester disk
12. Removable disk
13. Floppy disk
14. Magnetic tape
15. Microfiche
16. Technological evolution, retaining upward compatibility

disk has a capacity of 1 billion 8-bit bytes on each face. It is sold in a cassette, which makes handling easy; it has a guaranteed lifetime of at least 10 years.

The recorder-reader includes a laser and an optical head providing direct or sequential access to sectors of 1,000 8-bit bytes. A controller can also be built into the Gigadisc unit; it manages its interface on the computer side and up to eight Gigadisc recorders-readers; a device for automatic error detection and correction is associated to it.

A morphological and technological evolution is expected to take place in the near future (Figure 1). It will preserve the compatibility of products among themselves. Since their targets do not overlap (Figure 2), new products of the RWM [read/write memory] type will not interfere with first-generation products.

Gigadisc applications have already been developed for archival-storage and edition systems in several fields:

- aerospace (archival storage of satellite-transmitted data);

- medical (archival storage of medical imagery);

- industrial (archival storage of drawings and technical files);

- databases and document banks;

- iconographic-document banks, etc.

Finally, as an indication, this hardware is priced as follows:

- the recorder-reader-controller assembly: FF 80,000;

- the disk: FF 2,500.

These prices are for quantities in excess of 100 units.

Alcatel-Thomson-Gigadisc, La Boursidiere, P.O. Box 140, 92350 Le Plessis-Robinson [France]; Telephone: (1) 632.21.71.

Financial Participation Detailed

Paris MINIS ET MICROS in French 21 Jan 85 p 24

[Article: "Gigadisc: The Financial Structure of ATG"]

[Excerpts] Projections

ATG [Alcatel-Thomson-Gigadisc] is expecting to increase its sales from FF 14 million to FF 1 billion by 1988/1989, and its personnel from 150 to 800 people. In the long run, it expects to achieve 95 percent of its sales

on export markets (50 percent in the United States, 25 percent in Europe and 20 percent in the rest of the world, including Japan). The market for the digital optic disk is divided into three segments. For the time being, the ATG product is in the mid-range, where it expects to gain 15 percent of the world market; in the low range, sales are expected to represent 8 to 10 percent of the market by 1986, and ATG expects to be the leader in mass memories already by the end of 1985.

Financing

To finance the expected growth and the investments required, ATG will need about FF 200 million over three years. This will be provided by a financial package of the "venture capital" type, the French way, which will make it possible to associate industrial and financial partners as well as the State.

The breakdown will be as follows: FF 100 million in stockholders' equity; State aids (FF 40 million from the General Directorate of Telecommunications and FF 30 in loans from the Industrial Modernization Funds); and traditional financing through long and intermediate-term loans for FF 30 million.

The initiator shareholders are Thomson Telecommunications, CIT-Alcatel and Thomson-CSF; the financial [as published] partners are Bull (5 percent) and Rhone-Poulenc Systems (2 percent). As for the financial partners, they include the General Banking Company of Belgium (11 percent), the General Banking Company, the Bank for Industrial Expansion, the Suez Financial Company, Paribas, the European Banking Company and Natio Funds Prospect. All shareholders are minority shareholders; the largest is Thomson Communications.

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THOMSON SUBSIDIARY OPENS SOFTWARE R&D CENTER IN METZ

Paris ZERO UN INFORMATIQUE HEBDO in French 14 Jan 85 p 6

[Article by Michel Barreau: "Software Packages: Thomson-Answare Is Opening a European R&D Center in Metz"]

> [Text] In February, at the Metz Technopole, Answare will officially open its production center for professional software packages. There, 50 people will develop Unix applications.

Here is a newborn that is getting a lot of attention. Godmother: Edith Cresson, minister of industry, who commends the initiative especially because it is in Lorraine. Godfather: Jean-Marie Rausch, mayor of Metz and the opposition senator the most "in the know." Parents: Alcatel-Thomson Telecommunications--the French AT&T--and Thomson-Answare (one of its subsidiaries).

Baptized, quite plainly, "European Center for the Production of Professional Software Packages," it will employ 50 people starting in February, in rented premises in the new business parc of Metz-Queuleu, southeast of the town of Metz.

250 People by 1988

In the long run, the project is ambitious: 70 to 80 people early in 1986, and 250 by 1988. As Jean-Marie Rausch indicated during the presentation of the center last week, "it is the largest of the projects whose implementation at the Technopole has been announced to-date. For our region (...) it is a significant element, even if the job creations announced do not compare with the thousands of jobs that have been eliminated elsewhere."

Through its general manager, Pierre Blondeau, Answare also confirmed that these are true job creations (not a transfer of competence from Paris to Metz), accompanied by the establishment of a software engineering workshop. The latter will be connected to the Vax 11/785 that was just installed at the Technopole data-processing resource center and is not the least of the attractions of Metz 2000 for local small and mid-size industries.

"In a first stage, development will revolve around the 68000-Unix or Pascal line," we were told by Claude Xufre, assistant general manager who has the overall responsibility of the center.

Answare	1982	1983	1984
Sales (millions of French francs)	129	176	300
Breakdown (percent)			
- consulting and engineering	98	96	63
- consumer market	0	2	10
- professional market	0	0	25
- export	2	2	2
Personnel, on December 31	720	750	950

Work under MS-DOS will start in a second stage.

The Legacy of Micromega

At the start, therefore, the goal is to produce vertical software packages for the high-end (multistation) Micromega 32 microcomputer sold by Thomson, but the people in Metz are also thinking of flat-rate contracts for certain system developments, Answare's traditional line of business.

Although it is now supported by the Micromega product line, Answare nevertheless intends to engage in an independent software package policy that would not be linked to any specific hardware or to the microcomputer market alone.

Therefore, the people in Metz will do a little bit of everything: vertical applications for microcomputers, systems software packages, courseware, horizontal tools for Thomson's line of consumer products (MO-5, TO-7, etc.) and for all, since their goal is also to provide an industrial software-package basis to European hardware manufacturers.

But, for the time being, Answare is managing two distribution networks: the "professional" network (10 agencies which have installed over 1,000 turnkey systems) and a consumer network that distributed some 100,000 program cassettes in 1984 (compared with 20,000 the previous year).

These two networks, which are now being restructured, benefited from the FF 20 million in investments made by Answare during the past two years. In particular, the distribution of consumer products, which until now was done through the Thomson network, will have to make use of new methods of modern distribution.

As for the profitability of Answare, undivulged until Thomson has approved its accounts, its managers say it is "normal" for this type of business.

The Metz 2000 Technopole

The Metz-Queuleu business parc, which opened in August 1983, was created at the initiative of the city of Metz; it specializes in telecommunications and communication systems and its goal is to gather European-level entities (companies, research or training units).

Extending over 100 hectares, it now houses 5 companies which will soon be joined by Thomson-Answare and Eurosoft (courseware development center):

- Apple (center for the translation of software into French), 10 people (30 by 1987);

- Bull-Transac (maintenance of banking systems, automatic cash dispensers and automatic banking terminals), 30 people;

- Telemecanique (development of industrial data-processing systems), 70 people;

- Hewlett-Packard (Eastern marketing division), 15 people;

- Cesame (local small to mid-size firm developing process control systems, in particular display systems), 6 people.

As far as training and research are concerned, installation of the following companies is expected: Supelec, the Image-Research Center of the French Television Company, and the Center for the Study of Communication Systems (Cescom) which is supposed to be a showcase and a datacom "gymnasium" available to small and mid-size companies and industries.

In addition, a data-processing resource center equipped with a Vax 11/785 will be accessible to all companies.

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SWEDEN'S ERICSSON: PROFITS DOWN IN 1984

Results Published

Stockholm SVENSKA DAGBLADET in Swedish 12 Mar 85 p I

[Article by Lars Erik Ohlin]

[Text] For the first time, L. M. Ericsson is publishing the results for its operating divisions. They reveal that results for the information systems division, which is responsible for nearly 32 percent of the group's total billing, were down by 454 million kronor--from a profit of 237 million kronor in 1983 to a loss of 217 million kronor in 1984--after planned depreciation.

That is one chief reason why--as predicted in the 9-month report--the consolidated results did not come up to the 1983 level, but totaled 1,569 million kronor before allocations and taxes, compared to 1,758 million kronor the year before: a drop of 189 million kronor, or 10.8 percent.

Concentration on the U.S. market, which was intensified in 1984, resulted in a reported loss for Ericsson, Inc., with the group's share totaling 353 million kronor (225 million kronor the year before).

The proposed dividend remains unchanged at 9 kronor per share. Earnings per share after tax expense are reported at 30.54 kronor (34.46 kronor the year before). Earnings net of taxes and estimated taxes due on balance sheet allocations came to 19.99 kronor per share (22.05 kronor the year before).

New orders were up by 26 percent to 33,005 million kronor (26,142 million kronor the year before), and this year they are expected to continue their good performance in all lines of business.

Consolidated billing rose by 4,134 million kronor, or 16.4 percent, to 29,378 million kronor (25,244 million the year before), meaning that it did not live up to the initial forecast of a 20-percent increase.

Increased billing in the second half of the year was also limited partly by the lack of components in most lines of business and partly by problems with the design and manufacture of new products, chiefly in the areas of information systems and radio communications. As a result of billing backlogs combined

with cost developments, the group's operating results after depreciation stood at 2,203 million kronor (2,464 million the year before). That is 261 million kronor, or 10.6 percent, less than in 1983.

The problems underlying the drop in profits are being worked on. An extensive program of corrective measures has been introduced to improve profitability, including a greater concentration of product programs and marketing efforts. Those measures, combined with efforts in all other areas, are expected to improve the group's results gradually and to have their full effect during the latter part of the year.

Consolidated Billing and Results by Operating Area

Area of business	Billing		Operating results*	
	1984	1983	1984	1983
Public telecommunications	9,718	8,491	1,930	1,653
Information systems	9,295	7,475	(217)	237
Cable	4,022	3,645	89	7
Defense	1,831	1,603	172	95
Radio communications	1,992	1,592	(32)	31
System construction	1,970	2,239	111	264
Components	1,225	933	34	60
Other activities	528	348	116	117
Less internal billing	(1,203)	(1,064)	-	-
Ericsson Group	29,378	25,244	2,203	2,464

* After planned depreciation and before financial income and costs.

Production Problems

Stockholm SVENSKA DAGBLADET in Swedish 12 Mar 85 p I

[Article by Lars-Georg Bergkvist]

[Text] "This is an interlude in our history." That is how Bjorn Svedberg, Ericsson's managing director, describes the production problems--occurring above all in Ericsson Information Systems (EIS)--which were the main reason for last year's drop in earnings.

The 9-month report, which was published in November, hit the company's stockholders like a cold shower. As a result of interruptions in production and component shortages, the group's new growth venture--office information systems--was experiencing delivery problems.

Development costs in some areas turned out to be higher than expected, and the flow of orders was increasing faster than billing. It was a classic case of expanding too quickly.

Bjorn Svedberg says: "In some areas, we had a tendency to run before proving that we had learned how to walk."

Delivery Problems

He says: "We overcommitted ourselves before we had everything ready. But perhaps we could have handled the situation anyway if component shortages had not come along to create delivery problems."

The EIS got new management last fall. Stig Larsson, the former head of RIFA, succeeded Hakan Ledin, who in turn became head of Ericsson's U.S. operations.

Bjorn Svedberg says: "We needed to introduce a different way of working--a different kind of project control with a closer connection between marketing and production.

"We have now mapped out all the problems and have started taking steps. They will have a gradual effect during 1985. But in an operation with a turnover of 10 billion kronor and 20,000 employees, it takes a little time to expand and eliminate problems at the same time, especially when a lot of redesigning also needs to be done."

Ericsson's program of corrective measures is already reflected to some extent in the results for the entire year: despite rumors in the U.S. stock market about collapsing profits, the results for the year do not indicate a new setback in comparison with the 9-month report.

Bjorn Svedberg says: "I don't know that I am sorry that we did what we did.

"If we had gone into the EIS with tougher project control at an earlier stage, we would have put a damper on much of the initiative and motivation that exist in the firm. We might have strangled many ideas that are going to pay off in the future. What we have been going through is a costly but necessary learning process.

"An important conclusion to be drawn from what happened last year is that we must definitely concentrate our operations somewhat and abandon certain marginal activities. But we are nevertheless sticking to the main strategy that we already had, which is to combine our telecommunications know-how with computer technology from Data-Saab and Facit and sell computer terminals, electronic workplaces, and complex communications systems for offices."

Better Control

Ericsson has therefore sent in people and adopted methods from the "old" telephone business to ensure better control of the new activities. Bjorn Svedberg emphasizes, however, that incentives and ideas are also needed in other parts of the group:

"We are world champions at marketing telephone exchanges to big customers such national telecommunications authorities. But the world is changing. Telephone companies are either being returned to private owners, as in Great Britain, or broken up, as in the United States. The customers--especially our own National

Telecommunications Administration--are becoming tougher and more market oriented. Our 'light cavalry' in new areas of activity has a great deal to teach our 'big' sectors when it comes to doing business with market-oriented customers."

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COMPUTERS

BRIEFS

ONERA STARTS USING CRAY-S2000--ONERA [National Office for Space Study and Research] in Chatillon-sous-Bagneux just placed in service a new high-capacity computer, a Cray-1 of the S2000 type, in the installation of which Bull also took part (Cray is a U.S. manufacturer). This extremely complex facility is operated by ONERA jointly with Aerospatiale, Dassault, SNECMA [National Aircraft-Engine Study and Manufacturing Company] and MATRA [Mechanics, Aviation and Traction Company]; it is called "Aeronautical Cray," and is remarkable by its computing power (10 to 40 Mflops [millions of floating point operations per second]), the size of its core memory (2 billion 64-bit words), its read/write rate on mass memories, and the fact that the high-performance transmission lines of the 1-Megabit/s "Transmic" network of the PTT [Post and Telecommunications Administration] are used to connect the central computer with the computing centers of the associated manufacturers (in Toulouse, Saint-Cloud, Villaroche, Les Gatines, Velizy). The French Electricity Company had to install a special 1,200-kW transformer. Applications: aerodynamics, structural computations, energetics (study of flows in turbomachines and rocket motors), etc. But there is already some talk of the installation of another Cray in Toulouse, and of the replacement of the present Cray-1 by a Cray XMP (4 to 5 times faster); pending the availability of the future French hardware of the Isis/Marianne/Marisis program. [Text] [Paris SCIENCES & AVENIR in French Feb 1985 p 18] 9294

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MICROELECTRONICS

THOMSON SC TO CEDE MOS RESEARCH TO LETI OF FRANCE

Paris ELECTRONIQUE ACTUALITES in French 21 Dec 84 pp 1, 19

[Article by JP Della Mussia]

[Text] Thomson SC [Thomson Semiconductors] and CEA/LETI [Atomic Energy Commission's Electronics and Data Processing Technology Laboratory, Grenoble] have just signed an important agreement strengthening the already existent ties between the two entities.

Under the terms of this agreement, Thomson SC will cede to LETI the bulk of the responsibility for MOS [metal oxide semiconductor research], and, reciprocally, Thomson SC will have a partial say in certain decisions to be made as to lines of semiconductor research to be followed by LETI.

This agreement appears to be advantageous to both parties:

--Thomson will gain the benefit of a research team numbering around 200 persons which to a large extent will be working directly or indirectly to satisfy its needs;

--LETI's research will now be channeled towards concrete industrial end-use objectives, which it has always held to be its vocation. (The agreement does not, however, close the door on other areas of cooperation, as stipulated in the agreement).

--The equipment manufacturers will also be able to benefit from it, since the agreement provides for the setting up of a pilot line aimed at developing prototypes of circuits in very advanced technologies that are not yet in place at Thomson.

This agreement, signed with the blessing of the governmental authorities, might appear somewhat ill-conceived, a priori, in that a public laboratory will be putting itself partly at the service of an industrial firm. But on the one hand, Thomson will be paying LETI on a pro rata basis for the services the latter will provide (in addition to a subsidy from the Government); and on the other hand, the agreement provides for possible joint ventures with other semiconductor companies. The fact is that the Government, in any

case, subsidizes Thomson SC's research and that, of all forms of subsidy, the solution that has just been adopted appears to be the most cost-effective. The LETI-Thomson ties have also now been clarified. To the best of our knowledge, throughout the world, cooperation between public laboratories and industry have never been all that remote.

Three Levels of Research

The LETI-Thomson cooperative effort will rest on three structures installed in LETI's new microelectronics building, where activity got under way in February and which is to be inaugurated in coming weeks: These structures are a research laboratory, a technological shop, and a prototype shop.

LETI's microelectronics research laboratory, which employs 130 persons, prepares the elementary techniques used in micron-scale technologies, for integrated circuits as well as for bubble and other types of memories. Its results are accessible to all interested industries in the form of license agreements.

It has a scientific program-steering committee, on which those industrialists who decide to participate in the funding of the laboratory in exchange for the right of access to its results may sit. Thomson SC is the first industrial firm to sit on this scientific committee. At this level, no exclusivity whatever is given to Thomson. This firm can only express its views on research orientations.

The technological shop, which employs 30-40 persons, assembles elementary techniques into product lines that it validates, characterizes and transfers to production.

This technological shop will carry out Thomson-AEC [Atomic Energy Commission] joint programs requested by Thomson SC and jointly funded by Thomson SC, AEC and the Government.

The agreement provides that the product lines thus developed may also be transferred to other entities, such as CNET/CNS [National Center for Telecommunications Studies' Norbert Segard Center at Grenoble], or possibly other industrial firms. Until the product lines are fully developed, Thomson will have no rights over them; however, this company will, of course, have first priority to their acquisition.

The prototype shop, which is staffed by personnel already in place at LETI and EFCIS [Special-Purpose Integrated Circuits Design and Manufacturing Company] (30-40 persons), receives the product lines of the joint programs. It uses these incipient product lines to fabricate prototype IC's [integrated circuits], on the one hand for Thomson SC for its own needs and those of its clients as a whole, and on the other hand for the needs of the AEC itself and of its research programs being carried out together with industrial firms. For the design of advanced circuits based on client specifications, Thomson SC will thus be the prime contractor. For the design of complex systems in which IC's are but a part of the problems to be resolved, the prime contractor will be LETI.

Funding of the prototype shop will be shared by Thomson and the AEC on a prorated basis in accordance with their respective rates of utilization. The product lines introduced will be transferred to Thomson SC once they have been "de-bugged," for production on a mass scale. They may then be ceded to other partners to resolve second-source problems.

The technological shop and prototype shop share certain joint facilities. They also have an executive director [in common], who belongs to the AEC and who, in this instance, is Mr Lazzari, who combines this role with that of running the research laboratory. The prototype shop is staffed, for the most part, by Thomson-CSF [Thomson-General Radio Company] personnel. The overall joint program, at its three levels, is defined and overseen by a joint committee consisting of four AEC members and four Thomson members.

For Thomson SC, this agreement, in addition to making avalable to it a team of 200 persons mostly for its own research needs, also signifies that the technology-transfer difficulties inevitably encountered between the research and production stages will now be minimized. Thomson SC will moreover be able now to avoid cluttering its mass-production-line facilities with difficult developmental work that can be carried out in the pilot shop.

The agreement takes into account the need for supplemental work to be done by other private and state-owned laboratories--including the LCR [Central Research Laboratory (of the Thomson-CSF group)] and the Thomson/CI [Thomson-Integrated Circuits] bipolar laboratory in particular, insofar as concerns the Thomson-CSG group--to complete the research work being undertaken.

In 1985, the technological shop will study the elements of a submicron-scale (probably 0.7-micron) product line designated HC-MOS [as published] IV, with sights set on the actualization of work on a scale smaller than 0.5 micron by 1990. The prototype shop, for its part, is scheduled to become operational by the end of 1985, with an H-CMOS III 1.2-micron technology. Its lag with respect to what is presently being done elsewhere in the world should thus not exceed a year and a few months.

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IC, COMPUTER REVENUE UP FOR SIEMENS COMPONENTS BRANCH

Paris ELECTRONIQUE ACTUALITES in French 21 Dec 84 p 20

[Article by JP Della Mussia]

[Text] Munich--Siemens-Components had a revenue of 2.4 billion DM (7.37 billion francs) during its fiscal year 1983/84 ending in October, up 26 percent over the preceding year. The company has thus turned profitable in this domain, in passive components as well as semiconductors. Concurrently, its order book grew altogether spectacularly during the same period, up 52 percent, from 2.1 billion DM to 3.2 billion DM (9.8 billion francs)!

These figures must not be compared directly with those of other semiconductor companies, since Siemens's activities were 42 percent passive components in 1983/84 (from 46 percent in 1982/83). In semiconductors alone, its revenue went from 1.02 billion DM in 1982/83 (3.15 billion francs) to 1.4 billion DM in 1983/84 (4.27 billion francs), up 37 percent. This average, however, comprises growths of 15 percent in discrete semiconductors (optoelectronic, power MOS, microwave), 100 percent in memories, and as much as 200 percent in microprocessors.

European No. 2

Like many European companies, Siemens thus had a very good 1983/84 year, with planned sales goals exceeded in the IC [integrated circuits] domain. This was owing, of course, to the recovery of worldwide demand, but also, among other things, to rises in IC prices, a strong dollar, and Siemens's judicious choice of families of products. Siemens thus remains the European No. 2 in components, behind Philips (which never discloses officially the details of its European operating results in components). Worthy of note is the fact that Siemens now employs 17,000 persons in this components activity, or 1,750 persons more than the previous year.

With a dollar rate as favorable as it has been to European companies, one might have imagined that the export segment of Siemens's revenue would have shown a sharp upturn. Actually, its export revenues went from 49 percent in 1982/83, on a total revenue of 1.9 billion DM, to 50 percent in 1983/84 on a total revenue of 2.4 billion DM, and this even though Siemens realizes a

revenue of $150 million in the United States from components, up 39 percent (essentially, it is true, in discrete components with a lesser growth rate and thanks to its production activities there, which do not benefit from a strong dollar).

Results in Europe showed a wide variation: Its revenue increased 57 percent in Great Britain, 26 percent in France, and 24 percent in Germany; these figures are not very significant, however, since, for example, Siemens has but a very minor presence so far in Great Britain. In Japan and Southeast Asia, its revenue rose 29 percent.

Its export growth looms larger, however, if one considers only its semiconductor activity: From 36 percent in 1981/82, it rose to 39 percent in 1982/83 and 44 percent in 1983/84, with a projected rise to 48 percent in 1984/85.

The company's current order book justifies, in its view, a total revenue projection of 2.9 billion DM (8.9 billion francs) for the 1984/85 period ending in October, up 21 percent over that of this past year. Its semiconductor segment is being projected to shoot up to 62 percent of total revenue (1.8 billion DM, or 5.52 billion francs) as compared to passive components revenue which is only expected to rise from 1 billion DM (3.07 billion francs) to 1.1 billion DM (3.4 billion francs).

In semiconductors, IC revenues now total 780 million DM and are expected to rise by 45 percent in 1984/85, while discrete components account for 620 million DM, with a projected growth of 13 percent over the same period.

Siemens expects that between now and 1990 the semiconductor portion of its total components revenue will attain 75 percent. Its exports in 1984/85 are expected to rise to 52 percent of total, from 50 percent this past year.

Strong Growth in Telecommunications

Siemens is being greatly favored by the change that is currently taking place in the German market, where, in particular, consumer products are experiencing a relative downturn to the benefit of the telecommunications and data processing sectors. Thus, while telecommunications and data processing accounted for but 53 percent of the company's total 1982/83 revenue of 1.9 billion DM, this figure rose to 55 percent in 1983/84, and should go to 58 percent in 1984/85. Conversely, its consumer products revenue, which still amounted to 22 percent of total in 1982/83 (down from 24 percent in 1981/82), dropped to 20 percent in 1983/84, and is expected to plunge to 17 percent in 1984/85. Its other market segments are more stable: During preceding years, measurement, instrumentation and control products have accounted for 22 percent of total revenue, and Siemens is projecting 21 percent in 1984/85. Its automotive segment, on the other hand, is expected to go from 3 percent to date to 4 percent in 1984/85, up from 70 million DM to 116 million DM (+66 percent!) over a period of 1 year. Over the next 2 years, and aside from its automotive product lines, Siemens expects its fastest growth to take place in telecommunications and data processing.

11 Percent Annual Growth Between Now and 1989

According to Siemens, the worldwide components market, aside from television tubes, should expand from $28.4 billion in 1983 to $56 billion in 1989, a growth rate of 11 percent per annum in constant dollars. This growth rate, however, comprises a very wide range of situations, depending on types of products: The market for tubes, for example, should go from $2.5 billion to $3 billion, for an annual growth rate of 3 percent; from $7.9 billion to $11 billion (+5 percent per annum) for passive components; from $4.5 billion to $6 billion (+5 percent per annum) for discrete semiconductors, but from $13.5 billion to $36 billion (+18 percent per annum) for IC's.

Strangely enough, Siemens does not expect the greatest growth to take place in Japan, but rather in the United States, between 1983 and 1986. For 1983, Siemens estimates that the Japanese market represented 31 percent of the world market versus 39 percent for the United States and 20 percent for Europe. For 1989, it sees these proportions going to 29 percent for Japan, 44 percent for the United States and 17 percent for Europe. (Siemens estimates a constant proportion of 10 percent for the rest of the world).

For the period 1984-1989, most of Siemens-Components' investments will be in the IC sector. It is recalled that a total investment of 1,400 billion DM (4.3 billion francs) has been projected for its micron- and submicron-scale program during that period (300 million DM of which are being allocated for the production of 1-Mbit RAM's at Regensburg, 500 million DM for the development of its research center in Munich, and 600 DM for the production of 4-Mbit RAM's at Regensburg), plus an outlay of 800 million DM for research and development work on its 1-Mbit and 4-Mbit RAM's. Siemens emphasizes that its agreement with Philips covers only research: It is not certain whether Philips will manufacture the 4-Mbit DRAM developed exclusively by Siemens, just as it is not certain that Siemens will manufacture the 1-Mbit SRAM developed by Philips. In Siemens' view, moreover, this operation is designed only to develop an advanced technology that will enable the development of innovative products, particularly in the domain of telecommunications. Besides, the research portion of what Siemens is calling the Megaproject is simply being added to the 15-20 percent of semiconductor revenue that Siemens regularly devotes to its research.

The second production unit of its IC plant at Villach, Austria, has just recently become operational. It produces N-MOS and C-MOS IC's in 100-mm wafers, using 1.5-micron technology.

As regards fast components, Siemens is continuing its investments in ECL [emitter coupled logic] and does not plan to go into GaAs in the medium term. Its GaAs technology is used only for hyperfrequency analog circuits.

Notably, Siemens plans to cooperate very closely with Philips in the digital TV circuits sector.

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LATTICE LOGIC OF SCOTLAND UNIQUE IN MASK DESIGN

Paris ZERO UN INFORMATIQUE HEBDO in French 21 Jan 85 p 59

[Article signed R.M.: "In Edinburgh, a Silicon Compiler"]

> [Excerpts] Major manufacturers of precision technology have one point in common: they are very small or very large; very small, for you must start somewhere, or very large, and they are then a small organization nested within a larger company.

Lattice Logic, an old grey-stone building in the prestigious business district of Edinburgh, belongs to the first type: 21 employees and sales of £320,000 by the end of the fiscal year ending in April; projections are for a staff of 40 and sales of £800,000 for the current fiscal year (April 1985).

Lattice Logic is making "silicon compilers." It may be considered as a company involved in computer-aided design using third-generation computers and producing tools for the silicon industry. It is not the only one: there is another company, called Silicon Computers, in Sunnyvale, California.

The problem that Lattice Logic was about to tackle had already been approached by Dr John Gray of the Edinburgh University, almost a next-door neighbor (as we shall see later), already even before the company was started early in 1982.

What was needed was a computer-aided engineering system that could assimilate a logic diagram, check it and transform it into a chip that would be correctly organized and operational.

It was then found that the major obstacle to chip customization was the long time required to design and produce the mask and that, since chip densities and complexity kept increasing, a cheaper solution was especially desirable.

The solution had to be capable of apprehending all the operations involved, so that the person in charge of logic design would have time to design this logic in a productive manner, and so that would become a routine operation.

This is how Chipsmith was born. At first, it covered only the technology to manufacture CMOS [complementary metal-oxide semiconductor] integrated circuits.

A Line of Software Packages

Chipsmith constitutes a complete set of programs to manufacture masks. It produces on its own all the information that is required and was designed to be flexible: it will run on computers such as the IBM 4300, the DEC Vax and the Apollo Domain. Lattice Logic is now producing a line of software products enabling engineers to work upward or downward.

Model is a compiler that enable its user to represent complex structures of standard components or components he creates. Model is looking for structure and syntax errors, just like normal compilers will check a code. This is no guarantee that the design logic will actually work. A simulator of the switching level inherent in the system checks the logic consistency.

The final result is the outline of mask manufacturing. This is where the company went farthest: it is in touch with foundries and manufacturers that can take care of transforming these sets of masks into chips.

Today, this industry serves essentially those who have a pressing need for customized chips, i.e. the defense industry.

It is probably not just a coincidence if a large contract binds Lattice Logic and Ferranti, the cradle of programmable logic networks, which needs a lot of customized chips produced at a rapid rate.

Other Models

Can such a small group hold its own considering the fast-pace of technological development?

We do not have, they say, any counterpart in Japan. Besides, Japan has not yet made any notable inroads on the market of chip customization.

And then, as we saw above, Lattice Logic is right next to the electrical engineering department of the Edinburgh University and the Wolson Institute for Research on Semiconductors and Derived Technologies. John Gray and one of his colleagues are still part-time lecturers there.

But there are other silicon compilers in Edinburgh.

Drs Peter Denyer and David Renshaw are developing a system called First. This system is one more step in another direction: it is written in Prolog. It is a test to confront logic to logic.

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MICROELECTRONICS

FRG TO FUND NEW 'MICROPERIPHERAL' PROGRAM FOR 1985 TO 1989

Munich SUEDDEUTSCHE ZEITUNG in German 21 Feb 85 p 21

[Article: "Tax Money Goes for Solar Cells and Microelectronics. Total of DM 775 Million Available from BMFT. German Industry Competitive"]

[Excerpts] Bonn (DPA/VWD)--The Federal Ministry for Research and Technology (BMFT) will support certain technical developments with additional funding programs. This ministry has made about DM 375 million available until 1989 for further developments in solar cell technology to take advantage of energy from the sun; this is to ensure that German industry remains at the forefront in terms of international competition. The main objective in this area is to further reduce the manufacturing costs for solar cells made of silicon, explained ministry experts to the press in Bonn. It was also announced that the ministry wants to begin a new DM 400 million funding program on March 1 which will be to promote 'microperipherals' (sensors and power electronics). According to the VWD, the minister of research and technology will introduce this program next week before the Frankfurt Chamber of Industry and Commerce.

Electronics Applications

According to the AP, Minister Riesenhuber of the BMFT wants to continue and intensify activities in the area of photovoltaics during the next few years despite the less than favorable outlook. DM 74 million for 1985, DM 65.5 million for 1986, DM 75 million for 1987, DM 84 million for 1988 and DM 77 million for 1989 are planned in his budget for corresponding projects which will be funded at the standard rate of about 50%.

Regarding the new funding program for 'microperipherals,' the VWD has learned from what are usually well-informed sources in Bonn that of the DM 400 million fund projected for the five-year period from 1985 to 1989, DM 200 million will go to indirect-specific funding, DM 180 million to joint research and DM 20 million to technology transfers. As those familiar with research policies in Bonn explain, the continued integration of microelectronics into machine construction and plant construction, the automotive sector, electrical household appliances and tools, as well as in environmental protection and energy savings, is also influenced to a great extent by the availability of cost-effective microelectronics-compatible sensors and state-of-the-art power components

tailored to microprocessor applications. The gap in power electronics developments between the FRG on the one hand and Japan and the U.S. on the other, particularly in the field of machine tool construction, is viewed as unacceptable by the BMFT and must be closed as quickly as possible.

40 Percent Subsidy

Due to the problems involved in joining the technology race, two phases are planned: a maximum of DM 50,000 is planned for personnel costs and external consultation in the preliminary phase. For the development phase the subsidy limit will be DM 800,000 for the development of signal preprocessing and in thick-film, thin-film and semiconductor sensor elements and DM 400,000 for the development of a microsensor using commercially available sensor elements. Personnel costs, laboratory equipment and systems, R&D subcontracts and technical consulting contracts are being subsidized. The available funding is uniform and amounts to 40 percent of the costs which are able to be subsidized.

In mid-1984 there were about 500 sensor manufacturers in the FRG. Of them about 100 currently have the technological facilities necessary for the development of microsensors. Another approximately 100 companies which also have the technological facilities to develop and produce microsensors are not yet producing them. According to estimates by the ministry it is projected that about 300 companies (primarily sensor manufacturers) will enter this new technological arena during the next two to three years.

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FRG GRANTS DM 5.8 MILLION TO APPLIED MICROELECTRONICS CENTER

Munich SUEDDEUTSCHE ZEITUNG in German 22 Feb 85 p 20

[Article by Ludwig Fisch: "Microelectronics Pinnacle. Advanced Technical Schools and Companies Found Institute in Burghausen"]

[Text] Burghausen (by our own correspondent)--What is currently a unique model of cooperation in the FRG between theorists and practitioners in the field of microelectronics was created at the historic Burghausen toll house castle: The ten advanced technical schools in Bavaria and some leading Bavarian microelectronics companies founded an institute which, according to its initiators, will "be instrumental in closing the 'contact gap' between the economic sector and the advanced schools and will further open the door to high technology for the middle classes."

Semester of Practical Experience and Degree-Related Work

The Center for Applied Microelectronics (ZAM), funded by the Bavarian Ministry for Economics and Culture has set several goals for itself. Through courses and seminars, engineers will receive further education and additional training in the fundamentals and applications of microelectronics. Moreover, people with appropriate background will be retrained in special practical courses. The main emphasis will be on the training of engineering and information science students in conjunction with the advanced schools; in Burghausen these students will be able to complete their semester of practical experience and pursue the scientific work required for their degrees. Therefore, 40 students from all the advanced technical schools in Bavaria will be accepted at the Burghausen Institute where professors will provide them with advanced training in microelectronics.

DM Eight Million for Construction

Mathilde Berghofer-Weichner, culture secretary for Bavaria, also emphasized at the founding celebration for ZAM that businessmen will benefit from computer technology: "Through increased service the advanced technical schools want to concentrate on technology transfers primarily to small and medium-sized businesses, with the emphasis on applications-oriented research and development work and technological solutions to problems. To this end the businesses can turn to the individual advanced technical schools or to the new center in

Burghausen." During the construction phase between 1985 and 1989 more than DM 8 million will be needed for this newly founded center, of which about DM 5.8 million will come from the Bavarian state budget.

That the founding of this center provided "significant progress on the road to a successful technological future for Bavaria," was expressed by Georg von Waldenfels, the Bavarian secretary for economics. Developments during the past few years have shown that Bavaria is on its way to becoming a center of communications technology and microelectronics, reasoned Waldenfels, adding that approximately 110,000 jobs in Bavaria can now be added in the communications industry (components, communication engineering, entertainment electronics, data systems technology, as well as some areas of aviation and space flight) and that in Bavaria in the last 10 years about 10,000 jobs have been created in the field of microelectronics alone.

Bavarian Silicon

Finally, von Waldenfels also pointed out that nearly half of the basic material used world-wide for the production of electronic components, ultrapure silicon, comes from a Burghausen company which was also among the initiators of the newly founded center for applied microelectronics.

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COMAU, RENAULT WORK ON CAD RESEARCH FOR ESPRIT

Brussels LA LIBRE BELGIQUE in French 25 Mar 85 p 8

[Article: "ESPRIT Program: Second Stage"]

[Excerpts] The 1985 program of the European electronics and data-processing project privileges software technology.

One Example: Project 477

This is a large-scale project (over one billion Belgian francs) involving computer-aided manufacturing (CAM) and whose partners are Comau (Italy), Renault Automation (France) and the German subsidiary of Digital Equipment. The project will extend over the next 5 years and will be financed 75 percent by the above 3 partners and 25 percent by the EEC. It represents 90 men/year of work and will focus on production control (Production Activity Control, PAC) whose role is to optimize industrial production.

The object of the project is to design, develop and test sophisticated production-automation software, thus reducing as much as possible both human intervention and manufacturing time, through automatic recording of workshop data. Results will be applicable, in particular, to small-batch manufacturing.

The success of this project will lead to the definition of a common architecture for integrated production-control systems, so that any company will then be able to write compatible software. It will also lead to "tunkey" software that could be customized to suit various production environments. Today, each manufacturer has his own system with its own characteristics.

The Partners

Comau, which initiated the project, is a Fiat subsidiary and is taking part in various research projects sponsored by the Italian National Commission for Research.

Comau, acting as project leader, is more particularly in charge of architecture problems and of implementing the control software package in the field

of steelmaking; it will subcontract part of the work to the Turin Polytechnic School, one of the three leading engineering schools in Italy, with second and third-cycle students. The department of automation and data-processing of the school will be in charge of designing and developing the control modules and setting up a simulation environment.

Renault Automation, which is now taking an active part in the research project on advanced automation and robotics financed by the CNRS (French National Center for Scientific Research), will be in charge of gathering users' requirements as far as control systems are concerned. In addition, the company will implement the control software package in a mechanical-assembly environment.

Digital will carry out most of its R&D tasks at its CAD/CAM [computer-aided design and manufacturing] center in Munich and at its Clonmel factory (Ireland), which specializes in communication products. Digital will manage the design and development of the control software; it will also subcontract part of this work to the Galway University College, which is part of the National University of Ireland.

The role of the industrial engineering department of that university will be to define the control architecture, focussing in particular on production planning and inventory management. This department is carrying out research on most aspects of automated production, especially robotics, simulation and production control. It is already working with Digital and Renault on various research projects.

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SCIENTIFIC AND INDUSTRIAL POLICY

DEKKER OF PHILIPS ON JAPANESE COMPETITION, EUROPEAN UNITY

Rotterdam NRC HANDELSBLAD in Dutch Supplement 6 Mar 85 pp 3,7

[Article by Dick Wittenberg: "The Vigilance of Dr Dekker"]

> [Text] Top man at Philips speaks out on profits which are too low, a divided Europe, and arrogant Japanese.
>
> The annual figures of Philips for 1984 will be made known officially tomorrow. It is already certain now that last year the corporation managed to increase its net profits by 50 percent. But Dr W. Dekker, president of Philips, is not happy yet: he feels that the returns contrast poorly with their most important Japanese competitors. Hence, vigilance is still required.

"Our profits as percentage of turnover are still inadequate. We still have a long way to go." Philips President Dr W. Dekker leaned forward to emphasize the seriousness of his words. He was careful not to lean back with self-satisfaction.

Tomorrow Philips' annual figures for 1984 will be made public. It is already known that for the second year in a row the company succeeded in driving net profits up by approximately 50 percent. Dekker gave this away 2 months ago in his New Year's speech. The goal, which he constantly kept before the 345,000 workers via large scale poster campaigns, was comfortably realized: a 50 billion guilder turnover and net profits of 1 billion guilders. This comes down to a return of at least 2 percent as against 0.9, 1.1 and 1.5 percent respectively over the three preceding years.

But even though the progress is very striking, the results first of all indicate the depth of the valley the company went through. And Philips' figures still contrast poorly with the profits their most important Japanese competitors manage to score. Dekker is the first one to recognize that.

Thus, during the fiscal year 1983-84 Matsushita Electric made a net profit of 3.3 billion guilders with a turnover of 70.8 billion. The returns are about twice as high as those of Philips. "We also need to move toward net profits which amount to 3 to 4 percent of the turnover," Dekker feels. To the question of how many years it should take for that goal to be achieved, the president

of Philips first reacted with hesitation. "It is always dangerous to make predictions. I am not afraid to stick out my neck, but we are not a self-driven projectile. In 1984 the wind was with us, thanks to the explosion of the American economy. This year things will not be as easy."

In the end, he did dare to mention a few figures. "If everything goes well, we should be able to get to a 3 percent return within the next 1 to 3 years."

Large Margins

According to Dekker there are several reasons why returns among the Japanese -- "not all of them, you know" -- are still notably higher than at Philips. "First of all, as far as productivity is concerned they are still ahead of us. Consequently, they get better utilization of investments. Furthermore, they benefit from a protected home market. They make large margins in Japan. Operating from this protected base they succeeded in brushing the whole American electronics industry off the map, so that now they consider Japan and the United States as their home market. Consequently, they quickly ended up with an economy of scale. The Japanese banks also play an important role because they provide industry with cheap capital. I recently received a very interesting report on this subject. In it, one comes across paradoxical situations. Japanese enterprises put their money in a bank and receive higher interest than they themselves have to pay if they borrow from the same bank. That is unthinkable anywhere else in the world."

What is Philips doing to resist this Japanese force? "Of course, we are actively engaged in increasing our productivity," said Dekker. "We have made a great deal of progress already in this area in recent years. Furthermore, we are also trying to improve the ratio of our own capital to interest bearing foreign capital in order to push back the interest burden. In addition, we pay a great deal of attention to reducing our inventories. We are doing everything we can to achieve as large a scale as possible. And in the meantime I am continuing my crusade for a united Europe."

Weak Point

In spite of the sharp rise in Philips' profits over the last 2 years it continues to have trouble in the Image and Sound sector, which is always good for about one quarter of the turnover. In 1983, this group of products suffered a loss of 195 million guilders. It is expected that last year's results will not be any better. "At the moment, Image and Sound is our weak point," admitted Dekker. "In this area, Japanese competition is becoming more pronounced."

However, the president of Philips denied the rumors circulating specifically in the United States, to the effect that his company is considering withdrawing from consumer electronics. "Nonsense. The Americans themselves have dropped consumer electronics. Now they think it is logical for Philips to do likewise. Such speculations only serve as small trial balloons to see how Philips will react."

There remains the dilemma that the electronics industry is becoming ever more capital intensive while Philips must make the most of the available money. In recent years, the corporation has already systematically withdrawn from side line activities. Can the company continue to afford to spread out its money and energy over too many products?

"I will tell you a little secret," said Dekker. "The Board of Directors has decided to form a number of working groups of top people in the company who will be expected to go over all our activities with a fine tooth comb. This could lead to the conclusion that we should leave certain areas because we need the money badly for other things. But under no circumstances will the outcome be: withdrawal from consumer electronics."

According to the president of Philips it would be very stupid to leave that sector in particular. The dividing line between electronics equipment for consumer use and for professional use is becoming more and more blurred. Sector techniques are gradually growing toward one another. Dekker considers it precisely a great strength of Philips that the corporation is active in all those areas.

Chinese Order

Nevertheless, it means a great deal to the corporation to wipe out the bad results in Image and Sound as soon as possible. According to Dekker, the prospects for this are present. "Our decision to start manufacturing VHS equipment in addition to videorecorders with our own V2000 system will undoubtedly bear its fruit. Furthermore, following its first customary initial losses the compact disc will shortly start bringing in money. After having suffered serious losses last year, the video picture disc finally seems to be making a breakthrough. Their use for education, instruction and information are regarded very highly. The 375 million guilder order from China to supply video picture disc players and equipment obviously provides an enormous push for the product. Things are still not going well with hi-fi equipment. We have suffered serious losses in that sector. The competitors are cutting each other's throat. Even the Japanese do not make a cent on their hi-fi equipment. And yet it is a market we do not want to get out of."

All in all he expects that this year the results in Image and Sound will show a significant improvement. But will the group of products end up in the black in 1985?

"That would be nice," said Dekker, and he added: "Only you shouldn't forget that the results were pushed down even more because the Grundig losses were included in the figures. And yet I am not pessimistic. There is a tremendous struggle in consumer electronics. But we are and remain the only ones who have managed to keep our head above water in the face of the Japanese."

Far East

If Dekker has anything to say about it, Philips will in the near future also fight the Japanese in their own part of the world. Over the last 10 years the

company looked for expansion primarily in the United States. Nearly one-third of the turnover is achieved in North America, twice as much as 5 years ago. The number of Philips workers in the United States increased from 12,000 in 1972 to 70,000 in 1985. "Just as many as in the Netherlands," stressed Dekker.

Following this expansion in the West, the company is turning increasingly toward the Far East. "Not solely because of the spreading of risks," Dekker explained. "Also in order to be able to join together the technology of Europe, Japan and America. Things are vibrating in the Far East. Hence, we must be present there. In Taiwan we are one of the largest investors. In Korea our activities have lagged somewhat but we are working hard on it. We are in a good position in Hong Kong and Singapore. Only in Japan we hardly have any position at all. Even though Japan is after all the heart, not so much of technology as of the application of technology. This is why we are very actively strengthening our interests there through the acquisition of companies. This way we hope to drill a hole in the Japanese market. At this time, compact disc players from Philips, made in Japan and Hasselt, are already being sold in Japan."

According to the president of Philips it is not easy to acquire a company in Japan. "In the United States those kinds of transactions are carried out very openly. The only thing you have to make sure of is that you reach an agreement with the stockholders. In Japan you are forced to work much more cautiously. With companies of any size and of any importance there are always invisible hands which will not allow the takeover to take place. Without any clear reasons, the price of the shares will suddenly fly upwards. But we continue to lie in wait."

European Unification

Since he became president on 1 January 1982, Dekker has let few opportunities go by to plead for a united Europe. With a homogenous home market and standardization of products it would be so much easier for European industry to withstand the Americans and the Japanese. Less than 2 months ago, he launched a detailed plan to bring European unification within reach within 5 years. On what does Dekker base his hope that after having been smothered in nationalism and bureaucracy for nearly 30 years, the European ideal will suddenly take hold now?

"Because the need is greater than ever," said Dekker simply. "The sense of reality among both politicians and industrialists is beginning to grow. Slowly, the awareness is developing that European industry is in the process of fighting a battle for survival. In consumer electronics the battle has already been fought. Philips was the only one in all of Europe which managed to hold its own. Thomson is oriented toward France and part of the FRG. Thorn-Emi concentrates its activities on Great Britain. In addition, there are a few good small companies such as Loewe Opta and Bang Olufsen which are dependent on the large corporations for their technology.

"In the professional sector, the big shake out still has to happen. Europe happens to be too small to harbor a handful of companies in a sector such as telecommunications. Hence, there will be victims. The best will win. It is also possible to join potentials so that a common base is developed."

According to the president of Philips, so far the growth of the company in other parts of the world has not occurred at the expense of Europe. But if economic unity is not achieved quickly, then Europe will have to bleed. "That is what I am afraid of," said Dekker. "If we cannot get a United Europe off the ground within the next 5 years, then the technology and the talent will disappear. Then Philips will have no other choice but to follow. Or to take the initiative itself."

If this is a real prospect, does not Philips then take a very great risk by further strengthening the Netherlands as a management center and a center of knowledge?

"It would be a mistake to anticipate negative results already," said Dekker. "Then the battle would be lost in advance. Today Europe is still a full-fledged party. But it is a question which keeps running through your head."

Arrogant

In order to prod the top staff, the president of Philips sent the members a number of copies of newspaper reports. In these reports, top people from Japanese industry gave their opinion about the chances of Europe. "The West will lose," was the overall message. "I hope to prove that they are wrong," said Dekker. "The Japanese have become somewhat arrogant lately. That is a characteristic which easily surfaces among them anyhow. Especially when they are successful. The danger then is that the Japanese will no longer see the shape of the matter."

According to Dekker, the year 1985 at Philips is under the sign of "awareness," being aware of the seriousness of the situation. This is why this month the company has launched a large scale campaign in all parts of the world under the slogan: "Your quality, Philips quality." Dekker: "A worker must realize that he is not simply putting a small radio together. If he does it well, he contributes to the maintenance of the industry. If he does it badly then he throws his job out the window. We are in a state of war."

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LUBBERS OF NETHERLANDS WANTS UNIFIED EUROPEAN HIGH TECH POLICY

Rotterdam NRC HANDELSBLAD in Dutch 6 Mar 85 p 13

[Article by Wynold Verwey: "Lubbers Wants To Decrease the Technological Lag of the EC"]

[Text] Brussels, 6 March -- Prime Minister Lubbers yesterday told the European Commission that freeing the internal EC market is the proper way to decrease the technological lag of Europe relative to the United States and Japan. "The continuing loss of ground experienced by European industry makes initiatives and impulses at the community level imperative for the foreseeable future," according to a government memorandum supporting this position.

According to Lubbers the president of the European Commission, Jacques Delors, reacted "very positively." The visit by Lubbers, accompanied by Secretaries of State Van Eekelen (foreign affairs) and Bolkestein (foreign trade), was aimed at blowing new life into Lubbers' plea for a European technological community.

The Dutch prime minister advocated this at the last European summit meeting last December in Dublin. But no discussions on the subject followed at that time.

Diplomats feel that the visit by an important Dutch delegation to Brussels should be seen as a patriotic attempt to keep the upcoming European summit (29 and 30 March in Brussels) from being snowed under by the perils surrounding the entry of Spain and Portugal. The Netherlands feels that there should also be discussions on the economic viability of the EC.

Now Lubbers has also requested consideration of the educational aspect of technological cooperation. "The training of experts should be linked together, so that they can meet one another," said Lubbers, "the top people should be pooled."

Another new element is that Lubbers feels that a kind of "support code" should be developed for technological research and development (R & D). "In this respect we do not first of all think of what should specifically not be allowed, but especially of what the Commission would applaud in the area of R & D," said Lubbers. According to him, this could thus prompt the development of a European glass fiber network (telecommunications) or, for example, of a rapid train connection among European capitals.

Trade Policy

It is also remarkable that Lubbers now advocates a nuanced trade policy whereby free trade is no longer -- officially -- proclaimed as the ultimate truth. Lubbers said: "On the one hand we accept the principle that we conduct international trade the way it is described in the international agreement on tariffs and trade (GATT), but on the other hand we stand up for our rights.

In this respect, Lubbers believes that the EC should allow itself to be taken in less frequently by requests for trade protection by individual countries (France, and also the Netherlands) but should concentrate more on forming a joint EC front. "The United States is economically strong because of the incentives from the Department of Defense and Japan is too because of a special commercial strategy. But Europe, which has a greater market than either one of those two, is too divided to be able to record the same advantages," Lubbers noted. In this respect, Lubbers observed that Japan as well as the United States "handles" the principles of GATT differently than the EC.

Lubbers specifically wanted to avoid the impression that his visit to Brussels involved the sale of a "Dutch initiative." The Dutch delegation feels that: suggestions were made to the European Commission -- and next, the Commission needs to take its own responsibilities.

Commission President Delors yesterday promised that for the purpose of this month's summit meeting his institution would introduce a document on improving across border technological cooperation among business and industry, government and science. Observers are afraid, however, that the current problems (entry, financing and compensation of the southern countries) will demand more attention. Consequently, Prime Minister Lubbers excluded the possibility that he would speak on the subject of technological cooperation at the upcoming summit. "We have asked the Commission to make proposals on this subject -- and for now we are waiting," said Lubbers.

Yesterday, the prime minister once again stressed that in his opinion freeing the internal EC market means that formalities and controls at the internal borders within the EC should be successively reduced to cases of extreme necessity, that standardization and certification should be placed in a single category, that government contracts should be directed less to national markets -- for telecommunications the European market should be 100 percent open by 1990 --, that enterprises should also cooperate at a European level via, for example, computer networks, and that, for example, infrastructural projects deserve more European directed attention.

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