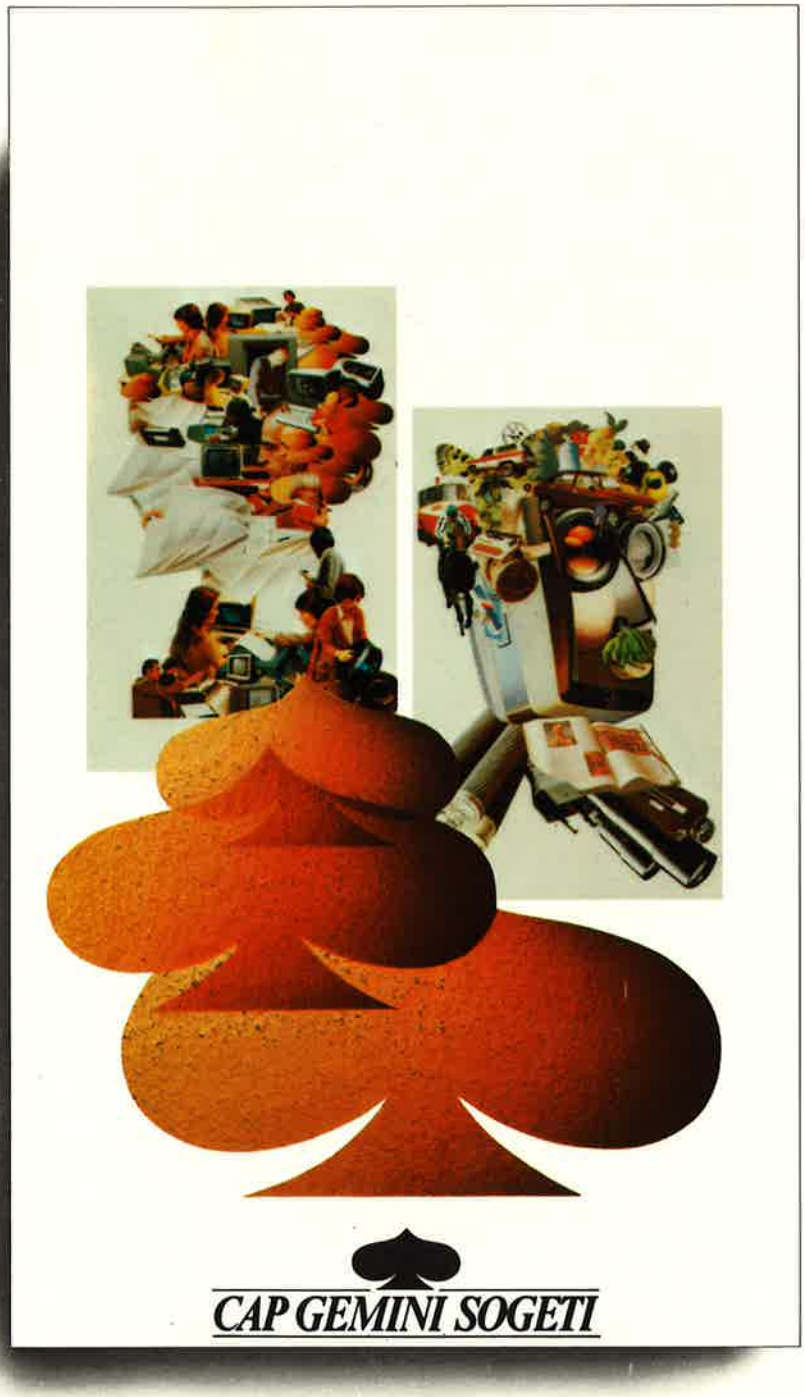


1978 ANNUAL REPORT

Summary

CAP GEMINI SOGETI

Summary CAP GEMINI SOGETI consolidated results for fiscal year 1978

	US $, in millions
CONSOLIDATED REVENUES	122
Gross CASH FLOW	10.8
NET INCOME after taxes	3.6
SHARE CAPITAL AND RESERVES	16.3
TOTAL OF BALANCE SHEET	73
TOTAL NUMBER OF EMPLOYEES as at 31 December 1978	2 670
NUMBER OF PROFESSIONAL STAFF	2 251

CAP GEMINI SOGETI is a group of some thirty computer service companies providing a range of professional services : consulting in the use of data processing resources, developing software that enables corporations and government agencies to make use of these facilities; designing and implementing complex data processing systems; giving assistance to computer operations; training; doing management consulting; and providing advertising and communications services.

CAP GEMINI SOGETI also offers computer-based and data entry services, although these operations account for less than 5 % of gross revenues.

Active throughout Europe, in the USA and Africa, CAP GEMINI SOGETI is one of the world leaders in computer services.

The Executive Committee of CAP GEMINI SOGETI comprises seven members and a permanent Secretary.
From left to right: Alain Lemaire, Christer Ugander, Michel Berty, Michel Jalabert, Daniel Setbon, Serge Kampf, José Bourboulon (permanent Secretary) and Jean B. Renondin.

LETTER FROM THE EXECUTIVE CHAIRMAN

SK/OBC 2785

Paris, April 30 th, 1979

1978 witnessed a steady and satisfactory growth of the world data processing market. Long-heralded "innovations"–the marriage of satellite telecommunications and data processing, office automation, and personal computing, to mention only a few–have moved from the drawing board to the status of precisely-defined programs and have led to the opening of new markets, a process in which computer service companies are closely associated. Among these companies, the CAP GEMINI SOGETI Group, which has acquired an exceptional level of expertise through years of investment in these fields, is consolidating its prime position and is preparing for fresh developments.

In an economic context favorable to data processing, any appraisal of CAP GEMINI SOGETI's 1978 financial results gives a positive picture: consolidated revenues increased to 122 million US dollars, and net after-tax earnings rose to 3.6 million US dollars, for a 21 % growth in revenues and a 41 % increase of earnings.

This performance simply helps to underscore the discrepancy between what I have referred to as the economic context of data processing and the general economic situation, which is far less cheerful, to say the least. On the heels of a pervasive ideological crisis, already perceptible at the end of the Sixties, came the energy crisis. Some people are now beginning to wonder whether gnawing doubts about the benefits of our civilization might not lead a part of the world into the myopic responses of religious war.

No doubt about it, these are bleak times. The social and economic columns of European newspapers are full of unemployment, weakened buying power, working conditions under a continuing cloud of doubt, dubious incentives, an uncertain future, ill-fitting redeployment of labor and resources.

In the midst of all this gloom, however, there are still some cheerful people. And I venture to claim that among them–they aren't alone, I could name quite a few others–are the data processing professionals.

After all, I am talking about a profession :

- in which unemployment is nonexistent; quite the contrary: one in which DP companies (manufacturers, service firms, etc.) are having difficulties meeting their requirements for trained personnel, to fill the new jobs created each year*.
- in which salaries for comparable seniority and skill levels, are among the highest in the job market, while individual purchasing power shows a steady rise*;
- in which working conditions are bearable, in general, and in any case where goverment "health and safety" commissions find themselves sitting on their hands... a happy circumstance;
- in which the actual work is generally very interesting and involving; most individuals have the pleasure of seeing the fruits of their labor "up and running"; they also share in a veritable technological revolution whose repercussions in daily existence are going to transform a way of life, proliferate and accelerate communications, enhance the relationships between people and ideas, and place an inexhaustible storehouse of knowledge at the fingertip of society;
- whose future seems to be assured; even the most prudent of the experts predict an average annual growth rate for DP activities on the order of 20 %, in a world that is getting accustomed to much more modest growths and is preparing–why not?–for the "zero growth" scenario advanced by the Club of Rome;
- in which labor redeployment is easy, first because data processing affects every realm and thus prepares its servants for any profession that requires familiarity with the mechanics of business, of economics, of research, of service... and second, because the esteem that accompanies the DP profession often opens doors that would remain closed to others.

But it is common knowledge that a happy existence is an unobtrusive one; that it is never wise to make a show of prosperity in a world where it is not equally shared; and that it is not too clever to give the impression that you have less need of solicitude, subsidies or raises than your neighbor. This is why the DP professional–whether to avoid attracting attention or bad luck, to be like the next guy, or merely to profit a bit more from the situation–never lets on that he is happy.

A DP professional along with all the others, then, I certainly won't be the first to proclaim my cheer. I will simply say that, placed at the head of a group of computer people, I consider myself a very lucky man.

But luck, they say, is merited. I hope that the following pages will convince you that everyone at CAP GEMINI SOGETI, from the oldest hand to the greenest novice, once again did everything to merit his luck in 1978.

Serge KAMPF

** The CAP GEMINI SOGETI companies plan to create 417 new jobs in 1979. Deducting the 300 or 400 departures expected during the year (12–13% of an average workforce numbering 2900), this means they must hire in the neighborhood of 800 people during 1979.*

** The salary for an employee in one of the CAP GEMINI SOGETI companies as of January, 1st, 1975 has increased, on average, 70% in four years, while the price index has risen about 44%.*

THE NEW COMPUTER AGE

CONTRIBUTIONS OF THE COMPUTER SERVICE COMPANIES

Computer service companies of respectable dimensions have developed just in time to provide users of the «new information technology» with the elements they absolutely need in order to survive and thrive in this new environment:

- Increasing productivity of software development and systems implementation in general.

Without this enhanced productivity, every Western European country could need one million software engineers just to take advantage of the hardware presently available. Innovation and continuing methodological development by computer service companies have become essential to the advance of software, the leading data processing technology.

- Promoting, developing and launching new applications.

New applications are characterized by the combination of multiple technologies (including data processing and communications), by the variety and number of users involved (TV networks, information holders, the mass media, etc.) and by the state of unpreparedness of the end user (e.g., a company executive faced for the first time with office automation). Because of their technical knowhow and their presence on the spot, the major software firms participate with the manufacturers in new-product development, also act as coordinators in the creation of new services, and implement the first installation in close liaison with end users.

- Representing users vis-a-vis the public, the manufacturers, and governments.

Clearly, the great discussions concerning the evolution of data processing techniques and uses are no longer the preserve of the manufacturers.

These now share much of the burden of continued market development with the service companies, and it is not surprising to see that the service companies are performing and publishing market studies, are delivering the majority of reports at professional conventions, and are signing - often together with independent consultants and end users - a great deal of articles published on data processing and, particularly, the new information technology.

THE EVOLUTION OF BASIC SOFTWARE

From the standpoint of performance, basic software is evolving in parallel with its fellow computer disciplines: new functions to increase the ease of hardware use, new forms of communications management, modern software development tools and procedures, and so on.

Change is equally spectacular from the standpoint of cost. While the average monthly salary of a programmer-analyst increased almost four-fold between 1968 and 1978, the development cost in the same period for a typical basic software product, such as a COBOL compiler running on a medium-size computer, was cut to about one-third its former level.

ENUMERATING TECHNOLOGICAL CHANGE

In 1955, it cost between 12 and 15 dollars to perform one million operations on a contemporary computer (e.g., IBM 704 or 709). Today, an identical million operations costs about five cents.

Advances in semiconductor integration are equally striking: semiconductor memory capacity increased from 10 to 1,000 bits per square millimeter between 1967 and 1977 (for a doubling of density every 18 months!) while unit device capacity increased from 16 to 16,000 bits.

In 15 years, the sale price of a megabyte of main memory will have been reduced by a factor of 30.

The same phenomenon occurs with regard to magnetic disk memories, whose density is now ten times that of semiconductor chips, at one thousandth of the cost (for equal density); in this case, too, density has doubled in 18-month leaps between 1967 and 1977, and the price per bit is inversely proportional to density.

Is it true that the Industrial Age is in the process of giving way to the Information Era? According to certain American reports, the economic sector that includes all activities for information processing and distribution is now employing half of the active population. If this is the case, then, efforts towards automation should not be concentrated on the industrial manufacturing process, but instead on the administrative processes through which the bulk of information moves.

In France, the government has launched a plan for nationwide familiarization with information technology, specifically projecting the use of 10,000 microcomputers by schoolchildren. Not a few parents too, are tempted to buy those do-it-yourself computer kits depicted in the advertising pages of the hobby magazines, knowing that every library in the world will soon be accessible through their living-room TV screens.

It is not by chance that all of these new facets of data processing are making their appearance at the same time, and 1978 will certainly be remembered as the inaugural year of what is already being called "the new computer age". The convergence of three factors – or, better the simultaneous maturing of three distinct phenomena – stands behind this general revelation:

1) The race of the technologies: microelectronics, telecommunications, data processing.

The very availability of microelectronic products – they are cheap and can be bought anywhere – is accelerating their propagation at a dizzying pace.

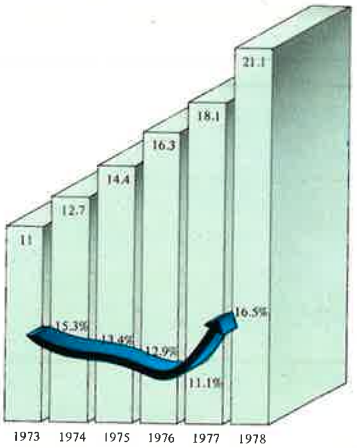
But this phenomenon must not be allowed to conceal the stages leading up to it, marked by a steady decrease in the cost and volume of electronic components and of all memory devices. This shrinkage has permitted the birth and development of minicomputers and microcomputers, without which distributed data processing would never have come into existence.

At the same time that microelectronic chips are doing the brainwork for the plethora of terminals now on the market, public data transmission networks are coming into operation. Transmission error rates and costs are dropping substantially, thanks to advances in telecommunications and to the carriers' rate-charging policies.

In theory, then, the sky is the limit: it will be possible to transmit any kind of information to anyone, and particularly to the public at large. Still, the advent of personal computing, in the form of home computer service, depends upon a smooth convergence of the technologies of telecommunications and data processing. But it is not enough for computers to have main memory capacities expressed in the millions of characters; individual networks must also permit inter-

Corporate revenues and the new computer age

Released 15 years ago, the IBM 360 series was a dazzling success on the market. Nonetheless, the growth rate of IBM's gross income had decreased by more than one point every year between 1973 and 1977, falling from 15 % to 11 %, even though the element of "sales" (compared to "service" and "rentals") in this income increased from about 31 % to 39 %. Then, in 1978, IBM's income growth abruptly jumped to more than 16 %. Not a bad start for the new computer age!



IBM's gross income
Consolidated gross income (dollars, in billions)
% annual increase

connection between terminals of all types, and between computers of all makes and sizes.

Moreover, extremely complex applications – including the supply of information from many different databases to any single home computer user – are forcing software to evolve in step with these other disciplines.

2) The computer manufacturers' second wind.

How have the manufacturers – and IBM in particular – corrected their growth curves? How are they making up for both the abrupt falloff in prices of their hardware and the inroads made by vendors of compatible equipment? The facts required to answer these questions are already staring us in the face. New markets are making their appearance, either as extensions of conventional data processing such as new kinds of users for very small business systems, or as complete innovations such as office automation.

At the same time, major users are vociferously demanding a certain independence from the mainframe vendor, so they can change computer types or install different computer makes on their internal networks.

Major users are therefore demanding that conversions of applications from one system to another be made technically feasible, and they are encountering positive encouragement from manufacturers eager to win some points against competitors; this is reflected in today's increasing compatibility of hardware and software.

When growth-hungry manufacturers have such powerful technological resources at their fingertips, however, one might reasonably ask: who is going to ensure the progress of the "human" technologies?

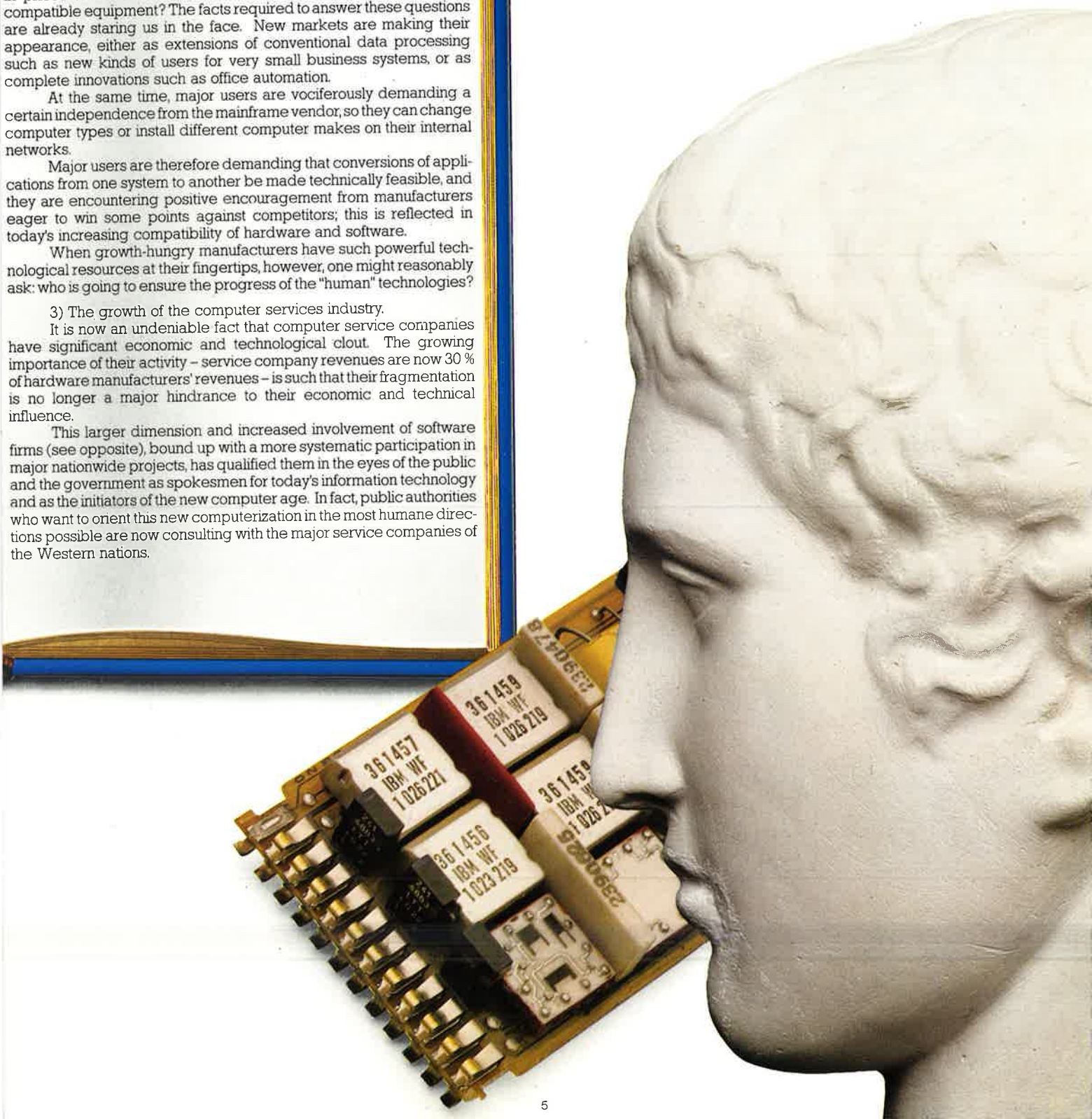
3) The growth of the computer services industry.

It is now an undeniable fact that computer service companies have significant economic and technological clout. The growing importance of their activity – service company revenues are now 30 % of hardware manufacturers' revenues – is such that their fragmentation is no longer a major hindrance to their economic and technical influence.

This larger dimension and increased involvement of software firms (see opposite), bound up with a more systematic participation in major nationwide projects, has qualified them in the eyes of the public and the government as spokesmen for today's information technology and as the initiators of the new computer age. In fact, public authorities who want to orient this new computerization in the most humane directions possible are now consulting with the major service companies of the Western nations.

CAP GEMINI SOGETI has decided to devote the bulk of this annual report for 1978 to six areas of the new information technology, and to the new ideas developed by some of the Group's experts during the year.
Each of these six domains will be introduced by an individual of acknowledged authority in his field, and the role played by CAP GEMINI SOGETI in each field during 1978 will be illustrated by some examples.

The following pages, dedicated to the NEW COMPUTER AGE, have this plan:



DISTRIBUTED PROCESSING

CAP GEMINI SOGETI and banking terminals
Like blood vessels in the human body, networks are circulation bank systems for the flow of information vital to a bank's existence. Networks are now reaching even the most remote bank branch. Hardware, communications procedures and protocols, network structures, distributed information management: the choices involved are delicate and techniques are complex, but the goal — information that is truly "on line" and available at the teller's window — fully justifies the current effort and investment. CAP GEMINI SOGETI's experience in this field was tapped by finance-oriented terminal manufacturers active on the European market and by major banks during 1978, with 50 Group engineers working either on basic software implementation or on installation and startup of a wide range of financial hardwares including IBM 3600, CII-HB TTS 7800, Transac T 7000, Philips PTS 6000, Nixdorf 8864, Logabax 5065, etc.

REGISTERED-SHARE PORTFOLIO MANAGEMENT AT CREDIT COMMERCIAL DE FRANCE

Among a bank's many activities, managing registered stock certificate portfolios is considered one of the hardest to fit into the conventional mold of mass bank data processing.

What does this application involve? A bank, acting on behalf of a customer company which entrusts it with management of periodically-issued registered shares, takes over issuing and cancelling stock certificates, maintains share ownership registers, makes payments to bearers, provides information to shareholders and customer companies, prepares general meetings, and so on.

The low level of interaction with the bank's central files and other activities, the large number of special cases for a relatively low volume of movements, the unusually-sophisticated printout requirements: share management has every feature of a textbook case in distributed data processing.

As of the beginning of 1978, a leading French bank - Credit Commercial de France - was managing shares issued by 200 customer companies and distributed among more than 20,000 shareholders. In order to absorb the steady increase in the number of operations, and to smooth out difficulties arising from a workload that was distributed very unevenly over the year, the bank decided to computerize most of its share-handling, and to entrust implementation of this application to CAP GEMINI SOGETI.

The most unaccustomed aspect of this delicate task, from the DP professional's standpoint, was the indeterminate number of special cases; each company prints its certificates according to its own format, while changing combinations of shares and shareholders differ widely; they might own one share or one thousand, have one or three addresses, and so on. Given the further considerations that the daily volume of operations for each client company is small, that answers must be available quickly for phoned-in queries, and that each operation must be accompanied by immediate printout of a working or «official» document on the correct special form, it is easy to understand the need to adopt a decentralized data processing system, used directly by the portfolio department personnel. This direct access also increases the requirement for operational security: some «official» information cannot be updated without a corresponding entry in the share transfer register, and must therefore be subject to special safeguards upon entry.

The hardware selected was a conversational minicomputer, well adapted to decentralized banking use since it was originally intended to function as a teller terminal. Even more important, this system has the advantage of a front-loading double-stream printer which accepts certificate forms in different shapes and sizes while it reserves one paper stream for continuous operation logging.

This new and fully parameterized application, which became operational in late 1978, enables Credit Commercial de France to integrate the management of shares issued by any new company without having to change the system.

Herbert R.J. GROSCH
Past President of Association for Computing Machinery, U.S.A.

The whole idea of distributed processing power, greatly advancing the flexibility, the specialization, the security of data manipulation and computing, is futuristic. The dream of perfect access and perfect response, of something approaching a science fiction Games Machine, with consoles available everywhere and programs and data spread throughout an organization, is only beginning to be realized.

The problem is entirely one of software, or perhaps of software some of which may be burned into the PROMs of tomorrow's superchips. We have only begun to conceptualize the really general systems, the ones where overlying layers of control software directed from any point in the net will search out applications programs, assemble the necessary data from various data banks, move the packages to the most available and most economical processing node, and make the results available wherever needed.

Virtual memory we already have, and in simple form, virtual processing. To this must be added completely flexible data transmission and what might be called virtual control-that is, control physically dispersed but so organized as to appear to be available continuously at every node and terminal.

That means more sophisticated systems of indexes and pointers than we now have in commercial practice, so that an upgrading of systems programming skills to the level of today's computer chess and 3D color graphics will be needed, while these advanced software research techniques in turn march further ahead.

Worldwide banking and credit systems, reservations systems blended together and available at travel agencies rather than just at airline offices and large hotels, teleconferencing, intraorganization electronic mail, all become feasible and economically attractive as the levels of distributed processing technology become available. Only the planning and the software are needed.

Only! Indeed, such tasks are among the most difficult and challenging intellectual efforts of the century. There is a deep reason for this, and one not as familiar to computer users, or to the scientists and engineers who produce the magnificent computing and communications hardware, as the speed limit of electromagnetic phenomena or

THE SLIBAIL BELGIQUE EXPERIMENT

The activities of leasing companies differ somewhat from those of the usual lending firms. Personalization of customer rates leads to a highly varied product portfolio. In addition the leasing firm remains owner of the leased item until expiration of the contract. Thus, it must manage and maintain fleets of equipment or groups of buildings, and therefore develop sometimes complex relationships with suppliers, users, insurance companies, tax authorities, and so on.

This is the case with Slibail Belgique. With almost 500 million Belgian francs in real estate assets and 1978 monthly revenues of BF over 200 millions, these activities are basically divided between utility vehicles and industrial equipment. Administrative management of new-contract installation, mountains of typed material generated by the multiplicity of contract documents, financial calculations, collections of statistics, management reports... the paperwork situation had to be faced. A workforce voluntarily limited to two executives and four secretaries could no longer keep abreast of company growth. Automation had become necessary and CAP GEMINI SOGETI was called in to help install a computerized solution.

the laws of heat dissipation. It is, to put it simply, the tremendous difference between human language and computer language.

Problems are presented to a computer applications organization in human terms, and in human language. Such languages are rich, evocative, constantly changing. They are inexact, redundant. Computer processes, on the other hand, must be specified with grim precision.

The language of the machine, whether giant data base system or specialized minicomputer, is of necessity precise, spare and during the life of a particular hardware system-unchanging. Moreover, the results of the processing must emerge into the outside world in a form acceptable to human beings. Whether as simply as in the labeling and arrangement of statistical output, or in something as glamorous as colored graphics, human considerations and human language again dominate.

The task of the computer professionals is to penetrate the interface between human and computer language. We do it every day, and frequently we do it well-the wonders of computer graphics and of giant airline systems and space simulators are examples. But it is difficult, and will remain so for the foreseeable future.

This contrast between the continuing flow of new hardware technology and the obduracy of software and applications work is the great challenge to CAP GEMINI SOGETI and its customers. Problems grow harder every day; we have solved the easier ones. Customer management is more aware of the costs and the risks of computer commitment, and is quite rightly more demanding of service organizations. The computer and communications manufacturers continue to deluge us with new and complex equipment.

One positive element in this challenging future is the spread of computer awareness throughout the world; throughout any branches or any sections of all firms; everywhere, in some measure, from Paris to Peking and from Alaska to Australia. This will continue and accelerate, and means many changes: a larger supply of interested young people to work in the computer field; more demands for human considerations – privacy, security, correctibility – in future systems, an impatience with slowness and with failure.

The work of computer people and computer organizations will be more difficult but more exciting, more subject to criticism but more central to our civilization, in the years ahead. Every financial transaction, every trip whether across a city by private car or across the world in Concorde, every phase of the educational process, every entertainment, every research project, will have a computer component. There will be more demands, and more rewards. Perhaps beyond any other human enterprise, we will shape the future. And we will live in it: we must shape it well!

DISTRIBUTED DATA PROCESSING IN BANKING APPLICATIONS

With the very latest concepts, the most up-to-date hardware, and state-of-the-art techniques and applications banks have played a pioneering role in the development of data processing. They have also invested heavily in those computer systems which today constitute their chief production tool.

Distributed data processing provides the answer to a number of specific banking requirements. This is why bankers have been among the first to apply this technique, with outstanding success in:

- equipping certain «peripheral» sectors which are allergic to massive data processing operations - such as registered-share portfolio management - with independent DP resources;
- strengthening computer-based networks with the installation of intermediate processing centers;
- decentralizing the responsibility for (and part of the operation of) these facilities; and
- enriching administrative tasks and increasing the delegation of authority.

An examination of Slibail Belgique's activities quickly indicated that the close interleaving of tasks that required automation and other operations did necessitate the operation of hardware under full staff control. The system had to be easily used and to offer instant access with immediate hard-copy output. Programming had to be speedy, to remain within the limits of a modest automation budget.

A minicomputer selected on the basis of these criteria uses 90 programs, written in Basic, to handle operations that range from contract installation and management to financial calculations and loan supervision management report-writing. Thanks to the simplicity of dialogue procedures, the staff was able to use the system effectively less than a week after actual startup; the company's capacity to accept and handle new contracts has now tripled.

CAP GEMINI SOGETI AND TRANSPAC

«TRANSPAC network operation will go on a round-the-clock schedule as of 21 december 1978, with commissioning of the first network switches and supervisory centers tasked with traffic monitoring»: this modest news item, printed out on press agency teletypes late last year, was at once an end and a beginning.

An end: the culmination of three years of effort and investment going back to april 1974, when the French Cabinet, in a meeting presided over by Valéry Giscard d'Estaing, decided to create a French packet-switching network. CAP GEMINI SOGETI, a natural partner in the effort already carried out to get TRANSPAC up and running, designed and implemented ESOPE, the network acceptance system.

An end, then, but above all the beginning of a process which should witness an increase in the number of contracts for connection with TRANSPAC to 4,500 in 1980, doubtless 10,000 in 1982 and over 25,000 in 1985. In every instance, these connections will be the fruit of a carefully-weighed decision, for which TRANSPAC's virtues - flexibility, advantageous rates, etc. - offer powerful incentive, connection can also result in technical and economic problems in certain cases.

It was while tackling such problems - particularly in the case of IBM 360/370 users - that CAP GEMINI SOGETI developed its RTX 25 connection software.

David FIRNBERG
The Director,
National Computing Centre
U.K.

When the shouting has died away and we are able to view the present turmoil in technology objectively, it may be that it is not the microprocessor that will stand out as the most significant development, but progress in telecommunications.

Recent studies into organisations experienced in using advanced communication networks showed clearly that networking had resulted in significant changes in the users' pattern of working. Time developed a different dimension, with people sending messages to each other at any time. The convenience of using a computer message system dramatically affected informal as well as formal communications; these became increasingly non-simultaneous with less direct person-to-person simultaneous contact, and yet people communicated more, and more effectively with each other. Office work became task oriented rather than hours oriented.

Of course telecommunication facilities not only affect the flow of ideas and communications between individuals, but also increasingly the flow of money, and details of commercial transactions.

If in the future we can carry our work around with us, communicating with our colleagues from wherever we happen to be, at whatever time is convenient, to what extent will it be necessary for us to go into our employer's office, or attend meetings in other people's offices. One might perhaps foresee the emergence of "community work centres" providing office and communication facilities, which individuals can use to communicate with their employment community.

ITCIS, a Dutch network

"ITCIS" is a large project in which CAP GEMINI SOGETI has been involved since the early seventies when the initial definition study started. The objective was to operate the bulk of the Dutch PTT's telephone applications and its corresponding network around a several billion characters database.
The system, as implemented now, includes 450 terminals used for directory assistance which are connected to a large computer center through thirteen regional computer based concentrators and two such back-up machines.
One of the requirements is to reduce to almost zero the downtime of the network as seen by each terminal user. This has been achieved by providing each cluster of terminals a back-up dial up number which it can use to get connected to the network through the back-up concentrators.

Telecommunication facilities for both private and business sers are developing rapidly all over the world. Not only are satellite ommunication links and fiber optics greatly increasing their universaty, penetration, accessibility and effectiveness but, more important erhaps, computing is increasingly being used both to manage and ontrol telecommunication activities and to provide services to consuners. With the introduction of digital networks, the full range of data rocessing facilities can be brought to bear on communication operaons and services. It is difficult now to make a clear distinction etween the computer and the telecommunication industries, and as ar as the user is concerned, they increasingly appear as part of the otal picture of "information processing".

The provision of software and the international adoption of standards provide the cement which makes it possible for one to conceive f truly comprehensive communication facilities. The communication etworks provided by the French post office or other common carrier rganisations provide the channels through which data and informaion, applications and communications flow. Software however is equired to enable a user to access the network, to handle the termials and telecommunication facilities, to allow the application rogrammers to be more independent of the hardware used in the ystem. Software also enhances the ability to share and make more economical use of network resources and to provide management acilities to users for such tasks as file and database management, job nd task management, and so forth. Once data is in the network, software controls its flow, ensures its security, directs it to its correct destiation and provides its optimum routing.

In providing a service to enable a user to make the most effective use of the opportunities modern technology presents, it is becoming increasingly necessary for advice and support to be available which is independent of the suppliers of items of equipment or telecommunication facilities.

The rate of growth in the computer service industry demonstrates the strength of service companies in fulfilling that role by putting together the "best mix" of hardware, software and telecommunication facilities to match a user's problem.

ESOPE in the USA

Western Union International has acquired ESOPE to test interconnection of its telecommunications network with other networks around the world. In France, WUI is very shortly to use ESOPE to test the interconnection of its transmission facilities with TRANSPAC.

ESOPE's acceptance

The government could not declare this public packet-switching data transmission network officially «open» until the net had successfully undergone a series of acceptance trials. Given the complexity of such a network, test operations are far from simple and require specialized instruments.

CAP GEMINI SOGETI developed a dedicated tool for qualitative testing and acceptance of TRANSPAC connection procedures. The function of this system, known as ESOPE, is to validate procedures for communications established via the TRANSPAC connect interface, outside of the network's internal workings.

An out-of-the-ordinary subscriber

ESOPE is connected to the network by means of one or two links, enabling it to simulate - in the network's eyes - two independent subscribers or one multi-line suscriber. When connected in this manner, ESOPE must be able to behave as:

- either a normal subscriber, i.e., one who complies with the connection protocol,
- or a subscriber who commits errors which the procedure has been programmed to anticipate (sequencing errors, acknowledgement errors), making it possible to simulate abnormal connection line operation,
- or a subscriber capable of literally «turning the procedure upside down», so as to activate and validate the network's defensive mechanisms when faced with irrelevant user behavior.

A novel scenario

The basic novelty of the ESOPE system lies in the concept of «scenarios», i.e., test sets fulfilling two requirements:

- test personalization: as the number of possible tests is a very large one, these are selected by the user, who may act by means of hardware configuration or through scenarios. The latter are true user programs which act on system behavior in real time. In particular, all error generation is performed by specific scenarios.
- tool enrichment: provision of user programs means the creation of an extensive test library as successive trials are performed. Faced by a specific problem, the user generates a scenario for a specific test; this scenario may be preserved, thereby enriching the test tool.

Although designed with TRANSPAC in mind, ESOPE is a powerful debugging tool for other network software. This is why CAP GEMINI SOGETI, with government approval, is marketing ESOPE (with several systems already installed in several countries) while continuing its development.

RTX 25 for network connection

As with all public networks, TRANSPAC imposes standards for connection of prospective users'data processing hardware (computers and terminals): X.25 - compatible interfaces between the network and high-speed hardware, and PAD interfaces between the system and low-speed terminals such as teletypewriters.

Leaving aside the technical responses which computer manufacturers build into their individual network architectures, three main approaches are available to subscribers who want to tie into TRANSPAC:

- the «black box» solution, viewed with favor by some manufacturers and system houses; related hardware includes either procedure converters for central unit/TRANSPAC links, or interface adapters for TRANSPAC/terminal links.
- solutions involving the installation of a front-end processor between the CPU and the network, a processor which can either replace the mainframe manufacturer's own front-end, or be inserted between the latter and TRANSPAC.
- software-based solutions: this is the approach chosen by CAP GEMINI SOGETI for design and development of its own TRANSPAC connection tool, RTX 25, intended for IBM users (see figure opposite).

RTX 25 is an ideal, inexpensive solution for both installation and operation: it does not require any modification of applications already installed on the central site, and it reduces the amount of supplementary equipment required.

With RTX 25, moreover, the user has more freedom to select his terminals, and may use TRANSPAC's facilities in a step-by-step manner (e.g., by initially limiting himself to those conversational applications for which TRANSPAC offers the greatest savings).

In conclusion, we note that RTX 25 is already a proven system; numerous networks have been in operation since 1976 in the USA (with Telenet) and in Canada (with Datapac) following Telenet principles, and offering a similar product.

BASIC SOFTWARE

SIP: A PROGRAMMER'S DEVELOPMENT SYSTEM

Seated at his SIP work-station, a programmer inserts a diskette containing the part of the general analysis of interest to him into his disk unit. After examining the detailed specifications instantly shown on his screen, he calls the data description table, already prepared elsewhere. He can now begin to work out his program, which he types in through his station's keyboard.

SIP has provided the programmer - like an airplane pilot, with banks of sophisticated controls at his fingertips - with immediate access to the instruments that he most frequently uses: keyboard, visual display unit, diskette drive, etc., but which had not been assigned to him personally in the past. The new system enables him to put his entire output on-line, and he is also able to obtain immediate - if non-physical - access to software debugging aids, automatic documentation software, code handling and text editing software, etc.

Designed and developed by CAP GEMINI SOGETI, the SIP system consists of two elements, which are fully independent of the machines for which programs are being developed :

- the work-stations themselves, termed «PADs» (Postes Automatisés de Developpement; Automated Development Work-stations), each consists of a cluster of microprocessor-based dedicated terminals; these are the programmers'immediate working tools;
- a MID (Machine Intégrée pour le Développement; Integrated Development Machine), supports the methodological tools required for software development, connected to each work-station.

PAD

Each individual station has been designed to enable the programmer to perform efficiently all operations required by his job. To this end, the PAD is equipped with a keyboard, visual display unit for text or code entry and updating, a diskette unit for storage, a work surface and a convenient shelf storage space.

PAD interfaces with MID by means of a simple language that permits search and retrieval operations, file storage on MID's mass memory, and file exchanges between PAD and MID.

MID

The usefulness of MID's independent configuration becomes especially evident when programs are being developed for processing on different computers, or when the target computer has a heavy workload, and program test must consequently be carried out on a different type of computer. The typical MID configuration includes a central processor, disk drives, tape drive, printer and communications facilities.

MID software includes a monitor, file handling routines, a set of software tools for code supervision and analysis, a project management package and communications software.

Because this software is highly modular, it can be adapted efficiently to specific situations (language, target computer and methodology employed).

A key to productivity

SIP contributes to increased software development productivity by offering the following advantages to programmers and users:

- reduction of physical tasks, particularly text and code manipulation,
- stricter (and automatic) methods application,
- improved analysis, thanks to use of a consistent set of tools,
- better overall project control.

CPL1: THE LANGUAGE OF THE '80s

It might seem out of place to talk about a product whose design dates back to 1970 in a report which is theoretically devoted to CAP GEMINI SOGETI's achievements during 1978. CPL1 merits special mention, however, because 1978 marked a turning point in its technical and commercial career.

From the technical standpoint, *it was in 1978 that Version 4 of CPL1 was released*, containing - in terms of language - the new PL1 instructions for structured programming, and - in terms of the compiler - a number of major enhancements summing up work performed on some 30 different machine types. Above all, however, with compiler transfer having been made virtually automatic, version 4 has taken a decisive step on the path toward software universality.

From the marketing standpoint, *it was in 1978 that CPL1 cleared the hurdle of 100 operational installations.* Accelerated sales during recent months may be explained by a number of factors: user recognition of the need for portability, the number of CPL1 compilers developed and, finally, the need for a language of this type in sophisticated business applications (teleprocessing, databases, real-time environments).

Dr. Reinhold THURNER
Chairman of SODECON,
SWITZERLAND.

The combined power of three convergent technologies – data processing, office automation and telecommunications – is making a break with the past. The computer center, entirely devoted to data processing production, is giving way to the end user, interested only in the information product that he requires. Responsibilities, functions and task allocations are no longer the same in this new process of information technology, which promises to lead to the automation of all information related work.

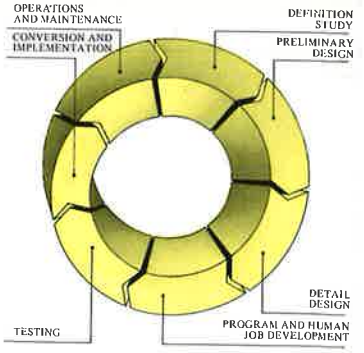
Obviously, a transformation of this scope is going to shake software to its very foundations. In particular, the change is already creating a massive need for new basic software that meets certain requirements: it must be user-oriented and adapted to a very complex set of hardware resources; it must permit concurrent use of different computer makes (the portability requirement); and it must be easy to modify.

It is a fact that computer manufacturers, forced to sell in ever larger quantities and to open new markets, have improved the conditions for basic software use. They have made software easier to manipulate, in order to attract non-expert "consumers". This has led the vendors, and some service companies, to develop advanced technologies for rational basic software development.

But this technology has not been transferred to users as a group, and every future DP manager must have access to a veritable infrastructure capable of eliminating the software bottleneck if he wishes to take advantage of the arsenal of increasingly-powerful hardware resources available on the market.

For it is no longer sufficient to manipulate a structure of programs dating from the punched-card era...

Above all, however, *changes in customer outlook are the factor making 1978 a milestone year in CPL1's career.* Originally designed as an attractive substitute for Assembler in the development of basic software and real-time applications, CPL1 had been relegated to the «systems» field. Last year, however, CPL1 won its first meaningful references in the «applications» realm. This breakthrough, coupled with the tool's intrinsic qualities - flexibility, performance, programmability, machine-independence - substantially strengthens the chances of seeing CPL1 become the language of the '80s for many users.



Currently-employed methodologies pass through seven stages along the path leading from the identification of a problem to its computerized solution.

Machine tools are manufactured not by hand, but by other machine tools, because – as with today's and tomorrow's data processing – accuracy requirements are incompatible with manual processes. So users need a true infrastructure of assistance for systems development: but how is it to be constructed?

Given the current level of understanding of software methods, a tripartite infrastructure might be posited:

- Systematizing the process of project implementation. Questions such as: What intermediate products should be developed? When should tests be performed? What acceptance criteria are to be applied? should not be left to chance or opinion.
- An analysis and programming method derived from a practical synthesis of the three approaches currently in fashion. These are: Structured programming, which offers an effective syntax for description of a process or solution of a problem; the Warnier and Jackson methods, based upon the "data" aspect of programs; and the "functional" approach of the "Requirement Engineering" school.
- Use of a development machine, a full-fledged computer supporting hardware and software that is fully dedicated to software development, documentation and maintenance. The machine's display unit would constitute the technician's primary working instrument in all phases of systems implementation.

Programs will continue to be written in COBOL for some time to come; in fact, until there is a breakthrough like the one enabling the shift from assembly language to high-level programming languages. But our "programming machine" will have access to tools that extend COBOL's functions, such as processors for decision tables or structured programming, report generators, automatic documentation systems, etc., and one day all of these isolated tools will converge into a single huge software generating system.

The user, in turn, will have to proceed in such a way that system development is performed in the pattern of a true manufacturing process. He will have to take steps to introduce and ensure correct use of methods geared to increase productivity. Making use of his authority, he will have to invest in building a software development infrastructure, knowing that he will certainly not be able to bank on the hardware manufacturers, but may instead rely on the service companies and the tools that they will have forged.

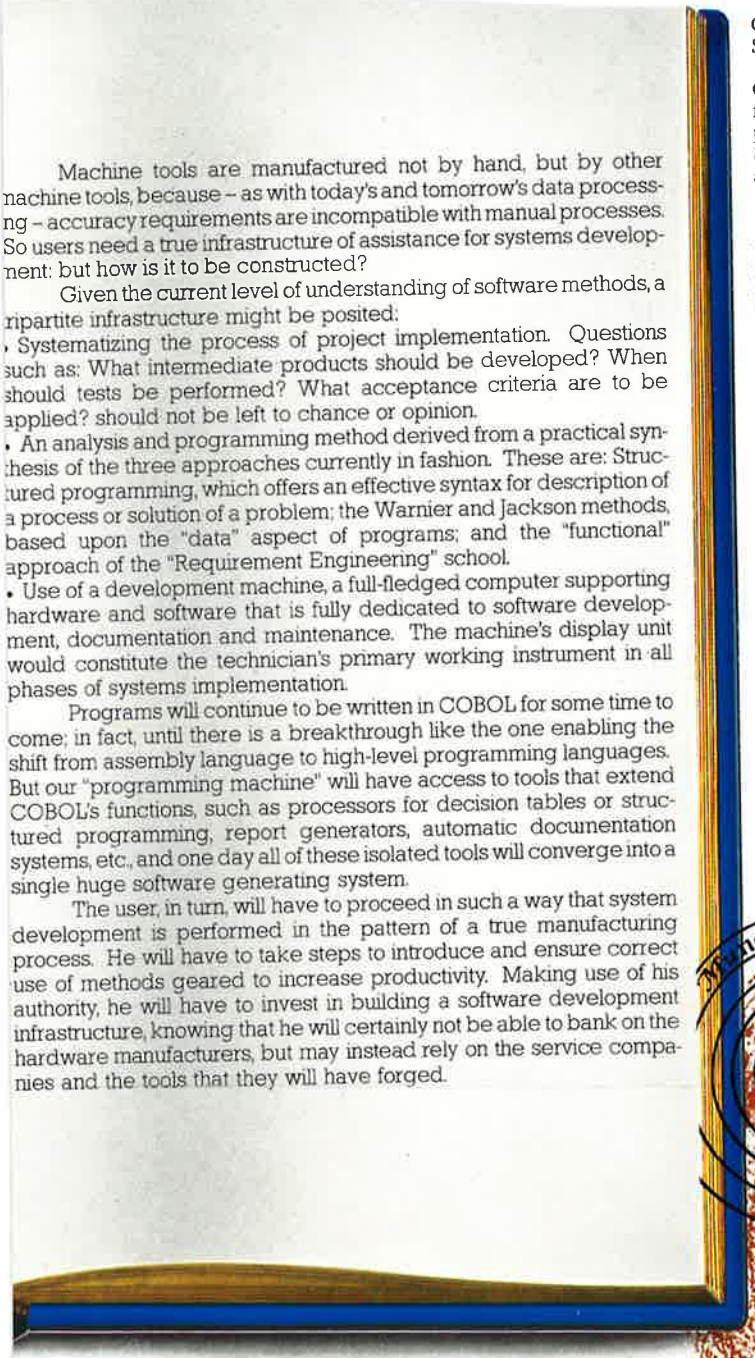
COMSI: EXPANSION OF IBM SERIES 1 CAPABILITIES

COMSI (Communications Monitor for IBM Series 1) is a program product created by CAP GEMINI SOGETI in Sweden to simplify applications and expand the communications capabilities of IBM's Series 1.

COMSI provides the user with ready-made routines for screen read and write operations, management of messages exchanged with other computers and local printer output.

The IBM Series 1 can be connected to a «host» computer, in which case application programs are viewed - thanks to COMSI - as logical terminals.

COMSI preprocesses all communications functions employing screens, printers and terminals, including hard-copy output of displayed reports.



SIEMENS BS-2000 IN THE LIMELIGHT

Having observed that man-machine communication was generally the «poor relative» of operating systems, CAP GEMINI SOGETI has implemented a totally new concept of this exchange.

For application of this concept, a machine-to-operator communications interface is being implemented for the BS-2000 operating system. Independent of computer configuration and accessible by all system users, this interface will generate and issue messages which may deal with machine status, of course, but also the contents of files and programs, and even the characteristics of the configuration in use.

Another CPL1 user: IBM

IBM's Federal Systems Division in the USA has adopted CPL 1 in order to use it in connection with the joint European-United States SPACELAB program.

The CII-Honeywell Bull TTS7800 terminal

CAP GEMINI SOGETI has been involved with the design of basic software for the TTS 7800 terminal, and with the development of general software requested for processing the various transactions of a bank branch applications.

CONVERSIONS

A SPECTACULAR CONVERSION for the Commission of European Communities in Luxemburg

In 1975, the Commission of the European Communities decided to replace its DP hardware by newer, more powerful machines capable of handling the organization's ever-growing requirements. Following an invitation for bids and an examination of proposed hardware, the ICL 2980 system was chosen and installed in Luxemburg in October 1977. CAP GEMINI SOGETI began its conversion operations in July of that year with a preliminary study, and continued them through 1978, with,converted applications placed in service during the first quarter of 1979.

Complex applications

The technical complexity of this project was bound up with the nature of the applications themselves: two of them, in particular, make use of gargantuan databases - over 1.5 billion characters! - accessible in real time from terminals distributed among various centers in Brussels and Luxemburg.

The Commission of the European Communities conversion involved four main applications:

- *Sabine:* a system for access to the database of product names and terms involved in trade between member nations. The database is consulted and updated in real time from terminals.
- *Cronos:* a system for processing time series applied to member-nations'economic statistics. The statistics database is consulted in real time by means of a dedicated language.
- *Comext:* a set of chains for processing statistics on trade between member nations, and between these and non-member nations. These chains consult the Sabine database and process magnetic tapes in a variety of formats originating in member countries.
- *Paye:* payroll application for Commission employees, unusually complex due to the diversity of regulations and currencies to be taken into account.

To summarize, the job involved a conversion which was made extremely difficult by the interactive nature of applications, by the size and organization of databases, by the variety of languages employed (COBOL, FORTRAN, PL1, CPL1, Assembler), and by the multiplicity of users.

Contractual procedures and techniques employed

Some years ago, CAP GEMINI SOGETI developed tools and methods - gathered under the label of «methodology» - for optimum handling of conversion projects entrusted to the Group. Strictly applied during the European Commission conversion, this methodology had been reinforced to be able to deal with voluminous databases and a real-time environment. The method was thus «generalized», and may henceforth be used for any type of application.

Written contractual procedures make it possible to break the conversion down into successive phases for each chain, permitting very precise project monitoring, each contractual task being followed by an «acceptance».

In the case of the European Commission conversion, four phases had to be defined:

- *phase 0:* installation of software procedures and tools: file converters and comparators, conversion tools such as METACOBOL, and dedicated tools required by the specific environment.
- *phase 1:* preparation of chains for conversion. A set of files, termed the «source standards», is formed for each chain, and includes the source programs to be converted, the test sets for testing them, and the results of chain execution on the test sets. Standards are accepted one by one, with each acceptance authorizing continuation to phase 2.
- *phase 2:* conversion proper, which transforms the «source standards» into their «images» on the target machine, where they become «target standards». These now contain the converted source programs, the test sets and the test results obtained in phase 1. Acceptance of the final «target standard» for each application constitutes provisional acceptance of the application.
- *phase 3:* startup of the applications converted during phase 2. The operational files are transferred to the target machine, and the definitive command language is debugged. Any modifications which could not be made during phase 2 are added at this point, as the application goes on «living» during conversion. Final acceptance is granted after a period of time long enough to allow the user to ascertain that no major errors have gone undetected.

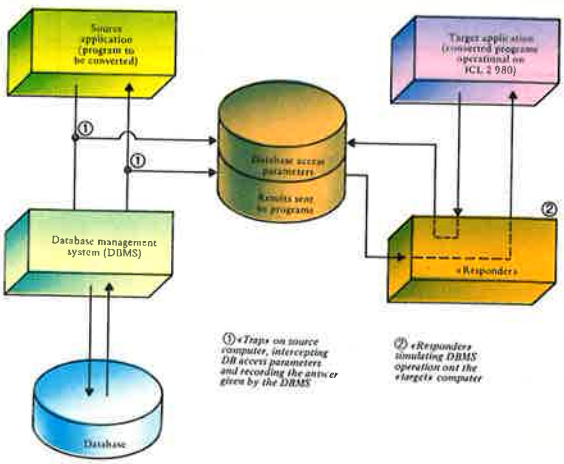
Prof. Dr. Konrad ZUSE
WEST GERMANY

There is no doubt that tomorrow's society is going to make ever-greater use of the computer, and that this will have significant repercussions on both hardware and software. The resulting technical problems will be focussed at the level of communication – or conversion, in the broad sense of the term – between data processing systems and their users, a level at which man-man, man-machine and machine-machine dialog holds a key position.

Are we prepared to solve these problems? We might recall that the computer was initially a tool for calculation, in the hands of mathematicians and engineers, who were led to develop numerical analysis in order to make use of this instrument. It soon became clear that the concept of calculation – or "computing" – had much wider ramifications: set theory, mathematical logic and other theories were to become day-to-day implements used by the entire information processing field. In turn, however, manufacturers flooded the market with systems operating on a variety of conventions, to the extent that "migration" even among a single vendor's computers often poses serious problems. The theoreticians may have made "computer science" (which subsequently become "data processing" and "information technology") a discipline characterized by a high level of mathematical rigor, but practice has not followed suit, unfortunately.

The maxim "in the beginning – of data processing – was the bit" should have been accepted as a fundamental law. As a matter of fact, it

Among the most original software tools used during the Commission of the European Communities conversion are doubtless the "traps" and "responders" used during Phase 2 to avoid database manipulation by simulating their presence.



was on the basis of this precept that the author, encouraged by the development of his first computer model, attempted to introduce a language ("Plankalkul") which is at once universal in its applications and well-founded on theory from the algorithmic standpoint. In this language, the various data structures are built up on the basis of character-oriented models and as components of a tree structure.

In this case, to "compute" is to construct new information by modifying the original data by means of an instruction set. Access is therefore required to any part of one of the structures thus assembled. The instruction (or program, as the case may be) is itself a data structure and may also be subject to data processing. In this context, conversion boils down to preparing a data structure for a system in such a manner that it can be read and processed by another system.

Unfortunately, it was only years later that this logical path was finally taken, with the introduction of algorithmic languages; so today data processing finds itself entangled in a linguistic Tower of Babel.

A consequence of this situation is that dialog, and one of its special forms, conversion, are made far from easy; nor is the creation of new programs a simple matter. We are today in a position where all kinds of initiatives and new developments must be undertaken to make up for thirty years of misdirected effort.

In order to convert applications today, we must naturally make strict use of methods developed for this purpose. Conversion tools will have to be created, but this is only a beginning. In the long run, it will also be necessary to "convert" programming and systems languages. Conversion, in its broad meaning, will in effect become one of the most important and difficult tasks facing data processing, and perhaps even society as a whole.

Because we need – and will continue to need – "conversion" between computers, between corporate services, between government agencies, and so on. Only if we succeed in discovering fast, practical solutions to these theoretical and technical problems will we be able to help make our planet's development a harmonious process.

The emancipation of data processing, in the form of a truly autonomous science whose roots descend into theory and whose branches reach into practice, has yet to become a reality. And Europe, rich in tradition and human potential, could play a vital role in the achievement of this goal.

Five lessons from the Commission of the European Communities experience

- The first lesson is really only a confirmation of what all of the participants knew from the outset: any conversion must be carried out under the strictest standards; under no circumstances may it be viewed as a «minor» DP project to be left to the initiative of a few «experienced programmers».
- Second, the problems raised by the tangled relationships between the user, the manufacturer of the new hardware and the conversion team must be handled by precisely-defined procedures which can help minimize potential conflicts generated by the sometimes touchy psychological ambiency of a hardware replacement situation.
- Third, the fact must be faced that a conversion is always an expensive proposition. There is a strong tendency to underestimate project cost, and excessive optimism should be avoided. In particular, work required both before and following the conversion represents a substantial expenditure, capable of rising to one-third - or even more- of total project cost.
- Software tools are important enough, but this importance should not be overrated; the fourth lesson is that good tools cannot make up for either poor organization or poor technical spadework.
- Fifth and last, it is not generally advisable to convert and improve programs at the same time: this is a sure way to slide into an uncontrollable process. Our counsel is to keep objectives separate, and first convert as rapidly as possible, applying very stringent methods, and then improve.

CONVERSION AND CONVERSATION

In Great Britain, CAP GEMINI SOGETI has supplied a major steel group with a production control system in which the various process control computers must maintain continuing dialogue with the central supervisory processor.

As the computers involved were of different makes, models, and types, the software experts had to design a «permanent conversion» tool whose functions include reception, analysis, translation and forwarding of each message to its proper destination.

POTACHE AND HOPA

CAP GEMINI SOGETI engineers have been closely associated with activities for design and implementation of elements of the French videotex system since its very conception. Disregarding their participation in projects too technical for adequate description in this limited space - such as work on syntax and so on for the Titan operating system - we shall mention only two of their most recent achievements in this field:

- installation on the videotex system of computer-aided instruction courses, POTACHE, currently available in French, English and German;
- implementation of an «information magazine» application (HOPA) which publishes a videotex brochure on hospital services in the Paris region.

Philippe PICARD
Directeur Général, TRANSPAC
FRANCE

It is sometimes easier to gain perspective when viewing a field in which one is not directly involved: in my case, this is applicable to videotex. Videotex – a typical example of personal data processing – is a concept of service which, ignoring its technical aspects, poses problems of a social, economic and legal nature comparable to those which I have had occasion to examine with regard to cable TV.

Videotex involves several categories of agents encountered in any mass media activity:

- "authors": creators and owners of specialized software and databases;
- "publishers and printers": promoters and operators of data processing systems supporting this software;
- "carriers", who must respect government-imposed regulations, as the monopoly-controlled telecommunication channels must be used;
- "suppliers" of terminal equipment.

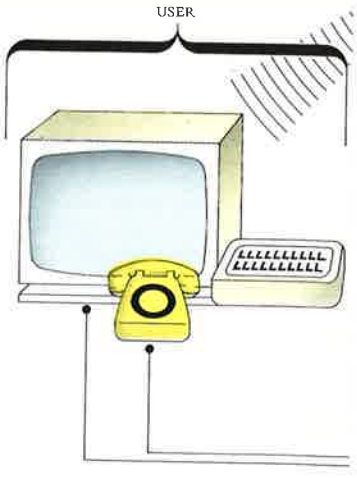
In time, videotex might overturn the established equilibrium of the mass media and have a profound impact upon certain professions and industries. It would be hard to imagine, for example, a videotex system offering an advertisement service (employment, real estate) and broadcasting commercial advertising without some association with the local press. Likewise, sales of leisure activities and travel services through videotex would threaten to set up a new form of competition for travel agents.

The professional ethics applicable to printed journalism (objectivity, right to "equal time") must be transposed to cover videotex, insofar as this service broadcasts information related to general and political news.

Finally, will videotex be a new vehicle for saturating the modern citizen with information or, in contrast, a convivial instrument permitting the voluntary selection of "consumer information" and enhancing communication in urban life?

From the technical and industrial standpoints, the factors required to implement videotex are all present:

There are currently two experimental personal data processing services existing in the world: PRESTEL, in the United Kingdom, and TELETEL in France.



• components for the manufacture of inexpensive terminals,
• satisfactory levels of telephone service,
• networks adapted to the flow of traffic between information providers and access points (TRANSPAC),
• maturity of the software industry.

Are all of these positive factors sufficient to permit a rapid development of videotex? Unfortunately, no: technology is not enough. In point of fact, videotex presupposes the installation of a complex organization that can support effective cooperation between the various parties involved, it must be conditioned by their economic motivation and by the creativity of software producers. This leads us to question the economic viability of videotex: will it be able to survive on purely commercial foundations, with each partner satisfying his economic interests, of course, while fully overcoming the nuisance created by arm-twisting commercials and advertisements?

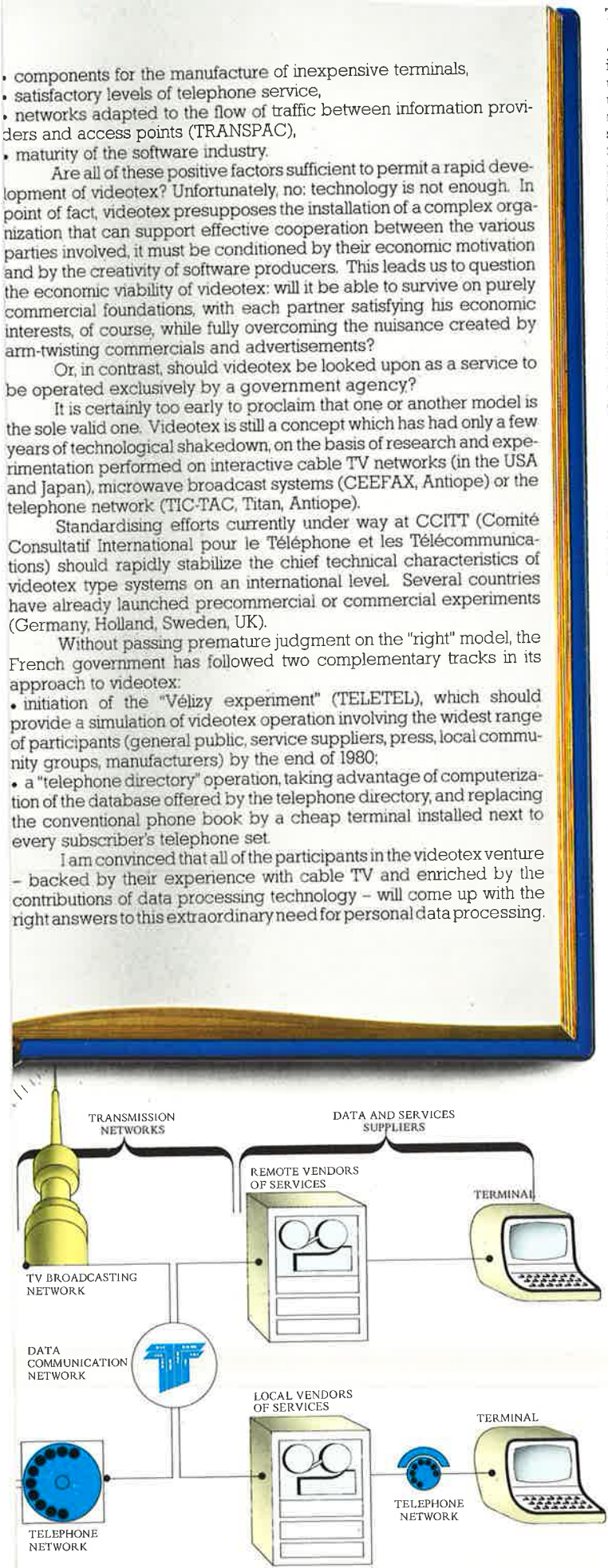
Or, in contrast, should videotex be looked upon as a service to be operated exclusively by a government agency?

It is certainly too early to proclaim that one or another model is the sole valid one. Videotex is still a concept which has had only a few years of technological shakedown, on the basis of research and experimentation performed on interactive cable TV networks (in the USA and Japan), microwave broadcast systems (CEEFAX, Antiope) or the telephone network (TIC-TAC, Titan, Antiope).

Standardising efforts currently under way at CCITT (Comité Consultatif International pour le Téléphone et les Télécommunications) should rapidly stabilize the chief technical characteristics of videotex type systems on an international level. Several countries have already launched precommercial or commercial experiments (Germany, Holland, Sweden, UK).

Without passing premature judgment on the "right" model, the French government has followed two complementary tracks in its approach to videotex:
• initiation of the "Vélizy experiment" (TELETEL), which should provide a simulation of videotex operation involving the widest range of participants (general public, service suppliers, press, local community groups, manufacturers) by the end of 1980;
• a "telephone directory" operation, taking advantage of computerization of the database offered by the telephone directory, and replacing the conventional phone book by a cheap terminal installed next to every subscriber's telephone set.

I am convinced that all of the participants in the videotex venture – backed by their experience with cable TV and enriched by the contributions of data processing technology – will come up with the right answers to this extraordinary need for personal data processing.



THE VIDEOTEX SYSTEM

«Videotex» is an electronic information service which makes use of the TV receiver as its terminal hardware. It may be set up as a «broadcast» system, supported by a TV broadcasting network, or in «interactive» mode, with information carried over the dial-up telephone system. Obviously, videotex - the name appears to be taking on generic weight - is destined to become a major vector in the development of personal data processing. French videotex, designed and operated by the PTT, is based on a technical procedure baptized «Antiope». CAP GEMINI SOGETI engineers have been closely associated with development work on the French videotex system since the very outset of research undertaken by the CCETT (Centre Commun d'Etudes de Télévision et de Télécommunications) in Rennes.

Information in the home

By definition, a videotex service consists of broadcasting or telephone network transmission of information that can be displayed on a home TV receiver. What kind of information? Well, any kind of information that an individual might find useful or necessary in the course of his daily life (not to mention professional applications, which are at least as significant as household ones from the economic standpoint). This means information which is available at the flip of a switch, and continuously updated by the publishing services:
• financial, banking and tax information, stock market prices and economic news, commodities and raw materials quotations, mail-order sales catalogues, loan and real-estate information, etc.,
• weather forecasts, traffic reports, road conditions, etc.,
• sports results, team standings and lineups, horse race results and odds, sweepstakes and lotteries, etc.,
• emergency services and information, doctors, nurses, ambulances, hospitals, fire and police departments, poison information centers, drug counseling, rescue organizations, legal advice, etc.,
• general news, flashes, reports, election results, etc.,
• multilingual TV subtitles for foreigners and the deaf,
• leisure activities, address files, stage shows and plays, transportation timetables, hit parades, best-seller lists, TV and radio schedules, cultural and social events, restaurants, hotels, tourist information, educational opportunities, notebook and desk-calendar functions, etc.,
• advertisements: employment, rentals, general advertising, etc.,

Among the most striking developments projected for the Antiope videotex system, we note:
• teledrafting/electronic blackboard: exchange of drawings, tables and written messages in general will be possible on TV receivers, with simultaneous voice conversation by telephone;
• programmed automatic home recording of selected TV programs (EPEOS system);
• electronic mail: home printout of the latest news, with drawings, using an Antiope receiver and a remote copier connected to either the TV receiver or a telephone;
• home quiz games to be played with a computer via the Antiope decoder;
• videodisk: recording of TV programs, databanks or fixed-image files.

Three components

Schematically, a videotex system that coincides with this definition has three main components: user terminals, communication networks and information providers.

• *The user terminal is basically a color TV receiver* which has been adapted to handle the new home information services. Why adapted? The TV set must be able to receive external signals and send them on to the display tube, but it must also be fitted with special circuits to receive data, decode it and translate it into visual images. This supplementary equipment makes up the «broadcast teletex» receiver. Its modular design enables it either to use data transmitted for other services, or to receive teletext data transmitted by other means.

Technological advances make it possible to prepare for the manufacture of TV receivers already containing an optional, complete teletex receiver built into the set.

• *Two telecommunication networks are - or will be - usable for videotex requirements: the telephone system and the TV broadcasting system,*
- the telephone system, associated with the TRANSPAC packet-switching network, permits asynchronous duplex (two-way) transmission and carries the interactive videotex service.
- the TV broadcasting network, by contrast, is presently a one-way system. Broadcast information is chopped, formed into «packets», multiplexed and placed on a TV-channel carrier signal. At the receiver, a demultiplexer-demodulator extracts information from the video signal as selected by a command entered by the user on his keyboard.

• Finally, *information providers are* organizations offering selective user access to databases stored and updated in source-computers' magnetic memories.

NOTARY PUBLIC OFFICE AUTOMATION IN HOLLAND

If there is one profession that cannot remain unconcerned by the emergence of tools for office automation - and particularly of word processing - it is that of the notary public. After all, what is a notary's essential function if not «word processing»? More precisely the notary draws up and conserves «authentic deeds» empowered to attest to significant agreements arrived at between individuals; he is also involved with gifts, antenuptial agreements, wills, deeds of ownership and conveyance of real estate. Verba volant, scripta manent: it is the notary's task to perform the transmutation to make himself the unimpeachable memory of those crucial phases of social life when property is passed from one set of hands to another.

Thus notaries were among the first to make use of the applications of «automated mail», an ancestor of word processing as we now understand the term. During the fifties, a significant number of notary's offices equipped themselves with «automatic» typewriters whose punched tapes were able to record the texts and forms of legal documents, inserting the specific clauses required to create the text of an absolutely «personalized» document. But, contrary to initial expectations, these devices failed to achieve popularity due to the variety and complexity of the texts involved: going beyond ritual phrases such as «before Mr..... In witness whereof. Reading of this instrument to the appearing party and signing of said instrument by the latter....», there are countless special formulae which cannot tolerate approximation.

This situation was not substantially altered by the appearance of the first automatic typewriters with magnetic memories. As a matter of fact, the complexity of notarial operations required even more sophisticated configurations if any really efficient processing were to be achieved. More powerful central processors were needed to manage more complex, more flexible structures of paragraphs and sentences; storage of a wide range of clauses demanded large memories; they needed to replace removable media (cassettes, etc.) with a memory of greater size which could be consulted from a visual display unit under optimal conditions of ease; and - above all - they needed reliability.

Besides, relatively powerful configurations were required if phases which precede editing itself were to be taken into account. For example, before writing up a deed, the notary must ascertain a large number of facts: the client's legal rights and powers (minority, various convictions, power of attorney, etc.), the origins of ownership (titles presented by the parties, inquiries at the mortgage registry and the survey department), legal, contractual or administrative easements, urban planning certificates, etc.

The NOVIS system

Intended for the 800-odd Dutch notaries'offices, the NOVIS system is structured around the Centraal Beheer's IBM 370/158 computer. The heart of the system is its notarial database and associated management software. Named IMDOC, this software manages data storage and handles database interrogation by notaries who subscribe to the NOVIS service. Implemented by CAP GEMINI SOGETI, IMDOC was particularly designed to manage textual information.

Subscribing notaries are connected to the central computer by a «star» network managed by a CICS teleprocessing monitor. At the other end, each notary's office contains the necessary text processing hardware, including a central processor with a 64 K byte memory, a keyboard, a visual display unit, an external diskette memory and a 45-cps daisywheel printer.

These word processing systems, installed at the facilities of each of NOVIS'subscribing notaries, may be used in three distinct ways:

- connected by the dial-up telephone system to the central configuration's notarial database, these systems may select the desired model document, insert variable data into it and, in return, receive on the local printer the complete personalized version together with associated documents.
- also connected to the central configuration, they permit magnetic memory storage of all kinds of texts to be processed on the central computer and printed out locally at a later date.
- finally, the local equipment can also operate on a stand-alone basis; its software enables it to perform all the usual word processing functions: initial input, storage, updating of contents (deletions, additions, amendments), formatting for specific layouts (makeups, merging of print types, indentation, changes of justification, etc.), paragraph sorting and gathering, merging of scattered texts, and so on.

Yearly cost: $10,000

In an initial phase, which began in 1978, the NOVIS database is handling model contracts related to mortgage loans. Given the fact that there are today some 80 financial institutions active on the Dutch mortgage-loan market, that each of these organizations offers a choice of an average 16 contract models of this type, and that the wording of these models is frequently amended, NOVIS'success on this market is understandable: over 25% of all Dutch notaries had requested connection to the system by the end of 1978.

Louis NAUGES
Consultant,
FRANCE

Just what does the term "office automation" stand for? Nothing more than a revolution on the verge of explosion in the office world, the eruption of new microprocessor-based, telecommunications-routed technologies.

The only tools currently used in the office are the typewriter, the telephone and the copier. A 1976 study carried out in the USA indicated that each office worker had access to about $2,300 worth of equipment (including data processing hardware), whereas an industrial worker had access to $31,000 worth, and a farmer... $53,000: twenty-three times the value of equipment made available to his office counterpart! In an era where the average cost of an employee is increasing by 10 % annually, while the cost of magnetic storage is falling by nearly 40 % each year, this undercapitalization in the office is reflected in a continuous increase in corporate information processing costs. The resulting capital requirements are enormous: a 5,000 employee company which merely doubles the $2,300 figure mentioned above is faced with an investment of well over $ 10 million.

A company deciding to develop its office automation system will attempt to achieve the following two goals:

- improved efficiency of executives and decision-makers. Who has not been stunned by the results of a study on use of the most valuable resource available: time?
- increased efficiency of information suppliers and processors, whether secretaries, documentalists or messengers.

In order to attain these goals, companies must place priority on the acquisition of word processing (WP) systems, interconnected to form an internal electronic mail system. These systems are currently undergoing remarkable development in the USA where 50,000 VDU equipped WP systems were sold in 1978, while the lag in Europe–and particularly in France–is becoming a matter for concern (only 300 VDU type WP systems were installed in France as of the end of 1978).

In view of the changes now taking shape, what role is to be played by DP professionals and service companies? Because of their familiarity with the techniques, concepts, and methods required for the success of WP systems, computer professionals–if they can grasp the differences, as well as the similarities, between DP and WP–have

najor tasks before them; new and very rewarding career opportunities should await them in office automation.

And what about service companies? In many cases, corporations acquiring office automation systems will need to call upon service firms for assistance, as they will only rarely have the human, technical or methodological resources required to get their systems up and running.

The larger service companies might provide them with:

- an understanding of required hardware and techniques (particularly for networking),
- experience in the management and supervision of large projects, with progress schedules spread over a number of years,
- potential for construction of application-dedicated "hardware plus software" systems, particularly in the case of state-of-the-art office automation systems.

Does this mean that data processing service firms need only put on a different hat to become "office automation service companies"? The answer to this question is clear: operations in office automation will be very different from those implemented in data processing, including a marked increase in consulting services for organization, training and assistance to management regarding the structural and job-content changes brought about by office automation. In many instances, computer service companies will be obliged to invest in the development of general-application WP products (teleconferencing systems, electronic desk diaries, etc.) or sector-oriented products (for insurance brokers, notaries, etc.) which may subsequently be marketed in volume. A service company's solidity and financial strength will thus be major advantages when it comes to tackling the massive office automation market. Moreover, new markets will appear for both machine-based (custom WP, phototypesetting, etc.) and professional services.

In conclusion, two ideas should be borne in mind:

- Corporations must already start taking steps in preparation for the profound changes to be engendered by the development of office automation, changes affecting structures, jobs, and people. Very large investments will be required in order to achieve a substantial increase in the productivity of information managers, an essential prerequisite for continuing competitiveness of companies in industrialized nations now entering the post-industrial era, called by some the "information age".
- The requirements for assistance and advice generated by these changes will offer fresh and promising prospects of growth and development in the office automation sector to those computer service companies which have made timely adjustments and which possess financial and human resources adequate for the task ahead. One figure is eloquent: the volume of textual information processed in a typical company is three to five times that of digital information, the only type that data processing has concerned itself with up to now.

We might note that average annual cost per notary's office at the beginning of 1979 was $ 10,000, including rental of the site-installed word processing system, central processing, average telephone consumption, system maintenance and office personnel training.

FINANCIAL INFORMATION

The BOSSARD Group has completed the study of the reorganization, by means of office automation, of a company whose activity involves updating the history files of events related to 120,000 real estate properties and providing the company's customers with all corresponding information.

Basic items of information (numbering some 30,000 yearly), gathered from press articles or specialized published sources and from surveys, will be input in conversational mode. On the basis of this information, each workstation through its visual display unit will permit staff to consult and perform the necessary operations (layout, typesetting, paging) to print the company's publications.

Expected productivity gains are considerable, but the development of such a project is above all justified by gains in speed and reliability, particularly because the system eliminates intermediate copy operations.

INNOVATIONS

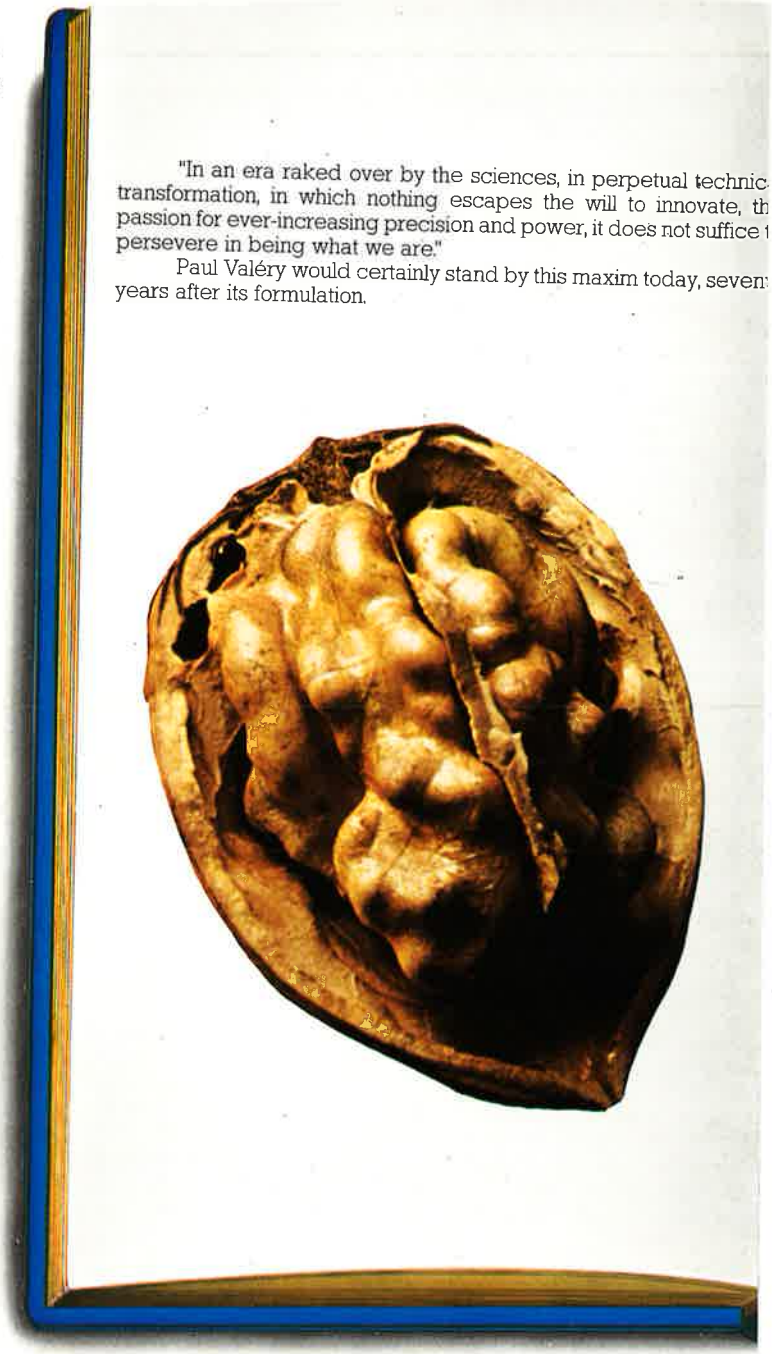
Tony Stewart (GEMINI UK) applied a multithreading technique to a small computer, thereby permitting simultaneous management of 20 display screens, without which the application (real-time order management) would not have been implemented.
Instead of consulting the screens one at a time, this procedure scans the contents of all screens simultaneously, thus cutting down substantially on response time. For all practical purposes, this small system operates in a multiprogramming mode, usually reserved for mainframe operations.

Jean-Paul Laroche (CAP SOGETI SYSTEMES) fortified by his experience with development of RTX 25 network connection software, specified a universal end-to-end protocol capable of supporting exchanges of all types over a data transmission network. Performances (including workload, memory size and volume of traffic generated) are excellent, and some of the guidelines followed by this system were presented at the 1978 International Data Processing Convention in Paris.

Denis Largillière (CAP SOGETI SYSTEMES) in the field of computer-assisted instruction designed and developed a generalized lesson-generating tool on a machine with graphics capabilities. Requiring only a few minutes of familiarization, this tool enables a non-programmer to «feed» the machine with the lesson which it is subsequently to administer to the pupil.

"In an era raked over by the sciences, in perpetual technic transformation, in which nothing escapes the will to innovate, th passion for ever-increasing precision and power, it does not suffice t persevere in being what we are."

Paul Valéry would certainly stand by this maxim today, seven years after its formulation.



Uwe Petersen (CAP GEMINI DEUTSCHLAND) invented a method for calculating the optimum dimension of file pages in a virtual memory system. On the basis of this method, Petersen designed a control circuit for a small business-oriented computer which determines this dimension for each user program. This development, which will enhance the performances of an entire computer range, is now being patented.

Sheila Macpherson (GEMINI UK) has discovered a means for remote detection of basic software faults for a computer model, thanks to creation of a database containing known failures, symptoms and remedial actions. When a computer misbehaves at a user site, the customer engineers note the symptoms and interrogate the remote database for information concerning causes and remedies. This facility has the effect of substantially reducing the «mean time to repair».

It does not suffice to persevere in being what we are... While roductivity in the Western economies is increasing by only 2 % nnually, productivity in data processing hardware is galloping along t a yearly rate of 25 %. Software, a hand-made product, will have to aintain a pace of 10 % if all of that hardware is to be good for anything.

At this rate, the exercise of "disciplined intelligence" alone is no onger adequate. For software to keep up the pace demanded of it, we ust also expand sources of enhanced productivity by a great many ndividual and "undisciplined" innovations.

Obviously, high-quality computer service companies offer ertile ground for innovation. The wide range of situations service-firm echnicians encounter coupled with the DP professional's proverbial aste for diversity, give rise to many fresh ideas which may be imple- ented to everyone's satisfaction.

Valéry also wrote: "The idea arrives by unmarked roads and hrough uncontrolled events: what we lack is the theory behind the heory". Even so, the innovations chalked up by CAP GEMINI SOGETI rofessionals allow us to guess the paths by which their imaginative hought has contributed to advances in software:

- application of a new theoretical concept (e.g., a method of calcula- on), reported in the scientific literature, to a "specific" case (user roblem or basic software function);
- effort toward implementation of a major goal: creation of hardware- ndependent software, with ease or automation of use carried to the xtreme. This effort might find expression in systematic application of he "programmable control logic" concept;
- application of techniques used in design of major new systems to maller or older hardware configurations, or to existing software;
- creation of new functions for addition to existing software, thereby xpanding its area of use;
- contribution of original solutions that make a problematic user appli- ation "computerizable" at suitable levels of profitability, response ime and processing ease.

These achievements explain why CAP GEMINI SOGETI pecialists play an active part in the proceedings of research groups in number of Western European countries. There they have the oppor- unity – and the honor – of representing a diversified experience in the oftware field in gatherings of basic and applied research specialists rom other domains of science and technology.

The «International Purdue Workshop on Industrial Computer Systems» *is known as one of the world's most dynamic research groups. It encompasses several dozen technical committees established in Japan, the USA and Europe. CAP GEMINI SOGETI is a participant in the committee on operating systems, whose activity is aimed at standardization of minicomputer system nuclei. Through its specialist* **Jean Robert (CAP SOGETI LOGICIEL),** *the Group chairs the LTP-E (Long-Term Procedural Language-Europe) Committee, which is engaged in development - on behalf of the European Communities - of the US Department of Defense's gigantic ADA project for a high-level language and a complete set of software tools.*

Claudine Bapst (CAP SOGETI SAISIE), working closely with the electrical engineering departments of SNCF, the French national rail system, implemented the acquisition of SNCF signal-station circuit diagrams on magnetic tape. Raw information is frequently in the form of hand-sketched schematics; the final product is a cable-laying plan.
This achievement may be attributed to an in-depth analysis of technological constraints bound up with the use of electrical components and with interconnection logic. Rigorously superimposing these two types of constraints, the acquisition procedure is able to enter, on tape, all data required for output of master cabling plans.

Antoine Jordan-Meille (CAP GEMINI SUISSE) designed and developed a building management program product for real estate management firms. Running on a small computer, this package can be installed at a new user's facility in four hours, regardless of hardware configuration.
In this system application programs translate only the processing logic; all variables (data, display screen masks) are stored in files external to the program. Thanks to this procedure, the software package may be run on other computers in the same range, implementation is rapid and use is simplified to the extreme (immediate file or mask change).

Ray Weston (GEMINI UK) conceived and implemented a system which, based on existing process control installations, can automatically furnish a continuous status report on chemicals plant operation. Currently in use in Great Britain and Germany, this system provides management with the advantages of up-to-date processing techniques without modification to existing control equipment, thanks to a particularly ingenious software architecture and development.

Duong Phan Huy (CAP SOGETI GESTION) developed a methodology intended for small business management applications, based on the «dictionary» concept:
- data dictionary, in which all company information is accurately registered. This is the basic reference source for all system users;
- report dictionary: this is a summary of the outputs, as well as a guide for analysis and programming;
- dictionary of calculation and management rules: a precise summary of the application's logical operations.

Application of this concept made it possible to systematize the performance of small-business data processing projects and thereby efficiently monitor their development.

Jean Harivel (CAP SOGETI LOGICIEL) recalling an article published in the Association for Computer Machinery Journal, offering a theory on character substring searches within longer strings, applied this theory to enhance the performance of CAP GEMINI SOGETI's MULTILIB librarian program product.
MULTILIB makes use of the character search function for a variety of text editing commands. The new algorithm involves a check for presence of a string character within the substring, repeating this check by successive increments equal in length to the desired substring.

CAP GEMINI SOGETI ORGANIZATION

The organization of the Group has been based on three guidelines:

- to provide operational decentralization by country and by type of activity, in order to give corporate decision-makers all the resources required for rapid, effective reaction to market demands and technical developments,
- to maintain overall coherence by defining a common policy, and to ensure that corporate structures are continuously adapted both to this policy and to momentary constraints. This is effected by staffing the parent company with a team which, while small, is in close touch with the inner workings of the operational subsidiaries,
- to prepare for CAP GEMINI SOGETI's development:
- first, development on the major international markets: not only by emphasizing export as a natural supplement to a domestic activity, but also by strengthening the Group's European and American presence by means of wholly-owned subsidiaries and by establishing cooperative ties with numerous non-Western nations,
- next, technical development, by investing in fields which show future promise for service activities.

In the application of these ideas, CAP GEMINI SOGETI's activities have been allocated among its member divisions and companies (illustrated in the flowchart, opposite) as follows:

IN FRANCE

where the Group's establishment dates back the longest (1962), functions are primarily divided by type of activity. Within the principal activity - «Consulting and Software Services» - companies are specialized by major market.

Thus:

- CAP SOGETI GESTION devotes its resources to consulting and implementing business and industrial applications: in Paris, for the private sector, and throughout regional France for all DP users. Since its establishment, CAP SOGETI GESTION has opened ten branches in regional France (Bordeaux, Grenoble, Lyons, Marseilles, Nancy, Nantes, Orleans, Roubaix, Rouen, Toulouse) and eight in Paris.
- CAP SOGETI LOGICIEL specializes in basic software, industrial and military systems software, implementation of certain highly-complex systems, and development and marketing of software products.
- CAP SOGETI SYSTEMES is active in the computerization of the Paris financial sector (banking, insurance), as well as in major government agencies and public-sector corporations. In particular, CAP SOGETI SYSTEMES contributes to the research programs set up by the French government for expansion of the scope of data processing applications.
- SORINFOR is the single company of the CAP GEMINI SOGETI group offering computer-based services. It has a high-performance computer center in Paris, connected to a powerful data communications network. This company now handles complex operations (facilities management and large database management).
- CAP SOGETI EXPLOITATION offers its extensive capabilities in consulting and assistance in computer operations for customers in Paris, Lyons and Toulouse.
- CAP SOGETI SAISIE and SESI have opened 11 data entry centers featuring the most up-to-date hardware in the Paris region, Bordeaux, Grenoble, Lyons, Marseilles and Montpellier.
- CAP SOGETI PRODUITS markets high-quality system software products throughout France.
- CAP SOGETI FORMATION organizes high-level seminars. It also designs and implements training and personnel selection operations.
- CAP SOGETI LGD develops and markets application software primarily tailored for medium-sized and small users.
- GROUPE BOSSARD and its subsidiaries offer organization services and consulting in corporate management, communications and marketing, and social relations.

OUTSIDE OF FRANCE,

functions are allocated on a geographical basis; within individual operational companies, branches are either regional, specialized by economic sector or specialized by activity.

Thus:

- In Western Germany, CAP GEMINI DEUTSCHLAND has opened four branches: one in Berlin, one in Düsseldorf for management applications, a second one in Düsseldorf for technical applications, and one in Münich.
- in Belgium, CAP GEMINI BELGIUM operates out of three agencie one in Brussels for the public sector, a second one in Brussels for the private sector and one in Antwerp.
- In the United Kingdom, GEMINI Ltd is established in London and Manchester with a«business applications» and an «industrial applications» branch in each city.
- Group activities in Holland are carried out by two operational companies: CAP GEMINI NEDERLAND in Utrecht and PANDATA in The Hague (Rijswijk).
- In Sweden, BRA has a seven-branch structure: five regional branches in Stockholm, Göteborg, Karlskoga, Sundsvall, Malmö, and two for specialized systems and for products.
- In Switzerland, CAP GEMINI SUISSE has two branches in Zürich and one each in Basel, Geneva and Lausanne.
- And in the USA, a youthful CAP GEMINI USA is building up its Washington, D.C. branch.

Under the overall authority of the Board of Directors, this organization is managed, supervised, coordinated and guided by th following bodies:

- the Executive Committee, whose monthly meetings, presided over by Executive Chairman Serge Kampf, are attended by six other Group executives (Messrs. Michel Berty, Michel Jalabert, Alain Lemaire, Jean B.Renondin, Daniel Setbon and Christer Ugander). It makes all major Group-related decisions and defines overall Group strategy.
- the General Management Committee, essentially made up of the managers of the major operational units. Meeting quarterly, it offe advice on general guidelines and rules on all matters pertaining to inter-company relationships.
- the Operations Committees, which meet weekly in France and monthly outside of France, coordinate activities among the various units, ensure their cooperation and lay down guidelines for short and medium-term marketing operations.

Moreover, an annual «Rencontres» brings all managers, senior engineers, and administrative staff of all the CAP GEMINI SOGETI companies together with a few guests and friends for three days of sessions dealing with a topic of mutual interest. After the 1977 «Rencontres» in Amsterdam, and the 1978 one held in Munich, the next one will take place in Monte Carlo in June 1979.

ORGANIZATIONAL CHART
AS OF MAY 1st, 1979

CAP GEMINI SOGETI S.A. (1)

Serge KAMPF*
Executive Chairman

Philippe DREYFUS*
Vice Chairman

Jean-Baptiste RENONDIN*
Vice Chairman

Michel JALABERT*
Vice President

Daniel SETBON*
Financial Director

Gérard Dubois
Pascal Giraud
Philippe Hennequin
Hervé Marin
Bo S. Söderberg
*Jean Vacheron**

GROUPE BOSSARD S.A. (2)

BOSSARD COMMUNICATIONS

Jean BOSSARD*
Chairman

BOSSARD INTERNATIONAL (B.I.A.)

Yves BOSSARD*
Chairman

BOSSARD CONSULTANTS

Jean-René FOURTOU*
President

DIVISION "U.S.A."

Leonard JACOBY*
President

CAP GEMINI U.S.A.

Gerald F. HICE
General Manager

DIVISION "CONSEIL EUROPE"

Christer UGANDER*
President

Jean RONCERAY*
Administrative Manager

Harry KOELLIKER*
Financial Director

CAP GEMINI NEDERLAND

Chris Van BREUGEL*
General Manager

CAP GEMINI BELGIUM

Jean MILAN
General Manager

CAP GEMINI DEUTSCHLAND

Werner WIESEHAHN
General Manager

PANDATA (HOLLAND)

Aad UIJTTENBROEK
General Manager

GEMINI U.K.

Peter W.M. OODDS*
General Manager

BRA (SWEDEN)

Sam MÖLANDER
General Manager

CAP GEMINI SUISSE

Werner ZÜLLIG*
General Manager

DIVISION "CONSEIL FRANCE"

Edouard BAZEILLE

Michel BERTY

Alain LEMAIRE

CAP SOGETI LOGICIEL

Edouard BAZEILLE*
President

Jean-Paul FIGER*
General Manager

Gilbert ELOIRE
Deputy General Manager

CAP SOGETI PRODUITS

Philippe de BEAUCHAMP
Manager

CAP SOGETI SYSTEMES

Alain LEMAIRE*
President

Francis BEHR*
General Manager

Jean-Jack LOUDES
Deputy General Manager

CAP SOGETI FORMATION

Alain LEMAIRE*
President

Cornel SIMIU
Manager

CAP SOGETI GESTION

Michel BERTY* *President*

Jacques BERTHELOT
Division Manager

Serge COLLIGNON
Division Manager

Daniel DELEERSNYDER
Division Manager

Robert DUNAND
Division Manager

Hervé JAHAN
Division Manager

Patrick LUCAS
Development Manager

CAP SOGETI LGD

Michel BERTY* *President*

D.T.E.S. (3)

José BOURBOULON*
President

SORINFOR

José BOURBOULON*
President

Jacques FLEURY
Sales Manager

CAP SOGETI EXPLOITATION

Rémi DONNEAUD
President

CAP SOGETI SAISIE

S.E.S.I.

André PONCHARD
General Manager

Members of the Board of Directors

Serge Kampf
executive chairman
José Bourboulon
Yves Bossard
Cisi s.a.
Philippe Dreyfus
vice chairman
Michel Jalabert
Michèle Kampf
Patrick Nollet
Jean-B. Renondin
vice chairman
Daniel Setbon

*MEMBER OF THE GENERAL MANAGEMENT COMMITTEE

(1)' Capital owned by:
- *Serge KAMPF* 50,6 %
- *Other Managers* 5,4 %
- *Jean-Charles LIGNEL* 10 %
- *CISI (Compagnie Internationale de Services Informatiques)* 34 %

(2)' Capital owned by:
- *CAP GEMINI SOGETI* 51 %
- *Jean BOSSARD* 24,5 %
- *Yves BOSSARD* 24,5 %

(3) Division "Traitement, Exploitation, Saisie" (Computer-based services).

As early as 1968, CAP GEMINI SOGETI laid the foundations of its internal management structure, and since that time the stringency and the reliability of this organization have contributed, and continue to contribute to the Group's survival and its expansion.

The system is a «mixed» one, seeking to reconcile a high degree of delegation of responsibility with rigorous centralized control.

The cornerstone of the system is the budget estimate combined with permanent budgetary control.

General Management lays down qualitative and quantitative targets in line with its general development policy; these targets are expressed in terms of annual spending and revenue objectives, which are then discussed and approved by the General Management Committee, and they amount to commitments entered into by each operational head.

The results obtained are audited monthly, compared against initial estimates, centralized for CAP GEMINI SOGETI as a whole and consolidated.

To achieve effective internal control and methodological uniformity, the Group has prepared a series of instruction and procedural handbooks, which have been translated into several languages, for staff use.

Materially speaking, production control and the required management syntheses and financial statements are processed - naturally - by a CAP GEMINI SOGETI - developed computerized system.

Turning to people, now, devising lightweight yet flexible structures was a major task. It is important to take into account the possible incidences of conflict between the autonomy of the individual unit - which is indispensable - and the commanding need for control. The job of optimizing these apparent incompatibilities is handled by the management comptrollers' and internal audit departments.

Lastly, these methods have enabled the Group to refine its consolidation statement techniques while preserving a certain degree of stability in the principles underlying their preparation. In 1976 we gradually began introducing International Accounting Standard Committee standards to the internal accounting procedures, while at the same time retaining the services of an international audit firm (McLintock Main Lafrentz) to conduct external audits on all CAP GEMINI SOGETI firms.

REPORT OF THE AUDITORS ON THE CONSOLIDATED FINANCIAL STATEMENTS

We have examined the consolidated balance sheet at December 31, 1978 of the CAP GEMINI SOGETI Group. Our examination was made in accordance with generally accepted auditing standards. For certain subsidiaries, representing together 27.2% of the total consolidated assets of the Group, the financial statements have not been examined by us. We have, in those cases, relied upon the opinions expressed by other auditors in their reports.

In our opinion the consolidated balance sheet presents fairly the financial position of the Group at December 31, 1978, prepared in accordance with the recommendations of the International Accounting Standards Committee.

We were not required to examine the consolidated balance sheet at December 31, 1977, and we are not therefore in a position to express an opinion on the consolidated statement of income or on the consolidated statement of changes in financial position for the year ended December 31, 1978.

We would add that the consolidated financial statements expressed in U.S. dollars have been translated from the consolidated financial statements expressed in French francs by applying the exchange rate at December 31, 1978 of U.S. $ 1 = French francs 4.18.

In order to facilitate an appreciation of these consolidated financial statements, this same exchange rate has been applied to both 1977 and 1978.

April 12, 1979.

Jacques BOURGUIGNON
Bernard PUGNIET

Commissaires aux Comptes inscrits
Compagnie de Grenoble.

McLINTOCK MAIN LAFRENTZ & Co.

McLintock Main Lafrentz & Co