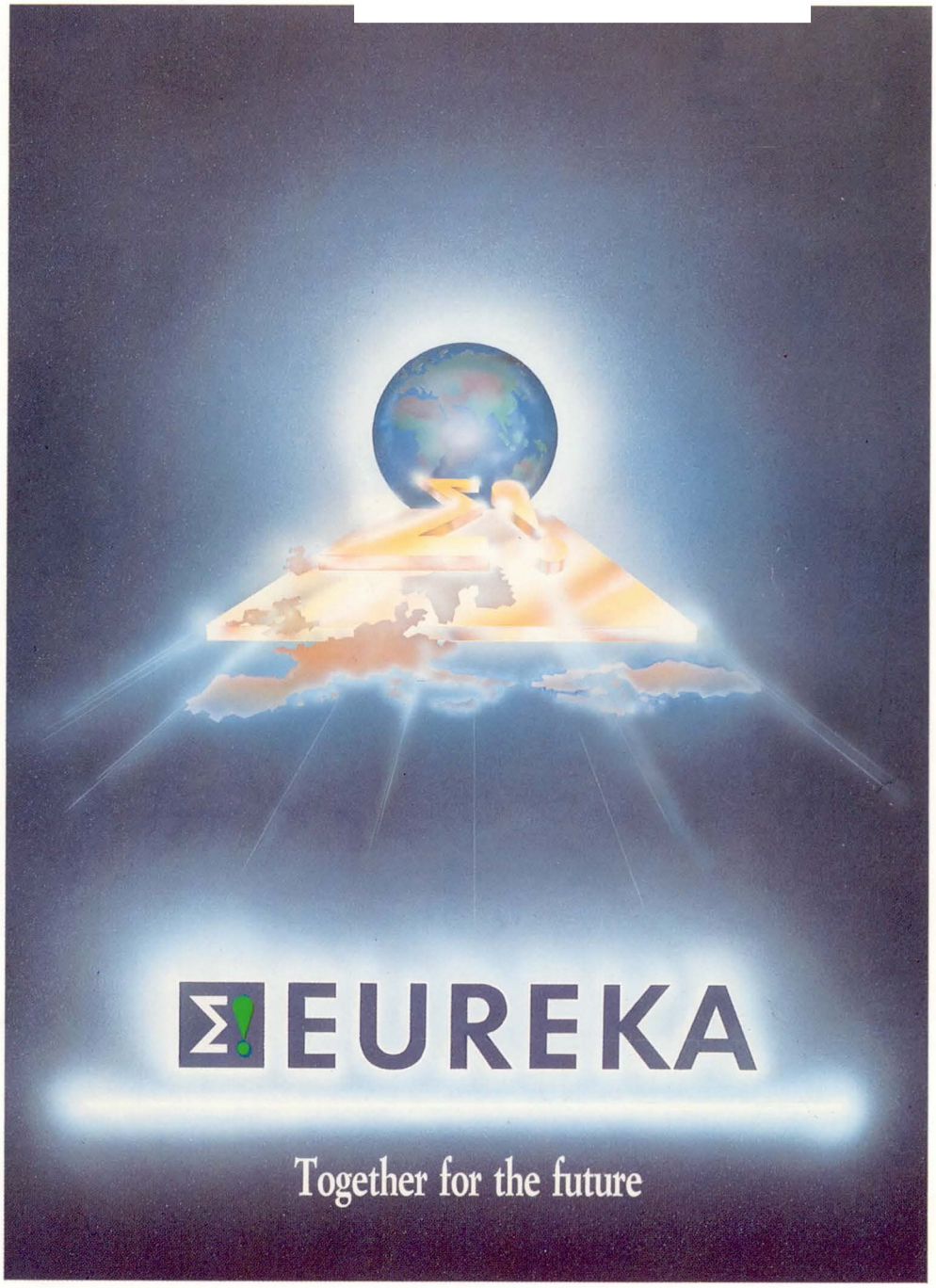

1989
PROJECT PROGRESS REPORT

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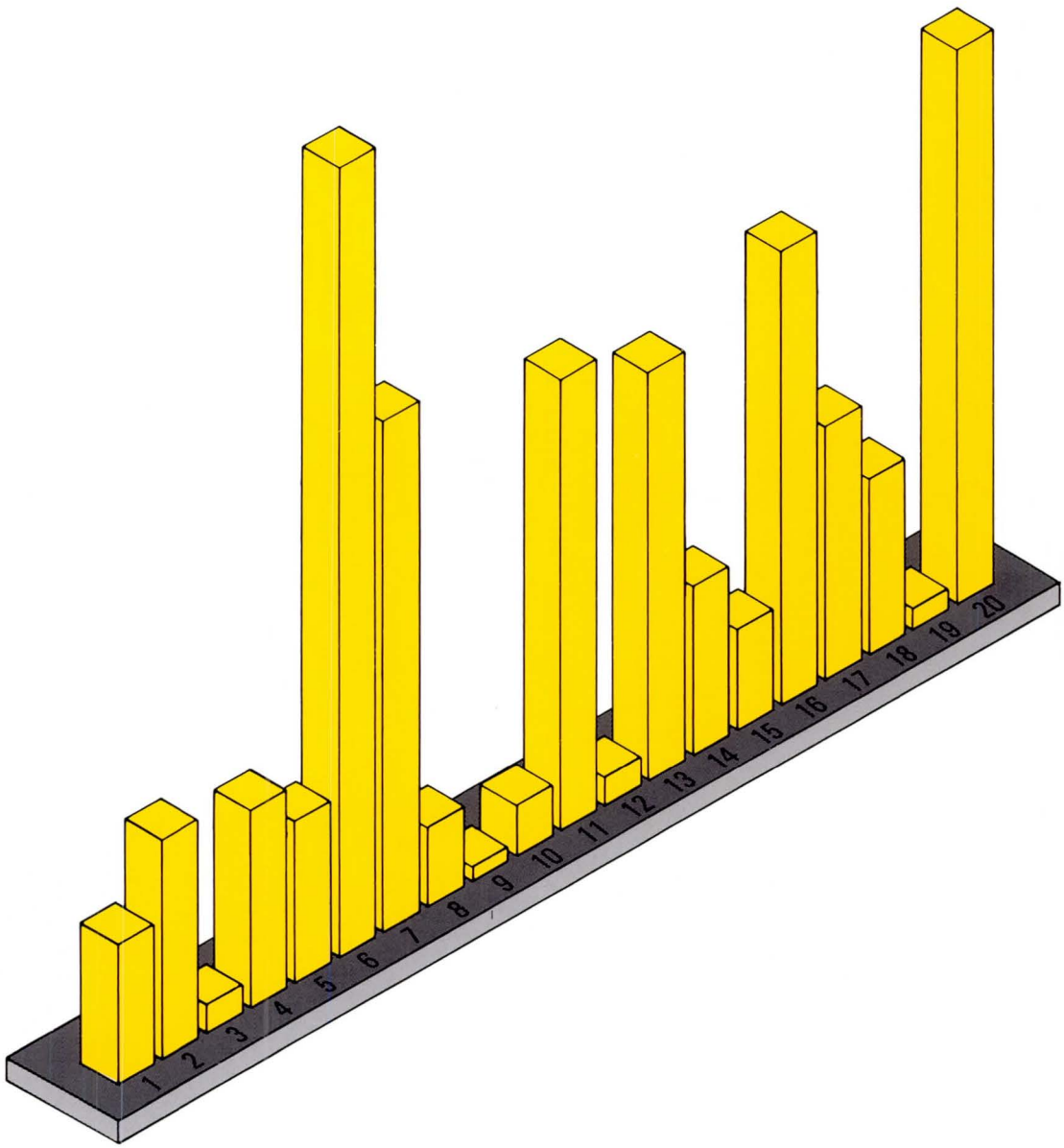

PROJECT PARTICIPATION BY MEMBERS

1. Austria-19
2. Belgium-30
3. CEC-4
4. Denmark-27
5. Finland-22
6. France-108
7. Germany-70
8. Greece-11
9. Iceland-2
10. Ireland-7
11. Italy-62
12. Luxembourg-4
13. Netherlands-56
14. Norway-23
15. Portugal-14
16. Spain-62
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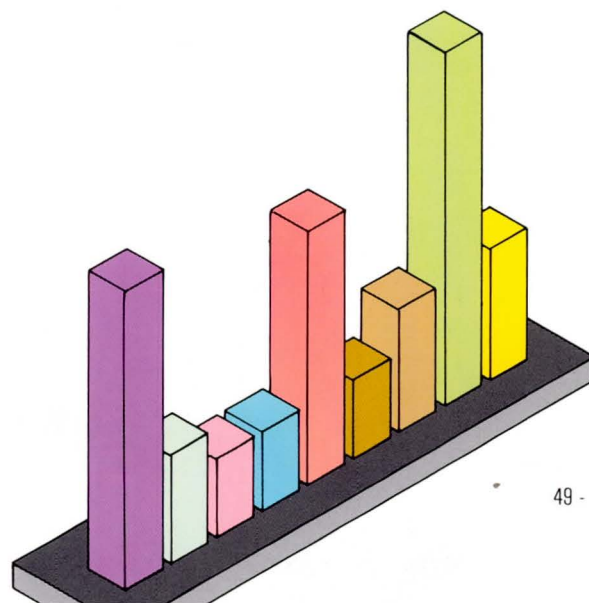
19. Turkey-3
20. United Kingdom-76



NUMBER OF PROJECTS PER AREA

41 - Medical-and Biotechnology
15 - Communications
11 - Energy Technology
11 - Environment
35 - Information Technology
11 - Lasers
17 - New Materials
49 - Robotics and Production Automation
18 - Transport

TOTAL : 208

EUREKA was launched in 1985. Its objective is to raise the productivity and competitiveness of Europe in the fields of advanced technologies through collaboration among enterprises and research institutes.

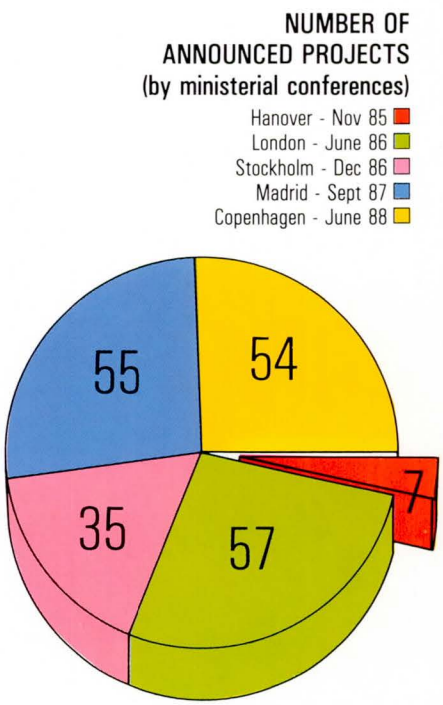
This annual report provides a description of the projects announced up until June 1988, the 6th Ministerial Conference in Copenhagen.

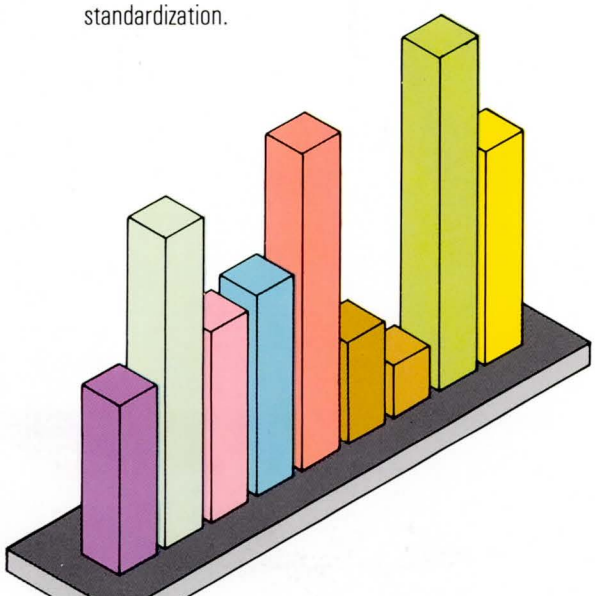
The over 200 projects covered in this report have a total estimated cost of 4900 million ECU and involve over 1200 participants, 550 larger companies, 230 SMEs, 370 research institutes including universities and 60 other organizations. 13 organizations come from non-member countries.

The projects mainly relate to products, processes and services in the fields of advanced technologies, but they also include research and development for modern infrastructure, for solving crossborder problems and for improving the quality of life.

The supportive measure requests so far received have been mainly in the area of standardization.

NUMBER OF ANNOUNCED PROJECTS (by ministerial conferences)





TOTAL COST BY AREA (MECU)

- 434 - Medical-and Biotechnology
- 809 - Communications
- 494 - Energy Technology
- 523 - Environment
- 820 - Information Technology
- 269 - Lasers
- 136 - New Materials
- 875 - Robotics and Production Automation
- 559 - Transport

TOTAL : 4919

PROJECTS

In this section the 208 announced projects are classified into 9 technological areas. An overall description is given of the ongoing work and on the supportive measure requests already formulated.

Supportive measures

The successful development and implementation of the results of EUREKA projects may require certain «enabling conditions» to be met which are beyond the capabilities and influence of the project participants themselves.

This is where the concept of «supportive measures» is important. The process is «bottom-up», beginning with the identification of project needs, but the fulfilling of the conditions may require action by governments and international bodies.

Gas turbine projects predominate, with applications ranging from small car engine turbines to large ones for electricity supply or marine propulsion. Most of these projects involve new materials, e.g. ceramics, or electronic control reducing turbine weight and increasing efficiency and speed. This will also reduce fuel consumption or pollution.

Two projects aim to substantially reduce the costs of *drilling hydrocarbon* wells by combining new materials and advanced technologies such as robotics and artificial intelligence. Two other projects are in the field of *power plants*. One is for the development of a commercial scale solar energy demonstration plant rated at 30 MW, which goes one step beyond the existing research and test plants. The other aims to build a compact non-polluting 300 MW coal-fired power station which in economic terms meets the most stringent environmental requirements, even using fuels with a very high sulphur content.

The remaining projects all share the aim of increasing the efficiency of existing systems, while reducing costs and minimizing side-effects. Among them, one aims to build and thoroughly test prototypes of very high power hydraulic transmission systems, with a rating of up to 5.5 MW-roughly 3.5 times the power of the largest hydraulic machinery yet built. Another one includes the use of amorphous silicon in photovoltaic cells for autonomous electric power supply. The other projects are intended to develop a new concept in uninterrupted power supply; new designs and technologies for high power semiconductor devices; the research, development and industrialization of absorption heat pumps and heat transformers for industrial use and high power applications; and to create an integrated electric drive for home automation.

Lastly there is a project for developing hydrogen-powered buses and lorries, taking advantage of seasonal and weekly electricity surpluses. These vehicles will kill three birds with one stone, by using the seasonal storage of energy, substituting fossil fuels and reducing environmental damage, especially in urban areas.

PROJECTS: 11
TOTAL COST: 494 MECU
MAIN SUBJECTS:
- Gas turbines
- Drilling of hydrocarbon wells
- Power plants
- Energy saving machinery

MEDICAL-AND BIOTECHNOLOGY

21 projects are directly or indirectly linked to *medical technology*. Biotechnology projects cover both clinical and diagnostic applications touching upon a range of diseases. Two projects involve R&D on cancer detection and treatment. Three deal with sexually transmitted diseases. And others aim to develop a malaria vaccine, advanced diagnosis and treatment of diabetes, allergies and high blood pressure. Further work is in progress on a variety of different aspects such as:

- an expert system for health examination;
- the electronic identification of blood bags;
- the functional restoration of the ability to walk by implanted - neurostimulation;
- bio-medical sensors;
- new biocompatible ceramics.

There are 12 projects in the *agro-biotech area*, some involving genetic engineering to improve the quality and disease-resistance of plants such as the sunflower, the tomato and corn. Others deal with the production of growth promoters and natural flavours. Last but not least, work should be mentioned on the development of new sparkling beverages.

8 of the biotechnology projects have primarily a *production methods orientation*. Several of these projects centre on process applications, such as the high volume production of animal and/or human cell cultures, antigen marking and filtration/separation techniques. Another project deals with separation processes functioning under zero gravity conditions (e.g. as in space), another with an automated and programmable laboratory for work with DNA (analysis, hybridisation, cloning, sequencing, etc.).

PROJECTS: 41
TOTAL COST: 434 MECU
MAIN SUBJECTS:

- Diagnosis and treatment of diseases
- Genetic engineering of plants
- Biotechnological production processes

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COMMUNICATIONS

PROJECTS: 15
TOTAL COST: 809 MECUs
MAIN SUBJECTS:
- Standards/Norms
- Specific Systems Improvement
- Networking/Systems Integration
- Communication Techniques
- High Definition Television

Although most of the projects in this area at least touch upon aspects of standardization, 5 projects aim explicitly at developing or preparing *standards*. Two of these use the Open Systems Interconnection (OSI) reference model as a basis: one project tries to set up a Europe-wide network of public and private research centres, which can cope with the diversity of information technology equipment installed via open (i.e. non-manufacturer based) standards, and to develop and test new communication services. The other project deals with communications security, which is becoming increasingly important as the use of open networks grows.

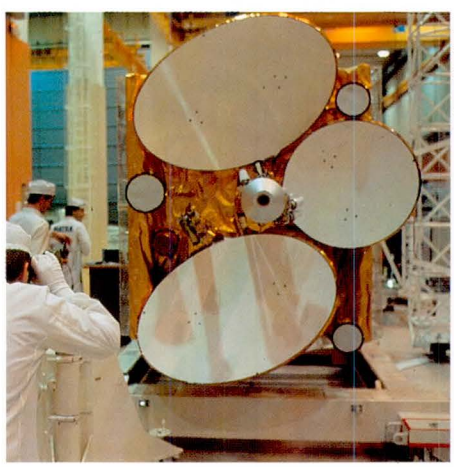
A further project studies the technical feasibility of a digital audio broadcasting system, and the remaining two deal with specific problems of developing algorithms for speech coding/decoding schemes and bit reduction respectively.

The six projects in the second group, *specific systems improvement*, deal with a wide range of specialized applications:
- stereophonic sound reproduction ;
- the development of a more sophisticated telephone ;
- process improvement for vacuum processes in the semiconductor industry (this latter project is hence also related to the area of robotics and production automation) ;
- the synthesis of computer images ;
- computerized information exchange in the context of large industrial co-operation activities ;
- combining image generation by computer with computer-assisted live shooting techniques in TV and video production.

Two projects aim at *networking/systems integration* for real-time process and machine control using industrial local area networks (LANs), and for private communication within and outside the home.

Two projects in *communication techniques* deal with problems of high bit-rate (up to 2.5 Gigabit/second) optical transmission systems.

The remaining communication project relates to High Definition Television, both in terms of developing production and broadcasting standards and of the operational equipment for the next generation of TV.



***Supportive Measures*: HDTV: Coherent and timely action is now being taken to pave the way for the acceptance of the European standards proposal and the introduction of the European HDTV system. In addition, the Commission has supported its promotion by funding a studio.**

INFORMATION TECHNOLOGY

The projects grouped under this heading deal principally with the technologies for producing *hardware components* (integrated circuits, sensors and peripherals), and *software components* (computer programs). A last category is formed by *information storage and retrieval systems*, and various *specific applications* of IT.

In the *hardware* sector, two current projects represent major European efforts to gain a measure of sufficiency in the production of ICs. One aims to create a production capability for Application Specific Integrated Circuits (ASICs) with production cycles of under two weeks, using «direct writing» technology. The other addresses the production of 4 Mbit non-volatile memories (EPROMs), and the feasibility and architecture of 16 Mbit ones. At the time of writing, the definition and planning phase of a third project, by all accounts the largest in scope and planned resources, has just been completed. This would be an 8 year research and development effort on silicon based microelectronics and its integration into systems.

Important individual contributions to the development of Integrated Circuit technology could come from projects for all-dry single layer photolithography, 0.1 micron ion projection, and intelligent automated inspection and analysis of integrated circuits. Extremely short prototype and production turnaround is the aim of an analogue transistor array project which uses direct writing by laser.

Several projects involve *sensors and signal processing* for acoustic and optical data as well as mechanical data on pressure and acceleration.

In the *peripherals* sector an ink jet printing project aiming at colour reproduction of photographic quality is represented among others.

In the *software sector* a number of projects address the problem of managing the production process of software components. The largest one is based on a standardised user interface bus; another is based on the emerging standard Portable Common Tool Environment (PCTE) resulting from ESPRIT. Two projects aim at software development environments specifically oriented towards the programming language ADA.

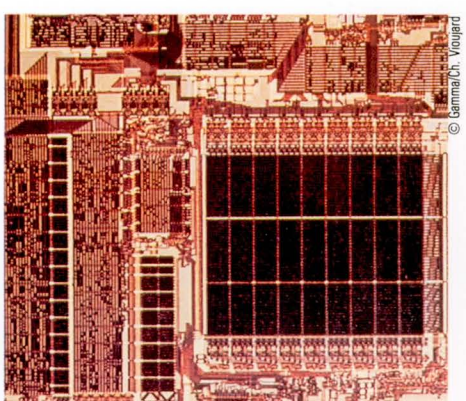
Individual tools or toolkits for specific languages and/or machines are being created by projects concerned respectively with the Prologue language (a common basis for many expert systems), with the standardisation of LISP (also used extensively in expert systems programming), and with compilers and operating systems research for the Transputer (a proprietary highly parallel processor).

PROJECTS: 35
TOTAL COST: 820 MECU
MAIN SUBJECTS:

- Hardware components production
- Software development systems
- Information storage and retrieval systems
- Specific applications of information technology

Software quality control is vital if real-time and embedded systems are to meet reliability and safety requirements. One project applies general methodologies to the problem, whereas another one will apply the latest Artificial Intelligence techniques to the specific needs of the aerospace industry.

Among the remaining projects concerned with *information systems* and other *direct applications* of information technology, two topics deserve mention since they are addressed by several projects: the security, safety and reliability of industrial systems (the expert systems approach) and natural language translation support (on-line dictionaries and thesauri).



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TRANSPORT

PROJECTS: 18
TOTAL COST: 559 MECUs
MAIN SUBJECTS:
- Road traffic and transport
- Air transport systems
- Associated technologies/products

The largest group of more or less coherent projects is in *road traffic and transport*. Three further endeavours are devoted to *specialised forms of air transport*. One concerns a fuel cell bus, while the remaining few projects are providing *individual technologies/ products* for traction, braking and the like.

The *EUREKA Road Transport Projects (ERTPs)* aim to contribute significantly to safer, more efficient and cleaner vehicle traffic and transport. The widest-ranging and best-resourced one among them, initiated by the European automobile industry, will create concepts and solutions for improved traffic systems by developing new on-board and roadside information control and management systems. Urban and interurban traffic is the focus of another major project, while the rest of the «traffic» projects could be seen as important precursors, providers of technology and data and developers of pre-standards.

The «logistics» sector (goods transport) is covered by several projects: one for specialised transport centres providing integration with other modes of transport, one which will provide information systems for general use, one for a system serving the needs of manufacturers with many facilities in Europe and one for electronic data exchange between drivers and base by satellite link.

The specialised air *transport systems* projects are for a European Future Advanced Rotorcraft (a convertible short/medium range plane), for a Flying Boat (mainly for specialised tasks such as forest fire-fighting in coastal zones, environmental inspection, surveillance and control) and for the transport of factory-built houses by manoeuvrable airship.

The *fuel cell bus* will incorporate a fuel cell unit powered by stored hydrogen and a gate turn-off thyristor drive. Industrial production of a new range of such high-power semiconductors has been the achievement of a recently completed project.

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Concrete inter-project activity has been started in Digital Cartography, a basic requirement for traffic improvement. A Task Force has been established to carry out a benchmark test in order to create a European Digital Road Database. Data acquisition started in early 1989 and assessment and road testing is to start in July. For the period of the Benchmark Test, a standstill agreement on copyright has been negotiated.

Supportive Measures:
The common concerns identified early on for government supportive measures to improve transport infrastructure, traffic control and information, and standardisation (especially for navigation and positioning systems), and to harmonise and liberalise transport services, are now being treated within the EUREKA Road Transport Projects Monitoring Group, composed of representatives of the governments involved and of the CEC. Representatives of ERT projects and of organizations such as ECMT, EBU, CEPT, CEN/CENELEC will be invited as guests where appropriate.

Application fields include the use of ceramics in diesel engines and gas turbines to achieve improved efficiency and lower emission of pollutants, and the use of fibre-reinforced plastics for lighter and more resistant aircraft floor panels.

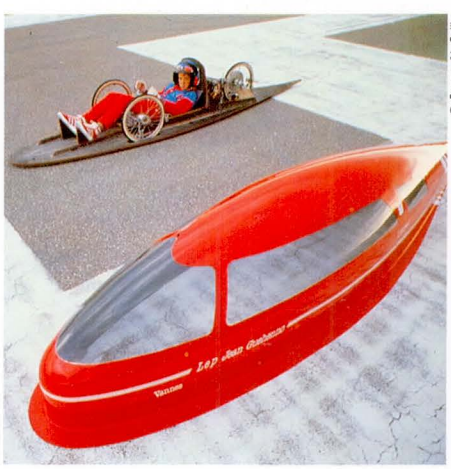
The five *fabrication and design technology* projects deal with car body production, the use of compact reinforced composite as a substitute for cast iron in mine shaft and tunnel linings, the effective use of electrochromic and thermochromic coatings based on various metal oxides for industrial products and the welding of aluminium alloys and the design of aluminium structures tailored to resist specific stresses (fatigue loading).

This application and production process oriented work is complemented by 5 projects in the *development of new materials* in the strict sense of the term.

While two projects aim at using the mineral wollastonite to develop new composite materials, another tries to further develop polyolefine grades, tailor-made for specific applications in medicine and for concrete reinforcement. A further project studies a new superconducting material with the aim of producing magnetic coils which will operate at much higher magnetic field strengths than is currently possible. A last project deals with new methods of producing precursors of ceramic material in order to achieve better property control of the ceramics.

Finally, 3 projects develop various types of *equipment for* testing materials and studying their microstructure.

PROJECTS: 17
TOTAL COST: 136 MECUs
MAIN SUBJECTS:
- Engineering ceramics in engines and turbines
- Development of new materials
- Fabrication and design requirements



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ROBOTICS AND PRODUCTION AUTOMATION

PROJECTS: 49
TOTAL COST: 875 MECUs
MAIN SUBJECTS:
- Flexible automated assembly
- Computer Integrated Manufacturing
- Process Control
- Robots

The «family» of flexible assembly projects now comprises 16 projects which range from the development of refrigerator compressor cells and telephone subset assembly to automated flexible plants for making washing machines, shoes and more complicated items such as electronic cards and metering equipment.

The remaining projects in manufacturing automation divide into those that will lead to new generic *production techniques* not necessarily related to a single product, and those dealing with the automation or improvement of a specific *product line* or a continuous production process.

In the *first category* there are at least four projects developing new computer-integrated manufacturing methodologies adaptable to several different production lines.

Another eight projects deal with the development of expert systems and technologies for integration into more complex production systems. These include the study of interaction between fluids and pipelines, the development of a new automation and remote control system for hydraulic machinery and expert systems in welding and civil engineering steelwork.

The *second category* comprises approximately twelve projects aiming at the development of specific production lines which are flexible or introduce advanced processes. Applications include innovative units for the manufacture of garments, cigars, electronic equipment, sub-sea pipes, leather, printed textiles, drugs, material treatment and the application of enzymes to the mechanical pulping process, etc. Last but not least comes fishing through the development of an innovative fishing ship.

Finally there is a group of eight projects dealing with remote controlled operations and mobile robots. Three of the projects relate to mobile robots which eliminate laborious or dangerous physical tasks in highly hazardous sites. Another three projects aim to develop submarine robots for deep underwater tasks such as the surveillance, maintenance and repair of cables and offshore structures, and the inspection of wrecks. The last two projects aim to build robots for agricultural applications such as harvesting and soil treatment.

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Supportive Measures:
The CIM project in Constructional Steelwork has identified an urgent need for the relevant code of practice (known as Eurocode 3) to be made available, so that its suitability for computerised use can be checked. Close contacts have already been established between the project participants and the Eurocode drafting committee.

The 11 laser projects deal with different laser types. Two projects relate to high power CO_2 (carbon dioxide) lasers rated respectively at 10 and 25 KW. At present, manufacturing industry, especially the automotive industry, largely uses 5 KW CO_2 lasers, but for other more advanced applications in aerospace, shipbuilding and metalworking industries higher powers are required.

Four projects are developing alternatives to the CO_2 lasers, to offer industry a better choice of characteristics, particularly as regards wavelength. Among these are two involving *excimer lasers* with a very short wavelength in the ultraviolet range, for applications in microlithography and material processing. The intention is first to develop 1 KW lasers and subsequently to increase power to up to 5 KW.

One project involves the development of a *solid state laser* for industrial applications for uses such as welding and cutting of metals.

The last project in the source field is developing a 0.5 KW CO *(carbon monoxide)* laser, which can later be increased to 5 KW.

The remaining four projects aim to develop the *application and utilisation of lasers* in manufacturing industry. Three of them aim to increase the use of high-power lasers of which one is specifically concerned with surface treatment, an expensive process which at present has to be carried out in ad hoc plants. One project will create a database to promote the use of solid state lasers by facilitating contacts between suppliers and users.

PROJECTS: 11
TOTAL COST: 269 MECUs
MAIN SUBJECTS:
- High Power Lasers
- New Laser Sources
- Industrial Applications

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Supportive Measures:
As the industrial use of lasers becomes widespread, existing standards and regulations have to be adapted and become more application-oriented. In matters of safety and health, EUREKA will be looking to identify and solve problems before they arise in practice (the so called preventive approach) in close cooperation with the participants, the EUROLASER Governmental Coordination Committee and the Commission.

Six projects deal with various aspects of *water treatment* technologies, whereas 3 projects are engaged in *large scale studies* in order to lay the ground for later actions based on a sound understanding of complex ecosystems. The remaining two projects deal with *specific problems*.

As regards *water treatment*, two projects focus on problems posed by *contaminated sludge* which poses a particular problem in harbour areas, because of its sheer volume (hundreds of millions of cubic metres) and the threat to ecosystems and drinking water supplies. Solutions being developed here include new sludge treatment technologies, including biological nitrogen removal processes and full-scale pilot sludge treatment plants.

A further pair of projects concentrate on developing new purification techniques of air especially from industrial outlets by removal of organic compounds with the help of new filter materials (zeolites) and of drinking water using membranes respectively.

The remaining two projects deal with the reduction of *water contamination by chrome salts* during the tanning of leather, by developing a substituting process and with the handling of *industrial effluent* by combining local pre-treatment with final central process-treatment.

Three projects undertake large scale research and technology based developments in:

- the transport and the transformation of pollutants in the atmosphere over Europe ;
- the vertical and lateral exchanges between the ocean, the atmosphere, the shelf sea and the coastal zone ;
- the effects of pollution on historic objects and monuments.

The remaining two projects tackle the easier measurement of hazardous gases by developing light, easily operated gas sensing equipment and new methods of identifying noise sources in vehicles, thus raising passenger comfort.

PROJECTS : 11
TOTAL COST : 523 MECUs
MAIN SUBJECTS :

- Water treatment
- Specific problems, e.g. :
  - atmospheric pollution science
  - marine technology
  - restoration/preservation of ancient buildings/artefacts.

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FINANCIAL SIZE OF PROJECTS (IN MECU)

Project Cost (MECU)	Total N° of projects*	N° of projects per area								
		BIO	COM	ENE	ENV	INF	MAT	ROB	LAS	TRA
< = 5	90	23	4	2	5	19	11	15	2	9
> 5 - < = 10	29	3	1	1	2	6	2	11	—	3
> 10 - < = 20	35	9	3	2	—	4	3	9	4	1
> 20 - < = 40	22	3	2	3	1	2	—	8	2	1
> 40	32	3	5	3	3	4	1	6	3	4

* Of the total N°. of projects, 38 are still in their Definition phase

PROJECT PROGRESS

According to schedule	Total N° of projects */**	N° of projects per area								
		BIO	COM	ENE	ENV	INF	MAT	ROB	LAS	TRA
< 1/4	15	5	—	—	1	2	2	4	—	1
1/4 — 1/2	76	16	3	4	2	13	8	17	7	6
1/2 — 3/4	46	3	6	3	3	6	3	16	1	5
> 3/4	26	3	3	—	3	6	2	4	1	4

* Based on information recived from 163 projects
** Of the total N°. of projects, 38 are still in their Definition phase

PLANNED PROJECT DURATION

Project Duration (months)	Total N° of projects*	N° of projects per area								
		BIO	COM	ENE	ENV	INF	MAT	ROB	LAS	TRA
< = 24 (Short-term)	15	2	—	—	—	5	—	4	1	3
25 — 48 (Middle- term)	97	22	6	4	7	16	7	22	3	10
> = 49 (Long-term)	96	17	9	7	4	14	10	23	7	5

* Of the total N°. of projects, 38 are still in their Definition phase

PLANNED PROJECT END DATES

Planned End Dates	Total N° of projects * / * *	N° of projects per area								
		BIO	COM	ENE	ENV	INF	MAT	ROB	LAS	TRA
< = 31.12.1989	23	5	1	1	2	6	—	5	—	3
< = 31.12.1990	38	8	4	2	2	6	4	4	3	5
< = 31.12.1991	58	8	4	4	1	11	5	19	2	4
< = 01.01.1992	75	16	5	4	5	7	7	20	6	5

* Based on information received from 194 projects
** Of the total N°. of projects, 38 are still in their Definition phase

PARTICIPATING ORGANIZATIONS PER EUREKA MEMBER

Member	Number of organizations				
	Industry	Thereof SME	Research	Thereof Univ.	Others
Austria	15	5	14	10	2
Belgium	26	14	17	15	1
Denmark	22	6	15	6	1
Finland	19	5	4	1	2
France	158	35	56	15	11
Germany	110	19	90	54	2
Greece	10	7	6	4	1
Iceland	1	—	1	1	—
Ireland	2	—	5	4	2
Italy	90	26	27	8	6
Luxembourg	3	2	—	—	1
Netherlands	68	23	24	7	10
Norway	25	7	10	3	3
Portugal	6	3	10	6	1
Spain	63	23	20	8	3
Sweden	35	14	15	10	4
Switzerland	30	15	17	14	1
Turkey	1	—	4	3	—
United Kingdom	97	29	32	17	12
EC	—	—	2	—	2

JOINT PROJECT PARTICIPATION BETWEEN EUREKA MEMBERS

Member	Member																			
	A	B	DK	SF	F	D	GR	ICE	IRL	I	L	NL	N	P	E	S	CH	TR	UK	EC
Austria	X	7	6	3	11	13	7	1	4	9	2	8	4	4	10	4	7	2	7	2
Belgium	7	X	5	8	12	9	4	1	3	10	2	12	4	3	11	4	5	1	10	2
Denmark	6	5	X	8	13	8	6	1	5	12	2	11	9	5	12	8	3	3	14	3
Finland	3	8	8	X	10	7	4	1	4	9	3	6	5	4	7	8	3	2	10	3
France	11	12	13	10	X	39	8	2	5	41	3	27	12	5	40	15	14	2	39	4
Germany	13	9	8	7	39	X	9	1	5	26	2	23	9	7	20	15	8	3	28	3
Greece	7	4	6	4	8	9	X	1	3	7	2	7	4	3	7	5	3	2	7	3
Iceland	1	1	1	1	2	1	1	X	1	1	1	1	1	1	2	1	1	—	1	1
Ireland	4	3	5	4	5	5	3	1	X	6	2	5	4	5	5	4	3	2	4	2
Italy	9	10	12	9	41	26	7	1	6	X	2	15	8	5	30	10	7	3	28	3
Luxembourg	2	2	2	3	3	2	2	1	2	2	X	2	2	2	2	2	2	—	2	1
Netherlands	8	12	11	6	27	23	7	1	5	15	2	X	7	5	15	14	9	3	28	3
Norway	4	4	9	5	12	9	4	1	4	8	2	7	X	4	8	12	4	3	13	4
Portugal	4	3	5	4	5	7	3	1	5	5	2	5	4	X	7	4	3	2	7	2
Spain	10	11	12	7	40	20	7	2	5	30	2	15	8	7	X	10	6	3	26	3
Sweden	4	4	8	8	15	15	5	1	4	10	2	14	12	4	10	X	6	3	14	3
Switzerland	7	5	3	3	14	8	3	1	3	7	2	9	4	3	6	6	X	1	7	2
Turkey	2	1	3	2	2	3	2	—	2	3	—	3	3	2	3	3	1	X	2	2
United Kingdom	7	10	14	10	39	28	7	1	4	28	2	28	13	7	26	14	7	2	X	3

At the 7th EUREKA Ministerial Conference in Vienna on 18/19 June 1989, more new projects were announced. These, along with the ones described in this report indicate that EUREKA is on course towards its goal.

There are also a considerable number of proposals under consideration or in the earlier stages of establishment.

The success of EUREKA's cooperation formula is gaining wide international recognition.

ANNEXES

- Selected Project Descriptions
- NPC Addresses
- EUREKA Bibliography

PACA (Industrial use of Absorption heat pumps)

The energy saving potential of Europe, which by many is considered its most important «energy source» is by far and large not yet exhausted. In heating and cooling down larger buildings, at the moment, much too much energy is used, and in Industry enormous amounts of waste heat are either not used, or at least not used efficiently, which is also increasing the burden on the environment.

The cause for this large wastage of energy is, amongst others, the fact that the present energy saving technologies are too costly, susceptible to interference and in many cases just not economical.

The goal of PACA is to further develop a relatively new energy saving technology, to make marketable and advanced machines available. A main area of use is industrial heat recovery, as in heating and/or cooling installations for large buildings or complexes of buildings.

The technology which should be used is absorption heat pumps and heat transformers. These are based on the known absorption technology, which has been in use for many decades in cooling absorption plants. Energy saving installations have been able to accomplish this technology so far. Yet over the past few years there has been a new impulse to develop these installations.

The partners have agreed to carry out the project in 3 phases:

1. Technical-economic market study for high technology absorption heat pumps
2. Basic Research
3. Research intensive demonstration installations set up with a typical user.

Phase 1 of the PACA project has in the meantime been completed. In general it seems that the heat transformers have better prospects than the heat pumps. Still better market chances have been forecasted for the absorption installations if they are successful in raising the performance of the installations and the maximal temperatures attainable and respectively the temperature rises. The results obtained from the economical investigations will be taken on as development goals in Phase 2 (Basic Research).

Higher temperature rises or better energy efficiency will be achieved through multi-staged heat transformation installations, which will be the centre points of phases 2 and 3.

Phase 3 of this project should begin in mid-1990 and forecasts the construction of research intensive demonstration installation such as a two-stage heat transformer for the generation of usable steam from waste heat or an absorption heat transformer (combination of a high temperature absorption heat pump with a heat transformer) as an energy saving drive for an evaporation plant.

With these installations a progressive absorption installation is at the disposal of the heat recovery industry, which will largely improve on the area of use and the economic efficiency compared with that of old installations. These installations are not damaging to the environment and save primary energy without having to raise the need for electrical energy.

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OXODIPINE

Oxodipine is a project which is progressing rapidly. One of the first health care projects, it was announced at the London Conference three years ago. Oxodipine's goal is the marketing of a new treatment for high blood pressure based on a fresh approach to pharmaceutical research.

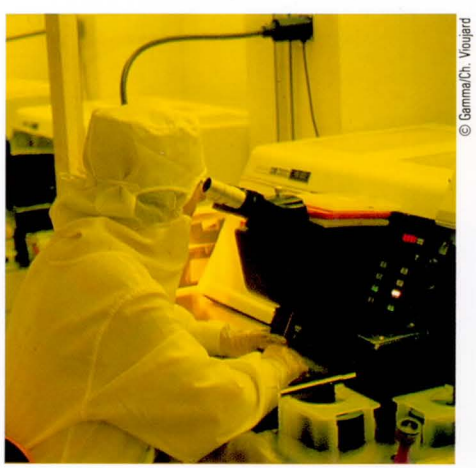
It all started with a meeting between two industrial pharmaceutical laboratories. The initial impetus came from the Instituto Quimico-Biologico, which was the first to synthesise Oxodipine. This new substance has remarkable calcium inhibiting properties and opens the door to a new much more efficient and easy treatment of high blood pressure.

But the interest of Oxodipine lies not only in its therapeutic qualities. The revolutionary approach to its development demonstrates a way of shortcutting the very costly and lengthy process usually followed in developing a new medical treatment. This is where the other partner, «Laboratories Delagrange» comes in. This firm is one of the leaders in what is termed «biopharmacy» i.e. the pooling of the intellectual forces of specialists from disciplines as varied as metabolism, pharmaco-kinetics, biochemistry and mathematics. Its research centre sets up «biomathematical» models describing the complex behaviour of a substance in the body. These models can be used to optimise its molecular structure and calibrate the effects of a drug to obtain the desired therapeutic results.

Such a research approach aims at developing a better targeted, efficient treatment while keeping doses to a minimum. This process has incidental strategic effects for the pharmaceutical industry in that it considerably reduces the need for prolonged animal experimentation and, at a later stage, for clinical assays on humans.

Oxodipine has successfully completed the first phases of its development and the results are promising. Clinical trials are being carried out in eight different European countries. It is hoped that this international effort will further accelerate its development.

If this pace is kept up, Oxodipine could be on the market within five years, compared with an average gestation period of eight to ten years when using current development processes.



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CERISE

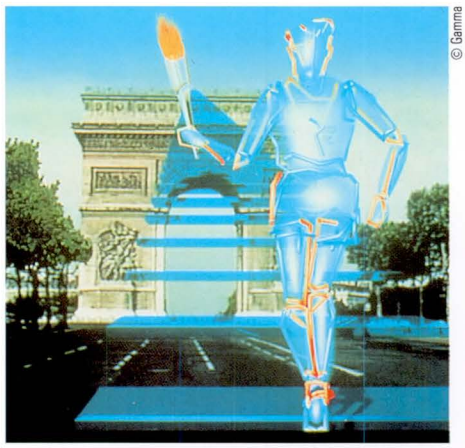
Synthetic imaging, that is the creation of three-dimensional images using video graphic computers, is one of the new technologies which has widespread industrial, commercial and artistic applications.

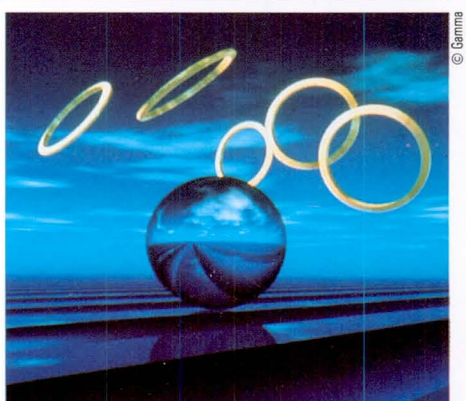
The audiovisual production specialists RTL Productions, and CAP-SESA, who specialize in the design and construction of high-tech information systems, joined recently by SOGITEC, decided to combine their efforts, their knowledge and financial resources to create a true symbiosis between corporations, research institutes and universities. All of these have a genuine interest in the further development and exploitation of both hardware and software in making synthetic images. Their goal is to create a true European centre for research into computer-generated graphics, to develop a European State-of-the-Art centre specializing in «New Image» technology, and by means of research and development to create 2D and 3D images capable of equalling or even surpassing the very best systems operated in the United States and Japan.

The «European Centre for Research in Synthetic Images» (CERISE) aims to develop European systems which enable creators, artists and the like to fashion 3-dimensional images themselves, without having to depend on specialized intermediaries. The goal is thus to put the technique within reach of the largest number of people possible.

CERISE offers excellent opportunities for training and nurturing new talent. One area of co-operation has been an agreement reached with the Louis Pasteur University and the Ecole Nationale Supérieure de Physique in Strasbourg within the framework of the EC COMETT training programme. Here CERISE has made a real breakthrough, since Europe does not possess any higher education institutes combining component theory and practice, and covering all the artistic, technical and economical aspects in synthetic image technology.

The number of potential users of video graphics has shown a sharp increase, with demands being received from many different market segments. Today CERISE creates a multitude of audiovisual graphics ranging from corporate logos to animated weather charts and television adverts. The list is endless, as are the possibilities.





COSINE

COSINE is EUREKA project to provide a computer communications infrastructure for EUREKA itself and other international and national programmes. It aims at establishing a pan-European computer communications infrastructure and services for use by the research and development sector.

The main objectives of the project are :
• to create a common operational OSI interworking infrastructure
on the basis of federated research networks to support all European research;
• to establish and integrate on the required scale all the functions and support services necessary to enable the users to take full advantage of the infrastructure;
• to take steps to ensure that the infrastructure remains available to European researchers after completion of the project;
• to thereby contribute to the market pull for OSI.

Initially, the following services are envisaged :
• interactive access to remote computers and databases;
• message handling and group communications systems and services;
• File Transfer, Access and Management (FTAM) mechanisms and services;
• directories and name-servers;
• network management.

Later on,
• Computer Job Transfer and Management (JTM) mechanisms;
• virtual terminal access etc. may be added.

The project work is guided by the following principles:
• adherence to OSI (Open Systems Interconnection) standards, in the form of European Norms derived by CEN/CENELEC, CEPT and ETSI, following functional standards work done in the framework of EWOS (European Workshop on Open Systems).
• use of publicly available, professionally managed data networks for conveyance of data, use of industrial, supported products.
• creation of a sufficiently large coordinated market to make it interesting for industry to provide appropriate, supported products. («MARKET PULL»).

After the initial definition, approved in June 1986, a Preparatory Phase followed and ended in June 1987. A Specification Phase, which came into force on 1st July 1987, was completed in 1988 with the final acceptance of the Specification Phase results in December 1988.

The three-year Implementation Phase commences in 1989. During this Implementation Phase, international and national services will be set up and common procurement specifications produced for international and national and local facilities managers and a project management unit will be set up.

A «Federative Phase» is to follow the Implementation Phase, capable of running on the basis of self-sufficient structures, set up during the Implementation Phase and at this stage the COSINE project itself should cease.

ES2

Demand for Application Specific Integrated Circuits (ASICs) is growing. In an attempt to break the dependency on Asian suppliers, a number of major European semiconductor firms founded a company called European Silicon Structures (ES2) in 1985. The company's objective is the creation of an ASIC production unit providing a European solution to supply problems. This project was announced in June 1986 by the London Ministerial Conference.

The ES2 project has adopted a two-part strategy :

• First, a revolutionary technology for chip production: direct writing on silicon. The traditional method of producing chip configuration is a «masking» technique. The masks are costly, take time to produce, and represent a fixed overhead regardless of the size of the ASIC production run. The new method chosen by ES2 consists of directly bombarding the silicon wafer with an electron beam. The cost and time overhead for masks is eliminated. This considerably boosts productivity, particularly for small production runs, reducing the manufacturing timescale to as little as two weeks.

• Secondly, the application specific concept is exploited to the full. Customers are offered a new computer-assisted design service enabling them to define the micro-circuit features which best meet their needs. Furthermore, ES2 is establishing a Europe-wide network of partner firms whose manufacturing teams will provide customers with expertise and follow-up services in micro-circuit definition and design.

In October 1987, the first European plant specially designed for the production of ASIC integrated circuits was officially opened in Rousset, near Aix-en-Provence. The Rousset factory, which employs one hundred people, began by manufacturing pilot and small quantity series using the direct silicon writing technique. Production time has already been cut to one month. By 1st October 1988, 219 micro-circuits had been produced, generating a turnover of 18 MECU.

Two main developments are under review for 1989:

• The development of a second generation of «silicon compilers» enabling the creation of multi-purpose work stations for system design.

• The development of production technologies for integrated circuits at micron level or below, using the electron beam technique.

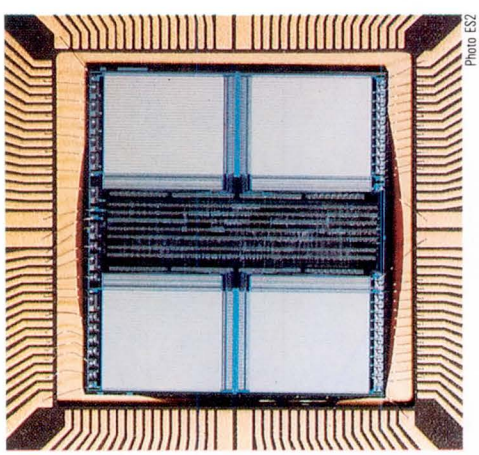


Photo ES2

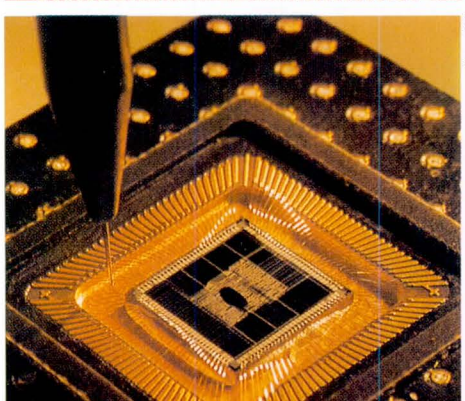


Photo ES2

ESF (European Software Factory)
Seeking to define today tomorrow's software factory and to arrive at a model which will not become outdated in a few years, that is how the promoters of ESF view their project. They want to develop a «reference architecture» for management of software production. This model, which will be highly productive, will stand out from the crowd through its ability to adapt to future innovation, combine new «tools» and old «components» (or vice versa) and respond in an optimal manner to all possible features of software development.

The ESF is currently completing its definition phase and getting down to serious work. Around 300 specialists from the six consortium countries are involved. A central co-ordinating office has been set up in Berlin. In May 1989, during a major event organized on the theme of «software factories», preliminary results of the project's work were made public in the form of demonstration modules illustrating the various different facets of the ESF concept.

The project has been established as a committed, funded and substantially resourced project with significant backup from the consortium via the Control Board. The first release of the reference architecture was issued internally in December 1988. There is much interest in the project's participation in other groups and software engineering conferences.

The project is organized into 18 sub-projects which represent specific areas of a software factory. Each sub-project is represented by several partners, particularly in a critical area. The sub-projects are legally contracted between members and the consortium. There are three basic categories of sub-projects :
- life cycle support
- Kernel design and development
- populating components which address specific factory functions.

PROMETHEUS

PROMETHEUS is the first programme which raises the horizon of the automotive engineer from the vehicle to the environment and the driver. The objectives are to increase traffic safety, to pay attention to the impact on the environment and to improve efficiency and economy. The really new approach to reach these objectives is to use modern information technology for road transport purposes and to design an integral approach in order to avoid white areas or gaps between various subsystems. Efforts have been joined for a common aim and this is understood by all the participating industries and institutes all over Europe.

The vehicles and the environment in which the vehicles are operating are being considered. It will be still the driver who is responsible for vehicle operation. So far there is nothing new. However, the technical devices which are integrated in this whole system are new. The Intelligent Co-pilot has been defined. In parallel to the perception of the driver, information is acquired from the environment by technical means and put into the computerized Co-pilot. The Co-pilot is supported by all the new sciences in order to support the driver in his normal perception and offer him the necessary information to perform his main task, which is operating the vehicle safely. Operating means steering, accelerating and braking the vehicle. The decision is always taken by the driver supported by intelligent means. This is the principle approach of the automotive industry. Vehicles and environment are forming a unit and PROMETHEUS is aware of the fact that they are not responsible for infrastructure. The programme has been drafted according to the demand of road traffic integrating also the public domain in order to realize the system approach for future improvements.

During the Definition Phase fields of potential research were defined, which were then published as Topics of Research at the end of 1987. Other institutes and industries have been invited to cooperate in this challenging field of future research.

The result: 677 proposals out of 103 companies in nine European Countries were received. The PROMETHEUS team evaluated these proposals following the descriptions in the Topics of Research and only considering technical aspects. So 258 projects have been accepted by the European Lead Researchers. In a subsequent step this figure has to be reduced drastically, both maintaining the coherence of the programme and obeying financial restrictions.

Automotive companies described their demands for future functions in the whole traffic system and described a potential vehicle contribution to improve it. Derived from these vehicle contributions Thematic Projects were defined in some areas. The cooperation between Electronics and Automotive companies and research institutes is conducted in these Thematic Projects. Potential results both out of the Basic Research and the electronic industry are integrated into the Demonstrators. Viability and consistency is proved and amendments are again fed into the Thematic projects in an iteration process.

Results during the Launching Phase.

- The project partners and the number of participating companies have been enlarged, the PROMETHEUS family has grown.
- The automotive companies have designed their first generation of Demonstrator vehicles.
- Within the industrial joint research programmes in the Thematic Projects 230 sub-projects have been defined throughout Europe.
- The Basic Research conducted in all the participating countries has been adjusted according to the programme defined in the Thematic Projects. Some of the scientific institutes have had to reduce their volume due to technical aspects as well as financial restrictions.
- A large part of traffic research has been tuned together with the EC programme DRIVE.

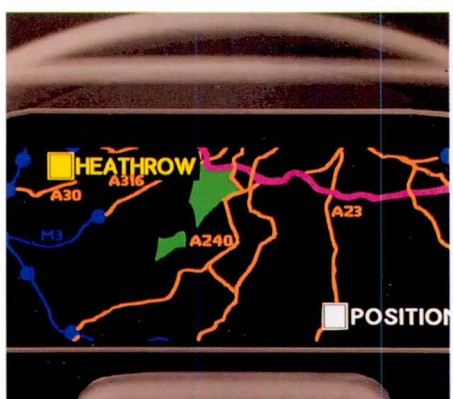


Photo Prometheus

GTO

Among the first EUREKA projects to be launched three years ago, GTO Thyristors (EU 24) has run its course and was the first to reach completion, in the second quarter of 1988.

«GTO» stands for «Gate Turn-Off» which is the name of a new generation of high power thyristors. These electronic components play a key role as current breakers in high-voltage circuits. They serve a highly specific market, as they permit precise control over the speed of railway traction machinery and other large electric motors.

Two well-placed European firms provided the impetus behind the project. They are Marconi Electronic Devices Ltd., a leader in the European top-range thyristors market for many years, and SGS-Thomson, a major semi-conductor manufacturer which is also highly respected in the thyristors sector.

The two firms had already worked together in ESPRIT between 1984 and 1986. As soon as EUREKA was launched, they decided to join forces in the GTO project, which, unlike their ESPRIT work, had direct commercial application.

The new range of GTO thyristors now marketed by Marconi is for electrical circuits operating at between 1200 and 2500 volts and carrying currents of between 300 and 2000 amps. The wide and interchangeable product range offered strengthens its position in the European market. They are the first to sell these new devices, which are in a technology area dominated to date by two or three Japanese firms.

Photo GTO

CARMAT 2000

The CARMAT project is one of the first EUREKA projects and was granted EUREKA-status at the EUREKA Ministerial Conference on 30 June, 1986. The project is an initiative of the French PSA- group (Peugeot-Citroën).

The goal sought in the CARMAT project is to arrive at producing in the 1990s a middle-range car, using as many new materials, designs and manufacturing procedures for the car body as possible. The cost of this car has to be lower than or equivalent to that of a comparable vehicle with improved performance.

At the start of the project, in addition to PSA, the project manager, 14 industrial partners from 6 different countries were involved, one of them the Dutch chemical concern, DSM. At a later stage, a number of companies have joined.

Apart from DSM, three more chemical companies are involved, namely ICI (Great Britain), Bayer and BASF (both from Germany). All the industrial participants are responsible for the realisation of one or more of the different components. The CARMAT project will be carried out over a 5-year period. The project includes three distinct phases:

Phase 1: (1987-1988) This phase can be considered as a feasibility study. Parts from an existing car (Citroën AX) are replaced by the newly developed CARMAT components. Numerous tests are carried out and the production costs are calculated. Phase 1 takes two years, at the end of which the final design of the CARMAT vehicle will be made.

Phase 2: (1989-1990) This phase will also last two years. During this phase, the manufacture of tooling and components for the CARMAT synthesis car will take place, on the basis of the data gathered during phase 1. Assembly studies will also be carried out and the production costs will be further evaluated.

Phase 3: (1991) This final year will be devoted to manufacturing and testing the synthesis car(s).

The basic skeleton of the CARMAT car will still be made of metal, with semi-structural and external components added to it. The advantages of such concept are: easy assembly, flexibility in the choice of materials used and the concept of the structure and a wide range of possibilities for the sub-assembly of components.

Apart from the creation of new materials and processes, one of the main characteristics of CARMAT is the intensive research cooperation: from the very first stage to the final result, the making of a new car.

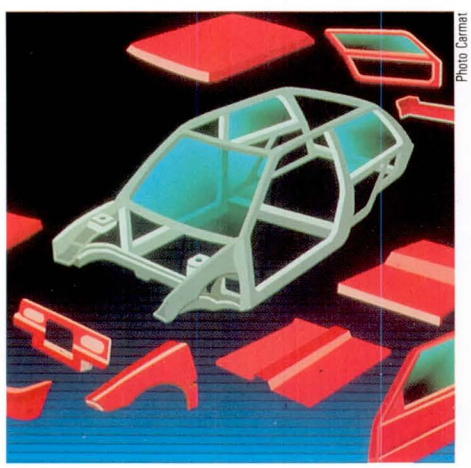


Photo Carmat

UPAC- Adaptive Garment Manufacturing Unit

The European garment manufacturing industry faces stiff competition, due mainly to the cost advantages of foreign companies. This project aims to substantially increase industrial productivity using new technologies and organization principles.

The project centres on the development of garment factories incorporating the latest concepts in production and organization:

- real-time control of manufacturing units ;
- flexible manufacturing plant ;
- production simulation and cost optimization.

The project was announced at the Hanover Ministerial Conference in November 1985. It was planned to last five years, but more than 100 machines based on concepts developed in this project had already been sold by the end of 1988.

Photo UPAC

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MITHRA

The technology of the mobile robots has reached a significant level in production automation (automated trolleys) in other sectors (anti terrorism, intervention in risky environments) there are similar products but with limited mobility and generally without an autonomous decision capability. At this very moment the market of mobile surveillance robots is in its initial phase and the offer mostly consists of experimental products, produced in the U.S, of limited capabilities which are rather expensive.

The MITHRA project is concerned with the development, industrialisation and sale of mobile robots for remote surveillance and emergency intervention within specific sites such as houses, factories and tertiary industries.

At the outset the range will include 3 families of robots of different levels of complexity and capabilities. The first kind, very user friendly, is for internal surveillance of public buildings and offices. The second is similar but also capable of gathering information (position of the objects, readings of instruments, etc.) for surveillance and information gathering in industrial environments (factories, refineries, monitoring, etc.). Finally the third one should be capable of precise emergency intervention in hostile environments (water, fire etc.).

The problems to be solved are many ; such as navigation problems and the capability to recognize the environment where the robot is called to operate, identify obstacles and decide how to overcome them. All this with a robot which must have a size which allows it to operate in standard buildings (e.g. it should be able to pass easily through a standard door). Also important is the solution of problems of robotic vision i.e. that the robot should be able to recognize images (from all the possible viewpoints) and collocate them in the exact space-time dimension.

The project has terminated its definition phase positively and has started the development one which is expected to finish within two years.

Photo Mithra

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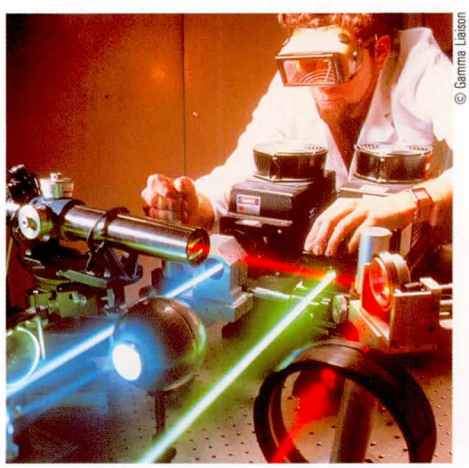
EUROLASER 25 KW Laser Cell

This project was conceived in the CO_2 Co-ordination Group, one of the working groups created by the EUROLASER «umbrella project» This group brings together an international task force of specialists from nine EUREKA member countries to co-ordinate the development of high power industrial CO_2 laser manufacturing systems. A formal participation agreement has been signed and national surveys on the current status of CO_2 lasers have been carried out. One of the results is an international EUREKA project to develop a 25 KW laser cell, this being the power it was felt to be reasonable to consider over the next five years or so. At present only 2% of industrial CO_2 lasers have power higher than 5 KW.

The project will develop an efficient 25 KW CO_2 laser module with good beam quality, that can be stacked with additional modules to create even higher powers. An advanced beam manipulation system will also be developed that will enable the laser module to be made fully effective for all types of material processing.

The final stage of the project will be to evaluate the cell in a wide range of industrial applications, including welding, cutting, heat treatment and evaporation. A typical application would be the use of laser welding for the hundreds of kilometres of weld runs required in the construction of a ship.

The definition phase of the project was successfully completed on 31st December 1987 and the three-year production phase started on 1st April 1988.



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Membrane systems for the production of drinking water and the treatment of waste water.

In the very near future it will become increasingly difficult to supply pure drinking water in the industrialized countries. Even today large quantities of surface water have to be used for drinking water after having been treated in several stages, both mechanically and chemically. Unfortunately, these treatments are not very efficient, and the addition of chemicals may cause harmful compounds to be formed. Additionally an ever increasing quantity of waste water is being produced.

Advanced membrane technology is the ideal solution to these very serious problems. The basic technology is generally available today, but existing membrane filtration systems are both expensive and complicated.

Therefore, this EUREKA project aims to develop a new type of membrane filtration plant, operating on the principle of reverse osmosis: the water to be purified is pumped across a fine membrane filter which only allows very small molecules (like the water molecule) to pass through, thereby continuously separating them from bigger molecules.

The plant should be easily mass produced, flexible in operation and resistant to salt water and chemicals. As water treatment plants cover a wide range of capacities (from 10 to 10,000 m3/h), just one size of plant will not meet the need. The solution chosen is to build a 50 m3/h module, up to 10 of which can be chained together. These modules can be built as mobile stations.

Techniques which have been studied in depth include:
- new membrane types based on surface modification;
- new integrated membrane support materials/spacers;
- welding methods for membranes.

This EUREKA project started in 1986. It is based in part on a previous project which the partners carried out in the EC BRITE programme. Commercial exploitation of the project is expected for 1992, but a prototype workshop has already been set up and prototypes have been built. A pilot plant has already started to provide a small village with its drinking water. In addition, the system has been chosen to equip the European Space Shuttle. Besides the large market for the treatment of drinking water and effluent a considerable market also exists for water treatment within many process industries.

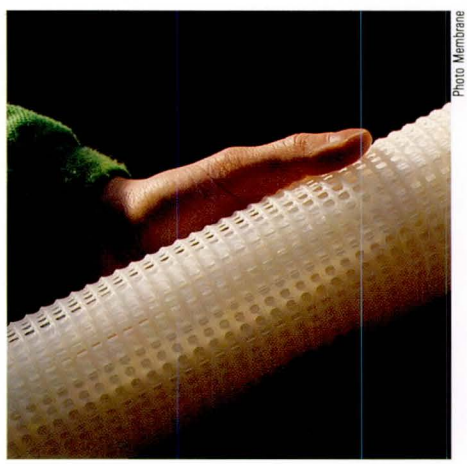


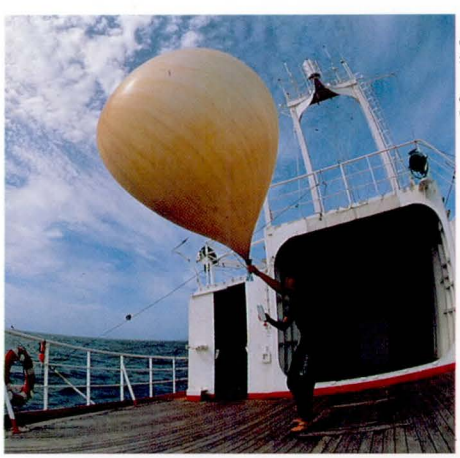
Photo Membrane

EUROTRAC

EUROTRAC is an environmental project focusing on the transport and transformation of pollutants over Europe. Special emphasis is given to the build-up of photo-oxidants, the formation of acidity in air and clouds and the exchange of pollutants through the biosphere/atmosphere interface. The project involves more than 400 scientists from 17 EUREKA countries and thus represents a real European joint enterprise in atmospheric sciences. The activities within this project include laboratory studies, joint field experiments, development of a European atmospheric model, and -most important- the development of advanced, standardized techniques for measurements of atmospheric pollutants. The latter is in close cooperation with and supported by Industry in different European countries.

EUROTRAC will enhance knowledge in atmospheric sciences and will provide the basis for future environmental policy decisions in Europe. The development of advanced technology in EUROTRAC will stimulate European industry in a market which will be of growing importance in the future.

EUROTRAC is closely coordinated with other ongoing activities in Europe and will contribute to international efforts on global atmospheric environmental projects, e.g. IGBP (International Geosphere-Biosphere Program) and IGAC (International Global Atmospheric Chemistry Program). EUROTRAC provides a unique basis for the European scientific community on atmospheric sciences to play a leading role on an international scale. The attractiveness of EUROTRAC is best documented by the request of scientists from several non-EUREKA countries to cooperate and/or participate in EUROTRAC.



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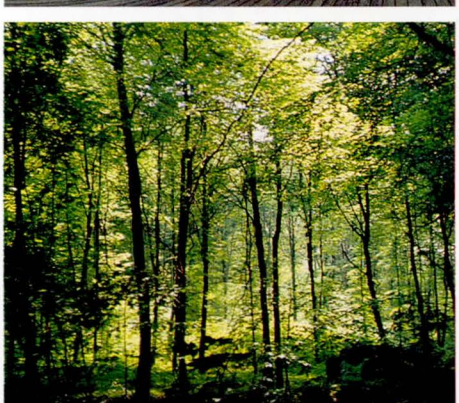

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For the interested reader, further material on EUREKA is available upon request from the respective National Project Coordinators or the EUREKA Secretariat (see addresses above).

Material available in English, French, German, Italian and Spanish includes :

- *EUREKA VADEMECUM* containing the:
  - Medium Term Plan
  - Declaration of Hanover
  - Procedures for EUREKA Projects
  - Memorandum of Understanding on the EUREKA Secretariat

- *EUREKA Brochure*

- *EUREKA Newsletter* (published quarterly)

Material available in English only :

- *EUREKA Checklist*

Checklist for the negotiation and drafting of an international R&D cooperation agreement in the framework of a EUREKA project

In addition, several brochures and newsletters are published on national levels.