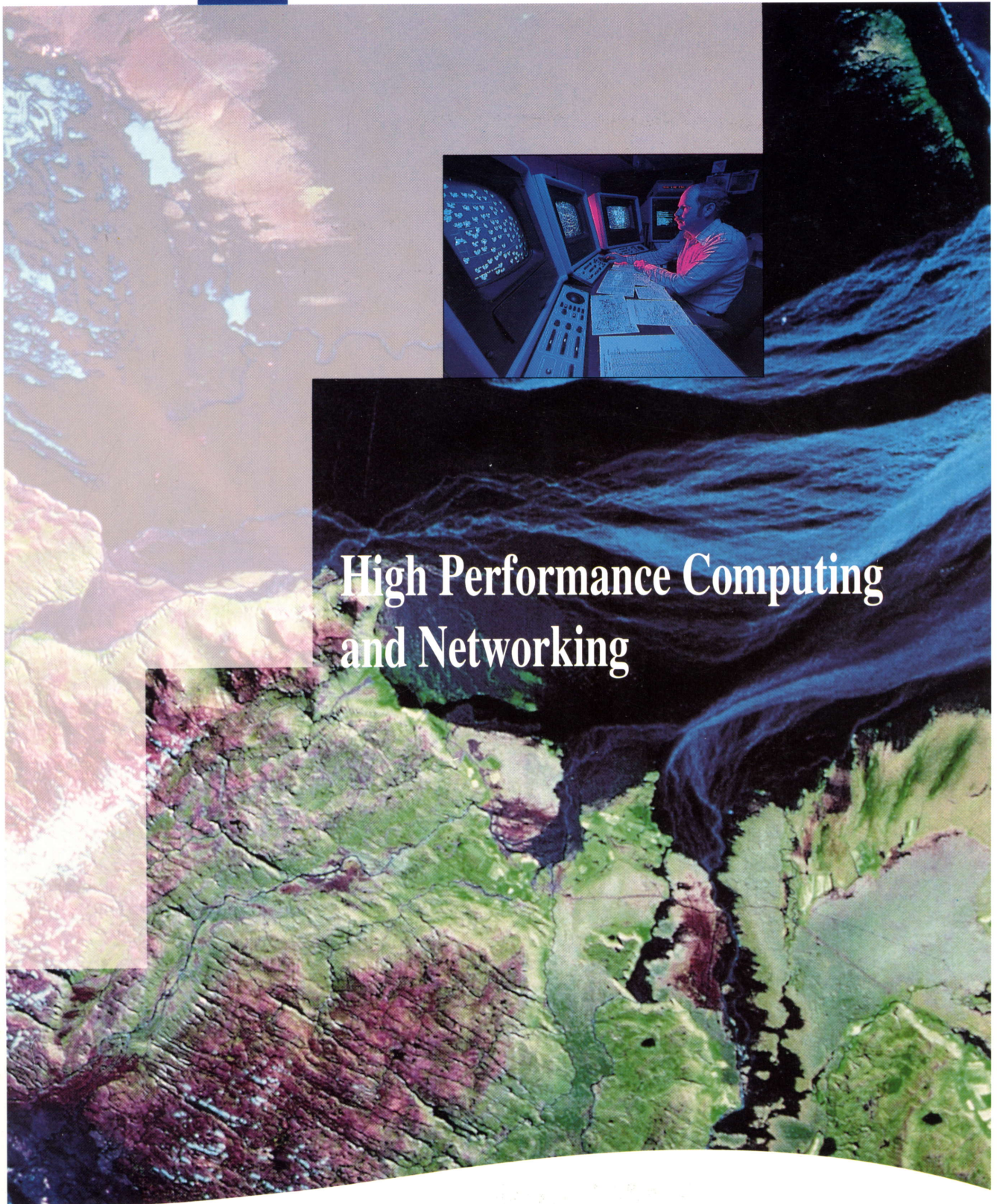# High Performance Computing and Networking

"HPCN enables us to improve the way we work"

Improving the way we work

A massively parallel super computer manufactured by Parsytec in Europe and marketed internationally.

During the 1980s, computers took on a friendly face. The personal computer on the desk transformed the way that we used computing. Suddenly, computers served their users, not the other way round.

Now the same transformation is possible for even the most demanding uses of computers. High Performance Computing and Networking (HPCN) offers us new ways to tackle abstract tasks, like design, modelling and information handling.

But the HPCN opportunity goes beyond simply doing what we do now faster and cheaper. Quick response (short enough to allow "trial and error" modelling), graphics (simplifying the presentation of complicated data) and communications (allowing the easy exchange of information with colleagues in other offices or even countries) make it possible to improve the way we work.

For a manufacturer, it means reduced costs and competitive designs. For a researcher, it means realistic models and accurate science. For a doctor, it means swift diagnosis and enhanced treatment of patients. For utilities, it means flexible services of greater value to subscribers.
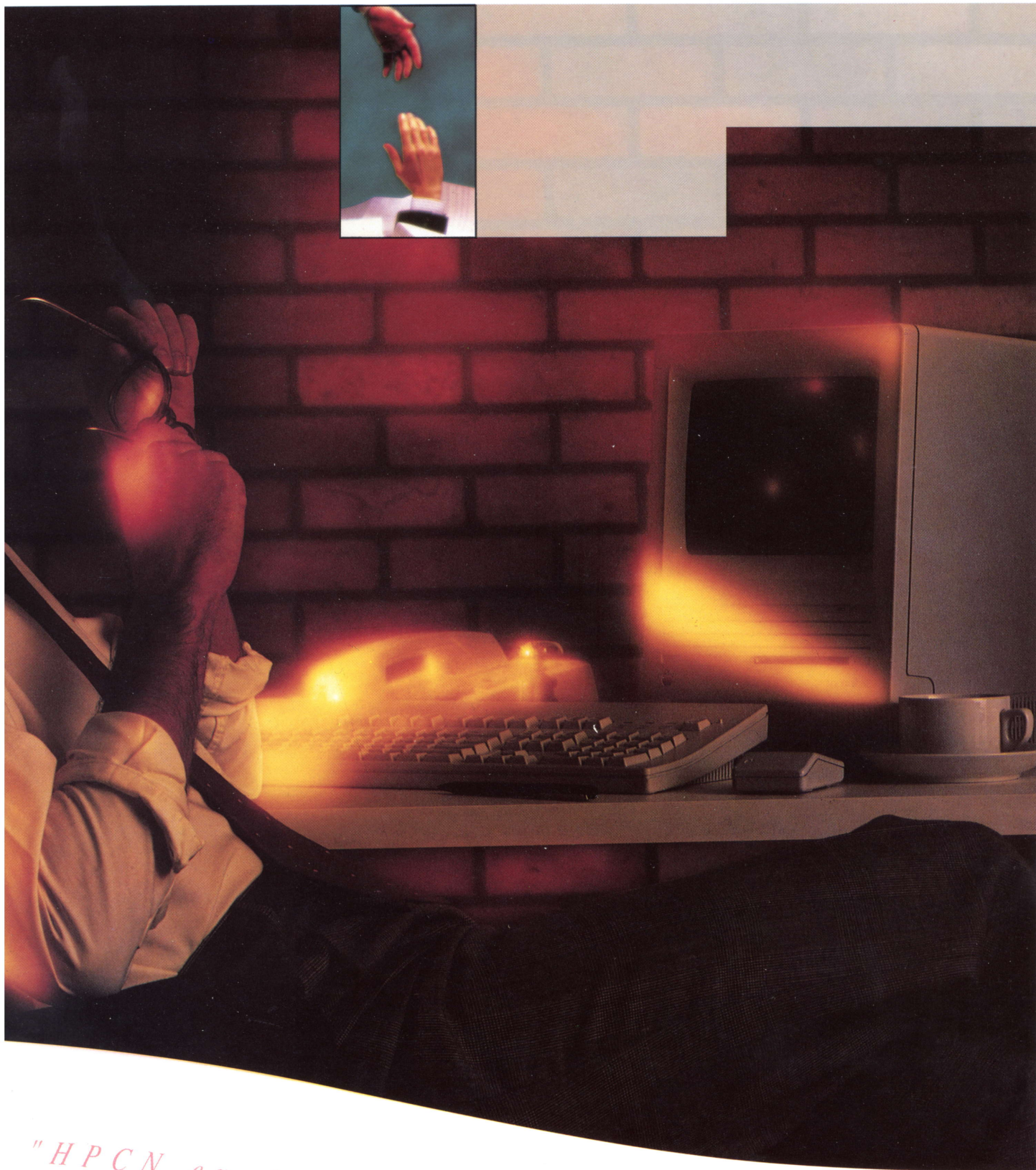
HPCN is becoming affordable and easy to use but it requires a conscious decision to exploit the potential for improving the way we work. The window of opportunity is open!

"HPCN enables us to improve the way we work"

*" H P C N   e n a b l e s   u s   t o   i m p r o v e   t h e   w a y   w e   w o r k "*

Winning the race

Sails are the "engine" of a yacht and the difference between winning and losing is a fraction of one percent in their power. Competitive sail-making is dependent on computer simulation for predicting the flow of the wind over the sails and the stretching of the cloth in response to the forces of the wind.

HPCN is used by sail-makers to model these effects and to predict the efficiency of a design before it is made. The computer model can be "raced" under different wind strengths and directions before a single piece of cloth is cut. When the designer is satisfied with the performance, the shapes of the individual pieces of cloth can be transferred by high speed networks to an automatic cutting machine, thus ensuring that the design that was modelled is the same as the one that is built.

HPCN enhances the creativity of the sail-maker. Success still depends on human expertise and judgement, but now HPCN provides complete freedom to experiment with new ideas. The high speed and low cost of HPCN allows the use of modelling as part of the thinking process, not just to predict the performance of a design when it is finished.
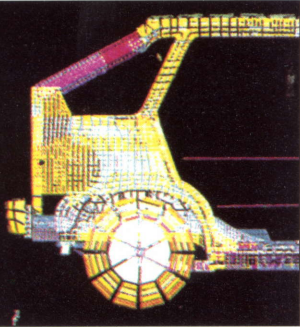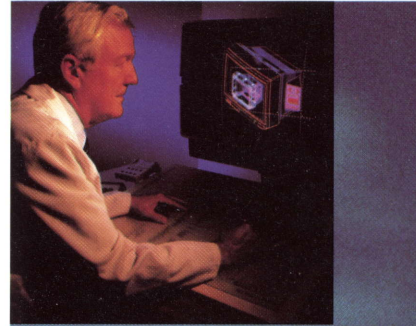
Carmakers observe the effects of collisions on simulated vehicles - evidence of the power of HPCN for improving automobile safety.

"Computer modelling means that the quality of th

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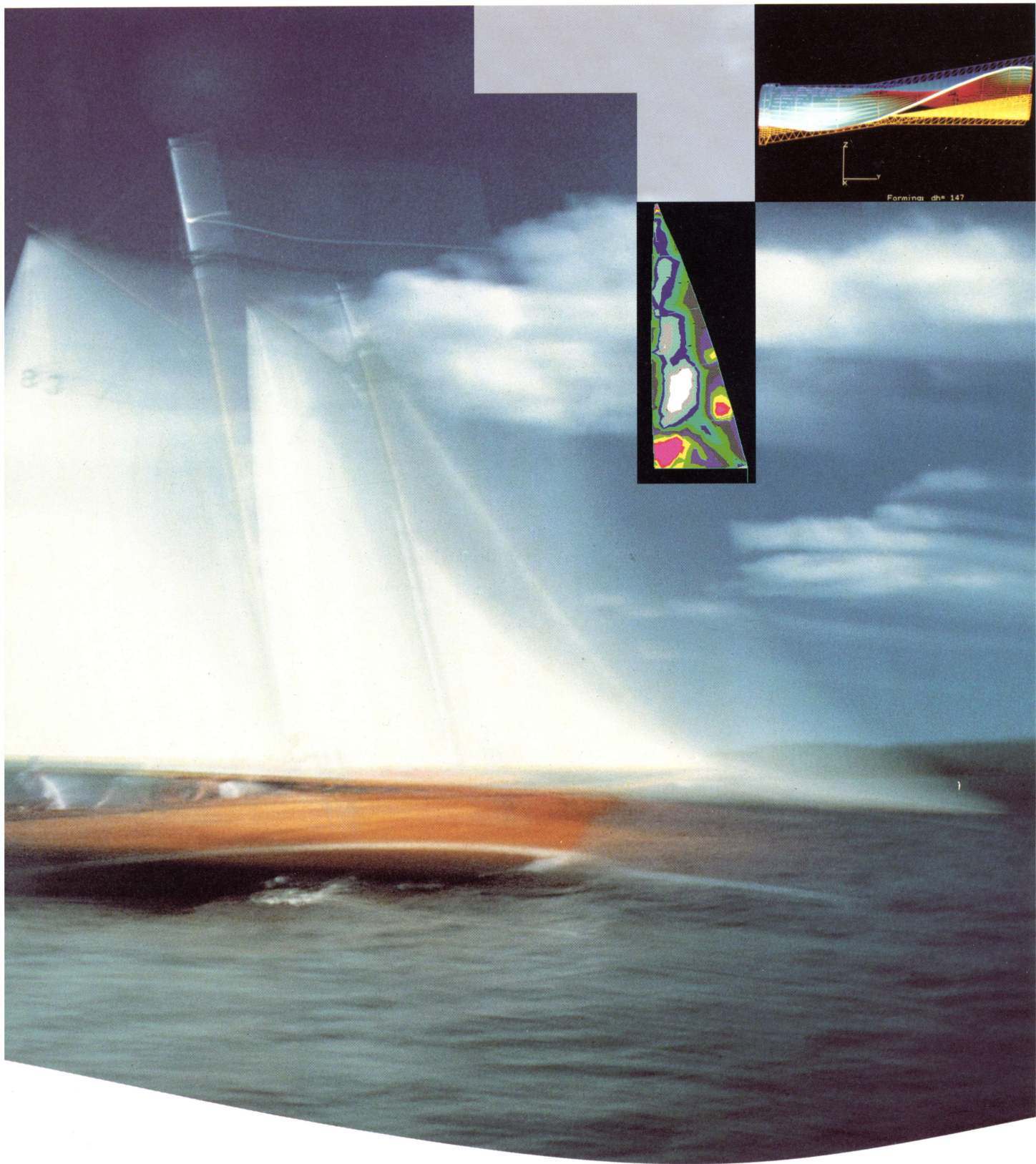
"nd product will be vastly better – for everybody"

Faster than thought

Nuclear magnetic resonance (NMR) is an established tool for monitoring chemical activity within the human body. The technique measures the total quantity of a chemical element along a line and sets of such measurements, in different directions, can be processed to make a "map" in three dimensions of the concentration of the element. This process is called topography and requires substantial computer processing to translate the raw data into a useful image.
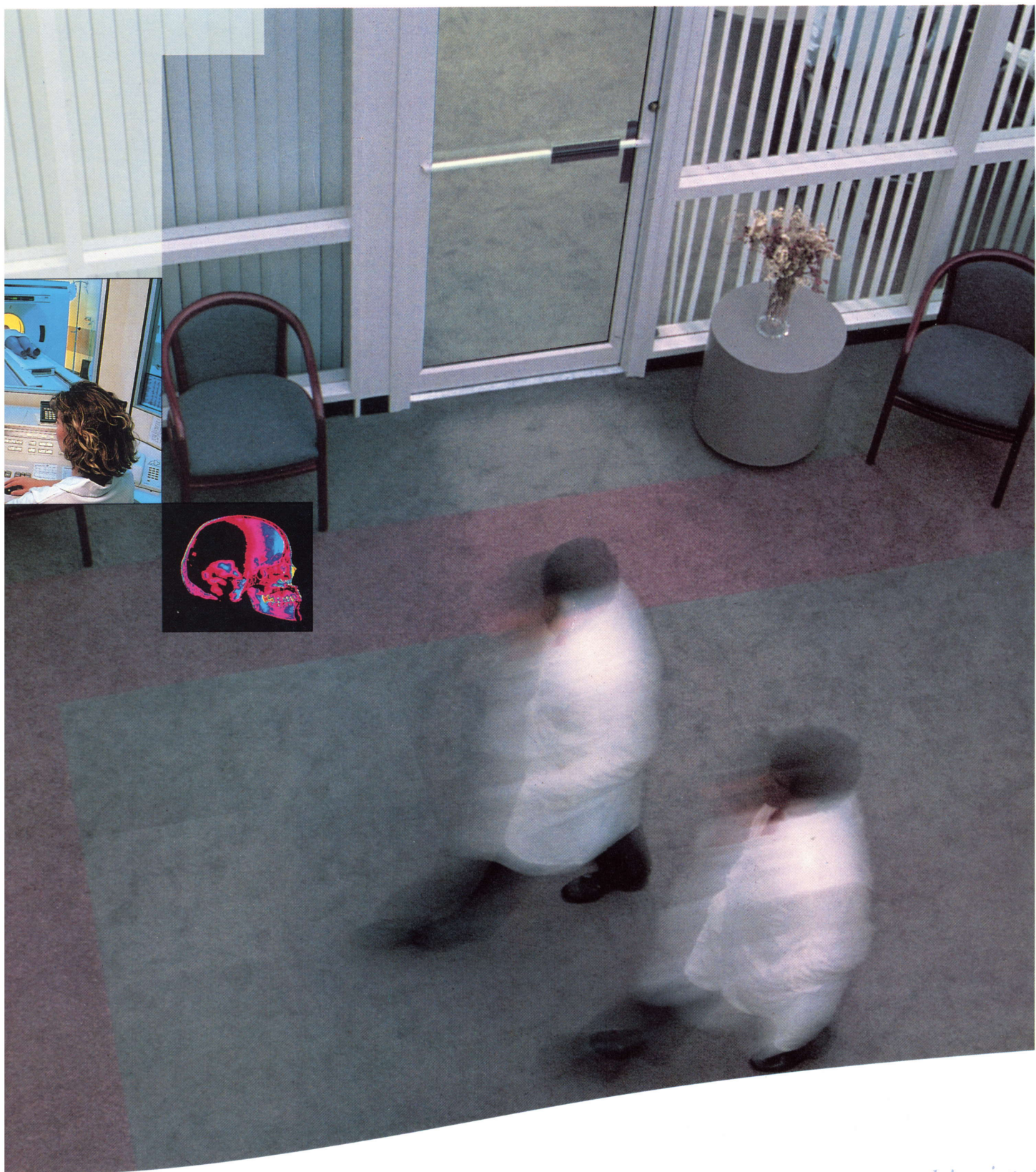
Early NMR scanners required a long time to collect enough data but recent developments have made it possible to collect data in less than one thousandth of a second. This is fast enough to show the changes in brain activity during the blinking of an eye or to allow doctors to diagnose their patients without making them spend long periods in the scanner.

Conventional computers would take hours to interpret the data and this would lose much of the benefit of high speed scanning. HPCN not only displays the image quickly but also makes better use of the specialists. It becomes possible to diagnose patients in a different hospital or for researchers to use a scanner in another centre without having to travel. Above all, HPCN enables the doctor to use NMR interactively, watching changes as they happen and in response to external stimuli.

Simulation enables trainee pilots to experience full flight conditions while HPCN helps translate complex radar phenomena into easily understood graphical information.
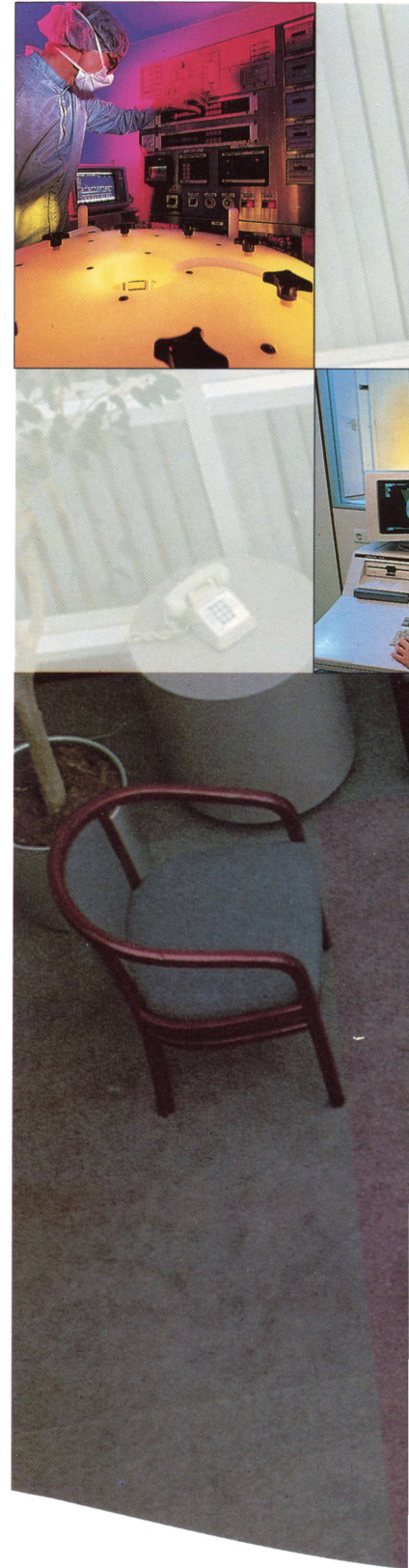
"The latest NMR technology coupled with HPCN is s

ulating new applications in science and medicine"

Power to the people

HPCN ensures that a vast range of business functions will in future be tailor-made to the special needs of individual customers.

Energy utilities are responsible for the distribution and supply of gas and electricity to large numbers of customers in a particular geographical area through a network of thousands of kilometres of pipelines or cables. These utilities are committed to high levels of customer satisfaction and are aiming to improve the quality of service whilst raising levels of performance and efficiency.

At the heart of any energy utility's ability to deliver service are its customer information systems. Large computer databases have been exploited in the past but their traditional role has been one of billing customers and collecting revenue - the basic functions of an accountancy system. The customer information systems of the future will be integral to a much vaster range of business functions such as the support of marketing activities and the management of service requests. They will also provide for the differing circumstances and special needs of individual customers, from personally negotiated rates for the commercial and industrial sectors to variable payment methods for those having difficulty paying bills. Overall is the demand for considerable flexibility to cope with the pressures of business change.

Conventional computing technology is unable to reconcile an anticipated requirement for a ten-fold increase in database size and functionality concurrent with the provision of a more cost-effective service and higher standards of performance. HPCN with its new generation of low-cost, high-performance computers offers the solution. In particular, advanced parallel database servers based on the European Declarative System (EDS) model are viewed as a key enabling technology for many of these utilities' future "customer first" information systems.
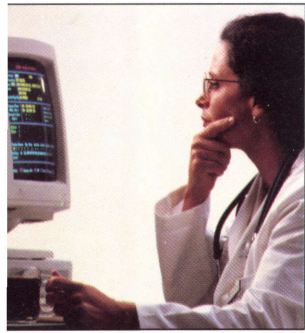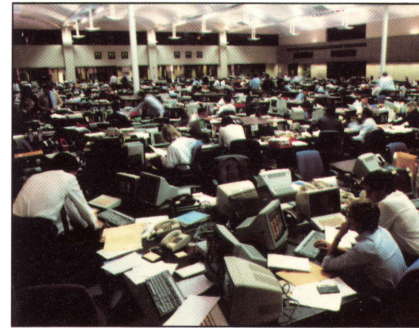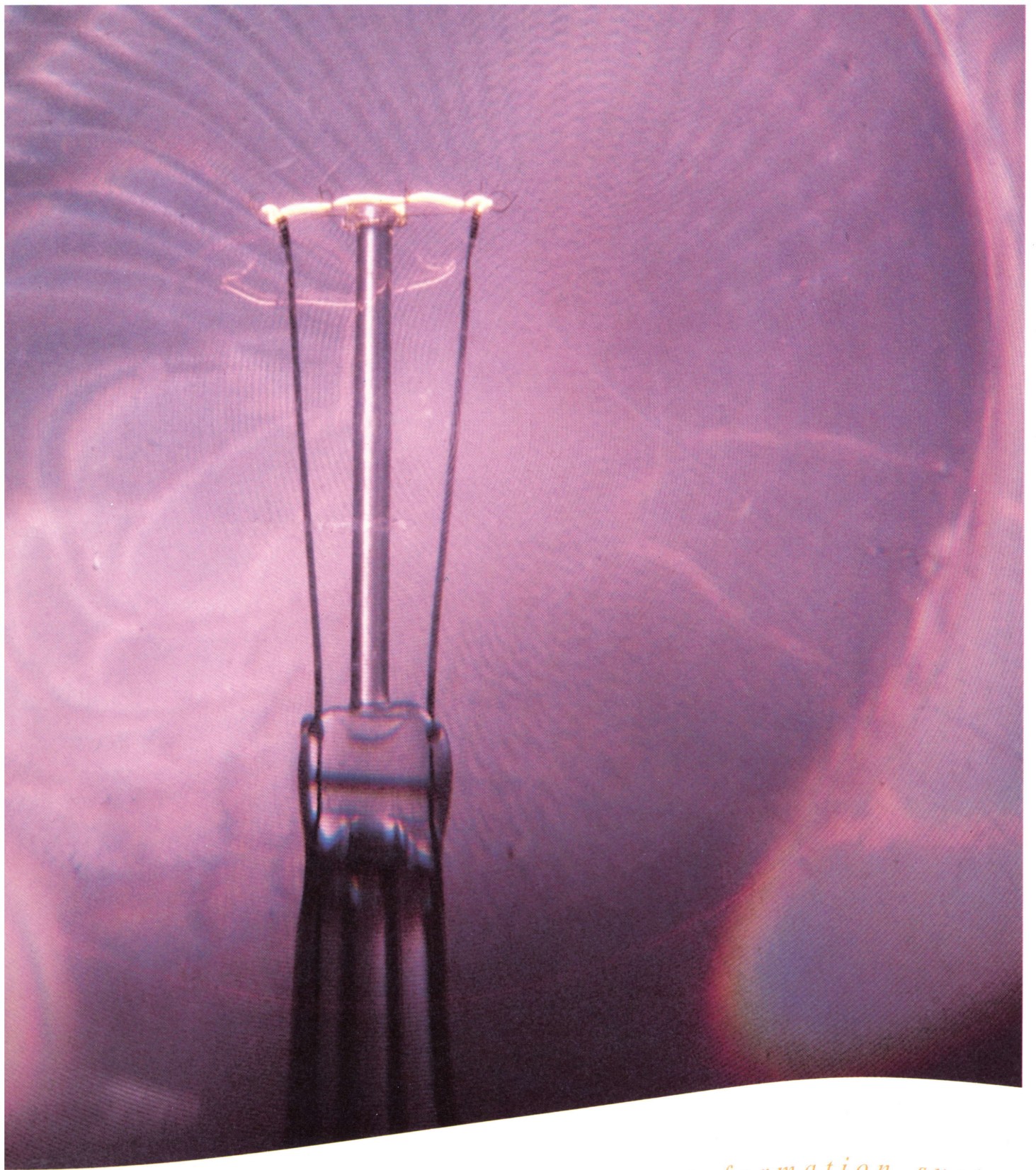

"High Performance Computing is at the heart of our strate

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for providing future 'customer first' information systems"

Opportunity for Europe

This European high-performance computer system produced by Meiko is installed throughout the world.

High Performance Computing is becoming integral to industrial competitiveness. Modelling and simulation techniques that once were the exclusive domain of specialist companies are now becoming widely used as industry focuses on quality design and engineering, shorter time to market and process savings in people and material.

With hundreds of thousands of graduates in science, engineering and business administration entering the workforce in the European Community each year, the pool of talented persons capable of exploiting HPCN systems is rapidly increasing. In the decades ahead, Europe will benefit as these people expand the use of and set new goals for HPCN systems.

The European Commission is working with European industry and science to help them exploit HPCN and be competitive in the world market. HPCN is a priority technology under the Fourth Framework Programme in the field of research, technological development and demonstration (1994-1998).

For further information on the CEC programme and the help available to companies interested in exploiting HPCN, please contact:

European Commission
DG III/F/4
200 Rue de la Loi
B-1049 Brussels

"HPCN enables us to improve the way we work"

HPCN... In Perspective

Networks

Training Activities

International Collaboration

National Programmes/EUREKA

Collaborative Community R&D

Designed and produced by
Communication Systems

Pictures supplied by:

Benelux Press
Engineering Systems Int.
Image Bank
Island Computer Systems
Meiko
Parsytec
Tony Stone Worldwide
Transvalor

"HPCN enables us to improve the way we work"

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