Micro-computer's Growing Role in Development

Jamal Mortoza

IF put to proper use, the micro-computer can easily revolutionise our development activities. Its contribution to the development and strengthening of administration can be no less envious. Micro-computers will, however, necessitate many changes at existing institutionalised levels so as to free development programmes. At the same time it must be capable of monitoring progress more intensively than before.

Several factors, till now, have contributed to the slow introduction of micro-computers in development activities, which has led to our being less than efficient. Senior administrative staff responsible for progress and success of any project are often seen to be uncomfortable with these machines.

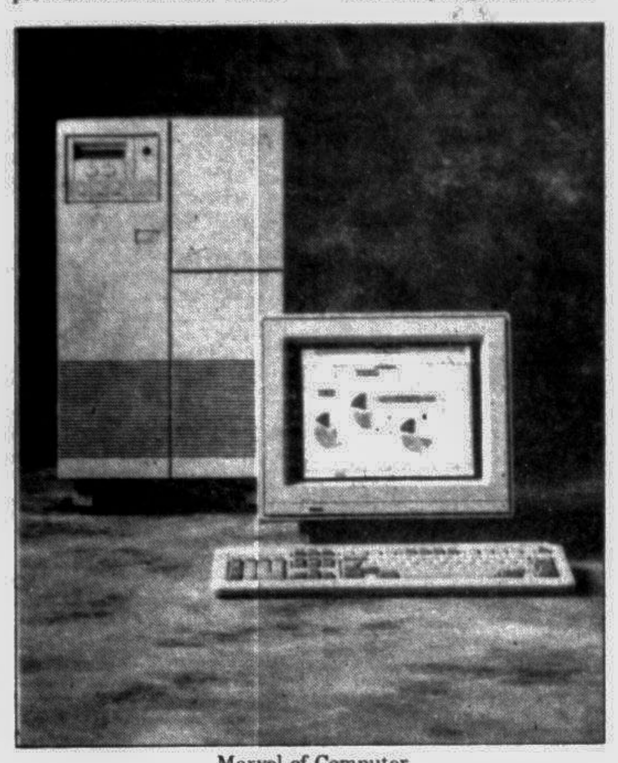
Few, if any, understand their processing capabilities and, as a result, are more often than not at the mercy of short-sighted vendors whose only interest is to sell their machines whether or not the choice is applicable. An added factor is the appalling lack of proper training of staff holding key positions.

Generally speaking, development agencies must concern themselves with four important aspects of administration.

These are, briefly, decision-making, implementation, monitoring on the basis of social equity, and client-based activity rather than, as at present, programme-based activity. Micro-computers can be a valuable asset in achieving these goals for they can remove the usual centralised procedures and other bottlenecks common to most agencies.

If properly utilised, micro-computer applications could be of help in improving the following areas:

— Budgeting and monitoring of projects, programmes and analysing why certain projects are more productive than others.
— Tracing the historical trends and forecasting probable future trends.
— Implications of cost-benefit analysis, delay, and cost reductions.
— The effects of plans by examining various alternatives through the use of modelling techniques.
— Monitor schemes or project status.
— Time and cost overrunning.
— Performance reporting especially exceptions.
— Comparisons between various regions and areas.
— Determine projections and fund priorities.



Marvel of Computer

As micro-computers become available at district and project offices, complex planning techniques will become more widespread facilitating improvements in existing development activities. The disbursal of large amounts of subsidies to increasingly large numbers of beneficiaries, and the implementation of schemes covering wide areas, requires the use of management information systems for judicious selection, audit and evaluation. The monitoring of schemes according to performance data as opposed to budget data and the presentation of ad hoc reports highlighting the need for immediate structural changes within the project are all, as a result of the micro-computer, within easy reach of the development agencies today.

Miracle Beads to Treat Cancer

BEADS seem an unlikely weapon to combat anything, leave alone cancer, and yet the most likely weapon of the nineties to treat cancer will be simple polymer beads which when coated with antibodies attach themselves to cancer cells and remove them.

These miracle beads, also often referred to as wonder beads, are the brainchild of Norwegian scientist John Ugelstad and his colleagues in Trondheim, who in 1979, literally brought the beads down to earth by being the first group of scientists who could manufacture them under laboratory conditions on earth.

The only other place where they could be produced before the Norwegian breakthrough was under the weightless conditions in space — a feat achieved by American scientists when all other attempts at producing microscopic plastic beads of uniform size on earth failed.

But problems plagued even the American method as it cost some 30,000 US dollars to manufacture a single gram of beads and only one kind of particle (of styrene) could be manufactured.

Ugelstad's production was and is unique because it gives monodisperse particles from a number of different plastic materials. Moreover, these particles can be made compact or porous, radioactive or magnetic, depending on the particular application for which they are required.

The particles are produced in sizes ranging from one-thousandth of a millimetre to about a hundred-thousandth of a millimetre. The size, the structure of the pores and the functions can be varied and regulated, reports "New Scandinavian Technology" quoting Prof. Ugelstad.

The larger particles are used for chromatography, as markers for various analyses, to clean blood and for medical research concerning flow conditions in the arteries.

Nowadays, the Ugelstad beads are used for a wide variety of purposes: chromatography, type determination of tissue in conjunction with transplantation, and selective removal of cancer cells from bone marrow in connection with bone marrow transplantations.

These enormous opportunities in biomedicine and biochemistry were thrown up when Ugelstad's initial breakthrough was succeeded by another three years later, where he showed that the beads could be magnetised.

By coating the beads with specific monoclonal antibodies, they can be made selective to a specific antigen. They can therefore find and bind themselves selectively to diseased cells.

Similarly, the beads can also make their way to and bind with parts of cells, viruses, bacteria, special proteins or other components which need to be isolated from biological material.

Each tiny ball or particle contains a magnetic iron oxide, so that it can be withdrawn with the aid of a magnet together with the components to which it has become bonded.

The size of each individual ball is four thousandths of a millimetre; one milligram contains 15 million beads.

These magnetic beads may offer a highly valuable contribution to treatment of several severe forms of cancer in the nineties by removing the cancer cells from the bone marrow.

The Ugelstad beads have already been used successfully in the clinical treatment of neuroblastoma, a cancer that strikes children aged from one to 15 years.

Such malignancies may require a very high chemotherapy and/or radiation therapy which would also destroy the stem cells in the bone marrow. Therefore about one-tenth of the bone marrow is removed from the body before high-dose therapy is given.

The rescued bone marrow which is contaminated by metastasized cancer cells is cleaned by the help of magnetic beads carrying monoclonal antibodies. When the high-dose radiation or chemotherapy is finished, the cleaned bone marrow is reinjected into the patient. During the whole treatment, the patient is kept in a sterile room to avoid risk of infection.

This method enables scientists to remove the vast majority of the diseased cells, but the enormous amounts involved make it impossible to ensure that no diseased cells are readmitted.

Numerous scientists throughout the world are currently working intensively on finding methods to isolate stem cells from the bone marrow with the aid of magnetic beads.

A method to extract stem cells may also pave the way for allogenic cell transplantations, i.e. transplantation of bone marrow from another person. This may be highly beneficial, for instance, for people with impaired immune defence, Ugelstad says.

Other areas in which the wonder beads are used are AIDS research, clean production of pharmaceutical products, control of sensitive instruments such as blood cell counters and microscopes and cleaning of proteins and antibodies.

They are also widely used in chromatography where the analysis time can be slashed by utilising these particles for separating biological components.

The beads are spelling success for the industry too, forming the largest ever Norwegian involvement in the area of biotechnology.

They have already become a success for both the Norwegian and Swedish biotechnological industries, and even bigger markets are now emerging in the United States, Europe and Japan.

Norwegian and Danish firms are also marketing non-magnetic beads called dynospheres which are expected to generate a turnover of around 300 million Norwegian Kroner by 1995.

Dynospheres are mainly used in chromatography, but also for various other separation techniques.

— (PTI Science Service)

BARI Technology Fights Fruit Fly

THE tiny fruit fly can cause enormous damage to valuable fruit crops. Some estimates of damage by this pernicious pest reach as high as 50%! Female fruit flies insert their eggs into the tissues of young or mature fruits.

As the eggs hatch, the larvae or worms that emerge feed on the internal tissues of the fruit. If this feeding is unchecked, the fruit becomes rotten and unfit for human consumption. Incomplete feeding, which results from larvae that die prematurely, results in badly deformed and unmarketable fruit.

However, a solution to this harmful pest appears to be around the corner. A technology to control fruit flies has been successfully developed by researchers of the Entomology Division of the Bangladesh Agricultural Research Institute (BARI).

In this simple yet effective technology, fruit flies are attracted to a bait material and killed by the insecticide incorporated in the bait.

The bait material is prepared by adding 0.5 g of Dipteryx 80 sp to 100 g of sweet gourd mash and mixing thoroughly. The bait material is then placed in a small earthen pot supported by three split bamboo sticks at a height of 50 cm. Another flat, larger earthen pot is placed 20 cm above the bait container to protect the bait materials from sunlight and rain. The bait material is changed every four days, and fresh insecticide is added every other day.

Repeated tests have shown the efficiency of the technology. It compares favorably with the more laborious bagging of individual fruits and spraying fruits directly.

Farmer level tests indicate the effectiveness of the technology. The Mennonite Central Committee obtained notable results from trials carried out during 1989-90 and 1990-91. In the 1990 test at the Barachawna multilocation test site conducted by staff of the On-Farm Research Division, BARI, farmers using the technology lost only five percent of their crop to the fruit fly. On the other hand, farmers not using the technology suffered almost total damage to their bitter gourd!

Scientists of the On-Farm Research Division, BARI, are very enthusiastic about the technology. Arrangements are now underway to test the technology in several FSR sites prior to dissemination to the farming community. — (BARC)

N-Technology in Industry and Earth Sciences

THERE is significantly increased interest in industrial applications of low-cost unclear techniques, tracer technology, and on-stream radiation analyzers.

Manpower development, dissemination of information, and technology transfer have been major objectives of the Agency's efforts in industrial applications through its technical co-operation programmes.

New events and trends have highlighted the advantages of radiation technologies for monitoring and helping to preserve the environment.

Many developing Member States have been keen to set up national qualification and certification schemes and to train staff for non-destructive testing facilities. There is growing interest in such advanced NDT and non-destructive evaluation methods as quantitative computed tomography, position emission tomography, neutron radiography, and thin-layer activation analysis.

Industrial applications

A publication issued in 1990 reviews the technical and economic benefits of the use of nuclear techniques in the exploitation of mineral resources.

Such advantages include speed, high specificity, adaptability to multiparameter analysis and control, relative simplicity and, in some cases, the possibility of application in hot, dusty, and aggressive environments where no other instruments or methods can be used.

A new research programme was initiated in 1990 to study the environmental pollution resulting from the burning of coal and coke, a problem which has reached serious proportions in many parts of the world.

The first meeting has already established that pulverization and washing are the most useful measures to achieve significant removal of pollutants from coal and coke used in electricity producing plants.

Nuclear and related techniques also are playing an important role in the evaluation of environmental pollutants with the purpose of environmental conservation, particularly that associated with pollution of the air with SO_2, NOx, CO_2, and cholorofluorohydrocarbons.

Research continued on electron beam purification of flue gases and on the radiation treatment of sewage sludge for safe disposal and reuse. The use of unclear techniques in the exploration and exploitation of energy and mineral resources was the focus of an international symposium which addressed nucleonic control systems and on-stream analyzers in the coal industry; on-line nuclear and related techniques in the mineral industry; nuclear borehole logging, instrumentation, data processing and interpretation, tracer techniques; radiometric methods; and nuclear activation analysis.

Water and mineral resources

The application of isotope techniques in hydrology and environmental investigations continues to expand with a corresponding increase in requests for training, analytical services, and assistance in calibrating and maintaining laboratory equipment.

Investigations continued in numerous arid and semi-arid zones to assess groundwater origin, recharge, and dynamics; different sources of recharge (precipitation versus surface water); and the dynamics of groundwater.

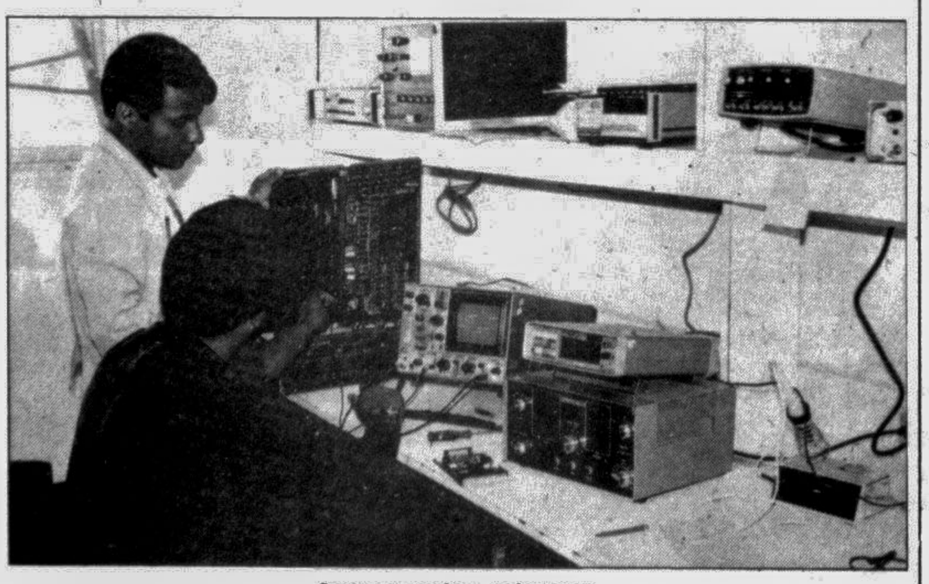
Field studies in Portugal and Haiti, for example showed that the origin of groundwater salinization is mainly sea water encroachment.

The dispersion of river waters was studied showing the possibilities and limitations of using tritium as a tracer in large rivers for discharge measurements.

Preferential patterns of lake water discharges into groundwater also were studied along with sediment transport experiments.

Some seven new facilities covering various facets of the use of isotopes in hydrological studies were installed in 1990.

— (IAEA)



Low-cost nuclear techniques

Soil studies take root in new research centre

by Bernabe Paguio

FOR farmers in the Philippines, SWAT teams do not mean armed commandos trained in special weapons and tactics.

SWAT stands for Soils and Water Access Team formed by the Department of Agriculture in each region of the country in response to farmers' demand for technology transfer. SWAT members form a core group of skilled fieldmen who disseminate technical information to farmers and farm technicians.

They facilitate the delivery of needed agricultural services, particularly in relation to soil and water technologies. They also complement the efforts of other extension workers in the region.

The SWAT concept is just one of the many exciting things going on in a brand new building besides the Department of Agriculture. It is the Soils Research and Development Centre, built with the help of the Japanese government at a cost of 80 million pesos (US $3 million.)

Under the Bureau of Soils and Water Management, the research centre is popularly known as the Soilsearch Centre. It aims to boost the productivity of some 15 million hectares under cultivation, study the soil and environmental characteristics of these farmlands, and diffuse farming techniques to farmers.

Diffusing new farming techniques to farmers around the Mt Pinatubo volcano, is one of the Soilsearch Centre's busiest activities. On June 12, Mt Pinatubo erupted after being dormant for 600 years.

That and subsequent eruptions covered some 86,869 hectares of farmland with ashfall and 23,063 hectares with volcanic mudflows. The Department of Agriculture has declared about 20,000 hectares (out of 80,000 hectares of farmland affected by the eruption) beyond rehabilitation because of thick mudflow deposited mostly along the slopes of the volcano.

As of October 31, the Department of Agriculture announced the rehabilitation of 53,397 hectares of agricultural land damaged by the eruption. Some 49,167 hectares were planted to rice, vegetables and root crops.

Basket farming has been recommended in areas where mudflow and ashfall deposits are too thick for conventional planting methods. Soilsearch Centre specialists say basket farming has been developed from native planting techniques in other provinces.

Basket farming means putting a plant or tree inside a native and biodegradable bamboo basket filled with a healthy soil. The basket is then transplanted to the ashfall or mudflow area, its healthy soil nurturing the plant until it outgrows its basket and take root in the surrounding soil.

Basket farming has been used in other provinces, in upland areas with poor soil or land resources. Farmers in these types of terrain have to dig holes in rocky and rough grounds deep enough to be filled with healthy soil.

In areas around Mt Pinatubo where the ash and sand deposit in thin, enough (5-10 cm), agriculture is possible. Less than a fourth, or about 10,000 hectares of irrigated land are covered with ash and sand thicker than 10 cm.

Using local plowing methods, deposits that are about 10 cm or less can be mixed with the natural soil and still be suitable for rice.

The Soilsearch Centre has come out with a primer on farming in eruption-affected areas, this after weeks of complex laboratory work, tedious field surveys and a series of discussions with various agencies.

The primer is an appraisal of the present soils and water situation in the areas around Mt Pinatubo. It deals mainly on farming issues, scientific concerns, immediate response and significant findings made by the Soilsearch Centre.

Neutron moisture gauges are used to investigate groundwater

Besides its concern over farmlands around Mt Pinatubo, the Soilsearch Centre has also accelerated soil surveys in other parts of the country and established a soil information system. Its modern laboratories have stepped up research in soil and water management.

Training covers agricultural land management, sloping agriculture techniques, irrigation soil testing, agronomy, geology, volcanology, remote sensing, rain stimulation research and other agri-industrial concerns.

— (Depthnews Asia)