Researchers warned: 'systems could crash on 1 January 2000'

[PARIS] Time is fast running out for research organizations that have not yet tested their information technology systems for the 'millennium bug' — a programming glitch in many microprocessors which will prevent them from recognizing the year 2000.

This, at least, is the growing consensus among computer experts, who predict mayhem in many sectors of society, including parts of the research community, unless computers and intelligent devices are repaired before then. Estimates of the worldwide costs of doing so are as high as US$600 billion.

Many research organizations are beginning to take the problem seriously. But others continue to give what some claim to be insufficient attention, pointing out that many scientists seem allergic to the hype generated by the thousands of consultants and computer companies feeding off the problem.

The problem originates from the practice of programmers representing years as two digits (dd/mm/yy) instead of four (dd/mm/yyyy) in many operating systems, software packages and electronic devices. As a result, many microprocessors will reset their clocks to 1900 in the year 2000, a date now known as 'y2k'. Any operation that adds, subtracts or compares dates may generate errors, or, at worst, cause systems to crash.

But the glitch is not restricted to computers. It also affects embedded microchips, which are found everywhere from toasters and lifts to laboratory equipment and air-craft. These chips often carry date functions.

The major concern for research organizations is in administration of such activities as payroll, procurement and grant tracking. "Our [business] software is supposed to be y2k-proof, but nothing is being left to chance and a full simulation is being planned," says Michael Metcalf, information technology specialist at the European Laboratory for Particle Physics (CERN) in Switzerland.

The situation there is comparable to the problem facing organizations such as banks and insurance companies which are highly dependent on data processing, and so most exposed to the y2k problem. Much of business still runs codes written in the 1960s and 70s using COBOL, a language that used two-digit dates, while even more recent software often contains chunks of older programs. Programs often run to millions of lines of code, all of which may need to be checked.

"Technically the y2k problem is easy to fix; it's the scale of the problem that makes it difficult," says Martin Jourdain, a researcher at the French computer research agency, INRIA, who is on secondment to Metaware, a company dedicated to the y2k problem. "Dates can hide in places you never suspect."

IBM estimates that remedying the problem worldwide will require 1,910,000 programmers. COBOL programmers are now commanding salaries double those 12 months ago.

Scientific computing seems to be much less vulnerable to the y2K problem than research administrations. Operating systems and applications are written in scientific and engineering languages where dates are usually stored as 32- or 64-bit timestamps. The 32-bit Unix datestamp used by Cray Research has measured time in microseconds since the birth of Unix in 1970, for example, while the most recent Crays use a 64-bit timestamp with a lifespan of 2^{34} years. But this does not prevent programmers from employing problematic date formats in programs.

Kent Koeninger, head of Cray's Year 2000 programme, says supercomputer codes are revalidated every time they are transferred to a faster machine and that correcting date problems has been part of this exercise. Cray has found minor y2k problems but nothing critical, he says. "We are taking the problem seriously, but we have much less work to do than in the data processing shops."

CERN will be shut down for Christmas 1999 until 3 January 2000, so "no circulating beam will risk appearing to be a century old", says Metcalf. "If anything untoward happens when tests start later in the year, this is anticipated to be no worse than the biannual change to and from summer time."

The y2K problem facing the US space agency NASA is "not trivial, but not all that pervasive for us," says Jim Radosevich, coordinator of NASA's $30-million Year 2000 programme. He says most of the problems concern administration, and desktop machines using commercial software.

Space science benefits from the fact that missions are timed as the number of hours from launch and not with respect to a specific date, he says. "On the scientific side, there is potential for slight problems but we haven't found anything serious in mission-critical systems."

US federal agencies estimate that they will spend $2.3 billion altogether between 1996 and 2000 on y2k. A report from the US Department of Energy foresees "a potential national emergency that can seriously degrade or threaten national security. If the problem is not addressed, the impact to the federal government could be insurmountable."

The report's list of mission-essential systems that must be checked includes "safe operation of nuclear power production facilities, control and accountability of nuclear materials, control of nuclear facilities; health protection from hazardous materials; and medical treatment of patients".

Many scientists remain sceptical, however, of the claims that many systems will melt-down in 2000 if left uncorrected. "This is all hype and there is a bunch of people that want

Art and science shape up for awards

SHELLEY WILSON
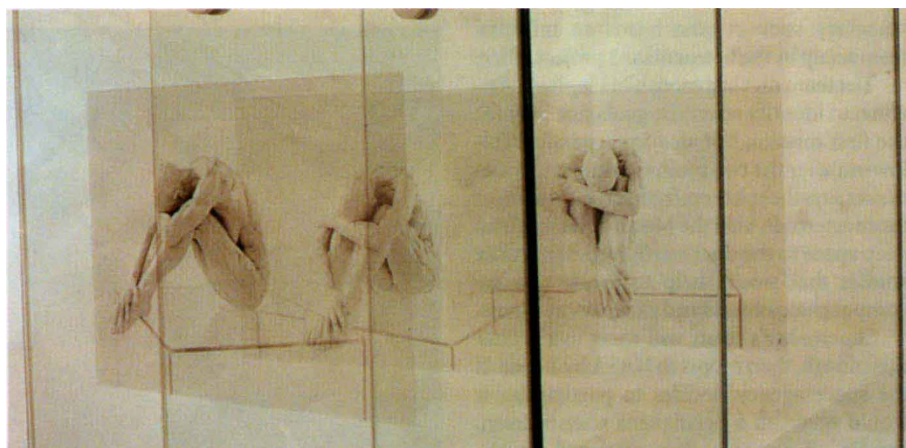
[LONDON] Six collaborations between artists and scientists in Britain have been awarded a total of £90,000 (US$146,000) under SCI-ART, a science and art initiative launched by the Wellcome Trust. Arthur Crisp, of Atkinson Morley's Hospital in London, and artist Shelley Wilson have received £12,500 for a project entitled *Portraits of Anorexia* that will produce artwork conveying this disorder to the public and showing how body shapes are categorized. An example of Wilson's earlier work is shown above.