

paying for time spent on the computer and telephone connection costs. Appropriately, the collaborators in the experiment have been drawn from the British community of researchers into computer human factors, which will form the subject of the journal.

The project is expected to last two years during which time each collaborator will be required to submit two papers to the journal for publication. Papers can be submitted directly via the computer system, can be sent to the editor, Professor Shackel, in a reasonably neat form for input into the system via a word processor or can be sent in perfect form to Birmingham for input through optical character recognition. Referees, who will be drawn from the same group of collaborators, will be informed that a paper is waiting to be read by messages which will appear on their Visual Display Units (VDUs) the next time they access the system. The submission and refereeing of a manuscript will be confidential to the editor and author or referee. Only when the manuscript has been accepted for publication will it be available to all collaborators in the system.

The British experiment is not the first of its kind. An earlier, similar exercise supported by the National Science Foundation in the United States ended in failure. The main problem was that people found the computer system difficult and time-consuming to deal with. At the end of that project, no paper had been submitted to the experimental journal, let alone published.

Professor Shackel is confident that the British experiment will not fall into the traps of the American one. His project, he says, has been designed to allow users a fair degree of flexibility, something which the Americans omitted. Although the ideal operating mode would be for everything to be done directly onto the computer, including the original writing of manuscripts, refereeing and editing, Professor Shackel acknowledges that this would be impractical for most people. His system allows authors to submit papers in several different ways, including the conventional way of sending a typed manuscript to him. Referees will also have the option of reading manuscripts directly on their VDUs or requesting that they be printed out.

Another aspect of the project's flexibility, says Professor Shackel, is that it will also investigate the possibilities of publishing scientific newsletters, annotated abstracts and reports of workshop conferences electronically, not just research papers. He also hopes to study the potential for greater cooperation between authors, referees and editors by using computer communications, and for increasing informal communication between scientists working on similar problems in different places.

Judy Redfearn

Soviet swindles

Degrees by stealth

Soviet ministries are killing the goose that lays the golden egg, as far as applied science is concerned. So says the prestigious weekly *Literaturnaya Gazeta* in the latest round of its press debate on the relative merits of pure and applied research.

Such debates are a common Soviet method of airing and channelling public opinion on problems of general concern ahead of decisions by the Party. The present debate was launched by *Literaturnaya Gazeta* in January of this year, as a Soviet version of C.P. Snow's "two cultures". In particular, it aims to investigate why public opinion considers applied research so much less prestigious than pure research. This is more than an academic question because, according to Party directives, all Soviet research should be aimed towards benefiting the national economy. However, at the Twenty-Fifth Party Congress (1976), Mr Brezhnev said that in the long run "there is nothing more practical than a good theory". And although the Soviet higher education system stipulates that new graduates must work three years in whatever job they are assigned, it is the most brilliant graduates (and those with special Party backing), who end up in the academic research posts.

To a certain extent, the division between pure research (carried out in the Institutes of the Academy of Sciences) and applied research (carried out in the "Branch Institutes" belonging to the various ministries) is a formal one. As I. Novikov, a Corresponding-Member of the Soviet Academy of Sciences, pointed out in the latest round of the debate, leading establishments such as the Kurchatov Atomic Energy Institute or the Central Institute of Aero-Hydrodynamics (the "cradle of Soviet aeronautics") fall outside the Academy structure. For the most part, however, conditions in the branch institutes bear no comparison with those of the Academy.

The working environment of the branch institutes was criticized by S. Kara-Murza, apparently representing the younger generation of scientists. He complained that it was difficult to maintain pride in one's work, and that team spirit was hampered by the custom of hanging up on the notice board graded assessments of researchers' creative potential. The ministries running the branch institutes seem to be trying to extend the principles learned in maximizing productivity in factories to the field of scientific research. The branch institutes also tend to be inward-looking, concentrating on intra-departmental communication and missing outside developments. One example of this is the institute that was supposed to be playing a leading role in stock-breeding and was found to be using methods of

biochemical analysis which dated from the 1920s and 1930s. The institutes run by the All-Union Academy of Sciences and the academies of the Union republics are less insular and benefit from communication with the world scientific community.

Meanwhile, it seems that some employees of the non-Academy institutes have found unauthorized outlets for their frustrated talents. These range from a racket in fake degrees and diplomas uncovered last year in Georgia and Azerbaijan to last month's revelation that the rector of a technological institute of fishery in Astrakhan had been diverting student housing funds to build luxury flats. Perhaps the most ingenious example of corruption so far comes from the Novgorod Polytechnic Institute and involved senior staff and some two hundred students. The staff applied for funds for research for which they had no facilities — the students were entered as "researchers", and received a sizeable share of the profits.

Vera Rich

Space shuttle

Delay costs money

Washington

Officials of the National Aeronautics and Space Administration (NASA) have expressed confidence that despite a tight schedule it should be possible to meet the planned date of next March for the first orbital flight of the re-usable space shuttle.

The delays in the schedule of operational flights have already caused problems for some of the shuttle's early commercial users faced with the alternatives of setting back their launch programmes or opting for more expensive expendable launchers.

Satellite Business Systems, for example, which plans to launch a series of satellites for information relay by private corporations, has recently decided to use a Delta rocket for the launch of its second satellite in 1981, rather than waiting for its first scheduled shuttle launch, originally booked for next March but since pushed back to 1983.

Even greater problems have been caused for Intelsat, the consortium of telecommunications authorities which pay for and use the communications satellites which are the present base of international telecommunications traffic.

Originally it had been intended to launch several of the Intelsat V series of satellites, the first due in December, from the shuttle. Now at least the first five out of eight launches will be from Atlas Centaur rockets.

Intelsat is keeping its options open. In addition to its shuttle bookings, and a recent decision to order the extra Centaur launches, space has been booked on two early Ariane launches (which remain dependent on the success of further tests of the European rocket).

For Intelsat V, the main problem caused by schedule uncertainties has been cost. Expendable launches are on average about twice as expensive as shuttle launches. For Delta payloads, for example, the relative costs would be \$21 million for a rocket launch compared with \$8 million to \$12 million for a shuttle launch, depending on the configuration in the shuttle bay.

But for the next generation of communications satellites, Intelsat VI, there is also a design problem, because payloads designed to fit neatly into the bay of the space shuttle, taking up the minimum length on which the cost is determined, may have a diameter too large to fit alternative launchers.

Already this has raised serious difficulties for the Hughes Aircraft Company, whose LEASAT communications satellite could face an expensive redesign if the shuttle launch schedule is not maintained. For Intelsat VI, it could mean delays in deciding the final design parameters. Intelsat VI satellites are to be bigger and better than the Intelsat V series, which are the first to be stabilized on three axes, and thus to be capable of directing radio beams at small areas — such as cities — on the surface of the Earth.

The outline design of Intelsat VI would provide the equivalent of 40,000 telephone channels (compared with 12,000 for Intelsat V). To economize in frequency spectrum (in the 6–4 GHz and 14–11 GHz bands) both series of satellites use circular polarization in opposite directions.

Operational specifications developed by Intelsat engineers were presented to the organization's board of governors in Washington this week. Given the uncertainties over the shuttle programme the board may decide to postpone approval of the specifications, perhaps until it meets again in December. Meanwhile the constraints on size and weight for Intelsat VI are being set by the capabilities of Ariane.

The delays in the shuttle programme are particularly embarrassing to NASA at a time when there is growing evidence that the demand for launches of telecommunications satellites will outstrip the supply of launchers well into the decade, even with both shuttle and Ariane operational and the maintenance of a fleet of expendable launchers.

Reflecting this demand, for example, NASA announced last week that eighteen space missions using expendable launch vehicles will be conducted by the end of September 1981, two carrying NASA scientific instruments and the other sixteen payloads for other government agencies and private companies.

Faced with the prospect of a full order book, NASA officials are keeping up the pressure for as early a shuttle launch date as possible. Despite renewed problems both with the engines and with the thermal tiles experienced over the summer, the agency has agreed to absorb the extra two months delay by squeezing the last planned six

months of work into four months.

So far, no further problems have been experienced, and Dr John Yardley, NASA Associate Director for Space Transportation Systems, said last week that progress on construction and testing was satisfactory and NASA is still aiming for a March launch date.

But there is still a long way to go before the shuttle can be launched. The final six week period, when many of the components will be tested together as a single system for the first time, will be crucial. So despite official optimism, no-one will be surprised if the launch slips back later into the summer.

David Dickson

Genetic manipulation

Ethics of change

Washington

Full-scale medical application of recombinant DNA technology to human genetic therapies may still be a few years off, but a Presidential Commission decided last week that it is close enough for federal agencies to prepare for the ethical decisions that research workers and medical practitioners may soon have to face. How, for example, should one balance the beneficial aspects of an attempt to correct a deficient gene against potential side effects of the treatment, or against the possibility of undermining traditional, often religious, conceptions of an individual's relationship to past and future generations?

Such broad philosophical questions have been discussed ever since manipulating the genetic make-up of human cells was first suggested. Temporarily eclipsed by the public debate over the immediate health hazards of recombinant DNA research, the wider questions have now resurfaced in the wake of the US Supreme Court's decision to allow the commercial patenting of microorganisms. Evidence for and against further federal involvement was heard last week by the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, a body formed this year under congressional mandate.

The members of the commission felt that they lacked the time and expertise to study the whole range of ethical issues raised by genetic engineering. But they did agree to a survey by the commission's staff of the more immediate questions raised by the imminent application of recombinant DNA techniques to the treatment of a range of genetic disorders.

Even those members who were reluctant to accept the existence of major ethical problems accepted the case for educating the public to distinguish between topics that are of legitimate concern (such as potential medical side effects or deliberate misuse) and those that are not (such as the

creation of a race of monsters).

The principal stimulus for the commission's interest was a letter written to President Carter in July, after the Supreme Court decision, by the leaders of three prominent religious groups, the National Council of Churches, the Synagogue Council of America and the United States Catholic Conference. They expressed concern over possible dangers triggered by the rapid growth of genetic engineering and raised moral, ethical and religious questions over experimentation with humans. The commission thereupon asked the President whether it should study the ethical problems raised by genetic engineering, and earlier this month, Dr Frank Press, director of the Office of Science and Technology Policy (OSTP), suggested a survey of the current practice of federal agencies.

In a more expansive reply to Dr Claire Randall, general secretary of the National Council of Churches, Dr Press said he agreed that the Supreme Court decisions had significant implications and added that, with the legal barrier to patentability removed, there might be danger of proceeding too rapidly in the development of genetic engineering techniques.

Dr Gilbert Omenn, previously associate director of OSTP and now deputy director of the Office of Management and Budget, pointed out that many studies of the ethical issues were under way and, compared with more pressing problems of medical care, genetic engineering should be relatively low on the commission's list of priorities.

Commission member Dr Arno Motulsky suggested that the application of recombinant DNA techniques in, for example, the treatment of sickle-cell anaemia was one of a whole series of advances in medicine which "do not raise particular complications". However, Dr Richard Roblin of the Frederick Cancer Research Center predicted that "within three to five years a hospital committee will have to decide whether to give the go-ahead for the functional use of gene therapy". Such gene transplants raised the need for criteria to distinguish legitimate from illegitimate forms of controlling genetic material, particularly where the latter might be seen as a new form of eugenics.

The commission itself was split over the seriousness of the ethical issues, but it agreed on three points: that the public needed guidance in distinguishing reasonable from unreasonable concerns; that enough scientific and medical data now exist on which to base a substantive discussion of the short and medium-term applications of genetic engineering in medicine; and that, apart from studies by the Office of Technology Assessment and the National Science Foundation, other federal agencies had focused primarily on the safety or patent aspects of recombinant DNA research, addressing ethical issues only subordinately.

The commission's staff study is likely to