that significant cost and schedule overruns with the 2.4-metre telescope, whose planned 1984 launch from the space shuttle will probably have to be postponed for up to a year, were leading the agency to cut corners in developing and testing the instrumentation thus prejudicing some of the scientific experiments.

For example, no reserve funds to meet unexpected difficulties had been included in the budget of the Goddard Space Flight Center, which is responsible for the development of the scientific instruments which will be located at the telescope's focal plane.

Partly as a result of this delay, caused chiefly by greater than expected technical difficulties in various parts of the project, cost overruns could amount to \$50–\$100 million, compared with an initial estimate of \$435–\$470 million.

The space telescope is only one of a growing list of NASA projects in the same trouble. In some cases, such as the Galileo mission to Jupiter, and the solar polar mission — delayed two years — these have been the direct result of problems with the space shuttle itself.

Ariane sells three

Washington

Intelsat — the international telecommunications satellite organization — has given a major boost to European space efforts with its decision to launch three of its nine satellite global communication systems from the French-built Ariane rocket.

Intelsat had originally hoped to launch the satellites from the National Aeronautics and Space Administration (NASA)'s space shuttle. Delays in the shuttle development programme, however, have caused concern about whether the launcher will be available in time. (Even after the first launch next year, it is uncertain whether NASA will be able to keep up its promised schedule of launches.)

Ariane is also experiencing problems, and following the failure of a test flight earlier this year there is no guarantee that it will be available for the Intelsat launches, which would be the sixth, seventh and eighth in the nine-satellite, \$300 million system. In this case, Intelsat would use Atlas Centaur rockets, which because of the shuttle delays are already being used for the first five satellite launches, with the first launch due to take place next month.

The launch vehicle for the final satellite in the series has not yet been decided, because Centaur launches are likely to be considerably more expensive than the shuttle. When all satellites are in orbit, the system will double the number of international telephone calls and television transmissions that can be handled simultaneously.

David Dickson

But in the case of the space telescope, there have been separate problems with each of the three parts of the project: the scientific instrumentation, the optical telescope assembly and the support system module.

In the case of the scientific instrumentation there have been what one scientist describes as a not unusual set of technical problems, extra costs caused by delays and a few "minor screw-ups" in all instruments except the high-speed photometer.

It is a similar story with Perkin-Elmer, which was awarded a \$58.5 million contract for the optical telescope assembly and which has also had difficulty in keeping work on schedule, finding that it lacked sufficient manpower for design needs and that a computer-controlled method for grinding one of the two optical mirrors was not as successful as had been hoped.

More recently, the other main contractor, Lockheed, awarded a \$73 million contract for the support systems module, reported that revised cost estimates were substantially larger than those originally submitted.

Both NASA officials and staff members of the relevant congressional oversight committees are looking closely for the reasons behind the delays. In particular, Congress wants to know whether tight limits on personnel have reduced the agency's ability to review contracts awarded to private companies.

In Europe, where several companies are working on apparatus to be included on the telescope, a delayed launch will relieve pressure on schedules that were said to be getting tight.

The delay seems unlikely, however, to have a significant impact on plans for a space telescope institute, which will be responsible for analysing the data received from the telescope.

NASA is expected to announce within the next few weeks the site that it has selected for the institute. Of the original four proposals submitted earlier this year, two remain in the running. One is from the Association of Universities for Research in Astronomy (AURA), which proposes building the institute at Johns Hopkins University in Baltimore; the other is a proposal from Associated Universities Inc. to locate the institute at Princeton University.

Although both proposals are accepted by astronomers as having strong merits, the balance may have been swung in favour of Princeton by a recent federal indictment against Computer Sciences Corporation (CSC). This company, which AURA intended to use to help develop the software for handling telescope data, is being indicted on charge of fraud and racketeering arising from a 1972 time-sharing contract.

AURA officials pointed out last week, however, that the section of CSC which has

been indicted is completely separate from that which would help operate their proposed space telescope institute, and hope that this will insulate them from any action which the federal government might take against the company. The General Services Administration (GSA), against which the frauds are said to have been carried out, has suspended the company from acquiring new business from the agency until a trial which is expected to open in January. The action by the GSA could affect 200 federal users of CSC's Infonet time-sharing system.

David Dickson

Biotechnology

Celltech set up

The formation of Celltech Limited, the first British company predominantly concerned with the exploitation of biotechnology, was completed on 6 November, according to an announcement earlier this week from the National Enterprise Board (NEB), the public corporation supported with public funds. The board will be the largest shareholder in the company, with 44 per cent of the shares. The remainder of the equity will be divided equally between the four remaining shareholders, the Prudential Assurance Company, the Midland Bank, British and Commonwealth Shipping and TDC (a venture capital investment trust, itself an offshoot of Finance for Industry, a joint venture between the clearing banks and the British government).

The shareholders have already subscribed the first tranche of the £12 million that will serve as the initial capital base of the company. The board of the company will chiefly be representative of the principal shareholders, with Mr G. Jackson of Philips Electronics Limited nominated by the National Enterprise Board (NEB), but will also include Dr J. L. Gowans, the secretary of the Medical Research Council, and Sir Michael Stoker, until recently director of the Imperial Cancer Research Fund Laboratories and foreign secretary of the Royal Society. Sir Michael will also be the chairman of the company's advisory board, to be known as the Science Council.

The council will also have as a member Dr Sydney Brenner, director of the MRC Laboratory for Molecular Biology at Cambridge, who has been involved with the planning of Celltech from the beginning. Other members of the council are to be announced in the near future.

Apart from the managing director of the company, Mr S. Fairtlough, the director of research and development will be Dr N. Carey, at present director of research at G. D. Searle Limited. Dr Caroline Vaughn, like Mr Fairtlough at present on the staff of the board, will be director of marketing. Other members of the staff of the company have yet to be appointed. The chairman of the company will be Mr Wynn Denman, a