

Edinburgh, for example, has had two periods of seven nights. One of these occasions gave only two nights of partial viewing, the other five being cloudy. The other period was a little better with an average of two hours' total viewing time each night for four nights; the fifth night afforded a mere ten minutes' break in the cloud and the other two were totally overcast. This group's principal interest is the recording of the spectra of faint stars for which at least an hour's continuous viewing is necessary to obtain a reasonable spectrum. The best spectrum obtained by one of the Edinburgh astronomers after seven nights was an 81 per cent exposure. He did manage to obtain some other spectra but often with exposures as low as 26 per cent.

The other time allocations are two nights for the infrared group of Queen Mary College, London, two periods of seven nights for Oxford University, three nights in May and six more nights some time during the summer for the Cambridge Observatory pulsar group, and ten nights over three months has been allocated to Dunsink Observatory, Dublin. This is a total of forty-nine nights on about twenty of which some viewing should be possible. At all other times the Royal Observatory, Greenwich, has had sole use of the telescope. Outside groups, however, are being recommended to apply for three times the amount of time they need and all applications were accepted. Not surprisingly, applications to the SRC's Large Telescope Users' Panel, which last met on April 8, are increasing.

The instrumentation of the telescope is still not yet complete—the long awaited Coudé spectrograph has now taken second priority to an image-tube spectrograph which it is hoped to install in early 1970.

Under the present system of time allocation, expert and highly paid astronomers are taken away from their jobs to operate equipment which can be run equally well by proficient technicians. According to one astronomer at the Royal Observatory at Edinburgh, one way of making more efficient use of the large telescope would be to abandon the present system and commission the Royal Observatory at Herstmonceux to take the spectra or observations, a service for which the outside groups would pay.

TECHNOLOGY

How to Innovate

TECHNOLOGICAL innovation and the growth of the national economy was the subject of a symposium at Churchill College, Cambridge, last weekend, attended by eminent industrialists, civil servants, educationalists and administrators from Europe, North America and Japan. The meeting, held under the auspices of the Science of Science Foundation, a body devoted to promoting research and discussion on the impact of science on people, was to discuss attitudes antipathetic to change in all sectors of society. The conclusion was that if technological innovation is to be allowed to occur on any worthwhile scale it must penetrate the whole fabric of social, cultural and educational life.

The symposium was inspired by the awareness that a country like the United Kingdom can only survive as a trading nation through the stimulation of technological innovation. Many ideas were put forward as to why the conditions necessary for innovation to

prosper are so elusive, but it was accepted that the traditional remedies of increasing scientific and technological manpower are very wide of the mark. Such increases of manpower, of course, often help innovation, but the real barrier to a sustained economic growth through technological innovation was felt to embrace social and cultural ideas just as much as those of science and technology.

To illustrate this view, Professor K. Oshima from the University of Tokyo delved into the anatomy of Japan's successful economic growth since the end of the Second World War, and he attributed the technological boom at least in part to the difference in cultures represented by the new technical products on the Japanese market, such as cameras and transistor radios, and the traditional pre-war goods. People tend to be perturbed by an erosion of traditional culture through innovation, he claimed, as has occurred in the west, but are much more willing to accept innovations as novelties.

The need for innovation in social and managerial problems was a recurring theme throughout the symposium. Dr H. Wolff of the Medical Research Council claimed that what is needed is a technological Dr Spock, who could produce the culture for a technological age. Dr A. Knoppers, vice-president of Merck and Company, stressed that management must decide what form innovations should take and whether a company should plump for totally new ideas or for new types of existing products. Management must also find out more about how research works and research management should have a greater say in top management.

The role of environment in the total innovative process was mentioned, and it was pointed out that policies such as moving industries to development areas, while being clearly beneficial in some respects, may well inhibit innovation. A technological arena suited to the characteristics of a particular country or region should be chosen, and the Netherlands was cited as a successful example. Too much central control of the economy was also considered detrimental to innovation, as was any "one buyer only" market, because it forced industries into taking unacceptable risks.

The symposium was followed on Monday by the fifth annual Science of Science Foundation lecture, given at the Royal Institution by Dr Robert A. Charpie of the Bell and Howell Company of America. As a sequel to the symposium, Dr Charpie discussed the role of technology in the international economy, and gave several examples of how the benefits of technology can be measured. The expansion of the synthetic fibre business, for example, in the United States had generated large savings of foreign exchange.

Dr Charpie attempted to describe the type of man who will make discoveries. He will probably be anti-establishment, he thought, and will be happier dealing with things than with people. He will be more familiar with the product than the market. Dr Charpie considered that a major reason for the success of the United States in technological innovation is that there is plenty of risk capital about for new projects. The US tax laws, whereby an investor gains considerably by investing in projects with a long-term rather than a short-term gain—as is the pattern with new technologies—were considered by Dr Charpie to be crucial to this success.