

Japan's MITI opens domestic R&D projects to foreign participation

Tokyo. Japan's 'technoglobalism', a policy of the Ministry of International Trade and Industry (MITI) aimed at cultivating international collaboration in research and development, seems to be blossoming. A week ago, the *Nikkei Shimbun*, Japan's leading financial newspaper, revealed that several non-Japanese companies, including the US semiconductor manufacturer Texas Instruments, are likely to join a huge group of Japanese industrial partners in a large-scale MITI-funded project to develop nanotechnology (see below). And foreign participation in other MITI research and development projects is on the increase.

Texas Instruments, Motorola and the Japanese subsidiary of the US chemical company Dupont are reported to be among several foreign companies that have applied to join the \$200-million nanotechnology project along with 39 leading Japanese companies, such as Toshiba, NEC, Hitachi, Fujitsu and Nippon Steel. Participants will not be officially announced until the project starts next month, but Don Shaw, director of Texas Instruments' new research institute in Tsukuba science city, northeast of Tokyo, confirms that his company has applied as one member of a large research association of more than 40 companies.

More than a dozen non-Japanese companies have signed up for various MITI projects in the past two or three years (see table) in response to the ministry's new policy of encouraging foreign participation. Technoglobalism was officially launched by MITI in 1990 at a meeting of the Organization for

Economic Cooperation and Development to counter the perceived 'technonationalism' of the United States, by which MITI means US efforts to protect its domestic technological advances from countries such as

space companies in a large-scale project to develop a turbofan/ramjet for hypersonic transport at three to five times the speed of sound. Winning this foreign participation proved to be a major ordeal for the ministry.

The ten-year project began in 1989, but it was only two years later that the foreign partners, Rolls-Royce of the United Kingdom, SNECMA of France, and United Technologies and Pratt & Whitney of the United States were able to join.

Differences over intellectual property rights were a major obstacle. In the United States and Europe, private companies that join government-sponsored programmes are usually free to exploit the fruits of their research, but in Japan, the government retains control of intellectual property rights. MITI had to rewrite Japanese law before foreign companies could join (see *Nature* **350**, 102; 1991).

Organizational structure also caused some friction. The Japanese companies in the hypersonic project formed a research association and negotiated with MITI as a single group, but US and European companies wanted to deal with MITI individually. MITI established an intermediary committee to act as go-between.

Language difficulties have also made it difficult for the foreign companies to benefit fully from the project, says Tony Millington, president of Rolls-Royce (Far East). Nevertheless, Rolls-Royce and the other non-Japanese companies were eager to join because Japan is one of the few governments putting money into engines for hypersonic transport, which remain much further from commercial development than mere supersonic technology.

The distance from commercial application is also an attraction for non-Japanese companies wanting to join MITI's nanotechnology project. "It's a very long-range project and it makes sense to have international collaboration at this stage" says Texas Instruments' Shaw.

Building on its experience, MITI is now beginning to involve foreign organizations in the very early planning stages of new projects. Next week, several non-Japanese organizations, including the Hydrogen Industry Council of Canada, will participate in a meeting to plan two projects of MITI's New Sunshine Program, a huge programme aimed at developing alternative energy sources and 'environment-friendly' technology. The programme will get under way next fiscal year.

David Swinbanks

Growing foreign participation in Japanese national research

■ Large-scale projects

Super/hypersonic transport propulsion system
Rolls-Royce plc (UK), SNECMA (France), United Technologies Corporation/Pratt & Whitney (USA), General Electric Co. (USA)
Advanced chemical processing technology
SRI International (USA)
Micromachine technology
IS Robotics Corporation (USA), SRI International (USA), Royal Melbourne Institute of Technology (Australia)

■ Basic technologies for future industries

Non-linear photonics materials
BASF AG (Germany)
Molecular assemblies for a functional protein system
GBF (Gesellschaft für Biotechnologische Forschung) (Germany)
High-performance materials for severe environments
Crucible Materials Co. (USA)
New models for software architecture
SRI International (USA)
Production and utilization technology of complex carbohydrates
Pharmacia LKB Biotechnology AB (Sweden)
Quantum functional devices
Motorola Inc. (USA)

Japan. The Japanese are also anxious to forestall criticism that Japan gets a 'free ride' on Western scientific and technological developments.

MITI's first success in drawing foreign companies into a Japanese research and development programme came with the participation of four US and European aero-

Very small plans

Tokyo. MITI's large-scale nanotechnology project, which has attracted the participation of non-Japanese companies (see above), is beginning to take on a more clearly defined form. Called the "Angstrom Technology Project" when announced by MITI last year (see *Nature* **352**, 650; 1991), its title is now "Ultimate Manipulation of Atoms and Molecules". More than ¥25,000 million (US\$200 million) will be invested over ten years.

The project will develop tools, such as the scanning tunnelling microscope, for probing and observing materials at the molecular and atomic level. MITI also hopes to develop technology for reading the structure of DNA and for manipulating atoms and molecules on surfaces and in three-dimensional space. The project will also include development of computer simulation techniques for the theoretical prediction of surface processes, and development of ultra-high-vacuum technology as well a tunable femto-second laser for manipulating atoms and molecules.

Much of the research is expected to be carried out at a new interdisciplinary research centre being established in Tsukuba science city as part of a reorganization of MITI's Tsukuba research laboratories.

D.S.