

Apparently there exist other programs which do not invite participation from foreign researchers and which are particularly directed at the private sector in Japan, but we have very little information on them. The 1991 White Paper on Science and Technology lists the following as examples of Government sponsored/supported programs relating to private corporations. The Cooperative Development of Industrial Technology (JRDC), the Large-Scale Project Program, the Next-Generation Fundamental Industrial Technology Research and Development Program, Japan Key Technology Centres Program, the Bio-Oriented Technology Research Advancement Institution and the Adverse Drug Suffering Relief and Research Promotion Fund.

All of these appear to be large scale, granting programs, and not private sector initiated consortia per se. A list of sixteen R&D associations supported by the Ministry of Agriculture, Forestry and Fisheries in the food industry with private sector participants was published in a recent issue of *Science and Technology in Japan*. However, none of these compare with the renowned Very Large Scale Integration (VLSI) Consortium which is credited with improving the international competitive position of Japanese industry.⁶⁰ The VLSI Cooperative Research Laboratory was established in 1976 as a central research organization with five member companies: Hitachi, Fujitsu, Mitsubishi, NEC and Toshiba. MITI provided approximately 40% of an estimated total cost of US \$280 million with the rest coming from member companies.⁶¹

D. Canada

Technology consortia have been a part of the landscape in Canada since 1925 when Paprican, a consortium of Canadian pulp and paper companies, began conducting joint R&D. Atomic Energy of Canada, Ontario Hydro and Canatom formed a large consortium to design and build the Candu reactor in the late 1940s. However, these joint R&D initiatives were formed only within a small number of Canadian industries. In the 1980s, stimulating cooperative R&D became the target of federal and provincial spending.

⁶⁰ Niosi states that both the VLSI and the Fifth Generation Computer Project were crucial to the Japanese being able to catch up in computer and communications technology so rapidly. On the other hand, economists have concluded that an analysis of the semiconductor market "suggests" that the Japanese success was actually a net loss to the Japanese economy: Richard E. Baldwin and Paul R. Krugman, "Market Access and International Competition: A Simulation Study of 16K Random Access Memories", reprinted in Paul Krugman, *Rethinking International Trade* (Cambridge: MIT 1990), p. 200.

⁶¹ Op. cit., testimony of Dr. Nishi.