

to small, minority and native American U.S. firms as well as firms owned by women, as prime or sub-contractors under the Small Business Administration Act⁶⁸;

- federal dollars are flowing in larger amounts to the development of technologies at stages closer to commercialization; and
- a demonstrated shift is taking place from funding for weapons technology to funding for commercially applicable research.

A listing of those programs which subsidize the operations of technology consortia with references to the relevant statutes that impose eligibility criteria is attached as Appendix B. Membership in SEMATECH, which is funded out of the Pentagon's Advanced Research Projects Agency (ARPA),⁶⁹ is only available to U.S. owned or controlled semiconductor or materials and equipment manufacturers or participating U.S. universities and federal agencies. Northern Telecom is a member through its U.S. subsidiary, which employs more than 20,000 Americans, in effect making it a bigger employer of American citizens than some of the "U.S. companies" that are also members of SEMATECH.⁷⁰ However, Northern Telecom is not listed as a member company in the Fact Sheets published by SEMATECH dated March 1993.

The aforementioned 1991 study by ISC concluded: "Of the twenty-three [U.S.] federal government programs reviewed: four are limited to U.S. nationals; three require security clearances; and two are limited to U.S. businesses (a term which is not clearly defined but may be a reference to ownership). The remainder appear to be open to Canadian-owned firms, though several require a U.S. plant location. It is

⁶⁸ Contracting dollars disbursed in support of small business have been estimated at US \$42 billion for FY 1992 out of a total of US \$200 billion for federal contracting only, both civilian and defence, and representing prime contracts only.

⁶⁹ Previously known as DARPA and recently renamed ARPA to reflect its new mandate to target civilian commercial technology, it is being considered by some to be the U.S. answer to MITI.

⁷⁰ It is not clear whether membership for Northern has translated into research jobs in Canada. Northern Telecom advises that the bulk of their R&D is conducted in Canada and that their involvement with foreign technology consortia is not a large proportion of their R&D expenditures. Dr. Niosi of UQAM advises that there is no manufacturing of semiconductors in Canada, even though 8 - 10% of the world's chip designs originate here. This is due to a lack of the appropriate manufacturing expertise in Canada, the prohibitively high level of fixed costs associated with establishing a facility combined with a small domestic market and a critical shortage of venture capital. Dr. Niosi states that large Canadian firms tend to locate their R&D operations close to their customers which explains why a number of Canadian enterprises conduct as much as one-third of their R&D off-shore. He is conducting more research on this to be published in a forthcoming paper.