

8 RESEARCH COLLABORATIONS

*R*esearch collaborations represent a public/private partnership not only because both public and private organization participate in them, but also because public resources are used to encourage their formation.¹

Specific research collaborations are discussed in subsequent chapters. Here, a brief history of research partnerships in the United States is given as an introductory overview.

SEMICONDUCTOR RESEARCH CORPORATION

One of the first formal research collaborations in the United States was the Semiconductor Research Corporation (SRC). A brief history of the SRC will serve to illustrate that many research collaborations or partnerships are formed to address industry-wide technological issues, or at least issues that affect a sizeable segment of the industry. This brief history is also interesting because it illustrates, among other things, a purposeful entrepreneurial response to competitive market conditions.

In the late 1950s, an integrated circuit (IC) industry emerged in the United States. The fledgling industry took form in the 1960s and experienced rapid growth throughout the 1970s. In 1979, when Japanese companies captured 42 percent of the U.S. market for 16 kbit DRAMs (memory devices) and converted Japan's integrated circuit trade balance with the United States from a negative \$122 million in 1979 to a positive

¹ This chapter is based on Link, Teece, and Finan (1996), Link (1999b), and much of the underlying research by Link that was sponsored by the National Science Foundation. Link (1999b) was later expanded in Audretsch et al. (2002) and then reproduced in book form in Feldman, Link, and Siegel (2002).

\$40 million in 1980, the U.S. industry became painfully aware that its dominance of the IC industry was being seriously challenged. It was clear to all in the industry that it was in their collective best interest to invest in an organizational structure that would strengthen the industry's position in the global semiconductor marketplace.

The Semiconductor Industry Association (SIA) was formed in 1977 to collect and assemble reliable information on the industry and to develop mechanisms for addressing industry issues with the federal government. In a presentation at an SIA Board Meeting in June 1981, Erich Bloch of IBM described to the industry the nature of the growing competition with Japan and proposed the creation of a "semi-conductor research cooperative" to assure continued U.S. technology leadership. This event witnessed the birth of the SRC. In December 1981, Robert Noyce, then SIA chairman and vice-chairman of Intel, announced the establishment of the SRC for the purpose of stimulating joint research in advanced semiconductor technology by industry and U.S. universities and to reverse the declining trend in semiconductor research investments. The SRC was formally incorporated in February 1982 with a stated purpose to:²

- Provide a clearer view of technology needs.
- Fund research to address technology needs.
- Focus attention on competition.
- Reduce research redundancy.

Policy makers soon noticed the virtues of cooperative research in part because such organizational structures had worked well in Japan and in part because the organizational success of the SRC demonstrated that cooperation among competitive firms at the fundamental research level was feasible.

SEMATECH

In 1986 when the Semiconductor Industry Association (SIA) and the Semiconductor Research Corporation (SRC) began to explore the possibility of joint industry/government cooperation, the U.S.

² The eleven founding members were Advanced Micro Devices, Control Data Corporation, Digital Equipment Corporation, General Instrument, Honeywell, Hewlett-Packard, IBM, Intel, Monolithic Memories, Motorola, National Semiconductor, and Silicon Systems.