I.1 Challenges of Organizing International Research & Development

"Technology is the major source of economic growth."
Graham Mitchell, 1998

1 Changes in the Global Environment

Multinational companies (MNCs) have a tremendous impact on global innovation and the structure of the world economy. They:

- Determine the international division of labor with production, R&D, marketing, and sourcing strategies;
- Transfer technologies, management capabilities, and financial capital;
- Control over 80% of the privately owned technological resources (Dunning, 1993);
- Influence regional restructuring with establishing local offices;
- Have a high negotiation potential in light of foreign direct investments particularly in smaller economies.

In many cases, internationalization started with the search for additional markets, then went to cheap labor for production, localization of existing products, and ended with a fully developed R&D. Mergers and acquisitions played a significant part in this journey that lasted up to 20 years in many cases, like at Hewlett-Packard, ABB, IBM or Leica Singapore. Small countries with small home markets and limited resources played a significant role: Switzerland and the Netherlands, for example, were always forced to export and to build resources abroad. This has led to some specific management challenges in R&D: Building seamless innovation processes, leveraging competencies and managing R&D in a global world are on top of the list of a recent Arthur D. Little survey (Fig. I.1.1).

1.1 Internationalization and foreign direct investment

Traditionally among the most centralized functions of the firm, R&D is adjusting to world-wide dispersion of knowledge and technology creation. While US companies have accumulated a large stock of foreign investment over the past decade,
they also have become net recipients not only in foreign investments but also in R&D. Foreign companies carry out more R&D in the United States than US companies do abroad. Many companies today face the challenge of building up an international network of R&D laboratories to tap global human resources.

The growing involvement in foreign-based R&D is one of the most significant developments in the operations of multinational companies. According to the National Science Foundation (1990), total US foreign R&D expenditures have increased from US$2.2 billion in 1978 to more than US$6 billion in 1988. Some industry groups were allocating particularly large percentages of their R&D budgets to foreign-based R&D. Industrial chemical companies devoted 21% of their R&D budget to international R&D, whereas pharmaceutical and machinery companies spent 16% and respectively 11% (Cheng and Bolon, 1993: 2). According to data from the Bureau of Economic Analysis (BEA) of the US Department of Commerce, foreign R&D expenditures in the US increased from US$15.5 billion in 1994 to US$17.6 billion in 1995. Foreign-owned companies accounted for 18% of total company-funded R&D in the US, up from 15% in 1993. By 1995, 676 R&D facilities in the US had been acquired or established by over 350 foreign companies from 24 countries (Serapio and Dalton, 1997). Currently, the US is the most attractive R&D country in the world.

R&D internationalization offers a number of ways to access and exploit new potential. The phenomenon of global innovation is therefore being investigated in more detail also by supra-industrial bodies in Europe and the US. The US Department of Commerce updated their initial report on R&D globalization, albeit from a US-American perspective, and noted a rising significance of foreign-based R&D in the US as well as an increase in US-company-based R&D performed outside the US (Dalton and Serapio, 1995). The European Industrial Research Management