MAR13-2012-020782

Abstract for an Invited Paper
for the MAR13 Meeting of
the American Physical Society

Physics and Innovation: A Large-Company Perspective

ROBERT DOERING, Texas Instruments

With regard to its influence on *innovation* (i.e., creating new commercial technologies), physics continuously faces the challenge of "keeping ahead of engineering" and "moving on" to new concepts as well as to potentially new roles with respect to industrial research. For most large companies, the R&D model has undergone significant transformation over the past three decades. This has been driven, in part, by the increasing cost of continuously developing new technologies upon which to base state-of-the-art products. Part of this challenge is to select which new concepts and "emerging technologies" to pursue. A poor decision at this point wastes development resources and can be very difficult to overcome later. Therefore, a key feature of many new R&D models is collaboration with entities outside of the corporation. Such partnerships reduce both the cost and risk of exploring multiple lines of research which may lead to new technologies. One flexible approach to organizing R&D partnerships is via the establishment of a consortium. The semiconductor industry has successfully used research consortia since the founding of the Semiconductor Research Corporation (SRC) in 1982 and SEMATECH a few years later. The automotive industry has also used the consortium approach for many years since the formation of the United States Council for Automotive Research (USCAR) in 1992. In the case of the SRC, the principal operating methodology is for the members to create requests for proposals leading to the collective funding of university research. This is often done in partnership with federal agencies. For example, the Focus Center Research Program (FCRP, an SRC subsidiary) is co-funded with DARPA. Another SRC subsidiary, the Nanoelectronics Research Initiative (NRI) is jointly supported with the NSF and NIST. This NRI-agency partnership has partly been enabled by the National Nanotechnology Initiative's Signature Initiative on "Nanoelectronics for 2020 and Beyond." Within the SRC portfolio, the NRI research is particularly "physics intensive"! Of course, in addition to consortia, the new models typically include external R&D through consulting arrangements, IP licensing, and acquisition of smaller companies that have developed useful new technologies, supported in some cases by SBIRs and other forms of government investment in growth of the economy.