

# Changing Research Cultures in U.S Industry

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*Changes brought by rise of the global economy and the end of the cold war era have resulted in industry, government, and university rethinking their roles with respect to research and development (R&D), basic versus applied research, and the role of corporate research. Since the mid 1980's, industrial research in the United States has been going through restructuring. Interviews with seventy-two scientist and eighteen managers working in six centralized corporate R&D laboratories in high-technology industry show that a new culture of dependence with a mission-oriented approach is replacing the cherished culture of independence with a result-oriented approach.*

### Old Research Cultures

Centralized research laboratories were established in the beginning of the twentieth century. The central mission of most corporate laboratories was twofold:

1. to employ science and technology to improve existing products and manufacturing processes.
2. to discover scientific principles and properties of the natural world to generate new commercial products.

The main objective of these laboratories was scientific discovery, with a focus to long term research. The founders and managers of corporate laboratories, themselves often scientists, believed that scientists needed a free environment to develop ideas. Therefore, the laboratories were built away from manufacturing plants to isolate research from business concerns.

### Decline of Old Research Cultures

Often, companies that invested in research could not successfully utilize the results because the connection between research and innovation was based on linear model devised by Vannevar Bush (1945): basic research generates new facts and theories that get tested through applied research and then converted into products and processes in the development stage. The complexity added by each stage made the end products difficult to manufacture.

U.S. companies have been responding to intense competition from Japan and Europe with financial restructuring: the centralized corporate R&D had their research linked directly to development, engineering, and manufacturing. R&D became a part of business divisions/units. The idea grew among corporate executives that large, centralized, corporate laboratories weren't helping business to develop relevant technology.

### New Research

With the restructuring, innovation in commercial R&D will be driven by market-pull. Centralized corporate R&D laboratories are teaming with business divisions, customers, suppliers, universities, and industrial laboratories. Below are a number of changing attributes, which in their combination suggest the emergence of new research cultures in industry.

- 1. Decentralization of Funding:** Funding is shifted from corporate sources to business divisions.
- 2. Business-Driven Research:** Decentralization of research funding has brought technical and business interest together at the business-unit level for product and process innovation. The goal has become to fit business needs into research and not the other way around.
- 3. Customization of Research:** Corporate laboratories are organizing their operations to accelerate and maximize customer needs that have become demanding in terms of quality, performance, and overall value for their money.
- 4. Teaming with Non-R&D Staff:** Strong involvement of non R&D staff including personnel from the business divisions and marketing operations in deciding research projects is becoming the norm.
- 5. Result-Based Research:** Market driven R&D research has shifted the focus from fundamental research towards applied R&D. Most long term and risky projects are replaced by short term safe projects.
- 6. Fusing Basic With Applied Research:** The distinction between basic and applied R&D is disappearing. Scientists are now working on application projects, which includes both forms of R&D, while working with engineers and marketeers all the while.
- 7. University Research for Industry:** Since companies are cutting on long-term research, universities are becoming the prime source of basic research. Since companies still need basic research to succeed, they are tightening the bonds with universities by joint projects and funding of academic research.
- 8. Outsourcing Research Globally:** Collaborations with the universities alone are not sufficient to meet competitive demands of shorter product life cycles and faster development. Companies are extensively outsourcing their R&D to other companies, usually in foreign countries. Their main goal is to reduce cost, risk and to get connected with the rest of the world.
- 9. Marketability in Evaluation:** The earlier success of R&D was measured in articles published, technical reports produced, or patents acquired. Today, business factors have been incorporated in the evaluation of R&D. The value of a research project is measured by the value they add to the products or processes.
- 10. Open communications:** In order to be able to keep up to date, scientists are getting more and more open communications with customers, suppliers, business managers, university researchers, R&D sponsors and others. Large networks of communication channels are starting to arise both within the company and outside it.