



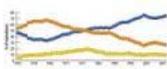
The Rising Phoenix

By Richard J. Lee, PhD, CEO, RJ Lee Group, Inc.

Thursday, June 9, 2011

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From the ashes of industrial R&D, smaller technology labs fill in the gaps with a new discipline: industrial forensics.



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Trends in Federal and Non-Federal Funding for R&D as a Percentage of Total Research and Development: 1953-2008 (Table 12). Data: National Science Foundation.

From 1945 to 1985, industrial R&D was characterized by large central corporate research facilities that sought to span the continuum from fundamental research to development, wrote David Mowery of the **University of California, Berkeley's** Haas School of Business in a 2009 article for the journal *Industrial and Corporate Change*.

As the flow of R&D dollars to industrial laboratories slowed during the mid-1980s, the number of corporate R&D laboratories declined. Mowery explained in his article "Plus ça change: Industrial R&D in the 'third industrial revolution'" that large corporations reduced or eliminated their central R&D laboratories, increasing their reliance on external sources of R&D.

With innovation in a slump and production for many industries moderating, corporate labs could no longer afford to focus efforts on development of new products and process technologies. Lacking adequate outside financial support, many corporate R&D laboratories ceased to exist. As ivory towers crumbled, PhDs, in some cases, had to abandon their intellectual pursuits, establish lines of communication with their business divisions, and focus on solving legitimate short-term problems.

While industry was no longer able to financially absorb R&D laboratories that did not directly contribute to the bottom line, there was a silver lining. Small and mid-size companies took advantage of the opportunity to flex their intellectual muscles and step into the gap.

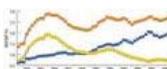
Not surprisingly, this expertise was a direct outcome of shrinking corporate laboratories as many former corporate scientists moved to much smaller companies. Sometimes they took on the role of entrepreneurs and founded start-up companies, supplying not only their own talent, but also at times purchasing the instrumentation of their former employers. Some of these entrepreneurial ventures succeeded and others did not. Those that survived did so because they took a different approach. They set new goals, they erased boundaries, and they set to doing what they did best—examining industries' problems by assessing the entire situation and arriving at a problem-specific resolution defined by a customized plan of action.

The holistic approach these renegades proposed was a suite of services, consultative in nature but rooted in scientific and forensic methods and comparative analysis that was formerly known as industrial problem solving. They didn't just provide a laboratory result or generate a report with test results. They instead used their expertise to understand the problem, interpret the data, and provide a solution. This is industrial forensics.

From a single result to a new discipline

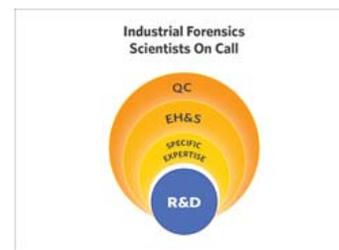
In the way that materials science has evolved into a discipline, so has industrial forensics (IF). However, IF is broader than a set of technologies or techniques. It includes research, quality control, environmental health and safety, and the processes of investigating the properties, attributes, threats, and liabilities that occur in the development and manufacturing of a product. At its center is the materials science laboratory.

The external analytical laboratory has almost always been a complement to corporate R&D centers. But many times it was the considered place to go only for routine analyses that could be done more cost effectively externally, for third-party quality checks because the internal labs didn't have the expertise, or if required results had to be validated. But that has changed. In March 2006, Proctor & Gamble executives Larry Huston and Nabil Sakkab explained in the *Harvard Business Review* that their company had identified that important innovation was increasingly being done at small and mid-size entrepreneurial companies.



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The extended capabilities of many of today's materials characterization laboratories are in part due to the R&D transformation that provided the talent and the equipment. Today, a materials laboratory that practices industrial forensics provides expertise across industries and industry requirements—materials, processes, environment, R&D, consulting research, and information technology. The IF laboratory staff listens, inspects, assesses, questions, responds, samples, analyzes, confers, plans, and resolves. The laboratory becomes a partner in the customer's investigation, establishing trust and confidence. The industrial forensics laboratory is the laboratory of today—as well as tomorrow—because it will continue to adapt as technology emerges, as instrumentation evolves, and as industry and regulatory requirements change.



Industrial Forensics: Scientists on Call. The industrial forensics lab works closely with the corporate R&D lab to inject a different perspective and provide critical assistance in deconstructing the problem and reinventing an objective solution. Source: RJ Lee Group, Inc.

Gross Domestic Product and Research and Development (total, federally funded and non-federally funded) 1953–2008 (Table 13). Data: National Science Foundation

The R&D solution vs. the IF solution

Corporations are under constant pressure to maintain the bottom line. At the same time, they can't afford to minimize the need to develop products, expand patent applications, and commercialize new products. So how does a corporation ensure expertise throughout all levels of the R&D process?

Outsourcing to a select number of specialized laboratories can provide the individual solution to the designated problem, but there is no single source to consider how these unrelated results may affect the overall performance of the product. There is no information chain and no translation from one discipline to another. The results are supplied but there is no single interpretation.

Implementing solutions without understanding potential consequences can affect quality, result in reliability issues, and overlook liability problems. The IF laboratory becomes the resource partner that can investigate, perform root cause analyses, ensure quality standards are met, and recommend a regimen to mitigate risk and maintain marketplace position.

The IF staff works closely with the corporate R&D lab. When there is impasse, they can inject a different perspective to provide critical assistance in deconstructing the problem and reinventing an objective solution. They can assemble multiple data sources to provide a base from which to extract patterns and apply modeling techniques. They can direct their combined efforts to a successful solution rather than focusing on individual components. By adopting a holistic position, the R&D process—from conception to materials selection, to prototyping and testing—becomes an integrated objective combining the best of both partners.

What does it all mean?

The industrial forensics concept has shifted researchers away from reliance on the limited expertise now available in R&D labs. With IF, they have the opportunity to collaborate with an organization and a technology platform that responds to industry at all levels of the product life cycle.



Industrial Forensics: Life Cycle Participation. The R&D process, from conception to materials selection, to prototyping and testing, results in an integrated objective that combines the best of both partners. Source: RJ Lee Group, Inc.

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May/June R&D Magazine Issue

Published in R & D magazine: Vol. 53, No. 3, 2011, June

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