An Obituary for "Curiosity-Driven" R&D

There has been a "death" in our family — our family of scientists and engineers. It has gone almost unnoticed. Unnoticed because it was slow (and tragic). Unnoticed even though there was much rhetoric associated with the circumstances surrounding its passage, including expressions like: need for relevance, need for market driven R&D, strategic R&D, etc.

"What death?" you ask. "Why, it's the death of curiosity-driven R&D (CDR&D), that's what." Still don't get it? Let me explain. This death is about the decline and/or total disappearance of the kind of work done by the self-motivated scientist-engineer-inventor type, who has good hunches and good luck about what is important to work on, including work that happens to be application-driven. It is the rapid decline of self-generated inventions and breakthroughs that have forever changed and redefined the technology we use. It is also about "eating seed corn." The key descriptor of CDR&D is "self-motivated R&D." Its key attribute is the pursuit of a mostly unjustifiable "hunch" that leads to an unexpected discovery or breakthrough, having either near- or long-term technologically important consequences. It is the kind of R&D that does not appear in a corporate "seven-year strategic plan" or in a "call-for-proposals" periodically issued by government agencies. (It is also unlikely to be funded as an unsolicited proposal.) CDR&D is also referred to as "blue sky" R&D, or, euphemistically, as "playing in the sand box."

Perhaps it would be just as useful to describe what curiosity-driven R&D is NOT. It is not about work that is in direct response to a corporate R&D strategy, either for future business needs or for token company prestige. It is not about grant proposals and R&D generated in response to government or industrial thematic invitations. It is not about scholarly- or discovery-driven science, either long or short term. And it is not about engineering projects that are generated as a result of the breakthroughs that occurred via curiosity-driven R&D!

"Now, hold on. What's wrong with the stuff just described?" you say. Nothing. It's great stuff, and it is vital to any nation's economy. But this stuff, as good as it is, is not what I mean by CDR&D.

There is a certain irony in all of this. Should you perchance have the opportunity to confront either a corporate R&D lab manager or a program director of a government contracting agency concerning the validity of my claims, you would likely encounter an explosive denial from both that they had stopped supporting CDR&D. If you want to believe them, just hand them a one page request-for-funding proposal about your best, but specific-application-unjustifiable, hunch. I submit that their response will consist mainly of directions for the way out of the office.

by Jerry Woodall

A personal example will demonstrate the inverse of this point. I am lucky to have been a co-inventor of the lattice-matched heterojunction, specifically the GaAlAs/GaAs heterojunction, a structure used for both high-speed electronics and photonics, and currently generating a multi-billion dollar revenue. At the time of the discovery, I was employed at the corporate research laboratory of a company that could afford to use a portion of profits to support CDR&D. Thus, when I did invent/discover the GaAlAs/GaAs heterojunction, it was supported, even though at the time there was neither a business need nor a business interest in the technological implications of this invention. And yet, I did not need to submit a 100 page inter- and multidisciplinary proposal with detailed multi-purpose end use justifications and unassailable outreach programs in order to obtain continued funding for my work.

The death of CDR&D could have been prevented. Unfortunately, its imminent demise was met by nearly universal apathy and acquiescence from those who might have prevented it (including corporate R&D management!). There was no ground swell of protest to stop it. Those who tried either lost their jobs, or had their technical virility neutered. A few were lucky enough to flee to research universities. In any case, the passing on of such a gargantuan entity as CDR&D, deserves at the very least, an obituary.

So, here is my obituary for CDR&D.

"CDR&D, one of the most important sources of national technical vitality, died sometime during the past ten years. The specific cause of death is not known. However, experts are quite certain that it resulted from complications associated with, e.g., corporate "right sizing," a corporate R&D strategy that supposedly responded to intense global competition; a change in strategy for DOD R&D funding; a retrenching of NSF priorities toward the funding of basic science and education at the expense of CDR&D; and finally, the Government Performance and Results Act of 1993, whose purpose is the measurement of annual performance against *a priori* goals, etc. As there is no interim measure of either success or failure for CDR&D, this last complication was thought to be the most important cause of death.

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Free Radicals

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"During its long and productive life, CDR&D was responsible for the seminal breakthroughs that led to nearly all the technologies enjoyed by society. This list, too long to reproduce here, includes: photography; electricity; light emitting devices (including light bulbs); telecommunication devices (including telephones); steam engines; gasoline engines; jet engines; trains; airplanes; motor vehicles; computer hardware and software; e-mail and the Internet; digital generation and storage of text, graphic, and photographic documents; semiconductor based electronics and photonics (including transistors and lasers); TV and other visual displays; remote and automated control including computer control; drugs (especially antibiotics); artificial limbs, organs, and transplants; radios; CDs and DVDs; electrical and gas driven appliances; efficiently produced agricultural products (including crops, harvesting, and storage, food processing and storage); power plants and power distribution; advanced microscopy; characterization and diagnostic tools (including X-ray and MRI); rockets, space craft, and space exploration; elevators; skyscrapers; and nuclear weapons, nuclear power and nuclear medicine, just to name few!

"CDR&D also was a great morale builder and a source of national pride. Those who practiced it were considered to have a favored status in the pecking order among practicing scientists and engineers. Its loss will be greatly mourned and long remembered by those who were practitioners.

"CDR&D leaves no immediate survivors. There are no known plans for a revival of CDR&D. There are, however, rumors that some of those who previously practiced CDR&D are planning a clandestine resurrection of CDR&D as a counter offensive to the now pervasive market/strategic driven R&D culture."

Who knows what might happen? Besides it has been nearly 2000 years since the last notable resurrection. ■

About the Author

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