Beating Scientists into Plowshares

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Severe budget restrictions for academic science have become globally endemic. Their persistence has created a unique situation for Industry: a buyer's market for academic laboratories. It is far cheaper to grant partial operating costs to an established research unit than it is to create one from scratch and maintain it at an industrial site that is wholly self-financed. So, for example, Pharmacia & Upjohn recently acquired a piece of The Karolinska Institute in Stockholm, and this acquisition is not likely to be the last of its kind in Sweden.

More systematic exploitation by private industry of public research resources has been worked out under the auspices of the European Union (EU). Academic scientists must apply to Brussels (headquarters of the EU) to recover support that was reassigned from national budgets. But a funny thing has happened on the way to Brussels: Money taken from the national budgets reappears earmarked for the train of the future, the car of the future, and the toilet seat of the future. Not surprisingly, corporate groups that produce trains, cars, and toilet seats—rather than academic groups—get the lion's share of these funds. The net effect is that money that was cut from basic research programs reemerges as industrial subsidy.

There has always been frustration among academic scientists with the ways that the EU generates research contracts and assigns them to individual investigators. The objectives of EU-funded research are defined by politicians and their administrators; tenders are submitted by individual investigators, and then applications in specific areas that match the program targets are reviewed for funding. This sort of allocation system is recognizable as a command structure, even if the term is not used in polite circles.

It needs to be said that the industrial threat is not restricted to long-term research. Commercial interests will tend to steer short-term development away from products that may be useful to society but that are deemed to have inadequate market value. An example is the lost generation of antibiotics: Although it had been recognized that new products would be needed to deal with drug-resistant pathogens, the pharmaceutical industry seems to have decided that it is not profitable to develop new antibiotics. Of course, Industry has no obligation for the social costs and dangers of bacterial infections. But governments do, and they must keep alive the research laboratories and the institutes that can deal with the health problems posed by bacteria.

It seems to me that we are witnessing the implementation of a well-orchestrated, global Industrial strategy to downsize on-site Industrial research and to replace it with publicly subsidized research at university laboratories, the efforts of which will be appropriately redirected (*1*). Well-meaning advice appears daily in the media encouraging academic scientists and engineers to accept their responsibilities to society by carrying out research that will make Industry more competitive. It is curious that I have never heard anyone in the media encourage Industry to carry out research that would make Industry more competitive.

What Is at Stake?

During the past 50 years a unique academic research organization emerged within the Western community. It served the Western Alliance so well that former Soviet client states were admonished from the earliest days of their independence to adapt its peculiar organizational form: bottom-up planning and peer-reviewed allocation. To do so, our new friends needed first to abandon the Soviet command structure, which consisted of nominal national academies steered by the politburo of the central committee in Moscow. Here, research missions were identified centrally, and these, together with matching resources, were apportioned downward through the national academies to individual academic institutes. (It is difficult to ignore the more than passing resemblance of this structure to the system favored in Brussels.) A bottom-up planned, peer-reviewed resource allocation system is slowly replacing the command structures of some former Soviet client states. Curiously, this transformation was initiated just as the Western community started to question the efficacy of its own bottom-up planning and peer-review system.

Our new friends were also expected to break up their network of Academy Institutes and to incorporate these into national university systems, a clear recognition of the synergy that exists between higher education and free basic research. A commitment to such synergism is in effect a commitment to certain cultural values that are inconsistent with those of the Industrial community. Foremost among these is the openness of the academic research community, an openness that is contrary to the secrecy of Industrial and State research. The free exchange of results and ideas is not a simple conversational luxury; it is the very basis of that heuristic scepticism that is the hallmark of Western science.

Academic scientists commonly believe that there is something precious in openness. Nevertheless, these are bad times, and academic scientists have accepted industrial contracts in order to keep their laboratories alive. The results of a survey of biologists at the 50 U.S. universities most well supported by the National Institutes of Health rather clearly chart the influence of this strategy (*2*). For example, it turns out that when compared with faculty that did not have as much industrial support, those with 65% or more industrial support tend to carry out research that is more often secret, that is more often oriented toward commercial interests, and that is less academically productive. Surprise, surprise!

People outside the academic community may view the absence of a command structure to determine the course of basic research as dubious, and in the extreme, as immoral. For this reason the academic enterprise is often referred to as "curiosity driven." Nevertheless, I do not believe that the academic and the industrial enterprises are distinguishable on the basis of their respective degrees of motivation by curiosity. However, they certainly are distinguishable according to whether or not they are oriented to solving problems or to developing products for the marketplace. Likewise, they are distinguishable according to whether they are long-term or short-term enterprises. Importantly, they are distinguishable by whether the scientists themselves pose the questions or a financial command structure determines the "deliverables."

How Did We Get Here?

In the wake of Sputnik, official enthusiasm for science seemed to be fueled primarily by two practical considerations: First, science and technology were perceived as vital to preparations for modern warfare. Second, these preparations were immensely profitable to industry. The academic community profited from these perceptions because it was understood that the most effective way to train scientists to do creative work, even creative work on weapons, is to educate them within an open academic environment in which they would feel that they were in charge. Accordingly, a relatively small slice of the total research and development pie was very wisely reserved for the feeding and exercise of academic scientists.

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The coupling of science to the defense posture has had the unfortunate consequence that disengagement has led to a precipitous drop in support for science. In effect, the collapse of the Soviet Union has made it impossible for the defense industries to mobilize national treasuries to the same extent as in the good old days. Consequently, politicians and industrialists now ask, What is science good for? Unfortunately, this question has been raised at a time of economic difficulty because one uncomfortable consequence of "the peace" is that it has been accompanied by a global recession. Little wonder then that governments and industries since have felt the need to reexamine their budgeting of research and education.

Another important factor is that decision-making processes have changed. Economic decisions are rarely made nowadays by people who know about "things," things such as alloys, bridges, and carcinogens. Instead, transaction specialists—economists and salespersons—monopolize corporate power. One reason for this is that during the past century the evolution of our economies has been characterized by pronounced increases in the relative costs of carrying out business transactions, as opposed to producing goods or performing other services. In the United States, it has been estimated that between 1870 and 1970 the costs to the private sector of carrying out transactions rose from roughly 22% to nearly 41% (*3*).

A particularly poignant example of the transaction specialists' potential for mischief comes from Ivan Östholm, a former research director at Astra. It concerns the precarious development of Losec (*4*), currently one of the leading pharmaceutical products in the world and a product upon which Astra will live very well for many years to come. According to Östholm, this golden egg came close several times to being aborted because the "front office" suspected that even if successful it would not command a sufficiently large market share to justify developmental costs. How could such a gross misunderstanding of the market be made by market specialists? Östholm attributes these near disasters to the fact that Astra's economists and market analysts simply could not understand the potential of a radically new product such as Losec.

More and more organizations, including academic institutions, are being steered by transaction specialists who, whatever other skills they may command, understand little about their company's products or production technologies. Furthermore, these specialists work within a very constrained time perspective: the time marked by the quarterly report. For these reasons the transaction specialists may not be ideally suited to plan long-term product development (and they are certainly not qualified to oversee the distribution of research funding).

What to Do?

The very language of current research planning, with its "tenders," "deliverables," and the like, is being transformed into a kind of marketplace "newspeak," as most transparently illustrated by McGeary and Smith in their recent presentation of "The R&D portfolio: A concept for allocating science and technology funds" (*5*). The thesis of McGeary and Smith seems to be that by invoking the mighty concept of the "portfolio," the traditionally thorny problem of balancing allocations to different sorts of research programs will simply vanish. In contrast, I would suggest that we academic scientists stop making believe that we are Captains of Industry. The fact that the universities must function within the marketplace culture should not trick us into thinking that the generation of profit is the only relevant cultural value to steer our enterprise.

The threat of being starved out of existence by the State is scary, but it is ameliorated by the fact that the academic science community has as an important function the training of scientists and engineers for extramural service. Accordingly, there will be in this age of technological competition a limit on how deep the cuts to university budgets can be before the State relents. In contrast, there are no obvious limits to commercial encroachments, if they are permitted to continue.

The historian William McNeill described the military sector of society as a macroparasite on the body politic (*6*). This metaphor more aptly describes the modern transaction sector, whose predations dwarf that of the military sector. However, it is not just the extent of the transaction sector that is the menace. Rather, it is its limited perception of time scale that strikes at the very heart of the scientific enterprise. Bronowski (*7*) stressed that the doing of science requires a long-term commitment to a concept: "the future." What Industry is out to do is to take control of our futures. Accordingly, our prime political objective must be to get Industry off the campuses and out of our laboratories.

Fortunately, the attitudes within Industry are not monolithic. Thus, the directors of some technique-intensive corporations recognize the importance of basic research to their long-term interests. Furthermore, in private, research directors of corporations often share this awareness, although they are less outspoken in public. Scientists need to encourage research directors to find a public forum for their opinions.

Above all, scientists must lobby for laws that regulate and limit the permissible activities of Industry on university campuses. I know of no country in which private Industry has a natural right to exploit public resources for its own ends. In view of the documented destructive influence of the Industrial presence within universities, opposition to this presence is merely a matter of self-defense. It is time to recall what the best defense is.

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