

Scientific Social Responsibility: A Call to Arms

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The primary goal of industry is to make a profit from creating and producing valuable products for consumers, but companies also have broader obligations, termed corporate social responsibility (CSR).

Analogously, the primary goal of scientists is, besides educating the next generation of talented young people, to provide new knowledge and elucidate new mechanisms in complex phenomena and structures. On the scientific scene, the societal obligations might be described as *scientific social responsibility (SSR)*.

Society has a legitimate expectation that scientists actively strive for transfer of research results into novel and useful products and services. In order to achieve successful technology transfer and innovation, talent, competences, and scientific interest must be decisive factors in the identification of the individual scientist's role in projects. There must, however, always be a commitment

and ambition from scientists to ensure that potentially useful discoveries are professionally evaluated with a view to further societal development in professional business environments prior to publication.

Today, the global research community is facing increasing demands from governments to “deliver” on the many promises we ourselves help perpetuate. The

Scientists must regain society's trust.

manifestation of this increasing societal and political pressure is often referred to as strategic research, which appears synonymous with politicians' mistrust of scientists' ability to prioritize and deliver the knowledge and technology needed to meet the admittedly huge and numerous Grand Challenges the world is facing, for example, powering the planet with sustainable energy, ensuring access to sufficient and clean tap water, or making affordable healthcare available.

This is our call for a preemptive strike; we urge that scientists develop a new mindset and regain the trust of society by reinvigorating scientific social responsibility and actively voicing their commitment to it. The incentives go both ways, to research funders and fundees, as all parties stand to gain from a joint effort to meet the Grand Challenges of our time, as we shall see below.



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The Strategic Demon

Strategic research has become fashionable and is put on the agenda in many countries by politicians seeking to appear dynamic in their effort to meet today's many global challenges. This practice, however, may be problematic, because earmarked funds often give you what you wish for, namely incremental improvements on existing technologies. This is exactly what we do *not* need in the present situation, where anyone with scientific insight agrees that breakthrough technologies are our only hope.

To this end, our fundamental claim is that the separation between basic and strategic research is an artificial one, which harks back to a traditional linear innovation model, whence basic, strategic, and applied research are only compartmentalized in the cubicles of policy makers seeking to justify public research expenditures. The division is artificial not only in an operational sense but more importantly also from a value-for-money perspective, since the best a society can do is to put the money into the most dynamic and visionary "basic" research environments to get the best "strategic" research output from scientists who understand and are willing to engage in SSR.

Such an approach will also work to counteract a very common cause of "funding waste". Scientists have become experts in dressing their research in compliant robes designed to convince funding agencies that the proposed research fits within the requested boundary conditions set up in the call text. This, however, often leads to nothing more than what might be coined "non-applicable applied research".

How to cut this apparent Gordian knot? We argue that the obligation and challenge fall on scientists themselves to face the demon by demonstrating that they are indeed ready to leave the ivory tower and take on these new scientific and societal responsibilities as the central elements of a new mindset. We call for a preemptive strike, a bottom-up process within the science community to engage in SSR. If we as scientists do not take on this responsibility, we foresee a

situation paralleled in the business world, where politicians have imposed unnecessary and inefficacious top-down demands.

What are the incentives? Funding agencies stand to get more value for their money, since our only hope to meet the Grand Challenges is new knowledge, which can aid the creation of the much-needed breakthrough technologies. Conversely, scientists stand to (re-)gain freedom to operate and the trust of major funding sources.

Societal challenges require interdisciplinary research approaches.

SSR

SSR as a concept is strictly speaking not new, but a redefinition is urgently needed. In recent years, SSR has mainly concerned the ethical responsibilities of the researcher, be it in the laboratory or in the applications of research. We, however, advocate for a broader definition of SSR: *It is the responsibility of scientists, from all sectors of science, to position and define their research activities in a context where they are able to contribute to the betterment of society and to help meet the Grand Challenges of our time*, in accordance with, for example, the Lund Declaration, which defines the vision of a mission-oriented approach to science.

In an operational sense, this means that the guiding principle when a scientist decides upon which projects to pursue should be to choose those with the greatest potential utility value in society. First, arguably a scientist's most important contribution to society is to educate bright young people who are trained in a research environment imbued with the aspiration to practice SSR. Second, research can bring value to society by forming the basis of utilization in a business environment.

Societal challenges are complex and require interdisciplinary research ap-

proaches. The SSR concept requires scientists from different sectors of science, frequently experts from the natural and medical sciences, social sciences, and the humanities, to join complementary forces. We are not blind to the fact that resistance to this notion can be found in some academic circles, but here we have a clear case of survival of the fittest.

The Executive Role

Historically, particularly the United States has been very successful in mission-oriented research programs; we need only mention the Manhattan Project and the push to put a man on the moon. These projects had very concrete aims, which were motivated by very concrete geo- (or seleno-) political concerns. Today's challenges may at first glance appear somewhat more diffuse, but the only way forward is to convince politicians to invest in science; the bankers and daytraders who are often motivated by short-term payoff will not solve society's problems.

While an appeal to altruism might work in an ideal world, it is evident that just stating the obvious will not make much of a difference. Difficult but necessary steps need be taken on an executive and funding level to instill a sense of urgency and—crucially—to provide a framework in which researchers can do what they do best. As an eminent scientist, US Secretary of Energy and Nobel Laureate Professor Steven Chu has done exactly that by allocating a large part of DOE funding to "exploratory projects", as he has also realized that breakthrough technologies are needed in order to have any chance of meeting the energy challenge in the 21st century.

Enter Pasteur

In continuation of the above, it could be asked if doing basic or applied research is more responsible in a societal context. The answer is neither (or both). On one hand, it is of utmost importance that scientists do not lose their freedom by becoming a tool for political, corporate,

and social top-down decisions and structures. Talent and scientific visions, ideas and interests should still be the decisive factors in the choice of research projects. On the other hand, scientists should keep in mind that discoveries of potential societal relevance should be professionally evaluated with a view for technological proof-of-concept and further development. In general terms, use-inspired basic research should be the focus in science, as envisioned by Pasteur: “No, a thousand times no; there does not exist a category of science to which one can give the name applied science. There are science and the application of science, bound together like the fruit of the tree which bears it.”

The development of this new academic SSR mindset has profound educational implications. Curricula in all areas of the academic educational system should be critically analyzed. Teaching programs

aimed at stimulating students’ professional identity should be supplemented by courses describing the scientifically fruitful borderlines between different academic disciplines. The history of key inventions exemplifying scientific breakthroughs of fundamental societal importance should be mandatory elements of teaching programs, with the aim that students are able to state the global context of their work.

The Prerequisite: Academic Leadership

All of these aspects obviously bring the question of academic leadership into focus. In order to bring SSR into full bloom, we need to identify and support scientists capable of stimulating collaborative efforts to reach identified research goals and at the same time allow each scientist to achieve a desired level

of individual scientific performance and freedom to operate. Academic leaders must possess or develop a capacity for novel and cross-frontier research coupled with the courage to initiate integrated programs.

We may take some inspiration from industrial leadership, but the scientific world is faced with the urgent challenge to design and develop academic leadership as a separate discipline. Again, the concept of research management frequently provokes violent knee-jerk reactions and mockery among academics, but in times of austerity we simply cannot afford to waste research funds on non-applicable applied research. Thus university and other research leaders should be given the authority to focus available funds on visionary research areas that can lead to breakthroughs and, not least, to deprioritize others.