

## **International Cooperation: What's in it for Us? – Eugene Skolnikoff**

The subject of this article is international cooperation in science and technology. To summarize what I have to say, I would note that in focusing on design of the science and technology enterprise for the future, changes needed with regard to cooperation are long range, based fundamentally on the way both the international system and our government are structured. Neither is going to evolve rapidly from the pattern of today.

International cooperation in science and technology is one of those activities we all assume to be of undoubted worth, always good, with important economic, scientific, and political benefits. What could be more appropriate in this age of growing integration of national economies, global issues, and tighter resource constraints than the idea that international cooperation should be a valuable and welcome phenomenon? However, international cooperation in science and technology turns out to be a rather amorphous concept, and not all the activities under that umbrella are of unqualified benefit. In the current political lexicon, the concept of international cooperation can be a rather big tent. In one formulation it can include cross-border information exchange and contacts among scientists across borders. Under this definition, there is undoubtedly more international cooperation today than ever before for the obvious reason of the expansion of international communications and transportation.

But international cooperation can also include informal research planning, support for research in developing countries, research programs coordinated by governments or international organizations, cross national research and development programs of multinational firms or within firms, major projects carried out among governments by agreement; and that doesn't exhaust the list – there are many others. In fact, the Title V reports from the State Department to Congress, which in principle list all of the international activities of the U.S. government, include some 200 pages worth of programs, some of them legitimately considered to be international cooperation. It's a big tent, with a lot going on and not very well circumscribed.

I am going to focus on those areas of cooperation that involve explicit agreements and incremental funding, rather than on information exchanges and interaction among scientists. This is not because these areas are more important than others; in fact, they are probably less important, but they are the only ones that we really have any focus on and have any data about now.

I will discuss four areas of public sector science and technology: programs that include formal cooperation among scientists in basic research; those that involve cooperation around large, high-cost research equipment such as accelerators; programs that might be aimed at large technological objectives such as cooperation on the space station or fusion energy; and, those that grow out of emerging global scale problems such as ozone and greenhouse warming.

There are many reasons why we might expect that international cooperation in these public sector topics would be a prominent part of the world scene today, and that financial commitments, numbers of scientists and projects would be on the rise. But in fact, contrary to expectations, the extent of cooperation in these four areas is a smaller part of national commitments, at least for the large industrial nations, than the rationale for cooperation would justify. And it appears that the trend line is down and not up.

That conclusion may not seem obvious on quantitative grounds. First of all, some of the decisions and definitions are quite arbitrary and almost impossible to disaggregate credibly. Just a few benchmarks help make the point. European Union countries are probably those most committed to cooperation in science and technology across national boundaries: they have created the European Space Agency, Euratom, Eureka, and many others. But it is worth noting that the European Union's Framework program for research, widely touted and given a lot of attention, actually accounts for less than 4 percent of the total R&D funds in the European Community. In other words, it is only a minor part of the R&D effort and there is little indication that it will increase substantially in the near future.

Germany recently announced that it will reduce its commitments to European science agencies by ten percent; that may mean they will violate their prior commitments. Both

France and Germany have drawn back from offers to site an experimental fusion reactor on financial grounds, because the siting nation has to pay a larger proportion of the costs. The United States looks as though it is going to be cutting its budget for fusion research which will almost certainly mean that we are not able to participate, or at least participate fully, in this new experimental reactor.

The Title V report activities, though they look substantial, actually amount to a very small part of the nation's \$60-plus billion of federally-funded R&D. The reasons for expecting that international cooperation would be a larger part of the whole are quite commonplace. The most obvious one is cost-sharing. However, the difficult financial situation in many countries that has served to reduce the R&D budgets of most makes even substantial cost savings through cooperation irrelevant. If countries are deciding to eliminate projects completely, it doesn't matter whether money can be saved by doing them jointly.

The emergence of global scale issues, clearly one of the hallmarks of the current era, is another incentive for cooperation. Many areas that can be studied independently will benefit from coordinated or joint research. In the long run, the most important aspect of joint cooperation on global issues is not so much the new knowledge as it is the involvement from countries all over the world, who later may be asked to make commitments of one kind or another based on the results of the research on those global scale issues. It makes a big difference if the nationals of the countries involved have been part of the process of determining what is necessary.

A third incentive is the diffusion of scientific competence around the world. No longer does one nation dominate as the U.S. did after World War II. Cooperation allows nations to tap competence wherever it exists.

A fourth motivation is foreign policy benefit. During the Cold War, we claimed the political benefits of cooperation, particularly east and west, as one of the most important reasons for joint programs. A lot of that has faded, but it still remains important.

A fifth motivation is the domestic political incentive: agencies of government have not been above using international commitments as a way of insulating projects from budget cutting. That is still going on, though in the inward-turning country we have today that's a less valuable device than it was in the past.

The question of building indigenous capacity is another important motivation for cooperation. If there is one thing that is agreed about the relation of technology to economic development, it is that nations have to have their own indigenous capacity to relate technology to development. Cooperation is one way of fostering this result.

With these incentives, why do I believe there is less cooperation than would be expected? The primary reason stems from the fundamental fact of the international political system: it is organized as a collective of nation states and it will remain so for the indefinite future. The consequence is that public sector science and technology are primarily supported by governments to further national goals and that decisions about projects are made in a national policy and budgetary process dominated by domestic pressures.

The observation that science and technology are largely national endeavors greatly complicates the process of developing international cooperation. National objectives are not identical, opportunity costs differ from country to country, criteria of choice among competing projects vary, government structures are not parallel, policy and budgetary processes are not only different in substance but also in timing, and domestic political pressures vary from country to country. Political goals, or goals that are to be served by cooperation, may not be identical.

All of those problems and incentives are as relevant to the United States as they are to other countries, but we have a series of special difficulties which stem primarily from the structure of our government. We have acquired a reputation – I don't think wholly justified – of being an unreliable partner in international cooperation. We change our mind too often. The fundamental structural issue is the nature of our government and the separation of powers, which has several effects. The executive negotiates agreements, but the Congress, not tied to

the executive as is the case in Parliamentary systems, has to approve and appropriate the funding.

This is always a dicey proposition. There may be differences of views, politics may be different, or views may change and diverge over time. Annual budgets, which have become a staple of our system, mean that firm commitments cannot be made beyond the initial year. Through we have done it from time to time, we are not happy to appropriate the full cost of a project in its first year. That is difficult to do to begin with and particularly difficult in a tight budget time.

The bicameral legislature and the Congressional committee structure mean that projects are dependent on action by several committees, themselves comprising many different actors, personalities, and politics. Projects are vulnerable to the idiosyncratic views of individuals, views that may change over time as a project goes ahead. Individual members of Congress, because of their separate elective base from the Executive, are typically more dependent on the views of their constituents than are legislators of Parliamentary systems.

Domestic considerations tend to dominate, breeding skeptical attitudes towards international cooperation and, sometimes, direct hostility. Moreover, it is still true in American government that foreign travel has the atmosphere of a boondoggle, so foreign travel costs are typically much more constrained than domestic travel costs.

Separation of powers is not the only cause of America's problematic performance. The relative isolation and self-sufficiency of the past makes it hard for us to recognize our growing dependence on other nations. As in many other matters, it is hard to accept when a project requires sacrifice of unilateral control. In short, perhaps for understandable but no longer viable reasons, we continue to reflect a parochial view toward cooperation. That is going to have to change, but it can only change gradually.

There is one other difficulty worth mentioning, which primarily affects smaller-size projects – our competitive process for approving projects. This is a much larger part of American science policy than it is of most other governments. The competitive peer review process

makes it hard to allocate up-front money. Often, to develop an international project, even a small one, you have to have planning and travel money at the start. Secondly, you never can be sure that a project, once developed, will actually be approved in the American system. This makes it more difficult to build the individual collaborations necessary for cooperative research at the small scale.

Finally, there is an issue that is particularly important for larger projects: Who benefits? Is it a level playing field? When knowledge is developed that is presumably open to all participants, will that knowledge be turned into commercial products more readily and rapidly in other countries than in the United States? That question encompasses more than science and technology alone, but it relates to our general attitudes towards protectionism and towards our technology policies.

What can be done, what can be changed, and what is possible? If the judgment is correct that international cooperation in science and technology is well below the optimum, what can we do to change the atmosphere? The basic impediment to cooperation is one that cannot be removed. The nation-state system is alive and well, notwithstanding the rhetoric of the global village and the growing interdependence of nations and economies. The rhetoric is not wrong, but it will not bring about the end of this form of organization of international affairs.

And that organizational structure leads nations to ask about any potential cooperation: "What's in it for us?" The 'us' can be and should be seen as an entity that is larger than the nation itself. It is not normally seen that way, but if there was one long term recommendation one could make, it is that we have to recognize that our national interests are much closer to global interests than we tend to assume in our political process.

Somehow, scientists must find a way to convince the public that our nation's parochial interests need to reflect a much different view of the international scene and where our real goals and objectives in science and technology lie.

As far as more specific policies are concerned, one place to start is for the scientific community and universities to demonstrate to students the significance of international ties and knowledge of other communities, and how their work relates both to the work of others and to the larger community of nations. We have not done a terribly good job of that. Most research universities today talk about expanding the international dimension of their education, but it has yet to happen. Just a few years ago, only about two percent of all U.S. science and engineering Ph.D. recipients planned to work outside the United States, and this, NSF data said, had fallen by half in the previous two decades. Only the senior faculty and administrators of the universities can correct this situation by insisting on adequate attention to the international dimension. Change will be slow, but it must be done.

There are a few specific more steps that are possible, though in periods of tight budget, are unlikely. One is the willingness to appropriate funds on a multi-year basis for projects. Second is to recognize the need for up-front money, for small science cooperation at least, perhaps sequestering some funds so that the peer review process doesn't throw out a project after it has been laboriously developed. Lastly, we need more support for the International Council of Scientific Unions which is probably the most cost-effective international organization that we have. And it works on a shoestring.

As far as the administration and the policy process is concerned, I think we need more focus, oversight, and planning at the center to make it clear throughout the government that international cooperation is in fact welcomed rather than something to be avoided. This requires leadership, planning, and oversight – things that neither the Department of State or any individual department can provide. That does not mean detailed oversight or detailed management. It does mean at least knowledgeable oversight. We do not have that capability today in the U.S. government, as agencies operate pretty much independently. That is necessary and overall probably a good thing, but there needs to be some type of oversight mechanism.

And finally, I note with regret that we do not have any intergovernmental organization concerned with or devoted to science and scientific cooperation. There is an S in UNESCO, but we are not members of UNESCO anymore, and it would not have made much

difference if we had been – it was never a very successful organization. I think it is unfortunate that science was included in the creation of UNESCO at the last moment. If an international body had been devoted only to science, it might have made a substantial difference in this whole area of cooperation. But I would argue that it is too late.

In sum, international cooperation involving explicit projects and identified funding in public sector science and technology, though not automatically always desirable, appears to be operating at considerably less than optimum scale. The impediments are substantial, but they relate primarily to the dominance of national considerations when cooperation is considered. Those national issues are not inappropriate, but they are normally based on a narrow, short range of criteria that do not reflect the real needs and opportunities of an increasingly global society.