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Interacademy Programs Between the United States and Eastern Europe 1967-2009: The Changing Landscape

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Glenn E. Schweitzer; Office for Central Europe and Eurasia Development, Security, and Cooperation; National Research Council

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INTERACADEMY PROGRAMS BETWEEN THE UNITED STATES AND EASTERN EUROPE 1967-2009

The Changing Landscape

Glenn E. Schweitzer

Office for Central Europe and Eurasia
Development, Security, and Cooperation

Policy and Global Affairs

NATIONAL RESEARCH COUNCIL
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Preface

This report documents more than four decades of cooperation in science, engineering, and medicine (hereinafter referred to as "science") between the National Academies of the United States and the academies of sciences and other organizations of several countries of Central and Eastern Europe. Taking into account recent changes in the political architecture of Europe, the report offers suggestions for future cooperative activities.

The report encompasses interrelated international interests and activities of the National Academy of Sciences (NAS), the National Academy of Engineering (NAE), the Institute of Medicine (IOM), and the National Research Council (NRC). Collectively, these organizations are known as the National Academies. For many years the NAS has provided the leadership for the international effort involving Eastern Europe, with the NRC serving as the implementing organization. In recent years, the NAE and IOM also initiated activities in the region.

STATEMENT OF TASK AND SCOPE

The Statement of Task that led to this report is as follows:

> The report will document how interacademy programs played a significant role in establishing and maintaining American scientific contacts with colleagues in Eastern Europe prior to and following the lifting of the Iron Curtain. The report will also discuss the changing roles of the academies of the region and the changing nature of interacademy cooperation that has emerged since 1991.

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The countries of interest are Poland, the Czech Republic, Slovakia, Hungary, Romania, Bulgaria, the former German Democratic Republic, and the countries that previously were united within the framework of the former Yugoslavia. These countries include Slovenia, Croatia, Serbia, Macedonia, Bosnia and Herzegovina, Montenegro, and Kosovo. Activities involving other nearby countries of the region (for example, Albania)[1] have been very limited.

Cooperation between the NAS and academies in the region based on interacademy agreements began in 1967. However, cooperation has been on a downward trend since the mid-1990s. Events are now occasionally held on an ad hoc basis.

For the purposes of this report, the countries of interest that are noted above are referred to as countries of "Eastern Europe," a terminology that was commonly used prior to 1990. Now, several of these countries are referred to as countries of "Central Europe." But the geographic reach of Central Europe is in transition, and therefore "Eastern Europe" has been adopted to avoid further confusion.

The author has used his judgment as to the most significant aspects of the relationships of the National Academies with the academies and other partner organizations in Eastern Europe that should be addressed in this report. In this context, "significant" has been interpreted as meaning the promotion of the international dimensions of science, while taking into account the secondary impacts on strengthening U.S. political relations with the individual countries of interest. Important considerations in singling out activities of interest have been (1) the relationships that have been established, which can provide the basis for future cooperation through interacademy or other channels; (2) the types of activities that have proved successful; and (3) the lessons learned that have relevance to developing future scientific partnerships between the United States and other middle-income countries.

This report does not attempt to provide a catalogue of the many individual contacts between officers and members of the National Academies with colleagues from the region. Such contacts have occurred at meetings of international organizations and at other scientific gatherings held throughout Europe and elsewhere. These types of contacts will be impor-

[1] Albania was not included in the NAS-led program during the Cold War in view of the country's limited scientific capability and the formidable political barriers to engagement. A U.S. Agency for International Development (USAID) program has been operating in Albania since 1992 with a small science-oriented effort in the field of health. Also, in 2007 the NRC assisted USAID in reviewing assistance programs to strengthen democracies throughout the world; for this effort, Albania was selected as a case study in the 2008 NRC report *Improving Democracy Assistance: Building Knowledge through Evaluation and Research*. The report is available online at *www.nap.edu/catalog.php?record_id=12164.*

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tant in the future since the availability of funding for bilateral activities has declined considerably, and various multilateral venues of particular relevance are addressed in Chapter 5.

The cutoff date for activities considered in this report is May 31, 2009.

RELATED REPORTS AND OTHER SOURCES OF INFORMATION

This report and an earlier report, *Scientists, Engineers, and Track-Two Diplomacy: A Half-Century of U.S.-Russian Interacademy Cooperation*,[2] provide insights concerning initial efforts of the NAS and the more extended efforts of the National Academies to engage counterpart scientists in countries that were under the control of Soviet-oriented regimes. Many scientists in the partner countries had been isolated from the broader international community, particularly during the 1960s, 1970s, and 1980s.

The earlier report concerning cooperation with Russia through 2004 presented some precedents for the interacademy relationships that evolved with academies in Eastern Europe prior to 1990. That report is currently being updated to include activities through 2009. A third report on interacademy relations involving the United States and other states of the former Soviet Union since 1959—activities involving 14 countries, including the Baltic states of Estonia, Latvia, and Lithuania—would be useful. For administrative purposes, these three states were addressed until 1991 by the NAS as Soviet states, recognizing that they were under the control of Moscow even though there were disputes as to whether they were ever legally incorporated into the USSR.

Collectively the foregoing reports would provide an extensive overview of the activities of the National Academies involving colleagues in the former Soviet Union and the countries of Eastern Europe in recent decades. This report is an important step in that direction.

The interacademy contacts involving Eastern Europe during a period of more than 40 years have been vast and varied. Many of them have been documented. Information on other contacts is not readily available.

Four sources of information have provided most of the basis for this report:

1. Newsletters published by the NRC Office of Soviet and East European Affairs (OSEEA) and by its successor, the Office for Central Europe and Eurasia (OCEE), during the period 1979 to 1997.

[2] Schweitzer, Glenn E. 2004. Scientists, Engineers, and Track-Two Diplomacy: A Half-Century of U.S.-Russian Interacademy Cooperation. Washington, D.C.: The National Academies Press.

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2. Internal documents of OCEE, and particularly annual reports to the National Science Foundation, which until 2005 provided substantial funding for programs.

3. Observations and publications of the author of this report, who served as director of OSEEA and OCEE from 1985 to 2009, with a 2-year leave of absence during 1992-1994. From 2007 to 2009, he consulted with the academies of sciences in Bulgaria, Hungary, Romania, Poland, the Czech Republic, and Slovakia to help ensure that the observations in the report took into account the views of these partners.

4. Interviews with former OSEAA and OCEE staff members, program participants, and other knowledgeable persons concerning the National Academies program and related activities.

Hundreds of books have been written on political and economic developments in Eastern Europe in recent years that provide a broad context for discussions of scientific activities. Also, thousands of articles have been published about specific scientific achievements by participants of the activities sponsored by the National Academies. A few of these political developments and scientific advances have been recognized in this report, and they contribute to the basis for the discussions.

In addition, several reports prepared by the United Nations Educational, Scientific, and Cultural Organization (Venice Office) and the European Academy of Sciences provide interesting assessments of trends within the academies of sciences of the region. Of course, each of the academies of the region prepares periodic reports on its activities and achievements, usually on an annual basis. This report presents a few highlights concerning the structural and policy transitions within the academies. The details of these developments within each country are documented in the academies' reports, which can be obtained directly from the academies.

INTENDED AUDIENCE

This report should be of interest to officials and specialists in both the United States and the countries of Eastern Europe who are actively engaged in promoting scientific cooperation through bilateral or other channels. The report includes considerable information that is not easy for government officials or scholars, let alone the general public, to obtain.

While the funding outlook is not bright for an increase in centrally organized bilateral scientific activity, multilateral channels for cooperation are increasingly available. In particular, European officials and specialists of international organizations should be able to learn from the bilateral experiences of the National Academies. Of course, informal scientist-to-

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scientist channels for cooperation are manifold, and scientists who have their own networks may also be interested in the discussions.

Finally, a newly emerging audience for this report is the small group of analysts in "science diplomacy," particularly specialists working within the U.S. government and in think tanks in Washington, D.C. A few are currently focusing on U.S. scientific cooperation with (1) countries with political agendas that differ in important respects from the objectives of U.S. policies and (2) countries that are involved in transitions from closed to open societies. In any event, analyzing in detail the relevance of the experiences in Eastern Europe to other specific countries is beyond the scope of this report. However, it should be widely recognized that from the beginning of the program involving Eastern Europe, the National Academies has emphasized the importance of mutual scientific benefits. While transparency, bridge-building, and other politically oriented objectives have been significant, particularly to the U.S. government prior to 1991, scientific integrity has been essential to achieving political successes in this region as well as in advancing international science.

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Acknowledgments

Several thousand scientists, engineers, and health professionals from the United States and Eastern Europe participated in the activities discussed in this report. Their contributions to international science and to the building of gateways to understanding on both sides of the ocean were critical components of the search for peace and prosperity in the difficult days of the Cold War and during the transition period of 1989 through 2009. Their achievements provided the substance for this report. For their innumerable contributions, the National Research Council is truly grateful.

Special accolades are extended to the staffs of the academies of sciences throughout Eastern Europe. In a highly professional manner, they repeatedly pushed aside political concerns and took the necessary steps to organize and implement complicated and sometimes controversial programs—whatever the visa, travel, or access challenges. They deserve considerable credit for the successes cited throughout the report.

Without the steadfast, and at times risky, financial support by U.S. government agencies and private foundations as well as by the academies of Eastern Europe, this story could not have been told. On the U.S. side, the National Science Foundation, the Department of State, the John D. and Catherine T. MacArthur Foundation, the Ford Foundation, and the Rockefeller Brothers Fund were the principal benefactors of the activities during the past 40 years. They provided long-term support, which together with internal funds of the National Research Council, enabled the program to facilitate many sustainable activities.

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This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Academies' Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the process.

I wish to thank the following individuals for their review of this report: Ivan Berend, University of California, Los Angeles; George Bugliarello, Polytechnic Institute of NYU; Stephen Deets, Babson College; Hans Frauenfelder, Los Alamos National Laboratory; Hana Rambouskova, Fulbright Commission, Prague; Ivo Slaus, University of Zagreb, Croatia; and Gary Waxmonsky, Environmental Protection Agency.

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations, nor did they see the final draft of the report before its release. Responsibility for the final content of this report rests entirely with the author.

Finally, I express my appreciation to Kelly Robbins and Merc Fox for their assistance in preparing this manuscript for publication.

Glenn E. Schweitzer, *Director*, Office for Central Europe and Eurasia, National Research Council

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About the Author

Glenn E. Schweitzer has served as director of the Office for Central Europe and Eurasia (previously named the Office for Soviet and East European Affairs) of the National Research Council since 1985. From 1992 to 1994, he was on a leave of absence to serve as chairman of the Intergovernmental Preparatory Committee (PrepCom) for the International Science and Technology Center (ISTC) in Moscow and then as the first executive director of ISTC, which was established by the governments of the United States, European Union, Japan, and Russia. He is the author of several books on international scientific affairs.

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Summary

This report documents how interacademy programs have played a significant role in establishing and maintaining American scientific contacts with colleagues in Eastern Europe prior to and following the lifting of the Iron Curtain. The report also discusses the changing roles of the academies of the region and the changing nature of interacademy cooperation that has emerged since 1991. The countries of interest are Poland, the Czech Republic, Slovakia, Hungary, Romania, Bulgaria, the former German Democratic Republic (GDR), and the countries that previously were united politically within the framework of the former Yugoslavia.

The report should be of interest to officials and specialists in both the United States and the countries of Eastern Europe who are actively engaged in promoting scientific cooperation through bilateral and other channels. Also, an emerging audience for this report is the growing group of analysts in the United States interested in "science diplomacy" involving U.S. cooperation with countries that have political agendas that differ in important respects from the objectives of U.S. policies. A key lesson in this regard is that maintaining the scientific integrity of a cooperative program has been essential in achieving political success as well as advancing international science.

Beginning in 1965, several foreign secretaries of the National Academy of Sciences (NAS) decided to try to bring the well established but isolated scientific communities of Eastern Europe closer to the mainstream of international science. These NAS officials developed scientific exchange

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BOX S-1
Cooperation as a Scientific and Cultural Experience

"I remain convinced of the value of cooperation, not only in a narrow scientific sense but as a broad cultural experience as well. At a time when so many channels of cooperation and communication with Soviet and East European colleagues have shrunk, the interacademy programs assume greater significance than their modest size would suggest. They offer Americans rare opportunities for access and for joint work with scientific colleagues and opportunities for scientists from those countries to visit the United States. But they will command wholehearted participation only if scientists are respected and treated equitably so they can participate in an unfettered manner in cooperation."

Walter Rosenblith, foreign secretary, NAS, 1983.

SOURCE: National Research Council (NRC) Office of Soviet and East European Affairs. 1983. Newsletter 5(1).

programs based on formal agreements with the academies of sciences of the region. The academies, with the exceptions of those in Yugoslavia and Romania, had adopted the Soviet model of an academy of sciences, which managed most of the leading basic research institutions of the countries. Box S-1 presents the view of one of the foreign secretaries on the purpose of the programs.

Interacademy cooperation was based on a quota system, which specified the number of exchange months that were available for sending scientists in each direction. These exchange months were divided between long-term visits of up to one year and short-term visits of about one month. The National Science Foundation provided financial support, and therefore the emphasis was on basic research, with agriculture and health projects not generally included. Box S-2 sets forth the quotas in 1978, as an example of the distribution of available resources throughout the region.

Leading U.S. and Hungarian scientists carried out a detailed review in 1989 of a decade of exchanges of individual scientists involving Hungary, with more limited reviews targeted on other countries as well. The positive impacts of the program with Hungary included the following:

- Stimulating fresh scientific perspectives
- Exchanging experiences on theoretical and experimental techniques

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BOX S-2
Exchange Quotas in 1978

- Bulgaria: 25 person-months in each direction
- Czechoslovakia: 55 months
- Hungary: 35 months
- Poland: 35 months
- Romania: 25 months
- Yugoslavia: 30 months
- GDR: 20 months

SOURCE: NRC Office of Soviet and East European Affairs. 1978. Newsletter 1(2):1 and 2(1):1.

- Planning and carrying out joint research projects extending beyond the period of exchange
- Starting or completing joint papers for publication
- Enhancing teaching materials with updated research data
- Facilitating interactions between basic and applied researchers
- Deepening understanding of relationships among national research priorities, national programs, and international scientific and social trends

Criticisms of the program were surprisingly few: Qualifications of a few exchangees were not as strong as might be expected, older scientists tended to dominate exchanges, and the small size of the program inhibited flexibility in the selection of exchangees.

In the late 1980s, the programs were expanded for about a decade to include more than 30 bilateral workshops involving all of the academies of the region. The workshops were held both in the United States and in the region. Among the most popular topics were energy conservation, environmental protection, education, and industrial management. Box S-3 comments on a successful bilateral workshop, and Box S-4 highlights a regional workshop that contributed immediately to a difficult situation.

Following the lifting of the Iron Curtain, the quota system for individual exchanges was terminated by the NAS in a move toward more "normal" modes of cooperation. Beginning in 1993 the NAS carried out annual open regional competitions among American scientists who wanted to work with colleagues in Eastern Europe and the former Soviet Union. This competitive program continued for about 10 years, with more than 200 exchange visitors traveling to and from Eastern Europe. They covered

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BOX S-3
Workshop on Ecology Challenges in Romania (1990)

As one of the few delegations of Western scientists to visit Romania in several decades, the Americans received personal attention from the State Secretary for the Environment and from highly respected Romanian scientists. Topics of interest were management of aquatic ecosystems, including agriculture and environmental impacts, and air and water pollution control. During the first week, the American specialists observed lakes, canals, and agricultural lands in the Danube Delta and inspected forests experiencing a drying phenomenon, presumably due to overuse of pesticides. The subsequent workshop involved 40 Romanian specialists.

SOURCE: NRC Office of Soviet and East European Affairs. 1991. Newsletter (Fall 1991), p. 5.

BOX S-4
Cross-Boundary Steps by Physicians in Yugoslavia (1995)

At the workshop, spare parts from Serbia were offered for non-functioning incubators in Zenica in Bosnia and Herzegovina, and children from Knin were invited to the Children's Hospital in Zagreb, Croatia. Lessons learned in Yugoslavia could be applied to children in other war zones.

SOURCE: Institute of Medicine/NRC. 1995. The Impact of War on Child Health in the Countries of the Former Yugoslavia. Washington, D.C.: National Academy Press, p. 40.

a wide variety of disciplines and involved dozens of institutions in the United States and Eastern Europe.

As the region opened its remaining closed doors during the early 1990s, the contacts established through the revised program continued to help many isolated scientists link more fully into the international scientific community. Of course, the positive impacts from individual exchanges usually needed time to materialize; and they were manifested in various ways. They included, for example, joint publications, curriculum development, and follow-on visits by the participants, their colleagues, or their students. Occasionally, however, results were evident almost immediately through presentations at international conferences, drawing on experiences during exchange visits.

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During the 1990s other types of programs were also introduced by the NAS. The most ambitious new effort was a series of policy-oriented workshops involving young investigators from the United States and from the region. These workshops were well received in the United States and abroad, and they led to a number of lasting collaborations. Popular topics included environmental protection, worker health protection, and energy conservation.

As to other activities, two highly successful 2-week training programs in laboratory analytical techniques involving up to 30 young scientists from the region were organized in Eastern Europe. A few young American scientists interested in studying science policy issues in Eastern Europe were supported. Also, a regional workshop on the intersections of science and democracy was organized in Prague. Most recently regional workshops on biosecurity were held in Budapest and Warsaw, and a bilateral workshop on innovation systems that had been developed in Poland and the United States was organized in Washington.

Activities supported by the NAS, while only a small part of the overall scientific relationships between the United States and Eastern Europe, have undoubtedly had a positive effect on international science. Also, they have supported the transformation of centrally planned economies to market-oriented approaches and to new scientific relations between East and West.

Eastern Europe is a unique cluster of middle-income countries with strong educational and scientific capabilities. These strengths are embodied, for example, in Charles University in Prague, in the Szeged Biological Center in Hungary, in the Center for Mathematics and Computational Modeling of Warsaw University, and in the Bucharest Polytechnical University. Indeed, many excellent institutions of the region have long histories of scientific interchange with the United States. Also, the strategic location of the area is obvious; and the time for science diplomacy has not ended. It is continuing.

The Eastern European desire to strengthen partnerships with U.S. colleagues is omnipresent. Considerable funding for research from Brussels has oriented much of the scientific enterprise in Eastern Europe toward cooperation with partners on the same side of the ocean. But such cooperation is sometimes described by the Eastern European beneficiaries as a low-cost alternative to not having adequate financial support to work with American colleagues.

At low cost, the NAS could sponsor annual regional scientific meetings in Europe, rotating from capital to capital. Such forums, organized in cooperation with interested academies and co-funded by these academies, could provide opportunities to exchange up-to-date information on scientific advances in selected fields, trends in efforts to promote

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sustainable knowledge-based economies, and mechanisms to expand scientist-to-scientist cooperation. The scientific and political payoff from such high visibility demonstrations of U.S. interest in the region would be substantial.

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1

New Approaches to Cooperation

Following World War II, the Union of Soviet Socialist Republics (USSR) steadily exerted increasing control over policies and activities in Poland, Czechoslovakia, Hungary, Romania, and Bulgaria. First, military control was strongly asserted. In parallel, political domination became widespread. The countries of the region soon were members of the Warsaw Pact, tightly bound to the USSR in many ways. At the same time, Soviet troops took control of a newly created state, the German Democratic Republic (GDR), which also became a member of the Warsaw Pact.

GROWING INFLUENCE OF THE USSR IN SCIENCE AND TECHNOLOGY

By the 1960s, Soviet economic influence in the region was extensive. This influence had extended well beyond the academies to the science policies and funding priorities of the governments. These policies and priorities were increasingly determined by formal directives and other types of instructions emanating from Moscow. Such directives reinforced and at times supplemented the views of local communist leaders who had strong ties to counterparts throughout the region. Of course, local communist leaders controlled key science and technology appointments within the governments and academies. Of special relevance for this report, party members received preference for international travel to scientific meetings. Usually they, like other travelers, were required to prepare trip

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reports that identified their international contacts and key foreign scientists whom they encountered abroad. While at home, they also reported on international activities including exchanges of journal articles. Given such inhibitions, researchers in the region were often out-of-date with international scientific achievements; and frequently they had no alternative to relying on abstracts describing international advances in their fields of interest.

Of particular interest for this report was the adoption in most of Eastern Europe (that is, Poland, Czechoslovakia, Hungary, Bulgaria, and the GDR) of the Soviet model of an academy of sciences. In this model, the academies assumed responsibility for managing many of the best basic research groups within the countries. The academies were advocates of rigid top-down planning and centralized financing of research activities, often carried out pursuant to strong guidance from government agencies.

The conflicts between the new role of the academies and the long-standing prerogatives of the universities as guardians for graduate students and associated research activities quickly became apparent. In general, universities successfully resisted the erosion of their pedagogical responsibilities, a struggle that continued into the 1990s. The new structures for science continue to direct basic research in Poland, Hungary, Slovakia, and Bulgaria, although the academies are less dominant as central planning mechanisms and less arbitrary in addressing personnel appointments, budget allocations, and program priorities. From university research laboratories to technology-oriented firms, few scientists of the region were left on their own to explore and apply science according to local needs and personal interests. Indeed, local needs and interests were soon defined by leaders of the Warsaw Pact as the collective needs and interests of the states of the region. More often than not, the Soviet Union was the leading state and often the primary beneficiary of collective actions.

An important mechanism for exerting direction of the research and development activities of the Eastern European countries was to be a newly established Council for Mutual Economic Assistance (CMEA). The facilities for CMEA's headquarters were constructed in the late 1950s and became fully operational during the early 1960s. The offices were located in Moscow, very close to the American Embassy, where they served as a frequent reminder for American diplomats of the reach of the Soviet empire. CMEA was staffed by more than 2,000 people, including many technical specialists from the Soviet Union and small scientific cadres from the other countries.

As to the scientific interests of CMEA, an important concept was to take advantage of the special technical strengths of the individual coun-

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tries and use them for the common good of the Soviet Union and Eastern Europe. A step in this regard was to be the designation of coordination centers for scientific activities throughout the region. These centers were well funded and were to provide technical leadership in selected areas of applied science for the region. According to reports received by the National Research Council (NRC) from specialists in the region, intercountry travel by specialists of the region to the centers was encouraged and readily funded by the governments of the region, although the centers were reported to have served primarily the interests of the host countries and the interests of the USSR. Thus, they seemed to be important components of the science infrastructures of the host countries but less significant as regional hubs. Box 1-1 presents a list of most of the centers.

At the same time, however, the Soviet government apparently was reluctant to place too much responsibility for controlling economic or

BOX 1-1
Research Coordination Centers of the Council for Mutual Economic Assistance

- Improvement of Nutritional Content of Food Products, Sofia
- Economic Requirements and Standards for International Highways, Sofia
- Industrial Robots Research and Development, Stara Zagora, Bulgaria
- Preservation of Ecosystems and Landscapes, Bratislava
- Utilization of Raw Materials in Lumbering, Bratislava
- Mechanization and Automation in Crop Raising and Livestock Husbandry, Prague
- Computer Technology and Mathematical Methods in Transportation, Prague
- New Chemical Consumer Goods, Berlin
- Defense Against Atmospheric Pollution, Dresden
- Biological Problems in Livestock Husbandry, Dummersdorf, GDR
- New Types of Mineral Fertilizers, Leipzig
- Synthesis of Fuel Supplements, Schwedt, GDR
- Utilization of Industrial Wastes, Budapest
- Economic Forecasting in Development of Automotive Transport Equipment, Budapest
- New Methods of Utilizing Coal, Katowice
- New Pesticides and Plant Production Methods, Poznan
- Economic, Social, and Legal Aspects of Pollution Control, Warsaw
- Crating and Packaging in the Food Industry, Warsaw
- Economic Forecasting in Development of Railroad Rolling Stock, Warsaw

SOURCE: NRC Office of Soviet and East European Affairs. 1985. Newsletter 7(1):10-11.

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scientific development into the hands of CMEA. Rather, many bilateral agreements between the USSR and the other countries in the fields of economics, trade, and science signaled that more direct control through bilateral arrangements would be an important approach for extending the reach of Moscow. Also, in some fields with potential military applications such as optics and material science, Moscow was reluctant to have achievements on display and kept them separate from multilateral activities. In the United States, the general view of political experts who focused on Eastern Europe and the Soviet Union was that bilateral arrangements were more important to the Soviet government than multilateral arrangements developed through CMEA, which provided largely window dressing when important issues were decided.

In parallel with the expansion of CMEA activities into the area of science and technology was an expanded role for the Soviet Academy of Sciences as a de facto coordinator of basic scientific activities throughout the region. The Soviet academy established an array of bilateral agreements with academies of the other members of the Warsaw Pact that frequently went beyond basic research into the technical sciences and engineering. These agreements served as the basis for many joint activities that brought scientists throughout the region more directly under the influence of Soviet policies.

Because this report covers bilateral scientific activities involving Yugoslavia as well as the six countries noted above, Yugoslavia's unique position in the postwar era deserves a few words. Yugoslavia was not behind the Iron Curtain. However, its Communist leadership was often sympathetic to the views of the USSR. Its ties between important elements of the population and professional colleagues and friends in adjacent countries also had long histories.

Politically, Yugoslavia was considered a nonaligned nation with regard to important international matters. At times Yugoslavia was a bridge between East and West in sponsoring international exhibitions and meetings on many types of developments, including scientific achievements. At other times it aligned itself with the activities and interests of either East or West, depending on the extent of mutual interests. But favoritism toward the East or West did not seem to be a consistent determinant of the scientific activities carried out within the country. Often the interests of international organizations were more important.

For example, beginning in the mid-1950s Yugoslavia promoted the nuclear research center at Vinca near Belgrade as a high-visibility activity of interest to scientists from many countries. The International Atomic Energy Agency (IAEA) became one of the external organizations most interested in Yugoslavia's important scientific activities. When a nuclear reactor accident at the center exposed about a dozen Yugoslav scientists

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to high doses of radiation in 1957, several were rushed to Paris for bone marrow transplants. At the same time, the Yugoslav government was quick to ensure that the IAEA provided an international umbrella for this emergency response.

As to technical relations with the United States, during the 1950s and into the early 1960s, the United States supported a substantial foreign assistance program in Yugoslavia. While not explicitly targeted on enhancing Yugoslavia's science capacity, some projects involved introduction of modern technologies into the nation's industrial base. Dozens of technical experts from the United States visited Yugoslavia each year to advise the government on agricultural and industrial developments, and dozens of Yugoslav engineers and agricultural scientists traveled to the United States for specialized education and training.

All the while, a significant diaspora of Yugoslav émigrés who continued their scientific careers in the United States helped ensure that vibrant scientific relations developed between the United States and Yugoslavia during the 1960s and 1970s.

REDUCED LEVEL OF SCIENTIFIC ENGAGEMENT FOLLOWING WORLD WAR II

Prior to World War II, important scientists from the Eastern European countries in addition to Yugoslavia had emigrated to the United States. Many had maintained professional contacts with their colleagues in their native countries, and they promoted a flow of exchange visits in both directions. Scientific papers written jointly by specialists living in the United States and those living in the region were common in the international journals. Science-oriented students from the region were enrolled at many leading American universities; and the distinction between U.S. science and Eastern European science in physics, chemistry, and mathematics was often difficult to distinguish.

But with the spread of Soviet influence in the 1950s and 1960s, American scientists had increasing difficulty gaining access to important research centers in the region. Also, many Eastern European technology-oriented companies were under state control. They were not ready to receive American visitors, whose presence could raise security concerns of local authorities.

No longer could transplanted Eastern Europeans or other American scientists depend on collaborative efforts being welcomed by the officials of the region. No longer could they easily obtain data that were not published in international journals. At the same time, scientists of the region gradually lost track of important developments in the United States in their fields of research.

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The degree of isolation varied from country to country. Yugoslavia, Poland, and Hungary were the most open countries of the region for Western scientific colleagues. Bulgaria, Romania, the GDR, and Czechoslovakia were isolated in many ways, particularly with regard to travel to the West by their scientists. Also, some fields of science became more insular than others. Achievements in engineering and the social sciences, in particular, became increasingly opaque in Eastern Europe.

Several U.S. government programs supported limited exchanges involving researchers from the region. However, participation often required special permission from the governments of the region, and approvals were frequently problematic. In particular, the Fulbright Program provided opportunities for a limited number of American scientists to obtain travel support for activities involving several countries of the region, and in return Fulbright participants from the region were welcomed in the United States. The National Science Foundation (NSF) had a variety of small programs over many years for supporting travel in both directions. The National Institutes of Health at times provided financial support for research in the region of considerable priority to the United States and also awarded fellowships to work in the United States for visitors from the region. Other U.S. departments and agencies occasionally provided funding for cooperative ventures.

Overall, when international funds were available on a competitive basis, Eastern European scientists fared well in the competition. But these activities did not add up to a level of activity commensurate with the scientific capabilities of countries with a combined population that exceeded 100 million. In previous decades, the region had made many important scientific contributions to economic progress, argued the American advocates of greater engagement during a period of political disengagement. There was both vocal and latent interest in the scientific communities on both sides of the ocean in expanding cooperation.

At the time, the U.S. government viewed expansion of such cooperation as a potentially important form of bridge-building that could contribute to the political objectives of weaning the countries away from the USSR. From the scientific viewpoint, NSF was particularly interested in supporting expanded ties. It correctly believed that the long legacy of important scientific achievements in the region continued to permeate local research institutions that could make significant contributions in advancing international science

INITIATIVE OF THE NATIONAL ACADEMY OF SCIENCES

Beginning in 1965, several successive foreign secretaries of the National Academy of Sciences (NAS) decided to try to bring the Eastern European

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BOX 1-2
Cooperation as a Scientific and Cultural Experience

"I remain convinced of the value of cooperation, not only in a narrow scientific sense but as a broad cultural experience as well. At a time when so many channels of cooperation and communication with Soviet and East European colleagues have shrunk, the interacademy programs assume greater significance than their modest size would suggest. They offer Americans rare opportunities for access and for joint work with scientific colleagues and opportunities for scientists from those countries to visit the United States. But they will command wholehearted participation only if scientists are respected and treated equitably so they can participate in an unfettered manner in cooperation."

Walter Rosenblith, foreign secretary, NAS, 1983.

SOURCE: National Research Council (NRC) Office of Soviet and East European Affairs. 1983. Newsletter 5(1).

scientific communities closer to the mainstream of international research and particularly research in the United States. They and other influential leaders of the NAS had repeatedly met leading Eastern European counterparts at international meetings—national and regional scientific conferences, sessions of the societies of the International Council of Scientific Unions, and meetings of other professional societies, for example. They received many invitations to visit the region, and they became convinced that strengthening contacts with Eastern European colleagues through a formalized interacademy program would benefit the United States in a variety of ways (see, for example, Box 1-2). NSF agreed, and funds were provided to the NAS for scientific engagement.

The natural counterparts for the NAS were the academies of sciences in the countries of the region. As previously noted, with the exceptions of Romania and Yugoslavia, each of the countries adopted the Soviet model for the structure and role of its academy of sciences. They were scientifically strong and well-funded organizations, tightly linked to the governments, particularly with regard to the selection of academy officers. By the mid-1960s, most academies had already established robust scientific exchange programs among themselves and, of course, with the Soviet Academy of Sciences. They also were in the process of broadening their international activities to include cooperation with other academies in more distant lands.

In the late 1960s, the political situation in Czechoslovakia, and to some

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extent in Hungary and Poland, became more liberal, enabling scientists to communicate and travel internationally more freely. More researchers, regardless of political affiliations, began to enjoy the benefits of formal and informal international research arrangements. Thus, there was considerable interest in the scientific communities in the newly evolving interacademy arrangements. This period of liberalization was temporary, ending in the 1970s. But by that time, the interacademy and other arrangements were in place. As for Yugoslavia, academies of sciences were located in each of the six republics of the country—Slovenia, Croatia, Serbia, Bosnia and Herzegovina, Montenegro, and Macedonia—and also in two regions of Serbia—Vojvodina and Kosovo. The individual academies did not adopt the Soviet model and were not managers of the major research facilities of the countries. They were primarily membership organizations that recognized leading scientists. They were linked through a council of academies with a secretariat that moved every 2 or 3 years among the cities of the country, depending on the residences of the presidents of the council. The council served as a mechanism for considering issues that affected the entire country and provided a focal point for coordinating international cooperation.

For about a decade beginning in the late 1960s, the NAS foreign secretaries traveled to the capital cities of seven countries of the region. There they signed agreements on scientific cooperation between the NAS and the counterpart academies of sciences of the individual countries. In the case of Yugoslavia, the Council of Academies was the signatory. Box 1-3 indicates the dates when the initial agreements were signed. Typically, these agreements were for 3 or 5 years, and they were regularly renewed as necessary by subsequent exchanges of letters until the early 1990s.

BOX 1-3
Dates of Initial Interacademy Scientific Cooperation Agreements

- Romania: 1965
- Poland: 1966
- Yugoslavia: 1966
- Czechoslovakia: 1966
- Hungary: 1970
- Bulgaria: 1970
- GDR: 1978

SOURCE: Agreements in the Archives of the National Academies.

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The purpose of the agreements was succinctly stated by the NRC as follows: "The purpose of these programs is to enable U.S. and foreign scientists to visit each others' countries for lecturing, familiarization, and research."[1] At the same time, the interested organizations and individuals in the United States and the region recognized that in addition to scientific benefits the agreements had political importance in overcoming the divide in East-West relations while providing greater visibility to the scientific capabilities of the region.

Because similar arrangements for scientific exchanges had been adopted by the NAS and the Soviet Academy of Sciences beginning in 1959, there was only limited concern in Washington that national security interests would be jeopardized through access by adversaries to U.S. scientific achievements.[2] With regard to Eastern Europe, the U.S. government seemed to believe that the possibility of misuse of exchanges for espionage targeted toward U.S. technologies was outweighed by potential technical benefits to the United States. At the same time, however, the intelligence services in both the United States and the partner countries maintained a careful watch over interacademy activities, primarily in reviewing the visa applications of participants in the programs.

The agreements provided for both long-term scientific visits in each direction—usually up to 1 year—and for short-term visits—usually for 1 month. An annual quota for visits specified in months was prescribed. For example, Box 1-4 sets forth the quotas in 1978, although the quotas changed frequently, depending on availability of funds and on application pressures in the United States and in partner countries.

Because the programs were supported by NSF, the topics that could be covered were limited to the following: physical, biological, or engineering sciences; social or behavioral sciences, with an emphasis on empirical and quantitative analysis of individual and group behavior; and biomedical sciences. Clinical studies and agricultural research were generally excluded.[3] The disciplines that were specified were subjected to minor modifications over the years. However, the consistent concept was clear—to have the disciplines for the program the same as the disciplines that were eligible for funding from domestic-oriented programs of NSF. Additional provisions were usually included in the interacademy agreements that addressed the organization of workshops, facilitation of cooperative arrangements to be implemented outside the framework of

[1] NRC Office of Soviet and East European Affairs. 1977. Newsletter 1(1).

[2] Of special interest is National Security Decision Directive 189, issued in 1985 by the National Security Council, which reaffirmed earlier directives that the results of basic research should be considered as unclassified information.

[3] NRC Office of Soviet and East European Affairs. 1985. Newsletter (Winter 1985), p. 1.

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BOX 1-4
Exchange Quotas in 1978

- Bulgaria: 25 person-months in each direction
- Czechoslovakia: 55 months
- Hungary: 35 months
- Poland: 35 months
- Romania: 25 months
- Yugoslavia: 30 months
- GDR: 20 months

SOURCE: NRC Office of Soviet and East European Affairs. 1978. Newsletter 1(2):1 and 2(1):1.

the agreements, and other suggestions for expanding bilateral scientific exchanges.

An important parallel development was the establishment by the U.S. government of research programs in Yugoslavia and Poland during the 1970s. These programs were funded with local currency generated as payments for agricultural products sent to the countries by the U.S. government (often referred to as P.L. 480 funds). The programs lasted until the early 1990s and involved support of dozens of scientists in the two countries. The level of financial support provided to local scientists to cover some research costs and to scientists in the United States as well as in the region to cover international travel costs varied from year to year but generally was in the range of local currency equivalent to $500,000 to $1 million per year per country. While at the time there were other collaborative programs supported by various U.S. government agencies through other funds, P.L. 480 research programs were important examples of how relatively stable scientific cooperation at the time could serve the interests of the U.S. government and its partner governments.

Another set of programs that provided an important context for interacademy activities during the early 1990s were country-specific intergovernmental scientific programs funded through the Department of State and carried out by a variety of U.S. government agencies. These programs, which were targeted on Poland, Hungary, Czechoslovakia, and Yugoslavia, were designed to expand contacts between institutions in the countries of the region and the United States following the opening of the region after the collapse of the Soviet bloc. Although the programs only provided support for travel and directly related expenses in both directions, they were considered to be of great importance by the governments

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of the countries of the region. They continued for 3 to 4 years with an overall annual funding level of several million dollars. As the programs terminated, there was a constant stream of appeals from the governments of the region to revive them. However, the argument that the region was rapidly becoming an integral component of Europe (whole and free) and therefore should look to European funding sources for cooperative activities was an important factor in the program termination decisions by the U.S. government.

Also of importance during this period were exchange programs of several U.S. nongovernmental organizations and foundations. The International Research and Exchanges Board, with considerable financial support from the U.S. government, supported a broad range of social science cooperative programs. The Ford Foundation, the German Marshall Fund, and the Rockefeller Brothers Fund supported American social science scholars interested in the region and also pioneered many environment-oriented activities. Finally, the Open Society Initiative (George Soros's organization) launched one of its first international efforts in Hungary in the mid-1980s, and this program was soon replicated in other Eastern European countries as well. Collectively, these activities, along with the programs of the National Academies, had a significant impact in opening many doors to outsiders with common interests.

Finally, Eastern European scientists were quick to learn how to successfully compete for international research grants offered in Europe and the United States. This experience was a strong factor in encouraging the establishment of grant programs in the region as the Iron Curtain was lifted.

POLITICAL, ECONOMIC, AND SCIENTIFIC CHANGES WITH THE LIFTING OF THE IRON CURTAIN

By 1991 the countries of Eastern Europe were desperately trying to establish market economies to revive their slumping standards of living. The salaries of researchers fell dramatically, and many limited their scientific efforts in order to take second and third jobs outside science. The GDR soon became an integral component of the Federal Republic of Germany; but the integration process was not easy, and hundreds of scientists who could not compete internationally were dismissed. The Hungarians continued to struggle with economic transition, which began many years earlier but moved slowly. The Poles took bold steps towards opening their economy by relaxing price controls, reducing subsidies, and adopting realistic foreign exchange rates. In Czechoslovakia, Romania, and Bulgaria, political support for abandoning central command and control spread rapidly; and free market concepts moved beyond the plan-

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ning stage with attendant economic problems. In summary, even though the roads to capitalism were uncertain at best, they were slowly adopted. At the same time, the introduction of free markets led to unemployment with limited social safety nets available.[4]

Economic issues led to many disappointments among the scientific communities. Most laboratories languished in retarded states of development. The emerging young talent of the region increasingly turned to business endeavors rather than accepting lower pay and loss of prestige of academic science. Funds became scarcer for equipment, foreign journals, and travel. Thus, local scientists reached out as never before for help from the West.[5]

Nevertheless, some research centers continued high-quality research that produced impressive achievements and had become focal points for cooperation. They included, for example, chemical catalysis investigations in Krakow, Poland; water ecology studies in Budapest; entomology experiments in České Budějovice, Czechoslovakia; fruit research in Pitești, Romania; and coastal morphology investigations on the Black Sea coast of Bulgaria. Government leaders in all of the countries advocated strong support for sizable scientific complexes despite the economic difficulties, although adequate funding seldom followed such political pronouncements.[6]

High on the priority lists of these countries were the future configurations, policies, and leaderships of the academies of sciences. During the 1990s, strong political attacks were launched against the Soviet-style academies by critics within the region and in the West. However, the academies defended their interests and successfully resisted radical reorganization, except in Prague. In other capitals, the conservative nature of the large networks of basic research institutions remained largely intact. Of course, the officers of the academies changed significantly, fairness in elections of academy members was greatly improved, and government control over the functioning of the academies was generally lessened. But most of the new governments in the region considered that preservation and modification of the academy systems were preferable to dismantlement. The GDR was a special case, and its academy disappeared. Meanwhile, the academies of Yugoslavia became aligned within the new states that succeeded Yugoslavia.

Most academies retained their historical roles of electing members in recognition of personal scientific achievements, although the electoral

[4] Schweitzer, Glenn E. 1991. The Future of Scientific Research in Eastern Europe. Technology in Society 13(1-2):39-51.

[5] Ibid.

[6] Ibid.

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process was of great concern in each country. In general, scientific achievements gained a rightful place in the process, with political favoritism as an election criterion playing a less dominant role. The academies continued to serve as advisory bodies for governments, just as they had throughout the days of Soviet domination. However, the mechanisms for developing consensus reports for consideration by the government involved more active participation by scientists throughout the academy systems rather than reliance on a very limited number of officials. Finally, most academies continued to have responsibility for managing substantial numbers of research institutions. Greater efforts were frequently exerted to link these academy institutions to the universities and to the users of research results, such as government ministries and the industrial sector.

Turning to Czechoslovakia, the old academy underwent a major transformation. Its members were dismissed, and an independent Learned Society was established to recognize the achievements of scientists and other leading intellectuals, with a membership of about 140 fellows. The academy's staff was downsized, with the new "Head Office" of the academy providing budgetary support for the institutes, the Academy Council and its Presidium, and targeted programs and projects. The institutes continued to emphasize basic research with only a loose affiliation to the academy through the budgetary process. The government decided that restarting the entire system was the only practical means of ridding the system of scientists with questionable credentials and motives. With the establishment of new institutional arrangements, there was considerable overlap among the leaders of the academy, the directors of its institutes, the managers of the government research council system, and the Learned Society; but their separate responsibilities were generally clear.[7]

As to the GDR, the Leopoldina Academy in Halle, the world's oldest academy involved in the natural sciences, had long been of special interest to the U.S. scientific community (see Box 1-5). Despite the establishment of a new Soviet-style academy in East Berlin in the 1950s, the Leopoldina Academy managed to maintain a program of international interactions of scientists from many countries. After the collapse of the GDR, it became an even more important academy representing the interests of scientists throughout the Federal Republic of Germany. As an indicator of its importance to U.S. science, more than 90 members of the academy now live in the United States.[8]

As to the international cooperation activities of the academies, many cooperative programs and supporting staffs at the academy level remained

[7] See *www.learned.cz/main.php?id=02.01.01.00; www.kav.cos.sz/gen.php?gage=about_us&lng=en;* and *www.cax.sz/en/*. Accessed July 22, 2009.

[8] Hans Frauenfelder, Los Alamos National Laboratory. April 2009.

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BOX 1-5
Leopoldina Academy

"During the dark days of the GDR, the Leopoldina Academy kept essential free contact with the outside world."

Hans Frauenfelder, Los Alamos National Laboratory. April 2009.

in place during the transition. Even in Czechoslovakia, familiar personalities remained and well-established approaches continued. Over the years, the annual reports of the individual academies as well as reports of the Central and Eastern European Network of Academies of Sciences published by the European Commission's Joint Research Center often discussed the changes in the academies.

In 1986 several intellectual leaders associated with the Serbian Academy of Sciences and Arts prepared a memorandum entitled "Topical Social Questions in Our Country." The memorandum blamed Croatia and Slovenia for the disintegration of Yugoslavian unity. It decried the fact that Serbia had been denied the right to create its own state, a clear reference to Serbian minorities living in Croatia and Bosnia and Herzegovina. This memorandum became known in the West as the manifesto that provided the intellectual underpinning for Serbian aggression in Croatia and Bosnia and Herzegovina.[9]

In 1989 NRC staff members met in Belgrade with a vice president of the Serbian Academy 2 days after a broadcast on Belgrade television reporting on the availability of the memorandum, which was immediately criticized in the West. The vice president assured the visitors that the memorandum did not reflect the policy of the Serbian Academy but only the views of several of its members. He urged the visitors not to take the document too seriously.

However, the manifesto set off a firestorm in the West. The leadership of the NAS, in consultation with members who were well acquainted with Yugoslav colleagues, decided that the Serbian Academy was not a responsible organization and therefore that the NAS should terminate all communication and cooperation with the Serbian Academy. This boycott continued for more than a decade. Despite informal reconciliation discus-

[9] See Posa, Cristina. 1998. Engineering Hatred: The Roots of Contemporary Serbian Nationalism. Balkanistica 11:69-77. Available online at *home.olemiss.edu/mldyer/balk/article1.html*. Accessed March 5, 2009.

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sions involving representatives of the academies at international meetings, a formal bilateral meeting involving the Serbian Academy has not been held in recent years. There simply has not been funding to support a cooperative project that would call for such a meeting.

SCOPE OF THE ACTIVITIES OF THE NATIONAL ACADEMIES

Against this background, this report addresses some of the activities that followed the signing of the interacademy agreements. Also, other types of activities that were supported by the NAS and then the National Academies as the political landscape in the region and interests of funding sources changed are considered. Chapter 2 discusses exchanges of individual scientists, initially within the framework of the agreements and then beginning in the early 1990s through other means that built on the experience of the exchange agreements. Chapter 3 is devoted to a discussion of the many bilateral interacademy workshops that were carried out beginning in the 1980s and continuing to the present time. Chapter 4 describes a variety of other activities beyond individual exchanges and workshops that expanded the program with counterparts in the region. Recommendations concerning future activities are then presented in Chapter 5.

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2

Individual Exchanges

With regard to Eastern Europe, for many years exchange visits of individual scientists were the backbone of the program sponsored by the National Academy of Sciences (NAS). During the 1970s, the funding was at a level of up to $750,000 per year. By the 2000s, the level had fallen to about $200,000 per year. When taking into account the declining value of the dollar, this was a very significant decrease.

Initially, from the Washington vantage point, these visits were intended primarily to open doors into a closed region of the world for American participants and to provide opportunities for Eastern European colleagues to become familiar with developments in the United States. In some cases, there had been earlier exchange visits between colleagues under other auspices. But in the majority of interacademy exchanges, the visitors and their hosts were acquainted only through correspondence. In some instances, there had been no contacts of any type between visitors and hosts until the receiving academy identified appropriate colleagues to serve as hosts for the visits.

In later years, the program participants were generally acquainted with one another. They often knew about the scientific work of the colleagues through the scientific literature and subsequent correspondence. Thus, visits were increasingly justified on the basis of likely contributions to scientific advances, with less emphasis on the door-opening aspects of the visits.

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THE QUOTA SYSTEM

At the outset of interacademy exchanges during the 1960s and 1970s, each of the interacademy agreements noted in Chapter 1 was based on negotiated quotas, expressed in person-months of visits in each direction. In most cases, these quota limitations constrained the number of scientists who traveled in each direction because the number of months requested by qualified applicants interested in traveling in either direction usually exceeded the quota allocations. The quotas were often adjusted due to the availability of funds and changing application pressures in the United States and in the Eastern European countries.

This quota system was patterned after the quota systems that were in wide use by academies in the USSR and Eastern Europe. This approach enabled the academies to control the funds and, of course, the selection of candidates for the programs from their countries and the acceptance of candidates proposed by counterpart academies. There were many exchanges among the countries of Eastern Europe outside the framework of the quota systems of the academies. But the academy systems were widely recognized in Eastern Europe as a good, although tightly controlled, international route for research scientists to follow in order to help ensure availability of funding and to avoid at least some potential political and security problems.

The requirements for American participants in the interacademy programs in the early days, which changed very little over the years, were as follows:

> Any American citizen who possesses a doctoral degree (or its equivalent) in the natural, mathematical, fundamental medical (non-patient oriented), engineering, or quantitatively oriented behavioral sciences, or who is now a candidate for the doctorate and expects to receive it prior to the time of the exchange visits is eligible.[1]

At that time, American applicants were considered for 1-month familiarization visits and 3- to 12-month research visits. Visits of 5 to 12 months were encouraged. Placements in Czechoslovakia and the German Democratic Republic (GDR) were limited to institutes of the counterpart academies, with greater flexibility in the other countries.

Applicants from Eastern Europe also chose between short- and long-term visits to the United States. For many years, most participants were interested in research in the natural sciences. Almost all successful applicants from the region were placed in U.S. universities.

[1] NRC. 1978. Study and Research in the USSR and Eastern Europe, 1979-80 (program announcement).

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International travel costs plus stipends of $1,400 per month (in the 1970s) for American participants were covered by the National Research Council (NRC). The level of financial support changed several times over the years. Financial responsibility for local travel was determined on a case-by-case basis, with participation in local scientific meetings encouraged by the sending academies. The academies of Eastern Europe were required to cover international travel costs for their participants and presumably continued paying the base salaries of the participants.

The receiving side covered costs of lodging, per diem, medical requirements, and limited research support. Americans traveling for more than 5 months could be reimbursed for the travel costs of immediate family members. Also, for the Americans, pre-departure language training was provided.

Sometimes families accompanied the visitors from Eastern Europe, but the details of financing for their travel were unknown to the NRC. In any event, when they arrived in the United States, living allowances were provided by the NRC for the entire families.

As examples of the substance of the programs, during the 1980s the following topics associated with visits were highlighted in the *Newsletter* of the NRC as areas that were of significant scientific interest (see *Newsletters* from 1985 to 1991 for reports of these and other visits).

Visits to the United States and Countries of Origin of Visitors

- Muscle regeneration in excitable tissues (Yugoslavia)
- Insect pathology (Czechoslovakia)
- Siloxane polymers (Poland)
- Computer education in secondary schools (Bulgaria)
- Ecology of deltas (Romania)
- Salinity of agricultural soils (Hungary)

Visits to Eastern Europe by Americans

- Laser wood cutting (Bulgaria)
- Calcium uptake (Poland)
- Wheat gene varieties (GDR)
- Neuropeptide mechanisms in invertebrates (Hungary)
- Fauna and flora in caves (Romania)
- Membrane biophysics (Czechoslovakia)
- Psycholinguistics (Yugoslavia)

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EVALUATION OF THE HUNGARIAN EXCHANGE PROGRAM

Each year the staff of the NRC presented reports on the program to an advisory committee established by the NAS for overseeing the overall quota program and to the funder of the program, the National Science Foundation (NSF). These reports cited accomplishments, problems, and future opportunities and formed the basis for budgetary requests to NSF.

Only on one occasion was an extensive effort undertaken to evaluate the impact of the program directed to Eastern Europe. This evaluation was conducted in cooperation with the Hungarian Academy of Sciences in 1989. Although the findings were unique to the Hungarian program, they indicated the types of impacts the program was probably having in other areas of Eastern Europe as well.[2]

Two Hungarian and two American scientists with substantial research responsibilities were selected for each of three topical panels that reviewed scientific exchanges. They reviewed responses to questionnaires completed by hosts and visitors from both countries over a 10-year period (312 questionnaires were sent, with a 73 percent return rate). They examined lists of publications attributable to the exchanges, interviewed 37 exchangees and hosts in Hungary, and reviewed many trip reports by American travelers. Two senior research administrators from each country then joined the 12 scientists from the topical panels in an overall evaluation committee.

In general the exchanges were considered highly successful in serving the interests of both countries. According to the committee, significant research experience was shared and diffused. An impressive number of substantial research papers and books resulted from the visits. Many visits led to establishing or strengthening personal contacts. These contacts subsequently led to further collaborative activities that often were conducted outside the framework and resources of the interacademy program, which served as a catalyst for investigators from both countries. A summary of findings of the three panels is as follows:

Chemistry

- Set the stage for cooperative research projects
- Allowed wider inputs from collaborators who normally were not accessible
- Introduced excellent researchers at small American universities

[2] See Schweitzer, Glenn, and David Berrien. 1990. Scientific Cooperation between the United States and Eastern Europe. Technology in Society 12(1):1-9.

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to high-quality Hungarian coworkers and provided an opportunity for long-term collaboration

Agriculture

- Encouraged young Hungarian scientists to continue in agriculture
- Facilitated interaction between basic and applied science in both countries
- Allowed exchange of materials not otherwise available

Biomedical

- Fostered the close scientific contact necessary to determine appropriate placement of young scientists in other countries
- Facilitated the transfer of specialized techniques that are mastered only through "hands-on" experience
- Reduced need, through long-term research visits, to duplicate expensive laboratory equipment

In considering the reports of the three panels, the review committee singled out the following types of positive impacts.

- Stimulating fresh scientific perspectives
- Exchanging experience on theoretical and experimental techniques
- Planning and carrying out joint research projects extending beyond the period of exchange
- Starting or completing joint papers for publication
- Enhancing teaching materials with updated research data
- Facilitating interactions between basic and applied researchers
- Deepening understanding of relationships among national research priorities, national programs, and international scientific and social trends

Criticisms of the program were surprisingly few: Qualifications of a few exchangees were not as strong as might be expected; older scientists tended to dominate exchanges; and the small size of the program inhibited flexibility in the selection of exchangees.

THE SPECIAL CASE OF THE GDR

During the 1980s, very few East-West scientific exchange programs involving scientists from the GDR were in place. The limited contacts were usually through mechanisms established by international organizations, and particularly conferences in Europe. Under private auspices,

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BOX 2-1
Examples of U.S.-GDR Linkages (1985)

- University of Utah: artificial heart
- Brown University: pediatrics
- Johns Hopkins University: biomedical engineering
- University of Illinois: biocatalysis and nuclear magnetic resonance in zeolites
- University of Massachusetts: peptide chemistry
- Polytechnic Institute of New York: simplex formation of polyelectrolytes
- North Texas State University: quantum electronics
- Carnegie Mellon University: electron microscopy

SOURCE: Schweitzer, Glenn E., and David A. Berrien. 1991. The Future of Scientific Research in Eastern Germany. Technology in Society 13(3):255-265.

a few GDR scientists would visit the United States for several days to 2 weeks each year. Examples of American institutions that were able to develop limited linkages with GDR institutions under these constrained conditions are set forth in Box 2-1.

In 1990, the staff of the NRC queried the American exchangees and hosts who had participated in the interacademy program with the GDR concerning their scientific activities. The Americans generally felt that they had gained scientifically from the program (see Box 2-2). Additional comments by American scientists close to the program indicated that they were particularly impressed by the high degree of technical competence of the East German participants, who were thus able to bring important perspectives to collaborative activities.[3]

After analysis of the results of the survey and a review of the situation developing with the demise of the GDR, the NRC staff reached the following conclusions concerning the limited interactions with scientists in the GDR:

- American scientists were not well acquainted with the majority of colleagues conducting similar research, and a familiarization period would be needed to match interests and capabilities.
- East German scientists were preoccupied with putting their own

[3] Schweitzer, Glenn E., and David A. Berrien. 1991. The Future of Scientific Research in Eastern Germany. Technology in Society 13(3):255-265.

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BOX 2-2
Survey of Participants in Exchanges with GDR

Former U.S. exchangees to GDR (29 respondents to 42 queries)

	Influenced priorities	Significant methodologies brought back	New access to people	Results achieved
Physical sciences	63%	61%	39%	33%
Biological sciences	44%	66%	55%	22%
Social sciences	50%	0%	50%	50%

Examples of other benefits attributable to exchange program:

- Set stage for further cooperative research
- Permitted longer visits to research laboratories than otherwise available
- Provided a window into East German science and scientists

Former U.S. hosts of GDR exchangees (62 respondents from 95 queries):

- One publication resulted from exchange visit (15%)
- More than one joint publication from exchange visit (7%)
- Benefits to U.S. science of visit were very good or excellent (55%)
- Host and visitor shared research interests and collaborated after visit (60%)

SOURCE: Schweitzer, Glenn E., and David A. Berrien. 1991. The Future of Scientific Research in Eastern Germany. Technology in Society 13(3):255-265.

houses in order and ensuring the security of their own personal positions. They had little time to consider international networking.

- Few colleagues in the GDR had the financial means necessary to travel internationally, and for the time being they had to be content communicating with Americans through the scientific literature.[4]

A NEW MODEL FOR EXCHANGES

With the political opening of Eastern Europe and the collapse of the former Soviet Union at the beginning of the 1990s, the approach to

[4] Schweitzer, Glenn E., and David A. Berrien. 1991. The Future of Scientific Research in Eastern Germany. Technology in Society 13(3):255-265.

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individual exchanges through the interacademy program changed dramatically. The quota system was quickly abandoned as both NSF and the National Academies wanted to move toward "more normal" scientific relations based on interests of individual investigators and merit review. Beginning in 1993, the program operated on the basis of an open regional competition among American scientists who wanted to work with colleagues in Eastern Europe.

The bureaucracies of the Eastern European academies were not pleased with this change, having used the quota system for several decades in dealing with many countries. In particular, some academy leaders were concerned that they would no longer have control over the selection of participants from their countries. This critical aspect became the responsibility of the U.S. side. At the same time, a number of researchers in the region welcomed the change, which they correctly believed would give them a better chance to participate in the program.

The announcement of the NAS in 1991 concerning the future of the exchange program was as follows:

> American scientists interested in visiting the USSR or Eastern Europe may apply for travel grants to help defray the costs of visits. The size of the grant will depend on the length of stay and distance from the scientist's residence to the country of interest. Also, American scientists interested in receiving scientific colleagues from the USSR or Eastern Europe may apply for travel grants to help support the visitors. The size of the grant will depend on the length of stay and the distance of the site of the proposed research to the East Coast of the United States. Applicants are expected to make all logistical and administrative arrangements for the visits since the National Academy of Sciences will no longer organize exchange programs through counterpart academies of sciences.[5]

This program, known as Cooperation in Basic Science and Engineering (COBASE), continued until NSF terminated funding for exchanges in 2003, with the final exchangees finishing their programs in 2007. At that time, NSF decided to emphasize global programs and terminate most of its region-specific programs. There were minor variations of the program during this decade of activity as discussed below. The number of exchangees to and from Eastern Europe during this period was more than 200. They covered a wide variety of scientific disciplines and involved dozens of institutions in the United States and Eastern Europe.

Examples of the fields of interest and the Eastern European countries represented are the following:

[5] NRC Office of Soviet and East European Affairs. 1991. Dramatic Changes in USSR and Eastern Europe Lead to New Approaches to Exchanges in 1993. Newsletter (Fall 1991), p. 1.

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- Romania: high temperature superconductors; seismic retrofit of masonry structures
- Czech Republic: congruence lattice representation in mathematics; evaluation of wood materials for use in specialized engineered products
- Poland: constraint solving, unification, and automated reasoning in computer science; public policy on alcohol consumption
- Hungary: Rutherford back-scattering spectroscopy; high-pressure, high-temperature reaction between diamond and silicon
- Bulgaria: transformation of small molecules in zeolites and other porous materials; Yamabe equation on the quaternionic sphere
- Former Yugoslavia: Universal Menger spaces and local connectivity properties of symmetric products (Slovenia); phonons in novel electronic and magnetic materials (Croatia)

Twinning Programs

Twinning programs were introduced in 1988 and continued for 19 years. These programs allowed the collaborating scientists to make two and sometimes more visits in both directions (to and from the United States) within the framework of a single project. This innovation was introduced to enable busy scientists to be abroad for shorter periods of time. Also, it was intended to encourage sustainability of joint efforts.

Initially scientists at institutions in Romania and Bulgaria and their partners in the United States were selected as twins. NSF was concerned over the small level of exchange activity with these two countries and correctly assumed that a twinning program would be an attraction for more applicants. As an example of the overall program, the organizations that housed the twins selected in 1995-1996 were as follows:

- Michigan Technological University, and in Bulgaria the Institute of Mathematics, the Technical University in Gabrovo, and the University of Shoumen: boundary of the theory of combinatorial designs and the theory of error-correcting codes
- University of Virginia, and in Bulgaria the Institute of Solid State Physics: photoexcitation of autoionizing resonances from intermediate excited states
- Cornell University, and in Bulgaria the Institute of Polymers: synthesis and characterization of novel amphiphilic polymers
- University of Delaware, and in Bulgaria Sofia University: relationship between monetary policy and development of financial institutions in Bulgaria

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- Syracuse University, and in Romania the Institute of Physical Chemistry: carbon as a catalyst for environmental applications
- George Mason University, and in Romania the Center for Machine Learning, Natural Language Processing, and Conceptual Modeling: multistrategy learning as a framework for knowledge-based systems
- Lehigh University, and in Romania the University of Bucharest: in-situ crack tip plastic zones using image analysis enhanced moiré interferometry
- Johns Hopkins University, and in Romania the University of Bucharest: Late Cretaceous island biogeography of Europe

International Research Experiences for U.S. Undergraduates

In 2004 NSF added a new aspect to the NRC program under a component entitled International Research Experiences for U.S. Undergraduates Visiting Central and Eastern Europe and the Newly Independent States, or INTREU. U.S. university faculty members were invited to apply for grants that would enable them to take a team of undergraduate students abroad for short-term international research experiences. Two of the selected teams, both from Oregon State University, traveled to Eastern Europe. One team visited the University of Debrecen in Hungary to work on a cross-continental study of controls on soil carbon and nitrogen dynamics. The other team visited the American University in Bulgaria to undertake a comparative analysis of environmental policies in Bulgaria and the United States. These initial efforts seemed quite interesting, but the overall program was terminated after only one year because of a shift in programmatic focus by NSF.

Nationality, Discipline, Gender, and Age Diversity

During the process of selecting the best qualified applicants for the program, special efforts were made to include projects involving a diverse range of different countries (particularly beyond Russia) and fields of science (such as social science and environmental science). These requirements were generally not difficult to satisfy, although in some cases it was necessary to take second-tier applicants in the interest of diversity. During some application cycles, special calls for proposals were issued that limited applications to those involving cooperation with specific countries, particularly Romania and Bulgaria, or research on specific topics. NSF was pleased with this flexibility, and the overall funding level was not affected by the adjustment. As to the percentage of qualified applicants who received funding, there was a steady trend over the years from less than 25 percent to more than 50 percent.

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Senior male scientists dominated the program at the beginning, and this domination continued until the end. Special quotas were established by which 25 percent of grants awarded were set aside for young investigators who had received their doctoral degrees not more than 7 years prior to submitting their applications. This quota was effective in lowering the average age of participants. However, given the low percentages of women working in many branches of sciences, a significant imbalance in favor of men was the usual outcome of the selection process.

The Impacts of Exchanges

Seeking to gauge the impact of the program, the NRC staff routinely contacted the American participants one year after their exchanges. The questions asked included the following: Have the U.S. and Eastern European specialists remained in contact after completing the exchange? Have the participants applied for and received funding from other sources to continue the collaboration? Have they published papers, made conference presentations, or taken other steps to enhance their careers or contributions to the scientific community as a result of experiences during the exchange?

The answers varied from year to year, but in general the lasting impact of many exchanges was impressive. The limited duration of usually 2 weeks to 2 months of the visits of Eastern Europeans to the United States reduced the likelihood that the exchanges would encourage emigration. In this regard, families almost never accompanied short-term exchange visitors to the United States.

The results from individual exchanges usually needed time to materialize, and they were manifested in various ways, such as joint publications, curriculum development, and follow-on visits by the participants or by their colleagues or students. Occasionally, however, results were evident almost immediately through presentations at international conferences. See Table 2-1 for the results of 3 years of surveys of participants in the COBASE Program.

CONCLUDING OBSERVATIONS

Over the years, exchanges provided an important channel of communications between American scientists and their counterparts in Eastern Europe. In the 1960s and 1970s, they were at times the only dependable channel for communications between the scientific communities in the United States and in Eastern Europe. This channel was considered both scientifically and politically important, as evidenced by the financing of the exchanges by NSF for more than 40 years and the continuing interest

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TABLE 2-1 Results of Surveys of American Participants in COBASE Program (percent)

Outcome of exchange program	Survey year		
	FY 1998	FY 1999	FY 2000
Partners still in contact	95	94	95
American had publication or presentation based on program	69	67	58
American applied for follow-on grant	52	67	56
American received follow-on grant	24	33	28

NOTE: Surveys were conducted one year after completion of individual programs. Although these data cover exchanges involving countries throughout Eastern Europe and the former Soviet Union, the results were comparable for exchanges involving only Eastern European scientists.

SOURCE: COBASE program data. Reprinted from Schweitzer, Glenn E. 2004. Scientists, Engineers, and Track-Two Diplomacy: A Half-Century of U.S.-Russian Interacademy Cooperation. Washington, D.C.: The National Academies Press.

of scientists on both sides of the ocean to participate. As the region opened its remaining closed doors during the early 1990s, the contacts being established through the program helped many isolated Eastern European scientists link more fully into the international scientific community. Then, with the expansion of other international programs, particularly those sponsored by the European Union, the impact of the smaller efforts of COBASE began to diminish.

Finally, in the early 2000s, NSF terminated its regionally oriented activities as it decided to deemphasize programs targeted on specific geographical regions as previously noted. The evaluations by NSF of the effectiveness of the interacademy program were at the highest level. But NSF apparently considered that its resources could be more effectively used in a different manner without the need for the NAS as an intermediary.

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3

Bilateral and Regional Workshops

From 1980 to 2008 the National Research Council (NRC) sponsored more than 30 workshops in cooperation with the academies of sciences in Eastern Europe. Most of these workshops were held on a bilateral basis in the region during the late 1980s and early 1990s. The principal funders were the National Science Foundation (NSF), the Ford Foundation, the Rockefeller Brothers Foundation, the John D. and Catherine T. MacArthur Foundation, and the NRC. A few were held in the United States. Several were organized on a bilateral basis but included participants from several countries within the region, and on two occasions participants from outside the region also participated. Some of these workshops are discussed below. They are organized on a country-by-country basis, and all of the workshops are listed in Appendix A.

In addition, a variety of specialized training programs and scientific meetings for young investigators were sponsored by the NRC, held primarily in the region, between 1989 and 1997. In some cases, counterpart academies of sciences served as cosponsors; and in other cases research institutions in the countries of interest were the cosponsors. These activities are discussed in Chapter 4. They are also chronicled in Appendix A.

Finally, representatives of the National Academies have participated in regional workshops in Eastern Europe organized by counterpart academies. Several that were of particular interest to the National Academies are also discussed in Chapter 4.

Each workshop discussed below addressed a specific topic of mutual interest. Some were proposed by the NRC, others by the counterpart acad-

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emies. The NRC has been more constrained in the selection of appropriate topics than the counterpart academies because of the special interests of the funding organizations in the United States. For example, energy and environmental protection were popular topics with U.S. foundations that provided financial support. Also, in several instances NSF was interested in basic science topics that introduced U.S. scientists to counterparts who might subsequently serve as partners on research projects.

In the early days, there was always concern whether or not the Eastern European workshop participants would be selected on the basis of their expertise, rather than as a result of political connections. Of course, participation by government officials was important. Overall, the participants were well informed, often criticized domestic policies, and engaged in lively discussions about both scientific and policy issues.

The organizational aspects of the bilateral workshops were somewhat standardized, with eight to ten specialists from each country participating. Most participants usually made presentations. In several cases, workshop proceedings were published by the National Academies Press. The participants from abroad almost always had an opportunity to meet in the country where the workshop took place with local officials and visit facilities engaged in research activities relevant to the topic of the workshop. In many instances the participants considered such meetings and visits more important than the workshops themselves in providing insights of scientific and technological interest. But without the workshops, many of the meetings and visits would not have been possible.

In general, the U.S. participants traveling to Eastern Europe gave positive reports of their professional and cultural experiences. Similarly, reports of Eastern European participants that were available to the NRC were generous in their praise of the workshops, from both the scientific and hospitality viewpoints. Unfortunately, the NRC did not have the resources to systematically keep abreast of follow-on activities, which at least in some cases continued to bring together specialists working in the same fields.

GERMAN DEMOCRATIC REPUBLIC (GDR)

The GDR was one of the most scientifically isolated countries of Eastern Europe throughout the Cold War. As discussed in Chapter 2, there were limited contacts between GDR and U.S. institutions in the 1970s, and several additional collaborations evolved from the individual exchange program of the NRC in the 1980s. However, when representatives of the NRC traveled to scientific institutions in the GDR during the late 1980s, meeting East German scientists who had contacts in the United States was a rare event.

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BOX 3-1
U.S.-GDR Heterogeneous Catalysis Workshop (1990)

Environmental Minister Karl-Hermann Steinberg and GDR academy president Siegfried Nowak led the GDR delegation. In general, the East German scientists had focused their research so it directly addressed applied problems, while the American emphasis had been on concepts and more fundamental aspects of catalysis. The GDR scientists visited four California universities after the workshop.

SOURCE: NRC Office of Soviet and East European Affairs. 1990. Newsletter (Fall 1990), p. 21.

Two interacademy workshops were held involving GDR and U.S. scientists. The first was on the topic of biosciences in East Berlin in 1989. At the time, the U.S. government had an office in East Berlin, and that office embraced the workshop as a major political event. The scientific discussions provided insights into GDR research, which was far from the frontier of world science; and the visits to research institutions also confirmed that the researchers were lagging behind their counterparts in Europe as well as in the United States. However, the American participants did find limited achievements in molecular biology, plant genetics, and plant biochemistry that were at a competitive level with U.S. science. At the same time, the GDR participants had followed the international literature. They were generally aware of achievements in the United States, and they were familiar with the research of some of the American participants.

A second workshop in California on the topic of heterogeneous catalysis took place in 1990. At the time, the GDR was approaching the doorstep of absorption by the Federal Republic of Germany. Again the weaknesses in the research base of the GDR were apparent (see Box 3-1). Given the subsequent political turmoil within the GDR, few if any, follow-on activities resulted from this workshop.

BULGARIA

Of all the academies of sciences in the region, in the 1980s the Bulgarian Academy of Sciences was the most interested in moving forward quickly with bilateral workshops. This enthusiasm was attributable in part to Bulgarian recognition of the political importance of workshops involving U.S. scientists and to the interest of the scientific leadership in having the Bulgarian academy be known as an important player on the international scientific scene. On two occasions, the American participants

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BOX 3-2
Conduct of Research in Bulgaria (1987)

The Bulgarian papers discussed the financing of fundamental research, basic research and its applications at the University of Sofia and the Bulgarian academy, kinetics of the introduction of an invention, and competitive systems and innovation. These topics were timely since Bulgaria was engaged in the reorganization and restructuring of many economic, political, and scientific institutions. The number of ministries was shrinking from 30 to less than 10. The Bulgarian academy was also being reorganized to decentralize management of research and to introduce greater competition in the funding of research projects.

SOURCE: NRC Office of Soviet and East European Affairs. 1987. Newsletter (Winter 1987), pp. 4-5.

in workshops in Bulgaria were invited to meetings with Bulgarian President Todor Zhivkov, who attentively listened to their observations as to the future promise of research in the country.

From 1986 to 1993 seven workshops were held in Bulgaria and the United States. One of these workshops included specialists from Romania as well. The topics of primary interest to the Bulgarian academy were (1) introduction of research results into practice and (2) use of computers to enhance the educational process, particularly at the secondary school level. During this period, a new private-sector computer industry was developing, and contacts with Western companies such as IBM were expanding. Thus, representatives of the private sector were active participants in several of the workshops that were held in Bulgaria (see Box 3-2).

The workshops led to several collaborations, some of which were sustained through the individual exchange programs described in Chapter 2. This flurry of workshops was also an important aspect of U.S.-Bulgarian relations on a broad basis at a time when significant political transformations were under way in the country. In this regard, the activities of the NRC provided the U.S. embassy in Sofia opportunities to engage in discussions with important Bulgarian leaders.

ROMANIA

During the 1980s, opportunities for organizing scientific workshops with the academy of Romania were limited. The academy was undergoing a variety of changes concerning its relationship with government

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BOX 3-3
Workshop on Ecology Challenges in Romania (1990)

As one of the few delegations of Western scientists to visit Romania in several decades, the Americans received personal attention from the State Secretary for the Environment and from highly respected Romanian scientists. Topics of interest were management of aquatic ecosystems, including agriculture and environmental impacts, and air and water pollution control. During the first week, the American specialists observed lakes, canals, and agricultural lands in the Danube Delta and inspected forests experiencing a drying phenomenon, presumably due to overuse of pesticides. The subsequent workshop involved 40 Romanian specialists.

SOURCE: NRC Office of Soviet and East European Affairs. 1991. Newsletter (Fall 1991), p. 5.

research institutions of the country, arrangements that were orchestrated in large measure by Deputy Prime Minister Elena Ceausescu, a chemist and the wife of President Nicolae Ceausescu. At the same time, the National Academy of Sciences (NAS) was the most visible U.S. organization engaged in scientific exchanges with the country, and the Romanian diaspora in the United States was encouraging the NRC to expand ties with Romania's scientific leaders.

The first interacademy workshop in Romania in 1989 was in the field of operator algebra. It was considered in both countries as a unique event in U.S.-Romanian relations. There were strong ties among the Romanian and American participants, including long-standing collaboration in publication of an international mathematics journal in the United States. Although the workshop was held in a secondary city, Craiova, the publicity in Bucharest was substantial.

Of particular note was the leadership role in the late 1980s of several Romanian professors from Bucharest University and the Polytechnical University who had participated in interacademy activities. They became active in the popular movement that led to the overthrow of the Ceausescu regime. Some of these professors were subsequently elected or appointed to very senior positions within the government.

Two workshops in 1990 and 1992 focused on ecological issues, primarily in the Danube Delta. These workshops were of considerable interest to the participants from both countries and probably strengthened the hand of Romanian ecological advocates in limiting the environmental damage from the expanding maritime activities in the delta (see Box 3-3). Subsequent joint activities also focused on ecological problems in deltas

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in the two countries, as well as on broader environmental problems, as discussed in Chapter 4.

POLAND

From 1987 to 1994 the NRC collaborated with the Polish Academy of Sciences in sponsoring four workshops in the United States and Poland. These were directed to ecological and energy issues, which were receiving considerable attention from the U.S. embassy in Warsaw (for example, see Box 3-4). A high point of the collaboration was the publication by the National Academy Press of a jointly prepared report in 1990 entitled *Ecological Risks: Perspectives from Poland and the United States*. This book captured many important developments in the two countries in the field of ecology that helped establish ecological baselines in support of Polish national goals. It also provided interesting insights on political developments within the country (see Box 3-5).

Early in this cooperation, both sides recognized the importance of a focus on young investigators. The governmentally sponsored scientific cooperation between Poland and the United States was extensive, and many privately organized exchanges were under way. But the encouragement of young scientists to become more involved in application of their experience in the policy arena was generally considered as a missing element both in exchanges and in other activities in Poland. As discussed in Chapter 4, this emphasis on young investigators became another focus of interacademy activities.

After a long lapse in holding collaborative workshops, in 2007 and 2008 workshops sponsored by the NRC and the Polish Academy of Sciences were held. These workshops were not part of an overall plan to

BOX 3-4
U.S.-Poland Workshop on Energy Efficiency (1990)

During the 2-week program, the American specialists visited government ministries, nongovernmental organizations, research institutes, and industrial plants in the Warsaw, Krakow, and Silesia regions to improve their understanding of environmental and energy challenges in Poland. During a debate in the parliament, the visitors were questioned about U.S. energy policy and asked for their input on solving Poland's problems.

SOURCE: NRC Office of Soviet and East European Affairs. 1991. Newsletter (Fall 1991), p. 6.

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BOX 3-5
National Debate among Political Forces in Poland (1989)

While the statements and demands for reform resulting from the Round Table Talks still stand as goals for the nation, the responsibility for their fulfillment is changing. In the environmental field, several political forces are now competing and the so-called "green" parties are growing stronger and stronger. Polish society is now freely articulating its own goals and aspirations. And the new government is struggling to meet the immediate needs of the people and, at the same time, help the country make the necessary adjustments to a free-market economy.

SOURCE: Grodzinski, Wladyslaw, Ellis B. Cowling, and Alicija Breymeyer, editors. 1990. Ecological Risks: Perspectives from Poland and the United States. Washington, D.C.: National Academy Press, p. v.

revive interacademy cooperation, but resulted from interests of NRC staff members who were able to find funding for the ad hoc efforts. The first in Warsaw was devoted to biosecurity issues, and it attracted participants from 15 countries who focused on dual-use concerns in the conduct of biological research. The second was in Washington and was directed to the development of innovation systems in the two countries.

CZECHOSLOVAKIA, THE CZECH REPUBLIC, AND SLOVAKIA

While Czechoslovakia was on the cusp of political change, three interacademy workshops were organized from 1987 to 1992. The first two workshops were held in České Budějovice prior to the breakup of the country. They were devoted to agriculture and related environmental issues. The first workshop resulted in a solid report on conditions in the country, and particularly agriculture policy problems (see Box 3-6).

A third workshop in Slovakia in 1991 with subsequent field visits in the Czech Republic considered the restructuring of the chemical industry. This was at a time when investors from Germany and the United States were negotiating with the two countries over the internationalization of several important facilities. The observations of the American experts, who had extensive experience in the field, were enthusiastically received, particularly by officials in Prague (see Box 3-7).

Two additional workshops that involved specialists from several countries were also held in Prague. In 1992 German officials and other European observers discussed the absorption of the GDR research establishment into the overall German research system. The relative academic

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BOX 3-6
Problems in the Agriculture Sector of Czechoslovakia (1987)

- Possible climatic changes from increased levels of carbon, nitrogen, and sulfur compounds released into the atmosphere
- Need for alternative sources of nitrogen to replace fertilizers
- Increasing exposure to toxic chemicals of human populations, including agricultural workers, and of plant and animal components of ecosystems in agricultural areas
- Poor soil management practices due to lack of understanding of soil behavior, poorly developed methods for soil analysis, and inadequate use of biotechnologies

SOURCE: Phillips, Anna S., and Glenn Schweitzer, editors. 1987. Agricultural Development and Environmental Research, American and Czechoslovakian Perspectives. Washington, D.C.: National Academy Press, p. 218.

BOX 3-7
Restructuring the Chemical Industry in the Czech Republic and Slovakia (1992)

Fifty chemical enterprises faced privatization. Each enterprise would be without the benefits of guaranteed markets, access to raw materials well below world prices, and other state subsidies. Several enterprises had entered into joint ventures with Western firms with new international marketing channels and investment capital to replace outmoded facilities. Most enterprises were scrambling to attract foreign partners. While worker pay was low, bloated workforces raised costs of production. Also environmental retrofits added to near-term costs. These concerns were at the center of the workshop discussions.

SOURCE: NRC Office of Soviet and East European Affairs. 1992. Newsletter, p. 19.

standings of eastern and western German universities, the role of the Max Planck institutes in the former GDR, and the financial and quality control responsibilities of government ministries for former GDR institutions were on the agenda. A second workshop sponsored by the NRC in 1997 attracted scientific leaders from several Eastern European countries to discuss the intersections between democracy and science. Of special interest were the potential contributions to strengthening of democracy

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of scientific advisory bodies to parliaments, advocacy of science-oriented professional societies, and the role of science journalists.

Chapter 4 discusses additional events involving the NRC in these countries. Although the workshops and related activities have been limited in number, the interactions between the staffs of the NRC and the academies of the countries have been strong over many years. Working-level visits in both directions to stay abreast of developments in the United States and the region have been frequent.

HUNGARY

Throughout the Cold War, Hungary was well known for its scientific openness, and workshops were relatively easy to organize in the country. Five workshops were organized by the NRC and the Hungarian Academy of Sciences (MTA) from 1988 to 1995—four in Hungary and one in the United States. These workshops were largely oriented to technology management, and they involved Hungarian specialists from government ministries and research institutes beyond the institutes of the Hungarian Academy of Sciences.

Several workshop agendas were tied quite closely to the evolution of Hungary's economic development policies. This orientation was due in part to the interests of the president of the Hungarian academy, who was an economist; and he helped to set the stage for the workshops. A particularly significant publication entitled *Industrial Strategies and Policies for Economic Growth in the 1990s, NAS-MTA Workshop* was published by the Research Institute of Industrial Economics in Budapest in 1991 (see Box 3-8).

During the 1990s several other external organizations became quite involved in supporting scientific activities in Hungary. In particular, the

BOX 3-8
U.S.-Hungary Workshop on Industrial Development (1991)

The Americans developed an understanding of the challenges as Hungary restructured its industry, privatized its state enterprises, and experimented with foreign joint ventures. Hungarian participants enhanced their understanding of the development of global markets, accompanying changes in strategic and operational management of corporations, and U.S. policies to nurture innovation.

SOURCE: NRC Office of Soviet and East European Affairs. 1991. Newsletter (Fall 1991), p. 5.

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World Bank provided two large loans to strengthen the country's science and technology infrastructure on a broad basis. Also, as noted in Chapter 1, the early international philanthropic efforts of George Soros were rooted in Hungary and led to several projects of interest to the Hungarian Academy of Sciences. Although the NRC was not directly involved, its activities were of considerable interest to these organizations; and consultations with the NRC were frequent.

YUGOSLAVIA AND ITS SUCCESSOR STATES

Among the earliest workshops sponsored by the NRC involving Eastern European academies were several with academies in Yugoslavia. In 1982 a workshop on robotics and prosthetics was organized near Ljubljana with the Slovenian Academy of Sciences and Art. In 1985 the Council of Academies of Yugoslavia sent specialists to Washington for a workshop on exposure to heavy metals, and in 1989 the Croatian Academy of Sciences and Arts organized a joint workshop with the NRC in Zagreb on putting research results into practice. Each of these workshops involved specialists from several regions of the former Yugoslavia.

As the country began to divide, organization of workshops became somewhat more diffused. In 1993 a trilateral workshop involving specialists from the United States, Slovenia, and Croatia was held in Washington on research and development and free markets. In 1994 a regional workshop in Trieste organized by the NRC addressed child health and welfare in Yugoslavia (see Box 3-9) as well as practical cross-border steps in this field (see Box 3-10). In 1998 a bilateral workshop in Zagreb was devoted to cooperation opportunities in health.

BOX 3-9
Child Health in Yugoslavia (1994)

Each specialist from the region discussed the status of children in a specific locale with reference to baseline data from before the war, data currently available, and data needs. The group considered emergency medicine, mental health, mortality and morbidity, and nutrition and disease. Discussions of the infrastructure required for restoring child health focused on damage to hospitals and clinics, disruption of supply networks, and new medical needs. The workshop also considered obligations pursuant to the International Convention on the Rights of the Child and addressed professional and ethical standards of pediatricians and other medical personnel.

SOURCE: NRC Office for Central Europe and Eurasia. 1994. Newsletter, p. 1.

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BOX 3-10
Cross-Boundary Steps by Physicians in Yugoslavia (1995)

Spare parts from Serbia were offered for non-functioning incubators in Zenica in Bosnia and Herzegovina, and children from Knin were invited to the Children's Hospital in Zagreb, Croatia. Lessons learned in Yugoslavia could be applied to children in other war zones.

SOURCE: Institute of Medicine/NRC. 1995. The Impact of War on Child Health in the Countries of the Former Yugoslavia. Washington, D.C.: National Academy Press, p. 40.

Given the splintering of Yugoslavia into independent states, there was great interest in Washington and in the new countries in establishing interacademy linkages through additional workshops. Many topics were proposed, and exploratory trips to the region were undertaken to set the stage for workshops. However, funding did not materialize to follow through on the many interesting ideas that were on the table.

SUSTAINED INTEREST, BUT NO FUNDS

Dozens of scientific workshops are being held every year throughout the region with minimal attendance by U.S. specialists. The Eastern European appetite for workshops involving U.S. specialists seems insatiable. The list of topics that are often proposed is long, and the interests among scientists in the United States are manifold. But sources of funding for such activities have been scarce. The U.S. government and private foundations repeatedly argue that since these countries are now part of a unified Europe, U.S. funding for scientific cooperation must be pointed in other directions. At the same time, the region is gaining in scientific strength; and workshops to introduce scientists to one another through discussions of not only scientific issues but also policy and management issues seem to have been a good investment.

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4

Special Activities

In addition to individual exchanges and workshops, the National Research Council (NRC) has sponsored a variety of other activities in Eastern Europe since the late 1960s, usually in cooperation with counterpart academies of sciences. Most of the activities have been linked to the individual exchange and workshop programs, which provided important contacts to help design and implement these additional activities. Some of the activities that were of particular interest are summarized in this chapter.

YOUNG INVESTIGATOR POLICY-ORIENTED PROGRAMS

In the late 1980s the U.S. Congress enacted legislation (Title VIII of the Soviet-Eastern European Research and Training Act of 1983 [22 U.S.C. 4501-4508, as amended]) that provided the basis for a Department of State initiative to enhance understanding by U.S. scholars and specialists of policy developments in the former Soviet Union and Eastern Europe. The new program encouraged visits to little-known facilities and to areas of social or economic importance within the region and provided support for investigations leading to joint publications with colleagues from the region. The NRC participated in the program for a decade, concentrating primarily on encouraging young investigators (usually recent postdoctoral scientists) to become engaged in policy-relevant activities involving science, technology, and health issues. The activities described below were carried out in collaboration with appropriate counterpart organizations in Eastern Europe.

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In 1989 and 1990 the Department of State provided funding totaling $90,000 for exploratory activities on the following developments in the region: Yugoslavia (industrial management), German Democratic Republic (biosciences), Bulgaria (science education), Romania (natural resources), Czechoslovakia (agriculture), Poland (energy conservation), and Hungary (sustainable agriculture). Some of the workshops on these topics that were discussed in Chapter 3 provided the venues for these explorations. Department of State funds were combined with other available funds to support the workshops. At the outset, these activities did not focus on young investigators.

In 1991 the Department of State provided significantly greater financial resources ($225,000), which enabled the NRC to launch its Young Investigator Program. Funding continued for several years in support of cooperative activities with colleagues in Eastern Europe and the former Soviet Union. The Eastern European component of this new program is described below.

Romania

In 1991, 10 American and 14 Romanian ecologists spent 3 weeks exploring the Danube Delta. The Romanians represented the key environmental research institutions of the country. The American and Romanian investigators spent most of the program aboard a 70-foot barge equipped with sleeping quarters and a galley. A tugboat towed the barge through the Delta. This flotilla also included a research vessel that provided a laboratory base for sampling and observing representative portions of all three branches of the Danube River. The Romanian scientists, with participation by the Americans, collected water and soil samples for nutrient analysis, zooplankton measurements, and benthic invertebrate enumeration. A workshop on observations and findings completed the visit.

The following year, young Romanian specialists visited the Mississippi Delta. There the scientists from the two countries addressed environmental research activities and policies to preserve the ecology of deltas in both countries. They considered, for example, wetland protection, hydro-engineering, biodiversity, and sustainable development. Drawing on these experiences, several of the American participants subsequently became consultants on delta issues to the World Bank, the U.S. Environmental Protection Agency, and the International Union for the Conservation of Nature and Natural Resources. The Romanian scientists became very active promoting environmental policies through many venues in their home country.

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Poland

In 1992, 10 young U.S. investigators spent 3 weeks in Poland examining issues associated with Poland's energy sector. Of special interest were energy-efficient technologies, emission standards, development of energy policies, and related public awareness programs. In general, the environmental situation in many areas of Poland was quite poor, particularly in regions heavily dependent on low-grade coal.

The second phase of the program involved visits by Polish counterparts to industrial and research centers in California, Pennsylvania, Colorado, and Washington, D.C. The young investigators from the two countries then compared U.S. energy problems and policies with challenges faced in Poland and developed future collaborative projects. Most of the U.S. participants published papers on developments in Poland or developed follow-on research activities, or both. Several of the Polish participants soon assumed important positions within their government and research institutions.

Czech Republic and Slovakia

Ten American young investigators traveled to the Czech Republic and Slovakia in 1993 to discuss environmental health issues and to visit relevant facilities. In the Czech Republic the visits focused on health impacts of coal mining, heavy manufacturing industries, lead smelting, and related ground water pollution that entered the food chain. In Slovakia the group visited a cellulose plant and paper mill that discharged heavily contaminated effluents, and the Americans toured a controversial hydropower station that raised issues about the effectiveness of water management schemes.

The reciprocal visit for the counterparts from the two Eastern European countries took place the following year with visits to North Carolina, Georgia, Massachusetts, Iowa, and Washington, D.C. An important emphasis was on exposure of children to organic chemicals and heavy metals. At the conclusion of the visits, the Americans and their counterparts jointly examined activities in the two countries concerning risk assessment models, environmental health problems and possible solutions, and opportunities for future collaboration.

Croatia

Six American specialists on coastal ecology spent 2 weeks in Zagreb and on the Adriatic coast of Croatia in 1996. They met with a number of government officials and researchers to discuss environmental issues, including discharge standards, measures for protecting ecosystems, and the international dimensions of environmental protection. In Istria, the

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young investigators gave considerable attention to the environmental impacts of tourism. Three of the investigators returned to Croatia under other auspices to continue their research while one wrote a book on international coastal protection law, which drew on his experience in Croatia.

Bosnia

Five American young investigators traveled to Bosnia in 2000 to consult with local officials and medical specialists on trauma and reconciliation in the war-torn country. The findings were both informative and depressing. The number of local experts in the field was limited, but a few international specialists were seized with the problem and provided important insights. There was no opportunity to arrange a reciprocal visit due to funding constraints.

SCIENTIFIC TRAINING PROGRAMS FOR YOUNG INVESTIGATORS

During the late 1990s, the Howard Hughes Medical Institute (HHMI) began drawing on the capabilities of the NRC to support training programs for young scientists (both Ph.D. candidates and postdoctoral scientists) from Latin America to become acquainted with advanced laboratory research techniques. Building on this experience in Latin America, the NRC organized two such programs in Eastern Europe.

A 2-week training program on determination of high-resolution structures was held in Poland in 2001. The first week took place in Poznan at the Institute of Bioorganic Chemistry and the second in Warsaw at the Institute of Biochemistry and Biophysics. The average age of the 24 participants was 27. They came from 12 countries of Eastern Europe and the former Soviet Union.

The program was intense, and indeed some participants considered it a little too intense. Lectures and laboratory sessions were scheduled for each day. The course focused on two disparate methods of structure determination, namely, nuclear magnetic resonance and x-ray crystallography techniques. Specialists who were familiar with methods using one of the techniques had the opportunity to learn about complementary uses of other methods. Several of the participants subsequently continued collaborating with fellow students or instructors whom they met during the course.

Drawing on lessons learned in Poland, the NRC organized a second 2-week training course in 2002 at the Institute of Microbiology in

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Prague. The topic was genome-wide approaches to understanding bacterial pathogenesis. The 20 students came from 11 countries and had an average age of 33.

Sixteen senior researchers from Europe and the United States presented lectures on the fundamentals of DNA microarray analysis and proteomics. They also discussed applications of the methods that they used in their own research with various pathogens. Students then had an opportunity to gain hands-on experience putting the techniques into practice in both wet-lab and computer-based sessions. In addition, an equipment vendor came to the sessions to talk about gene chips, equipment requirements, and analytical capabilities.

These training programs were considered quite successful by all concerned. The host institutions were particularly pleased to receive analytical equipment for the courses, either from their own governments or from HHMI, which they retained following the courses. A third program in Lithuania in 2003 also attracted enthusiastic Eastern European participants. But then the funding priorities of HHMI changed, and the NRC program was terminated.

BREAKUP OF YUGOSLAVIA

Since the 1990s, the political situation in the territory that was once a united Yugoslavia has been unstable. The reconfiguration of the political entities within the territory has had a major impact on scientific cooperation between the NRC and the academies of sciences of the region. Chapters 2 and 3 recounted some of the interacademy activities involving the old and new countries of the region. Of special concern was the crisis in Bosnia.

When full-scale war erupted in Bosnia in the early 1990s, the Bosnian Academy of Sciences put out a plea for international support of its activities and the response to Serbian aggression. The initial emphasis was on protecting the human rights of citizens. Subsequently the emphasis expanded to preserving the minimal level of scientific capability within the country, particularly within the universities.

In 1996, the NRC participated in an international symposium entitled "Bosnia and Herzegovina—Democracy, Reconstruction, and Integrity" that had been organized by the Bosnian Academy of Sciences and the Croatian Academy of Sciences and Arts in an attempt to address human rights and the building of democracy. A secondary issue was rebuilding the science infrastructure of the country. The NRC urged the establishment of Internet linkages among the universities in the country as a step in bringing together the new generation of scientists dispersed in ethnic

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groupings throughout the country.[1] After a delay of several years, this approach was finally embraced by Western development agencies.

Another request to NRC made during the visit was to consult with demining experts in order to provide inputs for NRC studies of the role of advanced technologies in detecting and removing land mines. The on-the-ground consultations indicated that remote sensing techniques sounded interesting but that their application might be possible only in the distant future. The immediate need was for (1) chemicals that could quickly soften frozen dirt so it could be probed with bayonets and (2) defoliants that could expose mines covered with moss and other vegetation.[2]

REGIONAL MEETINGS IN EASTERN EUROPE

Dozens of international scientific meetings are held each year in the region. The European Union, the United Nations Educational, Scientific, and Cultural Organization, the European Academy of Sciences, and the North Atlantic Treaty Organization are among the organizations that regularly support regionally oriented meetings on a variety of policy-oriented and research-oriented topics. Although the NRC frequently receives invitations to participate in such gatherings, attendance is often not possible due to funding issues or other commitments of key staff members. However, NRC participation in three meetings has been particularly useful.

In 1995 the Romanian Academy organized a meeting in Sinaia to discuss the future roles of academies of sciences. The meeting attracted 13 academy presidents from the region. Although the emphasis was on European integration, the academy presidents continuously reminded the participants that cooperation with the United States was of the utmost importance. The significance of the discussions was underscored by the presence at the meeting of the president and prime minister of Romania. They informed the participants that in the restructuring of the government, the president of the Romanian academy ranked third in the government hierarchy behind the president and the governor of the National Bank.

Another meeting of considerable significance was held in Zagreb in 2000 on the topic of technology transfer with participation by a number of United Nations agencies. All countries of the region were struggling to overcome the gap between research and commercialization of technologies. The United States was held up as the model to be emulated

[1] See Croatian Pugwash Society. 2008. Sarajevo 1996. Pp. 196-207 in Nuclear Disarmament, Nonproliferation, and the Responsibility of Individuals: Ivan Supek and Croatian Scientists in the Pugwash Movement. Zagreb: Croatian Association of the Club of Rome.

[2] NRC Office for Central Europe and Eurasia. 1996. Newsletter, p. 21.

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in bridging this gap. But the economic and industrial landscapes in the countries of the region were far different from the situation in the United States. Even very small steps that might be taken to promote applications of research products were of considerable interest.[3]

Finally, in 2009, a region-wide workshop on the international cooperation strategies of academies of sciences was held in Smolenice, Slovakia, under the auspices of the European Academy of Sciences. The emphasis was on science as an important dimension of European integration. At the same time, the interests of the participants were also oriented to restoring scientific cooperation with U.S. institutions that appeared to have lost interest in the region.

[3] Čavlek, M., J. Šrarc, and D. Hübner, editors. 2001. Technology Transfer for Economic Development: Experience for Countries in Transition: Conference Proceedings, Zagreb, June 19-20, 2000. Zagreb: Croatian Ministry of Science and Technology and United Nations Economic Commission for Europe.

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The Way Forward

Set forth below are the author's conclusions and recommendations that are based in large measure on discussions in the previous chapters. The discussions have been broadened, however, to take into account the factors that must be considered in deploying limited financial resources, whether they be public or private-sector funds.

CHALLENGES AND OPPORTUNITIES

Many collaborative activities supported by the National Academies have had a positive effect on international science, on the transformation of centrally planned economies to market-oriented approaches, and on new scientific relations between East and West during and following the Cold War. While the activities have been but a small part of the overall scientific outreach of the United States to Eastern Europe, they have had direct and catalytic impacts at crucial times during the political history of the region. Many testimonials from American and Eastern European political and scientific leaders attest to the significance of these small efforts in the struggle of Eastern Europe to become unshackled politically and begin the process of building viable knowledge-based economies.

However, the political, organizational, and financial landscapes for cooperative activities that could be supported by academies in the region and by the National Academies have changed significantly in recent years. The current international outreach of the academies of the region focuses to a considerable extent on projects that are supported by a variety

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of European funding organizations, particularly the European Union's Framework Program. In the United States, traditional financial supporters of scientific cooperation—both government agencies and private foundations—are increasingly looking to other areas of the world where security and international development concerns are viewed as more immediate, including the Middle East, South Asia, and Africa. Also, some funders are more interested in supporting ambitious global programs, such as programs that address broad-ranging energy and biotechnology challenges, rather than more limited regional or country-specific activities that may be better suited for implementation by academies. The academies need to convince governments that "going global" should enrich rather than displace successful regional and bilateral activities.

Eastern Europe is a unique cluster of middle-income countries with strong scientific capabilities in a number of important areas and with a long history of scientific interchange with the United States that unfortunately was disrupted for nearly one-half century. The legacy of scientific and educational excellence throughout the region is strong, and the desire to strengthen partnership with U.S. colleagues is omnipresent. Considerable funding for research from Brussels has oriented much of the scientific enterprise toward cooperation with partners on the same side of the ocean.

The challenge for the U.S. government and other American funding organizations is to capitalize on the capabilities and enthusiasm for cooperation of Eastern European colleagues at a time when Washington's attention is focused elsewhere. While the future of U.S. scientific relations with the region must fit into the broad general framework of international academic relations, the special attributes of the region should be fully recognized. No other geographic cluster of middle-income countries can boast the likes of a Charles University in Prague, a Warsaw University, a Szeged Biological Center in Hungary, and a Bucharest Polytechnical University, for example. Also, the strategic importance of the region is obvious. And the American reputation is clearly on the line in the struggling areas of Bosnia and Herzegovina as well as Kosovo. The era for science diplomacy in the region has not ended. It is continuing.

Of special concern is the growing role of the U.S. Department of Defense (DOD) in leading U.S. efforts to promote bilateral scientific cooperation. For example, the opening of new air bases in Romania and Bulgaria and other future strategic initiatives by DOD in the region will probably be accompanied by new interactions between American and local

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specialists in a variety of technical areas.[1] DOD already supports many research projects in the region—particularly in the Czech Republic and Poland. These projects raise concerns over the imbalance of the American approach. Indeed, senior officials from the region have commented that too many cooperative research activities are devoted to security issues, particularly dual-use topics.

Given the reduced presence of the U.S. Agency for International Development in the region, with the exception of a significant presence in some states of the former Yugoslavia, there are few stable U.S. civilian programs available to support scientific exchanges. The Fulbright Program and the Open Society Foundation offices are important, although they provide relatively little support in the natural sciences. In a significant exception to the clamor to "go global," the National Science Foundation has entered into a program with the Czech Ministry of Education to support researchers in the two countries engaged in joint research projects.

RECOMMENDATIONS

Set forth below are several approaches whereby the academies can assist in promoting scientific cooperation that should benefit the participating countries.

Multilateral Approaches

The InterAcademy Panel on International Issues (IAP), headquartered in Trieste, is a consortium of about 100 academies of science. Almost all academies in Eastern Europe as well as the National Academy of Sciences are members. Its core function is to build the capacities of science academies in all countries and to enhance their capabilities to provide high-quality scientific advice to governments. The IAP carries out consultations and issues statements on topics of global concern (for example, science education, water management, biosecurity, and access to digitized knowledge). The topics are selected by the members, and each member determines how active it will be in carrying out IAP projects. This well-established forum offers many opportunities for interactions among U.S. and Eastern European scientists (see *www.interacademies.net/iap*).

The InterAcademy Council, located in Amsterdam, prepares in-depth reports on topics of interest to the member academies. In 2009 the

[1] Representatives of the research offices of the U.S. Army, Navy, and Air Force based in London were not able to provide information concerning the extent of their support of research institutions in Eastern Europe. However, based on conversations with the U.S. embassies in the region, the support in some countries is in the millions of dollars each year.

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presidents of the National Academy of Sciences (NAS) and the Hungarian Academy of Sciences were among the 21 members of the governing board, but other academies also have the opportunity to participate in the studies. Past studies have addressed building worldwide capacities in science and technology to enhance African agriculture, the role of women in science, and affordable and sustainable energy supplies. If interested in such topics, the academies of Eastern Europe have an opportunity to participate more actively in the programs (see *www.interacademycouncil.net*).

The InterAcademy Medical Panel (IAMP), a global network of academies of science and medicine, is committed to improving health worldwide. The activities focus on strengthening the role of academies to alleviate health burdens of the world's poorest populations, build scientific capacity for health, and provide independent advice to governments and international organizations on health issues. A topic that has received special attention is controlling infectious diseases and setting priorities among diseases. The Eastern European countries have not been strongly represented at IAMP meetings, and there are clear opportunities for increased interactions through this mechanism (see *www.iamp-online.org*).

The International Council of Academies of Engineering and Technological Sciences (CAETS) has had strong ties with counterpart organizations in several Eastern European countries, particularly Hungary and Poland. The goals of CAETS activities include

- providing advice to governments and international organizations on technical and policy issues,
- strengthening engineering and technological activities to promote sustainable economic growth and social development,
- improving public understanding of applications of engineering and technology,
- providing a forum for international discussions of engineering and technical issues,
- helping develop engineering and technical programs of bilateral and multilateral interest,
- encouraging improvement of engineering education, and
- encouraging creation of engineering academies in countries where none exist.

Given the broad Eastern European interest in all of these topics, CAETS offers an attractive venue for greater engagement with counterpart organizations from the countries (see *www.CAETS.org*).

Special international science events are frequently organized in Eastern Europe, sometimes by governments and sometimes by academies of sciences. The National Academies often participate in these events. As

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noted in Chapter 4, occasionally the National Academies are cosponsors. But more often, the local academies take the lead in ensuring adequate nongovernmental representation from abroad.

Particularly important events are the biannual World Science Forums organized by the Hungarian government, which bring to Budapest hundreds of scientific leaders from all continents. Strong representation by the NAS is very useful in strengthening contacts with academy leaders and other colleagues from Eastern Europe. A forum is scheduled for November 2009 (see *www.sciforum.hu*).

Bilateral Approaches

Presidents of the academies of Eastern Europe often visit Washington. They sometimes take time to meet with the presidents of the institutions of the National Academies. Too often these visits are scheduled simply as protocol visits. Nevertheless, they can be useful in raising issues of broad concern. Greater preparation to help focus the meetings on interesting substantive issues is recommended.

Although the presidents of the NAS, National Academy of Engineering, and Institute of Medicine are less frequent visitors to Eastern Europe, the foreign secretaries of the three institutions often travel to the region. They are usually requested to make presentations that include issues of scientific cooperation. These visits are well received and should continue.

As another approach, American scientists frequently turn to NATO to provide support for scientific workshops involving East European colleagues. In some cases, this mechanism can provide useful venues. However, despite political efforts to broaden NATO's charter, the military dimension cannot be ignored. Still, since most countries of the region are NATO members, this mechanism deserves particular attention.

The agenda of the National Academies for studies that are requested by the U.S. government or by other organizations is much broader than the agenda of any counterpart academy throughout the world. More than 200 studies are initiated each year. Increasingly, international experts are invited to participate in the studies. There should be opportunities for Eastern European specialists to be on some invitation lists. Such participation would help strengthen the ties of the NAS with colleagues in an important area of the world.

Finally, the National Academies should consider sponsorship of annual regional meetings in Eastern Europe, rotating from capital to capital. Such forums organized in cooperation with interested academies in the region and co-funded by these academies could provide opportunities to exchange up-to-date information on scientific advances in selected fields,

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trends in efforts to promote sustainable knowledge-based economies, and mechanisms to expand scientist-to-scientist cooperation of mutual interest. Such an initiative should be targeted on topics wherein U.S. specialists are uniquely positioned to complement East European interaction with European colleagues. The costs need not be high, with travel costs being the primary expense. The scientific and political payoff from such high-visibility U.S. interest in the region should be substantial.

THE INDISPENSABLE APPROACH

While the efforts of the NAS and other organizations to stimulate collaboration are important, the cornerstones of effective cooperation will continue to be direct contacts between individual scientists who are interested in working with their international colleagues. If the interest is strong and the ideas are sound, they need only limited help in working across the ocean. They are ready to design the programs; and as they have done in the past, they will play leading roles in finding the means to carry out their programs.

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Appendix

Workshops with Eastern European Institutions[1]

Bulgaria

October 1986	Sofia: Introducing Research Results into Practice (I)
September 1987	Washington, D.C.: New Technologies and Society
September 1988	Sofia: Introducing Research Results into Practice (II)
September 1989	Davis, California: Computers and Pre-University Education
December 1990	Sofia: Convertibility of the Lev
October 1991	Sofia: Sustainable Agriculture
November 1993	Washington, D.C.: Energy Efficiency (with Romania)

Croatia

April 1993	Washington, D.C.: Research and Development and Free Markets (with Slovenia)
October 1998	Zagreb: Cooperation Opportunities in Health

Czechoslovakia

April 1987	České Budějovice: Agriculture and Environmental Research
April 1990	České Budějovice: Agriculture and Pesticides

[1] This list does not include young investigator program workshops or regional training programs in analytical techniques for young investigators.

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Czech Republic

October 1991	Smolenice: Restructuring the Chemical Industry (with Slovakia)
March 1992	Prague: Evaluation of Research Institutes (with Germany)
September 1997	Prague: Science and Democracy (regional)

German Democratic Republic

October 1988	East Berlin: Biosciences
March 1990	Irvine, California: Heterogeneous Catalysis

Hungary

October 1988	Budapest: Impacts of Scientific Exchanges
October 1989	Irvine, California: Biotechnology and Pesticides
April 1991	Budapest: Industrial Strategies and Policies
December 1992	Research Triangle Park, North Carolina: Innovation and Knowledge-Based Economies
June 1995	Miskolc: Technology Management
March 2008	Budapest: Biosecurity (regional)

Poland

October 1987	Mogilany: Ecological Research
November 1988	Washington, D.C.: Ecological Research
November 1991	Pennsylvania: Energy Efficiency
August 1992	Ustroń: Energy Efficiency
May 1994	Bieszczady National Park: Biodiversity (regional)
November 2007	Warsaw: Biosecurity (regional)
October 2008	Washington, D.C.: Innovation Systems

Romania

August 1989	Craiova: Operator Algebras
October 1990	Bucharest: Managing Natural Resources
November 1992	Sinaia: Integrated Resource Management
November 1993	Washington, D.C.: Energy Efficiency (with Bulgaria)

Slovakia

October 1991	Smolenice: Restructuring the Chemical Industry (with Czech Republic)

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Slovenia

April 1993	Washington, D.C.: Research and Development and Free Markets (with Croatia)

Yugoslavia

May 1982	Ljubljana: Robotics and Prosthetics
April 1985	Washington, D.C.: Exposure to Heavy Metals
May 1989	Zagreb: Research Results into Practice
March 1994	Trieste: Impact of War on Child Health (regional)

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