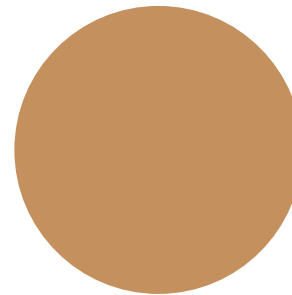
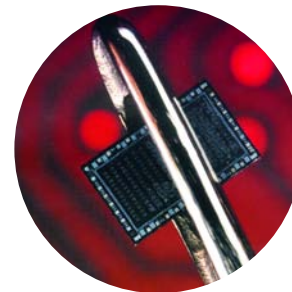


msi

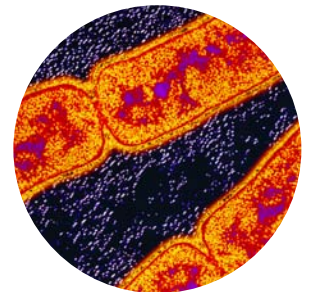
Millennium **Science Initiative**



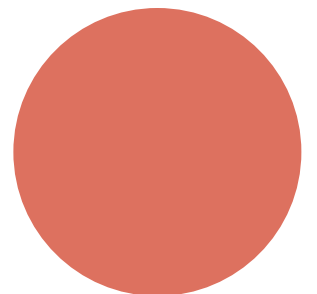
Fosters innovative research and applications of specific value to the host country or region



Develops science, technology and innovation capacity in the developing world



Promotes linkages among research and education, the private sector, and the global scientific community



Institute for
Advanced Study
Einstein Drive
Princeton, NJ 08540
USA

www.msi-sig.org

Every MSI is unique . . .

Each MSI is planned and implemented by local scientific and government leaders, according to needs and priorities of the host country and region. MSI topics vary widely, from biotechnology and public health to microelectronics and local access to Internet resources.

. . . but all share common qualities and objectives.

Every MSI is designed to strengthen capacity in science and technology and bring their benefits to society. To achieve this objective, all MSIs share these qualities:

- ▶ Excellence in research and training
- ▶ Directors of major scientific stature and proven leadership ability
- ▶ Linkages and outreach to other institutions, the private sector, and government
- ▶ Administrative flexibility to investigate new and/or multidisciplinary fields
- ▶ Opportunities for scientists to work in their home countries and address urgent national needs
- ▶ Strategies to develop adequate and sustained funding
- ▶ A design process led by local scientists
- ▶ Peer review by national and international scientists applying world-class standards

Genesis of the MSI

The MSI concept represents the confluence of two events. In 1997, the leaders of Chile, Brazil and Argentina agreed on a desire to strengthen S&T capacity in their region. Concurrently, the World Bank sought to expand its capacity-building efforts in science and technology, recognizing that scientific innovation would drive knowledge-based economies of the 21st century.

The MSI was launched formally at a major convocation in Santiago, Chile, in 1998. An international panel representing the scientific community, governments, and the private sector held two days of intensive discussions. Out of those discussions the Millennium Science Initiative was born.

The Millennium Science Initiative (MSI) strives to build capacity in modern science and technology in developing countries. Through its flagship MSI Institutes, competitively-chosen centers of excellence in scientific research and training, the MSI promotes the culture and material circumstances that allow scientists and engineers from the developing world to engage in world-class research and training in their home countries. MSI scientists and the students they train contribute to science as it addresses societal challenges and drives economies. The mission of the MSI will be reinforced by the Global Science Corps, which will send scientists from advanced nations to work alongside colleagues in the developing world.



Every MSI is designed to strengthen capacity in science and technology and bring their benefits to society.

Collaborative Effort

MSIs are always produced by partnerships. Scientists themselves lead the design process, with the involvement and support of the World Bank and other financing agencies, relevant ministries in the host country (Science and Technology, Finance, Education, Planning), and representatives of the private sector and of foundations. MSI planners also draw on the experiences of bilateral and multilateral aid agencies in planning for sustained support. Non-governmental organizations, including the Third World Academy of Sciences, contribute expertise and a wide network of contacts to all stages of development.

The Science Initiative Group (SIG)

The Science Initiative Group (SIG), formerly the Science Institutes Group, provides support and guidance for the MSI. SIG is governed by a board consisting of five scientists, including three from advanced developing countries who have built superb institutions that serve as models for the MSI, and a venture capitalist with extensive experience in the developing world. SIG is administered by a small staff based at the Institute for Advanced Study in Princeton, NJ, USA. Much of SIG's work has been supported by grants from the Lucile and David Packard Foundation.

Global Science Corps

This MSI component was conceived by SIG board member Harold Varmus, who introduced the idea in a speech at the Nobel Prize Centennial in December 2001. The GSC will place scientists from developed or advanced developing countries in laboratories and research institutes in developing countries where they will share expertise and collaborate with local partners. MSI Institutes will serve as GSC host sites, providing world-class laboratory and teaching environments.

Financing the MSI

Experience has shown that adequate and sustained funding is crucial to the success of programs to enhance science and technology. SIG, frequently in cooperation with the World Bank, works with governments to arrange financing. Financing mechanisms can be as varied as the



“The MSI/SIG, in brief, has an excellent plan in place for the promotion of centres of excellence in sub-Saharan Africa that has the trust, confidence and support of Africa’s scientific community.”

Mohamed Hassan,
*President, Third World
Academy of Sciences*

programs themselves, but typically involve some combination of loans (often on concessionary terms), government co-financing, and foundation grants. In an ideal scenario, the MSI and its financing mechanisms are integrated with a country's development strategy, creating conditions for sustainability and effective capacity building. The combined efforts of government ministries and financing agencies can be decisive in bringing this about.

MSIs by Country

Current MSI activities range across the scientific spectrum, from theoretical studies to applications of practical value to the environment, public health, the economy, or other sector. Some initiatives include a range of activities, while others focus on one or a few major areas. All projects are selected for the excellence of their research and training, plans to form linkages with other institutions and the private sector, and strategies to obtain long-term financing.

Chile

Chile, the seedbed of the MSI, has its own MSI executive secretariat, housed within the Ministry of Planning. Since its establishment, the Chilean MSI has supported three ongoing Institutes and 14 smaller Nuclei that have been funded for periods of three to six years. These are:

Institutes

- ▶ Millennium Institute for Advanced Studies in Cell Biology and Biotechnology
- ▶ Center for Scientific Studies
- ▶ Millennium Institute for Fundamental and Applied Biology

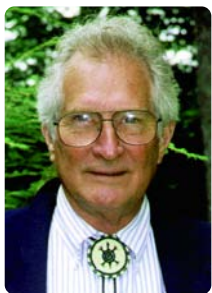
Nuclei

- ▶ Millennium Scientific Nucleus for Web Research
- ▶ Forest Ecosystemic Services to Aquatic Systems under Climatic Fluctuation
- ▶ Complex Engineering Systems
- ▶ Information and Randomness: Fundamentals and Applications
- ▶ Center for Integrative Neuroscience
- ▶ Millennium Nucleus in Developmental Biology



“In only 3 years the MSI has revolutionized Chilean science and has set a standard with respect to which every other initiative is measured.”

Claudio Teitelboim,
*Director, Centro de
Estudios Científicos*



“It is surely one of the most, if not the most, significant current efforts to stimulate first-class science in the developing world.”

Kenneth Ford, *Former Director of Science Programs, The David and Lucile Packard Foundation*

- Center for Advanced Studies in Ecology and Research on Biodiversity
- Condensed Matter Physics
- Seismotectonics and Seismic Hazards
- Plant Cell Biology
- Applied Quantum Mechanics and Computational Chemistry
- Quantum Optics and Quantum Information
- Center for Cellular and Molecular Neuroscience
- Metal Dispersed Systems: Applications to Fine Chemistry

Brazil

The Brazilian MSI consists of 17 networks of excellence, selected by a competitive process and involving multiple institutions throughout the country. These networks are expected to play key roles in achieving new standards of national competence in their fields.

- Oceanography: Uses and Conservation of Coastal Resources
- The Semi-Arid Zone: Biodiversity, Bioprospecting, and Conservation of Natural Resources
- Integrated Strategies for the Control of Tuberculosis
- Coastal Studies: The Mangrove Estuarine Environment of the North Coast
- Genetic Mapping of Citrus Fruits
- Global and Integrated Advancement of Mathematics in Brazil and the Region
- Water: Resources, Uses, and Environmental Issues
- Bioengineering: Cell Culture Therapies for Chronic and Degenerative Diseases
- Quantitative Information: Description, Transmission, Storage, and Use of Computational Information
- Immunological Research
- Complex Materials with Potential Scientific or Technical Applications
- Nanoscience and Nanotechnology: Developing Systems in Microelectronics, Optoelectronics, Telecommunications, and Bioengineering
- Systems on a Chip: Microsystems and Nanoelectronics
- Multidisciplinary Institute of Polymeric Materials
- Land Use Changes in the Amazon: Climatic and Carbon Cycling Implications

- Integrated Engineering and Manufacturing Initiative
- Institute of Stellar and Galactic Evolution in the Era of Large Telescopes

Mexico

The Mexican MSI consists of four competitively selected institutes, listed below. The focus of the MSI is being broadened to include an emphasis on innovation and transfer of technology to the private sector.

- Access to Digital Services and Information for Large Communities of Users
- Center for Signaling, Plasticity and Neurodegeneration in the Central Nervous System: The Neurological Bases of Decision Making
- Physicochemical Studies of Novel Nanostructured Materials
- High-energy Physics at the Large Hadron Collider: A Collaboration with CERN

Africa

A complex of potential MSI projects in sub-Saharan Africa has grown out of a series of planning meetings organized by SIG and the Third World Academy of Sciences and led by African scientific and university leaders. Those meetings led to the design of three multi-country emphases, which are in various stages of development.

Biotechnology, Bioinformatics, and Natural Products: This initiative focuses on training and research in biology, especially to address the challenges of malaria and other endemic diseases; to screen local plants for useful active agents; and to improve crop yields through genetic research. Scientists from Uganda, Cameroon, Botswana, and Namibia are involved in this partnership.

Instrumentation and Information Technology (IT): With a hub in Dar es Salaam, Tanzania, this MSI attempts to expand the instrumentation and IT resources available to African scientists, beginning with MSI participants and gradually expanding to other research centers. A central objective is to connect researchers to the Internet and provide low-cost access to digital resources.



“The MSI stands out as an attractive and highly relevant program that may help Africa reduce poverty and move toward the attainment of the Millennium Goals set by the United Nations.”

Vincent Titanji, *Deputy Vice-Chancellor, University of Buea, Cameroon*

Mathematics: This initiative emphasizes education, training, and the uses of mathematics. Its dual goals are to strengthen programs of traditional mathematics and introduce modern interdisciplinary programs. It will emphasize modeling, which is an increasingly important part of contemporary mathematics, especially in areas of specific interest to the region, such as epidemiology and hydrology.

South Africa

The government of South Africa has formally invited GSC fellow placements, and SIG will be participating in an evaluation of South Africa's Centres of Excellence program. Discussions initiated by the South African government, with the strong support of the US Embassy in Pretoria, suggest that a future MSI in South Africa might comprise two foci: HIV/AIDS research along a spectrum from basic science to direct applicability to pressing clinical needs; and a competition for centers of excellence in any field of science.

Vietnam

The MSI in Vietnam will be designed to complement the fellowship program of the Vietnam Education Foundation, a US government initiative to promote closer relations between the US and Vietnam by providing opportunities for Vietnamese nationals to pursue graduate and post-graduate studies in science and technology in the US, and for American citizens to teach in the same fields of study in Vietnam. MSI institutes in Vietnam are expected to serve as magnets to attract home Vietnamese students who have studied abroad and as training grounds for new generations of Vietnamese scientists.

Other MSIs

SIG will explore additional MSIs as opportunities arise. Discussions have been initiated in Eastern Europe, Central Asia, the Middle East and Central America.

Other SIG Initiatives

In addition to catalyzing the formation of MSIs, SIG engages in a variety of initiatives to build science and technology capacity.

Innovation to the Marketplace

Increasingly, scientific research provides the fuel for economic growth. SIG helps to spread awareness in the scientific community of the importance of the private sector and to bridge the gap between academia – the source of new ideas – and the industrial sector, which carries innovations to the marketplace. A clear understanding of this linkage is essential to rationalize government support for science, and demonstrates for private firms the potential value of R&D performed within their own firms and outsourced to universities.

Gender Study

SIG has commissioned a study of women in developing countries who work in science. SIG/MSI will act on the recommendations of the study to help increase and improve the reservoir of scientific talent for the future.

Advising and Consulting

The SIG board and staff provide consulting services on a limited basis to governments, scientific organizations, and others involved in scientific capacity building. Among the services provided to date, SIG has been involved in the selection and assessment of Centers of Excellence programs and in the evaluation of key fields of science in given countries, and SIG's expertise has been called upon by organizations seeking to emulate the MSI model.



“The MSI has proven to be an especially effective instrument to help reduce brain drain, as well as to strengthen the overall capacity for science and technology in developing countries.”

Kien Pham, Executive Director, Vietnam Education Foundation

Board of Directors



Phillip A. Griffiths,
Chair

Dr. Griffiths is Director Emeritus and Professor of Mathematics at the Institute for Advanced Study in Princeton, New Jersey. He was formerly Provost and James B. Duke Professor of Mathematics at Duke University and Professor of Mathematics at Harvard, and he has taught at Princeton University and the University of California, Berkeley. He received his PhD from Princeton University.

Dr. Griffiths served on the National Science Board from 1991-1996. He is a member of the National Academy of Sciences and a Foreign Associate of the Third World Academy of Sciences. From 1993-1999, Dr. Griffiths chaired the Committee on Science, Engineering and Public Policy of the U.S. National Academies of Science and Engineering and the Institute of Medicine.

Dr. Griffiths is Secretary of the International Mathematical Union. He also serves on the Board of Directors of the Oppenheimer Funds and of GSC Lumonics.



J. Tomas Hexner

Mr. Hexner received a BA in economics and an MBA from Harvard University. He has over 30 years experience in policy, projects and institution-building in developing countries, including Pakistan, Indonesia, sub-Saharan Africa, and Paraguay. He has worked with foundations, among them Ford and Rockefeller, and with bilateral and

multilateral agencies (USAID, World Bank, IMF, UNDP) that assist these countries.

Mr. Hexner's projects have included crafting an environmental action plan for sub-Saharan Africa, formulating the Agriculture and Rural Development Policy for the World Bank, privatizing enterprises in Bangladesh, and exploring the options for reinvigorating science and technology in Vietnam. He has founded several high-tech companies, and he has been involved in industrial-academic relations at both Harvard and Duke Universities.



Chung W. Kim

Professor Kim is Director of the Korean Institute for Advanced Studies (KIAS) and Professor Emeritus of Physics at the Johns Hopkins University. He has published numerous works on neutrinos, muon capture, nuclear decay, and other aspects of elementary particle behavior. A summa cum laude graduate of Seoul Academy of Science and Technology, he received his PhD from Indiana University.

In Korea, he has served as Chair, Physics Sub-Committee, Korea Institute for Advanced Study (1997) and Member, International Science Advisory Board, Korea Science and Engineering Foundation. He also served as President of the Association of Korean Physicists in America and U.S. Regional Editor, Journal of the Korean Physical Society. He is a Fellow of the American Physical Society, Korean Physical Society, and the Korean Academy of Science and Technology (Hanlim Won), and is a recipient of the Chong Am prize of the Korean Academy of Sciences and Technology, and the Korean national decoration, Moran Order of Merit.



Jacob Palis

Professor Palis is Director Emeritus and Professor at the Instituto de Matemática Pura e Aplicada (IMPA) in Rio de Janeiro, Brazil. He is a graduate of the Federal University of Rio de Janeiro and received his PhD from the University of California at Berkeley. His primary research interest is dynamical systems.

Professor Palis is Secretary General of the Third World Academy of Sciences (TWAS) and former Vice-President of the International Council for Science (ICSU). He has served as Secretary to the International Mathematical Union from 1991-1998 and as President from 1999-2002, being now its Past-President, 2003-2006. He is a member of Scientific Committee of the Brazilian National Research and of the Federal University of Rio de Janeiro (COPEA), an Interdisciplinary Scientific College.

He is chair of the Scientific Council of the International Center for Theoretical Physics in Trieste, Italy, and a member of the Scientific Advisory Committee of the ETH, Zurich, and the Scientific and Strategic Committee of the Collège de France. He is a member of several Academies of Sciences, including the Brazilian, Indian, French and the U.S. National Academy of Sciences.



C.N.R. Rao

Professor Rao is President of the Jawaharlal Nehru Center for Advanced Scientific Research in Bangalore, India. His main research interests are

solid state and materials chemistry, surface phenomena, spectroscopy, and molecular structure. He received an MSc from Banaras, PhD from Purdue, and DSc from Mysore.

Professor Rao is a Founding Fellow and President of the Third World Academy of Sciences. He is a fellow of many Academies of Sciences, including the Indian and French, the Royal Society in London and the U.S. National Academy of Sciences.

He served on the Executive Board of the International Council of Scientific Unions (ICSU) and the International Scientific Board of UNESCO. He has served as president of the Indian National Science Academy, the Indian Academy of Sciences, the International Union of Pure and Applied Chemistry and the Science Advisory Council of the Prime Minister of India.



Harold Varmus

Dr. Varmus is President of Memorial Sloan-Kettering Cancer Center in New York City.

Much of Dr. Varmus' scientific work was conducted at the University of California at San Francisco, where he and Dr. J. Michael Bishop and co-workers demonstrated the cellular origins of the oncogene of a chicken retrovirus. This discovery led to the isolation of many cellular genes that normally control growth and development and are frequently mutated in human cancer. For this work, Bishop and Varmus received the 1989 Nobel Prize for Physiology or Medicine.

In 1993, Dr. Varmus was named by President Clinton to serve as the Director of the National Institutes of Health, a position he held until the end of 1999. During his tenure at

NIH, he initiated many changes in the conduct of intramural and extramural research programs and recruited new leaders for most of the important positions at the NIH.

In addition to authoring over 300 scientific papers and four books, Dr. Varmus has been an advisor to the Federal government, pharmaceutical and biotechnology firms, and academic institutions. He is co-founder and Chairman of the Board of The Public Library of Science, and served on the World Health Organization's Commission on Macroeconomics and Health, advisory committees on electronic publishing, and a National Research Council panel on genetically modified organisms. He is a member of the U.S. National Academy of Sciences and the Institute of Medicine.

Staff



Arlen K. Hastings
Executive Director

Ms. Hastings has devoted most of her career to international academic cooperation. She received an A.B. from Princeton University in 1980 in Anthropology and Russian Studies. She held administrative positions at Harvard University, and then for ten years worked at the International Research & Exchanges Board (IREX) in several capacities including Program Officer for US-Soviet academic conferences and Secretary to the Board. She became Executive Assistant to the Director of the Institute for Advanced Study in 1992, a position she held through 2003. Ms. Hastings was actively involved in the creation of the Millennium Science Initiative and the Science Initiative Group and has been responsible for SIG's administration since its inception.



Alan H. Anderson
Editorial Director

Mr. Anderson has worked for the Science Initiative Group since its inception. He also works for other organizations, including the National Academy of Sciences, where he writes reports on science policy, science education, science and the law, and other topics.

He has worked in science and medical journalism for over 25 years, serving as a reporter, writer and foreign correspondent at Time magazine, Saturday Review, and other periodicals. He has published articles in the New York Times Magazine, Life, Saturday Review, Psychology Today, and other publications; edited several newspapers; and written or edited five books on scientific topics. He holds a BA in English from Yale University and an MS in Journalism from Columbia University.



Kiera Carlisle
Program Manager

Ms. Carlisle's responsibilities include writing, research and administration projects for SIG. She has worked in management consulting, online advertising and nonprofit fundraising. Most recently, she was Director of Fundraising and Corporate Relations for Boston Cares, a nonprofit agency dedicated to volunteerism. She graduated from Princeton University in 1998 with a degree in Politics and Environmental Studies.