Science, Technology, and Diplomacy

PCAST; Washington, DC

July 16, 2010

Bruce Alberts

Editor-in-chief, *Science* magazine
Science Envoy (Indonesia & Pakistan)

The Challenges

- Design a role for Science Envoys that dramatically demonstrates the potential and effectiveness of science diplomacy

- Create a Science Envoy “toolkit” and a set of principles to facilitate future efforts

- Help the US Government create structures that optimally support the Science Envoy mission (e.g., better synergy between agencies; Science Attachés in every major embassy)

- **Can we convince skeptics that there should be similar science envoys to all major nations, in addition to those that are “Muslim-majority?**

Our Advantages

- Still spending most of our time in the scientific community, so well connected to large numbers of outstanding individuals, programs, and institutions

- Volunteers, so can speak without conflicting allegiances with regard to helping the US government improve its many rules and procedures

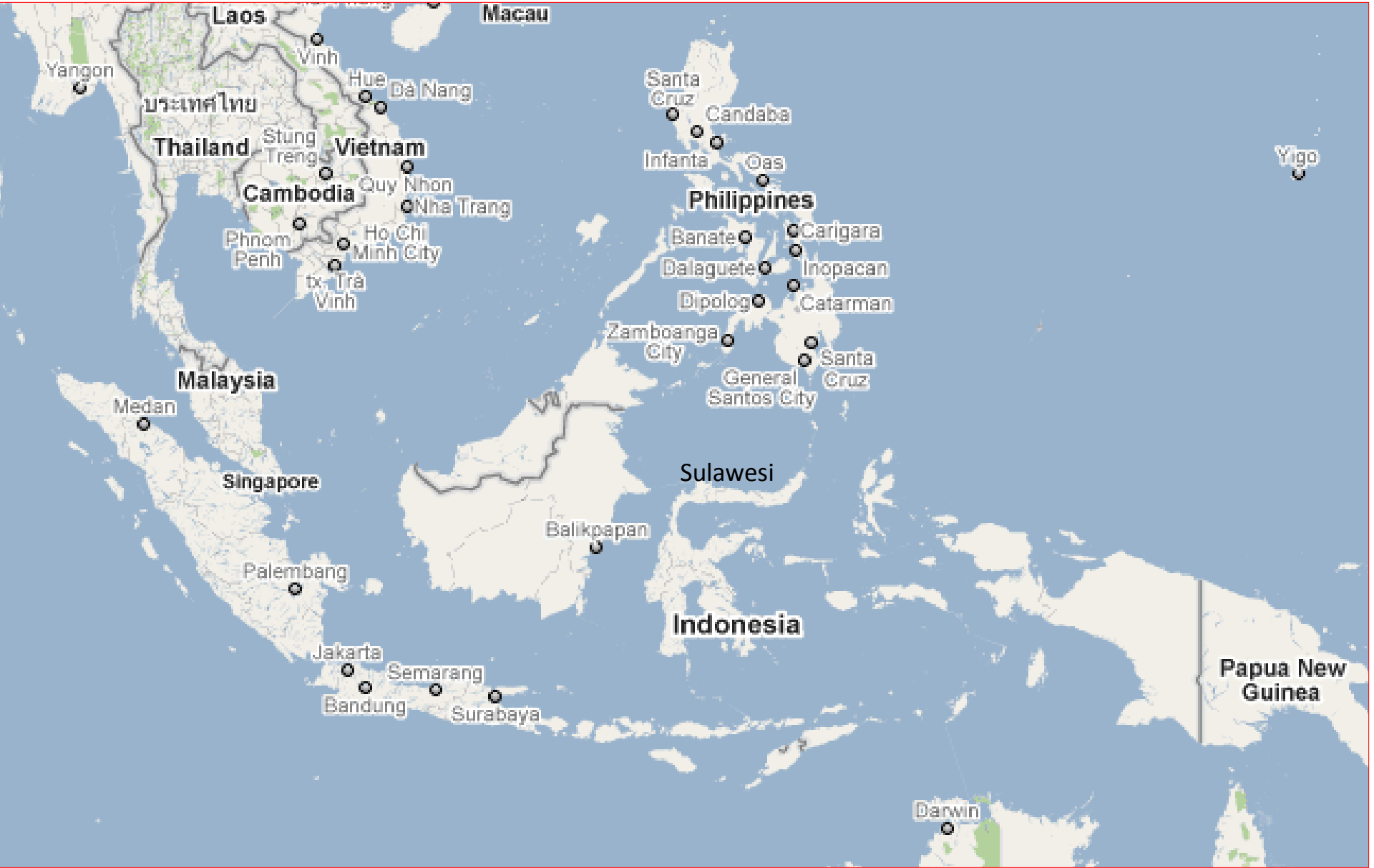
My first assignment is Indonesia

- Focus on **capacity building** of Indonesian institutions and individuals in areas of S and T of most interest to Indonesia

- Emphasis on connecting the next generation of S and T leaders from US and Indonesia

- Experiment with new programs to find best US partners

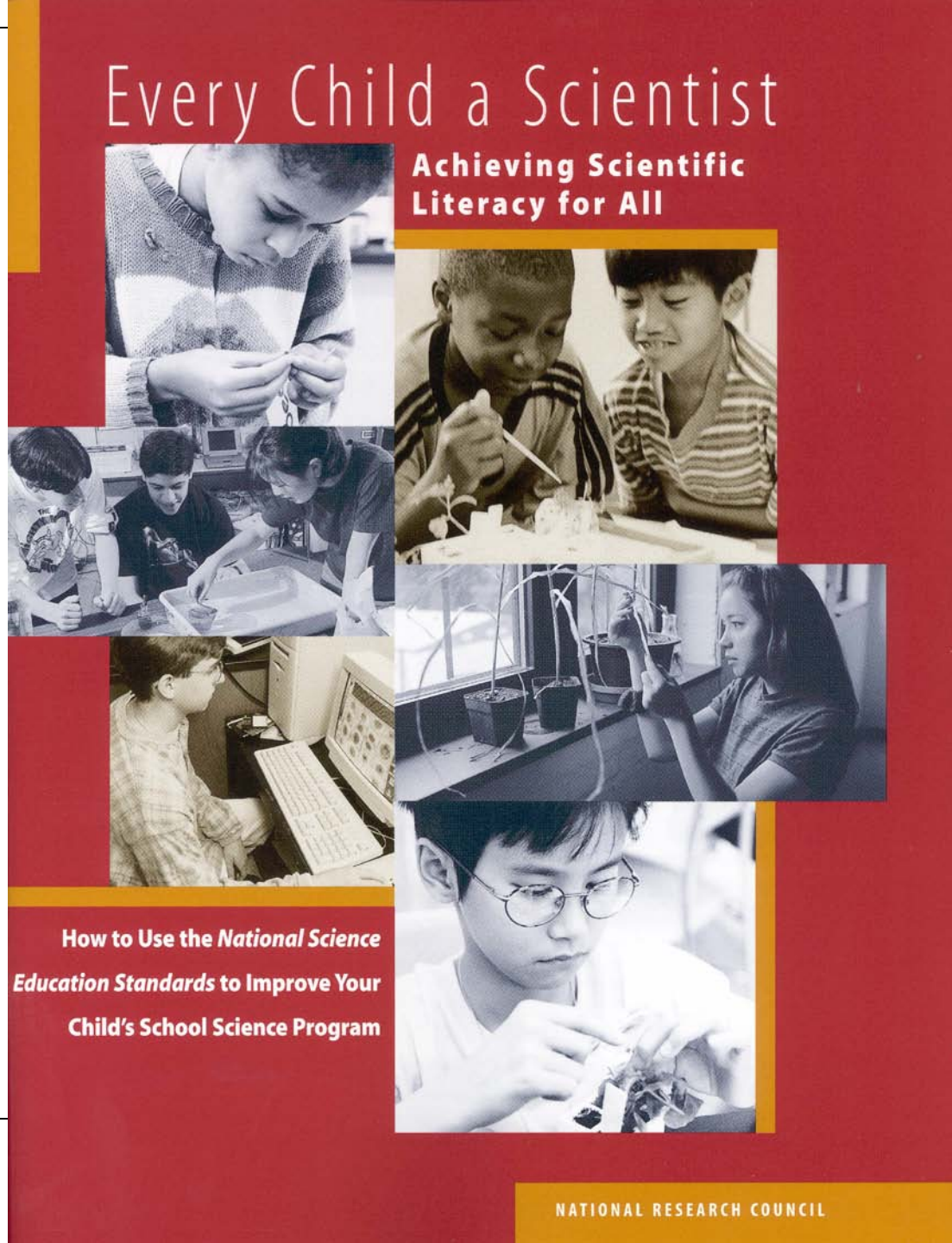
Indonesia 270 million people, more than 10,000 islands



I met with many young Indonesian scientists

President Susilo Bambang Yudhoyono stressed Indonesia's aim to become an "innovation nation"

Program of inquiry based science education in the US of interest to President Yudhoyono



THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

President of the Indonesian Academy of Sciences, Sangkot Marzuki -- a distinguished molecular biologist

Marzuki organized a three-day meeting of 40 of Indonesia's best younger (age about 40) scientists, in which we solicited their views and interests in collaborations

They emphasized a need for increased investments in science and technology, distributed with the aim of developing a **more "merit-based culture"** for Indonesian science and education

Some initial actions following my trip to Indonesia

- Establishment of an annual Frontiers of Science meeting pairing 40 US and 40 Indonesian future science leaders (ages 35 to 45)

- New US funds to support universiy exchanges recently announced

- Discussions underway in Indonesia on creating a new merit-based, research funding agency similar to the U.S. National Science Foundation (NSF)

- Indonesia sent a team of educators and scientists to the National Science Resources Center workshop on inquiry based children's science education in Washington, DC this week

National Science Resources Center

THE NATIONAL ACADEMIES | Smithsonian Institution

"Being here has truly reinforced the alliance concept. Our school district will benefit from inclusion in this process as community stakeholders are welcomed aboard."

- Jenny Johnston, North Franklin School District

2010 National LASER K-12 Science Education Leadership Development and Strategic Planning Institute

The National Science Resources Center invites you to take part in an exciting opportunity to transform the science education programs in your district, state or region and achieve real gains in student achievement.

Already, districts all across the US, most notably in states like Alabama, Washington, and Delaware, are seeing significant increases in test scores through the implementation of inquiry-based science education programs.

This is where you come in. We're creating a National Movement to reform science education and we are looking for states and districts that can be catalysts for change.

What:	An intensive 5½-day working institute to guide your school districts through the rigorous process of developing a tailored strategic plan—a plan for initiating and implementing an effective research-based science education program founded in best practices.
When:	July 11-16, 2010

REGISTER TODAY!

2010 National LASER K-12 Science Education Leadership Development and Strategic Planning Institute

July 11-16, 2010

The Westin Hotel
Alexandria, Virginia

Key questions for PCAST study:

1). How can the US best help to build local, merit-based institutions for science and technology?

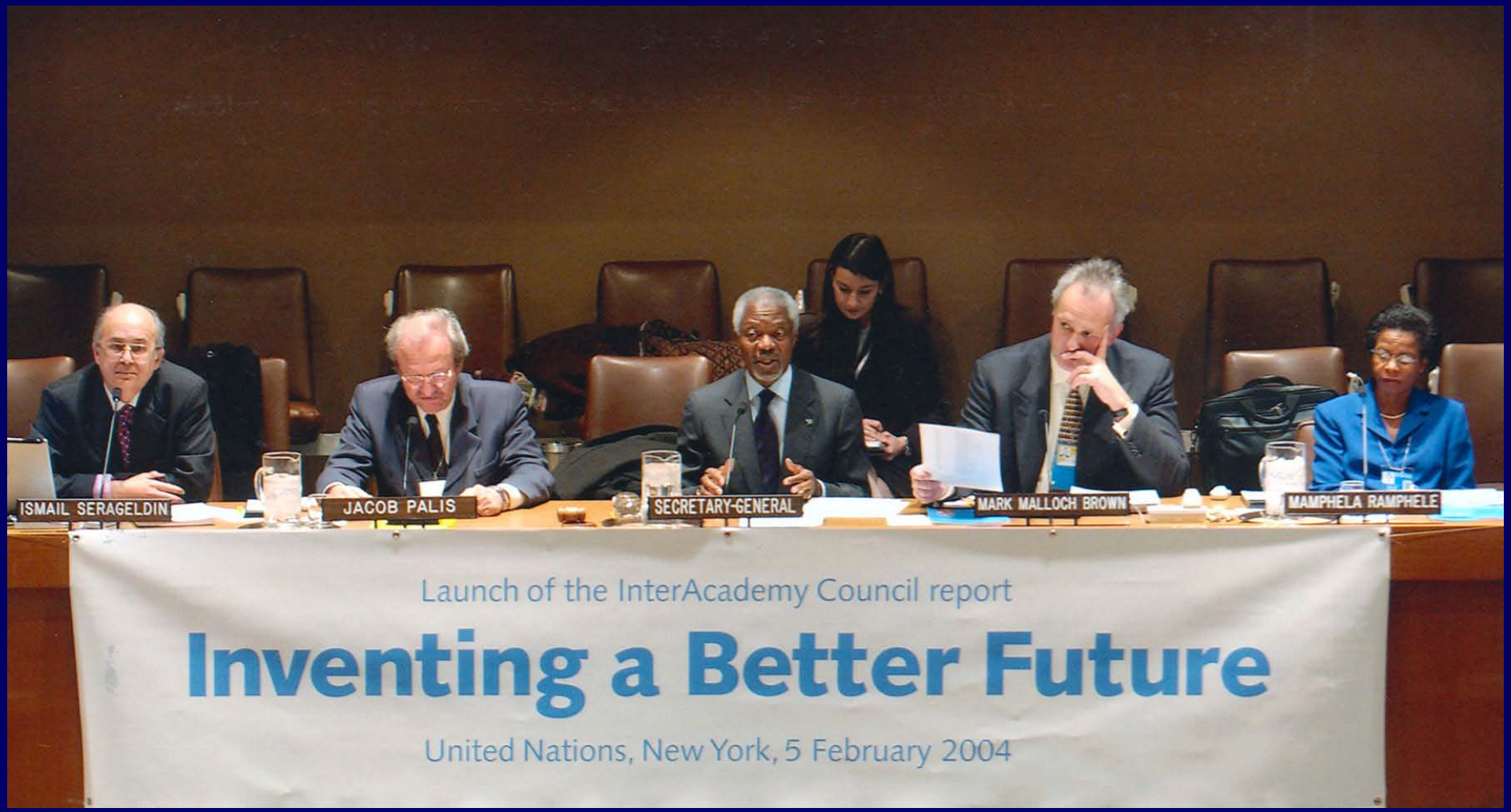
Science and technology can make a major difference for national development through a myriad of interventions, but most of these are much too fine-grained for outsiders to expect to be able to solve other nation's problems. Instead, our focus should be on helping to build the local capacities that each nation will need to solve their problems themselves.

An important how-to-do-it guide from the InterAcademy Council in Amsterdam

Inventing a Better Future: **A Strategy for Building Worldwide Capacities in Science and Technology.**

- A guide for building high quality institutions for science and technology in every nation.
- Download at www.interacademycouncil.net

The 2004 report release at the UN



Key questions for PCAST study:

2). How can we "make a science" out of international development?

We need to be much smarter in learning from the thousands of "experiments" in sustainable development underway in the world, sponsored by NGOs and by governments (for example, more than 50 different rural ICT projects in India alone). We can learn a great deal from the failures; but nearly all such projects claim to be successful, and the lessons learned are thereby lost.

Key questions for PCAST study:

3). How can we create much more effective coordination mechanisms within our own government?

"Hundreds of well-intentioned international aid agencies, with their own priorities and idiosyncrasies, seldom cooperate or even communicate with each other. Instead, they compete for publicity, funding, and access to potential recipients. Overburdened leaders in developing countries, whose governments are often relatively disorganized, confront a cacophony of offers and demands from donors."

Jimmy Carter

Key questions for PCAST study:

4). How do we best promote scientific knowledge as a "public good", and make the best of US education accessible on the Web?

How Science magazine can help

24 monthly winners of contest for best free science education websites

Science AAAS

ESSAY

WINNER OF *SCIENCE* PRIZE FOR ONLINE RESOURCES IN EDUCATION

Making Genetics Easy to Understand

An integrated pair of Web sites for students and teachers supports genetics and genomics education worldwide.

Louisa A. Stark* and Kevin Pompei

The Human Genome Project and the subsequent explosion of genomic information are transforming our knowledge of how organisms function and how genes and the environment interact. These insights have led to advances in personalized medicine, stem cell treatments, and genetic testing. Students, teachers, and the public must be prepared to make informed decisions about participation in genomics research, genome-related health care, use of genetically modified agricultural products, and public funding for stem cell research. Education has been identified as a crosscutting element that is critical to achieving the potential of genomics research (*1*).

To address this need for genomic literacy, we have developed two related Web sites. Learn.Genetics (see figure, right, from http://learn.genetics.utah.edu/) provides educational materials that currently cover 15 topic areas ranging from DNA to epigenetics. Classroom activities designed to support and extend these materials, as well as other resources for educators, are available on Teach.Genetics (http://teach.genetics.utah.edu/).

Learn.Genetics. The site provides educational materials on 15 topic areas, ranging from DNA to epigenetics.

graduate school use the site to better understand content their instructors present, to assist in completing assignments, and to explore science independently. Higher-education faculty use the materials for courses ranging from introductory biology to professional preparation in education and nursing.

Animations presenting science concepts in an accessible and engaging way attract members of the general public, which leads to "viral" dissemination through link-sharing Web sites and blogs. Although this type of dissemination is unpredictable, both our "Mouse party" and "Cell size and scale" (see figure below) interactive animations have spread this way, engendering discussions about science in over 30 languages around the world. "The new science of addiction: Genetics and the brain" module has received the most unanticipated use; it has been incorporated into police officer training and addiction treatment in several countries.

We use a participatory design approach to developing our materials, involving teachers and scientists along with the science educators, instructional designers, science writers, teacher professional developers, scientists, multimedia designers, Web developers, and evaluators that comprise our team. Our method emerged from extensive work with teachers in professional development programs and capitalized on teachers' real-world expertise in successful teaching approaches, knowledge of engaging topics and materials, knowledge of the gaps in available online materials, and familiarity with the state science education standards guiding curricula. It also draws on scientists' depth of expertise in their fields. Involving the center's entire team

A follow-up email from a thoughtful Indonesian professor educated in the United States

"I would say, that right now, Indonesia is at a cross road, in terms of culture, politics, international relationship and internal growth. We understand that changes are needed, we understand the world has changed, and we need to change with it. But we are not yet quite sure how to achieve that.

There are many opportunities and challenges, influence from many outside forces, politics and different interests. It is thus very important that in this fragile stage, Indonesia still holds the diversity of culture, pluralism, and charts its way as a leader of the region where all races and religions are respected and pluralism is held at its highest position."

A relevant quote

"The society of scientists is simple because it has a directing purpose: to explore the truth. Nevertheless, it has to solve the problem of every society, which is to find a compromise between the individual and the group. It must encourage the single scientist to be independent, and the body of scientists to be tolerant. From these basic conditions, which form the prime values, there follows step by step a range of values: dissent, freedom of thought and speech, justice, honor, human dignity and self respect.

Science has humanized our values. Men have asked for freedom, justice and respect precisely as the scientific spirit has spread among them."

Jacob Bronowski, Science and Human Values, 1956