

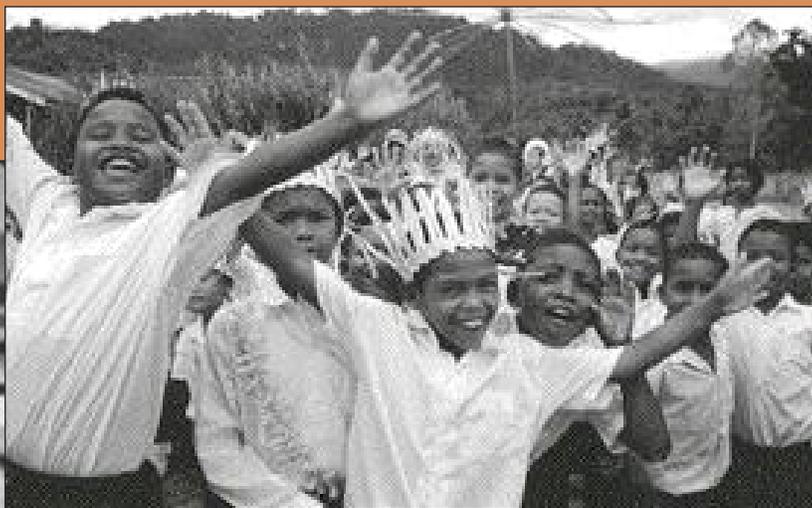
ASTC Dimensions

Bimonthly News Journal of the Association of Science-Technology Centers

September/October 2005

ENGAGING CITIZENS:

Science Centers and Social Responsibility



Science Centers and Social Transformation:

- The Challenge in South Africa

Going Global:

- UNAM's Local Approach to Global Science

Shared Resources:

- Building Capacity in Rural Mexico

Malaysians Can Do It:

- In Support of a National Vision

Fostering Deliberative Democracy:

- Europe's DeCiDe Project

Paying a Social Debt:

- Brazil's Museu de Ciências e Tecnologia

The Abbott Partnership Program:

- Addressing Equity in New Jersey's Schools



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September/October 2005

At the 4th Science Centre World Congress, held April 11–15, 2005, in Rio de Janeiro, attendees considered how science centers might succeed in “breaking barriers [and] engaging citizens” by providing the public with interactive, informal, capacity-building access to science and technology education. In this issue, we have chosen to continue some of the conversations begun in Brazil. Articles here highlight the work that a number of science centers worldwide are doing to overcome the social inequities inherent in an era of rapid economic globalization—inequities that separate rich from poor, skilled from unskilled, educated from illiterate. Much has already been achieved, and much remains to be done.

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Cover: When science centers bring their programs to remote communities like those of the Orang Asli of southern Malaysia (top right) and the Purépecha of central Mexico (left), the doors of education open for children and their families. Photos courtesy Petrosains (top right) and Alejandra Lerdo de Tejada/Papalote–Museo del Niño (left)

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Science Centers and Social Transformation:

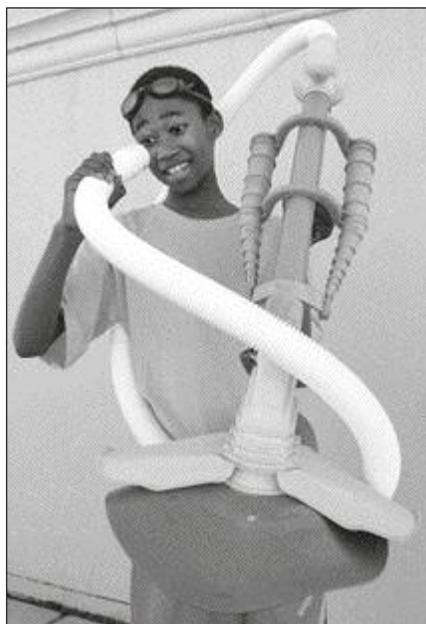
The Challenge in South Africa

By Mike Bruton

More than 13 years after the end of apartheid, South Africa is still a country in transition. Huge societal imbalances persist in most aspects of people's lives. We see the effects in the formal education system, where many students (and teachers)—forced to grow up in impoverished environments, with little opportunity for mental stimulation—still exhibit the long-term effects of educational deprivation. Schools suffer from inadequate performance by learners, complications caused by multiple first languages, and poor quality of teacher training.

These deficits are particularly severe in the area of science, technology, engineering, and mathematics (STEM) education. No one disputes that awareness of, and competence in, these subject areas is essential to South Africa's future growth and stability. But the schools are struggling, and the public shows little awareness or understanding of STEM issues. This is not surprising, since citizens have limited access to research venues, few opportunities to debate STEM topics, and little exposure to their nation's history of innovation (including South Africa's five Nobel prizes in science) or the potential benefits of future STEM advances.

The science and technology community should be actively contributing to the solution of this problem. I submit that science centers are better positioned than other types of educational institutions to help. Schools are too busy adapting to new curricula and overcoming inadequate staff capacity. Universities, focused on



Okuhle Mtya examines the Kreepy Krawly, a South African-designed swimming pool cleaner that is now marketed worldwide. Photo by Charles O'Leary

higher study and research, mainly address the needs of the cultural elite. Natural history and cultural museums, with their limited resources, are hard pressed just to care for their valuable collections.

What do science centers offer that the others cannot? I see key roles for us in four areas: (1) changing the mindset of learners, (2) empowering teachers, (3) celebrating our nation's achievements in science and technology, and (4) serving as forums for public debate on SMT topics—not just technical issues, but also social, moral, and ethical. If we can make a difference in these areas, we will truly prove ourselves an essential component of the educational infrastructure in South Africa.

(1) *Changing mindsets.* Research has revealed that human learning is essentially a process by which we add new experiences and knowledge to a past tapestry of experience and knowledge. Because science centers cater to families, we have a unique opportunity to affect the mental development of very young learners. In helping these children to develop a rich and diverse store of past experience and knowledge, we give them a more complex learning landscape on which to build in the future.

We further know from research that for learning to be effective, it must be mainly under the control of the learner. Science centers, with their hands-on, minds-on activities, are uniquely equipped to demystify science and technology for visitors. It is not a case of “us teaching you,” but of “you teaching yourself.” Changing mindsets within this friendly and supportive environment may even make students more receptive to classroom teaching.

We also know that people have different styles and preferences when it comes to learning. Exhibits in science centers are designed to be less language-dependent than those in collections-based museums. The many creative teaching methods common in science centers—science theater, music, sport, direct engagement with role models, science festivals, science weeks, science camps, robotics competitions, and the like—offer ways to make science and technology accessible to everyone.

(2) *Empowering teachers.* Teachers are the most important resource in the educational system. If they are to

teach their classes with confidence, it is essential that they have high self-esteem and an adequate understanding of their subject matter. Science centers are ideal environments to empower STEM teachers with the knowledge and confidence they need to teach in a bright and innovative way. The MTN Sciencecentre does this mainly by offering model classes on science and technology in the curriculum, usually in collaboration with other educational NGOs.

(3) *Boosting national pride.* All science centers should highlight and celebrate their own nations' technological inventions and innovations, thus encouraging a new generation of inventors to come to the fore.

In 2004, the MTN Sciencecentre mounted a temporary exhibition, *Great South African Inventions*, featuring more than 150 inventions developed by our compatriots. Before we began, not one of the people we interviewed, including practicing scientists, could name even five South African inventions. In our exhibition, we speculated on future inventions that might arise here and did our best to communicate the idea that current visitors might invent them.

(4) *Fostering public debate.* Society worldwide, but especially in South Africa, does not engage sufficiently with science and technology, but rather tends to embrace it, for good or for ill, without question. By facili-

tating public engagement with science and technology issues, we can bring vital questions into the main line of societal thinking and behavior.

In Barcelona, Spain—a major, cosmopolitan city, with a large number of cultural and educational institutions—the science center Cosmo-Caixa has established a role for itself as a meeting place for creative people. Artists, scientists, musicians—all feel welcome to gather in this “village square,” where cutting edge trends in innovation are debated.

South African science centers need to adopt this model. Whether the topic is bioengineered foods, generic medicines, or the pseudoscience of creationism and “intelligent design,” our science centers must help the public not only to appreciate the value of new scientific and technological advances, but also to safeguard themselves against negative impacts.

Overcoming obstacles

To prove that science centers can do this work in South Africa will require enormous effort. Ensuring in the minds of top decision-makers, sponsors, other stakeholders, and the general public that science centers have a unique role to play—that we are not just glorified games arcades or catch-alls for what other museums don't do—will require a critical mass.

At this time, by my count and according to the accreditation criteria

set by South Africa's Department of Science & Technology, we have only six true science centers to serve 46 million people. We need many more.

The obstacles from outside are formidable: inadequate funding and resources; unrealistic expectations on the part of government officials; a tendency to lump science centers together with other organizations when it comes to public understanding of science, engineering, and technology (PUSET) programs; inadequate human resources to design, build, and operate science centers; and a lack of teamwork among science centers, museums, universities, NGOs, and other stakeholders in STEM education.

Science centers limit themselves, too—sometimes by delegating too much control to a founder or original funder, sometimes by failing to develop adequate business plans and accounting procedures or by ignoring the need to do regular evaluations and document impact. We must rise above such mediocrity if science centers are to become centers of excellence, helping true equity and pride to take root in South African education. ■

Mike Bruton is director of the MTN Sciencecentre, Cape Town, South Africa; www.mtnsciencecentre.org.za. This article is adapted from a talk he gave in March 2005 at the Sasol SciFest in Grahamstown, South Africa.

A Call to Action

Science centers were founded on the principles that interactive methods are the most effective ways of teaching science and technology, that a strong science culture is a prerequisite for a winning nation, and that all people, whatever their culture or socioeconomic status, deserve access to information on topics that profoundly affect their lives.

If we truly believe that, then surely we must allocate some of our resources—human, financial, and in-kind—to rectifying imbalances in science center development worldwide.

Africa is ripe for such intervention. Many African countries—not just South Africa, but also Namibia, Nigeria, Cameroon, Rwanda, Uganda, Mozambique, and Swaziland—are on the cusp of establishing science center networks. In today's web-linked, globalized world, we are all neighbors—and all equally deserving of the means to lead peaceful, productive lives.

Now is the time for the global science center community to make timely and informed efforts to tip the balance in Africa's favor. If you would like to help, please contact mike.bruton@mtnsciencecentre.org.za.

Going Glocal:

UNAM's Local Approach to Global Science

By Elaine Reynoso Haynes

With globalization appearing to sweep the world like a cultural, economic, and technological wave, the general feeling among state and national governments is that one cannot afford to be left out. Hastening to join the movement, leaders often launch projects in fundamental areas like economic development, education, and science/technology research.

It is not surprising that such efforts may encounter resistance at the local level. Some people may not want globalization at all, while others may feel they deserve a greater share of the benefits.

In a 2002 article, "Mujeres y políticas de lugar," (*Development*, No. 45), Wendy Hartcourt and Arturo Escobar note that local perspectives tend to be seen as contrary to progress and are therefore minimized during globalization. But they seldom disappear completely. Rather, they may find expression in regional adaptations, such as the chiles and spicy sauces that are essential if McDonalds is to do business in Mexico. Globalization is thus not entirely pure; it is always subject to local influences. To describe this effect, Hartcourt and Escobar use the term "glocal."

Local context in the museum

A truly "glocal" scientific culture is one that maintains an equilibrium between global knowledge and local context, and that takes into account local problems and the ways in which they are addressed locally. By creating a sense of belonging and pride, this approach provides a more appropriate atmosphere for scientific and technological research and development.

Let's apply this concept to a key

mission of science centers and museums: helping to create a scientifically literate society. If science centers and museums are to provide people with the tools and knowledge they need to make decisions about science-related issues, on both a personal and a collective level, and at the same time to promote the values and attitudes that go along with such actions, they must adopt a glocal approach.

Once a museum has chosen its science content, how local does it have to get to make an impact? The answer is as local as possible. This can mean exploring science broadly at the regional level—and perhaps even narrowing it down to the immediate surroundings of the science center. As different museums explore their own local context, distinct cultural, historical, social, and economic ingredients will emerge.

Diversity is part of the picture, too. Inclusivity requires looking at the characteristics and needs of the people closest to our museums and mirroring that on our staffs. Local experts must be part of any exhibit development team. And to ensure that we are really connecting with target audiences, ongoing evaluation and permanent communication with visitors are essential.

As examples of a glocal approach to science education in museums, I offer two museums operated by the National Autonomous University of Mexico (UNAM) in Mexico City: the Museo de la Luz (Museum of Light), in the center of the capital, and Universum, on the UNAM campus.

The museum of light

The Museo de la Luz (www.luz.unam.mx) is located in a 16th-century church with historic painted murals



Photos courtesy UNAM

Housed in a building of historic significance for Mexicans (right), the Museo de la Luz preserves strong ties to its neighborhood. Above: Glass artist Narcissus Quagliata created this exhibit for the museum's Light in Art gallery.



and stained-glass windows. The local context is both historical and social. Constructed by the Jesuits during the Spanish conquest of Mexico, the building remained a church until 1767. In 1822, Agustín de Iturbide took his oath there as the first emperor of a newly independent nation. In 1824, Mexico's first constitution was signed there. The murals date from the 1920s, when intellectuals met there to discuss national issues. In 1929, the building became the property of UNAM, which used it for a variety of purposes. In 1996, almost in ruins, it was turned over to Universum for development as a museum.

Over time, the surrounding neighborhood had changed for the worse. Once the prosperous center of the city, today it is a low-income, often dangerous area, surrounded by the uproar of thousands (*continued on page 7*)

Shared Resources:

Building Capacity in Rural Mexico

By Lorena Baca

At Mexico City's Papalote—Museo del Niño, founded in 1990, our commitment is to children first, but also, through the children, to society as a whole. To understand that, it is necessary to understand the context in which we work.

Mexico is a nation of just over 100 million people living in a little less than 2 million square kilometers (764,000 square miles). Three-quarters of the population lives in urban areas, with Mexico City alone numbering 8.7 million inhabitants. The economy is the largest in Latin America and, according to a 2005 “Society at a Glance” report by the Organisation for Economic Cooperation and Development, eighth largest in the world.

Yet despite this seeming prosperity, the gap between rich and poor remains huge; the same OECD report lists Mexico as 23rd in per capita income. In 2004, Mexico's Secretariat of Social Development found that 47 percent of Mexicans live in poverty.

We also have a low level of education. In a country where 45 percent of the population is less than 19 years old, the average Mexican child gets only 12 years of schooling, compared to 19 years or more in developed nations. We also have a sizable population (6 percent) of indigenous peoples, many of whom live in marginal conditions, with no access to education.

These challenges put science out of reach for a large number of Mexicans. The problem is not in our resources, however, but in their distribution. In an effort to make science more socio-economically inclusive, Papalote has been bringing informal science education to those who cannot come to the museum and helping to grow new institutions that can provide life-

changing experiences for children in the poorer regions of Mexico.



Zigzag, in the Mexican state of Zacatecas, is one of eight new museums developed with help from Papalote.

Leveraging “know-how”

Papalote has long offered programs and activities for students within Mexico City itself, including children from disadvantaged communities. The museum's fight against poverty and marginality outside the capital began in earnest in 1996 with the creation of three traveling museums.

Known as Los Papalotes Móvil, these museums-on-wheels bring our programs and exhibits to rural and indigenous areas. To date, they have traveled in 23 states of the republic and in Guatemala, staying for three to six months in each new city or community. Of the 263 “microregions of high poverty” identified by Mexico's Social Development department, more than half have been visited by the Papalotes Móvil. Attendance of more than 5 million visitors per year confirms the success of the program.

Yet it soon became apparent that this one initiative could not serve all of the need. Within Mexico alone, the requests were so many that the travel-



A Cora boy tries a Papalote Móvil computer activity in Tepic, Nayarit, Mexico.

ing vans could not keep up. What was needed was a way to bring Papalote's know-how—our expertise in marketing, public relations, maintenance, finance, educational programs, exhibitions, fund-raising, and staff training—into the communities through locally based institutions.

It was decided that Papalote would enter into partnerships with state governments and the private sector to create permanent, community-based, efficiently managed museums that would integrate interactive fun with science knowledge. Because it is difficult for many institutions to obtain resources within the Mexican environment, funds for the new museums were to be raised locally, but all of the development—the concept, the design, the interior and exterior architecture, the production of exhibitions, the management model, and the training of the staff for the whole operation—

would be handled by Papalote. Each project would also have its own identity, depending on the place and its people, and the local educational levels, customs, styles, and traditions.

A new generation of museums

In line with this strategy, Papalote has helped to develop new museums in Sonora, Hidalgo, Guerrero, Puebla, Mexico City, Zacatecas, Veracruz, Tabasco, and San Luis Potosí. All eight are related to science and technology, but each varies in its exhibitions and architecture, and each has a room devoted to its own state. Master plans also exist for a new natural history museum in Mexico City and for new interactive children's and science museums in Jalisco and San Luis Potosí.

The success of the initiative encouraged us to form partnerships outside Mexico as well. In collaboration with local governments, we have helped to create exhibits for Maloka, in Colombia; Proyecto Museo de los Niños, in Guatemala; the Museo Interactivo El Mirador, in Chile; and El Chiminike, Centro Interactivo de Enseñanza, in Honduras. Papalote also conceived, constructed, and operated the Mexican Pavilion in Expo Hannover 2000, an exhibition that attracted 1.3 million visitors over five months.

All of these projects have generated local impact not only in number of visitors but, more importantly, in public engagement with science and technology. The number of visitors in the new museums averages 1,000 per day. Other noticeable results include more coverage of our work by the Mexican media, an increase in the number of scientists supporting the projects, and, in general, a greater positive response from the political and civil sectors.

From that one decision to share the museum's know-how, we are seeing the success of many small projects across Mexico. In the process, Papalote has made its name as a key developer of interactive, educational spaces. ■

Lorena Baca is manager of international projects at Papalote—Museo del Niño, Mexico City, Mexico; www.papalote.org.mx.

(continued from page 5) of vendors' stands. Close by, there is a school for blind people, and homeless children live on nearby streets. It was clear that the local component could not be ignored. This could not be just a science museum. We also had to tell the story of the building and take into account the local communities.

Visitors who enter the beautiful structure today find some 100 exhibits on light grouped in seven areas: the Nature of Light, Light and the Biosphere, a World of Color, Light in the Universe, Vision, Light in Art, and Light in Time. This last gallery is devoted to the historical, social, and cultural context of the building.

The glocal approach also extends to programming. The Museo de la Luz offers outreach programs, traveling exhibits, workshops for children, lectures, shows, and even a guided tour for the blind with a hands-on workshop. A special program focuses specifically on the homeless and people with disabilities; staff members work with social agencies that serve these populations and also receive instruction on how best to help these audiences become active constructors of their own experiences and knowledge.

Living with volcanoes

Opened in 1992 on the UNAM campus, Universum (www.universum.unam.mx) has a different story. The museum comprises 14 halls devoted to different principles of physical, biological, and social science. Its intensive programming includes science plays, demos, children's and teachers' workshops, summer classes, lectures by famous scientists, films, videos, and traveling exhibitions. From the beginning, Universum has been involved with the community, displaying works by local artists and working with specialists and civic associations to adapt its offerings to the needs of local audiences.

A recent temporary exhibition, *Under the Volcano: What We Should Know about Popocatepetl*, serves to illustrate Universum's glocal approach. Popocatepetl and its companion, Itza-

cíhuatl, are a familiar part of the landscape of central Mexico. Artists have painted them, and stories have been told about them. But they are also active volcanoes, in close proximity to several cities and hundreds of small towns, and as such they pose many risks, from mudslides and lava flows to the expulsion of volcanic materials.

Together with vulcanologists and disaster experts, Universum designed a traveling exhibition to reach households living within a 100 km radius of the volcano. Front-end evaluation included interviewing people in this high-risk area to find out what they knew and understood about volcanoes, as well as how they felt about them.

This process was extremely helpful in shaping the exhibition. For one thing, we learned that many people thought volcanic ash was similar to wood ash, light and easily blown away. In fact, the expelled pulverized rock can cause severe air pollution and, when combined with water, quickly turn into a heavy substance almost like concrete. One of the exhibits we designed shows how wet ash, swept into a (transparent) pipe, solidifies and clogs the drain.

As the exhibition has traveled, feedback from visitors has helped us to improve it. The displays now include information about other volcanoes around the world, as well as the Volcán de Colima, another active Mexican volcano. Visitors particularly enjoy the many stories about Popocatepetl, going back to the 16th century.

Of course, the exhibition also covers the science behind volcanic eruptions, and gives technical information on how the volcano is monitored and how that information is used to prevent disasters. A final section explains what each person should do before, during, and after a volcanic event. By moving from the personal to the scientific and back to the personal, Universum has clearly followed the principle of "glocality" in presenting science. ■

Elaine Reynoso Haynes is an exhibit planner at Universum, Dirección General de Divulgación de la Ciencia, UNAM, Mexico City, Mexico.



Malaysian girls participate in a Petrosains outreach program. Photo courtesy Petrosains

In Malaysia, the advent of globalization has brought extensive development and change. Leaders and the public share a common goal, to achieve the status of a fully developed nation by 2020.

To that end, the people have adopted a slogan, *Malaysia Boleh* (“Malaysians Can Do It”), that cheers us on to work harder. It might sound clichéd to outsiders, but to us, this mantra has been the impetus for many solid and prestigious projects, from educational and sociopolitical policies to economic and developmental programs.

In line with *Malaysia Boleh*, policy makers, educators, intellectuals, and planners have been scrambling to put in place a system that will generate more homegrown scientists and technologists. Creating an environment that generates creative and talented people is not easy, and we have a long way to go before we can declare ourselves even a scientifically literate society. The truth is that we are still importers of technology and will remain so for some time.

The danger of disparity

Like many developing countries, Malaysia faces a classic challenge: the dilemma of social imbalance. For various historical and sociocultural reasons, our nation still exhibits significant disparity in social and educational achievement—most visible in the distinctions between rural and urban populations. People who live in cities and

Malaysians Can Do It: Supporting a National Vision

By Harison Yusoff

towns, having access to excellent school facilities and other supporting infrastructures, are more likely to excel and to wind up in the higher social bracket. People who live in remote areas, lacking resources and opportunities, tend to remain backward from the socioeconomic perspective.

It is not good when certain groups benefit disproportionately from the progress of a nation. Such disparity is a root cause of social ills, ranging from minor discontent to political disharmony. If left unchecked, it may provoke crises detrimental to a growing economy like ours.

It is clear to all that we need to devise a formula for social integration. To address these challenges, the government has undertaken several powerful measures in the past decade or so. Because such capacity-building and social-equity initiatives require tremendous capital and social investment, partners from the private and corporate sectors, institutions, and social organizations have been roped in to help. Success has been incremental, yet we are convinced that it is imminent.

As a responsible corporate citizen, Petrosains’s parent company, Petroliam Nasional Bhd (Petronas), is one of these partners. Together with nonprofit organizations, the company has initiated and supported numerous social, environmental, and community projects in Malaysia.

Petrosains is just one of many educational training facilities developed and funded by Petronas; others include a kindergarten and a technology-based university. The company also supports a generous scholarship program for high-achieving students from poor or underprivileged backgrounds in countries from Asia to Africa to the Middle East.

A pair of initiatives

At Petrosains, we work hard to ensure that everyone who comes to the science center feels welcome, regardless of race, culture, or socioeconomic class. But we also have undertaken specific initiatives beyond our walls to address social and educational inequities. The following are two examples of our efforts to make science education freely available throughout Malaysia.

Orang Asli outreach

The indigenous peoples of Malaysia, about 20 different groups in all, are known collectively as the Orang Asli. They number approximately 100,000 individuals, most of them living in remote villages in the southern Malay Peninsula. Clearly, this is a population cut off from the educational resources and economic engine of the rest of the country.

Bringing science to communities like these is the goal of *Sahabat Petrosains*, a program that not only takes science outreach activities to the villages, but also brings Orang Asli children to the science center for a camp-in experience. The schools choose who will participate, based on students’ discipline, attendance, and improving performance, and Petrosains staff members who are of indigenous descent serve as advisors to the program.

For the village children, the visit to Petrosains is often the first time they have been to a city. They take great pleasure in things we might consider trivial—riding on escalators, play acting, coloring, shaping modeling clay, singing around a campfire, watching 3-D films. Their wonder and delight inspire Petrosains staff as well.

“This program has been most beneficial, not only for [the Orang Asli

children] but also for us,” says Petrosains general manager and CEO Tengku Nasariah Syed Ibrahim. “The journey has truly enriched us as we now know more about their lives and culture Our hope is that [they] will always feel accepted and confident that they will be included as a significant benefactor of our programs.”

Since we started *Sahabat Petrosains* in 2002, we have been able to reach more than 2,000 children, both directly and, through community contacts, indirectly. Feedback from their teachers tells us something about the long-term effects of our work:

- “[The children] became less shy and introverted and seemed to want to talk more, especially about what they saw in the city.”
- “School attendance shot up; more children stayed in school until the end of the year, when in the past dropping out at midyear was a norm.”
- “... increased perception of the world around them ... appreciate their homes, the forest and their environment, and willing to talk about all these, when previously they did not display any such interest.”
- “Class achievement improved, especially in science, and they seemed more motivated because ... achievers are rewarded with a trip to Petrosains.”

Satellite centers

Another significant contribution to educational equity is the work done at Petrosains’ two satellite centers, one in the northern state of Penang and the other on an island called Langkawi, close to southern Thailand. These centers strive to provide learning opportunities to people who have little money or access to education.

On the island of Langkawi, in particular, the majority of the people would never make their way to the city to visit our science center. These villagers make their living at sea. When Langkawi children are asked what they want to be when they grow up, most say “fisherman.” A few want to join the police or armed forces or become car mechanics. They don’t seem to be aware of any other possibilities.

In places like this, the role Petrosains can play is magnified. Apart from supporting social and cognitive processes, we also pay attention to children’s emotional and psychological development. We provide interactive and hands-on programs and exhibits at the satellite centers, and staff travel to schools and the community on a regular basis to conduct workshops and other fun, educational activities. We work with teachers to enrich their teaching and learning. We try to touch as many people as possible, traveling to schools in remote villages and even taking boat rides to smaller islands.

A vision of equity

Why would a science center take on these added responsibilities? Aligned with our parent company’s agenda, we see ourselves as partners to the movers and visionaries of our country. Like other responsible science centers and institutions, we believe that a strong, knowledgeable community is key to a nation’s success.

Malaysia’s government has placed a strong emphasis on bridging the knowledge divide and raising educational performance among the rural population. Our leaders view the people as a valuable asset that will continue to contribute to the nation’s future growth and success. They want to ensure that no one is left behind.

Recently our prime minister, Abdullah Badawi, gave a strong testimony for the role of inclusion: “The country’s aim to become a developed nation hinges greatly on the cultivation of correct values and culture among the people, which include transparency, trustworthiness, integrity, fairness, honesty, and accountability.”

At Petrosains, we strive to promote harmony, social integration, and good values in everything we do. That is equity in a nutshell. Petrosains is committed to the growth of the people and the vision of the nation. ■

Harison Yusoff is director of programs at Petrosains, Kuala Lumpur, Malaysia; www.petrosains.com.my/.

SOCIAL EQUITY RESOURCES

Readings

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- Walker, Perry, and Sarah Higginson. *So You’re Using a Card Game to Make Policy Recommendations?* London: Nef, 2003. Available online at www.neweconomics.org/gen/democs.aspx.
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Web sites

4th Science Centre World Congress:

www.museudavida.fiocruz.br/4scwc/index.htm
Posted on the site are talks and papers, daily newsletters, and selected videos of parallel and plenary sessions at the April 2005 gathering hosted by the Fundação Oswaldo Cruz/Museu da Vida, Rio de Janeiro, Brazil.

Science and Development Network:

www.scidev.net

Featured dossiers address science and technology issues as they pertain to developing nations. Six “gateways” lead to materials on Latin America, Sub-Saharan Africa, Middle East and North Africa, South Asia, China, and Southeast Asia.

Fostering Deliberative Democracy: *Europe's DeCiDe Project*

By Andrea Bandelli

Deliberative democracy—the practice by which lay citizens gather to discuss matters of local or national import and decide together how best to proceed—is a venerable institution. (Think of the Athenian agora or town meetings in New England.) “Deliberation” presumes that no one individual has the best answer, but rather that the group will come to a mutually acceptable solution through a process of structured conversation. Historically, this approach has worked for a wide range of issues, from land-use planning to budget formulation.

As nations became larger and more complex, such participatory forums became less common. But in the past 20 years or so, deliberative democracy has enjoyed something of a revival. Governments facing public censure for controversial policies have increasingly sought ways to engage the public in discussion and debate particularly on science and technology issues, such as water use, climate change, or genetic research.

These occasions have been labeled with a variety of names—consensus conferences, deliberative opinion polls, citizens’ juries, scenario workshops, stakeholders’ dialogues, deliberative and inclusive processes. They vary by the number of people involved, the amount of information that participants receive, and the role of the final deliberation in the formal policy-making process. This last element is crucial because it has been shown that participants exhibit stronger social engagement when

they know that their decisions will be heard and taken into consideration.

To achieve that level of trust, the organizing bodies must create the right framework to make meaningful use of debates, ensure that the quality

with citizen participation in science and technology decision making.

Called “DeCiDe” (Deliberative Citizens’ Debates in Science Centers and Museums), the project has three main goals:



In a test of a prototype DeCiDe kit on neurology and brain science, participants study the cards . . .

of discussion is high, and establish the necessary links with the policy-making system. This can be thought of as the “vertical” effect of deliberative democracy—letting policy makers know what the people think.

There is also a “horizontal” effect, which includes not only the individual learning that occurs during a session, but also the general benefit to society when people understand the democratic system and feel that they are competent to participate in it.

A serious game

In the spirit of deliberative democracy, four ASTC members—At-Bristol, La Cité des Sciences et de l’Industrie, La Città della Scienza, and Heureka, the Finnish Science Centre—have joined with the Ecsite network to engage in a Europe-wide experiment

- to raise European citizens’ awareness of deliberative methodologies
- to develop an effective tool to conduct deliberative consultations
- to monitor change of opinion on contemporary science issues.

A key partner in the project has been Nef, a British foundation active in the field of democracy, social inclusion, and participation. Nef had already developed a program of citizen participation called “Democs” (Deliberative Meetings of Citizens), and this became the model for DeCiDe.

Based on a game format, DeCiDe debates use a kit that can be downloaded from the Internet and printed in-house. The game is designed for six to eight participants with no prior knowledge of the topic. Components include placemats on which participants can write their comments; a Policy Position Voting Grid for use by

the group, feedback forms, and several sets of cards, as follows: 24 green “info” cards, 4 red “policy position” cards, 24 blue “issue” cards, 8 “story” cards, 3 “cluster heading” cards, several blank white cards, and a blank yellow card for each player.

During the first phase of the debate, participants select info cards, which represent facts relating to the subject of the debate, and issue cards, which present arguments intended to sustain a particular view on that subject. These cards are often a catalyst to unlock personal experiences and

Vertical and horizontal outcomes

The first topics developed for DeCiDe include nanotechnology, stem cells, and HIV/AIDS. As this article goes to press (mid August), the plan is to choose 12 European science centers and museums that will hold six DeCiDe sessions each. The results of the debates will be posted on the project’s web site for comparison and analysis. In collaboration with the European Commission, the outcomes will also be used

available on the Internet, and the only infrastructure needed is a table and some chairs. It is therefore an activity perfectly suitable for outreach.

The program is also potentially self-sustaining. In the trials conducted during the development phase of DeCiDe, a large majority of participants expressed a willingness to organize similar debates with their own family, friends, and colleagues. The web component of the project helps to collate the results, make them available to the general



listen to different viewpoints . . .



. . . and map out their consensus on the policy position grid.



Photos by Erik Wong

knowledge that people already have. In this phase, participants clarify their personal views on the topic at hand.

In the second phase, participants start to “cluster” their cards around common themes that emerge from their discussion. Each participant contributes his or her part to the definition of the cluster, and the final result is the achievement of the whole group. The goal of this phase is to define the group’s shared view on an issue, which will then be used to define and vote on the policy positions.

Finally, the group is asked to vote on four different policies for regulating the issue under discussion, deciding which one gets their consensus. (Participants can also formulate a new policy if they wish.) The clusters help them to put aside their personal interests and use their common view to inform their vote.

to inform the policy-making process at the European level—thus ensuring “vertical” spreading of the results.

It is difficult to assess in advance exactly how this process will take place. Among politicians, there is always a marked interest to get involved, but little concrete evidence of real plans to use the results. Different strategies will be used in DeCiDe, however—from the direct participation of policy makers in the DeCiDe session itself to the organization of debates as part of a framework of official events at the local and national level.

The real strength of the consortium developing the DeCiDe project may lie in its capacity to build the “horizontal” value of participative activities. The activity itself is one that anybody can organize with a minimum of effort. All materials are

public, and provide a stimulus for citizens to better understand how policy decisions are made.

An argument might be made that this activity engages only a limited audience in terms of numbers. This is true. But the quality of the results creates a social (and political) value superior to the sheer volume of participants. A challenge for our field is to create new organizational models that might allow us to capitalize on this value and, ultimately, to sustain it. ■

Andrea Bandelli (andrea@bandelli.com) is an independent consultant living in Amsterdam, The Netherlands. For background on Nef’s Democs project, visit www.neweconomics.org/gen/democs.aspx; additional information on the DeCiDe project is available at www.ecsite.net.

Paying a Social Debt:

Brazil's Museu de Ciências e Tecnologia

By Getúlio P. Carvalho

Among Brazilian science centers, the Museu de Ciências e Tecnologia in Porto Alegre, Rio Grande do Sul (known as “the MCT”), stands out in various aspects, but above all for its social impact. Here is how I became familiar with the museum and came to support its development.

In 1998, I was head of the Organization of American States (OAS) Inter-American Education Program, based in Washington, D.C. In that capacity, I frequently attended high-level meetings of education ministers—gatherings that tended to produce many well-intentioned resolutions but few resources to support relevant educational projects for the poorest social groups in the Americas.

After one such meeting in Brasília, I went to see an old friend, José Israel Vargas, then Brazil's Minister of Science and Technology. Vargas's long experience with national and multinational projects helped me to take stock of my immediate concern, a decline in regional technical programs and the attendant weakening of institutions like the OAS. We spoke of other topics as well, and not long afterward I got a call from Regina Weinberg, executive director of Vitae.

Created in 1985, Vitae is a São Paulo-based philanthropic institution, supported by the Lampadia Foundation of Liechtenstein, that primarily finances projects for the improvement of vocational education, formal and informal science learning, and the infrastructure of cultural entities. Would I be interested in the position of general manager? Weinberg asked. My role would be to review and follow up on the foundation's educational and cultural projects, with a main mission to support science centers. In January 1999, I found myself headed back to Brazil.

A social challenge

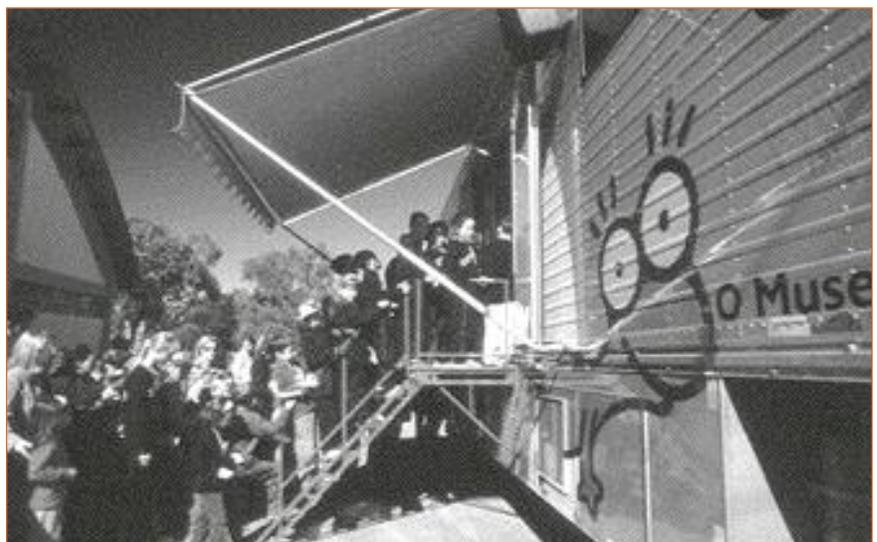
One of my first assignments was to visit the MCT. The museum, founded in 1967 by the Pontifical Catholic University of Rio Grande do Sul (PUCRS), receives university funding for its operating expenses but is expected to raise its own resources for programming, expansion, and other projects. It was, in fact, through a wise combination of funds from various sources that MCT director Jeter J. Bertolotti, a biologist and PUCRS professor, had been able to transform his personal, one-room collection of rocks, animals, and other items into a dynamic science center.

In 1995, the MCT had won a grant in a contest held jointly by the Brazilian Ministry of Science and Technology and the World Bank, and Vitae supplemented the competitively acquired funds with a grant for an area of interactive exhibits. The project, as is customary for us, began with consulting.

A panel of three consultants was chosen: Dietrich Schiel, director of the

Center of Scientific and Cultural Dissemination at the University of São Paulo; Jorge Flores Valdés, head of the Universum science museum at the National University of Mexico (UNAM); and David W. Ellis, president of the ASTC-member Museum of Science, Boston. Ellis was particularly active in the development process—visiting Porto Alegre several times, organizing a staff exchange between his museum and the MCT, and hosting an MCT planning team in Massachusetts.

When I took up my duties for Vitae, the MCT was already engaged in valuable education programs. Staff members had helped to develop a master's program in math and science education to be offered by the university. In a town where the wealthy generally send their children to private schools, the MCT was cooperating with the public school systems to provide teacher training, helping to improve the education available to low-income families. But the museum was also making plans to address a new challenge: making its



After PROMUSIT exhibits are unpacked at each destination, the traveling exhibition's trailer becomes a multimedia center. Photo courtesy Museu de Ciências e Tecnologia/PUCRS

services more readily accessible to the poorest citizens of Rio Grande do Sul.

Science on wheels

In the Americas, Brazil is notorious for her income and wealth concentration. According to the 2004 UNDP Human Development Report, the nation has a Gini coefficient (a comparative measure of income inequality developed in the early 1900s) of 59.1. By comparison, the Gini coefficient for Uruguay is 44.6, and for Canada, 33.1. This concentration of wealth among a small percentage of the population creates tremendous inequity in the distribution of socioeconomic opportunities.

There would seem to be little that a science center could do to counter the situation. But the MCT was not deterred. Museum staff had determined to undertake two new initiatives: a traveling collection of exhibits that could reach to the farthest corners of the state, and a program that would bring to the museum children from low-income families within the Porto Alegre metropolitan area for specially designed activities. Overseeing Vitae's support of these two projects was among my first duties in Brazil.

Despite enthusiastic support from PUCRS president Brother Norberto Rauch, budgetary constraints prevented the immediate execution of the initiatives. It wasn't until late 2001 that MCT launched its traveling exhibition PROMUSIT (Projeto Museu Itinerante). The exhibition consists of some 30 interactive exhibits, all cleverly designed to fit into a large semi trailer. At each destination, the trailer is unloaded and the exhibits are set up in a local community center or, failing that, in a large tentlike structure. This frees the trailer to be used over the next three days as a classroom environment, with Internet access, presentation equipment, and video microscopes.

In October 2003, Alan Edwards and Harry White of Techniquet, an ASTC-member science center in Cardiff, Wales, U.K., collaborated with the MCT to hold a joint workshop for the staff of Brazilian science centers in

Porto Alegre. The topic was exhibit design and construction, and the PROMUSIT exhibition was set up for participants to explore.

"Professor Bertoletti gave a detailed description of how it operated," Edwards and White wrote in their final report. "It was impressive to see how the concepts underlying the PROMUSIT had evolved in the 18 months since Techniquet's last visit. It had been so popular and well used that the truck's flooring had been renewed twice.... The truck's tail lift serves a double duty for loading and unloading the PROMUSIT, but also provides easy access for disabled visitors."

The traveling exhibition project has certainly reached its goal of disseminating knowledge and promoting science to poor schoolchildren, Vitae's target public. To date, PROMUSIT has helped more than 500,000 schoolchildren from Brazil's smaller cities and towns gain access to museum programs, exhibits, and multimedia equipment. How much is retained in their hearts and minds I cannot tell, but one thing is clear: The MCT has been unable to keep up with the demand. Of the 490 municipalities in the state of Rio Grande do Sul, 65 have been visited by the traveling exhibition so far, and the waiting list is full.

Meanwhile, as part of the initiative to reach out to the poorest children in its metropolitan region, the MCT offered special training to the staff who would be responsible for this more diversified audience, which includes students from the indigenous Caimangue community and a disproportionately large number of pupils in need of special attention. A bus was purchased to bring the children to the museum in the morning, returning them to their schools at the end of the day; the museum provides admission and lunch for free. So far approximately 30,000 visitors, including 3,256 teachers, have benefited from this program.

The next step

Since late 2004, the MCT, using its own funds as well as those from Vitae,



More than 100,000 visitors experienced exhibits from PROMUSIT at the 4th Science Centre World Congress EXPO in April. Photo courtesy Museu de Ciências e Tecnologia/PUCRS

has offered free internships to professionals from other Brazilian science centers. A big draw for these interns is first-hand experience with PROMUSIT and the program for disadvantaged children.

Thanks to the participation of the traveling exhibition in the recent 4th Science Centre World Congress EXPO, which was seen by over 100,000 visitors in Rio de Janeiro, the two MCT initiatives have attracted the attention of Brazil's Ministry of Science and Technology. Officials have insisted that PROMUSIT visit the capital, where it will be viewed by influential politicians and bureaucrats. Eager to gain new allies for his programs, Bertoletti is planning the upcoming visit with care.

Vitae's association with the MCT will soon come to an end. The funds of the Lampadia Foundation, planned to last for 20 years, are close to exhaustion, and our operations will end in December. We have fought the good fight and are about to clear the way for other, similar organizations to step in. But we believe that the museum and its work should and will continue.

Recently, I spoke with former Techniquet director Colin Johnson, who expressed to me his deep satisfaction with the MCT's activities and his opinion that Jeter Bertoletti should already have received an award of national recognition for his leadership. I would be delighted if this article could represent a step, however small, in that direction. ■

Getúlio P. Carvalho is general manager of Vitae (www.vitae.org.br); he can be reached at ggeral-vitae@dialdata.com.br. For additional information on the MCT programs, visit www.mct.pucrs.br.

The Abbott Partnership Program: Addressing Equity in New Jersey's Schools

By Ellen Wahl

In 1996, fewer than 4 percent of public school students in Jersey City, one of the poorest school districts in New Jersey, visited Liberty Science Center (LSC), a 3-year-old museum located in their own community. The number of visitors from neighboring urban centers was equally low. Even as LSC attracted overflow crowds from the affluent suburbs, few families came from nearby Newark, and fewer still from Trenton, New Brunswick, Camden, and Paterson.

One year later, all 30,000 Jersey City students had visited the science center. Nine years later, more than 170,000 students, representing the state's 31 poorest school districts, would benefit annually from an array of programs offered by LSC. Their options range from on-site field trips and multi-day museum experiences, to electronic field trips broadcast from the exhibit floor and traveling classroom workshops/assemblies delivered to the schools, to career-development experiences that include internships, mentoring, and interactive videoconferences beamed directly from cardiac, neurosurgery, and kidney-transplant operating rooms.

That's not all. Each year, nearly 25,000 families from the 31 districts attend community evenings and events at LSC and use their free passes to visit the science center on weekends, after school, and on holidays. Some 1,000 teachers a year take advantage of LSC's professional development workshops and institutes.

What brought about this startling change? The answer lies in a pair of landmark educational equity decisions handed down by the New Jersey Supreme Court—and in the science center's readiness to respond.

The Abbott rulings

In 1981, the Education Law Center (ELC), a nonprofit advocacy agency in Newark, New Jersey, filed a class-action suit with the state on behalf of the more than 360,000 children then attending public schools and preschools in 28 poor, urban New Jersey communities. In *Raymond Arthur Abbott, et al., v. Fred G. Burke, et al.* (Abbott), the plaintiffs contended that the state's existing system for funding education—an underfunded formula approved by lawmakers in 1975 to replace a system based on local property taxes—was “inadequate to assure a thorough and efficient education” for students from these disadvantaged city schools.

Over the next 16 years, the legislature tried various ways to address the funding inequities, but the case kept winding up back in court. In 1997, the New Jersey Supreme Court handed down the first of two decisions in which it ruled definitively for the plaintiffs (Abbott IV) and ordered a new set of education programs and reforms (Abbott V, 1998) aimed at giving every child in the state the opportunity to attain “his or her own place as a contributing member in society, with the ability to compete with other citizens and to succeed in the economy.”

Among the provisions of the Abbott “education adequacy” framework are

- rigorous content and standards-based education, with per-pupil funding equal to that in suburban schools.
- high-quality preschool education for all 3- and 4-year olds.
- supplemental (“at-risk”) programs to address student and school needs attributed to high poverty.
- new and rehabilitated facilities to adequately house all programs.

- school and district reforms to improve curriculum and instruction and enable students to achieve state standards.

- state accountability for implementation and the assurance of progress in improving student achievement.

Leveraging science resources

At Liberty Science Center, staff recognized the Abbott decisions as an opportunity to make a contribution to science education statewide. Shortly after Abbott IV was handed down, they approached the New Jersey Department of Education with a proposal.

As LSC president Emlyn Koster later described the process to a U.S. congressional subcommittee (“Technology and Education: A Review of Federal, State, and Private Sector Programs,” March 8, 2001), “we were not in search of a handout, but stressed our desire to earn public sector support through collaborative involvement with science education reform.”

The science center began by showing that all of its field trip, traveling science, and videoconferencing curriculum materials were aligned with the New Jersey Core Curriculum Content Standards. Said Koster, “We demonstrated how our teacher professional development workshops and institutes are attuned to the emerging state certification requirements. We ... suggested the inclusion of a third emphasis on the family, to extend school and science center learning into the home. And we offered to provide families with a free pass to the center, a quarterly newsletter, and monthly community evenings, as part of an inclusive package of science education services.”

The contract establishing the Abbott Partnership Program at Liberty Science Center was signed in late 1997; it has been renewed each year since. Annually, the science center develops agreements to provide a comprehensive set of services to the various Abbott districts. School officials are asked to respond to some searching questions: *What can LSC offer to support your efforts to raise the quality of science education? Where do you need to fill gaps in expertise, content, or technology? What concept or skill areas are typically problematic for your students to grasp, and where is there a match with LSC's areas of strength? How can our educators and interactive experiences help to capture your students' imaginations and attract them into science?*

Increasingly, these agreements focus on how our interventions can serve as levers of larger-scale change. As Abbott continues to evolve (the latest ruling, in February 2004, was Abbott X), districts are looking for impact that is deeper and more sustained than an episodic visit. At the science center, we are expanding our program development efforts to respond to expressed needs in content, skill building, and career development, and to stay ahead of the curve in science, science education, and changing assessments—not just state tests, but also No Child Left Behind and the revision of the National Assessment of Educational Progress (NAEP) due in 2009.

As the program matures, LSC is undertaking more in-depth evaluation to measure impact. To date, we know that the program has made an enormous difference in increasing *equity of access*, engaging more students from communities with limited opportunities in science. It has also had impact on *equity of treatment*, enriching the science experiences students receive in their schools and preparing teachers with up-to-date content and pedagogy.

It remains to be determined how well the partnership is helping to move toward *equity of outcome*. What contribution does it make to raising the quality of science education in these districts? to helping the state meet its court-ordered obligation to provide a

“thorough and efficient education” to every student? to reducing the gaps between demographic groups and preparing students to achieve and persist in science education and careers?

Within New Jersey, there has been some controversy over the Abbott decisions, but the response from the districts that work with LSC has been strongly positive. For the science center, a program launched as an extension of a belief in the social responsibility of museums has turned out to be financially viable as well, with a direct impact on the bottom line. This year, the Abbott contract brought in more than \$6 million in state funding. And when LSC closes its doors on Labor Day for a 22-month renovation, the program won't skip a beat. In fact, we plan a doubling of our outreach to the Abbott schools over the next two years.

Results and implications

New Jersey is not the only U.S. state to have experienced conflict over equity in educational funding. The system of funding schools through local property taxes has come under attack in many states for limiting access to high-quality teaching and learning, and for causing or compounding gaps between demographic groups in achievement and participation. Although educators have made some progress in reducing the gaps in the areas of mathematics and science, the effort has not yet produced a scientifically literate public or a technologically prepared workforce.

How science centers and museums relate to formal education remains a subject of continuing debate. Without blaming one part of the system or another, it is essential that all educators recognize the need for collaborative effort that touches not just students but their families and the community as a whole. Clearly, our schools and teachers need help if they are to incorporate new developments in science and technology into the curriculum, to prepare young people for science and technology careers, and to find the time, amid accountability demands, to turn students on to the open-ended and never-

done process of scientific investigation. Science centers are well placed to offer that help.

The arguments for diversity and full representation in science are compelling. “Who does science does matter,” wrote scientist/educator Cecily Cannan Selby in her 2002 report of that name to the Henry Luce Foundation. Good science depends on the diversity of the questions that are asked, Selby said, and the questions in turn determine the investigations that are pursued. A lack of diversity among researchers therefore hurts science itself. On a parallel track, Patricia Campbell, Eric Jolly, et al., argued in *Upping the Numbers* (GE Foundation, 2002) that ongoing shortages in the scientific and technical workforce could be remedied if women, minorities, and persons with disabilities were represented in science in the same percentages as they are in the general population.

It is Liberty Science Center's contention that museums have a critical role to play in who learns science and who does science. This is a shared responsibility that requires intentionality to redress historical wrongs, as well as sustainable strategies for the future. We may not be able to eliminate poverty, but we have a responsibility to help counter its effects on science education in schools and communities that have limited financial resources.

At LSC, the Abbott Partnership Program is a centerpiece of our commitment to social responsibility, but it is also a centerpiece of our budget. State-level equity financing decisions (and other initiatives aimed at reducing educational gaps) offer not just a chance to improve educational access, but also an opportunity to decrease dependence on gate and other on-site revenue.

Equity without revenue is likely to stay on the margins. Equity with revenue is a powerful force for change. ■

Ellen Wahl is senior director for program development, learning, and teaching at Liberty Science Center, Jersey City, New Jersey; www.lsc.org. She will lead the session “Equity from Top to Bottom (Line)” at the 2005 ASTC Annual Conference.

Calendar

THROUGHOUT 2005

World Year of Physics 2005: Einstein in the 21st Century. *Details:* www.physics2005.org

SEPTEMBER

12 Math Momentum Workshop: Algebra. Hosted by the Oregon Museum of Science and Industry (OMSI), Portland, Oregon. *Details:* Sandy Baril, sbaril@omsi.edu; 503/797-4560

19–23 GSTA International Conference and Trade Show. Boston, Massachusetts. *Details:* www.giantscreentheater.com

26–Oct. 1 Theatre in Museums Workshop. Science Museum of Minnesota, St. Paul. Part I (Sept. 26–28) open to all; Part II (Sept. 29–Oct. 1) requires previous participation. *Details:* Tessa Bridal, tbridal@smm.org

OCTOBER

15–18 ASTC Annual Conference. “Partnerships for Excellence.” Hosted by the Science Museum of Virginia, Richmond. *Details:* www.astc.org/conference

NOVEMBER

3–5 Museum Computer Network Conference. “Preserving Knowledge into the Future.” Boston, Massachusetts. *Details:* www.mcn.edu/

7 Math Momentum Workshop: Data and Measurement. Hosted by the Science Museum of Minnesota, St. Paul. *Details:* Majja Sedzielarz, majja@smm.org, 651/221-4554

9–12 Hands On Europe Conference 2005. “Serving Different Audiences.” Hosted by ZOOM Children’s Museum, Vienna, Austria. *Details:* www.hands-on-europe.net

10–11 ASTC RAP Session.* “A Different Angle: Mathematics Exhibits in the Science Center.” Hosted by the Museum of Life and Science, Durham, North Carolina.

16–18 8th Annual SAASTEC Conference. Hosted by the MTN Sciencentre, Cape Town, South Africa. *Details:* mike.brunton@MTNSciencentre.org.za

DECEMBER

2–3 ASTC RAP Session.* “Innovative Techniques for Training Floor Interpreters.” Hosted by the New York Hall of Science, Queens, New York.

FEBRUARY 2006

19–25 National Engineering Week (USA). *Details:* www.eweek.org

25–Mar. 5 National Engineering Week (Canada). *Details:* www.engineeringweek.on.ca

MAY 2006

10–14 6th ASPAC Conference. “Engaging and Communicating Science.” Hosted by Scitech Discovery Centre, Perth, Western Australia. *Details:* www.scitech.org.au

JUNE 2006

8–10 Ecsite Annual Conference. Hosted by Technopolis, the Flemish Science Centre, Mechelen, Belgium. *Details:* www.technopolis.be



Prepare to be amused by satirist Andy Borowitz at the ASTC Annual Conference.

Photo © Sigrid Estrada

Virginia Is For (Science) Lovers

If you’re not already signed up for the 2005 ASTC Annual Conference, to be hosted October 15–18 by the Science Museum of Virginia, Richmond, don’t delay. Advance registration closes September 15. On-site rates will be in effect after that date.

This year’s conference promises an exciting blend of workshops, panel sessions, in-depth dialogue, and featured speakers, complemented by day trips to ASTC-member museums and tours of the historic Richmond, Charlottesville, and Tidewater areas of Virginia. Following are some last-minute highlights. For up-to-date conference information and an online schedule planner, visit www.astc.org/conference.

The ASTC Annual Banquet returns on Sunday with an evening of humor and inspiration. The former comes to us courtesy of guest entertainer Andy Borowitz. Dubbed a “Swiftian satirist” by the *Wall Street Journal*, Borowitz writes a daily Internet column, *The Borowitz Report*, and appears regularly on CNN’s “American Morning” and National Public Radio’s “Weekend Edition Sunday.” His appearance is sponsored by LandAmerica, Media General, and the Science Museum of Virginia.

For inspiration, we’ll have the inaugural presentation of the Leading Edge Awards, created by ASTC to offer fieldwide recognition to members and/or their employees for extraordinary accomplishments. Two awards will be presented in each of three categories: Visitor Experience (large and small institutions); Business Practice (large and small institutions); and Leadership in the Field (individuals new to the field and those with more

* Information on ASTC RAP sessions is available at www.astc.org/profdev/. For updated events listings, click on ‘Calendar’ at www.astc.org.

than three years' experience). Winners will receive a complimentary registration for next year's ASTC Annual Conference in Louisville, Kentucky.

Sponsors of the 2005 "Edgies" include Sodexo (Leadership in the Field, New Leader), Ansel Associates (Leadership in the Field, Experienced Leader), and, for Visitor Experience, nine ASTC Board of Directors institutions: the Franklin Institute; Heureka, The Finnish Science Centre; MOSI; the Miami Museum of Science & Planetarium; the Pacific Science Center; Questacon—The National Science Centre; the Science Museum of Virginia; the Singapore Science Centre; and Technopolis, the Flemish Science Centre. For more details, visit www.astc.org/about/awards/leading_edge.htm.

Also on Sunday, Digital Theater Day is a Panasonic-sponsored showcase of high-definition programming available to science centers. Drop by Room E24 in the Greater Richmond Convention Center between 10:30 and 6:30 to view HD content and talk with producers and developers. On Monday, Spitz's Fulldome Video Showcase of planetarium, science, and art visualizations will lead off the traditional Big Screen Day program.

Continuing our tradition of giving back to the host community, the Science Museum of Virginia will collect toys and books for distribution to patients at the Children's Hospital of Richmond. Bring your unwrapped gift to the science center during Saturday evening's "All Aboard at Broad Street Station!" party, or drop it off at the museum any time during the conference.

McGrath Fellow Chosen

The Lee Kimche McGrath Worldwide Fellowship, established in memory of ASTC's first executive director, enables a representative from a member museum outside the United States to attend the ASTC Annual Conference. The 2005 McGrath Fellow is Cynthia Graham de Sampson, executive director of Explora, Centro de



Cynthia Graham de Sampson, of Panama's Explora, is this year's Lee Kimche McGrath International Fellow.

Photo courtesy Explora

Ciencia y Arte (www.explorapanama.org), in Panama City, Panama. Graham will receive free registration at the 2005 ASTC Annual Conference and a grant of \$1,500 toward her travel expenses.

Explora, which opened in 2003, is the first interactive science center in this Central American nation of almost 3 million inhabitants. Created to serve children and youth, the museum is administered by the Fundación Centro de Ciencia y Arte, which contributed \$2 million for its development. Its six rooms of exhibits focus on topics ranging from forests and rivers to the human body to energy and the Universe. Staff guide activities for school groups and families and work with teachers to help them to make the science center a resource in their work.

At ASTC 2005, Graham hopes to learn "how to always keep your science center crowded" and get some pointers on fund-raising and sponsorship in small countries. Despite nationwide interest in the science center and extensive marketing efforts, she says, "it has been difficult to maintain attendance.... I believe that the ASTC Annual Conference can help us to learn how to improve our participation in the educational system of Panama and make people aware of our importance."

Please join ASTC's board and staff in welcoming Cynthia Graham to Richmond in October. Those wishing to make a donation in support of future McGrath Fellows may contact Bonnie VanDorn, bvandorn@astc.org. ■

Erratum

In the May/June 2005 issue of *ASTC Dimensions*, the photograph on page 11 was taken at W5, Belfast, U.K., by photographer Oscar Williams, not at the Maryland Science Center as credited. We regret the error.

Welcome to ASTC

The following new members were approved by ASTC's Membership Committee in September 2004. Contact information is available in the Members section of the ASTC web site, www.astc.org.

SCIENCE CENTER AND MUSEUM MEMBERS

- **The Florida Air Museum at Sun 'n' Fun**, Lakeland, Florida. An outgrowth of an annual "fly-in" for sport aviators, the museum features historic aircraft, a working restoration center, and Howard Hughes' personal collection of aviation memorabilia.
- **Iron Hill Museum/Delaware Academy of Science**, Newark, Delaware. Operated as a natural history museum since 1968, Iron Hill, located in a historic African-American schoolhouse, is expanding to become a science learning academy and welcome center for visitors to the Pencader Heritage Area.
- **National Science Museum**, Tokyo, Japan. Rejoining ASTC after a three-year hiatus, this primarily natural history museum opened a 89,000-square-foot annex in November 2004, focusing on the interrelationship of human beings and nature.
- **San Diego Aerospace Museum**, San Diego, California. Housed in the 1930s Ford Transportation Exhibition building at Balboa Park, the museum is home to the International Aerospace Hall of Fame, plus more than 40 original aircraft; its Gillespie Field Annex serves as a restoration center.
- **San Diego Natural History Museum**, San Diego, California. Also in Balboa Park, this 131-year-old institution includes the Biodiversity Research Center of the Californias, the Environmental Science Education Center, and 34,000 square feet of exhibition space.

SUSTAINING MEMBERS

- **A-MAN, Inc.**, Los Angeles, California
- **David Heil & Associates, Inc.**, Portland, Oregon
- **Magian Design Studio**, Hawthorn, Australia.
- **Thinkwell Design & Production**, Burbank, California.



The San Diego Aerospace Museum

By Christine Ruffo



Visitors design their own hydroelectric dam in SCI's *When Things Get Moving* platform. Photo courtesy Science Center of Iowa

QUICK-CHANGE VENUE—The much-anticipated new **Science Center of Iowa (SCI)**, located in the state capital, Des Moines, opened May 13. Four times larger than SCI's previous building, the 110,000-square-foot facility logged more than 100,000 visitors in its first six weeks. It is the centerpiece of a riverfront revitalization project that features a downtown library, the new Iowa Events Center, and a planned expansion of Riverwalk.

Highlights of SCI include more than 150 exhibits, a 50-foot domed "Star Theater," and the city's first IMAXDome theater. To encourage repeat visitation, the facility is designed for time- and cost-efficient exhibit changes. Hidden trenches in six "experience platforms" carry cable TV, fiber optics, electricity, compressed air, and water to support a wide range of exhibits. The SCI team plans to introduce new exhibits for each platform every two to three years.

Current platform themes include

- *Science Is Where You Find It*, demonstrating science in everyday life through activity areas like Bathroom Microbiology and Kitchen Chemistry.
- *When Things Get Moving*, where visitors can explore how things work, fit, and move together.
- *Who Are We?*, in which participants become scientists in a simulated research station, learning more about their fellow Americans as well as international peoples and cultures.

- *Why the Sky?*, exploring the wonders of the night sky through the Black Hole Visualizer and a Build Your Own Telescope activity.

- *Small Discoveries*, with Iowa-themed activities for children 7 years old and younger, including Iowa Icons, Toddler Town, Ball Play, and a Soybean Sorter.

- *What on Earth?*, home to a re-created Iowa landscape and a weather studio where local meteorologists broadcast live reports on weekdays.

Of the \$61.9 million in project costs, \$58 million has been raised so far from individuals and private foundations and local, state, and federal government entities. SCI expects to reach its campaign goal by May 2006.

Details: Sally Dix, vice president of communications, sallyd@sciowa.org; www.sciowa.org

STEM CELLS IN ACTION—What are these controversial stem cells, and why do researchers need them? A temporary exhibition at the **Exploratorium**, San Francisco, California, allows visitors to find out for themselves.

Designed in partnership with professor Bruce Conklin's research lab at the University of California-San Francisco, *Mouse Stem Cells* explores the ability of murine stem cells to develop from an undifferentiated state into more specialized heart cells. In the process, it helps connect the public directly with current research and practicing scientists.

The exhibition takes advantage of the museum's existing Microscope Imaging Facility, dedicating one station to the mouse cell transition process. Visitors control the research-grade instruments at their own pace, choosing specimens in different stages of development, refining their selections, changing magnification, and engaging in suggested activities. Microscope images can be viewed on a 17-inch LCD screen or, for large groups, on a 42-inch plasma screen. Afterwards, visitors can access an ever-growing collection of related web-based images and movies on an adjacent computer.

Conklin's UCSF lab provided the mouse stem cells and instructed Exploratorium staff in the techniques

needed to culture them and activate them into their differentiated cardiac state. As the lab's stem cell work progresses, the exhibition will be revised to mirror new research, allowing visitors to keep abreast of the field's latest developments. *Mouse Stem Cells* will remain on display until January 8, 2006.

Details: Linda Dackman, public information director, lindad@exploratorium.org

SPIN DOCTORS—What do bikes, bodies, and galaxies have in common? They all rotate around a central axis.

X-treme Rotation, a temporary, 5,000-square-foot bilingual exhibition at the **Montréal Science Centre**, Montréal, Canada, introduces the principles behind rotation, such as inertia and centripetal force, as it demonstrates the prevalence of "spin" in visitors' daily lives.

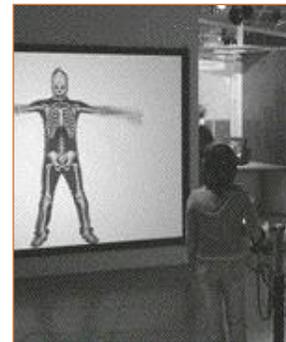
The five interactive zones include

- Robots, featuring Rotoscopic Machines, an exhibit by artist Bill Vorn that reacts to the presence of viewers.
- Objects, examining principles of rotation in five manufactured items: the wheel, gear, screw, lever, and gyroscope.
- Body, exploring rotation in the human body.
- Universe, comparing rotation at macro- and microscales.
- Creation studio, a place where visitors can create a miniature tornado, choreographing virtual dancers, and construct spinning tops.

The \$500,000 (US \$410,000) exhibition will remain on display until March 2006.

Details: Carol Pauzé, exhibitions director, cpauze@oldportofmontreal.com

SUBMARINE RESURFACES—Fourteen months after it disappeared from public view, the U-505 submarine at the **Museum of Science and Industry**, Chicago, reemerged on



You go first: A virtual skeleton awaits activation by a visitor to the Body zone at *X-Treme Rotation*. Photo courtesy Montréal Science Centre



The Museum of Science and Industry's iconic U-505 German submarine anchors a new underground exhibition. Photo courtesy MSI

June 5 as the core of a new permanent exhibition. The World War II German vessel, displayed outside the museum for 50 years, was extensively restored and moved to a climate-controlled, underground space. There it anchors *U-505 Submarine*, an exhibition that invites visitors to explore hands-on history and science exhibits that recreate the sub's capture in June 1944.

Visitors begin stepping back in time in *World at War*, *Battle of the Atlantic*, and *Plan of Action*—three exhibits that use historic footage and photographs to illustrate the role of submarines during the war. They then enter a “top secret” U.S. Navy tracking room staffed by WAVES (Women Accepted for Emergency Volunteer Service), the sub spotters who first detected the German boat in the Atlantic and informed Allied ships of its location. Next, guests find themselves aboard the USS *Guadalcanal* as it engages and captures the sub. The final exhibit is the 252-foot-long *U-505* itself, surrounded by hands-on exhibits that let visitors decipher covert messages, see a replica of the crew's quarters, and attempt a controlled dive in a simulated control room. Guided 15-minute tours of the sub are available for an additional fee.

The McCormick Tribune Foundation provided a \$5 million leadership gift toward the \$35 million restoration and exhibition project, which features more than 200 artifacts; other funding came from public and private sources.

Details: www.u505.org

BACK TO BERINGIA—Lions and camels native to North America? Strange but true. At *Ice Age Mammals*, a bilingual temporary exhibition at the **Canadian Museum of Nature** (CMN), Ottawa, Ontario, visitors take

on the role of researchers to learn about the effects of alternating climate cycles over millions of years.

The 4,000-square-foot (400m²) exhibition begins at a simulated Arctic research site, where visitors can compare 4-million-year-old fossils with modern-day bones to reach an obvious conclusion: The Arctic was once a warm, forest ecosystem, complete with three-toed horses and tiny “deerlets.” In video clips, CMN paleontologists describe their field work at the site.

Ice Age Mammals then fast-forwards through several glaciations to the most recent ice age—80,000 to 10,000 years ago—when glaciers covered most of North America. With so much water locked up in ice, areas of today's western Canada and Siberia were linked in a vast tundra known as Beringia. Across this grassy plain, the first humans entered the continent from Asia, hunting the mastodons, mammoths, and saber-toothed cats that flourished here (along with those lions and camels). Visitors can hear weather reports from the past, look at ancient pollen under a microscope, and examine the skeleton of a giant beaver.

Yukon palaeo-artist George Teichmann's murals complement the many specimens and re-creations. *Ice Age Mammals* was developed in partnership with the **Montréal Science Centre** (which will host it in 2006), the Royal Tyrrell Museum, and the Yukon Beringia Interpretive Centre. Financial support was provided by TransCanada Corporation. A smaller version will begin its cross-Canada tour in 2007.

Details: Laura Sutin, media relations/communications officer, lsutin@mus-nature.ca ■



Mastodons mingled with camels and lions during North America's last ice age.

Photo courtesy Canadian Museum of Nature

Grants & Awards

The **Schenectady Museum & Suits-Bueche Planetarium**, Schenectady, New York, received \$180,412 from the (U.S.) National Endowment for the Humanities to preserve the 80,000 negatives in the museum's GE Photograph Collection, to create digital access to 12,000 of the collection's images, and to develop an educational web site, *Inventing Modern America*.

• • • • •

Two ASTC members received 2005 Promising Practice Awards from the Association of Children's Museums (ACM), together with cash grants from the MetLife Foundation:

- **Chicago Children's Museum**, Illinois: \$7,500 for its three-year plan for diversity, initiated by staff and board to improve performance in all areas of operations.
- **Virginia Discovery Museum**, Charlottesville, Virginia: \$5,000 for its strategies to recruit and retain volunteers with disabilities.

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NSF Awards

The following members have received 2005 grants from the (U.S.) National Science Foundation in informal science education:

- **California Science Center**, Los Angeles: \$364,011 for *Goosebumps! The Science Behind Feeling Scared*, a 5,000-square-foot traveling exhibition being developed in collaboration with the Science Museum of Minnesota.
- **St. Louis Science Center**, St. Louis, Missouri (as a partner): \$326,742 for “Science Firsthand,” a collaborative program led by First Hand Learning to allow youth aged 10–15 to participate in long-term scientific investigations.
- **Exploratorium**, San Francisco: \$747,754 for *How Do We Know What We Know? Resources for the Public Understanding of Scientific Evidence*, a two-year project that comprises a survey on use of web sites, an outreach forum, conference workshops, and a prototype web site on the role of evidence; and \$642,683 for *Playful Invention and Exploration (PIE) Institute: Professional Development Opportunities for Informal Educators*, a three-year project to increase the capacity of museum staff to design and implement technology-integrated inquiry activities.
- **Chicago Children's Museum**, Illinois: \$724,580 to develop *CityScape*, a 2,500-square-foot permanent exhibition designed to promote adult-child collaborative learning, and to set up a partnership of like-minded institutions.

The Reading Public Museum, Reading, Pennsylvania has appointed **Marni C. Churchill** director of development. Churchill was formerly director of development of major gifts for the University of Connecticut Foundation, Inc., Storrs, Connecticut.



The new director of development at the Louisville Science Center, Louisville, Kentucky is **Mary Miller**. Most recently executive director of the Kentucky Museum of Art and Craft, Miller also worked as general manager of the Steppenwolf Theatre Company in Chicago.



On June 27, the American Association of University Women (AAUW) presented its 2005 Eleanor Roosevelt Fund Award to **Judy Brown**, senior vice president for programs at the Miami Museum of Science & Planetarium. The Roosevelt Fund award was established by AAUW in 1989 to honor an individual, project, organization, or institution for outstanding

contributions to equity and education for women and girls. The presentation in Washington, D.C., cited Brown for the “outstanding work [she] has done, especially with girls, minorities, and other traditionally underrepresented groups, in her effort to introduce them to science.”



Marilynne Eichinger, former president of the Oregon Museum of Science and Industry (OMSI), Portland, was one of three direct-mail entrepreneurs featured in the July 2005 issue of *Catalog Success*. Named the magazine’s Consumer Cataloger of the Year, Eichinger has been selling museum-shop-quality educational toys by direct mail since 1996. Many U.S. ASTC members participate in her catalog, *Museum Tour*.



May M. Pagsinohin, ASTC’s 2004 Lee Kimche McGrath Worldwide Fellow, has been promoted to managing director of the Philippine Foundation for Science and Technology

(PFST), Manila. Executive director **Leticia Moran-Zerda** retains her title but will now concentrate on generating new resources for PFST.



The Virginia Living Museum, in Newport News, Virginia, has named **Page Hayhurst** as its executive director. Hayhurst was previously director of development at the Virginia Institute of Marine Science, Gloucester, a division of the College of William & Mary.



ASTC welcomed three new staff members earlier this year: **Heather Domicic**, a master’s candidate in art history at American University, succeeds **Shirley Gaines** as publications assistant; Shirley retired in July after eight years with ASTC. **Pamela Bloxton** is ASTC’s full-charge bookkeeper; she was formerly employed in the hotel industry. And **Katerina Barry**, an artist and graphic designer, has joined us part-time as web developer. ■



Association of Science-Technology Centers

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