ASTC Dimensions

Bimonthly News Journal of the Association of Science-Technology Centers

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The Campus Connection: Linking Museums with Higher Education

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IN THIS ISSUE

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Almost every science center has some kind of campus connection, whether it's a formal affiliation (26 ASTC-member museums are run by colleges or universities), partnership in a grant-funded project, or an informal meeting of minds on the departmental level. Researchers find science centers a good match as community partners and dissemination venues. Professors contribute to museum content by lecturing, advising on exhibits, and meeting with visitors on the floor. Undergraduate and graduate students gain real-world experience through internships, technical/design projects, and service-learning. Teachers in training explore museum resources and learn the skills of inquiry-based science. In this issue, we discover some creative opportunities (and challenges) that exist at the interface of academic science and informal education.

Features

Departments

Cover: From a jointly sponsored science fair at the Hebrew University of Jerusalem (top left) to presentations on the museum floor by Princeton professor Rick Register (top right) and Stanford graduate student Chana Palmer (bottom right), collaborations between universities and science centers enrich both partners. *Inset photos courtesy, clockwise from top left, Bloomfield Science Museum Jerusalem, Princeton Center for Complex Materials, Barry Starr/Stanford at The Tech.*

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University-Museum Collaboration:
The Opportunity and the Need

By Kenneth H. Keller

For those who, like me, grew up in New York in the 1940s and '50s, the American Museum of Natural History—with its whale and its dinosaurs and its dioramas—was almost as familiar as our own homes. The Hayden Planetarium, where we touched the enormous meteorites and learned our weight on Mars and Jupiter, drew us into the world of science where many of us have spent our lives. That was its purpose, and it worked marvelously well.

We were less aware, then, that we were on the brink of an enormous expansion in the role of science and technology in our society. Spurred by Vannevar Bush's 1945 article, "Science—the Endless Frontier," the nation began to invest heavily in science, believing it could be as valuable in peacetime as it had been in wartime. That has surely proven true. But the very success has brought new challenges. In 1950 we spent less than $5 billion per year on research and development; we now spend $275 billion, with the federal government's share at about $80 billion, 13 percent of the discretionary federal budget.

The price of progress has been specialization, and with it a diminution in communication between disciplines. And the shortened time span between discoveries and technical applications leaves little time to consider the social, political, and economic consequences of those applications.

Universities and museums must respond to these changes. It is not enough for museums to attract young people into science or for universities to train those young people and to carry out research. Both institutions must help the public to set priorities for investments in science, to understand the nature of scientific uncertainty, to see the interdependence of various fields of science and technology, and to become aware of the potential benefits and social challenges new knowledge can bring.

These are responsibilities that cry out for partnerships between universities and museums, linking those who specialize in discovery and formal education with those who know how to reach lay audiences through engaging exhibits and programs.

Partnerships are hard work. Even within the university, multidisciplinary efforts are difficult to initiate and maintain, separated as we are by the paradigms of our professions—different interests, ways of thinking, ways of communicating—and by chronic shortness of time. Add to this the complexity of reaching beyond our own institutional borders, and the challenge appears even more difficult.

Nevertheless, there are opportunities. Government agencies, such as the National Science Foundation (NSF), now insist on (and fund) public education as part of many research grants, giving researchers both the means and the motivation to seek partnerships. And with the rapid pace of new discovery, museum professionals have more reason to stay in close touch with those at the forefront of science.

As need and opportunity converge, imaginative ideas will come from talented people in both institutions, but only if we get our strategies right. Here, experience provides guidance on what will work.

First, university and museum administrators have to formalize the partnership, giving it legitimacy and value in the eyes of the professionals and providing the formal mechanisms for sharing resources—people, money, and equipment—and simplifying contractual arrangements.

Second, people have to develop the habit of meeting regularly—in seminars, social functions, structured discussions, and informal exchanges. Through such meetings, over time, they can learn to bridge the communication gap, find common values and interests, develop mutual respect, and identify and respond to opportunities. When institutions provide for these interactions, collaborations will be born and good things will happen.

Finally, each ad hoc opportunity—each funded research grant with a public education requirement, each collaborative effort to develop a new exhibit—must be treated as a nucleating event, the chance to develop a new dimension of a productive and continuing relationship.

Thomas Jefferson argued that the best protection of a democracy was an "informed society." For that phrase to have meaning today, it must include enough understanding of the substance and process of science to evaluate the investments we are called upon to make, the regulations we choose to impose, and the expectations we can realistically have about science and its applications. Neither universities nor science museums can meet this need alone; but they can certainly do it together. ■

Kenneth H. Keller, a past president of the University of Minnesota and a former trustee of the Science Museum of Minnesota, is Charles M. Denny Jr. Professor of Science, Technology, and Public Policy at the Humphrey Institute of Public Affairs, University of Minnesota, Minneapolis.

A Shared Passion:

Leveraging Resources Through Museum–University Projects

Can an intimate, informal museum find happiness with an ivy-clad institution of higher learning? Yes, if the two share a passion for science communication. In this article, three small U.S. science centers describe how their talents and flexibility have won them long-term partnerships with academe.

The Testing Ground

By Ronen Mir

Scientists in universities often develop models of science communication that they would like to try out in real-world situations. Science centers, with their wide diversity of visitors, are an ideal venue for testing and implementing new technologies and programs quickly and at relatively low budgets.

The testing of a new technology is the focus of a collaboration between SciTech Hands On Museum, Aurora, Illinois, and the University of Illinois at Chicago (UIC). Several years ago, professor Andrew Johnson of UIC asked the museum to test and evaluate the Geowall Virtual Reality (VR) learning lab, a technology developed for undergraduate geology studies. A prototype was established at the museum in the summer of 2002 with equipment on loan from UIC's NSF-funded Electronic Visualization Laboratory.

The 15-minute VR sessions at SciTech are conducted by a trained museum explainer. Models available for viewing range from an ant, a bee, and a deep-sea angler fish to the workings of the human heart, the distribution of earthquakes on Earth, and a journey through the universe. Each session includes an explanation of the technology, an opportunity for visitors to manipulate the 3-D models, and commentary on the models seen. The explainer answers questions and ends with an informal evaluation of the experience.

SciTech visitors manipulate the Hourglass, one of four exhibits designed by University of Chicago SCOPE students. *Photo by Ronen Mir*

Since the Geowall has been up and running, the VR lab has hosted approximately 4,000 visiting adults and children. The most popular application, says one explainer, has been the virtual heart: "It gives them a real sense of what it looks like and how it works." The earthquake model is favored by teachers, who like its clear presentation of major fault lines.

A second university collaboration at SciTech focuses on science programming—specifically, the presentation of current science research. In early 2003, University of Chicago (UC) physics professor Leo Kadanoff approached the museum about developing a program to train graduate students in science communication. Kadanoff says he picked SciTech because the museum constructs the majority of its own exhibits and he thought staff would be able to help students implement their ideas. Three months later, the partners launched SCOPE (Sci-Tech Chicago Outreach Pilot Exploration) with $607,000 in NSF funding.

The 12 UC graduate students who participate in SCOPE each year come from physics, computer science, anthropology, and the social sciences. They are divided into two focus groups: Environment/Materials Science and Cosmology. Training is conducted jointly by university "coaches"—scientists with experience in hands-on exhibits design—and by SciTech's exhibits, education, visitor services, and management teams.

Participants work on exhibit research and design, exhibit prototyping, evaluation of exhibits, signage, and development of VR educational programs using the UIC Geowall setup. They also visit other science and natural history museums in Chicago. Their final challenge is to design their own projects for SciTech's visitors.

The first focus groups implemented an exhibit on "Sand Castle Science" and the VR cosmology program "Journey Through the Universe." More recently, groups have developed the *Wild World of Sand* exhibition, with four interactive exhibits, and new VR programs based on data collected by the Sloan Digital Sky Survey.

The coupling of university scientists with graduate students allows the program to cover both cutting-edge science and accurate fundamental science. As a "guide on the side," the coach encourages students to generate ideas and to appreciate the varied talents that each brings to the table. As one participant comments, "It helps that not everyone has the same expertise." SCOPE has demonstrated

that it can prepare confident science communicators; several program graduates are now employed in Chicago area museums. ■

Ronen Mir, a former research scientist, is executive director of SciTech Hands On Science Museum, Aurora, Illinois; www.scitech.museum. *Information about the Geowall project is available at* www.geowall.org; *for more on SCOPE, go to* mps.uchicago.edu.

A Conduit for Science

By Ann Fumarolo

At Science Central, in Fort Wayne, Indiana, we have developed successful partnerships with three local universities, but our largest collaborator is Indiana University–Purdue University Fort Wayne (IPFW). Five ongoing projects illustrate the range of this relationship.

For preservice teachers in IPFW's science education department, the museum serves as a laboratory. Students fulfill requirements for professor Jeff Nowak's course on field trips by creating pre- and postvisit educational materials and an activity linked to a floor exhibit. Everything is tied to the Indiana state standards and developed across three grade levels.

As a final exam, the preservice teachers come to the museum and deliver their programs to a visiting school class. Afterwards, each evaluates his or her own performance, and the classroom teachers evaluate the materials. This feedback is forwarded to IPFW.

The project has been a win-win situation for the partners. Not only do the young teachers get invaluable hands-on experience in teaching science, but all of the materials they create are donated to the museum. Although it takes time to evaluate and integrate the student projects, the result is that our library of potential floor programming has grown tremendously. And once these young teachers have their own classrooms, we find that they like to schedule field trips to the museum—and sometimes even request that we use the materials they created.

Another ongoing project is "Lunch with a Scientist," offered in collaboration with IPFW's department of science. One Saturday a month, a research professor comes to Science Central and offers a two-hour program for students in grades 4 to 8 and their families. Before lunch, the scientists talk informally about their areas of expertise, why they followed a particular career path, and what education that required. After lunch, each professor leads a hands-on activity that demonstrates his or her research in the field. This program sells out every year, with a waiting list for the next year.

Though located in a small Indiana town, Science Central has been able to forge partnerships with three local universities. *Photo courtesy Science Central*

In collaboration with IPFW's engineering department, Science Central hosts several competitions for middle school students, including First LEGO League, Future Cities, and Bridge Building.

Our newest collaboration has yet to yield results. IPFW and the museum have recently joined forces to pursue acquisition of one of the most complete mastodon skeletons found in the United States. If we are successful, the skeleton will become the property of IPFW but will be on loan to Science Central for 10 years. The university will handle science content, and the museum will provide educational programming and exhibit design. We are working together to raise funds for the project.

Finally, the single most important contribution IPFW makes to Science Central is to authenticate our educational materials. As a small museum we do not have staff from every discipline of science; IPFW scientists volunteer their time to read and evaluate our programs for scientific accuracy. In the process, they often suggest other program ideas. This shared passion for accuracy and depth of information has allowed Science Central to become a strong conduit for informal science education and the first place where people in our community come with questions about science. ■

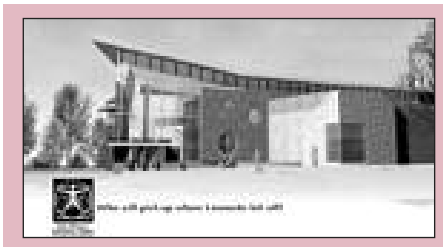
Ann Fumarolo is director of Science Central, Fort Wayne, Indiana; www.sciencecentral.org.

Da Vinci's Heirs

By Lin Erickson and Carol Pulham

Once a major industrial and steel-producing area, the Lehigh Valley of Pennsylvania is becoming an incubator for new science and technology businesses. Key to this renewal is the educational development of young people. Success depends not only on improving student achievement in science, but also on increasing the quantity, quality, and diversity of the science-teaching workforce and encouraging the best and brightest students to pursue science and technology careers in the region.

The Discovery Center of Science and Technology, an independent hands-on science center in Bethlehem, Pennsylvania, has been addressing these challenges since 1995 through a variety of programs that promote hands-on science *(Continued on page 7)*



The Da Vinci Discovery Center of Science and Technology at Cedar Crest College will be a learning laboratory for exploring best practices in teaching with scientific inquiry. *Artist's rendering courtesy Da Vinci Center*

Polymer Power:

Partnering to Enrich an Exhibition

By Elizabeth Romanaux

Will it spill? Princeton professor David Srolovitz performs the "three cup trick" while demonstrating the power of polymers at Liberty Science Center. *Photo courtesy Princeton Center for Complex Materials*

At Liberty Science Center, we are always looking for ways to extend the experiences we offer our audiences. In late 2003, museum staff spotted an article in a local newspaper about the Princeton Center for Complex Materials (PCCM). This National Science Foundation–funded research facility is located at Princeton University, about a 90-minute drive from our site in Jersey City.

As luck would have it, materials science—the study of the structures, properties, and potentials of the natural or manmade materials that make up our environment—was the topic of a traveling exhibition scheduled to open at the science center in March 2004. *Strange Matter: The Science of Stuff* is a 6,000-square-foot exhibition developed by Toronto's Ontario Science Centre in partnership with the Materials Research Society (a 30-year-old, U.S.-based organization that counts among its members researchers from academia, industry, and government). The exhibition is also funded, in part, by NSF.

Inviting the Princeton scientists to provide programming in conjunction with *Strange Matter* could not only extend the exhibition for museum audiences but also provide a way for the research center to meet NSF requirements for grantees to do community educational outreach. Would PCCM be interested? It was worth a call to find out.

The Princeton research facility already had a community education program in place, working primarily with local public schools. But PCCM outreach director Daniel Steinberg welcomed the opportunity to reach an even wider audience. PCCM agreed to provide volunteer "Ask a Scientist" programming at Liberty Science Center on weekends during the exhibition's 12-week run.

Physics on the floor

Prospective PCCM volunteers ranged from prominent professors to graduate students, but few had experience in working with family audiences. To help frame the discussions and keep presentations consistent in tone and educational level, Liberty science educator Erich Goldstein developed a humorous 20-minute script, "The Chain Gang," that could introduce the world of polymers while allowing plenty of opportunity for audience participation.

Featured in the script are some "amazing tricks" done with commonly found polymers, such as Silly Putty and sodium polyacrylate, the absorbent material in disposable diapers. Speakers would be welcome to use the script as is, alter it, or develop their own presentations on completely different subjects. (A few eventually did, adding information on magnetic levitation and superconductivity.).

Some of the scientists were nervous at first, says Steinberg: "This was a new audience for them, and we took away their traditional tools of communication, such as PowerPoint presentations and equations." A few days before each individual or group was scheduled to present, Steinberg would go over the script with the scientists to be sure they were comfortable with it, making adjustments as needed for different areas of expertise. It took 10 sessions to prepare all of the volunteers, but the effort was worth it. "Every scientist from PCCM who presented at Liberty Science Center came back pleased with his or her experience," Steinberg says.

Materials science has a tactile quality that lends itself easily to demonstrations, and the volunteers were able to safely illustrate principles like flow, strength, and absorption. Presentations were given on the exhibit floor without a podium or other physical barrier—a set-up that allowed a relaxed dialogue to develop with visitors.

During the 12-week run of *Strange Matter,* approximately 150,000 people visited the science center, and many had the opportunity to interact with the Princeton scientists. Rick Register, a professor of chemical engineering, enjoyed the experience so much that he went back twice with mem-

bers of his polymer science research group. "I was impressed with the kinds of questions that children were coming up with and the level of interest the kids showed," Register says. "The audience was primed for demonstrations about polymers, which heavily emphasize materials science."

The collaboration aroused interest on campus, too. According to an article in *E-Quad,* the online newsletter of the Princeton School of Engineering and Applied Science, participating professors and students valued the opportunity to display their work in a broader arena and to present science and engineering as possible career choices.

"We have to get people interested in science and materials science for the future," said David Srolovitz, a professor of mechanical and aerospace engineering who made artificial snow for science center visitors and showed them how polymers deform at different rates and temperatures. "Doing it outside the classroom is the best approach. Also, it was great fun for me!"

Barclay Satterfield, a chemical engineering graduate student whose presentation focused on polymer gels and solutions, said she thought it appropriate for the university to "use some of its intellectual resources to enrich its community."

Strange Matter has moved on, but the collaboration between the science center and PCCM was so successful that both institutions hope to offer future materials science programs together. Meanwhile, Liberty's grants director, Bruce Maccabe, is seeking opportunities to support other research centers in their outreach efforts. "This is a crucial element of our future plans," says Maccabe. "It is a model that any museum or science center should be able to replicate." ■

Elizabeth Romanaux is vice president of marketing at Liberty Science Center, Jersey City, New Jersey: www.lsc.org. *The work of the Princeton Center for Complex Materials is described at* www.princeton.edu/~pccm. *For more on* Strange Matter, *visit* www.StrangeMatterExhibit.com.

(Continued from page 5) education for K-12 students, teachers, and families. In 2003, following its merger with Leonardo da Vinci's Horse Inc., the center rewrote its mission to include the development of young people who, like da Vinci, think creatively and independently.

Cedar Crest College, a women's liberal arts college in Allentown, Pennsylvania, has been offering students a liberal arts education informed by humanistic values since 1867. More than 60 percent of entering freshmen declare an interest in pursuing a science major, and the college is committed to experiential learning and developing students' critical thinking skills and creative abilities.

It was natural that these two institutions should eventually find each other. In late 2005, the science center, renamed the Da Vinci Discovery Center of Science and Technology, will open its new 30,000-square-foot facility on the campus of Cedar Crest College.

It was Cedar Crest president Dorothy Gulbenkian Blaney, a member of the Da Vinci Center's board of directors, who first envisioned a science center on campus. The two organizations were already collaborating on a number of projects: Students were earning course credit for designing curricula, teaching hands-on workshops, and developing exhibit experiences at the science center. The synergy created by combining the strengths of both institutions could bring students, scientists, and educators together to improve the knowledge and skills needed for teaching and learning about science.

The first opportunity to leverage the new partnership came in summer 2004. With nearly $500,000 in public and corporate funding, the partners launched the first year of the Da Vinci Teacher Leader Institute. This three-year program of professional development for elementary school teachers aims to build local schools' capacity for effective science instruction in advance of Pennsylvania science standards testing in 2007–2008. The Institute grew out of discussion about science education reform with academic and community leaders in northeastern Pennsylvania. In addition to summer workshops, participating teachers attend two weekend retreats during the school year; work with colleagues to plan science instruction, museum field trips, and outreach; and receive mentoring support from Institute staff. The initial teacher cohort represents six school systems. Faculty includes science and education experts from Cedar Crest, Lehigh University, the Da Vinci Center, and area businesses and schools.

Together, the science center and the college will be at the center of regional efforts to improve science education. When the Da Vinci Center opens, it will be a learning laboratory where practicing teachers can deepen their understanding of science content, acquire new skills, and gain confidence in the use of inquiry-based approaches; where college students can learn about science and education careers, receive training in science pedagogy, and gain hands-on experience with youth; and where students can develop critical thinking skills and learn to use the tools of inquiry and imagination.

Dorothy Blaney has written that Leonardo da Vinci's "most dazzling discovery was the reaffirmation that all knowledge is one.... Whether he was painting the *Mona Lisa*, constructing an engine, building a bridge, sketching a mighty horse for the Duke of Milan, or working on *The Last Supper*, da Vinci's mind moved across the lines that we call different disciplines without any need for a passport."

This concept, the foundation for a liberal arts education at Cedar Crest College, is also the basis for the inquiry-based learning experiences at the Da Vinci Center. For the young people who will feel the full impact of the renaissance in the Lehigh Valley, our joint challenge is this: Who will pick up where Leonardo left off? ■

Lin Erickson is executive director of the Da Vinci Discovery Center of Science and Technology, Bethlehem, Pennsylvania, and Carol Pulham is acting provost of Cedar Crest College, Allentown, Pennsylvania.

Where Past and Present Meet:

The Changing Role of the University Museum

By Marta C. Lourenço

The oldest and closest relationship linking science museums and higher education is, of course, that of a university and its own in-house museum or museums.

No one knows the precise number of university museums and collections worldwide. In Europe alone, we might put the figure at over 3,000. The typology of such institutions is intricate. It includes not only the great natural history and medical museums, botanical gardens, and observatories of Paris, Chicago, London, Rome, Uppsala, Lisbon, and other major cities, but also historic houses, contemporary art museums, planetariums, and hands-on science centers. In many cases, these collections predate their host institutions, consisting of formerly private holdings entrusted to scholars for safekeeping and study.

Less visible, but equally valuable, are the small dedicated collections, such as the herbarium at the University of Turin or the scientific instruments at the Library of the Ecole Polytechnique in Paris. Together, university museums and collections hold a significant proportion of the world's scientific, natural, and cultural heritage.

In theory, the mission of these institutions has always been a triple one: research, teaching, and public interpretation. In practice, however, the public element has been the least embraced. Many collections have remained behind closed doors, seen and used by students and specialists only. As today's universities evolve in response to the new emphasis on public visibility and access, lifelong learning, and knowledge-based economies, so, too, the university museum must evolve. This article, through focusing on the current situation in Europe, will draw some conclusions about the past, present, and future of the university museum worldwide.

Sweden's Uppsala University has moved the majority of its art, medical, physics, and university history collections to a single museum, the Gustavianum. *Photo courtesy Uppsala University*

An impetus for change

Almost by definition, universities are dynamic institutions that reflect the demands and needs of contemporary society. The past 40 years have seen a particularly rapid pace of change in Europe, where most universities receive public funding and where national governments are accustomed to taking an active role in academic governance.

Today's European universities are expected to contribute to regional and local development, to establish strong links with local industries, and to adapt curricula to the needs and specificities of the labor market. Since March 2000, when the European Council met in Lisbon and set a new strategic goal of "becoming the most competitive and dynamic knowledge-driven economy in the world," universities have been asked to compete more actively in the international arena.

Several factors make this process challenging. Changing demographics in Europe have led to a slow but steady decrease in the number of students. Chronic underfunding means that universities must raise a significant portion of their annual budgets themselves. And, perhaps most significantly, progress in some areas of science has brought about profound changes in the curriculum, resulting in decreased use of collections as a source for research. The resulting "crisis" of natural history collections in Europe, North America, and Australia is well documented (see "University Museum Resources," page 11).

In European universities, ties between museums and scientific departments have been weakened or, in some cases, broken entirely, while disciplines that used to rely on collections for teaching and research, such as geology and mineralogy, are being either eliminated or dropped from graduate degree programs. Staff in collections-based careers—curators, museum directors, taxidermists, and naturalists—are let go, or not replaced at retirement. "Orphaned" collections wind up stored in attics and basements, deaccessioned, or even lost.

All of these changes have provoked debate about the nature and mission of university collections. Museums are confronting, perhaps for the first time, the need to convince parent institutions of their value and relevance for the university, as well as for society at large. In 2001, the International Council of Museums created a new international committee, UMAC, to represent the interests of university museums and collections. The past four years have seen a plethora of conferences, workshops, publications, articles, and

position statements, as museum professionals from Türkü to Edinburgh discover that they face similar problems. Several European universities are testing new models of museum management and funding, and a number of collaborative projects, involving as many as eight universities, are currently being developed for submission to the European Commission.

Integration and autonomy

Though generalities are risky in a complex field, it is possible to detect the emergence of some important trends in university-museum management over the past decade. Of these, two are likely, I think, to produce significant long-term change. These are the tendencies toward *integration* and *increasing autonomy*.

During the mid-1990s, some European universities began developing more integrated management of collections and museums. This has taken the form of physical integration (different collections under the same roof), institutional integration (a new official unit created to run the different parts), or both. Sweden's Uppsala University, for example, having already moved the majority of its arts, medicine, physics, and university history collections to a single museum, the Gustavianum, is now bringing its natural history collections together in a Museum of Evolution. The three universities of Montpellier, in France, are gathering their entire scientific heritage—from the Jardin des Plantes to the natural history and medical collections to scientific and astronomical instruments—in a structure provisionally named MuseUM and defined as a "project of scientific culture."

Because such integrative projects may arouse internal conflicts and require major unprecedented mental leaps, they can be difficult to implement in a university milieu. But the trend is gaining momentum, especially as universities come to see their new museum "showcases" as powerful public relations tools.

In parallel with the move to less connection with teaching and research and more emphasis on the public dimension, many museums and collections have been granted new autonomy within the university structure. Some have been removed from their traditional academic departments and grouped together under the administration of a dean or faculty director (Coimbra and Florence) or a rector/president or vice-rector/vice-president (Lisbon and Manchester). In other cases, a specific department or unit for "museums and collections" has been created (Oxford and Reading). Often, museums are repositioned under already existing administrative departments, such as those in charge of libraries and archives.

Risks and rewards

All of these changes may may arouse mixed feelings in university museum staff. Integration and autonomy do have their benefits: They can raise the institution's profile within the university, increase long-term stability of and care for collections, and help to establish or deepen collaboration links with nontraditional departments. In addition, they can make the museum eligible for funding from sources like ministries of culture or the European Commission.

On the other hand, change brings risk, particularly when the integrating "fury" puts everything—archaeological artifacts, paintings and sculptures, medical instruments, bird skins and fossils—into a single bag. Without proper assessment of objects by trained staff, integration can lead to selection and deaccession processes that will be regretted in the future.

One way to introduce a note of caution in the process is to create interdisciplinary teams that pair scientists and historians with museum professionals. This can be especially helpful when integration implies a dramatic change in the role of the object. Natural history museums, for instance, strongly resist having their collections seen as heritage assets for public display. Their priorities are contributing to the identification of new taxa and serving as archives of biodiversity. Becoming merely "historical" changes the perception of their collections and may severely jeopardize their utility in the future. This does not mean that research and teaching collections should not be put on public display. They should. But such display needs to be guided by reflection.

Founded in 1794 but closed to the public for decades, the Museum of Anatomy at Montpellier will be renovated as part of the MuseUM. *Photo courtesy University of Montpellier I*

The greatest asset

How can university museums better champion their relevance in a changing academic world? Can they indeed reinvent themselves without jeopardizing future use of collections? And, most importantly, can they do all this with limited human resources? I submit that the answer to these questions lies in the very structure of the university itself.

University museums—with their access to *real* objects, *real* researchers, and *real* laboratories, to knowledge as it is produced *now*—are probably in a better position than any other institutions to reflect on the complex issues of collecting, studying, and interpreting our common scientific and cultural heritage.

They have the resources, objects, and facilities to explain how research today is different from that of yesterday. They have access, through nearby IT departments, to state-of-the-art communications equipment and resources. (It is not by chance that university museums were among the first to develop digital catalogs and web sites.) They are close to researchers—not just in science, but also in education, history, and social sciences—who can and should *(Continued on page 11)*

A Bridge to Science:
Israel's University-Sponsored Museums

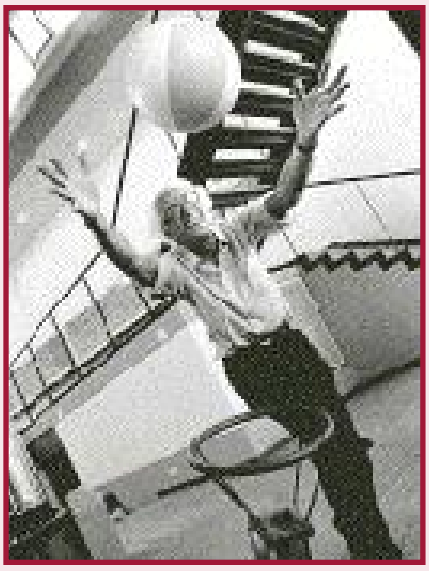
By Esthy Berzner

Bridging the gap between science and society is a worldwide challenge. In Israel, that challenge has been taken up by our institutions of higher learning.

Throughout Israel, university students and faculty members participate in programs designed to increase science awareness and understanding. Science Oriented Youth Activities Centers, launched at the Weizmann Institute of Science in Rehovot and now found at 17 universities and research facilities, offer afternoon study circles, summer school for outstanding pupils, study days for all classes, and special programs. Eight student-led PERACH Enrichment Centers, located next to colleges and universities, provide tutoring in science and other subjects to children from underprivileged families. BA'SHAAR ("At the Gate"), an academic community for Israeli society, arranges for science faculty to give public lectures and demonstrations across the country. The idea behind all of these projects is to use the human resources and physical facilities of the universities to integrate formal and informal learning in the service of society.

An additional initiative of the universities has been the creation of three science museums where the public can experience an inquiry-based, hands-on approach to science and technology. (Two natural history centers are under development.) All three were founded by faculty and developed with university support.

The National Museum of Science, Technology, and Space, in Haifa, is operated in cooperation with the Technion, the Israel Institute of Technology. The Clore Garden of Science, a 1999 winner of ASTC's Award for Innovation, is located on the campus of the Weizmann Institute, the nation's advanced research center. And the Bloomfield Science Museum Jerusalem (BSMJ) is an independent nonprofit organization that operates under the joint auspices of Israel's largest university, the Hebrew University of Jerusalem (HUJI), and the Jerusalem Foundation.



Hebrew University of Jerusalem professor Peter Hillman, founder of the Bloomfield Science Museum, enjoys a lighter-than-air moment at the museum. *Photo courtesy BSMJ*

Over the years, each of the three has emerged to some extent from its academic origins to develop its own identity and approach to science education, but all retain close ties to their founding institutions.

A longtime collaboration

Bloomfield Science Museum is located in Jerusalem's Museum Mall, near the science campus of HUJI. The museum was started by HUJI professor Peter Hillman, who remains its scientific director. The fact that it was founded by a professor on the university campus, under the university's auspices, and across the road from the science faculty, has created multifaceted opportunities for the partners to cooperate on an institutional and a personal level:

- HUJI researchers and professors serve as scientific advisors and as members of committees at the museum. They have helped to plan and design a number of exhibitions, such as *Medicine: Health Matters* (2001); *A Martian Home* (2003); *Physics in Toys* (opening this July) and *Mathematics* (opening 2006). They also participate in the yearly Young Israeli Scientists contest organized and hosted by BSMJ. In this European Union (EU) approved program, high school students aged 15 to 20 present research projects in all realms of science.
- Graduate students in HUJI's science teaching department use the museum to carry out practical research related to museum work or informal science education.
- Most of the museum's guides, the enthusiastic young people who interpret various educational projects for organized groups from schools and the general public, come from HUJI science departments; some are studying for advanced degrees.
- BSMJ collaborates with a few of the PERACH programs.
- Thanks to the museum's location across the road from HUJI (a tunnel between the two sites will open soon), the partners were able to run the four-day 2004 Science Festival in collaboration with the Authority for the Community and Youth of the Hebrew University. We hope the festival will become an annual event.

Additional academic partners

Bloomfield Science Museum also serves as a "research laboratory" for college and university students in areas as diverse as business administration, orga-

nizational psychology, and communications. For the last several years, BSMJ has cooperated with the history and theory department of the Bezalel Academy of Arts. Students in the Academy's "Brain and Senses" course use museum exhibits as a basis for art projects, and their work is displayed at BSMJ each summer.

The museum also collaborates with Hadassah College, whose Graphics Department helps to produce scientific posters for the Young Israeli Scientists contest, and with Jerusalem College for Teachers, whose students get some of their science instruction and part of their preservice education training at BSMJ.

Other Science and Society projects linking the museum with science faculty members include the Science Café program, which brings scientists and members of the public together in an informal atmosphere to promote public engagement in science, and the Pencil Project (Permanent European Resource Center for Informal Learning). This new program of ECSITE for bridging the gap between research and the school classroom will involve 12 science centers, two universities, researchers, and elementary and middle school children throughout Europe and in Israel.

Finally, the museum has been the leader in a long-term Israeli-Palestinian partnership working toward establishment of the first Palestinian science center at the Al-Quds University in East Jerusalem. Added support for the project has come from the EU and ECSITE members (especially Città della Scienza, in Naples). Political considerations have brought many setbacks, but the participants remain determined. Science is truly without borders, and at the Bloomfield Science Museum we look forward to a long and productive relationship with our Palestinian partners in the Al-Quds University. ■

Esthy Berzner is director of educational operations at Israel's Bloomfield Science Museum Jerusalem; to learn more, visit www.mada.org.il/.

(Continued from page 9) be encouraged to use exhibitions and collections in their work. They can act as bridges for projects between universities and other museums, and their unique position allows them to play an important role in science communication and public awareness of research.

But the most important asset of university museums and collections—one that I believe largely remains undiscovered, even by museum professionals—is that they hold the material evidence for how knowledge has been created and transmitted from generation to generation.

This evidence lies in the cannibalized instruments, in the scientific equipment many times used and reused. It is embedded in the hundreds of rocks gathered for a Ph.D. thesis; it is present in the archives of biodiversity, in the laboratory notes of scientists, in the field notebooks of zoologists, in the way botanical gardens and herbariums are arranged.

University museums alone hold this formidable resource. More than just "showcases," they contain the story of the great human adventure of science—a story that must be told. This is not an easy task. It requires ensuring that the essence of collections is not perverted or lost as objects are reorganized and displayed. It requires allowing for future use of collections, since the story of science is unfinished. And it requires a commitment to strong professional training and high standards of public service and visibility in all they do.

In these changing times, university museums must understand what distinguishes them and how that relates to contemporary society, and they must stick to that understanding. In an already crowded world of cultural institutions, that will be their raison d'être. ■

Marta Lourenço is an assistant researcher at the Museum of Science of the University of Lisbon and assistant editor of the journal Museologia. *She is pursuing a Ph.D. at the Conservatoire National des Arts et Métiers (CNAM) in Paris.*

University Museum Resources

International Committee for University Museums and Collections (UMAC)

http://icom.museum/umac

Founded by ICOM in 2001 to protect the varied human heritage held by universities, UMAC provides a forum for all those working in, or associated with, university museums, galleries, and collections (including herbaria and botanical gardens) worldwide. Featured on the web site are policies and guidelines, proceedings of past UMAC conferences, notices of events, and links to museum networks and related organizations.

Currently under development is the site's indexed *Worldwide Database of University Museums and Collections.* Entries to date include 1,016 institutions in Europe, 364 in North and South America, 323 in Australia and New Zealand, 202 in Asia, and 10 in Africa. To view the list or to add an entry, click on "search" under "University Museum Database."

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Digital Strategies:
Partnering for Personalization

By Clark Dodsworth

Do personal movie or book recommendations pop up when you log in at Netflix or Amazon.com? Do you carry store "club cards" in your wallet? When you check out at the supermarket, do they hand you a coupon for a rival product to one you bought? If so, you've encountered digital tools used by corporations in the ever-escalating competition for your attention.

Consumer product and services companies employ databases and digital communication media to remember more about their customers, communicate better with them, and become more sensitive to their needs. The use of "Customer Relationship Management" (CRM) tools is one of the strongest market forces at work today. The downside to CRM is that as consumers grow accustomed to this personalized attention, they begin to expect comparable service from every vendor. Companies that don't respond risk marginalization.

Personalized relationship strategies lie just ahead for the museum field, too, as institutions strive to expand audiences, find revenue, and better serve their visitors and their communities. And, as in the retail model, museums that don't find ways to make their educational resources a more relevant part of visitors' daily lives risk missing out on an opportunity to develop deeper, more enduring relationships with their "users."

Isn't such personalization prohibitively expensive? Not if your science center or museum takes advantage of two key resources that probably already exist in your community: broadband Internet access and free technical expertise available through your local college or university.

The always-on connection

Imagine that you could offer a personalized, "always-on" connection to visitors. What would be the benefits?

Most computer users regularly employ a general search engine, such as Google, to find information on the Internet. Search engines have the competitive edge of access to the latest information, but that advantage is diluted by extraneous search results and questionable reliability of sources. With well-implemented CRM strategies, a science center can be top-of-mind as the reliable "expert neighbor next door" on any science question.

CRM techniques can also personalize the presentation of exhibits and programs. Students and adults who might come to the museum once or twice a year can drop in regularly online, using the museum as a customized guide to explore the natural and physical world. Such high-quality interaction supports an enduring relationship, building a broader and more loyal demographic base.

The result may also be a more visible on-site presence, as online users sign up to become docents, volunteers, contributors, and, eventually, patrons. With an integrated digital strategy that includes CRM, extended broadband content, and university expertise, a science center can even solve the challenge of delivering current science research.

The hardware, software, and broadband connectivity needed to support such desirable outcomes are now much more reliable, affordable, and widespread. In the United States, broadband access has passed 50 percent household penetration. "Off-site" is becoming a marginal term, and "on-site" means anywhere the learner is sitting with network access. What remains expensive is the skill and time needed to design, imple-

Real-World Design

Prior to its opening in October 2003, the *Franklin Air Show*, a major aviation exhibition at the Franklin Institute Science Museum in Philadelphia, served as a design laboratory for undergraduates from the Industrial Design program at Philadelphia University. Under a partnership launched by a previous Institute exhibits director, students of design program director Goetz Unger spent a semester working with museum engineers and exhibit designers to develop and create prototypes of interactive exhibits. Both partners benefited. The museum enjoyed fresh ideas and concepts from students who came at exhibit design from a different angle, and students received course credit, practical experience that could not be taught in a classroom, and an introduction to the field of museum exhibit design. One *Franklin Air Show* exhibit that grew out of this collaboration is Control Surfaces, shown above, which allows visitors to control the rudder, elevator, and ailerons of a model plane.—*Bill Plant and Beth Tinker, Exhibit Designers, The Franklin Institute* *Photo courtesy Franklin Institute*

Stanford at The Tech

As part of an ongoing partnership between the genetics department at the Stanford University Medical School, Palo Alto, California, and The Tech Museum of Innovation, San Jose, graduate students and postdocs in any Stanford biology department can sign up to work at the museum. One morning a week for two quarters, students get on-the-job training in presenting science to the public in person and in writing. Responsibilities range from helping visitors spool DNA from calf thymus to helping develop new floor programs to answering "Ask a Geneticist" questions on The Tech's *Understanding Genetics* web site. Graduate student Joylette Portlock, pictured above (left) with Tech visitors, worked with two other Stanford students to produce *Genetics in the Flicks,* an interactive multimedia presentation at the museum that examines how TV and movies portray genetic science. For more on the program, visit *http://genetics.stanford. edu/techmuseum/.—Barry Starr, Program Director, Stanford at The Tech, and Stanford Genetics Liaison to The Tech Museum of Innovation.* *Photo by Barry Staff/Stanford at The Tech*

ment and manage personalization programs and the infrastructure that provides them with content.

At the same time, universities have challenges they need to meet within their communities. These include expanding outreach and visibility, disseminating faculty research, and providing projects, internships, and paid employment opportunities for undergraduate and graduate students.

In the corporate world, strategic alliances across industries are a current trend for dealing with challenges. Why shouldn't science centers and universities—both part of the "knowledge industry"—make common cause to keep pace with a changing cultural and economic situation? The optimal solution is a mutually beneficial strategic partnership between the two.

Imagine this scenario: A science center in Florida or eastern Australia partners with a local university to develop a broadband "Coral Reef Science" conduit, with authoritative interpretation provided by museum and university experts in response to online and on-site queries. Over time, educators and technicians from both institutions build online topical databases in specialties having to do with coral reef ecology. Name association accrues, potentially extending worldwide. The science center becomes known as the best place to seek the latest, most in-depth information on coral reefs, including live video feeds from reefcams and research labs. University scientists gain recognition for their work far beyond the pages of professional journals.

Symbiotic solutions

Keeping online resources constantly refreshed requires access to content and to technical expertise. Many universities offer both, at low cost to the science center, in the form of pools of skilled students in a variety of fields who are eligible to earn course credit hours via real-world internships or senior thesis projects. University internship offices or major advisors can help to identify appropriate student candidates, and the work can be conducted under the joint guidance of university faculty and museum staff.

For content help, the science center might collaborate with researchers in fields such as oceanography, astronomy, biology, archaeology, materials science, and physics, while for implementation and extension of web servers and databases, students in computer science and interaction design are the logical choice.

For the university, the museum's interpretive *(Continued on page 15)*

STUDENT PROJECT IDEAS

What might undergraduate or graduate students contribute to your museum? Here are some suggestions.

Enriched content generation:

- Extend existing exhibits with interactive, online broadband content.
- Digitize collections in 2-D and 3-D; then build out the databases for digitized elements and associated curatorial information.
- Develop online, age-specific narrative content based on new materials and/or existing collections and expertise.
- Produce downloadable digital video programs based on live museum demonstrations or special events.
- Design new visitor guides as "on-ramps" to the museum's knowledge resources.
- Repurpose printed visitor guides for online use with specific age groups.
- Develop "MyMuseum" web site features for user-customization of the museum homepage.

Real-time online information:

- Produce live digital webcasts of museum events and presentations.
- Implement near-real-time online "explainer" programs by staff in the labs. Once established, extend those programs, via e-mail-based query-sorting and assignment, to include volunteer explainers in academia and industry.
- Implement long-term live video feeds from research labs or field sites to the museum and/or web site; an example would be having graduate students and postdocs log the stages of an experiment daily, as it occurs, with live 24/7 video feeds for students to check repeatedly. Plant biology research is particularly amenable to this.

Personalization:

- Gather and analyze data on relative exhibit dwell-time under different conditions and demographics; plot against age group or time of day/week.
- Develop opt-in e-mail databases of topic interests by visitor; develop programs to address those interests.
- Develop trials of new-topic interest by offering web content modules (low cost to create), publicized via the e-mail databases; analyze the response.
- Gather and analyze data on attendance vis-à-vis programs, zip code, interests, online participation, and any number of other metrics.

—Clark Dodsworth

An "A" for Service:
Tapping the Talent at Community Colleges

By Cheryl Kessler and Carolyn Sutterfield

In 2002, as part of a master's degree project in museum studies at John F. Kennedy University, researcher Cheryl Kessler interviewed staff at western U.S. museums and community colleges then participating in service-learning partnerships. This article grew out of her final 2003 report.

On its surface, the volunteer program at the Arizona Science Center (ASC) in 2002 resembled similar operations in other museums. Like most U.S. science centers, the Phoenix museum relied on a large pool of teen and adult volunteers to interpret and maintain the museum's more than 300 exhibits, to conduct behind-the-scenes research, and to participate in a variety of programs. What made the ASC program stand out was that a goodly number of those volunteers came from an unusual source—service-learning programs at local community colleges.

Service-learning has been a staple in U.S. undergraduate education since Congress passed the National and Community Service Act of 1990. Unlike an internship, service-learning is linked to a specific course curriculum, and students are required to reflect formally on their service experience as part of their coursework. The goal is to connect students with their communities and help them develop a lifelong interest in civic participation.

In 1999, ASC established cooperative partnerships with several colleges in the local Maricopa County Community College District that offered students this opportunity to apply what they learn to real-world situations. By 2002, 33 service-learners had earned credit working at the science center.

The underutilized partner

Many museum administrators look to institutions of higher learning as partners, but not all such institutions are sought out equally. Community colleges—two-year, curriculum-based public institutions that award associate degrees and certificates, provide vocational and occupational training, and prepare students to transfer to four-year programs—are often misunderstood and underutilized.

It is true that these schools provide developmental and/or remedial programs for some students. But that does not make them an educational backwater. According to the Washington, D.C.–based, American Association of Community Colleges (AACC), the 10.4 million students enrolled annually in U.S. community colleges represent approximately 44 percent of all U.S. undergraduates. The group is ethnically diverse, comprising 46 percent of all African American undergraduates, 55 percent of Hispanic, 46 percent of Asian/Pacific Islander, and 55 percent of Native American.

Community college students are also socioeconomically diverse. Low fees and added evening and weekend classes attract the kind of historically underrepresented populations that museums are also interested in reaching. Many enrollees are working adults, a demographic not well represented among the ranks of community volunteers. When these students elect to work in a museum, they help to diversify the face of the institution and provide a link to new audiences.

According to Gail Robinson, coordinator of AACC's Horizons Service Learning Project, more than half of the 1,200 community colleges in the United States have a service-learning program. And with more than 40 percent of those programs offering a science component, ASTC members are a logical choice for partners.

Service-learning options

At the Arizona Science Center, service-learning ended in 2003, when budget cuts eliminated the volunteer coordinator's position, but former coordinator Sheila Kirsch, who now works for a regional science fair, recalls the program as a positive one.

Of the more than 40 community college service-learners who worked at the museum while she was there, Kirsch says, most came from science and mathematics, although the psychology, education, communications, and event planning departments were also represented. During ASC's 2002 run of *Titanic: The Artifact Exhibit*, she recalls, two history students researched customs and clothing of the early 20th century to assist actors portraying period characters in exhibition programming.

Because ASC service-learners averaged less than 30 hours in the museum per semester (a few put in 50 hours or more for a special course), the program did not always yield a return on staff investment, Kirsch says. "Interns have a longer commitment, which helps them to understand the museum culture better."

But the maturity of the service-learners was definitely an asset."We sometimes partnered them with "teens," Kirsch says. "They made strong role models for younger volunteers curious about the college experience."

Paula Vaughn, service-learning program coordinator at Paradise Valley Community College (PVCC), a former ASC partner, was Kirsch's counterpart on the academic side. According to Vaughan, 45 PVCC faculty members currently participate in the school's service-learning program, and about 75 percent of students who are offered the option decide to take it.

The partnership with ASC began, she says, when she was approached by science and math students looking to serve at some place other than an elementary school. Vaughn placed five at the science center. One of them, a shy math student, wasn't sure how she would handle the required "reflection" assignment at the end of the course.

"She wound up talking for 45 min-

utes about her work doing research on visitor study surveys," says Vaughn. "She had made plans to transfer to Arizona State University West and had already contacted a professor about a research assistantship."

Challenges and rewards

Service-learning is not without its challenges. The relatively short service time involved leads some educators to doubt its reportedly profound effects on student learning. Professors also express concern over loss of study time or dilution of the formal curriculum. From the museum's perspective, students' limited time for service and frequent schedule changes can make it hard to provide meaningful projects.

Nevertheless, as educators Janet Eyler and Dwight E. Giles Jr. point out in *Where's the Learning in Service-Learning?* (San Francisco: Jossey-Bass, 1999), the personal connection established through service-learning does give relevance to academic learning and allows students to better apply what they learn to real-world situations. An example from another museum partnership bears this out.

At Seattle's nonprofit Center for Wooden Boats (CWB), service-learners from Seattle Central Community College help to restore classic boats and construct replicas of traditional vessels. Many come from Native American, African American, and Pacific Islander cultures—groups that traditionally transmit knowledge more through storytelling and experience than through the written word, says CWB founding director Dick Wagner.

Wagner believes the hands-on projects his institution offers are "a long-lasting means of learning" for the service-learners, many of whom have not done well in school before. "They thrive at CWB," he says, "using hands and minds together, following mentors who teach them with direct experience methods." ■

Cheryl Kessler is a research associate at the Institute for Learning Innovation, Annapolis, Maryland. Carolyn Sutterfield is ASTC's editor. For more information on AACC's Horizons Service-Learning Project, visit www.aacc.nche.edu/servicelearning/, *or contact Horizons coordinator Gail Robinson at 202/728-0200 x254.*

(Continued from page 13) skills and visitor demographics directly address funders' requirements for public education and community impact. Because "outreach" is rarely within the expertise of research professors and may not be supported by the university, faculty benefit by having a local informal learning institution as a partner. Museum staff can perform the critical function of contact coordinator between the partners to yield outreach participation for research programs that far outstrips the development cost to the museum.

Every university benefits from improved public understanding of science, and state funding constraints have made academic administrators more aware of this than ever. Science centers and museums that have been university partners for a few years often find they have more grant participation opportunities than they can handle—a delightful problem that your own institution might help to solve.

There are other challenges for informal learning institutions that can be addressed with an overall digital strategy, but building the strategic partnership must come first.

Successful partnerships frequently grow out of informal collaborations between two individuals. Yet no matter how much impact those projects have and how great the financial benefit to both sides, they won't grow into permanent, symbiotic relationships unless both institutions buy in from the top down. On both sides, the partners must take responsibility to actively manage the collaboration process, to ensure that ongoing projects run effectively, and to constantly develop new collaborations as projects end and grant seasons cycle.

Fully implemented, an ongoing symbiotic relationship with a university expands and supports a science center's core relationship to its community—integrating the institution into the daily life of myriad visitors and into the fabric of their education process. It also introduces motivated university students to the science center, with likely long-term benefits for both. Finally, it enriches the lifelong educational experience of visitors to whatever degree and whenever they wish, while simultaneously providing the K–12 student with views into university life: research, careers, and curricula. ■

Digital strategies and design consultant Clark Dodsworth, principal of Dodsworth Associates, San Francisco, California, has worked on projects for MOSI, COSI Columbus, and Wichita's Exploration Place. He is currently collaborating with the Los Angeles County Natural History Museum on an exhibition to open in April, based on MacArthur fellow Jared Diamond's latest book, Collapse: How Societies Choose to Fail or Survive. *He can be reached at clark@dodsworth.com.*

Interactivity and Immersion

The Earth Theater at the Carnegie Museum of Natural History, Pittsburgh, is a partial-dome, planetarium-style, 68-seat facility that features interactive, immersive programs on a 70-foot wrap-around screen. The theater has had many collaborations with Carnegie Mellon University (CMU), the University of Pittsburgh, and other institutions. To give one example, CMU entertainment technology students produced a short show, *Cretaceous Chaos,* that took viewers who had just visited the museum's Dinosaur Hall back in time to search for dinosaurs. (For details on the project, visit *www.etc.cmu.edu/projects/earth_theater/cycle3/ index.htm.)* The exciting part was that the visitors could control parts of the show through voice or movement, interacting with the computer to trigger the storyline.—*Kerry Handron, Director, Earth Theater, Carnegie Museum of Natural History* Photo courtesy CMNH

Calendar

THROUGHOUT 2005

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

FEBRUARY

3 **Math Momentum Workshop:** "Data and Measurement." Hosted by the New England Aquarium, Boston. ***Details:*** Rebekah Stendahl, rstendahl@neaq.org

17–20 **ASTC RAP Session.*** "Successful Science Shows." Hosted by Technopolis, Mechelen, Belgium.

20–26 **National Engineers Week (U.S.).** Cochaired by ASME and BP p.l.c. ***Details:*** www.eweek.org

26–Mar. 6 **National Engineering Week (Canada)** ***Details:*** www.new-sng.com

APRIL

10–15 **Science Centre World Congress 2005.** Hosted by the Fundaçao Oswaldo Cruz and the Museu da Vida, Rio de Janeiro, Brazil. ***Details:*** www. museudavida.fiocruz.br.4scwc/

13–16 **Museums and the Web 2005.** Vancouver, British Columbia, Canada ***Details:*** www. archimuse.com/mw2005/

27 **Math Momentum Workshop:** "Measurement." Hosted by the Children's Museum of Houston, in conjunction with Interactivity 2005, Indianapolis. ***Details:*** Keith Ostfeld, kostfeld@cmhouston.org

28–30 **Interactivity 2005.** "The Power of Family Learning." Association of Children's Museums annual meeting. Indianapolis, Indiana. ***Details:*** www.childrensmuseums.org

MAY

1–5 **2005 American Association of Museums Annual Meeting.** "Museums at the Crossroads." Indianapolis, Indiana. ***Details:*** www.aam-us.org

6 **Space Day (U.S.).** "Return to the Moon." ***Details:*** www.spaceday.org

JUNE

8 **Math Momentum Workshop:** Topic TBA. Hosted by the St. Louis Science Center, St. Louis, Missouri. ***Details:*** Gloria White, gwhite@slsc.org

10–12 **ECSITE Annual Conference.** Hosted by Heureka, the Finnish Science Centre, Vantaa, Finland. ***Details:*** http://ecsite.ballou.be/new

AUGUST

2–6 **Visitor Studies Association Annual Conference.** Philadelphia, Pennsylvania. ***Details:*** www.visitorstudies.org

OCTOBER

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

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

Board Committees Offer Reports

At the 2004 ASTC Annual Conference, held last September in San Jose, the committees appointed by ASTC's Board of Directors summed up their activities over the past year and offered recommendations for the future:

• From the *Advocacy Committee* came the suggestion that ASTC do more to solicit support from federal agencies outside of NSF and IMLS, including NASA and NOAA, and work on developing strategies for raising the visibility of science centers in local and national media.

• The *International Advisory Board* reported on the first successful non-U.S. RAP, held at Technopolis in June, and the first award of the Lee Kimche McGrath Worldwide Fellowship. The group also explored ways to expand peer consultations, broker staff exchanges, and increase international representation at regional conferences.

• The *Membership Committee* approved the admission of 12 new Science Center and Museum members and 13 new Sustaining members, as well as the promotion of three current members—Maloka, Centro Interactivo de Ciencia y Tecnologia; Montshire Museum of Science; and SciTech Hands-On Museum—to Governing Member status. The committee also altered its Site Visit and Peer Consultation process to allow consultants to send their final report *directly* to the host science center/museum after completing their site visit, with a signed summary coversheet to ASTC.

• The *Conference Program Planning Committee* confirmed final mechanisms for gathering San Jose conference evaluation feedback, discussed plans for Richmond in 2005, and considered strategic themes for future conferences.

• The *Development Committee*'s traditional role is to identify and approach sponsorship prospects for the ASTC Annual Conference. At the September meeting, the committee decided to expand its charge and responsibilities by

The Ontario Science Centre, in Toronto, will host the 5th Science Centre World Congress. *Photo courtesy Ontario Science Centre*

helping with funding of other ASTC projects, including research needs and endowment-building efforts.

• In line with its commitment to building the capacity of ASTC members to be more effective in all areas of inclusion, the *Equity and Diversity Committee* agreed to work to collect and disseminate promising practices in equity and diversity and to ensure continuing support for the Conference Fellowship Program.

• A new committee, *Leadership and Professional Development*, identified issues that it intends to address, including qualities and competencies for CEOs in the field, skills needed for leadership at any level, and ways that CEOs can cultivate leadership in their own organizations.

• Another new committee, *Analyses and Trends*, reported on work to enable members to manage their businesses and "make the case" more effectively. Accomplishments included improvements to the annual ASTC member survey, plans for releasing data in print and disk formats, and support for an international study of economic impact.

For a complete list of ASTC committees, their charges and members, visit *www.astc.org/about/governance.htm*.

Toronto to Host 2008 Congress

Through a competitive bid process, the Ontario Science Centre, Toronto, has been selected to host the 5th Science Centre World Congress. The theme for the June 2008 gathering, expected to attract as many as 1,000 delegates and guests, is "Science Centers as Agents of Change—Locally, Nationally, and Internationally."

As it happens, *Agents of Change* is the name of the Ontario Science Centre's current $40 million, three-year transformation initiative, scheduled for completion in 2006. "This powerful theme will also serve to inspire science center leaders from around the world in considering their roles within their communities," says science center director general and CEO Lesley Lewis. "We are looking forward to learning from colleagues and sharing with them some of our accomplishments."

Science North, in nearby Sudbury, Ontario, will also play an active role in the congress. Professional development sessions will be scheduled at Science North so delegates can visit two leading Canadian science centers.

This will be the first time the five-day World Congress has met in North America. Previous gatherings were held in Helsinki (1996), Calcutta (1999), and Canberra (2002). The 4th Science Centre World Congress meets this April in Rio de Janeiro, Brazil.

For more information, visit *www.OntarioScienceCentre.ca*.

Probing for Planets

Where do we come from? Are we alone in the universe? Robot spacecraft like Voyager, Galileo, and Cassini have taught us much about our own solar system. But what about regions too far to reach with spacecraft? Is there life out there? How do we explore what we cannot see?

NASA's current Origins program of deep space research is an effort to answer some of these questions. It is also the inspiration for *Alien Earths*, a new, 3000-square-foot exhibition created by the Space Science Institute in Boulder, Colorado, that begins its three-year, ASTC-managed tour at the Lawrence Hall of Science in February. Visitors to *Alien Earths* will learn about the technology and creative methods scientists are using to conduct a search of our galactic neighborhood.

The exhibition is organized in four clusters—Our Place in Space, Star Birth, PlanetQuest, and The Search for Life—and features more than 20 interactive exhibits, computer stations, and models. Among a variety of options, visitors to *Alien Earths* can

Visitors test an *Alien Earths* prototype at the Denver Museum of Nature & Science. *Photo courtesy Space Science Institute*

• compare the life cycle of our Sun to that of other stars

• set planets in motion around a star and watch what happens

• experiment with an infrared camera

• explore the methods used to search for extrasolar planets

• learn about microbes, the most abundant life form on Earth (and possibly elsewhere)

• listen to sounds from space.

Funding for the project was provided by the National Science Foundation and NASA's Kepler, Navigator, and Spitzer missions. Additional support came from the NASA Astrobiology Institute, SETI, and the Space Telescope Science Institute.

For details, contact ASTC Exhibition Services manager Wendy Hancock, 202/783-7200 x117, whancock@astc.org, or visit *www.astc.org/exhibitions/*. ■

ECSITE TO MEET IN SUMMER

Beginning in 2005, ECSITE, the European science center network, will hold its annual conference during the summer months. This return to an earlier tradition (ECSITE first met in The Hague in June 1990) is intended to avoid conflicts with other professional events. The 2005 ECSITE Conference will be hosted June 10–12 by Heureka, the Finnish Science Centre, in Vantaa, Finland. The theme of the gathering is "The Impact of Our Science Centers and Museums." Details: *http://ecsite.ballou.be/new/*

Spotlights

By Christine Ruffo and Carolyn Sutterfield

Rutile with quartz is one of more than 400 gems and minerals on display at the North Carolina Museum of Natural Sciences. *Photo courtesy NCMNS*

ALL THAT SPARKLES—On July 17, the **North Carolina Museum of Natural Sciences** (NCMNS), Raleigh, opened its first temporary exhibition created entirely by museum staff. Centering on specimens amassed by an anonymous donor, *Treasures Unearthed: North Carolina's Spectacular Gems & Minerals* demonstrates the breadth of the state's "patchwork quilt of terranes," says NCMNS geologist Chris Tacker.

In addition to more than 400 gems, minerals, and artifacts, the 5,000-square-foot exhibition includes a learning lab where visitors can examine rock samples through petrographic microscopes; see rocks glow florescent under ultraviolet light; and identify minerals by sight, touch, smell, and taste. Twice-daily classes describe the use of minerals in daily life. A recreated gold mine tunnel, complete with canary cages, offers an immersive glimpse of the perils faced by early 19th-century miners. (A canary's death gave timely warning of deadly gases.)

Treasures Unearthed will remain open through June 12. Funding for the exhibition was provided in part by Wake Stone Corporation and the North Carolina Jewelers Consortium.

Details: Albert Ervin, special exhibits coordinator, albert.ervin@ncmail.net; *www.naturalsciences.org*

A WING AND A PARK—On November 23, the **New York Hall of Science,** Queens, unveiled its long-anticipated expansion. The 55,000-square-foot new north wing is an exhibit in itself, with its exposed structural supports and ventilation system and its exterior walls made of Kalwall. The transparency of this modern material—a composite of fiberglass and aluminum—contrasts with the concrete and cobalt-colored cast glass of the original building and sheds a soft light that reduces glare in exhibit areas.

Outdoors, the refurbished, 5,000-square-foot *Rocket Park* features replicas of Mercury and Gemini capsules sitting atop actual Atlas and Titan II rockets. In their day, these icons, a feature of the site since it was part of the 1964–65 New York World's Fair, represented cutting-edge technology. Today, the two rockets, along with a newly designed, "climb in" replica of John Glenn's *Friendship 7* capsule, let visitors experience firsthand the early history of the U.S. space program.

Inside, the expanded Hall offers four new interactive exhibitions and one refurbished classic:

• *Preschool Place* is designed to allow very young visitors to explore the natural and built world of a city (see *ASTC Dimensions*, July/August 2004).

• *Sports Challenge* demonstrates how friction, balance, and rotation impact athletic performance.

• *The Search for Life Beyond Earth* looks at the environments of Earth, Mars, and Europa (a moon of Jupiter) and examines how organisms live in extreme environments.

• *Connections* shows the power of networks, from rivers to the Internet. A big draw here is the haptic arm-wrestling exhibit, in which visitors compete with opponents down the hall or across the country.

• *Mathematica—A World of Numbers*, an original version of the 1961 exhibition designed by Charles and Ray Eames, offers interactive demonstrations of a range of mathematical concepts, including celestial mechanics, projective geometry, and probability.

Expansion of the New York Hall of Science was made possible by a $55 million grant from New York City, plus an additional $34 million in private funds. Polshek Partners Architects designed the new wing, and the restoration of the Titan II and Atlas rockets was executed by Thomarios.

Details: *www.nyscience.org/expansion/*

Translucent walls shed a soft light on the new wing's *Sports Challenge* exhibition. *Photo courtesy New York Hall of Science*

THE GREAT INDOORS—Diverse habitats come together under one roof at the **Virginia Living Museum** (VLM), Newport News, where walk-through habitats immerse visitors in a cypress swamp complete with snapping turtle and alligators and a cool, moist Appalachian cove with free-flying birds and a fish-filled mountain lake.

The new 62,000-square-foot, glass-topped, two-story structure, which more than tripled VLM's previous exhibit area, opened in March 2004. Along with the immersive habitats and a double-helix stairway, the addition houses four new galleries:

• *The Coastal Plain Gallery*. Here, a 30,000-gallon aquarium and 15-foot-long, wrap-around touch tank offer an up-close look at the Chesapeake Bay.

• *The Piedmont and Mountains Gallery.* Inspired by the fall line of the James River, this area features small-mouth bass, catfish, and wood turtles.

• *The Virginia Underground Gallery.* Visitors can navigate its limestone cave and examine colorful gems in an underground "jewel box."

• *The World of Darkness Gallery.* Here, viewers go eye-to-eye with noctural creatures like pine voles, ghost crabs, and flying squirrels.

Completing the building are classrooms, a laboratory for middle and high school studentss, and a rooftop observatory. Outside, a 3/4-mile boardwalk winds through surrounding woods, past live animal exhibits, to the new Coastal Plain Aviary.

The City of Newport News pledged $6 million for the $22.6 million project, and $10.9 million has been raised privately, including $1 million from Ferguson Enterprises and its associates.

Details: Virginia Gabriele, marketing@valivingmuseum.org

The new touch tank at Virginia Living Museum offers an up-close look at the Chesapeake Bay. *Photo courtesy VLM*

PUSH-BUTTON PLAY—Modern life rests on automation. What would we do without our robots, sensors, and bar codes? *Easy Life: Automation at Your Service*, a new exhibition created by **Heureka, The Finnish Science Centre,** Vantaa, Finland, uses everyday objects and situations to demonstrate the many ways and levels in which automation affects our daily lives.

Designed especially for families and schoolchildren, the exhibition, which opened in March 2004, is intended to spark interest among the children who will make decisions about the automated technology of the future. The exhibition is designed in five sections:

• The Historical Dimension: an overview of the vast history of automation, dating back to early Greek civilization.

• Making the Impossible Possible: a closer look at how the search for solutions drives changes in technology.

• A Better Standard of Living for More People: positive effects of automation, from the elimination of dangerous factory jobs to the lowering of prices for consumer goods.

• Automated City: the role that automation plays in keeping modern cities running.

• Automation at Home: an array of automated machines that have influenced domestic life.

The $2 million exhibition was funded and designed in cooperation with 39 sponsors, including Metso Automation Inc., Siemens Oy, the Finnish Society of Automation, Helsinki University of Technology, and VTT Technical Research Centre of Finland. After closing at Heureka this March, *Easy Life* will travel until 2008.

Details: Jaakko Poyhonen, project manager, Jaakko.Poyhonen@heureka.fi

Grants & Awards

The Institute for Museum and Library Services, a federal agency in Washington, D.C., announced its 2004 grant recipients in September. The following U.S. ASTC members received awards in IMLS's "Museums for America" category:

• **American Museum of Natural History,** New York City: $149,941 to conduct a two-year comprehensive analysis and prioritization of risk to the museum's more than 31 million specimens and artifacts.

• **Burpee Museum of Natural History,** Rockford, Illinois: $73,500 for development of technology-based elements for a new permanent exhibition, *The Story of Jane*, based on the discovery of a 67-million-year-old Nanotyrannus skeleton.

• **Children's Museum of Houston,** Houston, Texas: $145,938 to execute its DEEP master plan as it pertains to the topic of mechanics, and to redevelop and create programming for a 900-square-foot section of the *How Does It Work* exhibit area.

• **Children's Museum of Indianapolis,** Indianapolis, Indiana: $56,822 to create a national traveling exhibition, *MAPS: Tools for Adventure*, in partnership with the National Geographic Society and the Environmental Systems Research Institute.

• **Children's Museum of Maine,** Portland: $92,520 for the Global Learning Center, an interactive exhibition that supports multicultural education.

• **Children's Museum, Boston,** Massachusetts: $148,403 to support, in connection with a new permanent exhibition, *Boston Black: A City Connects*, an outreach project that will present public programs for families, structured school programs, curricula, and outreach strategies.

• **Discovery Center of Springfield,** Springfield, Missouri: $147,346 to plan, fabricate, install, and staff a new permanent exhibit area, *World Tour.*

• **EcoTarium/Worcester Natural History Society,** Worcester, Massachusetts: $146,711 to conduct visitor research related to exhibitions now being developed by the Environmental Exhibit Collaborative, and to develop and implement marketing materials and strategies.

• **Fairbanks Museum and Planetarium,** Saint Johnsbury, Vermont: $74,880 to accelerate comprehensive inventory and records automation for more than 4,000 historical objects from regional agriculture, forestry, transportation, ice harvesting, and household food and textile production.

• **Field Museum**, Chicago, Illinois: $149,959 to support inclusion of the museum's fishes specimen collection in the Advanced Collections Management database system, plus relocation of the collection to the Field's Collections Resource Center, now under construction.

• **Gateway to Science Center**, Bismarck, North Dakota: $45,914 to collaborate with organizations serving at-risk youth to present an education program focused on the science of art, following a model developed through a pilot program.

• **National Aquarium in Baltimore,** Maryland: $139,133 to plan, develop, implement, and evaluate a staff-led interactive program on the Chesapeake Bay, tentatively titled *Watershed Moments,* for presentation in 2006.

• **New York Hall of Science,** Queens, New York: $132,662 to expand its physical plant and provide the following new initiatives as part of the Career Ladder: student-teacher outreach lesson modeling, expanded programming for new audiences, and specialized explainers for specific areas of the Hall of Science.

• **Pacific Science Center,** Seattle, Washington: $145,518 for *Volunteer and Staff Training: Improving the Visitor Experience* (VAST), a new structure for in-depth training of staff and volunteers and an intern program for high school and college students that will increase the number of live science shows the center can present.

• **Peggy Notebaert Nature Museum,** Chicago, Illinois: $123,546 for technology upgrades that will allow the museum to expand its educational services and build public access to better serve the community.

• **Children's Museum of Pittsburgh,** Pittsburgh, Pennsylvania: $135,939 to keep a designer and developer on staff to continue to refine and test components of the new *Play with Real Stuff* exhibits and to create new exhibits.

• **Witte Museum,** San Antonio, Texas: $150,000 to develop a prototype, Witte Water Works, of the *Water Resource Center*, a capital expansion project planned for 2007.

People

The New Mexico Museum of Natural History and Science, Albuquerque, announces the appointment of **Louis French** as deputy director. Previously manager of guest services at the Field Museum, Chicago, French replaces **Lorin Saint,** who has taken a position with the Presbyterian Foundation in Santa Fe, New Mexico.

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Columbus State University (CSU), Columbus, Georgia, has appointed **Shawn Cruzen** executive director of its Coca-Cola Space Science Center. An associate professor at CSU, Cruzen was previously director of the science center's Mead Observatory. He replaces **Carole Rutland**, who had headed the museum since it opened in June 1996. Known for her work on the National Public Radio series *Starwatch*, Rutland left to become executive director of Riverway South, a regional tourism agency.

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Jan Albaum has been named director of planning and external affairs at the Virginia Museum of Natural History, Martinsville. Most recently self-employed as an economic development and urban planning consultant in Southside Virginia, Albaum previously worked as director of strategic marketing for Torti Gallas and Partners, a Washington, D.C.-area design and planning firm.

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Gretchen Jaspering, former vice president of marketing and communications for the St. Louis Science Center, St. Louis, Missouri, is the new executive director of the Giant Screen Theater Association (GSTA), St. Paul, Minnesota. She replaces **Mary Ann Henker**, who left to pursue other professional interests.

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The Denver Museum of Nature & Science announced the appointment of **George W. Sparks** as president and CEO. A former Air Force pilot and aeronautical engineer, Sparks worked for HP and Agilent Technologies before becoming a partner in the NorthStone Group, a management consulting firm. He has also served on the boards of several Colorado educational and business leadership groups.

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After 11 years as president and CEO of the Arizona Science Center (ASC), Phoenix, **Sheila Grinell** announced her retirement effective December 31, 2004. A former executive director of ASTC and leader of the 1988–1994 Institutes for New Science Centers, Grinell was centrally involved in the science center movement during its formative years. She will remain in Phoenix and continue to consult for ASC and other clients. Her successor at the science center is former chief operating officer **Chevy Humphrey.** A member of ASTC's Conference Program Planning Committee, Humphrey has been with ASC for six years.

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The new president and CEO of Sci-Port Discovery Center, Shreveport, Louisiana, is **Al Najjar.** Most recently senior vice president of the science center, Najjar is a physicist and foremer exhibit and program designer. He succeeds **Andrée Peek,** who resigned December 31 to relocate with her husband to Sandia Park, New Mexico. Peek came to Sci-Port in 1997 to oversee construction and startup of the science center, which opened in 1998. Prior to that, she served for 17 years as senior vice president of Discovery Place, Charlotte, North Carolina. She was also Member at Large on the ASTC Executive Committee, elected in 2004. ■

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