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The California Academy of Sciences 150 Years Young with a Vision for the Future

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Innovations Past and Present

The California Academy of Sciences has had a long and rich history (see Aldrich and Leviton 2000; Leviton and Aldrich 1997; McCosker 1999 for excellent examples). Established in 1853, it was the first scientific institution of its kind west of the Mississippi River, predating similar museum-based organizations in New York, Pittsburgh, and Chicago. Many "firsts" mark the institution's history. The Academy established the first public museum in San Francisco in 1874. The institution employed the first paid woman curator in the country in 1883, Mary Katharine Layne Curran (the future "Kate Brandegee"), and she was quickly followed by a second, Rosa Smith (the future Rosa Smith Eigenmann), in 1884. The Academy served as the first home to the Sierra Club, which had its offices in the first decade or so of its existence at the California Academy of Sciences. The Academy is also a unique suite of a natural history museum, aquarium (Steinhart Aquarium), and planetarium (Morrison Planetarium) all in one place, coupled with research and education.

In addition to its many "firsts," the Academy has had in its research, education, and exhibition programs many innovations, from dioramas that are some of the most beautiful ever produced, to the aquarium, which was one of the earliest in operation (and as of this symposium the oldest continuously operating aquarium in the country), to the planetarium. The latter**,** when finished in 1953, was only the seventh in the entire country. It was also the only one ever fabricated entirely inhouse**,** this because, following the Second World War, the Academy was unable to obtain a commercially produced star projector for its newly constructed planetarium. So, it produced its own in its instrument shop. The design and approach served as the basis for the first star projector for the Goto Co., a Japanese manufacturer still in business. The roundabout tank in the Aquarium was the first of its kind built in North America. The Academy, starting in the mid-1950s, also produced what appears to be the one of the earliest television shows on nature, *Science in Action*. The live show was broadcast from the Academy. For most of its existence, the Academy has taken pride in seeking new venues to communicate our interest in the natural sciences to the public, and this has continued down to the present day. Today, nearly 2 million people per month visit us by the Internet.

The Academy sponsors a vigorous education program, armed with docents giving numerous tours of the museum. It offers nearly 200 classes a year, all held at the Academy, except for its field trips, which serve to introduce people directly to nature through a wide range of outdoor educational opportunities. And every year, half of all of San Francisco school children pass through our facility; they come from every school, public and private, in the city. Actually, 40 percent of the California's schools from Santa Cruz to the Oregon border, a distance of more than 400 miles, send at least one class to the California Academy of Sciences every year. Annually, over 400,000 people are served by our education programs.

Academy scientists, numbering nearly three-dozen, are this year studying in 33 different parts of the globe. Our scientists published over 90 peer-reviewed papers and books last year. As would be apropos, the cover image of a recent issue of *Science* magazine is titled "The Tree of Life" (*Science* 300[5626]:cover, 13 June 2003). The identification, description, evolutionary relationships of the organisms that comprise the earth's natural endowment, and their distributions over space and time form the core of our scientific studies. With those activities, approximately 18 million specimens have been amassed in Golden Gate Park, accumulated mostly since 1906. It was in that year that almost all of our collections, painstakingly acquired during the first 53 years of our Academy's existence, were destroyed by the fire that followed the great San Francisco earthquake of April 18, 1906.

Multidisciplinary research has been a big part of our history. That approach has included a series of expeditions to Galápagos, and, more recently, major, multi-year, multidisciplinary commitments that involve work in China, Madagascar, and Myanmar (Burma), each engaging the attention of most every scientific department at the Academy. The tradition of multidisciplinary expeditions was begun many years ago, during the latter part of the 19th century starting with expeditions to Baja California; we will assuredly continue that tradition into the future.

Scientific research and education, comprising our dual mission "To explore and explain the natural world" strongly express the work of the Academy. That exploration and explanation are becoming more critical as the natural endowment of the earth is ever more threatened. However, the Academy is not new to the area of conservation. Conservation has been a part of the Academy for a long time, whether it was supporting the proposal in the early 1860s to set aside Yosemite Valley and its bordering highlands as a park dedicated to the people in perpetuity, to the establishment of Big Basin State Park, to the protection of Mt. Shasta and its environs in the late 19th century from overzealous logging interests, to a wide variety of other conservation issues in a state that, in particular, has been a leader in conservation issues locally, nationally and internationally.

The institution has had and continues to have significant impact worldwide. And in San Francisco, in a city that celebrates its cultural diversity and its cultural institutions, the Academy is by far its largest cultural institution.

Challenges Facing the California Academy of Sciences and Natural History Museums In General

Despite the wonderful, rich history of the Academy, and the impacts it makes locally, nationally and internationally, our institution, and institutions of natural history in general, face major challenges. The challenges are *intellectual, strategic*, and *physical*.

Intellectual challenges for natural history museums are those within the museum and others, quite similarly, from outside the building. Internal challenges include the vestiges of perceptions related to museums not being on the forefront of science, relegated to a storage/caretaker status for collections whose relevance is less and less clear. In this situation, the collections are seen not as assets but as resource sinks, both for money and space. These dated perspectives linger in the worlds of trustees, some administrators, and public programs staff. Outside the museum, natural history museums are viewed by some as stagnant, never changing facilities. It was as if, with their exhibitions based on building blocks of marble and brass, the museum and science itself sought eternal, never changing truths, and that these collections of facts were then embodied in a presentation system that was difficult to change. The relevance of natural history museums has not been well understood or perceived, even by many of those most closely associated it, including staffs, trustees, and visitors.

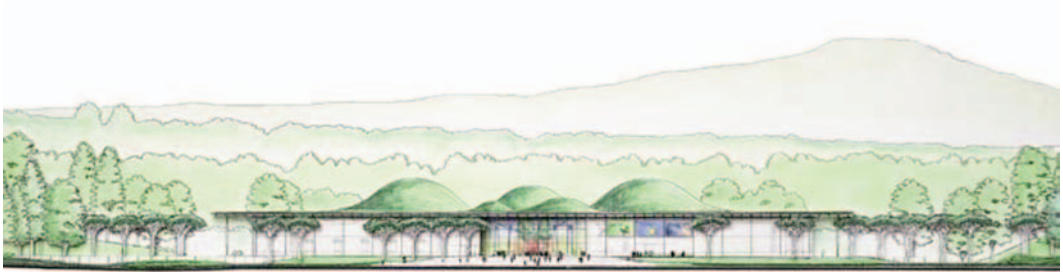

FIGURE 1. An artist's sketch of the new Academy building as seen from the the front. Image provided by Renzo Piano Building Workshop.

Yet, in a poll done by the Academy with Harris Interactive, the need to understand biodiversity is clear, and the relevance of *Science* to people's lives, including basic decisions people make every day, is well understood. Natural history museums, with their dynamic research programs, concentrated taxonomic expertise (to help address the taxonomic impediment in the biodiversity crisis), and playing the role of an equalizer in society, providing access to objects and ideas that the general public might not find elsewhere, are well positioned to address societal imperatives in research and education.

Strategically, for natural history museums to meet the demands of the future, they need to become more integrated in terms of their own research programs, fostering interdisciplinary studies, and across programmatic units, i.e., research, education, and exhibitions. And, instead of imparting institution-based "facts", museums also need to be sensitive to the interests and needs of their visitors, intellectually in terms of content, its changing nature, and amenities demanded by the marketplace. The changing nature of information is a given in the world of science. It is a world not of developing dogma, the old museum model, but of challenging dogma, of creating new data and generating new ideas and hypotheses. Science is a dynamic enterprise, not a static one, and the challenge, then, is to be able to share and express the dynamic nature of science, not keep it locked away from public view in musty storage cabinets, insulated laboratories, and technical literature. (See also Allmon, this volume, and Sampson and George, this volume.)

Many natural history museums face the additional challenge imposed upon them by their own buildings. These buildings, though large, strong, and often impressive in appearance (see Kohlstedt, this volume), are actually impediments to meeting the intellectual and strategic challenges museums face. The nature of their designs rebel against flexibility and change, and due to the way many of these institutions have grown, with additions in collections, scientific tools and disciplines, education programs and new exhibitions, the physical facilities are many times a hodge-podge of additions without the context of a long-range plan for the physical plant. In addition, they may be deteriorating due to their age (many institutions have been in their buildings 80+ years), and too rigid to support the level of change needed today and for the future. At the Academy, the ages of our 12 buildings show: serious seismic issues, systems and code deficiencies, e.g., lack of an integrated fire and safety system, ADA inaccessible, and leaking roofs. Programmatically, at a time when we are striving for integration within the institution, our intellectual capital has been pushed away, to the point where the two most distant points in our facilities, a distance of no less than a fifth of a mile, end up in scientists' offices.

Meeting the Challenges and Looking to the Future

The project to renew and rebuild the California Academy of Sciences was initially viewed as

FIGURE 2. Illustration shows the interaction between the Architect for the building and Exhibition.

one to address the physical needs of our buildings. But early on we found ourselves taking a hard look at how we could best play our role in society, given our mission "to explore and explain the natural world." Research plans have been developed that relate to creating a better understanding of the world around us and the ways our data could be used by a broad cross section of traditional as well as potential new users. The nature of needs in science in the schools also have been extensively discussed, especially given the poor showing of California's schoolchildren in national math and science tests. Meetings and focus group conversations with a wide range of constituencies centered on their needs and expectations about a natural history museum in the 21st century. These conversations led to insights about the marketplace, mindful of the competition for people's time as well as money, people's expectations, and people's aspirations for the institution.

The desire of our scientists to work more in interdisciplinary research, as well as to bring information together in a more cohesive fashion thus enabling them and their colleagues better to make informed decisions not only within their own specialties but in addressing concerns about conservation problems around the world, have also driven our planning. In terms of educational programming, we are trying to do nothing short of making a more scientifically literate citizenry. This is a lofty goal, but an absolute imperative. People are making important decisions related to themselves and California, a state where the economy has been fueled by science and technology. In this state, schoolchildren have consistently scored very low relative to the rest of the nation. So, for California, "Where is the next generation of scientists going to come from?" is a fundamental question. We think we can help answer that question. We believe that a museum, both on the public education side and for formal education, can be a great equalizer in our society, providing access to objects and ideas for the future.

We have been looking at three "programs' to help us address these societal needs. One is our

FIGURE 3. CAS Creative Design Team: CL = Client (=Academy Executive Director); CD = Creative Design Director; Δ = Design Group: OD = Octal Design, CAS = Academy Exhibit Design, RPRW = Architect; ▭ = Content group: E I = CAS Interest Content Spec; ○ = CAS groups to provide detail contents.

programmatic response, which we call an "intellectual program", that deals with addressing questions like "How will our science work?", "What are the education programs that we will offer?", "What are the exhibits that we will have at the Academy, and how will we assess their impact?" The second "program" is an organizational agenda, how the Academy will achieve the intellectual program. This is a very difficult set of analyses and considerations, because it deals not only with organizational structure, but also with the people and skills necessary for the 21st century, and the way people must work together to get things done.

Given an intellectual program and way of working, we then asked "does the current complex of buildings in Golden Gate Park allow us to support those programs?" In other words, can the current form support the future functions? That is how we thought about this project; "What do we need to do?", "How will we get it done?", and "What kind of facility will allow us to accomplish our goals?" We needed a building to support the wide array of programs at the Academy, to meet the aspirations we have in research, education, and exhibitions, and as an institution dedicated to societal aspirations.

A Building in Support of Science

In order to understand not only our programmatic needs, but also how the building might look and operate, we developed a wish list for our building. First, we knew we would have to create inspiring spaces to be synergistic with exhibits, and also support all of our other programs. We were actually very active clients to say that this is the program that this building has to support in these areas. We knew that we wanted the building to express a relationship with Golden Gate Park. And we wanted it to be a creative blend of old and new, whereby we recognize the contributions and

values of the past but build for the future. Also, the building needed to be adaptable, durable, flexible, safe, and assuredly accessible. And, in all this, we wanted this building to express our ethic and values about nature (Fig. 1).

The contour of the roof is in some ways an expression of our values as an institution. The roof has seven undulations; one of those undulations is where the planetarium will be, another expresses where a major new exhibition on rainforests will be. Another of the undulations will be associated with the Steinhart Aquarium, allowing you to look into the Academy. One of the undulations will be associated with an elevator (and stairs), because you will be able to go up and be on the Academy's roof. The roof will be a living roof. It will be a sod roof of almost three acres. Twenty-four different California native species will comprise that roof. It is part of the sustainable approach to architecture that this building will encompass. The roof has been designed to take on about 2 million gallons of rainwater each year, water that will not go to the storm drains of San Francisco. The rainwater will either evaporate or we will capture the excess and use it in a "gray water" system in the building. Our visitors will be able to go up and have views of the park, but also this building will tell its story; it will be an exhibition in and of itself about sustainable design. Energy efficiency and conservation, water conservation, natural light and air for our staff have been taken into consideration. Thus, this strategy will help us create a "green building." But if one is going to build a green building, what "shade" of green should it be? The U.S. Green Building Council certifies green buildings, and their certifications are silver, gold or platinum. The Academy's building, by design, will be a platinum-rated building — one of only a handful in the entire country and, once built, it will be by far the largest, most visited platinum-rated building in the world. Thus, the building should not only support a well thoughtout program, both intellectual and organizational, but also express the ethics and values of the organization. In this case, a wonderful juxtaposition of natural form and life with the high technology necessary to harvest and use natural resources in the most efficient and effective ways.

Process and Sacred Cows

When making change on the scale that we are doing at the Academy, we find there are a lot of sacred cows in the institution, items large and small, that people want to preserve, ranging from buildings, to exhibits, to programs. A relatively little discussed area relates to the processes of an institution. These can be viewed as sacred cows, too. Usually people do not think about processes in this regard, but in some ways they are more important than physical elements.

There are many constituencies who might perceive, and want to preserve sacred cows of any type. These may be people outside the museum, visitors, donors, politicians and consultants; but they live within the institution too — well-meaning, thoughtful individuals among the staff, among the trustees, among our volunteers, and others. One area addressed by the Academy on this rather sensitive issue is with regard to the development of exhibits, and the relationship of the architecture and exhibits as sacred cows. When this project was started, some people told us that we had to do the architecture first. The argument was, "The museum serves everybody. It's not just an exhibition space. You need to get the building right and then the exhibits can follow." Others told us, "The museum is about the public, and you have got to get the exhibitions first. That's what's paying the bills, so let the exhibit folks take off and then build the building around the exhibits." This led to the question of who should have primary responsibility for the design of the exhibits. Some advocated that the in-house staff should have primary responsibility. The argument was that the internal staff had knowledge about the museum, they share the passion and the mission of the organization, and, therefore, they can express the institution's ethic and mission in the design.

Others advised that we use external folks. "This is a once-in-a-lifetime opportunity, requiring the best and the brightest" and "You'll want to pay for high levels of creativity that you can't otherwise afford 365 days a year as a not-for-profit organization." In the end, the approach the Academy took reflected neither of the two points of view, either with respect to the debate over architecture versus exhibitions or the debate over who should design the exhibitions. Our approach was to strive for synergy. Architecture and exhibits are to be integrated (Fig. 2), in the same way as our institution is striving to be a more integrated institution. So, we had to figure out a way to marry content and design, bringing different expertise to the table, just as you would in a research project. To do this, we decided to create a team for our creative process. This team came to include four outside design firms, our own exhibits department, the architects, as well as content specialists from within and outside the institution. And, rather than assigning the outside firms to some specific tasks, such as one firm gets the aquarium, another the planetarium, a third the natural history museum, we wanted a single team working together (though these four firms were simultaneously competing for work on other projects) with the architects at the table. We had to, and wanted to, by design, manage the planning as a single, integrated process and the group as a single team (Fig. 3). What we had to do was introduce all of those diverse people, each with different skill sets, to each other and to the Academy. We had to figure out a way to get them to collaborate, to set their intradisciplinary jargon aside, to develop a sense of shared values about what we were trying to do as an organization, and to impart to the unified team the imperative and importance of this project. There were many management issues along the way.

In addressing the design of the building, and the way in which we approached the design of the exhibitions, and the integration of the two processes, we have striven for innovation and leadership as an organization. The building is not only innovative in the way it is designed and the resources that it uses, but operationally as well — the Academy will be a green organization. In terms of leadership, the way that we are thinking about what a natural history museum is, and the processes that we use to achieve our goals, we think will be exceptionally important for many of the other projects that are coming online both here and elsewhere. The large number of projects being considered by sister institutions will be able to benefit from our experiences. We are rebuilding this 150-year-old institution on our strengths and assets. There are intellectual and physical assets, specimens, scientists, and projects. In some ways we are rediscovering our past, like expeditions, like the power of real things; this innovative spirit that has been part of the California Academy of Sciences for 150 years. And we are continuing to challenge ways of thinking about what a natural history museum is and the role it can play in communities not only in the United States but even worldwide. All of that is done ultimately to develop a set of programs, a way of working, and ultimately a facility that will serve society and the Academy well into the 21st century.

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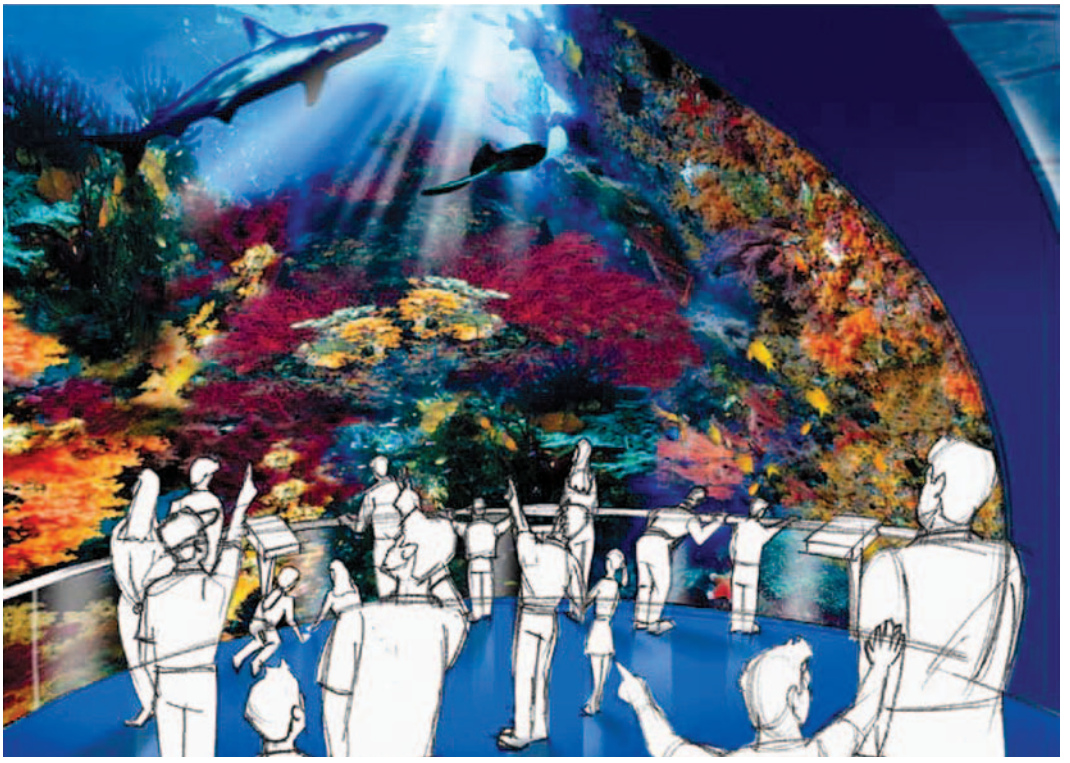

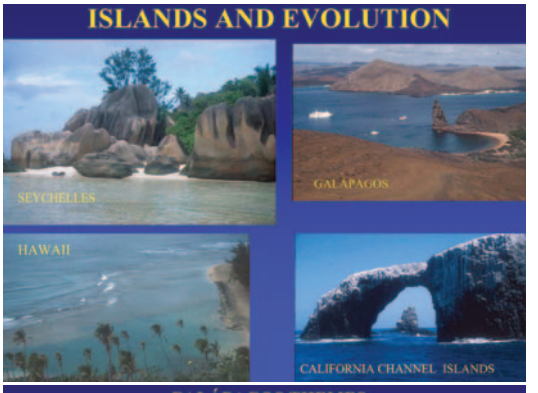
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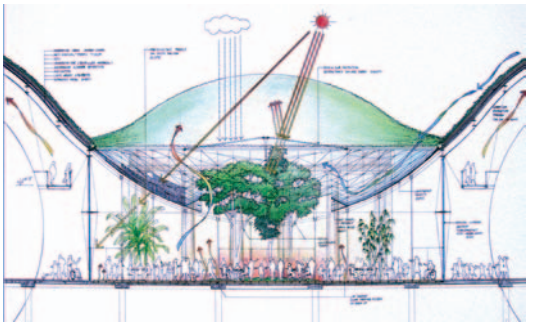
CALIFORNIA CHANNEL ISLANDS

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