PURPOSE BUILT CASE STUDY

# The California Academy of Sciences

This San Francisco museum designed an iconic, sustainable building to attract visitors and deepen their connection with the natural world.

# Executive Summary

**Organization**
The California Academy of Sciences

**Location**
San Francisco, California, USA

**Construction Type**
New construction

**Opening Date**
2008

**Project Area**
410,000 sqaure feet

**Project Cost**
$488 million

**S. D. Bechtel, Jr. Foundation Investment**
$2.5 million


The California Academy of Sciences (the Academy) is a scientific and educational institution in San Francisco's Golden Gate Park. Founded in 1853, the Academy conducts research and operates a museum that educates visitors about the natural world. Over decades, a series of ad hoc additions to the original facility created physical separation between museum departments and exhibitions, inhibiting cross-disciplinary research and preventing visitors from experiencing the full breadth of the Academy's offerings. Following years of waning attendance and the effects of a devastating 1989 earthquake, the Academy launched an effort to renovate its damaged aquarium. However, strong support from its local community and private donors encouraged the Academy to think bigger—leading to a decision to reconstruct the entire facility.

The Academy recognized that this capital project held potential to amplify the organization's mission and establish it as a leader in environmental sustainability. By developing an environmentally-friendly building and interactive exhibits, the Academy sought to respond to contemporary conservation issues while inviting visitors to explore, learn about, and protect the natural world.

The project team chose Renzo Piano, a world-renowned architect, to design an iconic facility that would be a symbol of sustainability. The signature element of Piano's concept was a living roof with undulating hills echoing the landscape surrounding the museum. A pair of impressive three-story domes, each 90 feet in diameter, would contain the museum's rainforest exhibit and planetarium. While this ambitious project vision contributed to dramatically increased construction and overall project costs, the innovative green design also attracted donors who supported the expanded scope.

Today, the Academy houses an aquarium, planetarium, and natural history museum, as well as scientific research and education programs under one roof. It is the world's first LEED[i] Double Platinum museum, and the largest Double Platinum building on the planet. Visitor attendance has nearly doubled since the building opened, with guests of all ages benefiting from engaging learning experiences. The new facility has also enabled better collaboration across staff departments, and inspired the Academy to focus its research on critical environmental concerns. This project influenced the Academy to evolve its mission, from "explore and explain the natural world" to "explore, explain, *and sustain life on Earth*."

This case study is based on research conducted by MASS Design Group in November 2015. Funded by the S. D. Bechtel, Jr. Foundation, this case illustrates how a capital project can require a balance between an organization's internal staff needs and external aspirations—and how a visionary design can bring both benefits and risks. It also demonstrates how a temporary space can help leaders advance operations and program changes prior to moving to a new building.

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i *LEED, or Leadership in Energy & Environmental Design, is a globally recognized symbol of excellence in green building. Source: http://www.usgbc.org/articles/about-leed.*

# Purpose Built Series

Capital projects often bring lasting benefits to nonprofit organizations and the people they serve. Given this opportunity, foundations grant more than $3 billion annually to construct or improve buildings in the United States alone.[ii] Each capital project affects an organization's ability to achieve its mission—signaling its values, shaping interaction with its constituents, influencing its work processes and culture, and creating new financial realities. While many projects succeed in fulfilling their purpose, others fall short of their potential. In most instances, organizations fail to capture and share lessons learned that can improve practice.

To help funders and their nonprofit partners make the most of capital projects, The Atlantic Philanthropies and the S. D. Bechtel, Jr. Foundation commissioned *Purpose Built*—a multi-faceted study by MASS Design Group, a nonprofit architecture and research firm. In 2015 and 2016, MASS conducted interviews, reviewed literature, and examined a diverse set of completed projects around the world; each project was supported by one of the above funders.

The study generated a set of core principles as well as tools for those considering or conducting capital projects:


*Introducing the Purpose Built Series* is an overview of the study and its core principles.


*Making Capital Projects Work* more fully describes the *Purpose Built* principles, illustrating each with examples.


*Planning for Impact* is a practical, comprehensive tool for those initiating capital projects.


*Charting Capital Results* is a step-by-step guide for those evaluating completed projects.


*Purpose Built Case Studies* report on 15 projects to illustrate a range of intents, approaches, and outcomes.

See the full *Purpose Built* series online at **www.massdesigngroup.org/purposebuilt**.

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ii *Foundation Center, Foundation Maps data based on grants made in the United States, 2006-2015.*

**"A lot of natural history museums are good at telling what was, but [we were] trying to shift to telling what could be or what should be."**

**—Staff member, California Academy of Sciences**

**Above.** Circular skylights in the museum's living roof provide natural light to the rainforest exhibit.
**Cover.** The museum's stunning living roof mimics the seven hills of San Francisco.

# Introduction

### A STORIED HISTORY AND CONNECTION TO COMMUNITY

The California Academy of Natural Sciences was established in San Francisco in 1853 during the Gold Rush years. Its stated aim was to systematically survey the new state of California and collect "rare and rich" natural specimens.[1] Two decades later, the renamed California Academy of Sciences (the Academy) opened as the city's first public museum.[2] Since the end of the 19th century, the Academy has conducted scientific research while also operating a museum to educate visitors about the natural world.

After the Great Quake of 1906 destroyed the Academy's original structure in downtown San Francisco, the museum moved to Golden Gate Park—opening there in 1916. With funding from the estate of a prominent local banker, Steinhart Aquarium was added to the facility in 1923.[3] During this era, an important and enduring relationship between the City of San Francisco and the Academy took shape, with the City providing land and contributing to maintenance of facilities constructed by the Academy and its donors. Over decades, the Academy expanded to include North American Hall, Simson African Hall, Science Hall, Morrison Planetarium, and other components.[4]

Featuring accessible content, low-cost admission, and a prominent location, the museum catered to children and families throughout the 20th century, reflecting an egalitarian quality lacking in many peer cultural institutions. As one respondent said, during this era, "almost every child" in San Francisco experienced the Academy.

### IMPLICATIONS OF GROWTH AND FINANCIAL CHALLENGES

Over many decades, the museum constructed a dozen additions to its Golden Gate Park facility. Then Director of Exhibit Design and Production Scott Moran described these additions as "very much separate buildings connected by hallways and doorways." This growth took place without a master plan, and physical distance created departmental silos that made collaboration among researchers difficult. The lack of a cohesive work culture slowed the Academy in advancing its research and museum programs.

The public perception of the Academy reflected the disjointed nature of the institution. Although visitors valued the museum as a beloved cultural institution, individually they were often unaware of the Academy's full range of offerings. As Moran explained, "Many people didn't know of the Academy as the California Academy of Sciences—they knew of it as the Steinhart Aquarium [or the] Morrison Planetarium." The separation of exhibitions and the buildings' lack of flexibility also inhibited the Academy's ability to address marketplace


**Above.** Located in Golden Gate Park, the Academy is near several other attractions within San Francisco.

changes and respond to heightened visitor expectations for museum experiences that were entertaining, interactive, and relevant.

Staff reported that attendance was dropping by about 4 percent annually in the 1990s, and admission income alone was far from sufficient to meet the museum's financial needs. As one staff member explained, the Academy "didn't have enough money, no matter what the attendance was. . . . [There was an ongoing need to] cut and cut to work within the existing budgets."

### A DEVASTATING EARTHQUAKE LEADS TO A NEW START

In 1989, the 6.9-magnitude Loma Prieta earthquake[5] shook San Francisco, causing irrevocable damage to the Steinhart Aquarium and forcing Bird Hall to close.[6] The Academy's useable exhibit space was reduced by about 25,000 square feet, and the safety and function of some facilities were severely compromised. One staff member recalled that conditions were so poor that employees had to wear hard hats in some office areas due to concrete falling from the ceiling. The extensive damage made it clear that the Academy would need to find funding for massive infrastructure improvements. In 1995, the Academy approached San Francisco voters with a bond measure for $29.2 million to rehabilitate the aquarium. The measure passed with the required two-thirds majority vote.[7]

While these funds would cover the aquarium's pressing structural problems, they would not help the Academy address its broader needs for improved exhibit spaces and greater internal cohesion across departments. The strong support of residents expressed through the bond vote encouraged the Academy to expand its vision and consider the potential for a larger capital project that would advance the institution in a more holistic way. With an intent to replace and rebuild the museum completely, the Academy returned to San Francisco voters in 2000 with an additional request for $87.4 million. The community also approved this measure.[8]

The bond measures provided the Academy with the capital needed to begin a large-scale project, and gave the organization's board members confidence that the new building would be financially viable. In the words of one board member, "the bonds meant that we could afford to dream. There was a belief that, if we're going to do this, we have to do it big and grand."

## Project Mission

The Academy approached this capital project as an opportunity to examine and elevate its organizational mission. While the museum's role had historically been to educate visitors about the past, the Academy now hoped to teach people about the future. As one staff member explained, "A lot of natural history museums are good at telling what was, but [we were] trying to shift to telling what could be or what should be."

In particular, the Academy felt it could play a valuable role at a

time of increasing international attention on climate change and conservation. In preparing for this capital project, the Academy expanded its organizational mission—its historic focus on *exploring* and *explaining* the natural world would now include an emphasis on *protecting* life on Earth. Project leaders aimed to create an environmentally sustainable building that would serve as an attraction for visitors, drawing them to the museum, creating a stronger revenue stream for the institution, and educating new generations about contemporary global issues. They also set out to achieve a unified design that would connect the Academy's research staff, enhancing their collaboration and improving their quantity and quality of scientific outputs.

# Process

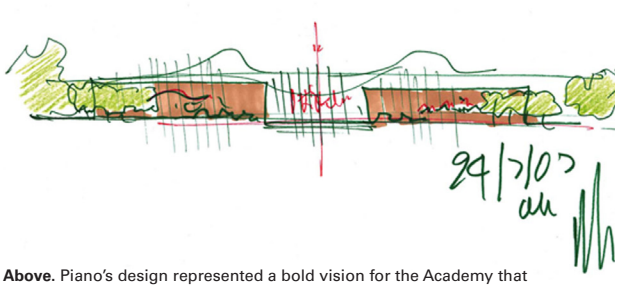
### ENGAGING PROJECT LEADERS AND CITIZEN ADVISORS

The capital project would be instrumental to the future of the Academy and called for strong leadership from its board of trustees. Board members were engaged throughout the process; several had expertise that was directly relevant to the project. Wall Street financier Dick Bingham served as board chair for the duration of the effort to plan and construct the facility. The Academy also benefited from the experience of board member Bill Wilson, a local developer and owner of a construction company.

Since the City of San Francisco was a significant investor through its bond measures, the Academy formed a Community Advisory Group of about 15 individuals from neighborhoods and interest groups. Interactions with these advisors helped the Academy gain critical feedback and anticipate community concerns. It also nurtured buy-in—through the Advisory Group, the Academy built relationships with residents who would become advocates for the project at City hearings and in their neighborhoods.

### SEEKING AND SELECTING A RENOWNED ARCHITECT

The Academy board wanted an architect whose stature would reflect the project's ambitious vision. The museum hired a former executive director of the Pritzker Architecture Prize, the field's most prestigious award, to conduct the search. Out of six finalists, the board ultimately selected Renzo Piano Building Workshop after an interview with the firm's founder that became legendary at the Academy. While many of the prospective architects presented polished models and renderings of their proposed buildings, Renzo Piano brought only a notepad and rearranged chairs in the interview room to form a circle. Rather than presenting an idea for the building's design, he opened the interview by asking the board about the Academy's mission and institutional goals. On the spot, Piano sketched out a design in response to the board members' answers. As one staff member recalled, this interview was "one of the [primary] reasons they selected him—because it was a conversation."

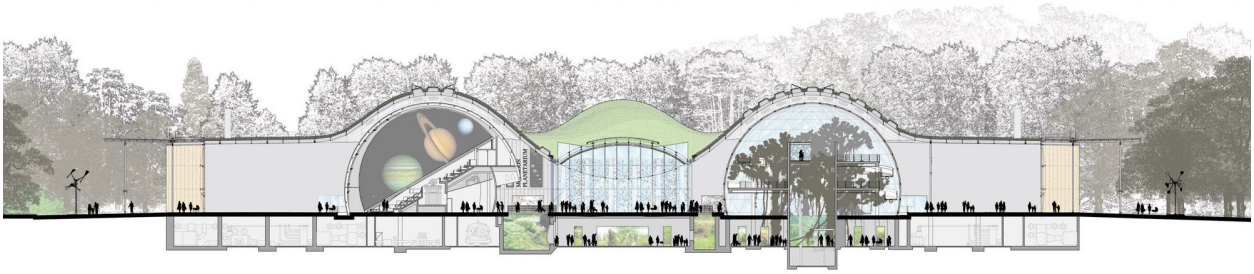


**Above.** Piano's design represented a bold vision for the Academy that resonated with many donors.

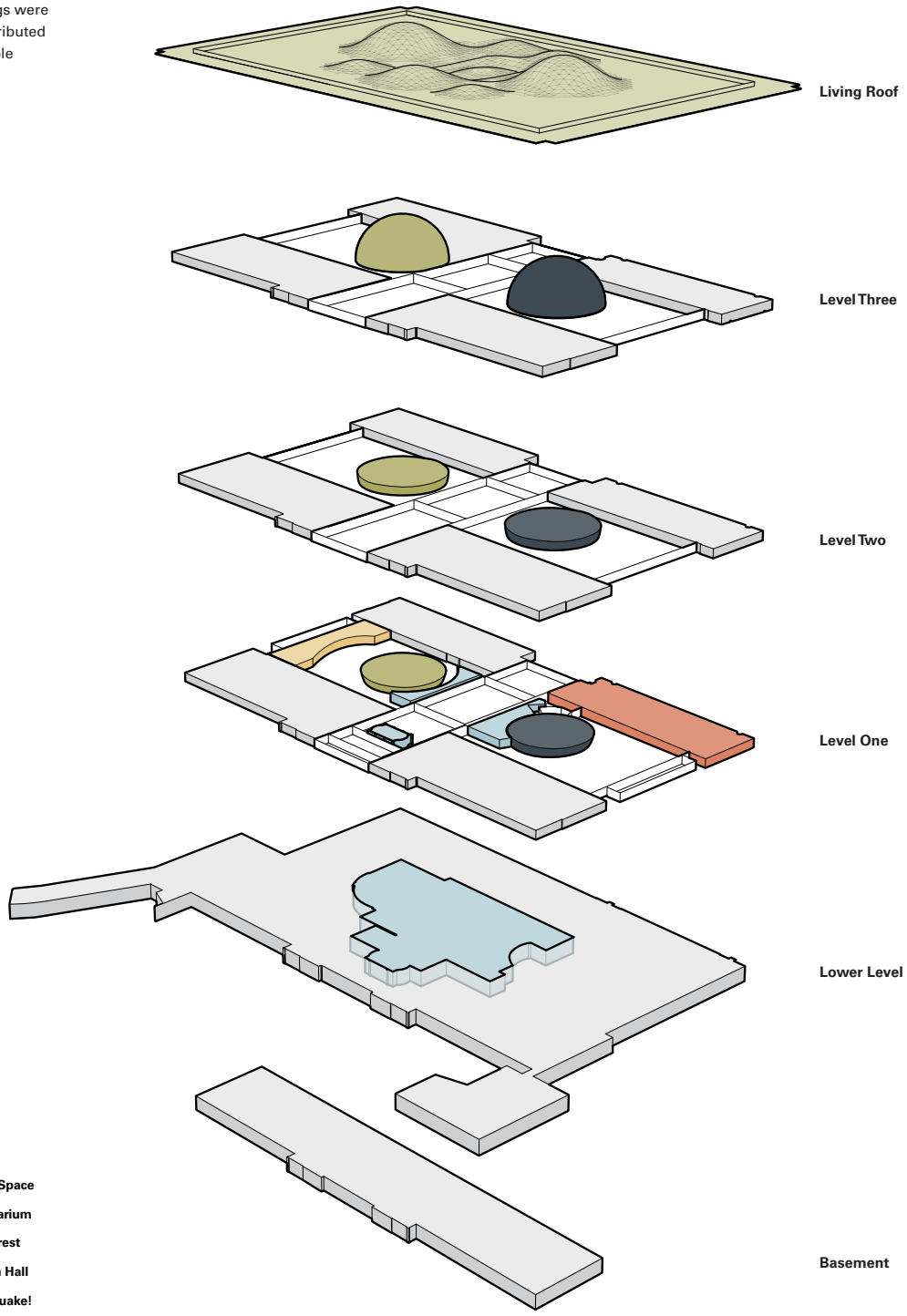
### DESIGNING A SUSTAINABLE, ACCESSIBLE BUILDING

The selection of Renzo Piano fueled the Academy's high aspirations for the museum's architecture and solidified its commitment to creating a sustainable building. Piano's design began with a living roof concept, which he described as "[lifting] up a piece of the park and [putting] a building underneath."[9] The roof would feature a field and seven rolling hills to mimic San Francisco's landscape. The roof would be visible from the Music Concourse, an open-air plaza within Golden Gate Park.

**Below.** Domes on each end of the museum house the planetarium and rainforest exhibits.



**Right.** The building consolidates several exhibits under one roof; these offerings were formerly distributed across multiple structures.



**Above.** Visitors travel on a ramp through the rainforest exhibit.

To make the museum more welcoming and transparent, glass exterior walls would visually connect visitors inside the Academy to the surrounding park. Piano described the approach as a reaction to the prior Academy and its solid walls; that structure was "in the middle of Golden Gate Park, one of the most beautiful places in the world . . . [yet visitors] had no sense of what was there."[10]

Under two of the hills on either end of the museum, 90-foot diameter domes rising three stories would anchor the Academy's entrance floor. Separated by a central piazza, these impressive domes would house a rainforest exhibit and planetarium, with the aquarium located on the floor beneath. This design would provide visitors on the first floor with sightlines of these three signature aspects of the Academy. The aquarium tanks would be seen from many angles—a contrast from the one-sided views in the original Steinhart facility. Nonlinear, interactive exhibits would encourage visitors to engage with educational materials rather than tour the museum as passive onlookers. Overall, the design intended to spark visitors' curiosity through an exploratory environment and bring them into contact with science and important environmental issues. To improve internal operations, including research collaborations, all staff would be consolidated in open-plan offices at the rear of the museum.

As the design developed, LEED certification was gaining national notice and many donors were attracted to the Academy's LEED Double Platinum ambitions. The building would reflect the Academy's commitment to sustainability through features including its living roof, ENERGY STAR® appliances, clean energy sources, and low-emission and ozone-friendly heating systems, ventilation, and air conditioning. The living roof and an accompanying "Building Green" exhibit would educate visitors and highlight the building's sustainable features. Weather stations on the roof would monitor wind, rain, and changes in temperature so that the building's automated systems and retractable skylights could respond accordingly. The roof's hills would be edged by solar panels and lined with 50,000 porous, biodegradable vegetation trays, and native plants would provide a habitat for a variety of wildlife.[11]

## CREATING A LARGE PROJECT TEAM—AND TENSIONS

Working with Europe-based Renzo Piano required the project team to engage a local architect of record, and Stantec Architecture was selected for this role. Along with several exhibit design firms, Stantec developed the building's final design with input from the Academy's staff, board, and local community members.

To address the complexities of working with a large project team and myriad stakeholders, the Academy hired Don Young & Associates to manage the overall effort. Young acted as a liaison between the various design consultants and the board. Communications were centralized through Young to help streamline the overall process. However, this approach limited direct communication between project players and created gaps in coordination. Designers described situations in which critical exhibit components, such as drains in the aquariums, had not been included in the architect's plans—requiring last-minute changes during construction.

Some exhibit designers felt that the Academy's prioritization of the building's living roof overshadowed their perspectives, forcing them to adapt to Piano's vision in ways that compromised other parts of the building and its exhibits. They pointed to the exhibits at either end of the building as creating a "somewhat disjointed visitor experience." One expressed concern that the Academy had "[fallen] too madly in love with the building as an icon" during the design process.

## ESCALATING COSTS, FUNDRAISING, AND FINANCING

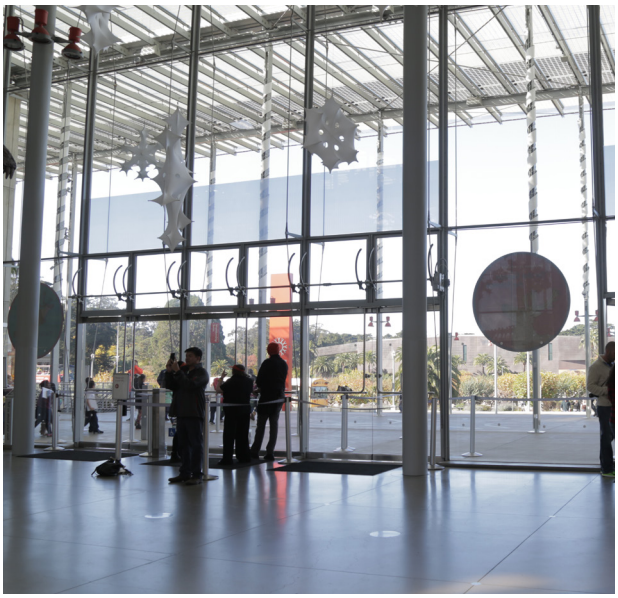
Piano's design came at a high price. Eventually totaling $488 million, the construction of the new Academy was significantly more costly than other major capital projects in the region. For instance, the reconstruction of the de Young Museum cost $202 million in 2005 following the Loma Prieta earthquake.[12, 13] The Monterey Bay Aquarium was constructed or renovated in phases from 1984 to 2005 and cost $133 million.[14]

Factors unique to the Academy project contributed to the colossal price tag. Some expenses were driven by the Academy's aim to become a visible symbol of sustainability—for example, the project's living roof cost about $30 per square foot, whereas a standard green roof is about $18 per square foot.[15] Other costs stemmed from the nature of the final design—for instance, the sloping roof and glass domes called for custom glass and metal structures, and their

construction requirements led to costly rearrangement of typical building phases. Still other expenses resulted from unanticipated external forces—the price of steel and concrete on the global market spiked[16] in 2001 following the September 11 attacks and again in 2004 after Hurricane Katrina.

Between 2001 and 2005, the Academy increased the project budget by more than 25 percent, from $388 to $488 million, even as it modified plans to reduce the building's size to decrease costs.[17] Increases came on seven occasions, and the project process was paused at points due to financial concerns. The final figure included all design and management fees as well as public engagement, site development, building construction, and exhibit and staff transition costs—including the expense of operating a temporary space for four years.[18]

While the ambitious project vision brought a significantly higher price tag, it also attracted donors. Their support allowed the Academy to increase the project's budget rather than abandon its design vision or LEED certification goals. Each of these elements had its own proponents. Director of Foundation and Government Relations Katharine Greenbaum explained, "Renzo captured people's attention, especially people who liked art more than science." Drawings and renderings of the building were essential to its fundraising appeal, and the Academy regularly highlighted Piano in communications, including featuring him on the first page of the building's post-completion report. The facility's sustainable elements drew the notice of donors interested in the museum's contributions to environmental conservation or science education, and some staff members believed that the Academy's ambition to be the greenest museum in the world had a greater impact on the team's ability to fundraise than the glamorous draw of a "starchitect."



**Above.** Glass walls create a visual connection to the surrounding Golden Gate Park, helping the Academy feel open, welcoming, and connected to its surroundings.

In addition to securing private donations and municipal bond revenue, the Academy was able to take advantage of bond financing through the California Infrastructure and Economic Development Bank. The bank provides low-cost, tax-exempt financing to nonprofit organizations for acquisitions and/or improvements of facilities and capital assets. This resource allowed the Academy to access an additional $281 million in July 2008, which was used to refund previously issued bonds and to finance construction.[19]

## MAKING THE MOST OF THE TRANSITION PROCESS

While construction was underway, the Academy housed its exhibits in a facility on Howard Street in downtown San Francisco. A move to this space was in itself an accomplishment, as it required transferring the marine life in the Steinhart Aquarium as well as other museum collections. The team treated this temporary site as an opportunity to test exhibit designs and programs and prepare staff for the coming transition to a major new building. Through its four years on Howard Street, the Academy succeeded in keeping the public involved and invested in its work, while setting the stage for greater success in its future home. According to Bart Shepherd, the director of the Steinhart Aquarium, "We invested in [the temporary] building heavily, because we knew it would be an important learning space."

At the temporary site, scientists constructed a mock-up coral reef tank to assess sunlight levels and procedures for divers. Staff built scale models of the penguin exhibit and a tide pool touch tank that would be installed in the new building. They piloted programs to engage visitors who were in their 20s and 30s—an underserved demographic for the Academy. A weekly "NightLife" event brought these young adults into the Academy; each evening featured food, drinks, and a special theme. This series has continued and become a popular feature in the new Academy space.

To prepare for smooth operations in the new building, leaders tested open-plan office configurations and helped staff adjust to new ways of working. In a 2008 interview, Moran explained, "By modeling the temporary facility as much as possible on what was being proposed for the new building, we were able to help people overcome their initial resistance to some ideas."[20] Operating the temporary site required fewer staff members; the Academy downsized its operations for these interim years. Positions were then added as the new facility opened, with the institution hiring to match its expanded opportunities and future needs.

**Above.** Visitors experience the coral reef aquarium from many angles; the new facility includes views from within as well as above the exhibit.

# Impact

### INCREASING THE NUMBER OF VISITORS AND MEMBERS

On September 27, 2008, the new Academy had a huge opening day.[21] According to a staff member, a line of 16,000 visitors stretched for more than a mile outside the entrance, with traffic managers placed at the door to limit crowd size in the facility. Chief of Staff Alison Brown lamented the opening day lines, saying, "Probably the greatest challenge that we still have [is that] people think we're too crowded to come visit." Nevertheless, Brown said the rebuilt Academy welcomed over two million guests during its first year.

As of fall 2015, annual attendance had settled at 1.4 million visitors, almost double the figure in the prior facility. Staff members view the increase in visitors and household memberships as the largest indicators of success for the project. One staff member stated, "We have 55,000 member households, which is huge for an institution our size. And I think that's reflective [of] people's love for the place; they just love coming here." In addition to better marketing, an enhanced visitor experience, and expanded programming, some of the attendance gains can be attributed to the Academy's new building, with surveys suggesting that as many as 20 percent of guests come to the museum to see the building itself.

As traffic grew, the museum shifted toward a business model driven by admission revenue and made the decision to increase its ticket prices. While the higher cost of admission makes the Academy less economically accessible to some potential visitors, many staff members strongly defended this change. They pointed out that the Academy's increased annual operating budget allows the institution to provide more free admission days and reduced-price educational programs, helping it serve more people overall. Additionally, one staff member reflected on the business model for the institution, saying:

> If [the Academy] is all going to be paid for by public funds—like many of the European museums—then it should be free, but it's not. . . . We're a private nonprofit and we get some money from the City of San Francisco . . . but the rest of it is all private funds and admission.

### RESPONDING TO NEW ECONOMIC REALITIES

Shifts in the Academy's business model have had mixed results to date. On the one hand, the museum now benefits from a significantly higher and more sustainable source of earned income: annual revenue from admissions and membership fees. This combined income source was under $2 million annually prior to opening the new Academy in 2008. That amount skyrocketed to $28 million in the new facility's first year, and has remained above $23 million annually since (see fig. 1). One board member explained, "We were all aware that if you don't bring the public in, if you don't have an attraction, you can't support the science."

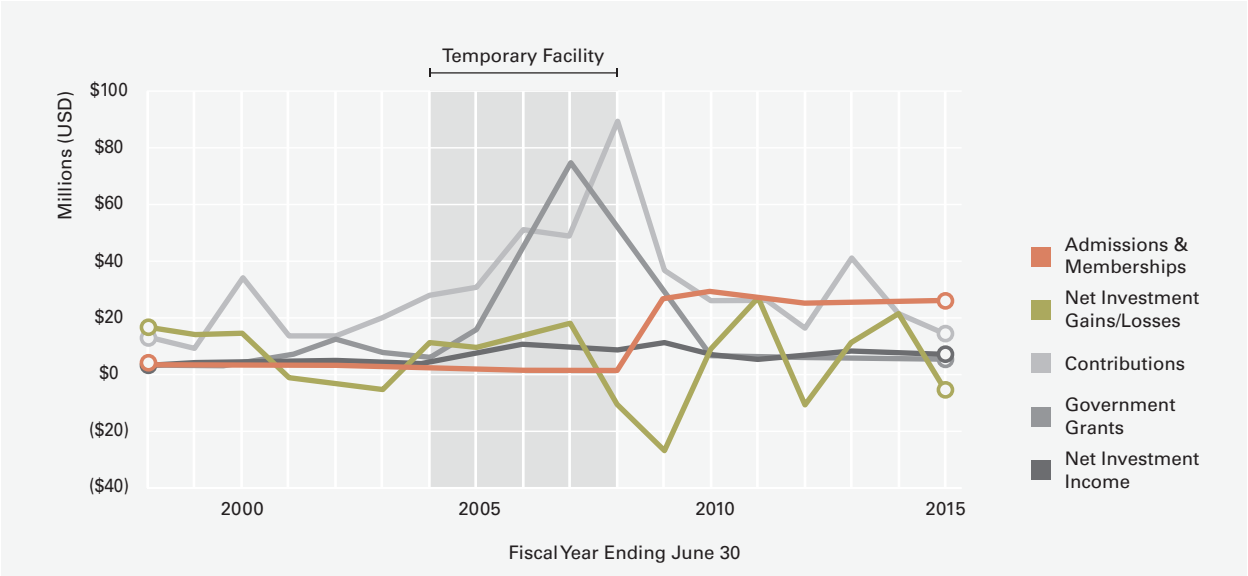



**Figure 1.** California Academy of Sciences Revenue Mix

However, admission and membership revenue has not been able to keep pace with substantial expense increases in the new facility. Between 1998 and 2008, the Academy's total annual expenses remained at or below $44 million, while the total since the move has fluctuated between $70 and $90 million per year (see fig. 2). Between 2004 and 2015, as the institution planned and implemented its expansive vision in the new space, operating expenses (staff and program) increased threefold, accounting for 80 percent of total expenses in 2015. Meanwhile, annual facility costs doubled.

The Academy secured bond financing from San Francisco and California to support the project, and chose to invest a portion of the bond revenue with the hope that it could generate returns and extend use of these funds. According to Moran, the capital project "created a foundation for new ways of thinking. We completely reinvented ourselves . . . and tried to use a for-profit approach to a nonprofit." While this strategy provided additional revenue (investments resulted in net gains of about $20 million or more in 2007, 2011, and 2014), it introduced greater economic volatility as well by making the Academy's annual income subject to fluctuations in financial markets. The Academy incurred net investment losses greater than $10M in 2008, 2009, and 2012 (see fig. 1).

## ADVANCING THE ORGANIZATION'S MISSION

Prior to beginning this capital project, the Academy's mission was to "explore and explain the natural world." As it examined the opportunities inherent in creating a new facility—in the context of increasing global concern regarding the environment—in 2005, the institution changed its mission to "explore, explain, and protect the natural world." In 2013, five years after occupying its new facility, the mission further evolved to "explore, explain, and sustain life on Earth."

> "The building made it an entirely new Academy."

Executive Director Jonathan Foley said he hopes the Academy will be known as "the first sustainability museum." Though the Academy's expanded mission statement was not solely the product of the capital project, many staff members believe that the building played a significant role in the mission's evolution. Foley remarked that "the building made it an entirely new Academy."

The new building also facilitated the organizational and cultural changes its leaders sought, co-locating the Academy's research departments to focus on critical conservation issues. Staff members now work across disciplines, and this integrated approach is reflected in exhibits that connect visitors to the interrelated challenges facing the natural world. Open-plan offices along the southeast of the building foster a more collaborative workplace, while the new, iconic architecture of the Academy helps attract scientific talent.

The building is a symbol of the Academy's values. As the world's first LEED Double Platinum museum and the largest Double Platinum building in the world, the Academy is known for its commitment to environmental sustainability.[22] The roof alone is a remarkable

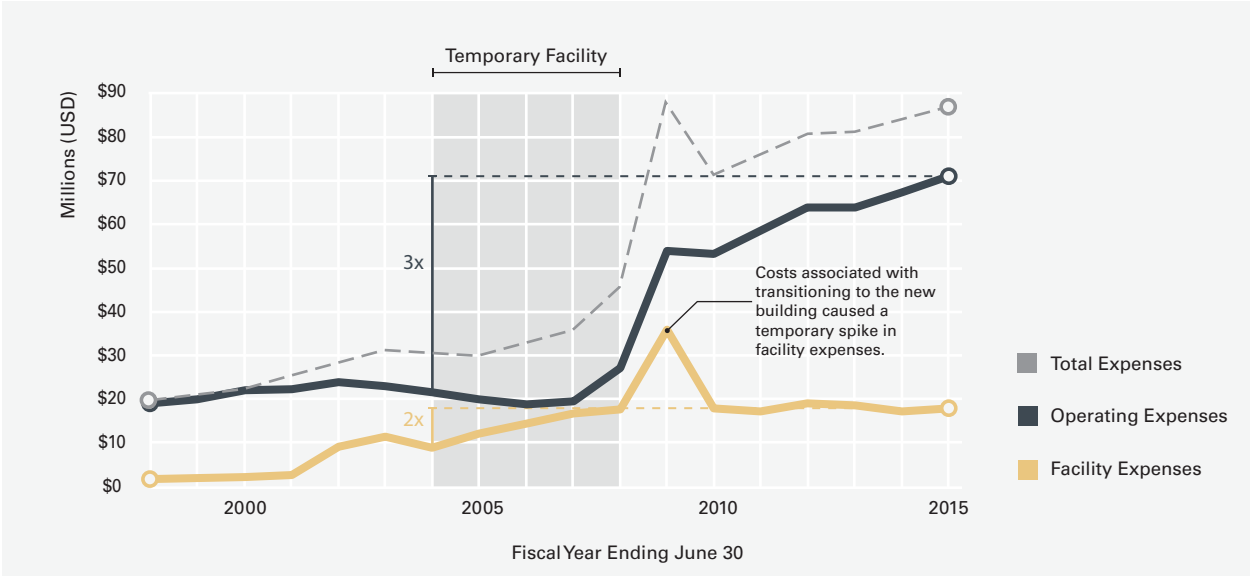



**Figure 2.** California Academy of Sciences Expense Mix

achievement: it prevents the release of 405,000 pounds of greenhouse gases per year, keeps the museum's interior temperature 10 degrees cooler than a standard roof system would, and absorbs enough rainwater to prevent 95 percent of potential storm water runoff.[23]

## DELIVERING MEANINGFUL LEARNING EXPERIENCES

The new building is home to a deeper and richer set of experiences for visitors. In addition to engaging exhibit designs, the Academy has added docents and scientists in public spaces. One visitor noted, "It was obvious when we came to the building that the Academy wanted to provide a different service to people." A school teacher commented on the changed educational style, saying, "Previously, the Academy was more teacher-directed because it wasn't as interactive."

Citing the impact of the facility on visitors, one staff member explained:

> [The building] helps you understand the world better. Being able to go up into the rainforest, then come down in a rainstorm and end up under the Amazon, you look and see how things are distributed. It flows like an ecosystem. That is new, and I think that is a wonderful way that the new Academy helps people learn about the environment.

Staff members indicated that the interactive quality of the Academy has increased visitor satisfaction and compelled guests to stay longer. Data collected via a self-administered kiosk survey revealed that visitor satisfaction increased from 64 percent in 2004 to 73 percent in 2014. Academy staff reported that visitors are staying at the museum for three and a half to four hours, compared to one to two hours in the prior facility. They commented that this increased time has positively affected visitors' learning experiences, although it has also posed some challenges in crowd management.

Community members described the Academy as an essential resource for local education, and some suggested that the museum has improved the quality of STEM (science, technology, engineering, and math) education in the San Francisco Unified School District.

> "There is a sense of pride in the community that we have a building like this—that this is our museum."

## STRENGTHENING A CITY'S IDENTITY

For many in San Francisco, the Academy reflects the city's ambition to be sophisticated, worldly, and environmentally conscious. One local teacher explained, "There is a sense of pride in the community that we have a building like this—that this is our museum." Because San Francisco residents were instrumental in financing the project (local bond revenue made up about 25 percent of the project's total funding), the museum strove specifically to deliver on the impact it had promised to the community. Staff members said that the Academy's increased volume of visitors and memberships indicates that this goal has been achieved and conveys residents' "love for the place."

## Conclusion

When structural damage from an earthquake precipitated the need for a new building, the California Academy of Sciences embraced this challenge to increase its visibility, dramatically grow its attendance and memberships, expand and enrich its programs, and demonstrate its leadership in sustainability. These changes were accompanied by an evolution in mission that moved the Academy beyond a historical focus on exploring and explaining the natural world to an expressed intent to help sustain life on Earth as well. Guided by the inspiring design of a world-renowned architect, Academy leaders and donors were emboldened to pursue an elevated vision and scale of programs for the institution, and to finance capital project cost increases that brought an already large $388 million budget to an eventual total of $488 million.

Important elements of the project process included knowledgeable board leadership, active connections to the local community, and purposeful use of four years in a temporary facility to test approaches and prepare for success at the new Academy. Public support was evident in the passage of two bonds that helped initiate and finance the project, and in community participation and pride in the new facility.

In addition to cost increases that hampered project progress, the number of project participants and division of roles created tensions and some missteps during the design and construction process. Once completed, the design and programs of the new facility generated dramatic growth in admission fees and memberships, boosting the Academy's earned income. However, new revenues are still falling short of increased expenses in the new facility. While economic challenges persist, and the organization carries significant debt related to project financing, the new Academy continues to garner support and serve its stakeholders. In the words of Scott Moran, director of exhibit design and production, this ambitious capital project created "a new era for the California Academy of Sciences that will also help change many other museums and institutions."

## Videos

For additional information on this case study, see the following videos available at www.massdesigngroup.org/purposebuilt:

*Finding the Right Architect*

*Raising the Museum's Profile*

*The Mission of the Building*

**Below.** Hills on the living roof mimic the seven hills in San Francisco.

# Lessons from the California Academy of Sciences

## Commit to planning to set the right scope.

**Visionary design carries reward and risk:** Due to costs inherent in aspects of the final design, unexpected changes in material costs, and other factors, the Academy expanded the budget for its new building by more than $100 million over the course of the project. When faced with escalating costs, leaders opted to increase the project's budget, rather than eliminate major elements of the design.

Donors were attracted to the project. They responded to the boldness of the architect's vision and the inspiring approach to environmental sustainability reflected in the building concept, despite the costs involved. Not all capital projects can achieve this level of deep and expansive donor commitment. Every project must weigh financial and design considerations; in this case the trade-offs were largely manageable.

Still, the ambitions of this project created debt for the Academy, as well as significantly increased operating and facility costs. With advantages including a supportive donor base, large numbers of visitors and members, and building maintenance contributions from the City of San Francisco, the Academy may be able to offset these costs and achieve solid financial footing for the long term.

## Combine inside knowledge with outside expertise.

**Big ideas call for coordination, balance:** The visually stunning and environmentally innovative work of a "starchitect" brought high visibility and attracted financial support to this project. Renzo Piano's design, as well as his European location, also contributed complexity to this large, multifaceted effort. The project team included a San Francisco architect and many local designers to complete key aspects of the new facility. A construction project management firm was put in charge of coordinating communications between all design consultants and the Academy's staff and board.

This structure streamlined project implementation, but created gaps in needed coordination between project players. Some felt that the overall commitment to Renzo Piano's vision compromised the design of some exhibits, with exhibits needing to fit the overall architectural approach rather than vice versa. In addition, essential alignment between designers was missed at points—including missteps related to aquarium drains that had to be corrected in the construction phase of the project.

# Lessons from the California Academy of Sciences

## Be ready for organizational change.

**Interim space is a place to prepare:** When the Academy began the process of replacing its museum, it had to move exhibits into a temporary off-site space to remain open to the public. Unlike many natural history museums, the Academy featured living marine exhibits, which made the move logistically complex.

The Academy not only handled the transition smoothly, it used the temporary space as a learning laboratory to test many ideas for its new facility. Staff members constructed mock-ups of the coral reef tank and tested sunlight levels and dive-show procedures, built scale models of penguin exhibits and touch tanks, and grew their collection in preparation for expanded exhibits and operations. The Academy also piloted NightLife, a program that continued following the move as a means to bring younger adults into the institution.

In addition, Academy leaders used the move to temporary space, which required fewer staff to operate, as a time to rethink their operating structure. Staff reduction for the four-year interval was followed by adding positions in the new facility that matched the organization's evolved mission and future intent. At the same time, more collaborative, cross-disciplinary approaches to research, and to public programs, were introduced in the temporary space and carried over into the new Academy.

This approach to the interim years allowed the Academy to open the new facility in ways that reflected its ambitions, and that avoided many of the change-management issues that often accompany the move to new physical environments.

# End Notes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