

CASE STUDY

California Academy of Sciences Morrison Planetarium Upgrade

Overcoming Strict Timelines, Eliminating Downtime, and Exploring Possibilities in the Morrison Planetarium

San Francisco, CA

In 1952, the California Academy of Sciences opened the doors to the country's seventh major planetarium: the Morrison Planetarium. Since then, the Morrison Planetarium has grown into the largest all-digital planetarium in the world at 75-feet in diameter. The director of the Planetarium, Ryan Wyatt, calls the space "the biggest storytelling machine" you can visit.

"The Academy's mission is to explore, explain, and sustain life on earth," says Michael Garza, the planetarium and production engineering manager at the Academy. "The Planetarium is a great way for us to present that because you can bring 300 people together and have a shared experience. We can show you everything in the universe to natural life sciences, and we can do it all because of our very flexible, digital technology that we're using in the dome."

Such an engaging space necessitates a unique, immersive, and all-around incredible experience for visitors. When the Academy realized they needed to upgrade the space, they enlisted the help of renowned and respected consultation

company TEECOM to plan the upgrade. TEECOM principal Blair Parkin, an expert in planning an ideal planetarium experience, determined that their only available window to upgrade was between September and October of 2016 due to the Academy's aggressive scheduled programming and expected visitors. Any delays would push the upgrade timeline back two years.

Objectives

- Upgrade within a strict timeline
- Experience nearly no downtime with the new technology
- Present pre-recorded and live presentations seamlessly from multiple media sources
- Maintain the highest resolution, quality and colors possible



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Searching for a Technology Partner

Instead of looking at the project from a vendor approach, the Academy began to seek a technology partner. “When we went about selecting a vendor, part of our process was not to look at the vendor as a vendor, but to select a future technology partner that will grow with us,” says Dean Do, the associate director of AV and electronics engineering at the Academy.

The Academy decided their ideal partner would have expertise in complex visualization solutions and would plan for immediate and long-term success. The Academy partnered with Mechdyne Corporation in May 2016 to upgrade the Morrison Planetarium technology due to our capabilities and relationship-driven approach.

“Right away, we took a partnering approach to make sure we understood what was critical to them and what would be realistic,” says Kurt Hoffmeister, Mechdyne’s technologist and co-founder.

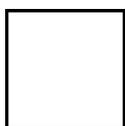
Mechdyne carefully analyzed the Academy’s usage in the Planetarium, current technology woes, and desires for the future. The ultimate solution – combined with Mechdyne’s aggressive project management capabilities – guaranteed that we could provide the solution that delivered on their needs within their timeframe.

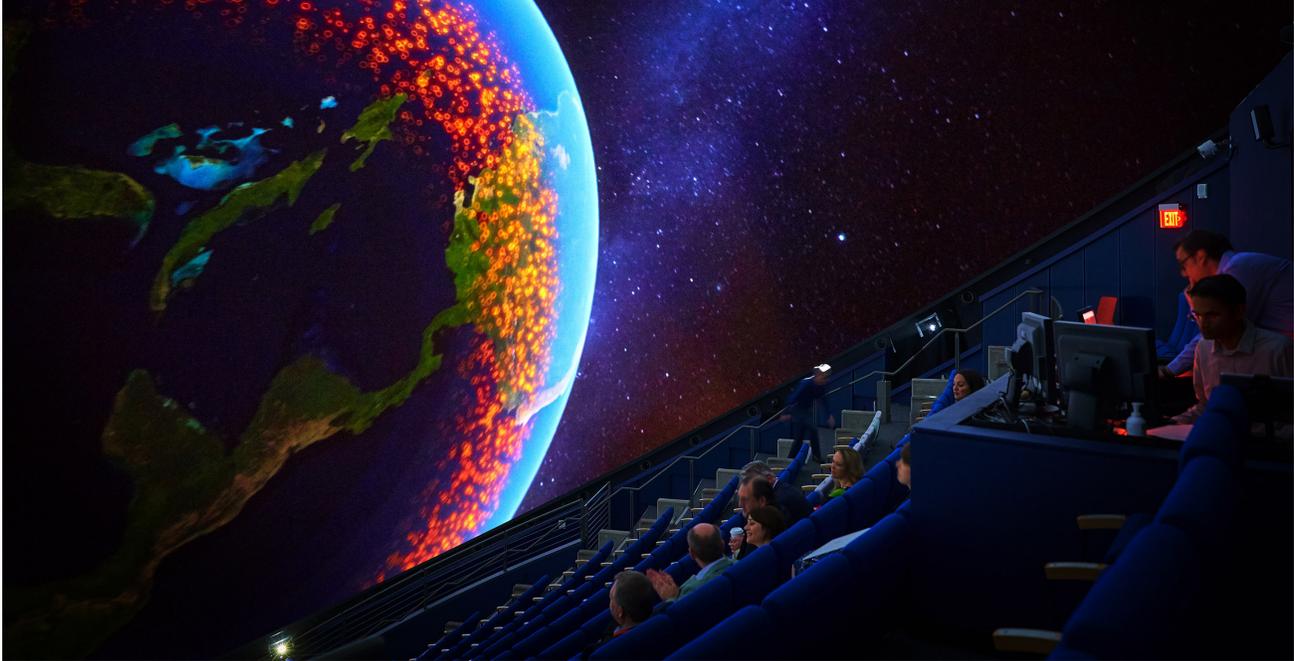
An Aggressive Show Schedule

The Morrison Planetarium is much more than a theater. The Academy writes, directs, and produces their own shows in-house. The films cover a variety of topics, such as astronomy, natural earth events, and environmental issues. Prestigious guests—including astronomy professors, NASA research scientists, and planetary scientists—occasionally present lectures within the Planetarium.

It’s not just the content that makes the Planetarium special. Before each show begins, a speaker starts out on the stage in front of the planetarium to introduce the audience to the show’s agenda. Often times, the speaker returns mid-show for another speaking segment, and closes the show out. Once a month, director Ryan Wyatt hosts a “Universe Update,” taking audiences through the latest astronomy news stories. Wyatt stands on the speaking platform and directs audiences through space, explaining the latest news and its impacts.

This broad range of programs, combined with seamlessly switching between live and prerecorded content, attracts a wide variety of visitors. It also demands a very flexible technology solution that displays crisp contrast and resolution across the color spectrum. Smoothly transitioning between different content pieces while considering the transitions to live presentations requires precision and innovation.





"Since the Morrison Planetarium reopened in 2008, we've come to understand the pros and cons of the technology," says Garza. "We wanted brighter, better color reproduction, and we wanted to be able to continue to present both our rendered and live presentations just as seamlessly as before."

"Sustaining Life" Impacts Technology Choices

Every day, the Academy strives to be an energy efficient facility, fully living out its mission statement to sustain life on earth. Their commitment to energy efficiency is so staggering, they set new standards for energy efficiency and environmentally responsible engineering. The Academy became the world's first Double Platinum museum and largest Double Platinum building in the world, according to the U.S. Green Building Council . The Academy truly lives and breathes sustainability.

Despite their success, the projectors in the Morrison Planetarium were extremely inefficient. With their long hours of usage, the projector lamps would quickly fade or burn out, requiring frequent changes. Furthermore, the lamped projectors didn't provide the sharp color contrast the Academy expected.

"We weren't able to present the content in the vivid way that we thought it deserved," explains Garza.

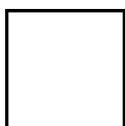
Components of the projectors, such as filters and color wheels, would also need frequent replacing.

All in, the lamped projectors cost the Academy a significant amount of maintenance time and money. As part of the upgrade, it became critical to identify a projector solution that would be energy efficient, sustainable, and leave behind a smaller carbon footprint.

Mechdyne's Technology Solution to Meet the Academy's Needs

With the Academy's deadlines and expectations for sustainability and image resolution looming, Mechdyne set out to design and deliver a successful solution that would focus on enabling photorealistic imagery in the general sciences, space imagery, and astronomy. Through a highly collaborative process, Mechdyne and the Academy selected Sony 4K projectors that would help improve image brightness, color, contrast, resolution, and black level performance. Furthermore, the projectors are considerably more energy efficient and don't carry the heavy environmental burden of component changes.

Mechdyne always stages, or pre-builds, entire technology solutions at our Technical Center as part of our quality control process. As a result, our clients experience faster project completion, minimal disruption at their site, and lower final cost. To ensure the solution would perform perfectly at the Planetarium, the team needed to stage the solution on a dome. To keep costs





down and meet the project deadlines, the team creatively staged at a nearby science center in Des Moines. Both staging and installation was done during night hours, to avoid disrupting a visitor's experience.

"Mechdyne came to us and discussed the ideas, listened to our needs, and then came back with a solution that fits our needs," says Do. "Not just for the current system but potentially in the future. This upgrade gives us double the pixels, almost twice the amount of light output so it looks much brighter and richer in color. Mechdyne delivered that upfront."

Furthermore, the solution consisted of proprietary components developed specially for the Academy never before seen in the planetarium market. Because the Academy combined pre-recorded and live elements to each show, they wanted a way to smoothly and seamlessly transition their content. The challenge was the Academy's exceptionally high resolution and refresh rate. At the time, no known products on the market would support a smooth transition. Mechdyne's engineers created Dome Display Managers, or DDMs, that would provide a smooth fading transition between different video sources or PCs.

Hoffmeister explains: "DDMs take care of the input from multiple sources and switching or fading between them, and it's also where the warp and blend is done before the image is sent to the projector. There are six of those boxes, synchronized together, one for each projector driving the display."

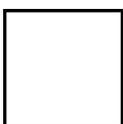
The result is a highly produced and professional appearance that takes advantage of multiple video sources. While one video source slowly fades out, another fades in, providing a smooth transition between content types or segments of the show.

Additional Upgrades in the Hohfeld Hall

Because the Morrison Planetarium is angled at about 30 degrees, the Academy takes advantage of a unique entryway into the theater. The entrance to the Planetarium, called Hohfeld Hall, is the first step of a guest's overall experience. A very atmospheric setting, Hohfeld allows guests to become acclimated to the dark and quiet space prior to the show's beginning. As guests queue next to the near-40-foot spherical wall, they are presented with both pre-rendered and live astronomy, space, and science imagery.

Upgrading the presentation space revealed several unique challenges. The curvature of the wall was asymmetrical both around and up away from the audience. In addition, two columns divided the screen area into thirds. The pillars were about two feet away from the top of the wall, then only a few inches away near the bottom because of the curve of the wall.

Prior to the upgrade, the displayed images were dim and had poor resolution. Furthermore, the lamped projectors required laborious maintenance and consumable waste. With a desire to create a brighter and higher resolution image without creating shadows from the pillars, the Academy





relied on Mechdyne's innovative and collaborative approach. After much research and testing, Mechdyne delivered a three-projector solution to provide incredible brightness and resolution, and at an angle that avoided showing any shadows on the wall. Today, the hall is used not only for a queuing area, but also for donor dinners and receptions.

Measuring Success

Once regularly scheduled programming resumed, the Academy saw a noticeable difference in their technology. Because the Academy doesn't tend to define success in terms of tickets sold or dollars saved, they measured the project's success based on timelines, increased efficiencies, and a polished, professional show they could be proud of. At the completion of the Morrison Planetarium upgrade, the Academy was thrilled with the results of Mechdyne's solution.

"The benefits from the upgrade are immediately evident," says Garza. "We're finding that our setup and maintenance routine is vastly simplified. We've eliminated so many of the challenges that we had in our previous system."

"TEECOM was very proud to get the call back from the California Academy of Sciences for their ten-year planetarium refurbishment," says Blair Parkin at TEECOM. "It's been a great pleasure to work with

Mechdyne, a newcomer to the planetarium world but one working with bleeding-edge technology in ways that had not been done before."

"Our experience with Mechdyne has been great," Garza continues. "We've had a close working relationship throughout the entire process. We've found that they've been a great partner for us."

About Mechdyne

Mechdyne is one of the world's leading providers of innovative visual information technologies. Mechdyne bends technology to our will in ways that transform complex data into insights and ideas. To ensure our clients succeed, Mechdyne provides comprehensive, customized solutions that include consulting, software, technical services, and hardware integration.

