A PHILADELPHIA PROBLEM SOLVER CARVES OUT

SPACES TO LIGHT
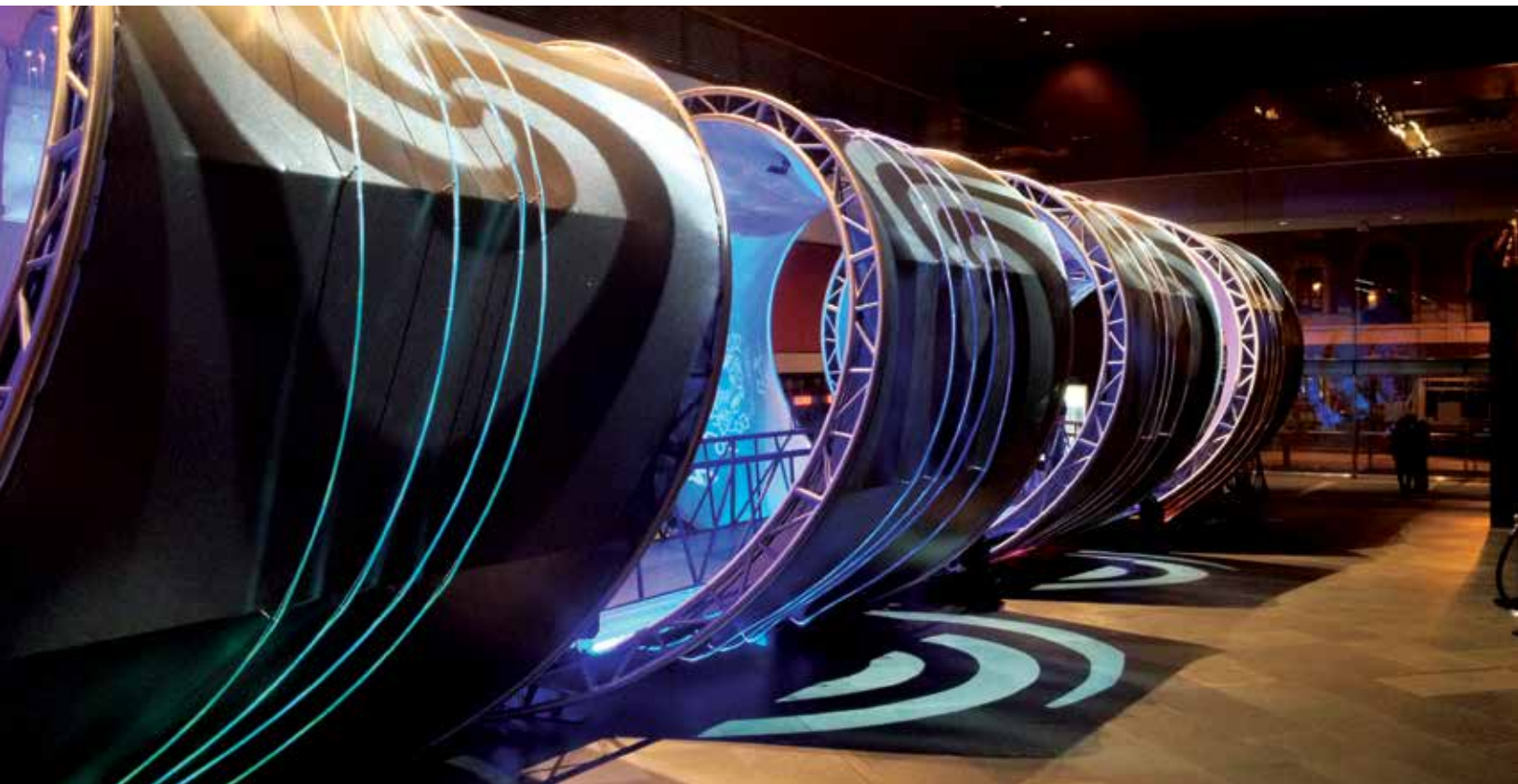
Inspired by a double helix of DNA, the sculptural installation featured projected images and motion-sensing technology that delighted an estimated 100,000 visitors.

Astronomer and Pulitzer-Prize winning author Carl Sagan once said, "If we could travel into the past, it's mind-boggling what would be possible. … I have no idea whether it's possible, but it's certainly worth exploring."

Such exploration is precisely what Lighting Designer Joshua L. Schulman helped to deliver as part of a team that mimicked time travel through an interactive exhibit for the Philadelphia International Festival of the Arts (PIFA) 2013. Held over a three-week period at the Kimmel Center for the Performing Arts, the event featured live performances, a staged musical, educational programs, and a 100-foot-long time machine experience — a sculptural light, sound, and video installation that served as the festival's hub and was enjoyed by an estimated 100,000 visitors.

"Conceived by the Kimmel's artistic director, Jay Wahl, the time machine concept was pretty nebulous, so we spent several days discussing what it meant and what we wanted the user experience to be," recalled Schulman. "We wanted it to be interactive, but we weren't sure how to make that happen."

The design team pondered various ideas, ranging from the science-fiction creations in writer H.G. Wells' books to the time-traveling DeLorean sports car from the 1985 hit movie *Back to the Future*, before settling on a spiraling exhibit through which people could walk. "We came up with the idea of the time spiral as an abstracted journey and a vehicle to explore the nature of time," said Schulman, adding that the spiral shape was inspired by a double helix of DNA. "Imagine a popped tube of refrigerated biscuits formed with a custom, bent truss that corkscrewed 16 feet around," he said.

With an exterior wrapped in sparkly spandex, the interior was shrouded in medium-gray spandex. Video images, including data and numbers that morphed into space objects and historical figures, were projected onto the inner surface. Motion-sensing technology identified where visitors were in the tube and impacted their experiences. For example, visitors who leaned over the railing of the tube's eight-feet-wide walkway could modulate the pulse of sound and light that projected down the tube because sensors sent signals to a lighting and sound machine nearby.
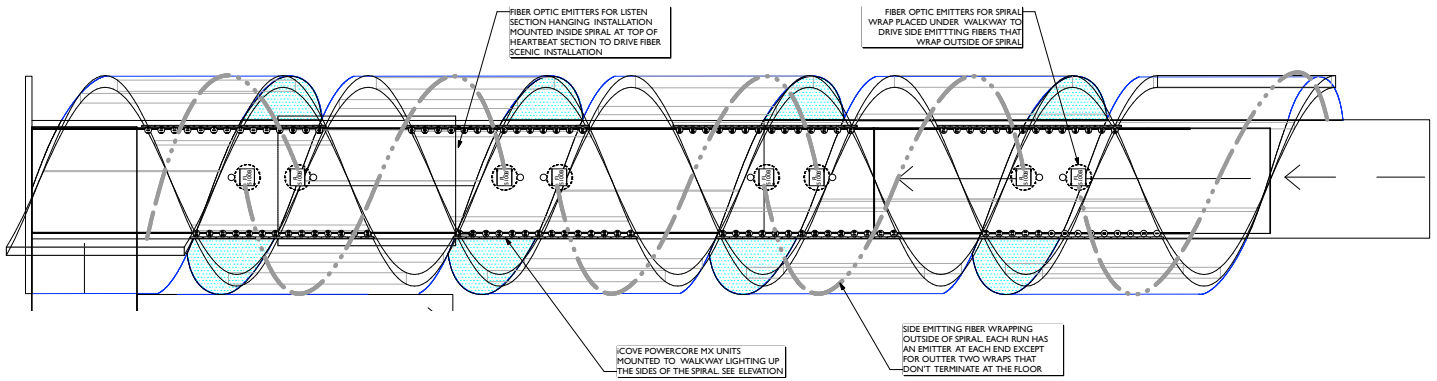
Shown top to bottom are views of Schulman's spiral lighting ground plan, lighting ground plan, and main deck lighting ground plan.

Vectorworks Aids in Decision-Making

Initially, the structure's gaps proved puzzling for Schulman, who modeled and rendered the exhibit plan and its surrounding program space in Vectorworks® Spotlight with Renderworks® software. "I wanted to make sure we didn't throw light through the structure's openings," said Schulman, knowing he could trust his design software to help him solve the issue. He originally learned to draft by hand, which is one of the reasons he appreciates the program. "Conceptually, Vectorworks is a tool that doesn't get in the way of the design process, and this is one of the biggest reasons why I prefer it to AutoCAD®," Schulman said.
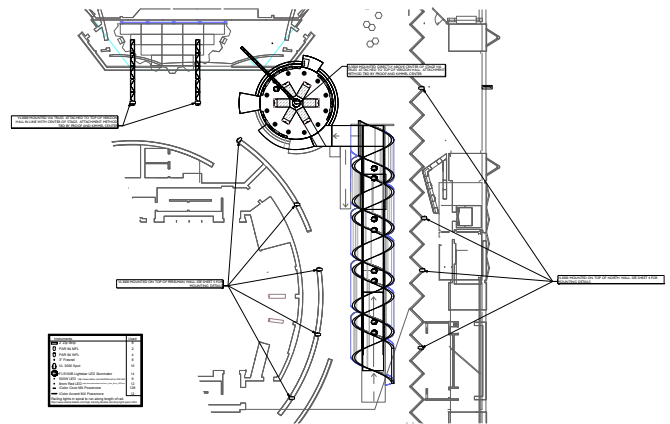
Another design component developed through iterations in the software was a giant structure formed with 600 crystals and suspended in a cluster over visitors' heads. When guests walked through the time travel installation and grabbed on to two rods positioned on the hand railing, fiber optic cables detected their heartbeats and created a mesmerizing light and color show using the glowing crystals. "The longer you held on, the more your pulse would populate the crystal field and the sound would change accordingly," Schulman explained. "Visitors fully enjoyed this sense of interactivity."

Schulman repeatedly tested where to position the structure. "We wanted users to be totally surrounded by crystals, so I mapped them individually in Vectorworks first to make sure no one would hit their head. Next, I rendered various options to examine different views and ensure success. Based on the modeled sightlines, we made accurate design decisions well before installing the spiral, which saved time and money."
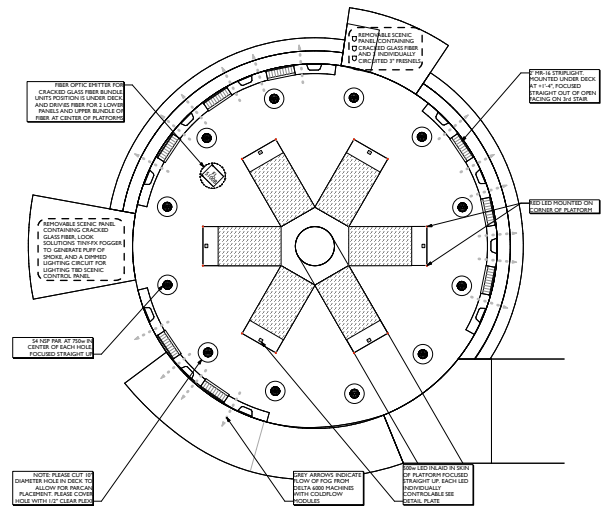
Schulman figured out how to light the tube's interior using basic photometrics and by rendering his ideas, which percolated in Vectorworks Spotlight with Renderworks software.

Theatre Under Glass

Another challenge that confronted the design team was the Kimmel's architecture. The facility houses three separate venues (two theatres and a symphony hall) capped with a vaulted, glass roof. The transparent ceiling's low point is 100 feet tall, and its high point extends an additional 50 feet. The resulting composition is like placing a glass dome over a trio of performance halls in between which exists a canyon of space where the time machine resided. "It was like working outside as far as the sun goes," said Schulman. "Early design considerations, therefore, centered on how much lighting we needed inside the tube to beat out ambient daylight. It was hard to gauge at first."

Many of Schulman's design ideas emerged as he experimented in Vectorworks and its rendering application, Renderworks. For example, he discovered that daytime sunlight prohibited the projectors inside the tube from registering. So after modeling the Kimmel, he figured out how to light the tube's interior in an interactive way using basic photometrics and his design software.

"In the theatre, where I've done 90% of my work, there are only so many variables because the environment is pretty tightly controlled," Schulman explained. "But changing sunlight conditions in the Kimmel revealed that our first attempts at video projection weren't punchy enough. We tested various ideas in Vectorworks Spotlight, right on the fly in front of PIFA's producer, and solved the problem by adding lighting instruments to specific locations. The producer approved our renderings that day, and the new equipment was installed the next day. Vectorworks made that possible."

Evening hours also proved to be challenging. "We only had a few hours at night to light the tube and a musical performed steps away on the Sundial Stage, which we were actively teching at the same time," he said. "It was through my exploration in the software that I arrived at various equipment decisions."

Hidden City a Launchpad to PIFA

Such problem-solving capabilities were exactly what artistic director Wahl knew Schulman would deliver at PIFA 2013 because the two had collaborated on the 2009 Hidden City Philadelphia Festival, for which Wahl was the managing producer and Schulman was the lighting director. Over a six-week period, the festival attracted 10,000 visitors and illuminated nine abandoned, obscure, or inaccessible locations with contemporary, site-specific works. The event earned several honors, including the Henry J. Magaziner Award from the American Institute of Architects' Philadelphia Chapter, City Paper's Big Vision Award, and Philebrity's Best Gathering of 2009 Award.

"The idea behind the festival was to open up spaces that were normally closed to the public and highlight their history and architecture," said Schulman. "All of these places were hiding in plain site."

He designed shows at five of the festival's nine locations, including two churches where his team put in a simple system of noninvasive lighting to highlight art displays. His work at three larger sites was more involved. For example, the Royal Theatre hosted a live performance of an original work, "Re-Sounding," by world-class musicians paired with a film and video installation. The facility had not been used since 1970, but Schulman transformed the site by designing lighting that highlighted the decay of the space while bringing attention to some remaining architectural details. The building was in such a state of disrepair that everyone had to wear hard hats, including the audience!

Schulman transformed the Royal Theatre with lighting that drew attention to the decaying site's remaining architectural details.

Almost all of the lighting at the Metropolitan Opera House had to come from the floor because there was nowhere safe to rig to.

Schulman's next Hidden City project was at the First Troop Armory, a cavernous space that once stored tanks, ammunition, and arms. Taking inspiration from its past, the site hosted a collaboration of dance choreography and choir music based on a military theme. Schulman hung lighting off the truss that held up the roof and put a few units on the ground. The audience sat in folding chairs and moved around the space as the piece progressed.

Schulman's last Hidden City site was the Metropolitan Opera House (the Met). As part of the festival, this neglected jewel for grand performances hosted "Revival," a performance that brought together original music and dance. "When the Met was first built, it sat 4,000," Schulman explained. "Being in the building felt like being on the Titanic. The piece itself took place on the old upper balconies of the theater. Almost all of the lighting had to come from the floor because there was nowhere safe to rig to. We had to bring in everything."

He overcame such challenges and the lack of real building plans with his design software. "With the three large venues, I measured the spaces and made plans in Vectorworks Spotlight, using the data exchange tool Lightwright® to track where the inventory of lights was going as we had to hop-scotch lighting from venue to venue." This

process worked because lighting instruments and parameters specified in Spotlight can be sent to Lightwright automatically to help users like Schulman better manage his professional lighting design documents. "Updates occur seamlessly and simultaneously in both applications for smooth synchronization," he said.

Throughout its history, the Met housed a basketball court, ballroom dancing, wrestling matches, and church services. Artists are shown here in a rehearsal, which led to a performance that fused original music composition and dance choreography, and explored the many histories of the building for visitors.

Award-winning lighting designer Joshua Schulman believes light's ability to carve out space is magical.

Light: The Glue That Binds

As an award-winning lighting designer, Schulman has left his mark on the city of Philadelphia because he knows how to bind the various visual elements of a production with light as the proverbial glue. "Light in the theater creates the plasticity of form, whether for a staged show, dance or musical production, or installations like PIFA's time travel exhibit. So when lighting a show, we must ask ourselves, 'Does this help tell the story? Can we still see the forest for the trees?'"

It is reassuring to know that this problem solver will continue to carve out magical spaces to light, wherever his next job takes him.

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>
> *–Joshua Schulman*