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A convergence at the Liberty Science Center

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On the Cover:

The look of excitement and wonder filled many faces at the Liberty Science Center when it showed off its new Jennifer Chalsty Plantarium. Read more about the convergence that led to the largest dome in the Western Hemisphere starting on Page 12. Photo courtesy Liberty Science Center.

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It was the right time
It was the right place

A convergence leads to excitement at the Liberty Science Center



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As the new home of the Western Hemisphere's largest and highest resolution planetarium, Liberty Science Center embarks on a new era of immersive, real-time science programming while continuing its giant screen legacy

In December 2017, Liberty Science Center (LSC) in Jersey City, New Jersey opened the largest and highest resolution planetarium in the Western Hemisphere. That's big news, and a powerful, straightforward headline for the public. Since opening, the new Jennifer Chalsty Planetarium has been covered by the *New York Times*, *Forbes*, *Washington Post*, *Time Out*, *Space.com*, *Popular Mechanics*, and ABC News, in addition to numerous media outlets in the Garden State and quite a few mom bloggers.

On the industry level, the story is big in a different way.

Located on the bank of the Hudson River near the Statue of Liberty, the 300,000 square foot science center celebrated its 25th anniversary in January 2018. LSC has annual visitation of 650,000 and is billed as the largest interactive science center in the NYC-NJ metro area. More than 250,000 students visit each year, with tens of thousands more via offsite and online programs.

LSC boasts 12 exhibition halls, a live animal collection, giant aquariums, live simulcast surgeries, a wind simulator, K-12 classrooms and labs and teacher-development programs, and now it boasts an Evans & Sutherland Digistar 6 True8K™ system with 10 Christie® Boxer projectors and a Spitz NanoSeam screen, in the new, 400-seat Jennifer Chalsty Planetarium and Giant Dome Theater.

The new planetarium grew out of converting the museum's giant dome theater from 1570 film to digital. The conversion didn't just transform a theater with an 89-foot (27-meter) diameter dome. It fueled an expanded programming and educational vision for LSC and a re-branding of the facility, and it achieved a major milestone in the planetarium-giant screen convergence.

Expanding the scope

"I sat down in the middle of the theater. I watched as constellations outlined themselves on the night sky, flew across Central Park, and through the Orion Nebula. Then I went on a roller coaster ride of a Möbius strip that was more intense than some theme-park attractions," Mary Beth Griggs wrote about the new planetarium at LSC in *Popular Science* ("Planetariums seem old-school, but they have a surprisingly lively future," December 19, 2017).

(Continues on next page)



Planetarium benefactor Jennifer Chalsty with Liberty Science Center Chief Executive Officer Paul Hoffman.

Background map: Google Maps

All photos courtesy Liberty Science Center, except where noted

“When our IMAX Dome Theater technology was approaching end of life, LSC jumped at the opportunity to reimagine the space,” said Mike Shanahan, who joined LSC as planetarium director in September 2017, coming from the Bishop Museum in Honolulu. “Doing so has exponentially increased the number of people we can deliver astronomy-based programming to and attracted even more people to LSC. Nowhere else in the region can students experience the space science standards in such a fully immersive manner.”

LSC’s new projection technology package, with the new Digistar system, Christie projectors and repaneled screen at the heart, enables it to perpetuate the venue’s giant screen cinema exhibition capabilities while adding state-of-the-art planetarium functionality with access to everything in the Digistar toolbox. The theater retrofit also includes a DCI-compliant projection system, new seating, and new lighting and sound systems.

“What we want to do with the Jennifer Chalsty Planetarium is break astronomy news,” said Paul Hoffman, CEO of the Liberty Science Center (quoted in a February 2 story in Forbes). “We want this to be a venue where observatories around the world can announce results and show images. Our Digistar full-dome system allows us to do just that.”

Portable provided astronomy

Shanahan explained that the transition was aided by prior experience with astronomy education at the facility. “While we did not have an actual planetarium, LSC has delivered astronomy programs to school groups using a ‘classic’ portable STARLAB for years,” he said. “We were encouraged by how popular these programs were—both with school groups visiting LSC and with teachers requesting we bring the STARLAB to their schools through our Traveling Science programs.” Planetarium shows are now also part of the mix in the museum’s monthly LSC After Dark themed parties for ages 21+.

As consultant to LSC, Paul Fraser of Blaze Cineworks helped engineer the RFI (request for information) and RFP (request for proposal) processes that led to selecting the new systems, over the course of two years (2015-2016).

A result of the RFI process was a request for Blaze to dive deeper into the planetarium option. Fraser delivered a report that would include planetarium programming and giant screen documentaries repurposed for full-dome. Not long after, Jennifer Chalsty, a philanthropist and member of the LSC Board, became a primary benefactor.

Michael Daut, director of Product Marketing for E&S, noted that at the time of the RFI, Digistar 6 had not yet been released, but was available by the time of the RFP, allowing them to offer all the latest improvements and



Above: Patrick McQuillan, vice president of STEM Education at LSC, at the controls of planetarium. Photo: Chris Monroe
Below and facing page: The audience reacts to visuals on the dome.



tools such as Domecasting; enhanced terrain for the moon, Earth, and Mars; Data2Dome implementation; and native support for Unity 3D, among other features.

A symbol of the convergence

What happened in the evolution of LSC's vision and the system ultimately installed represents a fulfillment of the convergence of markets and technologies, bringing the planetarium and giant screen industries together. This process has been underway for decades, as full-dome systems have steadily improved since the first permanent installations in the 1990s.

E&S has been positioning and developing its product lines for such a moment as this, and the E&S True8K Digistar full-dome system won the day—and the night sky.

"The digital theater had to be capable of matching or surpassing the quality of the IMAX films that LSC was known for offering," said Shanahan. "The addition of the (Digistar) planetarium software allows LSC to be a leader in the region in presenting educational programs aligned to the Next Generation Science Standards for earth and space science."

"The team at Liberty Science Center entered the process with an interest in 8K," said Daut. "Some of them were present at the E&S and Christie True8K demo at the October 2016 Giant Screen Cinema Association's annual conference in Toronto. The E&S 8K system has the image quality to surpass and decisively replace 1570 film, and we have the largest library of planetarium shows and giant screen film content digitized for domes."

Daut said, "The RFI was a general, order-of-magnitude request for an 8K digital solution to replace film," said Daut. "The real-time image generation system that is a feature of Digistar and key to its planetarium programming became very important later."

For concerns about replacing a single film projector with multiple digital projectors, Daut cited Digistar's automated alignment and blending features, which coordinate well with the Christie projectors. "The auto alignment and auto blending systems don't need to be employed very often, but are simple to run and work beautifully, and they make manual alignment a thing of the past," he said.

"It's been a long-term vision of E&S developing an ultra-high-end solution with seamless quality and an easy-to-maintain image. We knew we had to provide a consistently seamless image to make a multi-projector solution viable. It's a big, big dome, and takes a lot of light to fill up and lots of pixels to make it look spectacular. It needed the 10-projector recipe for a beautiful, bright, high-resolution image," Daut added.

"The automated system works very well,

(Continues on next page)



Q&A with Planetarium Director Mike Shanahan

Q. What kind of planetarium programming are you creating, and how are you using the new system to make that happen with pre-rendered and real-time content?

From the start, we felt it was important to establish the new Jennifer Chalsty Planetarium as a place that would provide insight to the latest breaking news in astronomy and aerospace. We're also committed to making live programming an essential part of the planetarium experience.



Mike Shanahan speaks about the 8K projection system at the Liberty Science Center in Jersey City. Photo: Chris Monroe

The first program we've created, *Wonders of the Night Sky*, is a 45-minute, live show that uses the current evening sky as an anchor to also incorporate breaking news in astronomy and aerospace, from the latest Juno mission perijove to the recent ESO images of Antares. Constant feedback from our audience, both during the show through Q&A and after through an audience evaluation survey, helps us fine-tune the show.

The show relies heavily on real-time flights to the planets, existing content in the Digistar library, and current images being released by NASA and other sources, instantly available in

Digistar through its Data2Dome implementation. Our audience has reacted positively to seeing real images of Pluto, Jupiter, and beyond.

To make full use of the Jennifer Chalsty Planetarium and LSC Giant Dome Theater, we wanted to open with a strong full-dome movie that could be complimented with a live section unique to Liberty Science Center. *To Worlds Beyond* was an ideal choice, thanks both to its high quality animations as well as the topic lending itself so naturally to being paired with a look at the night sky over Jersey City to identify the locations of the planets in the current night sky.

During our soft opening period, we also recognized the desire for a planetarium offering for our youngest learners. To meet this demand, we were able to quickly add *One World, One Sky: Big Bird's Adventure* to our planetarium schedule.

(LSC is also running a digitized transfer of the giant screen film *Aircraft Carrier: Guardians of the Sea*, from The Stephen Low Company, which continues the legacy of the theater as a giant dome cinema.)

Q. How are you dividing up the schedule for your various kinds of programming?

(Continues on next page)

both in terms of the blend and the alignment,” said Shanahan.

To the stars

“LSC is a good model for dome operators looking to build on their business,” said Fraser. “Adding a planetarium system can be seen as 1+1=3 because you’re adding a whole new content stream. These are all singing, all dancing, wonderful immersive theaters that can do many things.”

While LSC is the largest example, the first museum to expand its educational offerings in this way—discovering and leveraging the capabilities of a new digital planetarium system in the course of converting an IMAX film dome and bringing in a dedicated planetarium specialist—was the Science Museum of Virginia in Richmond. Its theater was renamed “The Dome” and reopened in 2014 with an E&S Digistar 5 8K system with five Christie D4K25 projectors. The museum’s new “immersive experience specialist” Justin Bartel quickly gained a loyal following with his topical, real-time science and astronomy shows.

Not long after opening The Dome in Richmond, Jim Peck, Technology Solutions director at Science Museum of Virginia, explained how the thinking evolved: “Initially, we had not planned to do much astronomical content in The Dome. We had thought we would focus on pre-rendered films, and offer a live star show about once a week, but the Digistar system has such robust astronomy features that we changed our plans and brought in Justin, as a specialist with content and technical expertise, to produce live astronomy shows.”

Shanahan talked about how Digistar resources are being used in the Jennifer Chalsty Planetarium: “We draw upon the Digistar 6 content library significantly for the all-live show we produced, *Wonders of the Night Sky*; the actual content rotates as the sky itself changes. We made use of the Digistar Cloud resources for that, and for the brief “where are the planets tonight” live introduction for screenings of *To Worlds Beyond*.

Operators, especially of giant domes (over 60 feet in diameter) have taken longer to convert from film to digital systems because of quality concerns. But while there will always be upgrades and improvements, the adoption of 8K systems for giant domes indicates that a quality threshold has been reached. As the example of LSC shows, reaching and crossing that threshold opens the door to additional possibilities, such as the ability to present giant screen movies and live interactive planetarium content in the same space. This convergence has taken Liberty Science Center to the stars—to become home of the largest planetarium and giant screen dome theater in the west. ☆

Mike Shanahan Interview, continued

What is the ticketing strategy?

LSC is nimble in responding to audience interest, and we have adapted our schedule since we opened in early December 2017 to best meet audience demand. The current weekend schedule as of February 2017 offers two showings per day of each of the planetarium programs, one showing of our Winter Laserfest show, and one non-astronomy film showing. That seems to meet the audience needs in an effective manner: two showings of *One World One Sky* for our young visitors, two showings of *To Worlds Beyond* for the 7-to-adult audience for those who want a mix of a full dome movie and live experience, and two showings of *Wonders of the Night Sky* for the 10-and-up crowd looking for some night sky and breaking astronomy content.

Q. How are the audiences responding? Has attendance gone up?

The planetarium response has been tremendous. Overall attendance at LSC has been very strong with planetarium shows often selling out.

Q. How are you presenting this upgrade to the public to get them excited about it?

The public learned about the upgrade via a tremendous publicity campaign, as well as through our website, online guest communications, and onsite promotional efforts.

Q. Besides the simple fact of status that size confers, why is bigger better?

When trying to show detail in an image of the rings of Saturn or the clouds of Jupiter, it’s just easier to explore that detail in a large image. Being able to accommodate 400 people per program has really helped to meet the high demand for our programming. The 30-degree tilt of our dome, something dictated by its IMAX-dome origins, does mean that everyone has an unrestricted view of the dome overhead.

Q. What were some of the challenges of this conversion in terms of upgrading the physical space, and how were they resolved?

The tilted dome has led to some interesting challenges in conveying, say, the change of sunrise and sunset positions during the year in a school seasons program, but students do seem to get the concept, even with the tilt. A great deal of care was put into setting the 10 Christie projectors so that no one sitting in any seat would get the light in their eyes; the solution of placing four projectors in front and six in back worked out well. The renovation also “completed” the dome so that it covers a full 180 degrees.

Q. How did LSC put together its new planetarium team?

Going into the project, we knew that the live programming that clearly worked well in small and medium domes (Pacific Science Center, Bishop Museum, etc.) would take some adaptation for the bigger dome, especially since our presenters would be expected to run the equipment while giving the presentations. This is one reason why we basically did a national search for the planetarium educator team, looking for candidates who could engage a 400-seat room and who also had astronomy backgrounds and planetarium experience. As part of the interview process, applicants had to wow an onsite audience that included LSC’s senior management staff. Since the theater had existed since 1993, there was an existing plan for traffic show and crowd management.

Q. You were at Bishop Museum in Hawaii for many years. How do you like the change?

I was raised in Worcester, Massachusetts and went to Holy Cross College there, so my roots are in the northeast. I love Hawaii and Bishop Museum and love the E&S Digistar/GOTO Chronos II hybrid we installed in that dome in 2012. That said, I’ve always wanted to live in the New York City area—for its theater, music, museums, large tango community, and other factors. And the job at LSC seemed ideal: a new giant dome committed to live programming and to exploring all the possibilities of a state of the art theater.

Q. Learning curve for the new system? How’s it going?

LSC’s “get it done” attitude meant that we closed on August 1, 2017, and reopened with films by Thanksgiving weekend (soft opening) and on December 9, 2017 for the full experience. We didn’t, in other words, have the luxury of months of training and rehearsal! That said, we did get the programming up and going and made it through the busy holiday season with no major glitches, a real blessing for a new theater. ☆

The combination: E&S, Digistar and Christie

Christie projectors are often integrated into E&S Digistar systems. The custom LSC Digistar 6 system features 10 Christie Boxer 4K30 projectors. "The Christie Boxer projectors have been a workhorse for us," said Michael Daut. "One of their many great attributes is flexibility; you can install a Boxer at any angle, any position, even straight up or down; they are that flexible. For a tilted dome such as the theater at LSC, that means you can position the projectors exactly as needed for the best audience sightlines. Christie has done a great job of eliminating those kinds of limitations and making even tricky installations possible."

Daut reported that the same projector recently served well for two temporary installations, both high-profile Digistar demonstrations. One employed 10 Boxers at Ontario Science Centre in Toronto in 2016 in connection with a meeting of the Giant Screen Cinema Association (GSCA); the other used 5 Boxers at the Saint Louis Science Center as part of the Pleiades Planetarium Conference in 2017.

The Toronto installation featured split screen demonstrations comparing 1570 film projection side by side with Digistar True8K digital full dome. "The projectors were positioned in front of the theater and the audience," said Daut. "Even with those limitations, they performed extremely well; aligning seamlessly and producing beautiful images, in addition to withstanding the rigors of

shipping. They're just very reliable. The power of Digistar technology and E&S engineering combined with the Christie projectors' image quality made this demo a huge success and left an indelible impression on the giant screen cinema community."

Both Christie and E&S are visibly invested in serving the planetarium and giant screen sectors. Each is a well-established technology and manufacturing company (E&S has celebrated 50 years; Christie has been in business nearly 90 years) and offers a suite of innovative display products developed in response to market and customer needs. Each is actively represented within trade organizations.

Notable Digistar installations using Christie projectors include Planetarium Hamburg (Digistar 6; 5 Mirage 4K30 projectors); Science Centre Singapore (Digistar 5; 5 Mirage 4K30 projectors); Science Museum of Virginia (Digistar 5; 5 D4K25 projectors); the Center of Science and Industry in Columbus, Ohio (Digistar 5; two Christie D4K2560 projectors); and Milwaukee Public Museum (Digistar 6; 5 4K Christie Boxer projectors). ☆



Image: courtesy Christie