Errata
Planetarian - Vol. 48, No. 1
March 2019

Page 18 corrected to reflect that the collaborative project involved six planetariums in Europe, not just in Germany.

Ad on page 55 replaced; original ad as appeared was dated for 2018 and was incorrect. Correct ad now appears.

With apologies, Sharon Shanks
Editor
15 April 2019
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Planetary 3
The perks of being the editor

This issue of *Planetarian* is later than usual to arrive in your mailboxes. The reason: She’s in the picture. Ellis Christine Shanks, born 16 January 2019, weighing 6 pounds, 9 ounces. She’s our first grandchild. (One thing about being editor is having the final say on what to print and what not, and I decided this baby needed to appear in *Planetarian*.)

I spent a week in February in Amarillo, Texas helping out while my son was out of town, and edited *Planetarian* in between feeding, changing, and rocking the baby. Any mistakes you find are due to sleep deprivation. I had forgotten how much time is demanded by these little bundles, and how much absolute joy they share.

Mom Melissa and Dad John have great taste in her room decoration: bright colors, great shapes, and astronauts. In her crib you can see something reddish between the slats; that is the plush Mars that I bought for her at the Great Lakes Planetarium Association meeting in October in East Lansing, Michigan. Yes, grandma is loving this.

Two other things to point out: I need to update my photo for this column. The one above is 16 years old, and wrinkles and gray hair have caught up with me. Also new in this issue

Also new in this issue

I am so excited to introduce another newcomer to these pages. Haritina Mogoșanu from the Space Place at Carter Observatory in Wellington, New Zealand, has volunteered to write a column devoted to things from the Southern Hemisphere. We decided on the title of 41 South, referring to her latitude.

Haritina’s first column covers constellations viewed “upside down,” which is how Northern Hemisphereans try to find familiarity in the southern skies.

I am indebted to her for providing readers in the Northern Hemisphere with some great entertaining stories to share the next time the audience asks to see the stars “down south.” With trepidation we northerners change latitude, knowing we can point out the Southern Cross and that’s about it.

Pulling rank for the guest editorial

In addition to unapologetically publishing a picture of my granddaughter, I also pulled rank and decided that Michael Daut’s essay on the need to build and engage audiences should appear in the opening pages. Carolyn Collins Petersen had used the essay as the bulk of her column for this issue, but I talked her into doing double the work to write another column so I could give Michael good placement.

I owe thanks to Carolyn, and also kudos to Michael for making a coherent, highly readable argument for the educational aspects of entertainment.

So many good things inside

There is so much good content in this issue that I don’t have the space to highlight it all here; you’ll just have to read it. I suggest that you pay particular attention to the changes to IPS’s structure in the Vision2020 update on page 12; the research into what motivates teachers to book field trips to the planetarian on page 20; and Tiffany Wolbrecht’s secret to no more tears from 3-year-olds on page 34.

Perhaps the most exciting feature starts on page 28 (but I might be biased, as I wrote the introduction). Bryant Gonzalez didn’t let political unrest in Venezuela deter him from his love of planetariums and sharing astronomy. Instead, he took his show “on the road,” literally, and is backpacking through South America with the mission of visiting every planetarium he can find.

He is accompanied by Pablo Urrea, a photographer and designer, and you can follow their trip and enjoy the photographs on your own virtual tour of the continent. The photos remind again that children are the same all over the world; note the “bunny ears” on page 29 for proof.

And one thing that’s missing

Not in this issue is a story about the new planetarium at the Perlan Museum in Reykjavik, Iceland. Bowen Technovation was the lead developer of this project for the first planetarium in Iceland. This is another story that I am working on personally, and making connections with the right people did not work to allow the story to be completed for this issue. Keep your fingers crossed for June.

Right city, wrong river

Natalia Bulgakova, author of the invitation to Saint Petersburg, Russia, for the 2022 IPS Conference, caught my mistake in a caption on page 22 of the December issue. The Volga does now flow through St. Petersburg; the city is located on the Neva River. My apologies!
President’s Message

Taking the reins of a strong IPS

It is with great honor that I write my first president’s message. I take over the reins of a very strong IPS, and that strength is a tribute to the leaders who have come before me.

First of all, I must thank Shawn Laatsch, who now transitions to the role of past-president. This is his 25th consecutive year of serving as a member of IPS’s executive officer corps. Shawn’s dedication to and love of IPS is unmatched.

Thanks also to Joanne Young, who completed her terms as president and past president and has rotated off as an executive officer. She stepped up four years ago when IPS was in a leadership crisis, running in and winning our special election for president. Joanne’s advice and encouragement has meant much to me personally.

Thanks also to Rachel Thompson, who completed her term as executive secretary. Rachel had a challenging job, replacing Lee Ann Hennig, who had been in that position for two decades.

As you know, the executive officers are now joined by President-Elect Kaoru Kimura and Executive Secretary Patty Seaton. They join Shawn, myself, and treasure Ann Bragg.

Meet our director of operations

The other new addition is IPS’s Director of Operations Kristen Lepine Dos Santos. At the beginning of the year IPS engaged an association management company to help with the operation of our organization. After a lengthy search, the firm we selected was Managing Matters, based in Toronto.

This is a big step for IPS, moving from an all-volunteer organization to having some paid staff. The transition was one of the major recommendations coming out of Vision 2020, and will help IPS operate more professionally.

I am very excited about the promise of the next two years. Together we are in the process of fulfilling the goals laid out in our strategic plan. To me these mean building a more inclusive, a more active, a more global, and a more forward-thinking IPS. As we approach the centennial of the planetarium (2023), it is the work that we do now that will ensure that the planetarium will thrive into its second century.

To accomplish that, we need everyone working together. All IPS members should know that they are always encouraged to contact me with ideas or suggestions. If there is a project that IPS could help support or an initiative that you would like to start, please let me know.

Saving the Bradford Planetarium

As an example of how planetariums are stronger when we work together, I’d like to share with you a recent experience. Back in November I was contacted by a woman named Pauline Hammerbeck. Pauline told me that the local high school in her community had a planetarium, but that it was little used and scheduled for demolition. She wished it was used in more of his classes.

A high school student talked about what a special place it was and how important it was to volunteer his time to run planetarium shows on the weekend. A high school physics teacher, Jason Standish, offered to have his students train the high school students in how to use the planetarium.

Other community members came up to speak, all in favor of saving the planetarium. Senior citizens talked about how the planetarium had been used in the past (it was built in 1961) and the importance of investing in education. The Bradford physics teacher, Jason Standish, offered to volunteer his time to run planetarium shows on the weekend. A high school student talked about what a special place it was and how he wished it was used in more of his classes.

Then it was time for the school board to make their decision. The tension in the room was high. School officials told the cost of making sure that they could make the most of their investment.

Jean spoke next and talked about how they are using the planetarium at Carthage. He offered to have the college students train the high school students in how to use the planetarium.

Then I spoke. I mentioned the educational value of a planetarium and the power of immersive learning. I explained that a modern planetarium isn’t just for astronomy, but for all of the sciences, art, and even theater, as they had experienced. Finally I let them know that there was an entire planetarium community willing to help them and make sure that they could make the most of their investment.

To read more about the meeting, go to www.kenoshanews.com/news/local/bradford-planetarium-avoids-wrecking-ball/article_021a2802-7162-5f4b-9cfb-a9555960146d.html. Photo courtesy CBS 58, Milwaukee, Wisconsin, Mark McPherson.
COSMOS ODYSSEY
A Brief History of Astronomy

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When I joined the planetarium industry in 1999, I had come from the world of live theater, film, television, and education (having also served as an adjunct faculty member in the Media Communications Department at my alma mater, Webster University in St. Louis). I had no formal teaching experience when I was called on to be a college professor, so I used what I knew about engaging audiences to engage my students.

As an adjunct professor and a working professional in the entertainment industry, I leveraged my professional background in an attempt to captivate my students. I wanted to be that professor who connected my students to the material I was presenting—kind of like Mr. Keating, the private school teacher who Robin Williams brought to life in the movie Dead Poets Society. I wanted to inspire them, so I used humor, current examples from film and television, and group projects to inspire passion and love of the material I was teaching.

My experiment worked. I could see from my students’ faces their level of engagement, and my end of semester evaluations reflected this success.

Connecting entertainment and education

This experience taught me the indelible and essential connection between entertainment and education. When a speaker, teacher, or performer stands in front of a group of people to offer them something, the presenter “takes the stage” and the group or individual becomes the audience. That’s how it works, and how it has worked ever since our ancestors told stories around a campfire. This relationship between the performer and the audience allows the presenter to draw from centuries of stagecraft and entertainment industry experience to hook, hold, and transform their audiences. This is the key to success.

As I began to understand the DNA of the planetarium community, I was constantly amazed to see how much resistance there was to anything that sounded like it was based in entertainment or inspired by Hollywood. I had the unique privilege of being on the ground floor of the creation of the digital fulldome medium, a spectacularly immersive canvas for telling stories that surround audiences in an unprecedented way. This powerful medium for all kinds of storytelling across limitless topics from education to entertainment was siloed into planetariums and science centers with a very narrow range of topics and essentially a single genre—astronomy—and later, general science.

This is an unpopular, but no less true, statement: the fact that many domes are cloistered in science institutions has prevented the medium from realizing its true potential, has limited the types of stories it can tell, and has held it back from being embraced and loved by the general public. This applies to giant screen film domes as well as digital domes. It would be as if television, when it was invented, was only found in hospitals. Imagine the type of programming that would have been produced with this severe limitation, and how our favorite binge-worthy shows would not even exist today.

Fulldome as a creative and educational medium

Fulldome is a medium that is as adaptable as cinema or television. There is virtually no story that cannot be told on this immersive canvas, yet the variety and diversity of stories that have been told is seriously limited. Add to this the fact that there is a strange misconception that any pre-produced content that is created for a digital dome theater cannot be called a “movie,” since that moniker evokes entertainment. Because they reside in planetariums and science institutions, this idea implies that domes must educate first. If they happen to entertain as well, that’s fine, but entertainment value is a distant consideration, and certainly not the objective. The industry’s focus on education almost to the exclusion of entertainment has led to some unhealthy and potentially terminal practices that must be understood...
and addressed if the fulldome medium has any chance of continued success.

Furthermore, solutions are not that difficult to implement, and if put into practice, they can revive the health of the fulldome environment and establish a better destiny for the entire fulldome community. The biggest challenge is creating a paradigm shift in mind set, and it is up to the community to embrace this shift for the sake of a better future. This article is an attempt to shed light on the problem and to offer a fresh perspective as a catalyst for transformation.

The concern
As stated earlier, for a long time, there has been a visceral reaction from some in the planetarium community against anything that sounds like it came from the entertainment world. This manifests itself in various ways: “Planetarium shows are not ‘movies!’” and “We’re educators, not button-pushers.”

There are people who treat the planetarium as a holy sanctuary that must educate audiences to the exclusion of entertainment. It’s as if the planetarium has this vibe that anything entertaining cannot be educational, or that entertaining content distracts from the planetarium’s educational mission. That’s rather ironic because there’s also been this long-echoed wish among many planetarians that they could have the Hollywood budgets, to be like Star Wars or Star Trek or other blockbusters that attract audiences.

It’s also ironic because in wishing for that, today, new theaters do have fantastic digital systems that can help domers provide educational content (real-time or pre-rendered) that will attract, build, and keep audiences.

Please don’t misunderstand. Education is a noble goal, and it can happen in many ways in the dome, from live presentations to fulldome videos. In fact, the immersive dome environment itself can be an outstanding source of inspiration that will encourage guests to engage in a lifetime process of learning. Understanding what a dome presentation can and can’t do will go a long way to help us rethink uses for the theater and how it can best inspire lifelong learning.

A majority of facilities recognize that they need good fulldome video content, want to give good live shows, and work toward those goals within whatever budgets they have. For them, entertainment and education go hand in hand. They realize that we have to give our audiences a good time. If they do, then audiences come back. Word of mouth brings in new audiences as people evangelize about the great time they had at the planetarium seeing a show about black holes or exoplanets or coral reefs or a little cat who goes to the moon.

For a subset of people who produce for fulldome and/or who realize that live shows need to have good entertainment value, too, the concept of drawing inspiration from feature films is not an alien one (pun intended). It’s one that says to them: “Give people a good time, even as you are teaching them something, and they’ll come back again and again. And, they’ll tell their friends.”

This is a healthy way to operate. Audience is important. Without audience, domes wouldn’t be here. That’s true regardless of whether they’re in schools or in informal education venues. Think about the best teachers you ever had: they were probably inventive, entertaining, and memorable because they could find ways to excite you about the topic. Right?

Customizing the approach
In schools, the audiences are pretty well defined, and planetarium educators are teaching within curriculum guidelines. Some domes use a variety of content, including video and live presentations. They work to satisfy the multiple requirements under which they operate.

In the informal environment, there’s more leeway, but we’d like to think that good production values would be appreciated under all domes, regardless of mandate. Remember, inspiration, not formal education, is the goal. Inspired audiences will seek out additional information on the internet, watch other documentaries on the topic, follow influencers and experts on social media, and so on. This exciting result should be our ultimate goal, and this can only be achieved when we offer engaging and entertaining experiences under the dome.

Unfortunately, all too often planetarium facilities select content based on price rather than effectiveness in building an audience. We need to understand that when we fail to consider audience impact, we are tearing down our institution, not building it up. It is the same as poisoning our own water supply. If we provide poor or underwhelming experiences for our audiences, they will have a bad experience. They won’t come back, and will tell their friends not to bother coming either. This is a recipe for disaster. Sadly, this is happening way too frequently.

What’s the competition?
Something to keep in mind as we make and use fulldome productions is that all of us in the domes have competition from outside. This is particularly true in the informal arena. There are many other things people can do with their time besides come to the planetarium. Think about this most of us have screens in our pockets and on our wrists. Those deliver content 24/7, with a constant input of streaming media. We are adapting to that.

In truth, we don’t have to go out of our homes to do a lot of things we used to do. Audience members could simply stay home and get all the info about the Hubble Space Telescope (for example) that they could get at the planetarium. Or, they could watch Netflix and enjoy films, art programs, or dance concerts. Why leave home? Whatever is “out there” in our domes has to be pretty compelling to attract an audience at all, doesn’t it?

Keeping it relevant
If planetariums are going to continue to be relevant against this constant backdrop of media access, we in the domed community need to take some advice from entertainment industry, but also from history. We need to understand what appeals to audiences.

For “Hollywood” media, the biggest indicator of what appeals is in the box office (but this isn’t always an indicator of the quality of a (Continues on next page)
film). If people pay to attend something, it shows up in the box office. Of course, not all domes charge admission, so think of it this way: the success of a show is reflected in the audience sizes, the numbers of people who come back to see it, or bring their friends and family to see it.

We should define metrics we can use consistently to measure our domed success. Box office is only one way, but not the most important in many places. Our focus is audience impact, and we should find ways to evaluate our effectiveness in achieving this goal.

Engage audiences
As with Hollywood, if domers (mostly at the informal venues) ignore audience, it’s at our own peril. Audiences are the lifeblood of our theaters. Without an audience we have nothing, and if our audience is not growing, we are dying—either slowly or quickly.

Ultimately our success or failure depends on our audience. And, they won’t show up if we don’t engage them. If you have a shrinking audience, adding more and better science alone without learning and implementing what engages your audience, you will fail.

The priority and focus has to change for theaters to be truly viable. It’s time to learn to entertain our audiences again. This means spending money on good movies and on marketing to let the audience know what you have to offer them. For those facilities where admission is charged, audience engagement potentially can transform a theater from a cost center to a revenue center. (Even if this is not necessarily true for those in schools, think about those students who delivered positive evaluations at the end of the semester—and consider what value that may have for school audiences.)

Engage!
There are some time-honored principles that fulldome theaters and producers can learn from the Hollywood production model. They help us embrace our audiences, entertain and educate, and be more effective. Best of all, they don’t pose a dichotomy between education and entertainment. Think about it: we learn from plays, movies, radio shows, podcasts, all sorts of media. Fulldome should be no different; it should embody both education and entertainment and do it in a way that gives audiences a memorable experience. As we know from educational research, memorability affects what audiences learn, and that’s a good thing.

So, what do we in fulldome do to engage our audiences? The answers need to be tailored for each facility, but in general, the most effective results come from show selection. This may mean investing in content that may be more expensive than you are accustomed to licensing. For some theaters, such expenses can be recouped through revenue share in the budgets they provide for show licensing.

Incorporating a live presenter in the dome can also raise the excitement and impact of the show and give your theater an advantage as it attracts and builds a loyal following.

Beyond that, theaters need to engage in marketing. What that really means is reaching out to the communities they serve to present themselves as attractive, appealing, and relevant experiences. Once a theater does that, it then has to deliver an exceptional audience experience. And, that will almost always mean bringing fresh, entertaining, and educational experiences that people can’t get anywhere else.

Of course, there are folks in our community who do this already. They say, “Let’s consider doing something different and really reach out to our audiences.” This can be something as simple as licensing a piece of content that showcases music and art, or on a topic they don’t normally show, such as dinosaurs. Our fulldome community offers a wealth of possibilities. And, for those who can’t license shows, there are streaming options available.

In addition, taking a step toward expanding our vision to include audience preference means coming to an understanding of what audiences like and don’t like. We should not be afraid to ask these questions of our audiences through surveys, phone calls, member forums, or other creative means. When we review this feedback, we must be willing to adapt and change to increase our effectiveness.

Support producers
There is a small, delicate ecosystem of producers in the fulldome community who are very much in tune with what audiences want and like. Supporting their work is important. Not only are these producers the most obvious source of new content for our theaters, but their visions can help attract audiences hungry for new experiences. Our fulldome community benefits from producers who continue to expand the envelope of productions, who want to expand theater operators’ horizons.

However, many producers are struggling. Production budgets are low, and producers are getting beat up on pricing. They are competing with free content that may or may not be very good, but is popular because it’s free. And, if an independent producer invests a lot of their own money on a show, it’s very likely it will be years before they will see any return on investment.

Producers can’t work for free; they have families to feed and produce to fund. And, they do it for a tiny fraction of what a typical Hollywood or PBS production spends on their lineup of stellar shows.

The fulldome community is very lucky to have these producers—some of whom have been part of our community for decades. Yet, there are challenges ahead and we may lose them if we don’t nurture their work.

The producers’ quandary is that there’s only so much they can afford to invest in a show because of the dynamics of the market. And, the less they invest, the less “bang” it has. Money talks, especially in production, and if we want good shows, we as a community need to find ways to support productions that help us bring in audiences.

Yet, there’s also a quandary on the theater side: some don’t have money to pay license fees. And if we want to get better content, to gain that “Hollywood” feel that so entices audiences, we need a heightened awareness of the ecosystem of producers, theaters, and audiences, and acknowledge that money does indeed drive the merry-go-round.

It all comes back to audience members. They motivate us to acquire new shows, to produce our own content, and to deliver live lectures that will delight and educate them. What audiences want and enjoy (and return for) should motivate theater administrations to re-examine the budgets they provide for show licensing.

In the long run, we need to look at planetariums in the future—a year out, ten years out. Will we embrace the kinds of productions that bring in audiences and also reflect the values we espouse in our domes about education and entertainment? That direction shows support for our producers, while at the same time showing respect for our audiences. There’s food for thought here, and we hope in a future piece to look more deeply at some marketing and outreach tactics that can help domes tackle these issues. Stay tuned!

Many thanks to Carolyn Collins Petersen, IMERSA Board member and Loch Ness Productions producer for insights she contributed to this article. In the course of discussing these ideas, we found we had many points of agreement based on our years of experience in the dome. In addition, special thanks to IMERSA Board Members Dan Neafus and Ryan Wyatt for their extremely valuable input into the topics discussed here.

Michael Daut, formerly at Evans & Sutherland Corp. and Mousetrappe Studios in Burbank, California, now serves as an independent writer/producer/director in Los Angeles and part-time fulldome show distributor for K2 Studios. He is an IMERSA board member and maintains an active interest in the dome community and the content we show. He can be reached at: msdaut@gmail.com.
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Vision2020 Update: A new chart and remaining tasks

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With the approval of the new IPS governance structure, and more recently the passage of three by-law revisions allowing for implementation of the new structure, Vision2020 has accomplished its primary undertaking of the past two years.

The revised IPS organizational flow chart on the facing page is a dramatic departure from our previous organizational document, and I want to thank Dayna Thompson, assistant director of the Charles W. Brown Planetarium in Muncie, Indiana for updating this chart from the one presented at the IPS business meeting last summer.

Note, please, that the membership zones are somewhat fluid and subject to change at the discretion of the IPS Board.

So, what's next?

The overall goals of V2020 have always been to put forth recommendations of a big picture vision of what IPS should become. Although we have already accomplished much of what V2020 was tasked to do over the past five years, namely, to create a more modern active organization with greater participation from its membership, there remain a few items on our “to do” list.

V2020 will make a recommendation on whether IPS should keep its U.S. federal tax exempt business organization known as 501(c)6, adopt a similar 501(c)3 tax status for non-profit organizations, or become a hybrid non-profit business that has the tax advantages of both models. The future IPS board, officers, and director of operations will eventually decide which tax status to adopt.

Another important recommendation will be a strategy that produces real membership growth, one that not only includes a membership drive, but also a plan for sustainable growth to attract and recruit new members as well as one that retains current members. This will eventually be a coordination effort between the membership committee, officers, and the director of operations.

V2020 will also assist the Elections Committee in recommending or recruiting candidates for the election of first round board positions. Affiliates will also be involved in this process.

Individual goals

As previously presented, each of the V2020 team members represent a particular goal meant to focus on big picture objectives for IPS. Although the strategies to achieve these goals have changed over time, the underlying challenge is how the recommendations stemming from these goals get implemented.

The solution is to integrate V2020’s individual goals and IPS committees into task forces - small groups that figure out what’s needed to achieve the desired outcomes. Most team members have coordinated with a relevant existing committee and are working on action plans to implement their big picture strategies.

The results will be presented to council at this summer’s meeting in Iceland. V2020 will also lay out its recommendations mentioned above, an update on team member goals, and what we still hope to accomplish in the remaining months before the IPS2020 conference in Edmonton.

New officers, for the record

The results of the election of IPS officers have been widely disseminated already, but are listed here for the official record.

Mark SubbaRao, director of the Adler Planetarium’s Space Visualization Group (Chicago, Illinois), took the reins as president starting January 1, 2019.

President-elect Kaoru Kimura from the Japan Science Foundation/Science Museum in Tokyo, began a six-year commitment to the IPS in January. In 2021, Kimura will become president and SubbaRao will transition to past president.

Shawn Laatsch of the Emra Astronomy Center at the University of Maine in Orono, has become past president, and the current past president, Joanne Young, president of Audio Visual Imagineering in Orlando, Florida, has retired from the officer cadre but continues to keep active with committee work.

Patty Seaton, planetarium specialist at the Howard B. Owens Science Center in Lanham Seabrook, Maryland, was elected as executive secretary, and Ann Bragg, director of the Anderson Hancock Planetarium at Marietta College in Ohio, ran unopposed as treasurer.

In addition to officers, IPS members also overwhelmingly approved several changes to the by-laws, all of which were language changes to reflect the change in government structure.

The IPS By-Laws and Standing Rules can be found at www.ips-planetarium.org/page/rules.

Membership changed to anniversary model

Ann Bragg
IPS Treasurer

IPS is now using the “anniversary” model for memberships, meaning that expirations are 1 year (or 2 years) from the date of joining.

This is a fairly recent change. We used the “annual” model before that, under which all memberships expired at the end of the calendar year. As a result, most memberships do still have 31 December expiration dates.

The membership software of our website automatically sends out emails ahead of a member’s expiration date. It also sends out a reminder 10 days after the membership has expired.

If a member has not received a renewal reminder, it probably has landed in or been blocked by spam filters and are not seen.

If this is your problem, you can add a filter for “yourmembership.com” to your approved list of incoming mail.

☆
The IPS Mission...
To provide the planetarium community professional development, science literacy and arts/humanities awareness, innovative ideas, and partnerships in order to enhance the world’s appreciation and understanding of our universe.

*Zones are subject to change at the discretion of the IPS Board.

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“Overall, I think it was a good experience for both of us, as well as others on campus, especially in the Physics & Astronomy Department. I hope he feels the same way. It seemed that beer is the universal language, which I was not entirely prepared for. But, we didn’t do too bad considering I was 9 months pregnant!”

Sara Schultz, Planetarium director at Minnesota State University in Moorhead, Minnesota. email: schultz@mnstate.edu; phone: +1 218-477-2457

**Week in the United States**

**www.ips-planetarium.org/page/WeekinUS**

Üllar Kivila from Tartu, Estonia visited Minnesota State University Moorhead Planetarium in October 2018. From their reports, it is obvious that the experience was very beneficial and enjoyable to both the host and the winner.

Here are some comments from host Sara Schultz’s report on the program:

“It was a pleasure to host Üllar for a week in the U.S.. In our initial planning stages I wanted to maximize his opportunity to experience more than just my dome, so I offered some dates close to conferences like LIPS and GLPA. Üllar opted to combine his visit here with attendance at the GLPA yearly meeting, which also had a mini-LIPS session which he also attended.

“Instead of staying in a hotel, he stayed with two different faculty members during his time here. The benefit to this was two-fold: one to keep down cost, and the other to get more time with others and experience more of our culture and family life.

“For MSUM, his visit overlapped with our homecoming week. We attended a tailgating event (which ended up having to be indoors because of the crappy weather we were having all week), walked in the homecoming parade, attended pregame festivities (including a beer garden), and hosted three presentations open to the public.

“Üllar also got a fair taste of daily activities at the planetarium as we had two shows a day for our local fifth graders. These shows were comprised of topics for the standards in that grade, so it gave him some insight into our schools.

“During his visit, we hosted a “potluck” dinner with the Department of Physics and Astronomy where Üllar got to sample dishes from each of us. I, being a native Midwesterner, made the most Midwestern thing I could think of, Tater Tot Hotdish (Google it). It seemed to be a hit!

“Üllar also got the opportunity to dig deeper into his amateur astronomy hobby. He met up with our local astronomy club at a local brewery and ended up on a brewery tour to boot. He got to check out our observatory telescope and hike a bit in our local state park. Fargo was hosting Oktoberfest that weekend, so Üllar and one of the faculty from the physics department went to sample some local brews as part of a pub crawl.

“Overall, I think it was a good experience for both of us, as well as others on campus, especially in the Physics & Astronomy Department. I hope he feels the same way. It seemed that beer is the universal language, which I was not entirely prepared for. But, we didn’t do too bad considering I was 9 months pregnant!”

Sara Schultz, Planetarium director at Minnesota State University in Moorhead, Minnesota. email: schultz@mnstate.edu; phone: +1 218-477-2457

**Report from winner Üllar Kivila:**

“I prepared two shows with some overlapping topics to be presented for various audiences. For the general public, the topic was “Measuring the cosmos with sticks and shadows” which explained the step-by-step journey of our understanding the sizes and distances of celestial objects from Eratosthenes to the scale of our solar system based on Venus transit observations.

“The second show, aimed at students and teachers, was about the discovery and study of exoplanets—a continuation of the first show in many ways as it covered the next few steps of the cosmic distance ladder.

“In practice, we decided to use the exoplanets show for all audiences and I incorporated some elements of the first show as an introduction to the exoplanets show. I presented the show twice, the first time to the students and staff of MSUM and the second time for the general public. Both presentations were around 45 minutes long with 10-15 minutes of Q&A at the end.

“In my personal opinion, the second time went better than the first
I experience at home. Estonians are evidently rather similar to our Vol 48 No 1 March 2018 used to. Even though we use the same software (Univew), the user Bethlehem for most Americans instead of what I talked about. name ‘Christmas star’ would associate with the legend of the star of locating the Christmas star at midnight. I realized only later that the ence teach their kids to count the time remaining until Christmas by culminates at less than a degree from zenith, so I suggested the audi- nation is about 10 days before Christmas and in Estonia its maximum Capella. The story goes that when Capella is overhead at midnight, it’s connection came from our ‘Christmas star’—commonly known as about some Estonian legends of the sky and an unexpected point of discussion came with my improvised sky tonight presentation. I talked from the presentation point of view as I learned to use the system better and was probably slightly less nervous in front of the general public as opposed to physics and astronomy students and staff. The audience reactions were pretty good and I didn’t notice anyone falling asleep during the show or shaking their heads at something I said or did. “In addition to the planned presentations, I also got the opportu- nity to do a short guest presentation on a regular “sky tonight” show. I wasn’t too prepared for that but it was a lot of fun. I compared the visible skies from my home and Moorhead (12° of latitude difference, which doesn’t sound a lot but makes for a big difference in observing the central regions of the Milky Way in Scorpio and Sagittarius, for example). “I was very happy with the exchange experience and would love to do it again (though that would be rather selfish of me as there are certainly many great planetarium presenters who deserve this oppor- tunity too, so I’ll pass on that hope). Maybe there will instead be a chance to participate as the receiving planetarium—I’d be happy to host a colleague in our cool little virtual spaceship. “I enjoyed the activity of U.S. audiences in comparison with what I experience at home. Estonians are evidently rather similar to our Nordic neighbors in being reserved and not asking too many questions. “Interestingly enough, of all the shows I did, the most questions and discussion came with my improvised sky tonight presentation. I talked about some Estonian legends of the sky and an unexpected point of connection came from our ‘Christmas star’—commonly known as Capella. The story goes that when Capella is overhead at midnight, it’s Christmas. It’s not strictly true, of course, as Capella’s midnight culmination is about 10 days before Christmas and in Estonia its maximum altitude is 13° short of zenith. “As I discovered, the story works even better in Moorhead, as Capella culminates at less than a degree from zenith, so I suggested the audience teach their kids to count the time remaining until Christmas by locating the Christmas star at midnight. I realized only later that the name ‘Christmas star’ would associate with the legend of the star of Bethlehem for most Americans instead of what I talked about. “The MSUM planetarium itself was also different from what I’m used to. Even though we use the same software (Univew), the user (Continues on page 17)
In July 1969, 600 million people spread across all the continents, together with their family or friends, some around a radio and some a television, and followed the first step of a man on the moon. Fifty years later, we want to feel this enthusiasm for the moon again in a global, universal movement, transcending all borders.

How? Nothing could be easier. We want everyone, young and old, to discover the moon through an astronomical telescope in a worldwide event. You have astronomical equipment? Install it at the corner of a street, along the side of a river, on a village square—simply join the event On the Moon Again on 12-13 July 2019 and invite passers-by to observe the moon and share the wonder.

Where and when to observe?
The where to observe is easy: where the pedestrian traffic is most intense! Going to an observatory or a scientific outreach structure requires anticipation and planning. This will only reach an informed public. In order to reach as many people as possible, it is therefore important to set up where people pass by. There is no need, of course, for a dark sky without city lights to observe the moon.

In the end, the best places are a city center, along a river bank, next to a tourist attraction, or in front of a popular café or restaurant. If you live in a village or in a non-touristy place, you might set up your instrument in front of your house and tell your neighbors and friends on social networks to join you to observe!

Of course you also can open the doors of your personal observatory, but the best is finally to give fresh air to your astronomical equipment and bring it where the general public is.

On the Moon Again will take place on 12-13 Friday, a week before the 50th anniversary of humankind’s first step on the moon. For a large section of the Earth’s population, this period is summer and the weather may be expected to be good.

These two dates were chosen because the phase of the moon is waxing gibbous, thus allowing quality observation of several hours just after sunset.

By observing during these two evenings around the world, there will be observers discovering the moon continuously for 48 hours! On the Moon Again will begin on the evening of July 12 in the Pacific Ocean region, Tonga, or New Zealand and will also end in the Pacific Ocean on the evening of July 13 in Hawaii and Tahiti.

This global event will be another way to realize that we all still live on the same planet and under the same sky, a point that was made in 1969.

What equipment to use?
The moon has the advantage of being clearly visible with any astronomical equipment, from your eyes and a pair of binoculars to telescopes of 20-30 cm in diameter, including the popular 60 mm, or 115-mm diameter telescopes. Your telescope has not seen the stars and taken the air for a long time? You just have to dust it and put it back on the ground.

Obviously, the small instruments are practical because they are easily transportable in the street. If you have a non-motorized instrument, no problem! You will only have to put a low magnification (30-40x). Do not be stopped on the pretext that you do not have sophisticated equipment: you will be astonished to see how passers-by will be amazed to see the moon in your 60-mm telescope.

How tocommunicate?
On the Moon Again wants to be a catalyst of and for observers. Thousands of telescopes will be out on 12-13 July. Starting in June 2019 a map of all observers by city will be accessible on the On the Moon Again site at www.onthemoonagain.org. We will rely on you to communicate your whereabouts and to encourage your friends to join us.

Do not hesitate to talk to the local press and also to share your location for observation on social networks. The strength of this event will depend on the momentum and community involvement of all participants.

In addition to our site www.onthemoonagain.org, you may contact us at onthemoonagain50@gmail.com. For more information, check Facebook (@onthemoonagain) and twitter (@onmoonagain). In order to share our experiences during these two days, there is only one hashtag, #onthemoonagain. For a video, go to https://www.youtube.com/watch?v=XCr3NfOEpE.

Sylvain Bouley, Planetary Scientist
Paris Saclay University
Versailles Saint-Quentin-en-Yvelines
Université Paris-Sud

Let's (focus) on the moon
PARTYcles Alex Cherman#037 - Mar.’19

I’m a proton and you’re an electron

But are we really particles?

LOOK. AT. THE. TITLE. OF. THIS. COMIC. STRIP.

That is hardly scientific evidence...

OK... But look at us!

How can we NOT be particles?!?

We are round and we are tiny...

That’s just another unscientific allegation...

Maybe we are the way we are because the artist is untalented and lazy...

Oh... I wish you hadn’t said that...

The artist might be untalented, but he knows his Physics...

He just turned you into a wave!

Dr. Guilherme Frederico Marranghello (left) and Ruth Grützbauch

(Week in U.S., continued from page 15)

interface was set up differently so it took some getting used to. We even managed to be mutually useful to each other, as Sara and I both knew a few technical tricks in the software that the other didn’t.

“While less technically fancy than my home planetarium, I enjoyed the more relaxed atmosphere and the ability to have long Q&A parts at the end of shows without the risk of running into the next show. (At AHHAA we often have successive shows sold out every 30 minutes).

“In conclusion, I’d like to thank my host Sara Schultz for the warm reception and also Matt Craig, Steve Lindaas, and Ananda Shastri from MSUM for accommodating me and showing me around Moorhead and Fargo. I wholeheartedly recommend this exchange program to all planetarians!”

Üllar Kivila, planetarium coordinator, Science Center AHHAA. Email: ullar.kivila@ahhaa.ee; phone +372 5363 7603

Week in the United States Winners for 2018

We have two new winners who will travel to the United States in 2019. Congratulations to Dr. Guilherme Frederico Marranghello from Brazil, who will work with Michele Wistisen, supervisor of the Casper Planetarium in Wyoming, and Ruth Grützbauch from Austria, who will work with John Meader, director of the Northern Stars Planetarium in Fairfield, Maine. I look forward to hearing about the adventures of these talented planetarians.

Grant Opportunities for hosts of Week in the U.S.

I am thrilled to report that two regional groups, the Middle Atlantic Planetarium Society and the Great Lakes Planetarium Association, have instituted a $500 grant for hosts of the winners of the Week in the United States to help defray their costs. If you are a member of one of these regions, please consider applying to host a foreign colleague! Thank you MAPS and GLPA!

Week in Germany

I am delighted to announce that this year’s new country joins our IPS professional development initiative with a program to host a planetarian from another country.

In 2019 Matthias Rode and Tilo Hohenschlaeger, the 2017 winners of the Week in the U.S., will welcome Derek Demeter, who hosted them at the Emil Buehler Planetarium at Seminole State College in Florida! Next year the Society of the German-Speaking Planetariums (GDP) will support a formal competition with specific rules for applications and a host grant, similar to the MAPS and GLPA grants.

Details will be shared on the IPS website when appropriate: https://www.ips-planetarium.org/page/share.

Pages of Stars

www.ips-planetarium.org/page/pagesofstars

What a wonderful way to contribute audio files to IPS! Congratulations to these 2018 contest winners:


Honorable Mention Winner: Marco Avalos Dittel, Costa Rica; a sample script of the closing message of the 2018 astronomy program of his mobile planetarium.

Week in Italy

www.ips-planetarium.org/page/italy

We are pleased to announce this year’s winner is Chrysta Ghent, planetarium educator at the Liberty Science Center in Jersey City, New Jersey. I know you will have a wonderful trip and experience with the Italian students, teachers and public! She will travel to Italy in the Spring of 2019.

Week in the United States Winners for 2018

We have two new winners who will travel to the United States in 2019. Congratulations to Dr. Guilherme Frederico Marranghel-lo from Brazil, who will work with Michele Wistisen, supervisor of the Casper Planetarium in Wyoming, and Ruth Grützbauch from Austria, who will work with John Meader, director of the Northern Stars Planetarium in Fairfield, Maine. I look forward to hearing about the adventures of these talented planetarians.

Grant Opportunities for hosts of Week in the U.S.

I am thrilled to report that two regional groups, the Middle Atlantic Planetarium Society and the Great Lakes Planetarium Association, have instituted a $500 grant for hosts of the winners of the Week in
You'll definitely agree that planetariums are unique audiovisual tools for the popularization of science, not only (although primarily) astronomy, but also other natural sciences, mainly of inanimate nature. They can't substitute for learning at schools, but they can fascinate and motivate their visitors to make them interested in science and, of course, in critical thinking, so important in these days of commercial, political and social manipulations.

Planetarium shows, especially when presented by experienced lecturers, justly fascinate planetarium visitors, simply because they show starry skies regardless of the time of day or light pollution.

After all, cross your heart, how many of you can still see the silvery band of the Milky Way? The astonishment this view brings followed by beautiful images from the Solar System as well as from the edge of the visible universe is the feeling we often remember for the rest of our lives.

But this fascination isn’t an end in itself. It reminds us how incredibly clever people are. With telescopes and other detectors, we are looking into space to finally discover and carefully study our everyday world. The fact that we don’t die of trivial illnesses, we travel from one continent to another one, and we’ve almost become a part of our computers—all that is the result of the work of many generations of inquisitive people, scientists of all kinds.

**International project supported by grant**

Fascination and motivation are also the basis of the international project involving six European planetariums from the Czech Republic, Hungary, Germany, Poland, Romania, and Slovakia. The implementation of the project has been supported by a special EU grant and a grant from the Ministry of Education, Youth and Sports of the Czech Republic in the amount of €221,000.

The official goal of the project is to create a digital planetarium show by mid-2020 that deals with space technologies in our everyday lives. It will be made in six variations (content-adapted to particular countries) and in seven languages.

The unofficial but equally important goal of the project is collaboration and sharing of personal experience. Each of the participating planetariums comes from a different environment. It isn't just a different language and culture. Each of them also has a different projection system and serves different type of visitors, and yet they have something in common: their visitors love the universe!

And what is really the most important facet for the staff of the Brno Observatory and Planetarium (Czech Republic), Slovak Central Observatory (Slovak Republic), Tudományos Ismeretterjesztő Tarsulat (Hungary), Complexul Astronomic Baia Mare (Romania), Zielonogórski Ośrodek Kultur (Poland), and Hamburg Planetarium (Germany)? Probably that this joint project could be the beginning of a beautiful friendship. You could see that already during the first project meeting, which happened in January at Brno. The second meeting is scheduled for April in Slovakia.

So, stay tuned—we will keep you informed about the progress of our cooperative project.

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Planetary experts from the Czech Republic, Hungary, Germany, Poland, Romania, and Slovakia gathered recently in Brno to begin planning the collaborative project. All photos provided by author.
WHAT DID IT TAKE TO PUT THE FIRST HUMAN ON THE MOON?

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THE APOLLO STORY

EXPLORE THE SECRETS OF OUR COSMIC CHEMISTRY.

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Why do they come? The motivation behind field trips to the planetarium

Karen Schwarz (West Chester University), Chrysta Ghent (Liberty Science Center), Julia Plummer (Pennsylvania State University)

Introduction
When you work in a planetarium, you might assume that teachers organize field trips to your dome so that their students can learn more about astronomy. The planetarium takes learning to a level not easily achieved in a regular classroom (Plummer, Kocarelli, & Slagle 2014; Plummer & Small 2018; Yu, Sahami, & Dove 2017). After all, the planetarium is a powerful teaching tool with the capability to show the sky for any date, time, or location. You can, for example, display the sun’s noon time position for both equinoxes and solstices in order to demonstrate why we experience seasons. Or students can observe an entire month’s worth of lunar phases in a matter of minutes. There are plenty of topics in state standards, as well as the Next Generation Science Standards (NGSS), that relate to astronomy. The teaching of many, if not all, of these ideas could be enhanced by demonstrations in a planetarium. Therefore, we might assume teachers bring their students to the planetarium as a purposeful way of supporting their astronomy learning and that this experience is integrated into their existing astronomy instruction. However, prior research on teachers’ choices for visiting science museums (Kisiel 2005) suggests that teachers are motivated by a variety of factors when choosing particular field trips, some of which are not focused on the academic content of the experience.

Without input from teachers as to their motivations and goals for a trip to the dome, planetarium professionals have no guidance for their presentations. While teachers may be content with a general tour of the night sky—constellations, planets, some deep sky objects—knowing why they’ve chosen to bring their students to the planetarium would allow for a more tailored, and effective, presentation.

Since a visit to the planetarium is often a one-time event for any given class, we should be making the most of this opportunity. In the process of learning why teachers choose to come to the planetarium, we might also communicate to teachers the demonstrative capabilities of the planetarium (particularly digital systems) that they may not have appreciated and how this can support classroom learning.

In order to better understand the reasons teachers bring their students to the planetarium, we conducted a formal survey of elementary teachers guided by the following research questions:
• What factors influence teachers’ choices when planning a classroom field trip?
• To what extent (if any) do teachers integrate their visit to the planetarium into their lesson plans?
• What are teachers’ goals for their students during their visit to the planetarium?

Description of study
Our study focused on teachers in grades K-5, as these are the most common grades that we see in our planetariums and there are several Pennsylvania state standards relating to space science in these grade bands (note, Pennsylvania has not adopted NGSS).

The study drew from the population of teachers who regularly visit the planetariums at West Chester University (WCU) and Pennsylvania State University (PSU). The Sandra F. Pritchard Mather Planetarium at WCU is equipped with a SciDome XD Touch digital projector inside a 32-foot dome. The PSU planetarium houses a Spitz Nova III opto-mechanical projector in a 15-foot dome. Both planetariums are open to K-12 school groups and offer live presentations.

Teachers who requested a field trip to either planetarium during the spring semester of 2016 were contacted about being interviewed. Nine teachers—six at WCU and three at PSU—agreed to take part in the study. The group consisted of three second-grade teachers, five third-grade teachers, and one fifth-grade teacher. Three of the teachers were from private schools while the rest taught in public schools.

The individual class sizes ranged from 9-23 students, although for some of the schools there were multiple classes in the same grade who visited the planetarium together. The teachers were interviewed before their scheduled trip to the planetarium. Interviews were conducted over the phone and were recorded for later analysis.

As this was a qualitative study, with a small sample of teachers, analysis was conducted by reviewing interviews to draw out themes in response to the three main research questions of this study: the factors that influence teachers’ choice in planning field trips, the extent to which teachers integrate the planetarium visit into classroom lessons, and teachers’ goals for their students on the field trip.

Findings
Findings are organized according to our three research questions. Results are presented to highlight emergent themes in teach-
ers’ choices, use of the planetarium, and goals for their students. Descriptive examples from teacher interviews are provided to highlight the variety of responses found across the sample of teachers.

Influencing Factors

When asked what goes into choosing destinations for field trips, all of the teachers stated that the trip must be tied to their curriculum in some way. For all but one of the teachers, this was the first factor that they mentioned. Some stated that relevance to the curriculum was dictated by the administration, while others indicated that it was their own personal choice.

The next most common factor was cost, with 6 of the 9 teachers mentioning it as something they take into consideration. This was true for both public and private school teachers.

Admission fees charged by planetariums cover a wide range. Penn State offers their programs for free while the Mather Planetarium charges $2 per person. However, we note that the question about influencing factors was not specific to planetarium visits but rather field trips in general and typically the largest cost of any trip is the rental of the buses.

Other factors, mentioned by only 1-2 teachers, were distance from the school, timing of the trip in relation to the academic year (such as working around standardized testing schedules), and personal connections at the planetarium. See Figure 1 for a summary of influencing factors.

Six of the teachers planned 2-3 field trips for their classes for the school year. Three of the teachers were able to take 3-5 trips during the year. One teacher reported that her school only funded one trip a year; however, she was able to take her students on more trips by personally seeking out funding from other sources. This particular teacher funded her students’ visit to the planetarium through an external grant.

Given the small number of trips most teachers are able to take, the fact that they chose to visit a planetarium—even going to the effort of securing a grant to pay for the trip—suggests that these teachers see the planetarium as a valuable experience for their students.

Integration

The teachers were asked whether or not the planetarium visit was integrated into their classroom teaching. (We did not define what “integrated” meant in this context.) Slightly more than half (5 out of 9) of the teachers stated that the trip was integrated into their space science unit (Figure 2). Their responses indicated that these five teachers interpreted “integrated” to mean that a visit to the planetarium would be covering some of the same material contained in their classroom lessons.

All five of these teachers who indicated that the visit was integrated into their space science unit reported planning to do some kind of follow-up after returning to the classroom. Three of the teachers planned to hold class discussions about the trip, one teacher planned to have the students complete an additional project about constellations, and one teacher planned to write about their experience in the planetarium.

Of the four teachers who did not integrate the visit into their classroom unit, one reported having any kind of follow-up planned for after the field trip.

The timing of the trip relative to the classroom unit also varied. Six teachers planned to use the trip as a wrap-up, after the classroom unit had been completed and often after the students had already been tested on the material. This was true for the teachers who indicated that they integrated the trip into their space science unit as well as for those who did not.

Two of the teachers who said they integrated the visit into their unit told us that they try to schedule the planetarium visit to occur in the middle of their unit. None of the teachers indicated that they brought their students to the planetarium before beginning their classroom instruction.

One teacher who has been visiting the university planetarium for many years shared that she has changed her classroom lessons—adding additional material—to make sure that she covers everything that the students will see in the planetarium before their trip. This last piece of information might suggest that at least some of the teachers see the planetarium visit as almost a final test for their students, rather than an opportunity for further learning.

Goals

We started our interviews asking the teachers what went into choosing a field trip for their classes, but our last question focused on what they wanted their students to take away from the trip. What are their goals for a visit to the planetarium?

Not surprisingly, the teachers’ goals for their classes were quite varied. Six of the teachers stated two or more goals. Figure 3 shows a summary of the goals that were stated, as well as their frequency.

While all of the teachers stated that one of the primary reasons they choose to visit a planetarium is because it ties well with their curriculum (our first survey question), only three of the nine had an end goal for their visit relating to reviewing material covered in the classroom. One of the three specifically stated that the visit occurs after all classroom instruction is complete. Additionally, two of these teachers had previously indicated that... (Continues on next page)
the visit was not integrated into their classroom unit.

The most common goal the teachers had for their students' visit, with five of the teachers mentioning it, was to learn about what can be seen in the night sky. This is a goal for which the planetarium is ideal, of course. One teacher even remarked on the light pollution in their area, stating that she liked the fact that her students could see what a truly dark sky would look like.

Other goals the teachers mentioned were less well-defined. There were goals relating to getting their students excited about or sparking their interest in space and/or astronomy. Another goal focused on wanting students to come away with an appreciation for the vastness of space and our place in the universe. One teacher's goal was simply to have her students know that the planetarium is a resource available to them and their families.

Regardless of what their goals were, we asked the teachers how they would know if the goals were being met. All of the responses were based on student comments. Some teachers were relying on comments overheard on the bus ride back to school, while others planned a formal discussion with the class about the visit once they were back in the classroom. Two of the teachers planned to have their students write summaries about the trip.

None of the teachers planned to perform any kind of formal assessment of what the students learned from their visit to the planetarium, nor did they plan to include any of the planetarium content in their unit assessment. (Remember that for most groups, the visit to the planetarium was scheduled for after the completion of their space science unit, therefore the planetarium content was not covered by their end of unit assessment.)

Conclusion

The results of our survey indicate that the majority of the teachers we spoke with were not relying on their visits to the planetarium for instruction of material to directly support their space science curriculum. While they acknowledged that the presentation was tied to their curriculum, it was not part of their curriculum.

A few teachers saw it as a means for reviewing and solidifying what had already been covered in the classroom, but most had other goals for the visit. This is unfortunate as research suggests connecting field trips and classroom instruction increases student learning (e.g., Anderson, Lucas, Ginns, & Dierking, 2000).

Teachers may not be aware of the capabilities of a planetarium, especially the digital systems which may not have been available when they were students themselves. Planetarium environments are unique in being able to offer full sky simulations, rapid time flow to cover long periods of time quickly, and opportunities for observations.

When requesting a field trip at either the WCU or PSU planetarium, teachers have the option of specifying particular topics they would like to have covered during the presentation. Despite this option, rarely are any kind of requests made. If the teachers were made aware of the different perspectives that the planetarium can offer they might arrange their lesson plans differently to make better use of the visit and make it more integrated into their classroom instruction.

Additionally, many elementary teachers lack confidence in their own knowledge of science (Czerniak & Chiarellot, 1990). This may be another reason why they shy away from attempting to integrate the planetarium visit, and the content covered therein, more thoroughly into their classroom lessons.

We asked all of the teachers in our study if they would be interested in receiving educational materials from the planetarium to use in their classrooms. Every teacher responded positively. We are currently working on a follow-up study to formally assess what impact a visit to the planetarium has on student comprehension of particular astronomy concepts. Eventually we hope to develop pre- and post-visit activities that will intentionally tie the planetarium experience to the classroom lessons.

If your planetarium offers shows covering a variety of topics, you probably already give teachers a list to choose from. Live, interactive presentations can be effective at increasing student conceptual understanding (Plummer, 2009). If you have the flexibility of these kinds of shows, you might consider asking teachers to fill out an on-line survey so that you know what standards they are covering in their classroom instruction, where they will be in their unit when they visit (Have they just started? Already finished? Somewhere in the middle?), and what types of activities they've already done.

While the experience at our planetariums has been that an open-ended comment box does not often get filled in, a more specific web form—with answers required for submission—does get responses.

At a minimum, asking the teachers why they are bringing their students to your planetarium may allow you to help them reach their goals for the visit. At best, having a short conversation might inform the teacher as to what your planetarium has to offer as a teaching tool and enable you to better assist the teacher with their curriculum goals.

Bibliography


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Notre Ciel: Bringing French language immersion to an American planetarium

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Introduction
Depending on where one lives in the world, it may not be common practice for a planetarium to present live shows in multiple languages. In the United States of America, live shows offered in multiple languages seem to be less common. The exception occurs perhaps at some of the planetariums in major cities, such as the Morrison Planetarium in San Francisco, California, which offers live shows in four languages several times a year.

One might also find an institution in a smaller town and there with an offering in a world language, such as the Chaffee Planetarium at the Grand Rapids Public Museum in Michigan with its live Spanish show.

In most cases for planetariums within the USA, a show in a language other than English is often a canned production with a dubbed track in the needed language, as is the case with The Little Star That Could and Dynamic Earth in Spanish at the Bechtel National Planetarium at Columbia Basin College in Pasco, Washington, or Big Bird’s Adventure: One World One Sky in Spanish at the Adler in Chicago, Illinois.

This is an unfortunate situation as the unique environment of the planetarium can lend itself well to teaching a world language, or helping visitors who may not be comfortable outside of their own language feel more at home. It is within the teaching of astronomy in a world language under the dome that meaningful language learning can occur for students—giving them the opportunity to explore multiple subjects at once and outside of a normal classroom environment.

With a staff member capable of presenting a live planetarium show in French, the James S. McDonnell Planetarium at the Saint Louis Science Center in the United States has presented multiple bilingual French-English live shows, and took the leap in 2017 to present the first-ever all live French show, Notre Ciel. Let’s take a look at how a planetarium can be beneficial to second language acquisition, welcome visitors who do not speak English as their primary language, and increase attendance through new group visits and partnerships.

Why bring a world language into the dome?
For students learning a world language, whether in an immersion school or in a class in a traditional school, the planetarium can provide a unique opportunity. One of the best ways to help second language (L2) acquisition is to provide meaningful input and allow the opportunity for interaction and output. According to Fred Genesee (2001) of McGill University, “Instruction for beginning language learners, in particular, should take into account their need for context-rich, meaningful environments” (para. 17).

Meaningful input is language with communicative intent that is not a drill or activity specifically providing L2 learning instruction.

Input is also considered in many language acquisition theories, to be the foundation for learning, comprehending, and acquiring a language. By partnering with a teacher or school, a planetarium can provide meaningful input about astronomy in the L2 of the students, and in turn, provide the students with an opportunity for output in a safe environment where they may not feel judged by other students for speaking. Bill VanPatten (2003) explains in From Input to Output: A Teacher’s Guide to Second Language Acquisition, that it is important, however, to note that we are not talking about learners practicing a form of structure in their output; we are talking about learners coming to the awareness that they need a form or structure because of their output (p.69).

By asking questions and allowing the students to answer, it also provides the students the opportunity to create (hopefully meaningful) output as well, which in the end could lead to better processing of the input.

To provide the most meaningful experience for the students, the presenter should communicate with the teacher before the visit if at all possible. Students who are in the beginning stages of the Second Language Acquisition (SLA) process for meaning first and foremost, as intake processing abilities of a new language learner are limited.

Intake can become a part of the linguistic system as it is what is held and processed in working memory. If there are other environmental factors drawing on the attention of the learner, however, it makes intake and processing for meaning far more difficult (VanPatten, 2003).

By working with the teacher beforehand and providing suggestions for pre-visit activities, the teacher can prepare the students with vocabulary and at least some content in the classroom. This approach means students will have at least some knowledge of astronomy in the L2 so that when they hear the vocabulary and content in context, scaffolding (building upon previous instances of learning a concept) can occur and the students will be able to better process the input for meaning with less of a drain on processing resources from any other input (i.e. the stars on the dome).

A world language show is an opportunity to bring a new audience into the dome. For
A chance to reach more students

For both stand-alone planetariums and domes that are part of a museum campus, an opportunity lies within this concept. As travel is difficult for most schools, particularly if there are not multiple classes attending the trip to make the cost of bus transportation worthwhile, the potential for science and world language teachers to partner and bring more students is strong. Any partnerships formed could also lead to more partnerships within the same school and district as well.

This is a chance for planetariums to build new partnerships with teachers too, which will hopefully increase attendance (and when applicable, revenue) and become a repeat visit every year.

There is also a benefit in regards to native speakers, as a show in their native language can make an institution feel more welcoming to them. It also enables these visitors to be better engaged and hopefully increase stay time.

Furthermore, if one taps into the tourist industry in the area, it is possible to have a new group of visitors to bring in from traveling groups passing through the city. In the end this could lead to a new revenue source for the institution.

Finally, a planetarium show in a world language opens up cultural opportunities to explore with the audience. Students study their own culture, perhaps the history of other cultures within the last 500 years, and primarily that of ancient civilizations in the United States. If they are taking a world language or international studies class, they may also study current cultures of other countries.

By having a world language planetarium show, students can also experience that a different culture may view science, specifically astronomy, in a different way. This is the case, for example, while discussing the Big Dipper. Most American visitors who come to the planetarium are familiar with the Big Dipper, but are often unaware that other cultures call that asterism something else, i.e. the Great Plough in the United Kingdom, laCasserole (the sauce pan) in France, and der GroßerWagen (the large cart) in Germany. This lends itself to then discussing a new concept—that not all star patterns are considered official constellations. This also allows for more stories from cultures other than the Greeks (which seem to be the most popular, particularly within the United States), leading to better engagement of the audience.

How should the show flow?

Once approval has been given to have a 100% live world language show (and/or bilingual shows), decisions have to be made on how to arrange the show for the audience. Lightbown and Spada (2006) note that it is important to provide a content-based natural setting rather than a language classroom instructional setting, and to keep in mind that the focus of a lesson is, on the subject matter, such as history or [astronomy], which students are learning through the medium of the second language… the emphasis is on using the language rather than talking about it (p. 110).

By creating a planetarium show in the L2, the presenter is giving students an opportunity to explore the language in a natural and meaningful way. The students are able to listen to, respond to and interact with the L2 in a setting where they do not have to worry about a teacher grading them on their ability to provide grammatically correct output or that they need to pass a test. Again though, presenters should remember to keep the astronomy content at the proper level for the students’ age and grade, as focusing on the content and using normal L2 speech patterns will be most beneficial to them.

While one may be able to follow a normal show flow in the second language (L2), it may not be advantageous to the group in attendance. As with any live show, it is always best to gauge the audience (in advance of their arrival if possible). If the group in attendance is made up of native speakers or they have been studying the L2 for a year or more, it may be easier to provide a show in the L2 that is closer to a live show given in one’s native language (L1) in terms of concepts and vocabulary.

For more advanced users of the L2, most likely older students who have had some astronomy previously in their science courses, it may be possible to delve into more advanced topics such as the age of the universe, deep sky objects, and even black holes and quasars.

If the students in attendance are a group of
across, rather than a shorter phrase with more advanced vocabulary, can be used to aid comprehension too.

It should be kept in mind too that students are most likely still new to the ideas presented in a planetarium, and that their L2 abilities may very well be limited, so grace is required. Lightbown and Spada (2006) remind educators that “In these situations the emphasis is on getting meaning across clearly, and more proficient speakers tend to be tolerant of errors that do not interfere with meaning” (p. 111). Therefore the presenter should not take it upon themselves to correct the language, but rather just allow for use of the language in a content-rich setting.

Furthermore, the presenter should be sure to give plenty of wait time, perhaps even longer than one would normally wait for visi-

Lessons learned from the McDonnell Planetarium and Notre Ciel

French live shows and bilingual French-English live shows at the James S. McDonnell Planetarium have been met with appreciation and positive feedback from attendees. These shows have been able to keep native speaking visitors, students learning a new language, teachers, and non-French speaking chaperones engaged while learning about the night sky and the universe around them.

Currently, most of the visitors have been younger elementary school-aged students from the French immersion school; however, there have also been a few groups of teenage and adult native French speakers on vacation who have appreciated having some content in their L1.

When offering shows in a world language, it is important to only regularly schedule these shows when the presenters who can speak the needed language are available. Another option, which is the route the McDonnell Planetarium took, is to make the show available only through a group reservation for a day when a bilingual staff member is available.

If the planetarium is a public institution, it should be well designated that the program will not be in the L1 anywhere a visitor might see the show schedule. All box office team members should also be aware of the change in language so they can make those purchasing tickets aware of the language differences.

Finally, it is good to also announce at the beginning of the show that it will be presented in an L2 so that anyone who may have misunderstood has time to exchange their tickets for ones to a show they will better comprehend.

While many live show presenters present without a script and create their shows as they go based on a show’s main ideas and audience feedback, as is done at the McDonnell Planetarium, in this instance it would be best practice for a presenter to prepare a script in advance. While this does not mandate the presenter to use the script in real time, it will force a potentially non-native speaker to think through what they want to say and how they want to say it so that they can model proper speech in the L2 for students.

Also, as most world language instruction does not include a science unit or a large amount of astronomy vocabulary (most L2 instruction goes as far as giving the vocabulary for Earth, sun, moon, planets, stars, and maybe galaxy), the presenter may find they need to research some vocabulary for themselves in advance. Having a script prepared, or at least an outline with key vocabulary, will help a presenter feel more equipped when the time comes to work with visitors in the L2 under the dome.

As mentioned earlier in the article, talking with the teacher prior to the visit can help ensure that students get as much out of their visit as possible. The first group to attend Notre Ciel was comprised of first grade students from a Saint Louis Language Immersion School (SLLIS) who had been speaking French for a year, and also students new to the school who did not know a lot of French. After talking to the teacher, a communicative show was created to accommodate the young learners at their varying levels.

The feedback from the show was positive from the teacher, the students who shouted out answers in French and English, and even the parent chaperones who were surprised to find they understood a lot of the show even though it was completely in French.

It can be difficult getting the word out to teachers about the shows, and even within the same immersion school, teachers may or may not know that a trip to the planetarium is an option. Reaching out to schools and world language teachers personally has seemed to work best.

Other means of communication can include e-Blasts or email newsletters, a small description in a program book, listings on the organization’s website, and asking reservation personnel to offer the show to those who are booking a visit.

It should be noted though, that one should not assume that these latter methods are a guaranteed way to capture groups; they do not appear to yield the same results. By speaking to a teacher or the principal personally, other means of communication can include e-Blasts or email newsletters, a small description in a program book, listings on the organization’s website, and asking reservation personnel to offer the show to those who are booking a visit.
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Sharon Shanks, Editor

Planetarian

Somewhere on a road in South America, a planetarian is on a quest. His mission: to teach and spread knowledge and the wonders of the universe to everyone he meets, in exchange for a bed, food, and something that will help him along on his journey.

The planetarian is Bryant Gonzalez, and you can be sure that he is going wherever he goes with all of his heart—and a backpack.

Bryant, a native of Venezuela, began his travel in October 2017. He had spent six years working at Planetarium Humboldt in Caracas as a speaker in charge of programs in the planetarium, using the Carl Zeiss III Plus star projector. At the same time he was developing innovative ways to teach astronomy.

“The economical, social, and political situation pushed me out of my country, but I decided to go to try my luck in other places. I knew that my experience at Planetarium Humboldt and the projects I developed would help me to cause impact in other planetariums, so I created this project, “Mochileros Astronómico” (Astronomical Backpackers), and I started to describe my travels in my blog.”

He started by heading south to Columbia. “I request always to planetariums to present my show in exchange of food and hotel, because as a backpacker I have few resources to pay this. If the planetarium accepts, I present my show several times in a week and then I go. I sell a CD-ROM of astronomy to make some money and pay for my personal stuff and the reproduction of my teaching material.”

In cities where there are no planetariums, “I am able to teach astronomy in the street with some scale models I have and other resources, like paper models, etc. I have to use every single resource I can to teach.”

Bryant didn’t make his way alone for very long. He was joined by another traveler, photographer and designer Pablo Urrea. “Traveler and lover of adventures, I love to tell stories through photographs and videos. I am one of those who thinks that traveling is to live, that’s why I joined this extraordinary idea,” Pablo says.

So now we have two, and they are the Astronomical Backpackers.

Along their way they are also being ambassadors for the International Planetarium Society. Bryant is a member, and is introducing the IPS to an area where membership is underrepresented.

Cúcuta: My first step

Sunday, October 8, 2017

I arrived in Cúcuta, without a penny, but with great aspirations, simple and at the same time great.

I was supposed to arrive, I would do my 3-day job teaching astronomy and I would leave, but when I arrived at the Museo Norte de Santander I found great surprises. I arrived at the museum to leave my stuff, I had not finished unpacking my backpack when Luísa, the organizer with whom I made contacts, said “Tomorrow you have a television interview.” My face was not normal, a surprise. In fact, it was two television stations that interviewed me. I’m making contacts to see if I find them and post here.

First time that I am interviewed abroad, the first time I leave the country, but, I did not have 48 hours and there was already a media display in my favor, amazing!
Bryant Gonzalez

Here, after a year of travel, I have enough material to break down and create different sections to teach a lot of the places where I have been and the relationship they have with this project, whose main goal is to visit all planetariums in Latin America and the world, where I hope to be received and have the opportunity to show my innovative shows for planetariums.

In this entry, which will be updated gradually, I will mention the main planetariums of the cities I have visited, their characteristics and types of projectors used. If you want to know the full history of these cities or places, just click to be directed to the page where I relate the whole experience. Now without more, let’s start.

**Planetario Humboldt de Caracas, Venezuela**

Obviously I must start these stories by mentioning the planetarium I know best. The planetarium where all this started. A planetarium of 57 years of age, uses the same model Mark 3 Plus of German manufacture and with which several projections of the night sky are made.

**Planetary of Bucaramanga**

On my trip to Colombia, I went through Bucaramanga, where I had communicated through emails and social networks with the representatives of the Universidad Industrial de Santander, which had the Halley Amateur Astronomy group as well as a planetarium and astronomical observatory where they carried out dissemination works.

The date of my arrival in Bucaramanga coincided with the Annual Meeting of the Astronomical Network of Colombia (RAC), which was attended by the representatives of the different Colombian institutions. That year, it would be in Cali, on the other side of the country, so even though members of the UIS knew of my arrival, there was no time to plan or organize the activity, so my presence in this place was only as a visitor.

Its main planetarium is located on the terrace of one of its buildings. There is a digital fulldome projector, and on Sunday after my arrival I attended the planetarium as an audience member and talked with the people in charge. I explained who I was and what I was looking for, but I was also interested in entering the planetarium to know its projection system.

The instructor in charge made me be part of the audience and just when the function began his cell phone rang and he had to go out to answer the call. Quickly and not to interrupt the function I took the reins of and explained what the projection looked like. Upon re-entry of the instructor, he was surprised to learn my ability to animate planetary shows so I served as a support at that time and it was my first participation, unofficial, in a planetarium from abroad.

After the functions he took me to know the equipment and works of the astronomical observatory.

In Bucaramanga, there is also the ADAWY Traveling Planetarium, an initiative of a very kind girl who allowed me to work with the theme of astronomy in a non-profit foundation for vulnerable children.

**Planetario de Bogotá**

This picture below is downloaded from the internet, but how much I wanted to have a picture there! When I left my country, I did not have cell phones, cameras or any electronic equipment, so many of the photos correspond to planetarium workers who helped me with the photos to complete this blog. To them, thank you very much.

When I arrived in Bogotá, it was night so I could not go directly to the planetarium so the next day in the morning I went to the place and that view was very exciting for me, because what I had observed many times from the internet was before my eyes. The Planetarium of Bogotá is very beautiful on the outside but inside, it has really developed spaces.

They are spaces full of informative exhibitions, games, a mini-theater, an interactive museum, and even a coffee house, which makes this visit a complete experience even before the main event that takes place inside the dome. My lecture was related to the date of the International Lunar Observation Night.

Being in Bogotá, I had the option of going to Pereira or Medellin. Everything would depend on the answers I could get from the Medellin planetarium, because I knew that Enrique Torres, a worker at the Venezuelan Institute of Scientific Research (IVIC) in Venezuela, worked there, but if he, as my contact, did not respond or knew of my arrival to the city, maybe I could not participate there. To my surprise and 2 days before my farewell from Bogota, Enrique responded by welcoming me to his city and there I took a bus to Medellin, my next planetarium.

**Planetary of Medellin**

If my excitement was huge when I arrived at the Planetarium

(Continues on page 32)
January 28
Pisco, a city with potential
The first time we stepped in Pisco, it was a quick stop. My traveling friend Kevin invited me to have a Pisco (typical drink) in Pisco, but I only spent one night there because we went to Paracas and Ica, thinking it would be hard to come back.

The initial idea was from Ica, to cross to Huaytará, because according to Google Maps, a route would take to that town of the department of Huancavelica. However, when arriving at the town farthest from Ica, they indicated that this route was only for mining. It was not paved and corresponded to a desert not traveled, a risk for anyone who decides to venture no matter how adventurous.

They recommended us to return from the usual route of Pisco and again we contacted Kevin. We traveled back to his city and he, interested in our project, recommended us to extend our stay by suggesting that we present the project to the municipality talking directly to the Mayor.

This invitation surprised us, since from the country where we come from, as well as those already crossed (Colombia, Ecuador), “to speak with a mayor, governor, minister, president” is practically impossible for ordinary citizens, unless it is a time of elections and they are looking for votes to the most forgotten towns of their own cities. However, Kevin told us that this mayor, Juan Mendoza (or Juanito as he is known), gives audiences to anyone who wants to talk to him two days a week. This seemed surprising and pleasing to me, since as disseminators we are not accustomed to bureaucratic processes (which makes the easy, difficult through the useless).

We spoke with Juanito and when he heard us, he immediately agreed to provide the requested support of lodging, food and logistics through the Provincial Municipality of Pisco. That same day in the afternoon, we started our activities in the Alto Molino sector.

Earthquake in Pisco
While we rested from our activities on January 24 at night, an earthquake of 4.1 magnitude was felt in the city, several seconds of shock, but nothing serious to report. Pisco is a city with an interesting history, after having been hit in 2007 with an earthquake that destroyed a large part of its buildings and left many victims. Its inhabitants rebuilt this city and now, because of what little I have known in time I was there, it’s a growing city.

May 30 of 2018
Thanks Manizales
Those who plan their travel, which has an itinerary, which has budget, which has a line path… I do not belong to any of the above.

As in my previous post I mentioned (and probably will mention in future entries) that my rhythm depends on the amount of astronomy activities that can be performed in the host city and boy did Manizales have potential for amateur astronomy!

After the last scientific coffee, mentioned in the previous entry, a trip to the Nevado del Ruiz was scheduled with only 2 weeks of time. The reason, the Rain of Aquarius Stars that the 5 and 6 of May would happen.

With some risk but with the best energies in terms of weather conditions, every member of the Astronomy Amateur Caldas (SAGs) made their contribution to make this trip, from the coordination of where would camp, permits, transport and the ideas, as well as spreading the word to make this experience the best, we all manage to ensure the trip. However, the intention was beyond going to see shooting stars! I wanted to consolidate and make this astronomy group stronger and better known.
Nasca Maria Reiche Planetarium and Museum

The enigmatic city of Nasca is known worldwide for its famous Nasca lines, a tour or destination that European tourists usually take to fly over them, however, backpackers and travelers can take other alternate ways of looking at them. Our visit took us first to the City of Perse, where the director of the Nasca Planetarium received us, the main objective in our #AstroRuta.

The reason why this planetarium is visited is to know the Andean cosmovision of the Nasca tribes, who not only built temples very similar to the structure of the planetarium but also the famous lines that everyone wants to see.

Observing the lines is an experience without equal, the sight makes you question many things, such as How were they built? Why so big? What do they mean? and many questions that you can answer in the Maria Reiche Museum, Maria’s first home and where she completed her studies of the lines.

In this museum, your guide and caretaker of lines is Gerardo Davalos, responsible for telling all the anecdotes and curiosities of what was the house of Mary and the evolution of the culture of Paracas and Nasca that inhabited that extension. And coinciding with the studies we made of the lines and astronomy, it allowed me to complement its information with the relationship between the lines and the constellations.

Maria Reiche was a German-born Peruvian mathematician, archaeologist, and technical translator. She is known for her research into the Nasca Lines, which she first saw in 1941 together with American historian Paul Kosok. Learn more at en.wikipedia.org/wiki/Maria_Reiche

At the Maria Reiche Planetarium in Nasca. Our visit took us first to the City of Perse, where the director of the Nasca Planetarium received us. The reason why this planetarium is visited is to know the Andean cosmovision of the Nasca tribes, who not only built temples very similar to the structure of the planetarium but also the famous lines that everyone wants to see.

Cali: Planetarium of the Military Aviation School

The planetarium of the School of Aviation was a place where I would have liked to participate, however, because it belongs to a military institution, access protocols and security were high. I managed to talk to the military in charge who very kindly gave me the pertinent information and even the contact of the manager of the planetarium, who very kindly and by telephone indicated me the difficulties of accessing the place. I knew I had a functional model II Zeiss projector, but I could not access its facilities, the fact is that Cali has a planetarium that I did not visit, but at some point, when I return to this city, I will try again.

Manizales: CineDomo or Planetarium?

Manizales was not part of my Mochilera route, but in Pereira I met the person in charge of a foundation who was interested in my knowledge of the rains of shooting stars and there invited me to participate in an event I had prepared. When I arrived at the city and its event, I found a traveling planetarium and its operator allowed me to give lectures inside and was surprised by my abilities to point of taking me to meet the main representative of the astronomy of that city.

In that planetarium, I managed to give two courses of identification of stars and constellations, because the STARLAB had the right cylinders to give a complete course of stars and constellations.

Shortly after and in my exploration tours of the city I learned about the existence of the Yarumos EcoParque, where I had been told about BioMa and a planetary sphere that existed there. I went to that place and to my surprise, when talking with the worker of the place I discovered (and apparently they did, too) the existence of a room that they called Cinema Domo, but was really a planetarium. Fulldome projections with astronomy themes and a UniView projector are the tools they have in a room of only about 5 meters in diameter where they fit about 20 people.

I wanted to take my course to that place, but the bureaucracy (useless process to make difficult easy) prevented this from being possible. I did not stay with the desire on this occasion and agreed to teach the local workers to give a dynamic planetarium show in exchange for (Continues on page 78)
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Tiffany Stone Wolbrecht
Ward Beecher Planetarium
Youngstown State University, Ohio
tiffany.wolbrecht@gmail.com

The preschool program Space Shapes at the Ward Beecher Planetarium was developed as a last-minute attempt to accommodate an age I struggle with under the dome. Only one week into my new job, I received a phone call from a concerned teacher. She was scheduled to bring her 3-year-old preschool class in for the first time and I was worried they could not handle the dark foreign environment.

This is a common and valid concern for planetariums. I am sure many of you are thinking of your own experiences like this, and perhaps some memories still are reverberating with the howls of upset children. I have been there too, which is why what I promised this teacher seemed impossible: we would have fun and there would be no tears.

My development of our Space Shapes program led to a modular, highly-customizable experience that includes the short fulldome program by the same name. It allows children to explore the planetarium. Preschoolers learn about shapes, colors, and planets by physically engaging in activities under the dome.

The program comprises of five activities, each 10- to 15-minutes in length. The size and age of the group and time flexibility determine which of the activities to include.

In the very first Space Shapes program, there was only time for four activities and we never looked up at a star field or turned off all the lights. Thankfully, there was no crying! The 3-year-olds from that preschool still visit each year and Space Shapes has become our most popular program for smaller groups ages 3 to 5.

Before the visit
Because the program is built to be tailored to a specific audience, it is important to get information about the group beforehand.

How many children will be in the group? Many of these activities will need to be modified if the group is larger than sixteen.

How old are the children? There is a developmental difference between a group of 3-year-olds and a mixed-aged preschool class.

Will the parents be with them? The presence of parents will change the dynamic of the program. In general, children are more comfortable with their parents around but are also less focused. I have found that asking parents to model behavior for their children can help.

For materials, you need some basic shapes (circle, square, and triangle). I have a quantity of basic shapes cut from felt for the scavenger hunt. The larger basic shapes I use are made from inexpensive shaped foam available in most craft stores. I have both flat and dimensional, each painted in primary colors.

Other optional materials on hand may include a set of inflatable planets (a nice set is available from Learning Resources and through many sites online), a rope or piece of tape, something that produces a sound (like an instrument or other device), and a take-home coloring sheet relating to the program, such as color by number basic shapes and/or planets of the solar system.

The planetarium must also be prepared before the program. I recommend soft white lighting bright enough to see all around the room. Identify and restrict any off-limit areas of the planetarium. For the space shapes scavenger hunt, scatter felt shapes throughout the room, avoiding restricted areas and where the children will be sitting when possible.

Tip: The felt may cling to walls covered with carpeting or other sound dampening material, extending where you can place the shapes.

Introducing the planetarium
How the introduction to the planetarium is structured strongly depends on the size of the group and the energy of the children as they enter, but this “activity” is important because it sets the tone for the rest of the show.

For 3-year-olds, I almost immediately begin singing with them. I ask them if they want to learn new words to the song “If You’re Happy and You Know It,” then we start singing, introducing new lyrics and body movements:

- If you’re happy and you know it, reach for the stars (reach up with your arms)
- Rotate the Earth (spin around slowly)
- Walk on the moon (walk slowly in place with exaggerated steps)

While bursting into song at the beginning of a show can be personally uncomfortable, introducing myself and the planetarium with a song the children recognize has never failed to set them at ease and get their attention.

The goal of the introduction is to make the children feel safe and comfortable in the planetarium. Ask questions like, “what shape is our ceiling above you?” or “what shapes can you see around the room?” I usually show them how the lights on the dome can change colors, putting up circulating rainbow lights and asking them to point to their favorite color.
I also introduce our “instrument,” in this case a wind chime, a classroom management tool meant to signal the end of an activity and a time to focus on the teacher.

There are many great ways to signal children during an activity: other instruments or sounds, a light cue, or physical cues like clapping or repeating a phrase. I prefer the wind chimes because the children can both see and hear them. We learn that the sound from the wind chimes means they do three things: Freeze, Eyes on Me, Lips Together. We practice by standing in front of our seats and being “really loud and silly” until we hear the wind chimes. We do this a couple of times, both to get out any nervous energy and also to learn how play will be structured in the planetarium. Then we are ready to explore.

Shape scavenger hunt

The children are encouraged to search the planetarium and find up to 3 felt shapes that were placed around the room before they arrived. Once every child has a few shapes, the wind chime sounds and we return to seats. Then we discuss the color and shape of our felt pieces. I hold up a large shape and ask them to also hold up their shapes if they have one like mine. I ask each child what color their shape is to keep them engaged in the activity.

Optionally, I introduce the 3-dimensional shapes of sphere, cube, and cone and ask them, “where have you seen shapes like this before?” The goal of this activity is to understand that shapes are everywhere and all around us, even in the sky above us.

Next: viewing Space Shapes

Space Shapes is the name of an open-source planetarium show written by Ron Proctor and created by participants of a Blender production workshop held at Ott Planetarium at Weber State University in Utah. A free download is available through Audio-Visual Imagineering at av-imagineering.com/index.php/how-to-order.

The 9-minute video discusses different shapes found in space and introduces the youngest audiences to the planetarium. The show is engaging and the perfect length for preschoolers. I can’t recommend it enough!

Becoming the solar system

After the Space Shapes video and the brief introduction of a few planets it contains, it is time to get up and moving again. The goal of this activity is to introduce planet names and characteristics by building the solar system with our bodies.

In our planetarium, we have a large poster of the sun on one side of the room, so I lay a piece of rope from the poster across the front of the room, instructing the students to stay on the rope during the activity. (The first time I did this program there was no rope and all the children were “gravitationally attracted” to the sun poster as soon as it was brought to their attention.)

We learn about each planet, starting with the first planet from the sun. I hold an inflatable model of the planet and say something like, “Mercury starts with the letter M. M-Mercury. Can we say that together? Mercury is close to the sun so it moves really fast like this!” Each planet has its own movement:

• Mercury is close to the sun, so run really fast in place.
• Venus is the hottest planet, so fan your face with your hand.
• Earth is our only home and we have to take care of it, so cross your arms in front of your chest and rock side to side.
• Mars is cold, so shiver.
• Optional: After Mars is not a planet, but the asteroid belt where space rocks live, so motion around your waist where a belt would be.

Right: Student employee Howard Hale making the “Twinkling Star Sound” to signal a new activity. I will sometimes run this program myself, but it is really nice to have the extra hands. I try to schedule this show when I know I will have student employees.

Below: The first Space Shapes program.

Tip: Nerf balls make great asteroids!

About the hula hoop: the connection of the rings to Saturn in the inflatable set is a weak point and the planet doesn’t hold up to energetic use.

Left: Children explore the planetarium to find shapes in a scavenger hunt.
(Live shows in second language, continued from page 36)

After holding the inflatables as I introduce them, I lay them down in a line in front of the children. After we get through the solar system, I ask them to pick up the planet in front of them and either do the day/night spinning activity (below) or ask them to return the planets to the “solar system bin,” a large canvas bag.

Optionally, we also learn that all planets spin. While we are spinning, sometimes we can see the sun and call that day while sometimes we see the stars and call that night. The children spin, sometimes seeing the sun poster (day) and sometimes not (night).

Star talk
If there is time and the children are comfortable, we put up the stars and find shapes. Light pollution is always on and we rarely go beyond basic shapes, but might include the Big Dipper and North Star and any visible planets. The goal with the star talk is to give the children a brief experience of a more traditional planetarium setting.

Conclusion
The planetarium can be a powerful tool for learning at any age and I have learned through Space Shapes that redirecting a small child’s seemingly endless energy into active learning is much more effective than trying to contain it in oversized planetarium seats. I hope that Space Shapes will help you develop your own “no tears” program for those youngest planetarium visitors.

Special thanks to Annie Wilson for taking these photos of the program in action; to my mother-in-law, who is a Montessori preschool teacher and gave me invaluable advice; to Sharon Shanks, for gifting me with closets full of useful demo materials I use for this program and many others; and to Ron Proctor, for the fantastic Space Shapes fulldome video.

References
TOTALLITY

EXPLORE THE WONDER OF ECLIPSES

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Bays Mountain Productions

www.baysmountain.com/planetarium-productions
Neither rain, nor snow, nor the freezing temps of the polar vortex kept the 2019 IMERSA Summit from happening in February at the Center of Science and Industry in Columbus, Ohio. Nearly 140 immersive pioneers gathered together for four days of sessions and camaraderie. We shared, we enjoyed keynote presentations, fulldome videos and live performances, and had plenty of time to mix and mingle. Look over the full schedule at https://imersa.org/summit.

Celebrating A Birthday
This year's meeting, with the theme “Connecting our Worlds of Immersion,” also celebrated the tenth birthday of IMERSA. The group, which began in the mid 2000s through “birds of a feather” meetups and the first Domefests, officially formed in July 2008. Since that time, the organization has held summits and joint meetings, beginning first in Denver, Colorado at the Denver Museum of Nature and Science and branching out two years ago to COSI. At the 2019 Summit, a birthday luncheon heralded the success of the organization.

Bringing immersives together
The 2019 summit brought people from around the world to share their work and philosophies about fulldome, VR, and other immersive experiences. In particular, I have long wanted to have sessions dedicated to the art of composing music for fulldome, as well as the challenges and rewards of good soundtracks and sound design. So, we planned a day and a half of sessions on the role of music and sound in storytelling, and introduced many attendees to some state-of-the-art audio practices.

Keynote speakers Kevin Bolen (Skywalker Sound) and Johannes Kraas (German soundtrack composer) shared their thoughts on the role that sound and music (respectively) play in the storytelling process. Bolen shared a scene from the 360 version of Solo: A Star Wars Story to make his points, and Kraas illustrated clips from the soundtrack he produced for Dimensions, a show he co-created with Rocco Helmchen (AVMediaDesign.com).

Monica Bolles (IMERSA ambassador) brought in 3D and spatial audio experts Joel Douek (EccoVR), David Ledoux (Université de Montréal), Marta Gospodarek (New York University), and Kevin Bolen in a panel to discuss the future of immersive audio. Meyer Sound sponsored a 12.1-channel speaker array which offered a venue for spatial audio workshops, demonstrations, and special 3D audio compositions by a variety of composers, including Ledoux and Schedel. Morrow Sound set up a system in the planetarium that was used for the screening of Mars 1001.

Immersing ourselves in video
Storytelling in the immersive video realm is an important piece of the entertainment and educational pie. Those of us who produce for the medium are well aware of the importance of story, and have shared that knowledge freely throughout the years. For the Summit, Michael Daut (IMERSA Board Member) gave a very moving presentation summarizing the components of storytelling that sometimes affect us without even knowing it.

Throughout the summit, attendees were treated to examples of the storytelling art via fulldome videos. One fascinating session, “Immersive Storytelling” moderated by Dan Neafus (IMERSA CEO) and Matt Heenan (American Museum of Natural History), featured a variety of clips from recent productions. Show topics ranged from astronomy to art, and the social condition, including an imaginative little piece called The Game about gambling addiction by producer Natalia Oliwiak.

We were also treated to a fascinating tour of Chinese sky patterns from the Hong Kong Space Museum, a chilling look at a social-media-influenced future in Holosense, and a shattering examination of the death of a loved one in the video Vestige (originally produced for VR by Aaron Bradbury of NSC Creative).
These days, live action is a part of many fulldome productions, and it presents its own challenges. Paul Fraser (Blaze Cineworks) brought together a group of producers who have worked with live action in native fulldome productions to talk about the challenges they faced in their most recent videos for a panel of audio producers.

Of course, the IMERSA planning team curated a selection of other full-length shows to present, including *Birth of Planet Earth*, *Dimensions*, *Exo*, *Expedition Reef*, *Mars 1001*, *Ningaloo*, *Sonolumin*, and *Star Maker*. Each one illustrated the many points of conversation we have at IMERSA about storytelling and immersive production.

**The state of fulldome**

No IMERSA Summit would be complete without a look at the state of our industry and its role in education and other arenas. Dr. Ka-chun Yu (Denver Museum of Nature and Science) shared research into the educational value of fulldome. Mark C. Petersen shared his research into the population of fulldome theaters and commercially available shows in his “State of the Dome” presentation.

Micky Remann (Bauhaus University) made a virtual appearance via Skype and Salve TV to talk about live theater presentations and the role they’ll play in the upcoming Jena Festival. Finally, I presented a look at fulldome film festivals, a topic that will be expanded on in an upcoming IMERSA white paper.

IMERSA also held a “listening” session focused on topics of interest the organization will be exploring in more depth in the next year. Given the rise of live action in the dome and the increasing numbers of artists experimenting with the domed space, we asked attendees to share their thoughts about how we can facilitate more interaction between theaters and artists.

We also asked attendees to give suggestions for ways that producers can gain more access to funding for production. The final topic was focused on digital rights management and how it may play out against the complex backdrop of fulldome projection systems, producer needs, and user concerns.

The Association of Fulldome Innovators (AFDI) has presented IMERSA with a set of standards for DRM, which will be published on the IMERSA.org pages. Further discussions about this important and sensitive topic continue.

**Live performances**

IMERSA tradition includes at least one live performance for each summit. This year, attendees were delighted with two performance artists “in residence” during the meeting. J-Walt opened the summit with a tour through his Lucid Dreamscapes show, created with his specially-made “anitar” instrument. It lets him create both visuals and music at the same time, taking audiences to fantastically animated realms.

German-born composer and performer Robot Koch rendered his visions on the dome in a mind-altering presentation called *Sphere*. It was an hour-long audio visual show created with visual artist Mickael Le Goff.

**IMERSA Summit takeaways**

As I write this, the Summit is only a few days in the past, but already we’re getting some very good and delighted feedback from attendees. Our aim is always to give immersive producers, users, and performers a fertile place to meet, greet, and discuss our common interests.

This year we wove a successful program around ample time for socializing (including a Super Bowl party), with the common threads of storytelling, production challenges, and the variety of 40+ fulldome productions.

None of this would be possible without the generous support of our sponsors, volunteers, IMERSA board members, and our ambassadors and advisors. We are already looking forward to events later this year, including IMERSA days at the Jena Fulldome Festival in May and at Brno on June 4. In addition, we are already busy planning for 2020 and beyond!
**Constellations**

I do enjoy a good foldable and was going through Dinah Zike's *Reading and Study Skills Foldables* and came to her three-flap booklet. This is a fun foldable that you can use to compare three things.

For constellations, for example, students find the International Astronomical Union's constellation guide for basic facts that they can use to start making this foldable. Below is a sample that is very similar to the one I used with my middle schoolers.

The International Astronomical Union’s constellation guide gives you a lot of information that you can limit the scope for your students.

Example: (In the named stars I just listed the ones in the Big Dipper asterism because otherwise it would take up too much space). Unless it was distinctly specified, I let the students choose the other two cultures. This gives them a bit of freedom when doing their research since some IAU constellations are combined or split in different cultural constellations. If you are looking to create a collection of resources, I would suggest starting with the bibliography “Unheard Voices, Part 1: The Astronomy of Many Cultures, a resource guide by Andrew Fraknoi." Another excellent resource is *Star Names: Their Lore and Meaning by Richard H. Allen* to see some of the different names for stars from different cultures.

### Activity for a solar system unit

This winter I was helping with the solar system unit for a local elementary school fourth grade class. When it came to the end of the unit we had the students design a mission to a location in the solar system. The assignment involved them designing a probe or device based on equipment from past and current missions. They then had to write a narrative story for what their device was going to do. The students used the following table to create a mission using a dice. It was done in stations around the room where students rolled dice for each of the three categories. The students had a basic worksheet to record the information from their dice rolls and space for them to write some samples of the “fleshed out” versions of their missions.

Example: One of the students rolled a Location 3, Mission 3, and Looking 4. It was written out as a mission statement, “Our mission is to visit the Asteroid Belt with a lander looking for minerals.” The student focused the mission on sending a lander to Vesta to look for iron.

Students designed their device by selecting pieces and parts from already designed spacecraft and robots. My cooperating teacher and I printed out a collection of spacecraft that were placed in the front of the room as a common supply.

Example (continued): The student took the picture of the Viking lander as a base foundation and landing technique, then cut the solar panels off Deep Space 1 for power. Instead of Viking’s sensor package, the student used the Curiosity rover’s robotic arm so it could look around the landing site.

Finding pictures for the spacecraft took some discussion, as we had two options: cartoon or realistic. We could have used NASA digital coloring books (www.hq.nasa.gov/office/hqlibrary/ic/coloringbooks.html) for the more cartoon-style drawing, or use the more realistic images/pictures from the mission fact sheets (www.jpl.nasa.gov/news/factsheets.php). We decided to use the fact sheets and printed them in black and white. Some of them still had just line drawing versions of the spacecraft, but were detailed enough that the students could identify specific parts they wanted in their mission.

* (Continues on page 67)

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2. PDF available at www.lpi.usra.edu/planetary_news/2014/05/12/two-new-educator-resource-guides-available/
3. Dover Publications, 1963, originally published 1899. If your library doesn’t have a copy, it is still available at the usual book sites online. I would suggest the electronic or paperback editions; the hardcover edition on Amazon.com starts at $500 and goes as high as $1,075. Plus shipping.

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**Foldable projects for fun constellations**

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<td>Ursa Major</td>
<td>Norse</td>
<td>Ursa Major is also known as Man’s Chariot and could represent Charlemagne or Thor traveling across the sky.</td>
<td>Norse</td>
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<td>Iroquois</td>
<td>There are three hunters stalking a large bear. Alioth has a bow and arrow. Mizar with his pot (Alcor) is ready to cook the bear. Allakaid is bringing firewood to help cook the bear.</td>
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Digistar 6 creates realistically rendered real-time black holes. Now you can demonstrate proper gravitational lens distortion including Einstein rings when stars appear behind the event horizon. Digistar settings allow you to choose different characteristics including accretion disk on/off and disk color. It's just one of countless astronomy options in Digistar.
Two new projects for the Education Committee

Congratulations to the two members of the Education Committee just elected as new officers of IPS: Kaoru Kimura as president-elect and Patty Seaton as secretary. Kaoru and Patty have been great contributors to the work of the Education Committee, and now we will have the benefit of their work for all of IPS. Best wishes, Kaoru and Patty!

Two new projects

Two new Education Committee projects have been underway. The first originated at the summer meeting of the committee in Toulouse, when Patty Seaton asked for more ways the Committee might help planetarians with dome-related activities. The solution has been to accept requests for help via the website.

Anyone can Google “IPS Education Committee” and see a list of current projects (or go directly to www.ips-planetarium.org/page/edcom). In the list are Sources of live, interactive planetarium activities and Contact form.

If you click on Contact form, you will go to a form that requests name, e-mail (make sure it is reachable at any time and not restricted to in-school hours, for example), planetarium location, topic of interest, type of planetarium (fixed, portable, optical-mechanical, digital), and floor space available for the activity. The form then includes a section in which one can write in detail what is needed. Click the Submit button, and your request is complete.

Michele Wistisen will be the lead facilitator on this project, and she intends to respond quickly to activity requests, gathering help, as needed, from other members of the Education Committee.

As our second new project, IPS President Mark SubbaRao has asked the Education Committee to prepare a document focused on “The Educational Value of the Planetarium.” We see this new document as having the following uses:

• A rationale for initially building or purchasing a planetarium.
• A rationale for funding a current planetarium and keeping one still open (helping those threatened with possible closure).
• A continuing rationale for all who work in and with planetariums to disseminate positive information about the value of the planetarium.
• Support best practices for ways of learning in planetariums with references to research and experience conclusions.

I have written to IPS officers, affiliate representatives, committee chairs, and a number of other leaders in planetarium and astronomy education, asking for their views, which will be summarized in this new document. I also welcome views from all other IPS members. Please send your thoughts to me: jeanneebishop@wowway.com.

I hope that you personally will be able to use the final result.

If you are looking for planetarium education information, the IPS Educational Resources page (https://www.ips-planetarium.org/page/edresources) has many full articles that may be helpful. Many are from back issues of Planetarian.

Space robots are alive

At a recent meeting of our Cleveland-area planetarians hosted by Katy Downing at the Lake Erie Nature & Science Center in Bay Village, Ohio, we discussed a widespread response of children (and some adults) to functions of space vehicle robots. Via questions and discussions, many children reveal that they believe robots like Marian rovers, are intelligent, thinking entities. A natural unguided child’s response to a lost or broken space robot is one of concern and even sorrow, as if the robot were really alive.

This phenomenon is not limited to the U.S. culture. When China’s (CSNA) Chang’e-3 spacecraft landed on the moon on the moon in December, 2013, the lunar rover Yutu (“Jade Rabbit,” named for the pet white rabbit of the Moon Goddess, who is Chang’e) failed to move. Although Yutu transmitted intermittently, its “mechanical abnormality” caused it to shut down completely by March, 2015. Thousands of Chinese children were upset that little Yutu “died.” Now that China has accomplished the admirable landing of Chang’-4 on the dark side of the Moon (January, 2019) and Yutu-2 is moving around there, my guess is that children are regarding Yutu-2 as being “happy and healthy,” and the children are happy about it.

(Continues on next page)
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Along with Chang’e-4’s landing, the start of this year certainly was momentous for space, as Osiris-REX went into orbit around Bennu on December 31, and New Horizons passed mu69/Ultima Thule on January 1, learning that the object is a contact binary.

What does this natural perception by children (and perhaps others) mean for us as planetarium educators? I believe it would be interesting to perform a planetarium research project to determine details about this perception children have of space robots. I hope someone will do it. Results can refine how we address it in our planetarium presentations.

Regardless of the research, we should be aware of this possible interpretation of space craft. I think we should explain how space robots are mechanical and not alive, but I also think that this natural interest can be a perception that can incite interest in learning more about past, current, and future space missions.

Responses to darkness

This past week, in two separate programs for fourth grade students, a child needed to leave the planetarium with a teacher due to being either afraid of the dark or nauseated. This was very unusual, as I always try in a variety of ways not to have this happen. Maybe the first student’s reaction started a reaction by the other.

A fear of darkness is a common reaction. At times in human history it was helpful to be afraid of the dark for avoiding predators and other dangers. Today, if a fear of darkness is not overcome, it can interfere with seeing and enjoying the real sky or the planetarium sky. I have known of instances when adults would not enter a planetarium because they are afraid of the dark. This strong fear in adults is unnatural. It is given the name “nyctophobia.”

I understand that fear of the dark typically develops as a child’s imagination develops, and it expresses itself most strongly when the child has recently been exposed to real or imagined violence or danger.

To minimize bad responses to darkness, try the procedures listed below, many of which are recommended by psychotherapists.

Dim the background light gradually. Give a warning; say that on the count of three, we will have a moment of darkness. Describe what it will be like: there still will be a very small amount of light. Tell where the light will be (some small background light and possibly another tiny light somewhere in the planetarium chamber). Then turn the light down for two seconds and back up again. Discuss how the children felt. Ask how many felt comfortable, warm, like in a cozy blanket, safe—and raise your own hand high.

Say that since we are comfortable, let’s practice breathing comfortably. Say lean back on your seat. Breathe in to a quiet count of 5 and out to a quiet count of 8.

Then explain that now that we are comfortable and relaxed, we will wait slowly for the beauty of the night sky. Say I hope you will enjoy the stars as much as I do. Introducing the moon or planets before stars in a darkening sky can help children become used to the darkness that will be needed for seeing stars.

I never turn off all background lights to make the planetarium totally dark for very young children. Except for my very recent experience, this set of techniques has always worked to make student audiences emotionally adapted to darkness. After students are darkness-ready, effective learning is possible.

I the planetarium building energy efficient. One of the board members explained that he had been going back and forth between eliminating and keeping the planetarium, but that what he heard that night convinced him of the value of keeping it.

Other board members spoke in support and thanked the community for coming out. In the end, the board voted 6-1 not just to keep the planetarium, but also to fund $130,000 for building renovations. Driving back home that night I was elated. Seeing the community together to save their planetarium was something special.

(Continued from page 6)
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- Two Projector
- Laser Illumination
- 12,000 Lumens
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- Laser Illumination
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- Laser Illumination
- 54,000 Lumens
- 4096 x 4096 Pixels
- Domes up to 80 feet

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TEACH bigger
Below, I’m very happy to present to you exciting news from our worldwide and very diverse community. You'll find many excellent examples of new ways of collaboration, engaging activities, special events, and new productions.

For this section I’m indebted to contributions from Andrew Kerr, Tom Arnold, Bart Benjamin, John Hare, Ignacio Castro, Milène Windling, Loris Ramponi, Alexis Delivorias, Björn Voss, Anna Arnadottir, Aase R. Jacobsen, and Sumito Hirota.

Let’s start the tour around the World on the west coast of North America.

**Pacific Planetarium Association**

The association is planning on expanding and sharing the hosting of its Pacific Planetarium Seminars with GLPA in 2019. As a result, there is a need to remove the “Pacific” from the name of that web seminar series. They’ll be called Planetarians’ Web Seminars (PWS), and will still occur on the last Friday of each month at 3:30 p.m. Pacific time (5:30 p.m. Central; 23:30 UT or during DST, 22:30 UT), skipping some months as appropriate. All recordings are uploaded to the PPA Youtube channel.

Upcoming seminars are listed on the PPA calendar page. Links to archive recordings of all eight seminars of 2018 are found on this page: www.ppadomes.org/events/ppsarchive. For each seminar there are two recordings: a presentation and a question and answer session. The last seminar of 2018 was on 30 November with a talk by Justin Filiberto, staff scientist at the Lunar and Planetary Institute, on Volcanism in the Inner Solar System.

**Great Lakes Planetarium Association**

**Illinois.** The William M. Staerkel Planetarium at Parkland College in Champaign will once again host its James Kaler Science Lecture Series, which will feature talks on spiders, tornadoes, and artificial intelligence. After 30 years of pointing out the Big Dipper, Director Dave Leake will retire next summer!

On 8 October, Chicago’s Adler Planetarium hosted a press junket for the *First Man* movie. Director Damien Chazelle and star Ryan Gosling fielded questions from about a dozen Midwestern reporters about the film, while situated in front of the planetarium dome and a beautiful lunar backdrop. Adler also wrapped up their sixth Kavli Fulldome Lecture on 9-10 November. Northwestern University astronomer Dr. Shane Larson took audiences on a journey through “The Cosmos in a Heartbeat,” describing the past, present, and future of multi-messenger astronomy. In January, Adler premiered their newest sky show, *Imagine the Moon.*

This fall, the Peoria Riverfront Museum and Dome Planetarium presented the classic *Dawn of the Space Age* while their Giant Screen Theater showed *First Man,* and planetarium educator Nick Rae spoke about the current state of human space flight before the movie’s premiere. This winter, the planetarium was part of a “Wizard Day” at the museum, showing stars, constellations, and celestial objects that tie into the Harry Potter book series, while their Giant Screen ran *Fantastic Beasts: The Crimes of Grindelwald.* The staff continues their evening programs once a month with *Wine and Cheese Under the Stars,* and has added a new program, *Space Family Night,* sharing the latest news from space missions.

**Indiana.** Jeff Bowen of Bowen Technovation reports that the first public planetarium in Iceland has opened with a 15-meter dome showing the original Bowen all-dome show *Wonders of Iceland.* (The full story about this new dome will appear in the June *Planetarian.* Ed.)

**Michigan.** The Kalamazoo Valley Museum Planetarium began 2019 with *Polaris: The Space Submarine* and *The Mystery of the Polar Night,* a production of the Saint-Étienne Planetarium of France, as its family program. The planetarium is supporting KVM’s Sensory Saturdays by offering sensory aids and the planetarium sound volume set at lower levels to better accommodate their autistic and special needs learners.

In October, the Grand Rapids Public Museum’s Roger B. Chaffee Planetarium completed a brand-new school show, *Earth, Sun, and Moon.* The show was a collaboration between planetarium and education staff at GRPM, and featured upper elementary Next Generation Science Standards connections and custom software that integrates clickers for student interactivity. In early November, the Chaffee Planetarium closed down for six days for deep cleaning, maintenance, and an upgrade to Digistar 6.

The Delta College Planetarium in Bay City recently completed its upgrade to Digistar 6, which included the new JVC laser-phosphor projectors. Response from the public has been very good and more special events are planned to help showcase the new capabilities. One is

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Lars Petersen, PhD, is an astrophysicist and science communicator. From 1997-2016 he was director of Orion Planetarium, Denmark. At present he is engaged in various astronomy communication projects. He is a fellow of IPS.
the new show *Incoming* from the California Academy of Science. Plans continue for exhibits, shows, and activities for their countdown to the 50th anniversary of Apollo II.

**Ohio.** Sue and Buck Batson recently brought their portable planetarium to Titusville, Pennsylvania, where the elementary school students presented constellation stories created for their class with the school’s library media specialist.

At Vandalia’s Smith Planetarium, the community shows this year will relate to the 50th anniversary of the Apollo moon landings.

Brittany Ventura is interim director of the Armstrong Air & Space Museum with the departure of Chris Burton.

**Wisconsin/Minnesota.** The Bell Museum has seen 80,000 visitors in the first 14 weeks since its opening, far exceeding all expectations. The attendance at the Whitney and Elizabeth MacMillan Planetarium was over 40,000, which is a fantastic capture rate for a planetarium within a larger institution.

The Soref Planetarium in Milwaukee is playing *Space Aliens: Looking for Life in the Universe.* This original production follows two “X-Files like” characters—Skeptical and Hopeful—as they explore the science of astrobiology. Production of their new show starts soon; the working title is *It’s About Time: Cosmic Cycles We All Live By.*

The Southwest Minnesota State University Planetarium participated in a domecast lecture from the Adler Planetarium using Uniview 3.0.

The University of Wisconsin-Milwaukee Planetarium is excited to announce its assistant director, Victoria Robison, and a part-time marketing person to be determined. In November and December, *Constellations of the Zodiac* combined some of Jean Creighton’s favorite Greek myths and astronomical objects along the ecliptic.

**Southwestern Associations of Planetariums**

Big things are happening at the Kirkpatrick Planetarium at Science Museum Oklahoma in Oklahoma City. Renovation of the current planetarium was just completed, replacing the 40-year-old Minolta with a Digistar 6 system sporting six 4K Sony projectors, Bowen Technovation lighting, and new seats within the current 40-foot dome.

The response from the audience has been overwhelming. Incorporating both live presentations and fulldome movies provided to guests every hour has proven to be a big hit. Live presentations which allow the audience to decide what they wish to see, however, remain the real bread-and-butter for the planetarium. Providing fully interactive programming geared toward audience desires and interests is a challenge, yet the staff, led by Director Tom Arnold, has been able to create programming which meets that need with ease.

This is only the first phase of the many plans. Using the financial boost from the Digistar 6 system, Science Museum Oklahoma is well into the process of raising money for a completely new planetarium within the museum. It will house a 55-foot dome, electro-optical star projector (hybrid), and increase the Digistar footprint to eight projectors. In addition, the museum is planning a completely new astronomy hall to accompany this new facility and perhaps even a large observatory to top off the planetarium.

The Kirkpatrick Planetarium has been a mainstay within Oklahoma City since before the museum was built. Now the community is energized once again by the renovation and looking forward to the completion of the future plans. The popularity of the planetarium in Oklahoma City is responsible for both the current upgrade as well as the plans for the new venue.

**Southeastern Planetarium Association**

The next SEPA conference will be a joint conference with the Middle Atlantic Planetarium Society. Dates are 4-8 June, 2019. The conference hotel is the Embassy Suites, Columbia, South Carolina, and the host facility is the state-of-the-art, Blue Cross Blue Shield Planetarium of the South Carolina State Museum in Columbia.

Planetarium Director Liz Klimek brings years of conference planning experience to the event. Because this is a joint conference with MAPS, a large turnout is expected. Conference hosts urge attendees to register as soon as possible.

Looking forward to 2020, the Hallstrom Planetarium at Indian River State College in Fort Pierce, Florida will host the 2020 SEPA conference. Conference dates and details will be furnished later.

1 January marked the changing of the guard for SEPA officers. The officers for 2019-2020 are President James Albury, Kika Silva Pla Planetarium, Gainesville, Florida; President-elect Elizabeth Klimek, Blue Cross Blue Shield Planetarium, Columbia, South Carolina; Past President Derek Demeter, Buehler Planetarium at Seminole State College, Sanford, Florida; Secretary/treasurer Patsy Wilson, Horizons Unlimited, Salisbury, North Carolina; and IPS Council Representative John Hare, Ash Enterprises International, Cocoa, Florida.

Just a reminder that SEPA has gone digital. The quarterly publication, *Southern Skies,* and general SEPA information is unrestricted to anyone visiting the official website: sepadomes.org.

**Association of Mexican Planetariums**

The AMPAC 2018 general meeting took place at the end of November. AMPAC President Karla Peregrina reported on her tenure 2016-2018, offering special thanks and recognition to Jesus Mendoza Alvarez, director of Mexico’s Science and Technology Council (CONACYT), for supporting the International Planetarium Festivals held in Mexico.

At the meeting, a new AMPAC Board was elected for the period 2018-2020: Julien Claude Potier, responsible for Descubre Planetarium, as president; Manuel Eduardo Hernández, director of Planetarium Torreón, as president elect; Ramón Vargas from Puebla Planetarium, as secretary; and Eduardo Piña, from Universer Planetarium, as treasurer.

During the meeting the possibility to bid for 2024 IPS Conference (Continues on next page)
was considered, if economic and institutional support is given by the government authorities to rebuild and acquire top of the line dome projection technology. The planetarium and site as the possible candidate are still to be selected.

Featured as an under-construction planetarium in the September 2018 Planetarian International News, the Guadalajara Planetarium is now finished and was inaugurated on 2 December by the former Jalisco governor, Aristóteles Sandoval, as an achievement of his state during his tenure. This is so far one of the best planetariums in the country with an 18-meter dome and a Digistar 6, 8k-3D projection system, six 4k projectors with 30,000 lumens each, and a seating capacity of 175. Visitors will learn about the evolution of humans, Newton and Einstein, waves, atoms, the microcosmos, bio molecules, space, the universe, Earth, environment protection, biodiversity, drones, mathematics, and even handicrafts from the State of Jalisco.

Society of French-Speaking Planetariums
The annual meeting of French Speaking Planetaria will take place in the Museum of Air and Space in Paris, 24-26 May. Located within Europe’s leading business aviation airport, Paris-Le Bourget, the Museum of Air and Space is one of the world’s finest aviation museums, both for the wealth of its collections and for its long history. It features an incredible collection of more than 400 aircraft, 150 of which are on display, from the very first aeroplanes to the Breguet 19 “Point d’Interrogation,” the Spitfire, and the Concorde. An 8-meter planetarium welcomes the public and presents a session about the sky.

In January, at the Planetarium of Nantes, a dance company performed a show staging the epic Voyager probes for a limited three performances. Two artists danced and told a story in parallel with the journey of the two probes presented by a planetarium animator.

Italian Association of Planetaria
Last November, the Science Museum of Brescia hosted the yearly meeting devoted to the description of activities organized during the year by different astronomical associations, and events in various cities and at astronomical sites were presented.

This ranged from the novae research of amateur astronomers of Monte Baldo Observatory (Lake Garda), managed by the Verona Astronomy Association, to the project of a new scientific exhibition in the tower of Torrazzo arranged by the Cremona Association of Amateur Astronomer that also includes the description of the tower’s astronomical clock.

Inside the Torrazzo tower of Cremona, which has characterized the main square of the city since the 13th century, the two opposite sides are occupied by the cathedral and the city hall. They are planning three new exhibition rooms, including one devoted to Foucault’s pendulum, and a project of a small planetarium managed by the local astronomy association.

Amateur astronomer Angelo Omodeo, from the hills of Parma, presented a rich list of astronomical drawings realized through observations with a refractor telescope. During the meeting, the art and science events held by Sara Surico (Amateur Astronomer Association of Rovigo, which also manages a planetarium) and the astronomical activities in Brescia were presented as well.

The meeting ended with a curious projection of slides prepared by Kevin Milani, 2018 winner of the week in Italy prize, who after the lessons in Brescia in April 2018 continued collaboration with Italian colleagues.

On the 24-25 November the PLANit Association took part in the National Fair of Astronomy in Bologna, where the most important Italian organizations in the field were present. The fair’s theme focused on the activities of several amateur astronomical associations, which showed their astronomical photos and talked about their work for schools and the general public.

There was a cycle of conferences on different topics which illustrated the level of dissemination of astronomy in Italy and new perspectives for the future.

(Continues on page 50)
Meet the New Star Projector of the Digital Age
Simple, Compact, Powerful

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* The above image of Megastar-Neo shows its relative size compared to MEGASTAR-IIA (right in the background), MEGASTAR-III (left in the background) and the soccer ball.

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An important section was devoted to the Olympics of Astronomy, which is managed by the Italian Astronomical Society (SAIt) and the National Astrophysics Institute (Inaf). The national representative showed data that illustrated the significant growth of participants in 2018. He also emphasized the fact that the Italian team is present in the medal area each year.

PLANit organized a stand with some posters, banners, and a projection with detailed information on Italian planetariums, their activities, and their collaboration with the IPS.

The StarLight, a Handy Planetarium Association participated in Astronomers for a Night, a national event, which took place for FAI (Italian Environment Foundation) at the St. Francis Wood in Assisi. They organized two star parties on the occasion of the Perseids meteor shower.

The event was divided into two parts. The first took place at the historic Benedictine monastery and consisted of a presentation of the phenomenon with readings from some literary pieces accompanied by a flute. During this part the children participated in activities related to the circumpolar constellations.

After that, all walked through the wood to reach an open space known as Third Heaven, where they ran the observation, with the participants divided into four groups around four telescopes. Each group observed constellations, an actor read a myth, and a flautist played historical pieces from the top of a small medieval tower. During the observation everyone was able to see numerous shooting stars and the air echoed with many exclamations of awe.

Society of German-Speaking Planetariums

On 17 and 18 November, the planetarium in Osnabrück hosted the annual autumn meetings of some of GDP's working groups. About 30 GDP members participated in the discussion of topics ranging from administration matters, like new regulations of Germany's performing rights society, GEMA; a planned new cooperation projects of the planetariums; and plans for 2019's Apollo moon landing anniversary; to projects that are envisioned in GDP for the 100th anniversary of the planetarium.

As the European Space Agency's (ESA) spacecraft Rosetta explored comet 67P/Churyumov-Gerasimenko, ESA created the wonderful animated series The Amazing Adventures of Rosetta & Philae. The series shows the exploration of 67P in child-appropriate form as a cartoon, and was very well received by all audiences, not just children. Therefore, the Planetarium at the Swiss Museum of Transport in Lucerne had initiated an international project to create a planetarium show based on this animation series. This production was finished in October 2018, and had its world premiere in Lucerne on 18 October.

Some 19 planetariums from seven countries participated in the project, which was realized also with the generous support of the Swiss Space Office and with support by ESA. The production was managed by the experienced team at the Swiss Museum of Transport’s planetarium, led by Marc Horat.

Much of the production work was carried out by Design & Data GmbH, the same production company that was already involved in producing ESA’s original “flat” Rosetta cartoons.

After the premiere, the show was distributed to the 19 participating planetariums, and can now be seen on domes in Switzerland, Germany, Austria, Poland, Italy, and Singapore. From May 2019, the show will be available through Design & Data GmbH.

In January 2019, the German/French TV channel ARTE presented a themed series of programs under the label Winter of Moon, motivated in part by January 2019’s lunar eclipse, but also by the upcoming 50th anniversary of the first Apollo moon landing. To publicize their themed TV program, ARTE partnered with GDP to promote their program in the planetariums, and vice versa to promote the planetariums on their channels.

The main element of this cooperation was a lottery-like drawing of planetarium tickets: ARTE viewers could register on ARTE’s website to (Continues on page 52)
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A partial solar eclipse occurred on the morning of 6 January. It could be observed all over Japan while the sky was clear. Many planetariums and public observatories held observation events. Left, at Kawasaki Municipal Science Museum about 500 people experienced this phenomenon. Observing the Sun in front of Kawasaki Municipal Science Museum during the partial solar eclipse on 6 January. Courtesy of Kawasaki Municipal Science Museum.

Below: At the end of 2018, a new planetarium facility was opened in Yurakucho, Tokyo. KONICA MINOLTA PLANETARIA TOKYO has two different type of domes:

**Dome 1** is called Digital Multi-purpose Theater. It has 8K digital projection, and offers planetarium shows with live performances. The other dome has an opto-mechanical projector and 4K digital projection. Yurakcho is the town where the first planetarium in Tokyo was built in 1938. It was burned down in 1945 in World War II. Courtesy of Sumito Hirota.

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**Japan Planetarium Association**

A partial solar eclipse occurred on the morning of 6 January. It could be observed all over Japan while the sky was clear. Many planetariums and public observatories held observation events. Left, at Kawasaki Municipal Science Museum about 500 people experienced this phenomenon. Observing the Sun in front of Kawasaki Municipal Science Museum during the partial solar eclipse on 6 January. Courtesy of Kawasaki Municipal Science Museum.

Below: At the end of 2018, a new planetarium facility was opened in Yurakucho, Tokyo. KONICA MINOLTA PLANETARIA TOKYO has two different type of domes:

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**Nordic Planetarium Association**

**Norway.** The Nordic Planetarium Association will be gathering in Sandnes during the first week of September this year. Registration for the NPA conference is now open at www.npa2019.org and the association hopes to see you there. Note that the conference language will be English and although the conference is aimed at planetarians within the Nordic and Baltic countries, others are very welcome to attend.

**Iceland.** A new 8K planetarium capable of seating up to 150 guests was opened in Perlan, Reykjavik, in December. Their first full-dome show is about the Icelandic nature, and their second show will be about the Auroras over Iceland. (The full story about this new dome will appear in the June **Planetarian** -Ed.)

**Sweden.** The Kreanova Science Centre in Blekinge opened in 1999 and it was then planned that they should have a planetarium. The planetarium dome was built, but no planetarium projector was ever installed. Instead Kreanova has a film projector at its centre. But now, at last, Kreativum has secured funding for installing a digital planetarium under their tilted dome. Kreativum is currently going through the public procurement process for the new installation and if all goes well, they will be able to open a brand-new digital planetarium by the end of this year.

**Denmark.** At the 60th Nordic Filmfestival this past fall, 30 October-4 November in Lübeck, Germany, Carsten Andersen from Bellahøj Skole (in Copenhagen) was presented with his old star projector because Kreanova Science Centre in Blekinge opened in 1999 and it was then planned that they should have a planetarium. The planetarium dome was built, but no planetarium projector was ever installed. Instead Kreanova has a film projector at its centre. But now, at last, Kreativum has secured funding for installing a digital planetarium under their tilted dome. Kreativum is currently going through the public procurement process for the new installation and if all goes well, they will be able to open a brand-new digital planetarium by the end of this year.

**Denmark.** At the 60th Nordic Filmfestival this past fall, 30 October-4 November in Lübeck, Germany, Carsten Andersen from Bellahøj Skole (in Copenhagen) was presented with his old star projector made by Carsten Andersen from Bellahøj Skole back in 1937 at a factory in Lübeck only 100 m from where the dome was

(Continues on page 64)
NARRATED BY SEAN BEAN

FASTER THAN LIGHT
THE DREAM OF INTERSTELLAR FLIGHT
I’ve been to too many star parties lately, travelling up and down the length of my country.

You might or might not know that New Zealand is actually one very long country, made of one big North Island that, according to the Māori people, looks like a fish; and one long South Island that, also according to them, looks like a canoe.

In the legends, the canoe comes first. Māui brought it here when he travelled to the southern ocean. Then he and his brothers, standing in it, fished up the North Island, known as Te Ika-ā-Māui (the fish of Māui). His waka became the South Island, Te Waka-ā-Māui (Māui’s canoe). The North Island was so heavy (you can imagine, since the North Island is a super-volcano, that it must be very heavy) that the fish hook broke and sailed into the sky to become the Fish Hook of Māui.

Māui was a demi-god and the fishhook was the jawbone of his grandmother, Muri-rangawhenua. When he asked his brothers for some bait for the catch, he got punched in the nose instead. The blood from the nose spilled onto the hook and that’s how Māori explained the red colour of Antares.

The fishhook of Māui, is—you guessed it—Scorpius, and it drags the Milky Way (the Ikaroa, or big fish) from the sky all night long every winter. Of course, this being New Zealand, winter is in July and Scorpius climbs all the way up to the zenith. In fact I’ve analysed the situation a few years ago together with the famous NEO and comet-hunter/sky expert, astronomer Alan Gilmore. He confirmed that from the latitude of the North Island, the galactic centre climbs all the way to the point overhead that is called the Zenith, just like foam on the crest of a huge wave. It even looks like a huge wave! Around the galaxy’s centre, our ancient supermassive black hole gathers stars, clouds, and dust in a whirlpool of light. Is it fair that New Zealand’s sky is spectacular in so many ways? No, but it’s worth the trip to see it. Can’t you go to South America to see the Milky Way at zenith, you ask? Yes you can, but what I love about New Zealand is the richness of the starlore and its history of astronomy. The stars have been an integral part of the story of human settlement here.

Polynesians navigated to Aotearoa—the Māori name of New Zealand—by the stars. Captain James Cook came to the Pacific in 1769 to observe the transit of Venus, which led to understanding the size of the solar system. But the voyage also had serious repercussions through-

(Continues on page 56)
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out New Zealand. The following transits and a few eclipses later in the 1880s led to an army of amateur astronomers coming to the shores of New Zealand. This year we celebrate 250 years since his first voyage.

**Learning the skies upside down**

Star parties are wonderful networking opportunities here in New Zealand and a chance to share grief with fellow North Hemisphere stargazers for looking at a sky that is upside down. Many of them have reported anecdotally that they’ve spent their first months here looking at the sky arched back in a desperate attempt to recreate parts of the Northern Sky and get some bearings.

I must confess. That was me, too. The only thing I could recognize was Orion and it was upside down. The moon is upside down too, and although the sun does rise in the east and set in the west, as it should, but follows the ecliptic through north—hence it moves counterclockwise. As a result, the shadows here in the morning look very much like the evening shadows at the opposite latitude.

It took me a few months to figure out why it all felt so strange at first, and so here I am saying if anyone tells you it’s just jetlag, send them to my planetarium shows at Space Place at Carter Observatory. I shall demonstrate in there how things occur here.

To take away the confusion and prevent people from spending time arched back for too long, here are some tricks that New Zealanders use: Orion here is known as “The Pot.” Canis Minor, on the opposite side of the Milky Way, is also known as the “Hot Dog” here. Up above it is the Dog Star (Sirius).

To the right and a bit higher up is Canopus. This magnificent star, which was used by early spacecraft for triangulating directions, is a very odd one. It wasn’t until the launch of the Hipparcos satellite that we knew that it is 310 light years away. It’s a supergiant, and the second brightest star in the sky, visible high in the sky in summertime (that is December to February for us).

The sky this time of the year is full of wonderful creatures, food, and cooking utensils. Following the path of the Milky Way south, right in its wake we bump into a group of stars known as the Southern Cross. Right next to them, a dark patch of the sky is the Coalsack. Further south are the two pointers, in order, Beta Centauri and Alpha Centauri. The latter is the third brightest star in the sky and home of our closest neighbour, Proxima Centauri.

Yes, these are our iconic groups of stars, so famous that some ended up on our flag (and the flag of our closest neighbour and many other countries for that matter), but here they have a secret name too: they are the fish in the frying pan. Remember what happened to mighty Orion? He was changed into a pot in our skies, and poor Centaurus was changed into a pan.

The reason: seafood. The stars from Centaurus, Alpha and Beta Centauri (Hadar) are the handle of the pan, and together with Birdun, Muhlifain, and Delta Centauri they make this South Celestial Frying Pan. This is a season-based asterism visible probably best in summer (December to February).

The Southern Cross and the Coalsack are respectively the Fish and the Flounder (the latter is the Māori name for the Coalsack) in the frying pan. And with a little bit of imagination, if you are into Chinese food, instead of a pan you can make up a wok, and the bottom of it is the famous Omega Centauri globular cluster.

So right now here in the southern hemisphere we are very lucky to see the brightest (the Dog Star), second brightest (Canopus, the Cat Star), and third brightest stars in the night sky all in one go all night long if you’re lucky and your star party’s sky stays clear.

We can also see the Pot (Orion’s belt, sword, and Eta Orionis), the Hot Dog (Procyon or Beta Canis Minoris and Gomeisa or Beta Canis Minoris), The Fish (Southern Cross) and The Flounder (the Coalsack) in the frying pan (some stars in Centaurus), gastronomically matching our amazing seafood (that is true) and the traditional New Zealand Hot Dog.

So, in New Zealand, you don’t have to remember all the old asterisms, nor spend time arched backwards. Just invent your own and enjoy the seafood!
“From the day that we were born we were destined to be together in this room today…”
A recent discussion on Dome-L about prerecorded audio tracks started me thinking about non-presenter elements of live, interactive programs. How do presenters use effects to enhance their programs? What types of effects do they use?

Because there is a wide range of dome types—fixed or portable; analog or digital; small, medium, or large—I kept the definition of “special effects” very broad. I asked the LIPS Community to think of special effects as anything other than the presenter’s voice and the basic astronomy projection.

As John Erickson of the Lawrence Hall of Science correctly pointed out, “With a digital system it is hard to draw the line where ‘basic astronomy projections’ stop and ‘special effects’ begin. It’s all special!”

John continued his comments with:

A general “effect” I have been using more often recently is text on the dome. One of the aspects of a live, interactive program that makes it an authentic scientific experience is the discourse among the participants and between the participants and the presenter. When we project a question on the dome it helps focus our conversations and seems to open the participants up for sharing. Some examples are, “What do you observe?” and “Make a prediction. Share it with a neighbor.”

We not only use these during programs, but also to prepare the participants before we start. For instance when participants walk into our show about Mars, there is a projected Martian panorama (from Curiosity) with the text, “Welcome to Mars. What do you notice? What do you wonder?” (I learned at LIPS [2018] that the participants can have something visual to engage them even before the presenter says “Good afternoon everyone.”)

Text on the dome can be handy for more complex discussions too. Half way through our program Journey by Starlight we put up the text “Which direction should we point our canoe at the beginning of our journey from Tahiti to Hawaii?” This sets off a discussion that builds on what we learned in the first half of the program about Polynesian wayfinding. The text on the dome reminds us what the goal of our discourse is.

In this same show we have an unusual and effective special effect. By means of a projected panorama, the planetarium becomes a double-hulled voyaging canoe. The image is simple and somewhat schematic, but it works well because it moves with the “waves.” The pitching and rocking of the canoe is dependent on the direction of the canoe relative to the direction of the waves. This gives us a clue to which way we are headed even when the stars are not visible. So far no one has gotten seasick, but I’ll know it is an especially realistic effect if someone does. I have not yet thought of ways to use the “rocking panorama” effect for other purposes in other programs, but I keep wondering.

Maybe we’ll be lucky enough to experience the “rocking panorama” effect John described at a future conference.

Karen Klanczynski of Evans&Sutherland wrote,

When I directed the Barlow Planetarium in Wisconsin, we put on a few live plays in the dome with the cooperation of the UW Fox Theater Department. During the play Galileo there were scenes where we projected all skies

over the dome (stained glass) and had two actors on our catwalk. They switched on personal white lights that illuminated them behind the dome; the overall effect was they appeared ‘floating’ high on the dome.

On occasion, I would “treat” an audience to “something few people see” by turning on work lights behind the dome. With the right lights on, it was a very cool effect that showed the structure of the dome and some of the speaker placement. Not only could I use it when telling people a bit about the planetarium, but kids were always very excited to get a “special, rare” view. This could be used to capture attention of an unruly group before the show began, or alternatively, it could be a reward at the end of a show for a group.

Probably no article would really be complete without mention of the grain-of-wheat bulbs that have been used in perforated domes for years as homemade special effects. They could be faded up to be a nova, supernova, or “Star of Bethlehem,” the last of which could be combined with slide projector art to make a very impressive visual effect that could be greatly enhanced by soaring music.

I wish I could remember more about a nifty handmade effect our physics professor had made—something about a horizontal panel suspended with springs with a lamp under it and a motor that jiggled it. I think the panel was actually a transparent dish with colored liquid...

It’s easy for those of us who experience the planetarium every day to forget how magical an environment it is. Giving the audience a “behind the scenes”/“behind the dome” view makes the program extra special.

Karrie Berglund is the director of education for Digitalis Education Solutions, Inc. and leads the Vision 2020 initiative on professional development. She is a former director of the Willard Smith Planetarium at Pacific Science Center in Seattle, Washington, USA.

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By the way, if Karen’s description of her physics professor’s creation sounds familiar, please let me know! I’m curious to hear more about it.

Patty Seaton of the Howard B. Owens Science Center, Lanham, Maryland, noted,

We used “cascading lights” mounted behind the dome to represent the lightning on the dark side of a crescent Jupiter that was displayed as a single allsky slide. Still get goose bumps when I see that. We’ve also used Christmas lights mounted behind the dome to light up behind an image of a Christmas tree...magical.

And my favorite special effect of all time, that I will keep and use even if I ever get the funding to go hybrid: the Sky-Skan snowflake projectors.

Nothing else is quite as realistic or beautiful!

We’ve added small doses of special effects to our programs with great results! For a winter program, I created some programming of simple lighting and visual to accompany a 3-minute recording of the “Winter Solstice Song.” At the end, when the lyrics are “Here with my candle burning,” I have a relay trigger two electric candles that light behind the dome to shine through the dome. The effect is beautiful.

In another program, we had a panorama of the southwest (buttes) and a cloth backdrop to show a dancer in silhouette against the starry sky for a short 2-minute segment. This was also well received. I used the same silhouette effect to highlight a friend playing the saxophone live for a short segment. This was also well received. I used the same silhouette cloth backlit to show a dancer in silhouette against the starry sky for a short segment. The effect is beautiful.

Another example of using cover lights: The same colorful DK Pocket Books cover under cove lights of varying colors. Credit: Karrie Berglund.

Pocket Guides: Space facts by DK Publishing, Ian Ridpath (consultant), Sarah Crouch (designed by), Clint Twist (joint author); 2003.

Special effects relating to the ocean

Dave Cuomo of Pacific Science Center (LIPS 2018 host!) in Seattle, Washington, commented,

As you describe them I am a huge user of “special effects.” My most recent show starts out with a fulldome video shot aboard a U.S. icebreaker underway in the Arctic. It’s my walk-in environment and you can hear the ice hitting the hull. The show is very heavy on “special effects.” It uses the high resolution Earth package for Nightshade NG to explore close up glaciers in Greenland and also has Uniview modules I’ve created ... to show sea ice change over time and Earth ocean circulation. Plus more movies of the ice breaker in rough seas, the retrieval of scientific equipment, etc.

I do a brief presentation with a National Oceanic and Atmospheric Administration fish biologist where I have turned the dome into an aquarium. We dive into the Bering Sea and I use Nightshade NG to fill the dome with a blue-green color, then bring in animations of fish moving around the dome. It’s actually a really cool effect. And she talks about the different species and how she determines their numbers and sustainability.

I’ll run short Goddard Space Visualization studio animation to enhance programs; for example, they have a nice 5-minute clip that helps explain the formation of Bennu that I use in a presentation about OSIRIS-REx.

I’ve used JPL’s “Seven Minutes of Terror” fulldome clip in a number of shows about the history of Mars exploration. We created a show about the history of Chinese Astronomy that spanned over 4,000 years and we had a special effect “time wheel” to help guests track our seques through time.

My philosophy is that the dome is a primarily a visual medium so I always want interesting imagery. I still strive to keep the shows interactive, but I want to make sure the visitors who have never been to a planetarium (a significant percentage of our guests) and are expecting a movie stay enthralled.

Ronn Kistler of the Hardin Planetarium at Western Kentucky University in Bowling Green told me,

As you may remember from a previous a LIPS presentation, we are big believers in incorporating music into any presentation.

• Planetarium shows are “theater” and all the basic theater production rules apply. At very minimum, pre- and post-show music is included in all our presentations. Pre-show music gives the audience something to focus on when they first come into the star chamber, and it should be chosen to put them into the appropriate mood for the show. For instance, consider the difference in mood between a planetarium Christmas show and a presentation on dark matter.

• Post-show music should give the audience an extension of the mood created during the show and leave them with the feeling you want. When in doubt, we always choose some kind of up beat music that will leave them humming and smiling as they leave. In theater, the first and last moments are the things the audience remembers the best, so this music should not be ignored.

• As an interactive planetarium, we like to work music into the show itself, and if we can find a video clip which the audience can sing along to, so much the better. Using musical intelligence also helps the audience members transfer information into long term memory as well.

Using your dome’s cove lights

Several people discussed using cove lights in programs.

Jeff Bowen of Bowen Technovation wrote “...explaining lighting system colors and color mixing is a pretty good physics lesson.”

Kerri Kiker of The Cradle of Aviation (LIPS 2019 host!) in Garden City, New York commented,

We use our cove lighting a lot for different effects. In our pre-kindergarten show we use it to create a sunset; we find it helps transition the little ones to dark skies better. Also, in a specialty show, we used our cove lights to create auroras. We handed out noise makers so that the audience could see and hear the auroras in the planetarium.

Dayna Thompson of Ball State University (LIPS 2017 host!) in Muncie, Indiana, commented,

There’s the color by numbers light reflection and absorption activity that I got from Susan Button in a workshop awhile back. We created an entire planetarium lab around it and a few other activities we created. It’s a great intro to spectroscopy.

Using cove lights in a fixed dome (or RGB lights in a portable dome)

(Continues on next page)

that can be turned on individually or in combinations), you can explore absorption and reflection of light in an engaging way. You can have audiences draw their own pictures with colorful markers—fluorescent markers work particularly well—and look at them under different colored lights.

Mark Breen of The Fairbanks Museum and Planetarium in St. Johnsbury, Vermont wrote,

I’ve produced a few 20-minute shows using the Digitalis stratoscript language, which included music for mood and background and visual effects like a spinning spiral clock across the entire dome.

I have found music and visual effects help transport the audience out of the dome, and into the “world” we are portraying, whether that is a location, or a period of time, or a concept. Movies and television have been doing this for decades, and I find it works great in the planetarium.

Carole Holmberg of the Museum of York County, Rock Hill, South Carolina told me,

We have a “Fun with Flashlights” event (idea was from Fernbank) where the kids bring or are provided flashlights and make their own “special effects” with a disco ball, glow in the dark stickers, shadow puppets, etc., and music. We also sometimes illustrate light pollution by telling everyone to turn on their cellphones, and then turn them off.

In the Zodiac Zoo show I use an alien puppet named Zeke the Zookeeper, who controls the animals of the night sky. In this show I perform with Zeke and interact with the audience and together we explore the constellations of the zodiac. This show was created for our preschool audience. Zeke has lights in his fingers that illuminate to bring up the constellations in the sky.

Speaking of puppets, one of my own favorite special effects is the use of shadow puppets. At LIPS 2018 Natalie Copeland of Seattle’s Museum of Flight demonstrated a program she wrote that incorporates shadow puppets. It was so much fun that I asked Natalie if she would do some programs at the American Astronomical Society winter meeting in early January, 2019, which was taking place in Seattle. She kindly agreed, and we had several excited and enthusiastic participants helping tell constellation stories in the dome. They either used shadow puppets made from their hands or with laser-cut puppets that Natalie brought. See the pictures for a better sense of how this program felt.

Thanks to everyone who wrote in with comments and images. As always, I received many good ideas from the LIPS community!

The skinny on the next LIPS
On a different topic, if you’re curious about LIPS 2019, here’s the basic information:

- Hosted by The Cradle of Aviation in Garden City, New York
- Wednesday-Friday, August 14-16
- Optional Data to Dome LIPS-Style workshop on Tuesday, August 13
- The attendance will be limited to 60 people (50 non-sponsor attendees and 10 sponsor attendees); limit of 10 sponsoring companies
- Visit the LIPS website to learn more or to register: http://LIPSymposium.org
- And, as always, please contact me with questions or comments: Karrie@DigitalisEducation.com.

Derek Demeter of the Emil Buehler Planetarium at Seminole State College of Florida wrote about programs involving puppets,

We hosted a program called Mission STEAM-possible which was created by Michelle Puppetry. Mission STEAM-possible tells a story of Magnificent, a teen inventor who dreams of becoming an engineer on the first manned mission to Mars. Magnificent’s hilarious robot sidekick, Dinobot, is programmed to fetch balls and to help Magnificent use the scientific method to compete in the Mission STEAM-possible Challenge. When her dreams collide with the needs of her little brother, Marcus, who is physically disabled, Magnificent learns that through her own ingenuity and engineering skills, she can help her brother and still reach for the stars. The show involves puppetry; black light art and props, shadow puppets, and fulldome imagery.

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As a graduate student working on a degree in education as it relates to the planetarium, I was thrilled about the encouragement and assistance I received in attending the Live Interactive Planetarium Symposium (LIPS) this past September in Seattle, Washington.

For my master’s research I am studying the perceived education-entertainment dynamic of a live program and a pre-recorded program. In my position at ‘Imiloa Astronomy Center I regularly operate both live and pre-recorded/integrated programs. Of these, our Skies Above Hawaii and Maunakea: Between Earth & Sky are played daily (Tuesday-Sunday) and are never removed from our schedule. These programs have become the focus of my study in comparing the perceived educational and entertainment value of live and pre-recorded/integrated programming.

Skies Above Hawaii is a completely live program which presents highlights of the current night sky and does a launch into outer space to explore the cosmos. The pre-recoded program Maunakea: Between Earth & Sky discusses the dormant volcanic mountain Maunakea and its significance to Hawaiian culture and astronomy. The program is followed by a live tour of the evening sky and is frequently advertised as ‘Imiloa’s “signature show.” It has been a part of our regular programming for over a decade.

Throughout the latter half of 2018, audiences were given a survey asking them to rate the entertainment and educational values of the programs, specifically querying what they thought was entertaining and what they learned. The goal is to study how the audience experience differs between these two regular programs and what the audience is taking away from the experiences.

Additional take aways involve methods of how to get the best survey return and responses from our audiences and how these relate between a live and integrated program. For example, during the latter half of the survey period I discovered that more surveys were returned for a live program than from the integrated program.

The dynamics of live vs. pre-recorded programing in the planetarium has been discussed many times before, but I experienced a great amount of difficulty finding relevant articles/papers written by planetarium professionals (partially because Planetarian’s archives are not easily searchable).

I did not realize how fortunate I had become in my search when I stumbled across the Live Interactive Planetarium Symposium (LIPS) website. I contacted the organizers and was welcomed into the LIPS community with their characteristic warmth and encouragement. The community of LIPS introduced me to the hidden gems of planetarium research and how these endeavors can play into my own research.

As LIPS is exclusively based around the implementation of live programing in the planetarium environment, I felt at home through all of the different presentations and discussions. My eyes were opened to the wide world of interactive planetarium programing and the variety of work that is happening in it.

The diversity of new programs and how these programs were developed based on the needs of the planetariums illustrates the flexibility behind the development of live programs and the extraordinary ways that these unique forms of live programing can impact their audiences. Live programs certainly challenge the creativity of planetarium educators.

Discussions revolving around the set ups of the planetarium and thinking about the experience from the audience perspective opened up my mind to ways that small interactions and changes can lead to impactful outcomes. Coming back from the conference I took action to make our planetarium a more open and interactive environment by extending our presentation abilities and setting up a limited presentation console at the front of our planetarium. Our operators/educators now have the opportunity to present in a way that they are visible to the audience and can interact directly with our patrons.

As I introduced this change in the middle of my data collection period, I will be able to discuss how this small influence altered the general audience perception of the different forms of programming. This and more will be discussed in my full paper, which will likely be in the September 2019 Planetarian. I am also looking to present my paper and my findings at the 2019 LIPS in September.

Though for now, I just need to actually write my paper. ☆

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How LIPS is helping my master’s research into education-entertainment dynamic of live programs

Emily Peavy is a Planetarium Technician & Support Facilitator at ‘Imiloa Astronomy Center in Hilo Hawaii where she has worked for the past 7 years. She is currently working on a master’s of education degree at the University of Hawaii at Hilo.
Oddly enough, this article started out as the result of an early November snowstorm. It was the day after the 2016 U.S. Presidential Election and, as if to add insult to injury, we had had 20-30 cm of wet snow fall overnight. I probably should have noticed it coming down, but, since we are six hours ahead of the East Coast in the United States, I had literally been wide awake all night long while following the election results.

I went to put on my usual winter coat I use for things like clearing the driveway only to find that the zipper pull broke into two pieces while I was putting it on, so I needed an alternative. That’s when I remembered that I had a perfectly serviceable winter coat that we staffers had been given while I was still astronomer/program producer at Cosmonova, the IMAX/digital planetarium theater at the Swedish Museum of Natural History in Stockholm.

Fortunately, I remembered that it was in a downstairs closet, and moving the steamer-trunk-sized storage case for my 20cm SCT out of the way, found that I was right. What I had half-forgotten about was its color, but more about that later.

While I cleaned out the driveway with my small snow blower, I got to thinking: just how much of this planetarium-branded clothing do I have after 40 years in the profession? Turns out the answer is “a lot,” and I’m probably not the only one who has a collection.

The closets became clothes magnets

Outside of some astronomically-themed tee shirts that I had started acquiring from the 1970s, planetarium-branded apparel didn’t really start to accumulate in my closets and drawers until after I moved to Sweden in 1991. One of the very first was a quilted gray sweatshirt fleece jacket that Cosmonova’s technicians first got after we opened in October 1992. I received one too, since I spent so much time down in the theater’s control room and the air-conditioned Digistar I program room.

We had some cloth patches that had come from some of the manufacturers who had installed systems in the theater, so there was a scramble to distinguish one’s own jacket from another’s. Embazoned across the back was a color rendering of our logo, which we were all quite proud of since we were the largest such facility in Sweden and one of the most modern in the world at that time.

Since Cosmonova was originally a Digistar I facility, a lot of the initial shirts I have came from Evans & Sutherland, passed out at the annual Digistar Users Group meetings over the years. Two of my favorites are a spruce green “Digistar 3” Lacoste-style polo shirt (oddly enough, a “polo shirt” in Sweden is a turtleneck sweater, though I couldn’t tell you why), and a dark blue long-sleeved “Digistar Laser projector” shirt. I got the latter when I went to Salt Lake City to see a test run of said projector, and it really worked (the projector) and looked great on their in-house test dome.

In 2008 we updated the theater and converted to fulldome video and also installed a large 3D film viewing area at the front of the dome, which was at that time the largest 3D screen in Sweden. This gave us analogue IMAXDome®, a digital planetarium and digital 3D movies. The vendor that installed those two newer systems, Global Immersion (no longer in existence, having been absorbed into Electrosonics), surprised me at the 2008 IPS meeting in Chicago with a goody bag with a logoed black polo shirt and a black zippered sweatshirt, both of which have seen their amount of wear.

Coats and jackets galore

Speaking of over the years, the one thing that Cosmonova seemed consistent about was issuing coats and jackets of all types to make the opening of certain IMAX films, and in one special case, a planetarium show. We had a nylon shell mountain climber-like jacket for the premiere of Everest, and not only did the planetarium staff get such a jacket, but it was arranged that everyone on the staff of the Swedish Museum of Natural History got one too. That way staffers out and about in Stockholm would be passively advertising the show.

For the last major public planetarium show that I produced (UFO: sanningen är här/UFO: The Truth is Here) our boss decided that we should have a coat made as a promotional gimmick. I had designed an alien alphabet to be seen in the visuals for one part of the show, and I used it to make up a title line for our planetarium staff positions that were supposed to be stitched on the front of the coats, while the show’s orange UFO-shaped logo and white title were stitched across the back.

Unfortunately, the alien text title lines got scrapped, replaced by the more mundane “crew.” These Fox Mulder-esque looking long black coats were also passed out to the museum’s staff, but there were a few who didn’t seem to like it. In fact, one went so far as to pull out all of the elaborate stitching that made up the show’s logo and title across the back so that it was just plain black. However, in spite of their efforts, you could still see the pattern from where all the stitching had been removed; it was subtle, but it was still there.

Back to the winter coat

The Cosmonova winter coat that I mentioned at the beginning was a Christmas present to ourselves that was the brainchild of our then new boss. Our original leader—who had gotten the theater built after 25 years of effort on his part—had retired, and his replacement was young and full of all sorts of ideas. Keeping his plan a secret, he only asked us what size coats we wore.

It’s very traditional for Swedish offices to have some sort of a pre-Christmas activity together and this year was no exception. We were to go over to our temporary marketing person’s apartment for a festive activity (Continues on page 64)

1 Fox Mulder, the FBI special agent in television show The X-files.
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(Dome Under, continued from page 62)

dinner together, but before we left the museum, we were also supposed to receive our surprise coats. Surprise was probably just about the right word, as they were three-quarters fluorescent yellow with the lower quarter being a dark navy blue. Bands of white reflective materials ringed the waist and cuffs on the sleeves. It goes without saying that our Cosmonova logo was splashed across the back.

If one didn’t know better, you would think that we were employees of a road construction company or a tree felling crew, since such coats are also popular for those kinds of work in Sweden.

An invasion in the subway

Slipping on our coats, we marched off in the winter dark to the subway station next door to the museum at Stockholm University. The train arrived at the underground platform and we stepped en masse into the closest car and all conversation therein immediately came to a stop. Everyone in our subway car was staring at us, trying to figure out if we were from the fire department or some other form of first responder. Once they realised that nothing was up, they went back to what they were doing before we got onboard.

The same scene repeated itself at every subway stop along the way until we got to our destination.

Two of the most unusual planetarium-branded items that I have are a tee shirt and a hat. During one IPS meeting, Astro-Tec (a dome manufacturer) was passing out tee shirts at their booth in the vendor’s area, but they weren’t just regular shirts. They had spray painted their logo on the front by using a piece of dome material so that the paint had passed through the perforations in the aluminum screening to make the pattern. As they described it in the booth, it was a “just for fun” last minute idea.

The hat, the other unusual item, is a helmet-like fleece hat that covers one’s head and ears. What struck me as unusual about it is that Cosmonova also distributed them in conjunction with the IMAX film Mysteries of Egypt, one place where you probably would have little need for such a head warmer.

With all of the various kinds of planetarium-branded clothing that has been given out by both theaters and companies over the years, perhaps IPS should consider setting up a collection of such items as part of our history. As for mine, I’m still wearing them even though it’s not under a dome.

-European/Mediterranean Planetarium Association

Greece. On 18 December the Eugenides Planetarium in Athens celebrated the winter solstice with three free screenings of HORIZON: Beyond the Edge of the Visible Universe, a Live Company Ltd. and GOTO Inc. production that won the 2018 Brno Fulldome Festival best movie award.

On 25 February, it premiered Oceans: Our Blue Planet, an IMAX film produced by BBC-Earth, and currently the Eugenides Planetarium is preparing its latest production on Mars and its illustrated guidebook that expands on the key theme of the show.

Croatia. Regarding the Rijeka Astronomical Centre, in the past issue of Planetarian it was briefly mentioned that its October activities included World Space Week, Earth Science Week, Children’s Week, and Lifelong Learning Week. As an update to that note, the World Space Week also saw the introduction of the Made in Space show, highlighting the benefits of space exploration in the form of the many inventions that are now widely used, such as memory foam, scratch-resistant lenses, digital cameras for smartphones, vacuum bags for food, etc.

In November, on the occasion of the Leonid meteor shower, the audience at the Rijeka Digital Planetarium had the opportunity to learn more about this phenomenon, thanks to a short presentation before the regular program. In December, the holiday season matinee for the youngest children on Saturdays included the Find your Stars drawing workshop.

For the general public, the special holiday program Christmas at the Planetarium included a show on stargazing and the winter constellations, as well as Standancer’s Waltz, an immersive fulldome film in collaboration with the musical track from Concerto for Violin, Rock Band, and String Orchestra by Mike Mills and Robert McDuffie, produced by Diana Reichenbach.

At the time of writing, the Rijeka Astronomical Centre is preparing its festive activities to celebrate its 10th anniversary, which will be detailed in the next Planetarian issue.

(What do Europeans know about space activities?)

How do residents of Germany, France, the United Kingdom, Italy, and Spain view space and space activities? At the request of the European Space Agency (ESA), Harris Interactive surveyed more than 1,000 citizens of each of Europe’s five most populous countries to better understand how they perceive issues related to space.

Europeans identify space activities as a whole as stimulating research and as a source of dreams, inspiration and cooperation; their capacity to create economic prosperity and to make everyday life easier, however, gives rise to split opinions.

Invited to spontaneously mention the words that come to mind when they think of space activities, Europeans cite above all celestial bodies like “planets” and “stars” in general, with the moon and Mars in particular—a sign that the missions carried out in recent decades by space agencies have a strong impact on the collective memory.

Moreover, some space actors are also spontaneously mentioned by Europeans: the US agency NASA is at the forefront of representations, as are “astronauts” in general. More precisely, the exact names of astronauts who recently stayed aboard the International Space Station (ISS) are widely cited by the citizens of the countries concerned: Thomas Pesquet for France and Alexander Gerst for Germany, for example.

You can read more and download the complete study at www.esa.int/About_Us/Welcome_to_ESA/How_much_do_Europeans_know_about_space.

What do Europeans know about space activities?

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STARLAB in a Tipi

In this column, over the years, you have seen stories of portable planetariums being used in many unusual locations. I think that using a mobile dome in a tipi is especially unique!

I was talking with Mike Murray at the 2018 Great Lakes Planetarium Association conference and he asked if I had the picture of a STARLAB in a tipi. I remembered what he was talking about and exclaimed, “I do not have a copy of that picture and I would love to have it!” Later he emailed it to me, saying, “I finally found the images from my 1994 IPS talk in Cocoa (“Astronomy in the Wilderness”) that included the STARLAB setup in the Blackfeet tipi.”

I was so thrilled to see it again and to be reminded of the story. I immediately went to the 1994 proceedings to further refresh my memory.

The crux of the story is that classes that were part of a Montana State University outreach program were taught in the STARLAB during the daytime and under the real sky at night under beautiful clear skies that were over 60 miles from any city lights. The planetarium needed to be protected from the sun, heat, dust, and wind, accomplished by placing it inside a tipi. Project staff and guests (up to 40 people) camped in tipis and there were larger ones used for meals and classes; one of the larger ones was adapted for using the STARLAB.

In the past the Blackfeet tipis were used year round and were made out of tanned bison hide that was stretched over tree poles; the cover on this tipi was made of canvas. It was staked near the poles with the outer fabric wall held down with rocks. Mike told me, “The winds could get incredibly ferocious there (it was, after all, in the Montana badlands) and so tipis were pretty much the only way to go. Someone tried bringing a ‘modern’ tent that was supposed to hold up to 40 mph winds and it was promptly destroyed in the first storm.”

He continued, “An air conditioner was placed behind the inflation fan so it would draw the cool air into the STARLAB. Even though the STARLAB was inside the tipi to shield it from wind and direct sunlight, summer temperatures in the Montana badlands were intense and we would have cooked without it.” I was skeptical and asked if it really worked and he said, “It did! We had generators to run it during the sessions.”

When asked how he came up with the unusual idea to provide this program and in this way, Mike replied, “The Museum of the Rockies in Bozeman, Montana provided some unique education and outreach possibilities because of our affiliation with Montana State University outreach program.”

How to use a STARLAB in a tipi. Images courtesy Mike Murray.
University. Some of these involved helping with outdoor courses and teacher workshops. The Museum received grants to provide teacher training in paleontology, geology, and astronomy at the Paleontology Field School near Choteau, Montana, a dig site made famous by Jack Horner in the 1970’s as the first site to discover fossilized dinosaur eggs and nests.”

According to Mike’s 1994 paper, Larry Kirkpatrick, physics professor at MSU, was the head of the project. Robert Law, retired MSU professor of meteorology, and Mike, then assistant director of the Taylor Planetarium, were the other two instructors.

The lessons focused on “observation and activity-oriented teaching methods.” They used planispheres, basic sky maps, and models, and taught techniques of star-hopping, constellation patterns, the use of averted vision, and the use of real and apparent celestial motion as indicators of time and seasons. Outside the dome activities also were part of the program. One example was using a 4-foot steel rod in the ground to mark and track the sun’s shadow over several days to observe the apparent path and changes in that path.

**Was scale of constellations a problem?**

I related to Mike that when I was first trained I found it difficult to transfer the small size of the constellations in the planetarium to the vast sky outside. And I asked, “Did the participants have the same experience?”

He replied, “We did indeed talk a lot about how to adapt and extrapolate the appearance of the constellations in the STARLAB to the real sky outside. We would use some of the basic techniques of finding bright stars and asterisms in the STARLAB, and then began with that same exercise in the real sky at night. You could see that sense of thrill when they made the connection into the real sky!”

He also explained that Indigenous perspectives were presented as they told Native American sky stories at the nightly campfire sessions, as well as pointed out constellations of various cultures. They brought in seasonal discussions as well, like how storytelling for most tribes took place in the winter when people were more confined to their tipis and winter lodges.

The camps lasted 4-5 days. They would cover mostly paleontology and geology in the day, along with a few astronomy exercises like tracking the sun with shadow sticks and the STARLAB in the tipi. Night was dedicated to observational astronomy and storytelling.

These camps were grant-funded and would take place once a summer from the late 80’s through the 90’s. I asked Mike if there was a long term effect/affect on the participants, and did they use the information acquired in any way with others?

He replied, “I know there was some post-evaluation of the program but that was done by the university. I do know that the teachers talked a lot about how they wanted to use these exercises when they signed up to use the STARLAB for their classes (w e had four of them that would get reserved and shipped to K-12 teachers all across the state. I would hold training sessions once or twice a year at the museum).”

I wondered if they connected the astronomy with the paleontology focus and Mike said that one of the connecting themes was time scales, because understanding long-term time is essential to grasping the changes that happen in biology, geology, and astronomy.

**Still using the teaching concepts**

I questioned whether he uses what he learned from this experience now and he told me that in his current position at Delta College (Bay City, Michigan), he still likes to weave these concepts together in his planetarium shows or outreach activities. He believes it helps students better understand the forces of nature and how we know what we know.

Although he is not in a position to do field trips like the one described here, he has incorporated many of the concepts so important to the scientific method: detailed observation, recording information, assimilation, logic, problem solving, good communication, and collaboration.

He also emphasized that having the planetarium in the field “proved to be invaluable” because it enabled the teachers to become oriented and familiar with the sky very quickly and increased their ability to retain what they learned.

Thank you for the pictures, Mike, and the story of how you provided a very unique and effective in-service experience for teachers. Although we cannot all use a tipi as a setting for teacher training, you provide us with an example of what can be accomplished with a mobile dome in remote locations and encouragement for us to “think outside of the box!”

Contact Information: Mike Murray, Delta College Planetarium & Learning Center, 100 Center Avenue, Bay City, Michigan 48708 USA; email: mikemurray@delta.edu; www.delta.edu/planetarium.


Susan Button is a past president of IPS and has chaired the Portable Planetarium Committee since 1988. She is a retired portable planetarium director for the Onondaga Cortland Madison BOCES in Syracuse, New York, USA.
Making Stars Physical: The Astronomy of Sir John Herschel

Stephen Case, University of Pittsburgh Press, 2018
Reviewed by Francine Jackson, University of Rhode Island Planetarium, Rhode Island, USA

When thinking the name “Herschel,” normally either William or Caroline come to mind. However, William had a son, John, who not only continued his father’s—and his aunt’s—work, but added a whole new dimension to all they did.

John spent much of his time continuing his father’s studies of double and variable stars and their magnitudes. John’s work on Eta Argus (now Eta Carinae) created the need for “vast, billowing cosmic clouds” to explain variations in stellar brightness. He also, surprisingly, felt the best way to understand and study variable stars was with the naked eye.

One of John’s greatest weaknesses stemmed from the lifelong collaboration of his father and his aunt. They were committed in their style of work: William was the observer, while Caroline organized and performed the calculations necessary for their catalogues. John, however, with his knowledge of mathematics, determined to do it all—from the observations to the final publishing process—resulting in a disappointingly smaller set of results. What he did write, however, became the outline for others who followed.

John also continued his family’s work on nebulae. His concentration on them included looking for minute changes, again collecting this information as a “baseline” for the future. His study of “spectral analysis,” including observing the chemical activity of the sun, was quite unique, as he did not investigate these spectra in attempts to determine the nature of stars, but instead as a way to study light itself.

Throughout his life, John immersed himself into many varied topics of astronomy, often with the intention of doing so until retiring, then finding himself looking into yet another aspect of the subject.

The amount of work that he did was unparalleled for that time. Also, with whatever he was interested in at that time, he would find himself interacting with the “stars” of that discipline: Fraunhofer, Bunsen, von Humboldt, and virtually all the other big names in the scientific fields. John even asked his aunt Caroline for guidance at times, to keep his work as perfect and as close to what she and his father had accomplished.

John introduced at least two of his sons (he had 12 children), John and Alexander, into the science, but their work did not come near to all that their father did.

Stephen Case, in Making Stars Physical, introduces the incredible life and work that John Herschel accomplished in his lifetime; it also shows a son and a nephew so enthralled with the accomplishments of his father and aunt that he very much desired to follow in their footsteps. Case gives a clear and concise look into someone often overlooked, as William and Caroline are “the Herschels” in people’s minds.

He even, although very quickly, mentions the fiasco of John’s alleged “discovery of life on the moon,” courtesy the New York Sun. Case’s research into John’s life makes for a complete introduction to the man, and this book will surely become the ready encyclopedia for John Herschel in the future.

The Girls of Atomic City

Denise Kiernan, Touchstone (Simon & Schuster), New York, 2013
Reviewed by Francine Jackson

There recently have been books about women in science, most notably Hidden Figures, concerning the mathematicians who worked at NASA during the space race, and The Glass Universe, Dava Sobel’s wonderful work on the women hired at Harvard University at the turn of the 20th century who translated over half a million glass plates into our current understanding of the stars.

But, in the 1940s, there was another group of mostly women, almost all just out of high school, who were asked to take jobs away from their homes, and do work that they could not talk about. In addition, as workers, they could not discuss what they were doing even with their coworkers, although what they were asked to do seemed to have no apparent purpose to them.

Some were chosen to clean pipes; others were to watch dials; still others sat in cubicles monitoring “calutrons.” Individually, their jobs didn’t make sense to them, but the pay was good, and, as long as they didn’t speak of their work (they would be instantly fired), their living conditions were generally better than their original homes.

It wasn’t until 1945 that the reality of their contributions became known, when it was revealed that their place of business, Oak Ridge, Tennessee, was pivotal to the end of World War II and that they had contributed to the creation of the atom bomb.

Author Denise Kiernan, in addition to an engrossing story of these women, follows the progression of the weapon from 1934, beginning with geochemist Ida Noddack reading Enrico Fermi’s paper on the behavior of bombarding neutrons into atomic nuclei. She considered the possibility of splitting a nucleus, an idea that was believed to be too fantastic to be useful. From there, others began to believe in the concept of “tubealloy,” and its possible reaction by fission.

(Continues on page 69)
For quite some time now, people have wondered if there was a way to continue rich discussions about teaching astronomy that goes beyond conferences, www.facebook.com/astromoneyeducation, and the Astro-Lrner e-mail group and meet regularly face-to-face.

We’re all busy, to be sure, and the idea of having yet another meeting to go to flies in the face of productivity and time-management advice.

However, many of us have no one to talk to about astronomy teaching, learning, and grading issues. You might be the only person in your department who teaches astronomy, an adjunct with no regular contact with your colleagues, or you might not be meaningfully affiliated with any school, college, or university. Most of us do not have any colleagues we can fruitfully interact with on a regular basis. This is a problem in need of a solution.

Thusly is born our weekly face-to-face video-teleconference “anti-faculty-meeting” meeting for astronomy educators. We call our meeting Astro Base Camp (or ABC for short). It is the weekly place to come to in order to hang out with your favorite hot (or cold) beverage and meet “face-to-face” via video-teleconference with colleagues who are dealing with the same issues you are.

Think of it as something half-way between an online mastermind mentoring group and an informal coffee klatch.

This spring, Astro Base Camp meets via zoom desktop video-teleconferencing on Mondays at 6 p.m. eastern, 5 p.m. central, 4 p.m. mountain, and 3 p.m. Pacific (folks in Arizona, Hawai’i, and Australia will have to figure out what time that is) during the academic year.

The meetings are already underway and we continue gathering on Mondays for the rest of the semester. We meet using zoom at zoom.us/my/caperteam from your phone or computer.

Moreover, if you’d like to extend the conversation outside of our weekly hour-long meeting, we are all set up at astrobasecamp.slack.com to continue the discussion, share materials, and otherwise commune remotely with like-minded astronomy educators for support, brainstorming, and camaraderie.

As a first step on the journey, come over and sign up at https://tinyurl.com/abc-signup-23, then mark your calendar for Monday afternoons. Learn more at our new website: www.caperteam.com/astrobasecamp

We hope you’ll join us, see some old friends, make some new acquaintances, and not feel so isolated in your astronomy teaching endeavors.

- Katie Berryhill, Los Medanos College, Martinez, California
- Tim Slater, timlaterwyo@gmail.com, University of Wyoming, Laramie

(Book, continued from page 68)

The chapters alternate between the life of the workers and the scientific progression of the final product. The author also spent much time interviewing the surviving workers, and their stories are incredible. All of them, just out of high school, realized that what they were doing was important, although individually they had no concept of what their jobs were. And yet, for those who were alive when this book was written, they still had a pride of their place in history.

The Girls of Atomic City, in addition to being a great introduction to the life and times of people willing to do whatever they were told for the common good, and a solid history of the 1940s atomic age, is a way to remind us that there were girls in the World War II effort that did more than we had ever imagined.

Planetesimals: Early Differentiation and Consequences for Planets
Ed. Linda T. Elkins-Tanton and Benjamin P. Weiss, Cambridge University Press, 2017
Reviewed by Bruce L. Dietrich, Wyomissing, Pennsylvania, USA

This trans-disciplinary graduate level tome captures the excitement and mystery of our developing solar system. It is the work of more than 39 acknowledged experts who describe the history of our amazing dynamic home. Linda T. Elkins-Tanton is the director of the School of Earth and Space Exploration at Arizona State University, and Benjamin P. Weiss is professor of Planetary Sciences at the Massachusetts Institute of Technology. Through their skillful editing all four sections of the text seamlessly merge: Dynamical Evolution, Chemical and Mineralogical Diversity, Asteroids as Records of Formation and Differentiation, and Early Differentiation and Consequences for Planet Formation.

New data from asteroids and second glances at our meteorites inform our understanding. Forming from what less-reverent undergrads would call celestial dust bunnies into truly formidable bodies, which subsequently behaved as if they were in continual conflict while developing amazing chemistries and intense magnetic fields, our solar system emerged. Where did our water come from? Exactly how did proto-planetary disks begin? Is this model of the solar system really congruent with that of the systems around other stars?

The whole story is presented here, written in literate prose with the abundant mathematical, chemical, geological, and metallurgical background to enhance serious scholarship. This is the central focus of planetary science. All the data are clearly presented and a beautiful section of color plates is included. This truly is an essential reference for those interested in planetary formation, solar system dynamics, and exoplanets.

April Whitt is an astronomy instructor at Fernbank Science Center in Atlanta, Georgia, USA. She shares that she is so old that she has flown on both the Kuiper Airborne Observatory (KAO) in 1995 and the Stratospheric Observatory for Infrared Astronomy (SOFIA) in 2015.
Taking on the master plan

Matthew, Florence and Michael

Sounds like introductions at a family reunion? “Shannon Lee, meet your Cousin Matt, Grandma Flo, and Uncle Mike.” However, this is actually the family of hurricanes which recently devastated the Robeson Planetarium in Lumberton, South Carolina.

Previous articles in Planetarian and on the net have chronicled the adventures of Ken Brandt, the Robeson’s director and science teacher for the school district. Those articles recounted how, in 2016, he salvaged operations after hurricane Matthew inundated the planetarium with more than a meter and a half of water. Ken shifted to a mobile dome in donated space, didn’t miss a day of teaching, and has continued to diligently pursue funding and land to rebuild.

But wait! The 2018 hurricane season brought not one but two more direct hits named Florence and Michael. More wind and water meant more damage to the old planetarium building, rendering it completely unsuitable for further occupancy (if that question was ever in doubt). Ken, with his portable universe loaded in his trusty Prius, was approved to set up the dome for shows in refugee shelters, as if his regular teaching load wasn’t enough.

The Robeson celebrated its 50th anniversary in January—congratulations to Ken and his predecessors Matthew Perkins and Robeson founder James Hooks! Half a century ago, no one foresaw the growth and development that would occur in the Lumberton area. There were no computer models for flooding, no satellite data, no laser surveying equipment. The building was designed and constructed within the known constraints of the land at that time.

This quarter and the next Outside Space will be about master planning for the land and site for your planetarium. Now we’re really in outside space: outside the dome, outside the building, out where the trees, sun and stars are. And where the water is.

Master planning requires you to look far into the unknown future, into the fourth dimension, and anticipate what your planetarium building might be 5, 10 or 50 years from now.

To illustrate what a master plan could be, we have provided some example diagrams of how the Robeson could be re-built, particularly with strategies for the long-range future. Since no other possible sites have been identified yet, we will consider what it would take to replicate the Robeson on its existing site.

I did have a cousin Matt, my mom was Flo, and my brother is Mike. So, of course, in our planning we will make sure that when Hurricane Timoteo strikes in a few years, Ken will be safe and dry!


The flooded Robeson Planetarium, post-Florence. Yes that’s mold on the glass, on the seats, and on the dome. Below: A very cranky Ken Brandt, who provided the photos.
What is master planning?

A planetarium show may last from 30 minutes to an hour in length. Digital planetarium technology may now last only a few years at best. Buildings, however, should last many decades or longer. Land should last forever, or at least until the next supervolcano or meteor strikes. So, creating a long-range master plan for your site is critical to your success.

The objective of the master plan step is to confirm that your planetarium will work on your available land, within the framework you established in the first step, the design brief. The master plan should have a very long-term perspective, since many planetariums cannot afford everything at the outset, but instead choose a phased strategy so that additional spaces or buildings can be added in the future.

Anticipating a future phase also provides room for new ideas, new technologies, and a place for future generations to achieve their own visions. Even if you can afford to build everything on your wish list in one phase, you may choose to reserve a portion of your land for things that can’t be seen in the crystal ball. With 20-20 hindsight, many opto-mechanical planetarians have looked in their rear-view mirrors and wished they could have gone back in time and held just a small parcel of land for a digital dome. So, save a place for your future Chrono-Synclastic Infun-dibulum!

Master plan process

Similar to the design brief first step, finding good advisors to bring on to your team will help your planetarium project a great deal. Since the master plan will require some technical analysis, drawings, and perhaps renderings, your architect or engineer should be leading this process. You will have the checklist below to help you in preparation, and to cross-check the progress and results.

Many master plans are created before the fundraising efforts have achieved all donation goals. Drawings and renderings from the master plan can be valuable in convincing donors to give an extra million or three, so your development and fundraising team should definitely be engaged in the master plan.

The master plan is also typically the point in the process where your plans for the new planetarium are made public. So, your other team members in Communications should actively participate in the master plan: community liaison, public outreach, member services, webmaster, branding, imaging, graphics, and other experts you have.

The steps in the master plan are easy: after a bit of preparation, hold two workshops to develop a preliminary and then a final master plan.

Design Concepts

In master planning, the role of the planetarian is to contribute your knowledge of how planetariums work and what your visitor’s experiences should be. Rely on your architects and engineers to analyze technical planning issues such as traffic studies, soil testing, and storm water management.

- Where is the location and what is the context and neighborhood?
- How will visitors arrive and depart from the planetarium?
- How much building and parking is required?
- What is the available land area and the site’s maximum capacity for future phases?

This quarter’s concepts illustrate several master planning design ideas. Please use them in any way to help your project.

If you have cool ideas or images, please send them to us to share with the entire IPS community. The whole set of diagrams are posted on the IPS website at www.ips-planetarium.org/page/2017DesignGuide☆

(Continues on next page)
Master plan preparation

In the design brief, your team will have analyzed the site and confirmed that there is adequate capacity for everything with a test fit during the feasibility test. If that test fit was not completed in the design brief step, then that should be the first part of your preparation in the master plan step. If there is not adequate capacity on the site, then you may have to go back to the design brief and re-prioritize. Or, a tight site may be one of the solutions that you explore in master planning, such as designing a taller building with multiple stories.

The design brief report will be your primary reference for the master plan. For other preparation materials, you should collect a good photographic and video record of your land, including aerial photography, and include any existing buildings.

Finally, you will need accurate background drawings of the land and existing buildings. If you do not have an accurate drawing of the land, you will need to hire a land surveyor to provide a physical survey of the proposed planetarium site. As a minimum, that survey should show: adjacent context (as appropriate), site boundaries, existing structures, topography, easements, underground utilities, and if possible, trees and landscaping.

Your design professionals should analyze any technical constraints and opportunities such as zoning regulations, soil conditions, or flooding control.

The final preparation task should be for your architect or engineer to draw one or two options for the site. The option(s) should include plans and sections of the new planetarium and existing buildings, exterior areas, parking, landscaped areas, open space, and of course, future phases.

Preliminary master plan brainstorming workshop

This workshop should be a continuation of the previous two workshops held during the design brief step. You should invite the same team members as well as any new team members identified above. If the 2-hour or working lunch format worked well before, you should continue that, or pick whatever format is comfortable for your team.

The team should first review the preliminary option(s) and discuss their advantages and disadvantages. The majority of the first hour should be devoted to considering all elements and brainstorming as many ideas as possible. In the second hour, the team should prioritize the options and ideas, and move toward agreement on one option or a hybrid option of many ideas.

After the workshop, it truly will be “back to the drawing board.” Your architect or engineer will then revise the plans to reflect the best option or hybrid, in preparation for the final approval workshop.

In the next Planetarian installment

Next quarter we will conclude the master planning process, which will provide you with a physical plan for the long-range future of your project. This perspective will help guide your decisions as you move into the subsequent building design tasks, which we will continue to explore through 2019.

CHECKLIST: Master Plan

Context and Neighborhood
- Will the master plan provide a favorable benefit to your community; will the planetarium be a good neighbor; will this create public support and enthusiasm?
- Does the site plan and building massing fit within the context of the surrounding area?
- Does the auto traffic work well within the existing public road capacities?
- Does the plan help improve the natural environment?

Visitor Arrival + Departure
- Does the site and building convey an exciting and interesting image?
- From the street, can pedestrian visitors easily find their way to the planetarium?
- Is there a comfortable loading area and convenient parking for the disabled and elderly?
- For school buses or tour coaches, is there a safe queuing/pick-up area?
- Have you given priority access for bicycle parking and public transportation?
- Is auto parking visible and auto circulation smooth?
- Are sidewalks and plazas safe and fun, especially if your site has some topography?
- Is there a weather-protected exterior waiting area by the entrance?

Site Layout
- Are gardens, fountains and landscaped areas woven into the natural environment and open space of the site?
- Are outdoor program spaces linked together with indoor spaces, e.g., how do exhibits, playgrounds, star-gazing, or café patio connect to the planetarium inside?
- If there are multiple phases, how will they be expanded and flow together in the long run; will construction of later phases have minimum disruption to on-going operations?

Technical Items
- Can emergency vehicles, ambulances, and fire trucks quickly move into and around the site?
- Is truck access to the loading dock straightforward?
- Are recycling and waste dumpsters screened from view?
- Are utilities, transformers, and other exterior equipment safe for maintenance access, but screened from view?
- Does the plan comply with all codes and zoning?
- Does the plan address storm water management, soil conditions, vegetation, and environmental impact?

Budget Re-check
- Are the final master plan quantities still within the ranges approved during the design brief step?

Schedule Re-check
- Is the schedule for master plan still consistent with the timeframe approved during the design brief step?
- Are any future phases for the master plan clearly defined and communicated so the next generation will understand the concepts?

Master Plan Checklist

As in our previous steps, we have provided a checklist for your reference. The Master Plan Checklist above is also available digitally on the IPS website. Please contact the IPS Design and Operations Committee if you need help! www.ips-planetarium.org/page/2017DesignGuide
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We need to celebrate astronomy and planetariums more often

Hard to believe, but it's been a decade since we celebrated the 2009 International Year Of Astronomy. I kind of wonder if we need one of these every 10 years just to keep spirits up (or bottoms up, perhaps).

What we do have to look forward to is the 100th anniversary of the planetarium projector itself. Again, it is kind of hard to believe that we have been shining small dots of light up at domes for so long and people never tire of it. Well, some do, which is why we've progressed.

We lowly amateur planetarians need love, too, (not to mention spendable cash) to keep our meager operations going. There's always the big question: “Where to look for support”? Well, why not to our big brothers, those that actually make a living doing this? But what could we exchange for their overwhelming generosity? How about a rock opera, or perhaps rock rap or rock poem readings. Yes, so much rock that you will probably never make it to the end.

You think I jest, ye of very little faith; you demandeth proof of such an overwhelming undertaking. Take this (Copyright Gareon Music, used with permission):

From the (rock) Opera “Beyond The Sixth Magnitude”
It started with Zeiss, about a century ago,
and where it would end, no one would know.
Light came from lenses, light came from holes,
but the image created was a sight to behold.
People would look up, totally in awe,
by the image of starlight, that they all saw.
The equipment we use might be old,
but look at the age of the folks in control.
And like old equipment, used anywhere,
it’s best in the dark, if you use it with care.
The plastic is brittle, and will probably break,
so turn up the volume, until your ears ache.
And if our music sounds a bit out of tune,
remember our tools are considered heirloom.

WOW, unbelievable isn’t it??? And if you sing it as rap, you’re probably wrong. Think of it in B flat major. It would be sung G,C,D,D#,D,C,D#,C,A#,C,D#,D#,F,G,A#,G,G,G.

Imagine 10 or more of these planetarium epic songs and poems on one CD for the unbelievable price of $10 (cash) + $5 (cash) shipping and handling. Hey, if William Shatner could do it, why can’t we? And even if you never listened to it a second time, instead using the disc as a coaster after playing, your heart will feel fulfilled through helping to keep the amateur planetarians website alive and well.

Not sure if that will make it past the eagle eye of our editor, but you can’t fault a guy for trying. Anyway, on to more usual things.

Keith’s captured quips, chapter six
“I liked the moon. Because it looked nice to live on.”
“I think the word gravity is very intense.”
“I especially like the cartoon. Next time I would like to see a longer cartoon.”
“That thing up stairs was cool. It was hot.”
I especially liked __________. Next time I would like to see __________. (Clearly this letter was modeled after a generic sample provided by the teacher.)

Ten years ago
March 2009: This is the first issue of the “International Year Of Astronomy 2009.”

I note quite a few pages are devoted to reviews of both books as well as fulldome digital/video. Steve Case provides reviews of a few of these presentations.

I will not begin to review his reviews as good or bad (that’s in the eye of the beholder), but I note that many of these videos are under 30 minutes in length. I find this interesting and wonder if the attention span of people has really deteriorated that much. I have a hard time keeping my shows to an hour and have had no negative comments from anyone of any age groups.

Perhaps it is the cost of production that keeps them short. After all, how many of these specialized presentations can be sold or leased out? Also, I must consider the number of times the theater wants to run the show. The more runs, the more viewers (usually); the more viewers, the more revenue; the more revenue, the greater the chance to lease more programs.

Another new column penned by Judith Rubin talks about the immersive digital dome from production to presentation. Dan Neafus from the Gates Planetarium at the Denver Museum of Nature and Science gives three points for producing good dome movies.

• Respect your audience.
• Respect for the dome venue. Basically make use of the screen you have.
• Production quality.

Twenty-five years ago
March 1994: In Jeanne E. Bishop’s article on “North American Indian Archaeoastronomy and Ethnoastronomy” (two words my spell check doesn’t recognize) I learned something new (it tends to happen more and more the older I get). The Zuni’s four sacred directions are the solstice sunrise and sunset points rather than the cardinal directions. It is easy to see that the beginning of summer and winter would be more important to them than finding north. All in all, this could be the beginning of a good show.

In Edward F. Albin’s article “Planetarium Special Effects: A Classification of Projection Apparatus,” a first call is made for some kind of standardization for both video and audio in planetarium programs. Back then and certainly today with exponential growth in technol-
ogy, trying for any standard is like shooting at a moving target. The problem is that wherever you hit you tend to be stuck there unless you have tons of disposable funds.

Perhaps this is why the classic optical/mechanical projector is still in use. I remember when Windows 7 came out just about the time I retired, and I found that many of my old programs didn’t work any longer. With much less disposable income, you can bet that a lot of the older XP machines are still in use around my digs (and are doing their jobs just fine, I may add).

Dr. George Reed of West Chester University asks the question we have all asked ourselves, “Who in the Hell Needs a Planetarium?” He points out the the buzz word of the day is “virtual reality.” Remember that this is back in 1994. It appears that the buzz word today is also “virtual reality,” but just with more expensive and more powerful computers.

Dr. Reed also points out that the planetarium experience, then seventy and now almost one hundred years old, has always been a virtual reality experience.

How many of you miss the smell of acid fixer in the morning? There was nothing like working in the dark with film and chemicals to wake a body up. That smell would linger on one’s fingers for up to a week, no matter what soap you used. Richard McColman reviews the do’s and don’ts when developing film. He even delves into color slide processing, something I never got right and was happy to let Kodak do. While a time-consuming pain at times, I find myself missing it, just a little. Perhaps I should give a class for folks who don’t know what a sprocket hole is.

I always love Jane’s corner and this one is full of gems, especially the teacher who said “The phases of the moon happen because we see the moon from different sides of the Earth.” I’ll just let you digest that one for a while.

Forty-five years ago

March 1974: This was an interesting year for Planetarian in that there were only two issues, a spring/summer and a fall/winter. It looks like it was typeset on a typewriter from the font used. At least they had an IBM Selectric with the little ball (one can tell, as the type face can be changed easily. I can almost smell that mimeograph ammonia smell.)

“Planetarium for the Deaf” by Lionel Daniel delves into getting the audio portion of any presentation to those with hearing loss. In this day changed easily. I can almost smell that mimeograph ammonia smell.)

The answer is slides projected with a simple written description of the audio track. Making that many slides could prove to be expensive, even with inflation moving the decimal point, a $500-per-month budget still doesn’t hold a candle to the multi-million-dollar effects that make sci-fi movies so special. Yet, at the same time we are moving away from the educational value of the classic planetarium that Mr. Spitz intended to a special effects movie.

This is something that has been so beaten to death that virtually no blood remains, but it is interesting to me that the “handwriting on the wall” was scribed some 45 years ago. Well worth a reading today.
Jon Elvert joins staff of Ash Enterprises

Ash Enterprises, headquartered in Cocoa, Florida, announces that Jon Elvert has joined the staff as Sales and Marketing director.

Elvert, a past president of IPS, has served in the planetarium field as director of planetariums in Yonkers, New York, Eugene, Oregon, and Baton Rouge, Louisiana, where he oversaw a broad range of educational programs and two major theater renovations, including acquisitions of fulldome video systems.

Jon completed an internship program at the Strasenburgh Planetarium in Rochester, New York and served as an English program presenter at the Carl Zeiss Planetarium in Stuttgart, Germany. His peers elected him president of the IPS for 2003 and 2004; he was also elected president of the Pacific Planetarium and the Southeastern Planetarium associations. He was named an IPS Fellow in 1992.

Educated at the University of Nevada, Reno and University of Tuebingen, Germany, Jon taught introductory astronomy at the University of Oregon and Lane Community College. He hosted four planetarium conferences—IPS2012, PPA1993, WAC2001, and SEPA2012. He served the IPS as PPA’s affiliate representative for eight years, chaired the IPS Outreach Committee, and has been chair of the IPS’s Vision2020 Initiative since 2014.

Ash Enterprises provides the planetarium community with hard-to-find products and services GOTO, Spitz, Minolta, Viewlex, and other opto-mechanical projectors, along with RSA Cosmos and Ash’s own Warp Media Digital Systems. The company also does some installation work for other companies as well: Astro-Tech’s Domes, First Class Seating, ChromaCove™, and East Coast Control Systems to name just a few.

Anna Green starts new life chapter in Germany

After eight-and-a-half years serving the McDonnell Planetarium at the Saint Louis (Missouri) Science Center in multiple roles, Anna Green resigned from her position as planetarium manager in November 2018 to start an exciting new chapter in her career.

Since then, Anna has been part of the Stiftung Planetarium Berlin (SPB) in Germany as the head of the INTENSE Project. The Stiftung Planetarium Berlin serves Berlin with two large planetariums (23m and 20m), a small planetarium (8m), two observatories and a modern mobile dome (6m). As a branch of the Education Department for SPB, Anna oversees the INTENSE Project and its future, working with the students of Berlin with the mobile dome, on content development for students and teacher development, and to support all of the domes of the SPB.

With the project INTENSE, the Planetarium Berlin’s mobile planetarium dome travels through the schools of the capital and visits pupils on site. The aim of the project is to arouse and promote the talents of students in the STEM subjects (mathematics, computer science, natural sciences and technology). The project is made possible by a donation from the Department of Giftedness of the Senate Department for Education, Youth and Family in Berlin.

Mark Webb is new staff member at GOTO

Nobutaka Goto, president of GOTO INC, is very pleased to announce that Mark Webb has joined GOTO’s international team effective January 1, 2019. Mr. Webb retired from his longtime post as theaters director at the Adler Planetarium to work in U.S. marketing and product development from his base in Chicago. He joins GOTO’s USA Liaison Ken Miller and the staff of Ash Enterprises to focus on and fulfill the unique requirements of American planetarians.

During his 23-year term at the Adler Planetarium in Chicago, Mr. Webb played a role in the production of all of Adler’s shows. As manager of Adler’s three theaters, he ensured excellent maintenance of one of America’s first major opto-mechanical projectors and oversaw the addition of fulldome technologies in its two large domes.

Prior to his time at Adler, he served similar functions at the Cernan Earth and Space Center in River Grove, Illinois. He is a strong advocate of live, interactive programming in the dome, and has been invited internationally to speak on this mode of presentation. He is well-known and respected by planetarians around the world for his very active memberships in IPS, GLPA, LIPS, and IMERSA.

GOTO INC, based in Fuchu, Japan and with systems in more than 600 planetariums worldwide, it is recognized in the planetarium world as a leader in innovative design, optical excellence, and manufacturing proficiency. In addition to planetarium equipment, GOTO INC also produces and distributes planetarium programs and offers design, maintenance, and management services to planetarium operators.

Strasenburgh upgrade stays true to historical roots

On January 12, 2019, the Strasenburgh Planetarium at the Rochester Museum & Science Center in Rochester, New York re-opened after four months of theater and lobby work coinciding with its fiftieth anniversary. Thanks to generous benefactor, Dr. John Bruning—whose business was high-precision manufacturing using specialized optical devices—and his wife Barbara, the planetarium is operating with Digistar 6 running at 4k with two Christie Boxer projectors equipped with the latest hemispherical lenses made in Rochester and donated by Navitar.

The projectors sit on stands supplied by Minitec Framing Systems from their plant in Farmington, New York. New Bowen Technovation lighting and theater control, new speakers, and sound system round out the upgrade.

Planetarium Director Steve Fentress reports that the 1968 Zeiss VI will “stay until it is replaced (money not there yet), and will make an appearance in just about every show, because our audiences expressed great concern about what would happen to ‘Carl.’ Eliminating this machine was never part of the plan.”

The planetarium has a unique history. “Fifty years ago, Clara Strasenburgh ordered that the first performance in the new Planetarium should be for the construction workers who built it. Continuing that, the first performance of our in-house-produced Digistar show Outer Space to Inner Space was for the tradespeople who worked on the renovation and their families. I have the letter that Mrs. Strasenburgh wrote for Ian McLennan to read at the event in 1968, and I got it out and read it to the new generation of tradespeople.”

Hiroshi Naka
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Vadim V. Belov
1941-2018

On 13 November 2018, the life of Vadim Viktorovich Belov was interrupted. He was one of the most active participants in the creation of the Association of Planetariums of Russia in 1994, and spent more than 20 years of active involvement: as the chief editor of the Russian Planetarium Association newsletter, the secretary of RPA, and source of the quarterly submission to International News in Planetarian.

This infinitely devoted planetarian man was my pillar at all stages of the promotion of the project and the construction of planetarium in Nizhny Novgorod.

Vadim Viktorovich’s distinctive quality is his active life. In 1990-1993 he was a deputy of the Gorky (Nizhny Novgorod) City Council of People’s Deputies, where he contributed to the introduction of local self-government and territorial public self-government in Nizhny Novgorod. He was deputy chairman of the city commission for publicity and communication with social movements and a member of the Organizing Committee of the Russian Association of Territorial Self-Government Bodies.

In the early 90s he became actively engaged in the creation of the Association of Planetariums of Russia. With its establishment in 1994, he was its permanent secretary, member of the board, chief editor of the Bulletin of the Association of Planetariums of Russia and the Eurasian Commonwealth of Planetariums. The association, in the difficult times of the 90s, was the protector that that defended planetariums in difficult situations.

The Nizhny Novgorod Planetarium itself also needed protection while working in a religious building on the territory of the functioning Annunciation Monastery. The planetarium was saved with a new building in 2005 by the whole world, but Vadim Viktorovich was its most active and devoted defender. With his direct participation, conferences of the APR were organized in the period of its formation.

Much was done by him to maintain contacts between Russian planetariums and the International Planetarium Society. Quarterly, for many years, he prepared and sent materials on the work of Russian planetariums to the section International News in the magazine Planetarian.

Vadim Viktorovich was my main support at all stages of promoting the project of the new building of the planetarium in Nizhny Novgorod; it was truly a path through thorns to the stars. At the design stage of the building, the role of V.V. Belov was invaluable. He devoted himself to this work.

He completed his career in the planetarium as a researcher. He developed suits on astronautics and astronomy, biennial sessions in the digital star room, and, almost always, his sessions ended with the audience’s applause, which was possible only to him alone.

A book being written by him dedicated to the history of the Nizhny Novgorod Planetarium remains unfinished, but his work throughout his life will remain a bright page in the history of the planetarium.

V.V. Belov. His colleagues, relatives and numerous friends will keep the of this bright person’s good memory.

Zina P. Sitkova, Chief expert
Director of the Nizhny Novgorod Planetarium, 1987-2009

(Astronomy Backpakers, continued from page 32)

using the equipment and opening the doors to the Amateur Astronomy Group of Caldas, a group that was created by me, after about 3 months of inhabiting the city.

In Colombia there will surely be other planetariums of which I did not know their existence and some that were not on my route, but the truth is that it is a country with a strength in research and dissemination of astronomy. In these planetariums, I left the doors, or rather the windows, to the universe open, thanks to its people.

Ecuador

This country breaks the record (until now) of functional Zeiss equipment. Before visiting Ecuador, I had sent many emails and tried to contact so many outreach groups so that just after arriving in the country and coming to the institutions I was finally able to participate in them.

Planetario-Cultural and Planetary Center of the Military Geographic Institute (IGM)

It is the largest Planetarium in Quito, a dependency of the army, but also where all the cartography works of the country are carried out. Its Cultural Center and planetarium is a large complex of the Ecuadorian Science and Geography Museum. Its planetarium has more than 300 seats, a dome that reaches almost 20m in height, and a fulldome digital projection system Digistar V.

With scale models and experiences of immersion and experimentation as well as a scale model of the solar system in the terrace-Mirador, it is a quite complete place for the dissemination of astronomy and sciences. There, we celebrated the Week of Astronomy, an event for civilians, military, and friends.

Also, I visited a planetarium in Parque La Carolina and belonging to the Mundo Juvenil Foundation. A cupola of approximately 10 meters in diameter, also has a Digistar V projector. There I offered a unique day of special sessions where a large number of people attended.

Quito’s third planetarium is located in the Middle of the World City. It is more of a tourist than an informative place. It has a Mark II projector that works at 30% of its capacity and the lessons are supported by video projections.

After enjoying my participation in these planetariums, I made several routes before arriving in Guayaquil, where I was located in the Planetarium of the National Military Oceanographic Institute of the Navy of Guayaquil. There they have a wonderful team and the planetary projector Zeiss Model VI.

In a dome similar to the Humboldt Planetarium’s, I was able to hold sessions as if I were in Caracas. During one week, the lectures were given to visitors from universities, schools, astronomy groups, and the general public.

Finally, in the south of Ecuador, I visited the Planetarium of Cuenca, a planetarium in the shape of a planet, with a Zeiss Model II projector on display and a fulldome projector in use in the planetarium.

There I met my friends Ana and Ánuel from ACOGE A SCIENTIFIC-IC, where we presented our projects and culminated with a telescopic observation.

Being this the last of the planetariums to visit, I undertook my route to Peru. Many more planetaries and adventures await me there.
2019 - International Year of the Periodic Table

10 March. International Day of Planetariums, public initiatives between 9 and 10 March. www.ips-planetarium.org/page/IDP

Contact Andrey Lobanov: lobanov@planetariums.ru

25-27 March 2019. RSA Cosmos Users Group Meeting – USA, Charles W. Brown Planetarium at Ball State University, Muncie, Indiana USA. planetarium@bsu.edu

26 March. Deadline of PlanIt Prize for an original video production, organized each year by Italian Association of Planetaria (PlanIt), Italy. The prize is open to all. First prize 500 €. www.planetari.org

5-7 April. Italian Association of Planetaria (PlanIt), XXXIV National Conference, Planetario Osservatorio Astronomico di Cagliari-INAF, Italy. Contact: osservatorio@serafinozani.it; www.planetari.org

12 April. Yuri’s Night. The international celebration that commemorates milestones in space exploration. Learn more at https://yurisnight.net/

4-6 May. Gesellschaft Deutschsprachiger Planetarien e.V. (GDP), Annual Meeting of the German-speaking Planetaria (GDP), Mediendom, Kiel, Germany. www.gdp-planetarium.org

18 May. International Museums Day, icom.museum

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22-23 June. International Planetarium Society Council Meeting, Perlan Planetarium, Reykjavik, Iceland. www.perlan.is


2 July. Total solar eclipse, South America.

12-13 July. On the Moon Again! Worldcelebration of the 50th anniversary of the moon landing. An initiative of French scientists with world-wide collaboration; www.onthemooamagain.org

20 July. 50th anniversary of the Apollo 11 landing on the moon.

23 July–1 August. Spitz Summer Institute. Spitz, Inc. Chadds Ford, Pennsylvania, USA. Dome-based education using the SciDome planetarium; courses cover astronomy and earth science presentation, curriculum, program creation. Contact jtowne@spitzinc.com or see www.spitzinc.com/institute.

31 July. Deadline for the applicants of “A Week in Italy for an American Planetarium Operator” in collaboration with IPS Portable Planetarium Committee. www.ips-planetarium.org/page/italy

31 July - 3 August. Western Alliance Conference (WAC 2019). https://www.facebook.com/events/1956848214363185/

14-16 August. 2019 Live Interactive Planetarium Symposium. Cradle of Aviation in Garden City, New York, USA. Contact Karrie Berglund <karrie@digitaleducation.com> or see www.lipsymposium.org


6-8 September. NPA meeting, Nordic and Baltic Planetarium Association, Vitenfabrikk, Sandnes, Norway. Conference language is English. Contact: Sven Gundersen, sven.gundersen@aerums.ee; NPA president Aase Roland Jacobsen, aase.jacobsen@iau.dk. www.aerums.ee/vitenfabrikk/en www.facebook.com/Nordicplanetariumassociation


4-10 October, World Space Week. www.worldspaceweek.org/calendar

23-26 October, Great Lakes Planetarium Association Conference, Toledo, Ohio, USA.


2020 - International Year of Plant Health

18-19 June. IPS Fulldome Festival, Edmonton, Alberta, Canada.


21-25 June. 25th International Planetarium Society Conference, Tellus Aviation in Garden City, New York, USA. Contact Karrie Berglund <karrie@digitaleducation.com> or see www.lipsymposium.org


For corrections and new information for the Calendar of Events, please send a message to Loris Ramponi at osservatorio@serafinozani.it. More details about several of these upcoming events is included in the International News column in this issue. The most up-to-date information also is available online in the IPS Calendar of Events at www.ips-planetarium.org
Ancient hieroglyphics reveal conference humor

I still take notes at conferences the old fashioned way, with pen and paper. The ensuing hen-scratch can take years (literally) to decipher. Here’s a totally random selection of some translated hieroglyphics:

When Neil Armstrong visited James Hughes’ planetarium, he was invited into the console area, with a slightly lower floor than that outside the booth. James told him, “Watch out, Neil. That’s one small step.”

Kris McCall describing the (then upcoming) 2017 solar eclipse: “This eclipse will occur WHEN we say it will, WHERE we say it will, and for HOW LONG we say it will. And it’s during the DAY.”

A mission to a Kuiper Belt Object hadn’t yet happened in 2016. “Zero missions. Patience, young padawan.” We like our padawans.

New Horizons sailed past Ultima Thule for the New Year in 2019, leading to the title of “The APL (Applied Physics Lab) Spacecraft School of Witchcraft and Wizardry.”

In describing the New Horizons mission, Paul Schenk pointed out that “the Student Dust Counter doesn’t actually collect the dust of students.”

A weighty problem

A bit of trivia for an Apollo anniversary year: The rocket’s second stage was the last to be built, but when it was finished, the entire assembly was too heavy. That second stage had to lose weight. Engineers created one fuel tank with two chambers, to save 2400 pounds (1099.8 kg).

When Pluto was discovered, it was deemed to be too small to be a proper planet and to be disintegrating. It would disappear by 1984, “an ominous year back then.”

“The Robert Heinlein Award for Technology in Space” goes to the guy (gal?) who worked out how to use solar sailing and drag on MESSENGER’s solar panels. The craft used less of its fuel on course correction maneuvers, and was able to orbit Mercury a little longer, sending back more data. If you’re a fan of the television comedy “Big Bang Theory,” look for the three images from MESSENGER in Leonard and Sheldon’s apartment.

At another meeting, Tony Butterfield gave the paper that Carolyn Sumners was scheduled to give after Hurricane Harvey decimated Houston, with the flooding he referred to as “an excessive fresh water event.”

Mr. Carrington received an apology letter from a rowdy group that had visited his dome. “We’re really sorry. If you let us come back, we’ll be sure not to throw orange peels again.”

From one of Ron Kaitchuk’s astronomy summaries: “Exoplanets. We were going to find systems just like ours. Based on the huge sample of one.” He ended that speech with a quote from comic Stephen Wright: “A conclusion is the place where you get tired of thinking.”
It takes great technology to make a planetarium work.

It also takes creativity, knowledge, perseverance, and heart. It takes commitment. The GOTO team has amazing technology and we also bring all of these other qualities to your project – we’re committed to it.

GOTO is proud to announce that Mark Webb, Theaters Director at the Adler Planetarium for 23 years, has joined Ken Miller on the GOTO U.S. team. They are committed to helping you make the future of your planetarium the best it can be.

Make a commitment to reach out to GOTO today and start a conversation about the future of your dome.

We may already be friends, if not let me introduce myself. I’m Mark Webb. I’m still using Chicago as my home base in my new role representing GOTO in North America. Please feel free to contact me or say hello the next time we meet at a conference. If you are visiting Chicago let me know and we can try to meet up, maybe even visit the Adler together. If you are thinking about renovating your planetarium, or building a new one, let me know about that too because I would like nothing more than to listen to your plans.

For details, please see my self introduction on Goto’s website.

Sincerely,
Mark Webb
A Growing **Family** of Products and Services

Designing great planetarium solutions can only happen when we understand your goals and requirements. Evans & Sutherland combines the talented team at Spitz along with a global network of planetarium professionals.

Together we provide the best in fulldome planetariums, projection domes, shows, and educational solutions. Our dedicated engineers, customer reps, service technicians, educators, and producers share a common commitment: making your planetarium successful.

E&S welcomes the newest member to our team

**Christophe Bertier** - Sales Manager

“I am delighted to join the talented Evans & Sutherland team. E&S is a great company having developed the best planetarium solutions and leading the market over many years. I totally embrace the E&S philosophy to better serve customers with great products and support.”