Largest (and best!) in Indiana

In October, Ball State University in Muncie, Indiana, opened the Charles W. Brown Planetarium - the largest in the state. After operating a 30’ dome for more than 30 years, Dr. Ron Kallchuck moved into a totally new 52’ dome featuring a GOTO INC CHRONOS II HYBRID system with full dome video by RSA Cosmos. Prime equipment contractor Ash Enterprises helped to design the dome with 148 seats, great handicapped accessibility, and ample space for lectures or small ensemble concerts.

A vibrant undergraduate program at Ball State reaches more than 1,600 astronomy students each year — one of the largest enrollments in the country! In addition to this large and growing number of university students, the new planetarium will also serve area K-12 school children and the surrounding community, continuing Ball State’s 47-year tradition of providing all planetarium programs free of charge.

At the center of the action is the new GOTO CHRONOS II totally LED illuminated opto-mechanical star projector. It is getting rave reviews from astronomy faculty, amateur astronomers, and fellow planetarians who gathered for a Great Lakes regional conference in the dome one week after its dedication. The CHRONOS II’s 8,500 stars, combined with the 10,000,000 micro-stars which make up the Milky Way and deep sky objects are simply amazing. It is so realistic that the staff delights in loaning binoculars to visitors to show them the sky as it has never before been seen in a planetarium.

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On the Cover: Singing and teaching under the CMB—The House Band of the Universe take astrobiology education on the road. Read more starting on page 22. Photo provided by David Grinspoon

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Please notify the Editor of any changes on these two pages.

Contact the Treasurer/Membership Chair for individual member address changes and general circulation and billing questions.
I'm sure you've heard the proverb “it takes a village to raise a child.” There's controversy (of course) over the origin of this adage, but it looks likely that it comes from Africa.

More often, I hear it as “it takes a community to raise a child,” and today the variations on this theme are endless. All you need is a cause, and that's what it takes a community to do.

Lars Broman, who is stepping down from most of his planetarium activities, obviously believes firmly in the raising of the child part of the proverb. He stated this in a guest editorial in the December 2013 Planetarian titled “The Century of Our Grandchildren.” In it he described the Strömstad Academy and its scholars’ concern for the century ahead.

Lars also has been an active and caring member of the planetarium community for many, many years, and I will terribly miss seeing his name in my inbox and his cheerful Hej Sharon! when deadline comes around again.

I will, however, now be seeing email from another Lars, and I'm sure that we'll work well together too.

I'm sure Dr. Lars Petersen already knows he has large shoes to fill. (See International News starting on page 68.)

Writing in the third person (because it's difficult to write about yourself in first person in your own column), Lars had the following in his final International News column:

“This news appears in this, his 76th and final International News column, which he has been editing since 1996. This summer he stepped down as IPS Awards Committee chair, a position that he had held since 2007.

“In addition, the year 2014 will be the last year that his company Teknoland will conduct any business. One final company activity is a donation to Orion Planetarium of Teknoland's Warped Media system this fall; the company started in 1999.

"Broman will instead concentrate on other activities, including spending more time together with his eight grandchildren, continue as Strömstad Academy’s vice chancellor, conducting marriage ceremonies, and being active in the Swedish Green Party.

“His remaining planetarium commitment is being one of NPA’s directors for another year and, possibly, doing some consultant work.”

Take a second to study the picture below. Yes, it’s an adorable baby, and yes, Lars has every right to be proud of his latest grandson.

What I'd like you to notice is the expression in Marius' eyes. He's looking up at his grandfather with such an open, expectant, and fascinated expression, one that says “I'm happy to be sitting here and I trust you completely. What do you have to tell me?”

Sometimes we see these expectant looks in the faces of the children under our domes and feel motivated to earn their trust; to have them share in the wonder that is the universe and the many things in it.

We are the village raising not only Lars’ grandson, but every child we captivate under the stars.

That’s a heavy responsibility, and no one can do it alone. That's why it's so important to have a village, to have a community, to draw strength and assistance from, and our village, as planetarians, encompasses the entire globe.

The IPS is just the framework of the international planetarium community. It is there to help members communicate with each other (the journal in your hands goes a long way towards that goal) and to share information helpful to our jobs.

The more we communicate, the better our profession can become—especially if we band tightly into our community.

Please: join a committee. Contribute your talents to the greater planetarium village. And look into a child’s eyes and imagine just what talents can you can do together.
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Dear fellow Planetarians

Greetings to all of you around this marvelous planet!

Challenging days lie behind us—and ahead of us. We just witnessed a deadly day for space tourism when Virgin Galactic’s SpaceShipTwo disintegrated on October 31 above California, killing one of its co-pilots. And this happened just a few days after the October 28 explosion of the unmanned supply Antares rocket bound for the ISS.

How will the future of space flight be affected by these incidents? Is space travel worth the risks involved? Is the dream of “going boldly, where no one has gone before” still alive?

I believe it is—not only because the future rests on such days of setbacks, but also because it is driven forward by visionaries and by opening up new perspectives which allow us to put our daily life in a bigger context.

As I am now one of the “old guys,” I remember how much I was inspired not only by being an eye-witness of the Apollo era, but also by watching Stanley Kubrick’s masterpiece 2001: A Space Odyssey.

Since then film and planetarium production techniques have move forward at an extremely fast pace. From analog to digital, from HD to 4K and 8K, from high frame rates to streaming over IP networks, each with enormous new possibilities to create unforgettable experiences for audiences.

Now we have Gravity, a film that managed to reach out to a whole new generation of people. And, as I write this, I am looking forward to Christopher Nolan’s Interstellar.

Quite understandably, there has been a lot of discussions about the merits of these films and what they will do with our audiences and the planetarium—will they make us look bad? Well, just watch 2001: A Space Odyssey, which is once more hitting theaters for a limited time. Did this film hurt us? Not at all. In fact, the result was just the opposite, as it inspired people to look to space. Let us take advantage of these new releases for our mission!

On November 12, ESA the European Space Agency, achieved something that really sounded like science fiction: landing a probe on the nucleus of comet 67P/Churyumov-Gerasimenko, an astonishing, audacious technical achievement. It was not science fiction but science reality for the teams that have dedicated their entire lives to this mission, driven to push the boundaries of our technology for the benefit of science and to seek answers to the biggest questions regarding our solar system’s origins.

Watch the amazing short film Ambition (ambitionfilm.com), which was produced by ESA, in collaboration with Platige Image, directed by Tomek Baginski and starring Aiden Gillen and Aisling Franciosi. Ambition clearly tries to embrace science and fiction, using the language of blockbuster movie making to advocate the excitement of current research.

You can witness passion and human interaction not just in this very interesting production. You can see it for yourself, as I did with the people in the control room at ESOC, the European Space Operations Center in Darmstadt, Germany. I was there when Philae “kissed” the comet. I was truly moved by finally meeting Prof. Klim Churyumov, who not only is the co-discoverer of the comet but who is “one of us”—he is director of Kiev Planetarium, Ukraine.

The other name belongs to Dr. Svetlana Gerasimenko, also astronomer/lector at Kiev Planetarium. She was participating in the landing event via video-link from the European Astronauts Center in Cologne.

Due to the political situation, plans for my visit to Kiev Planetarium in September had not worked out, but now we finally met. We are now trying to find a date for my visit to Kiev in early 2015. And I am eager to arrange with him a live event for IPS so that Prof. Churyumov can interact with audiences at planetariums around the world.

Indeed, the Rosetta mission proves what we, as a global community, can do together. It offers all the elements for us reaching out beyond political and economic borders in order to create wonderful opportunities for the public in our planetariums in 2015 and beyond.

(See also www.esa.int/rosetta and follow hashtag #cometlanding on twitter.)

Remembering Carl Sagan

This epic journey reminds me of the NASA Voyager missions and the legacy of the unforgettable Carl Sagan, who would just have celebrated his 80th birthday on November 9. We salute you and miss you, and I know you would have loved the comet landing.

Carl once pointed out that probably 99% of all people on earth are born, live, and die without knowing their place in the universe. But now I think we have the tools to change that.

While Virgin Galactic has sold more than 700 tickets to paying customers for a ride on SpaceShipTwo, each costing more than $250,000 and barely offering more than a few minutes of a “near space” experience at only 100 kilometers from Earth, our planetarium domes offer trips much further out into space. We can go anywhere, combining our new digital immersive theater technologies with robotic eyes and ears in space like Rosetta.

For just a few bucks (and in some cases, for free) and without risking lives, we allow millions of people to virtually be on a comet nucleus, walk on Mars, or even witness the grand architecture of space, time and matter by using our domes as virtual spaceships and time
machines, providing context for the world we live in. So don’t be worried about Hollywood—we can offer something much bigger.

Indeed, I am convinced that what we planetarians can pull off is very powerful and of increasing importance in order to inspire and enable a better future for humankind on planet earth. And that is why the opportunity you gave me to serve this world community of planetarians for a second time as officer and president of IPS is such a special honor and privilege. I thank you for that, and for your friendship and support in this endeavor.

Old and New IPS Officers

This is my last column as IPS president as my two-year term will come to an end on December 31. For two more years I will still be an officer of IPS and continue to work with my fellow officers, then in the role of IPS past president.

After we successfully performed special elections, I am really pleased that Joanne Young is now fully onboard. She will take over the presidency of IPS on January 1. Joanne will be a wonderful president. She is a great and passionate advocate for planetariums of all sizes in all regions of the world!

Elections for the next round of officers concluded on December 1 and I look forward working in the renewed team of IPS officers in 2015-2016. And I salute Dave Weinreich, who’s 6-year term as officer of IPS will be finished by the end of this year. Dave, we all love you and your human spirit with which you win people’s minds and hearts. I look forward to work with you on specific projects where your expertise will be so helpful for our international community.

IPS Vision 2020 Moving Forward

If there is something I am proud of as an achievement of my presidency, then certainly the initiation and development of Vision 2020, our strategic planning initiative, comes to my mind. Vision 2020 is now gaining speed and moving forward.

On our IPS website you will find more information and the full makeup of the planning team and advisory group for Vision 2020. Chaired by Jon Elvert, the planning team consists of five persons, each one assigned the lead in formulation of one of the five goal statements:

- Karrie Berglund (Digitalis Education Solutions, Bremerton, Washington)
  Goal #1: Improve and increase professional development efforts that are based on research and best practices (e.g. summer schools, Kavli Institute).

- Dr. Mark SubbaRao (Adler Planetarium, Chicago, Illinois)
  Goal #2: Strengthen ties with the professional scientific community in the field of astronomy and other space sciences (e.g. ESO, NASA, ESA, NAOJ) to bring current research and discoveries to our audiences through immersive data visualization on our domes.

- Robin Sip (Mirage3D, The Hague, The Netherlands)
  Goal #3: Expand international collaborations in recognition of the more global nature of our society and increased media attention to foster enhanced financial support.

- Marc Moutin (Cite de L’Espace, Toulouse, France)
  Goal #4: Gain greater recognition for IPS members’ efforts and results, especially as related to STEM or STEAM education.

- Dr. James S. Sweitzer (Columbia College Chicago, Illinois)
  Goal #5: Provide support and leadership in transitioning to next-generation planetarium design, technologies and content development.

The planning team currently assists in the ongoing SWOT analysis, offering all stakeholders—current IPS members, non-member planetarians, and vendors—the opportunity to tell us their ideas and suggestions for the future of IPS.

The team already has collected hundreds of responses and decided to extend the deadline to the end of December. Even now, when you read this, you can still provide us with your perspective on what you would like IPS to be in the next decade. If you have not yet done so, we are asking you to participate in a brief exercise that currently reflects the Strengths, Weaknesses, Opportunities, Threats of and to IPS. Please go to the IPS website (www.ips-planetarium.org) and click on the Vision 2020 link to complete the survey.

It is important that planetarians in all regions of our worldwide society be encouraged by their IPS representatives and active members to give us their input. Please use either the pdf or the version in Microsoft Word (docx) if you have to reach out to those who will not access our website.

IPS officers met with the Vision 2020 planning team during the 50th Annual GLPA Conference (October 29-November 1, 2014) to discuss status and next steps.

Based on the upcoming results from the SWOT analysis, the planning team will collect white paper statements outlining strategies for achieving their goals and draft mission, vision, and value statements that will be discussed with IPS council in 2015, leading up to a two-day workshop with council in August.

I would like to thank Jon Elvert and the Vision 2020 team for their dedicated voluntary work in this important area. I and all the other IPS officers were really pleased to see the momentum building in this challenging endeavor and we have already received some really smart suggestions and ideas.

In addition, GLPA proved to be what we expected: a great platform for many personal conversations with members about IPS. GLPA was hosted by the new Charles W. Brown Planetarium at Ball State University in Muncie, Indiana, and drew approximately 170 participants, so we could gather input from this largest group affiliated with IPS during the conference. In addition, Jon Elvert presented Vision 2020 during a session to GLPA.

With its long tradition and far reach, GLPA has made many outstanding contributions to our field - reaching beyond the region and deserving attention by IPS as best practice for the future. If you look at the website glpa.org/conference/2014 you will already see one example: conference presentations that can be accessed online, all uploaded as videos to YouTube.

Although we have been doing that too at IPS conferences, we have to make sure this concept will be followed up by future IPS conferences and these recordings be preserved in our documentation in a searchable archive.

IPS Science and Data Visualization Task Force

Well, speaking about things I am really happy with, I have to mention again the name Mark SubbaRao. I feel really proud about launching the Science and Data Visualization Task Force and selecting him as chair. Those of you who attended his session at IPS 2014 in Beijing and now read his regular columns in this journal. They exemplify what IPS can do in this vital area: not just at conferences, but continuously between conferences, helping us to increase the potential for scientific communication and storytelling in the planetarium.

And this is especially true for his current column, which comes at an appropriate time to reflect on the capabilities and opportunities that the World Wide Telescope has opened up inside the dome, allowing the presentation with objects and images from ongoing research in the context of the night sky.

Mark and I are in agreement that IPS could be an important element for making sure that these capabilities are maintained. The opportunities will be explored in the coming months. Thank you Mark and all your great team members. You are spearheading an im-

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important area into the future, an ideal test bed related to goals of Vision 2020!

IPS Awards and Awards Committee

Please note, that this issue of Planetarian includes a call for nominations for our prestigious IPS awards by Manos Kitsonas, director of Eugenides Planetarium in Athens and now chair of the IPS Awards Committee. I am happy to tell you that, following our bylaws, the IPS officers have chosen from the list of IPS fellows Tatsuyuki Arai and Kris McCall as the two members in the awards committee chaired by Manos.

Please contact them if you have any questions or suggestions. In addition to already existing awards, Manos will start working on new awards reflecting our desire to support and encourage good content and presentations in planetariums. We will also evaluate and learn from what we did in the format of a festival during our recent IPS conference in Beijing and in Macao.

IPS Election Committee

The difficulties we had to go through this year with our special elections need attention in 2015, when council also will have to decide about the future makeup of the IPS Election committee.

It appears to me that in the interest of the future of our organization, a review of the procedures for elections is necessary because we need to win the hearts and minds of a young but creative and talented IPS members so that they indeed are willing to be candidates and are eager to compete in the next rounds of even more transparent election.

IPS Conferences 2014-2018

Once more I would like to thank our wonderful host Dr. Jin Zhu and his team at Beijing Planetarium for a most memorable conference in China. Jin, you and your team were such great hosts and worked so hard to make us feel welcome and to experience what your institution is doing for education for future generations! We all are most grateful for that.

I also want to thank the team at the Macao Science Center for making the first IPS Full-dome Festival become reality (as a pre-conference event in collaboration with the Beijing team), and a special salute to the Japanese Planetarium Society with its president H. Gan, plus JAXA and Nagoya Science Center, for putting together a great post conference tour in early July 2014, almost 20 years after IPS gathered in Asia for the first time.

Asia truly is a powerhouse for the future of planetariums and science education and I am sure that we have to come back for another IPS conference in this region—and that we should not wait another 20 years to do that!

If you want to visit a planetarium in China, you can now do so from your desktop. Daniel Audeon (Planetarium of Nantes, France) just finished working on a map showing all planetariums in China. Visit www.aplf-planetariums.info/en/index.php?onglet=planetariums&menu=china and you will find over 317 planetariums with exact locations and pictures.

There is a special map (you can click on the map) for China (similar maps already exist for the USA or Japan) to facilitate searching by regions on an interactive map, and also a list of Chinese regions. For each choice (continents or countries or regions), you open a table containing a list with just a few details and sorted by size. Then, you must click on the small picture (to the left) to open a personal page for each planetarium. See also www.aplf-planetariums.info/en.

I salute Daniel for this work and we will do all we can to work together for making the directory of the world’s planetariums more accessible and useful for you all by including more possibilities for multiple search criteria and making information openly available.

We all are now gearing up towards our next IPS conference in 2016 in Warsaw, Poland. The team working with Monika Malinowska and Maciej Liogowski, our hosts at the Copernicus Science Center, are very experienced conference organizers and have already provided us with the first drafts of the packages that will go out to vendors and potential sponsors. All is moving forward according to schedule and you will receive updates in the next issue of Planetarian.

And let us look further ahead, to 2018. The final decision on accepting the (one and only) bid from Clark Planetarium for hosting the IPS 2018 conference in Salt Lake City, Utah, will be made at the next IPS council meeting. Please expect a detailed article from our potential host, also in the March issue of Planetarian.

IPS Council Meeting in August 2015

The next council meeting is scheduled to happen August 7-8 at the Planetarium Rio Tinto Alcan/Espace pour la vie in Montréal, Québec, Canada. Our host will be Pierre Lacombe, whose planetarium features a set of new twin domes will provide us with a fantastic site to meet!

The Montreal planetarium has pioneered efforts for bringing live interactive music and visuals to domes, so I felt we could do something for professional development in IPS and for spreading the gospel and knowledge we all are embracing in IPS.

Working with our new IPS Immersive Audio Committee so that we possibly can offer an IPS workshop on the “Future of Immersive Audio” (working title only) during the two days preceding our council meeting. Such a workshop could possibly be open to all interested members and results could be made available to all members as a special publication (online and/or print). More details on this will be published as soon as we have the details worked out.

And let me point this out again: The most important item of that council meeting will be a workshop with the Vision 2020 planning team, which will fill the entire second day of the council meeting.

Inspiration from STARMUS

One more thing, one more story I would like to share with you.

In late September I participated at the sec-

Keynote STARMUS talks by two well-know figures. At the top is Cosmonaut Alexey Leonov, the first spacewalker (50 years ago, in 1964), and being proud grandfather with his grandson (inset). Below, Stephen Hawking, who discussed black holes.
We intend in our planetariums? A description given by STARMUS sound like what from and what’s out there.” Doesn’t that de-

I believe that STARMUS opens up wonder-

ful opportunities for us in IPS on how we could reach out beyond just our own community of planetarians. I do even hope we can work with the STARMUS team in the future, perhaps someday even conducting a joint conference or workshop on these beautiful islands, which offer so much astronomical heritage.

STARMUS truly can be called the finest combination of science, art, and music to be found anywhere in the world at this time. “It is an astronomical and artistic experience meant to enhance your perception of your place in the universe and change your life forever! The Starmus Festival is open to everyone and, young and old, beginners, amateurs and professionals. Anyone who holds a passion for astronomy and space exploration, and who has a desire to know more about where we came from and what’s out there.” Doesn’t that description given by STARMUS sound like what we intend in our planetariums?

I believe that STARMUS opens up wonder-

cause in just a few days I will travel to Buenos Aires for the meeting of the South American Planetariums (APAS) and later continue to Colombia for the celebrations of the 45th anniversary of the Bogota Planetarium. Unfortunately I have to return to Hamburg in early December and hence cannot go to Brazil or Mexico this time, but 2015 is coming soon and you all know that I love to see what you are doing, learn from you, and explore with you what the future might bring us.

A letter, which the late Armand Spitz wrote in 1967 to then GLPA President Von Del Chamberlain upon the initiation of GLPA’s annual Spitz Lecture, explains that desire so well: “...we occupy a unique vantage point between the macrocosmos and the microcosmos and we have the intellectual capability of comprehending both... the full potential of the planetarium in its broadest connotation has yet barely been scratched...I dream about the planetarium being used as a catalyst to begin reactions and to evoke people to understand each others individually and collectively...so...don’t be ashamed if you have a dream!”

Finally, please remember: always onwards and upwards.

At La Palma, the “108 minute” STARMUS roundtable discussion was held under the GTC 10-m . Taking part were (seeded) Astronaut Walt Cunningham, Nobel Laureate Robert Wilson, Astrophysicist Robert Williams, Starmus organizer Garik Israel, Nobel Laureate Sir Harold Kroto, and Nobel Laureate John Mather. Below: It’s photo time, with (from left) Dr. Brian May, composer Alexandros Hahalis, soprano Katarina Mina, Nobel Laureate Robert Wilson and myself.
Minutes of the 2014 IPS Council Meeting
Room 203, Beijing Planetarium
Beijing, China
June 21-22, 2014

Guests:
Dr. Jin Zhu - IPS 2014 Conference Host, Director, Beijing Planetarium, Beijing China
Martin George - Chair, Elections Committee
Dr. Dale Smith - Chair, Publications Committee
Mark SubbaRao - Chair, Science and Data Visualization Task Force
Jon Elvert - Chair, Vision 2020 Initiative
Dr. Maciej Ligowski and Monika Malinowska - IPS 2016 Conference Bid, Copernicus Science Center, Warsaw, Poland
Ricardo Rodriguez - AMPAC
Nieves Gordon - APLE
Celso Cunha - President of Rio Planetarium Foundation, Rio de Janeiro, Brazil
Oded Kinderman - Astrojujuy, Mobile Planetarium, San Salvador de Jujuy, Argentina
South American Planetarium Association (APAS)
Dr. Nikolay N. Samus - Institute of Astronomy of Russian Academy of Sciences & P.K. Sternberg Astronomical Institute of M.V. Lomonosov State University
Iurii Kostenko - Ukraine

The meeting was called to order at 9:30 a.m. by President Thomas Kraupe. Council and guests were welcomed by Thomas and introductions followed. Thomas reviewed new Council members and reviewed the format for the Council meeting as well as changes in the agenda.

The Secretary's Report on the Minutes of the 2013 South Tyrol, Italy Council Meeting had been previously published in the December 2013 Planetarian.

The Minutes were approved.

President Thomas Kraupe delivered the President's Report. This report will also be published in the September 2014 issue of the Planetarian. Thomas reviewed how the IPS Vision 2020 strategy has begun and how it will progress. As part of this process, Thomas has reorganized the committee structure and that implementation will allow for more participation and positive results for the membership as demonstrated during the conferences and in between conferences as well. Thomas reported on the Full Dome Festival in Macao and its successful production. The President has endeavored to reach out to organizations, affiliates, and other stakeholders in the planetarium community to forge relationships and broaden the international aspect of our organization.

The Past President’s and President’s Report were filed.

(Continues on page 12)
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Affiliate reports

President Thomas Kraupe reiterated the importance of Council Members’ participation as active representatives of their affiliates. Vision 2020 will require Council’s input and support through the affiliates on a sustained basis. Council business requires involvement throughout the year, not just at Council meetings.

Written Affiliate Reports were reviewed and Affiliate Representatives highlighted events and concerns from their respective reports. These reports are posted on the IPS Website.

In news from the floor:

SEPA Representative John Hare reported on the issue of vendor sponsorship for conferences in terms of rising costs, multiple conferences, smaller venues, etc. This is a topic to consider for Council discussion.

The Council Group Page on the web site is available for discussion of issues; we should make use of this option to extend our business beyond the annual Council Meetings.

Written Affiliate Reports not submitted: British Association of Planetaria (BAP); Canadian Association of Science Centres (CASC); Chinese Planetarium Society (CPS); and Pacific Planetarium Association (PPA) (report submitted 9/10/14).

Conferences

IPS 2014 Conference

Dr. Jin Zhu, IPS 2014 Conference Host, gave an update on the conference highlights and registration to date.

IPS 2016 Conference

Dr. Maciej Ligowski and Monika Malinowska presented their report on plans for the conference at the Copernicus Science Center in Warsaw, Poland. The Conference is scheduled for June 19–25, 2016, preceded by the Council Meeting. Details and updates will be posted on the Conference Website www.ips2016.org and will be published in Planetarian.

IPS 2018 Conference Bids (presented June 22)

One bid proposal was presented for Council review for IPS 2018 Conference:

Clark Planetarium, Salt Lake City, Utah, presented by RMPA Affiliate Representative Michele Wistisen on behalf of Seth Jarvis, Director, Clark Planetarium; proposed dates are June 25-29, 2018.

Council will continue to review the bid proposal as they formalize plans for the final bid presentation at the 2015 IPS Council Meeting. Information on the Bid proposal will be posted on the conference web site linked to the IPS Web Site as well as an article regarding plans and information to be published in the March 2015 Planetarian. On behalf of Council, President Thomas Kraupe thanked the Clark Planetarium staff for their proposal and willingness to host an IPS Conference.

The first day of the Council Meeting was adjourned at 6 p.m.

The second day of the Council Meeting was called to order at 9:10 a.m. on June 22, 2014.

IPS 2020 Conference Bids

President Thomas Kraupe reported that there are several potential bids for the IPS 2020 Conference. We will be monitoring those potential proposals for intentions and follow up.

Standing committee reports

President Thomas Kraupe reported that the new committees formed last year were becoming active and offering opportunities for growth among the membership, particularly at this conference. Committees should be more inclusive and active throughout the year to provide more meaningful services to the membership and the planetarium community as a whole.

Standing Committee Reports were presented, reviewed, and discussed. The full committee reports will be posted on the individual Committee Webpages on the IPS Web Site.

Awards Committee

Awards Committee member Jeanne Bishop presented the IPS Awards Committee Report on behalf of Chair Lars Broman, who is stepping down as chair. The President’s Award, the IPS Fellows, and the Technology and Innovation Award honorees will be presented to the membership at the IPS Banquet.

The 2014 IPS Award recipients are:

President’s Award: Past President Dave Weinrich

2014 IPS Fellows: Jurgen Hellwig, Manos Kitsonas, Stephen Klashed, Paul Krupinski, Shaaron Leverment, Ian McLennan, and Alexandre Serber

Technology and Innovation Award: Ludwig Meier and Phillip Sadler

IPS Service Award: none awarded this cycle

Affiliates are encouraged to submit nominations for IPS Awards to the Awards Committee. President Thomas Kraupe, on behalf of Council, expressed gratitude to Lars for his decades of service to IPS both as Chair of the Awards Committee and as Associate Editor of the IPS International News. *Thomas announced that Manos Kitsonas will be stepping into the role of Awards Committee Chair with a major task of aligning the awards designations to the IPS Vision 2020 objectives.

Elections Committee

President Thomas Kraupe declared a closed session of Council to allow for Council discussion of the consequences of President Elect Paul Knappenberger’s resignation. As part of the Elections Committee Report, Chair Martin George outlined the Special Elections format and timeline as well as potential changes in the By-Laws and Standing Rules to address future issues related to vacancies in elected offices. *Chair Martin George and the Elections Committee will draft a proposal of revisions to pass on to Council (no later than end of September) for review and action.

Martin also reported on the status of the regular election cycle. For the offices of Executive Secretary and Treasurer/Membership Chair, Lee Ann Hennig and Shawn Laatsch were contacted and asked if they would consider running as incumbents for the offices they currently hold; Lee Ann agreed, Shawn declined. Martin expects to have the candidate list ready by the General Business Meeting at which time additional nominations will be entertained from the floor and the candidates will give brief statements. The 2014 electronic ballot election ran smoothly and is expected to follow the same procedure in 2016.

Chair Martin George implored the Affiliate Representatives to be more involved and proactive in encouraging and seeking qualified candidates for IPS offices. This was a particularly difficult election cycle despite the efforts of the committee (publicizing the nominations process, calling for candidates) directed multiple times to the membership and to Council urging participation and consideration of service to IPS in running for office. President Thomas Kraupe thanked Martin and the committee for persevering during this challenging task. The President urged Council Members to consider that one of their major responsibilities is to promote and encourage their regional membership to consider IPS officer candidacy.

Publications Committee

The IPS Publications Committee Chair Dale Smith presented his report. Executive Editor Sharon Shanks continues to maintain the journal’s excellence in conjunction with a talented roster of authors, columns and advertisers. The article titled “Under One Dome” continues from last year and frequently features smaller domes. New columns have been added: “Data to Dome” (Mark Subba Rao) and “Sound Advice” (Jeff Bowen) and a practice of including “Guest Editorials” continues. Lars Broman completed his 18th year as Associate Editor of “International News”- a column that showcases the international vibrancy of our profession. Chair Dale Smith reported that Lars is stepping down from this role, “...leaving a legacy of promoting the global reach of planetarium work and encouraging contribu-

(Continues on page 14)
tions from around the world.” In looking for someone to continue this role, the Planetarian is hoping to build on Lars’ contributions.

The current edition of the Planetarian is available on the IPS Website in the Members Only area, and all previous editions are posted in the open area of the IPS Website.

The Baton Rouge IPS 2012 Proceedings were distributed by Jon Elvert.

The 2013 edition of the IPS Directory (which includes the IPS Directory of the World’s Planetariums, the “white pages”, and the IPS Resource Directory, the “yellow pages”) was mailed to all members in December of 2013. The next edition will be distributed in 2015.

The IPS Web Site falls under the purview of the Publications Committee and as such, Planetarian Editor Sharon Shanks, assists as editor and content manager of the web site and Alan Gould is Webmaster.

President Thomas Kraupe, on behalf of Council, expressed appreciation for Dale and his committee’s dedication and excellence in contributing to the valuable resources for IPS and also recognizes Editor Sharon Shank’s commitment to the high standards of the Planetarian.

“The Publications Committee will now work toward making the Directory more accessible to the membership as a searchable online database with multiple search fields. Plans will also proceed on a special publication regarding a subset of Digital/Fulldome Planetaria. These tasks were put forward by the IPS President and were supported by the officers and Council. Standing Committee Reports were filed.

Ad Hoc Committee Reports

Ad Hoc Committee Reports were presented, reviewed and discussed. Complete reports will be posted on the IPS Web Site Committee Pages.

IPS Education Committee

no report

IPS History Committee

Historian John Hare reported that his committee is continuing to make progress on completing the scanning of slides and photographs of archival material. The cataloguing of the image files was affected by lost and/or corrupted data, but John is working on recovering as much of that file as possible.

The Memorial Presentation at IPS 2014 for IPS members who have passed away during the last 2 years is scheduled for the Conference Luncheon. Affiliates are requested to pass on relevant information to John so that he can continue to provide a lasting memorial and tribute to our former colleagues. President Thomas Kraupe thanked Historian John Hare, Ian McLennan and committee members for their efforts on this important aspect of IPS History.

IPS International Relations Committee

Chair Martin George and his committee continue to promote IPS through their global travels and connections, including: Thailand, the Philippines, Ukraine, Ghana, United Arab Emirates, and Slovakia. Based on experiences with administering the Stipends for IPS 2014 Conference, Chair Martin will propose some revisions of the current guidelines and present them to Council for review and approval. Martin will continue to work on ways for IPS to provide more opportunities for less fortunate planetariums to participate in our international network.

President Thomas Kraupe acknowledged Council Guest: Oded Kinderman (Astrojuy - Mobile Planetarium, San Salvador de Ju-juy - Ju-juy - Argentina). He reported on his efforts to promote planetariums in Argentina and with the South American Planetarium Association (APAS). He requests suggestions and materials exchange to assist these regional planetariums in moving forward the dream of joining the IPS community.

President Thomas Kraupe acknowledged Council Guest: Dr. Nikolay N. Samus, Institute of Astronomy of Russian Academy of Sciences & P.K. Sternberg Astronomical Institute of M.V. Lomonosov State University. Dr. Samus gave a brief report of the state of Russian planetariums.

President Thomas Kraupe acknowledged Council Guest: Iuri Kostenko, Ukraine, who gave an update on the status of planetariums in Ukraine. There has been no government support of the facilities since independence and they are still quite isolated as a whole.

President Kraupe thanked our guests for providing insight into those regions that are struggling to carry on the planetarium message amid some daunting challenges.

IPS Portable Planetarium Committee

Past President Dave Weinrich presented the IPS Portable Planetariums report on behalf of Chair Susan Button. Promoting the use of live, interactive sessions under the dome continues to be a major goal of the committee and is being supported at a number of regional meetings. The committee has launched a new initiative: “Pages of Stars,” whose main objective is to build a collection of short audio registrations that can be easily shared among planetarians using mp3 files. See the IPS Web Site for details on the program.

Susan reemphasized the need for Affiliate Representatives to make information regarding portable available to their memberships and to encourage participation in those activities. It is crucial for the IPS Portable Planetarium Committee to have a portable planetarium representative from each IPS Affiliate. This representative needs to be responsible for periodically sending Susan news and contacts for portables located in the affiliate’s region. Please send Susan the name and contact information of this individual.

IPS Planetarium Design and Operations Committee

Chair Ian McLennan reported that the committee has begun work on codifying Best Practices for Planetariums concerning design and renovation, and is collaborating with IPS Audio, Sound, and Acoustics Committee regarding that aspect of facilities design. Work continues on repurposing the document “So You Want to Build a Planetarium” into a “living” web-based document that evolves as does the profession. Ian and several other committee chairs and guests will be presenting a panel/workshop at this conference on operation and programming.

IPS Audio, Sound, and Acoustics Committee

President Thomas Kraupe announced that Chair Rene Rodigast would be giving a presentation at this conference and that the goals and objectives of the committee would be finalized in the next month.

IPS Presenting Live Under the Dome Committee

President Thomas Kraupe announced that Chair Mark Webb would launch this committee’s mission with workshops under the dome at this conference.

IPS Science and Data Visualization Task Force

Chair Mark SubbaRao presented the committee report outlining his committee’s vision for professional development opportunities, best practices for visualization, data to dome issues, and increasing the potential for scientific communication and storytelling in the planetarium. Mark has assembled a wide range of experts for his committee and outlined the goals (December 2013 Planetarian). He is also providing material in the column, “Data to Dome." Plans are progressing for a document that will “...evaluate the current state of the field, recognize current trends, and identify opportunities to exploit and make recommendations of where advancements need to be made in the realm of science and data visualization.”

President Thomas Kraupe announced that there will be a meeting of all Committee Chairs on Friday to discuss the missions, collaborations, and impact of IPS Vision 2020 on committees. He also emphasized that IPS Committees should be mission driven, offer concrete services to the membership and collaborate as much as possible. All committees should participate in conferences through (Continues on page 16)
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workshops, panels, presentations, and open meetings to encourage membership participation. IPS 2014 is a good example of how some of the committees’ missions are being broadcast and shared with the membership.

The Ad Hoc Committee Reports were filed.

Constitution matters

The revisions for By Laws and Standing Rules regarding officer elections will be reviewed by Council upon receipt (no later than the end of September 2014) from Elections Chair Martin George. Other changes to consider will be: revisions/updates in appendices, general consistency and clarification edits to keep the document current.

Unfinished business

Several of the items of unfinished business will be addressed by the IPS Vision 2020 Initiative, including the following: Survey of Membership, Awards (type of awards and structure), and Memoranda of Understanding documents.

IPS Seasonal/Summer School: these would be professional development initiatives focused on training opportunities globally and accompanied by certifications supported/sponsored by IPS. The venue could be workshops associated with IPS Conferences, Affiliate Conferences and at other times throughout the year. Awards will be coordinated with the revisions of Committee structure.

IPS Vision 2020: President Thomas Kraupe has appointed Jon Elvert as coordinator for IPS Vision 2020. Jon presented an overview of the timeline and format to lead us through the completion of this strategic planning operation. There will be a panel session and then a workshop at the conference to initiate a SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis for initial input from conference attendees. Immediate plans will involve sessions at Affiliate conferences and follow-up.

New Business - none

Project Reports

The International Year of Light: please report any efforts from your region regarding participation in this event.

Jim Sweitzer is conducting a workshop on the Nanotarium, a project to introduce planetariums (low cost simple devices) to the developing world. The project is supported by IAU-OAD and IPS.

Call for 2016 IPS awards and Fellows nominations

Manos Kitsonas, Awards Committee Chair
mak@eef.edu.gr

The IPS Awards Committee is being re-structured after a very successful term under Lars Broman’s guidance. The IPS Officers and I are working together in order to establish the new Awards Committee that will be able to expand its mission in the years to come, particularly in accordance with Vision 2020.

In the meantime, now is the time to nominate people or institutions for the 2016 IPS Awards and Fellowships. The next IPS Awards will be given and Fellows named at the IPS Conference in Warsaw, Poland in June 2016. The IPS Council will decide which persons or institutions will be honored at the next IPS Council meeting in Montreal, Canada, in August 2015. The decisions will be based on the Awards Committee presentations regarding each potential Awardee of Fellow candidate.

Nominations for the 2016 IPS Awards and Fellows must therefore reach the Awards Committee on time and in any case no later than the 1st of June 2015. Please send your nominations to my email address (mak@eef.edu.gr) and include the reasons why you think your nominee should be awarded or named an IPS Fellow.

As you well know, the IPS Awards that require nominations from the members are the following:

The IPS Service Award. This, according to IPS Standing Rules “shall be bestowed, from time to time, by the Society upon an individual or institution whose presence and work in the planetarium field has been, through the years, an inspiration to the profession and its members.” Since 1982 there have been 23 people awarded with the IPS Service Award.

The IPS Technology and Innovation Award. This “shall be bestowed, from time to time, by the Society upon an individual whose technology and/or innovations in the planetarium field have been, through the years, utilized or replicated by other members and/or other planetariums.” So far, there have been only 4 persons awarded with the IPS Technology and Innovation Award.

For both these Awards the nominees must have a broad, deep and concrete effect in the profession and its development.

Deserving IPS members can also be named IPS Fellows and in order to be named, the IPS Standing Rules state that “a member must have continuous active membership in good standing in IPS for at least five years and substantial contributions in at least two of the following respects:

• Serving IPS in effective office, diligent and/or devoted committee work, and the organization of conferences and meetings.
• Relevant and significant publications and/or conference presentations.
• Cooperation with professional societies, organizations and groups that brings attention to the importance of planetariums’ existence.
• The development of new methods in the planetarium field.”

So far, there have been 254 people named IPS Fellows. I would like to encourage you to consider possible Awards or Fellows nominees, not only from your region but from all over the world. More information regarding previous Awardees and Fellows can be found in the IPS Awards Committee web page (www.ips-planetarium.org/?page=awardees).

With business completed, Shawn Laatsch moved to adjourn the meeting, seconded by Manos Kitsonas, and approved by Council.

Respectfully submitted,
Lee Ann A. Hennig
Executive Secretary, IPS
June 22, 2014

Addendum to the Minutes:

At the IPS General Meeting, IPS Elections Committee Chair Martin George announced the nominees for President Elect, Executive Secretary and Treasurer/Membership Chair and all of the candidates for IPS office presented statements supporting their candidacy. There were no nominations from the floor.

The nominee for the office of President Elect is: Shawn Laatsch

The nominee for the office of Executive Secretary is: Lee Ann A. Hennig

The nominee for the officer of Treasurer/Membership Chair is: Ann Bragg

President Thomas Kraupe announced that Jeanne Bishop will Chair the Education Committee.

The IPS 2015 Council Meeting will be held at the Montreal Planetarium in Montreal, Quebec, Canada.
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A Longitudinal Study of Early Elementary Students’ Understanding of Lunar Phenomena after Planetarium and Classroom Instruction

Kim J. Small, Arcadia University and Upper Dublin School District
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Julia D. Plummer, Pennsylvania State University
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Abstract: We examined the durability of students’ understanding of lunar phenomena one year after a combination of planetarium and classroom lessons. Children (N=16) were interviewed before and after instruction during Year 1 and then again one year later. Analysis of the interview results and instruction reveals that many students retained an understanding of some of the key constructs targeted in the program. Results also suggest that students were more likely to learn and remember challenging constructs that they actively engaged with in both the planetarium and the classroom.

Background: Few research studies have been conducted to measure the impact of planetarium programs and instruction on children within the last 15 years (e.g. Plummer, 2009; Plummer, Kocareli, & Slagle, 2014). Even less frequent are studies that focus on the long-term effects that planetarium programming combined with classroom instruction has on children’s conceptual constructs. This longitudinal study aims to not only quantitatively examine such impacts but also to begin to uncover what aspects of programming and instruction may have led to these results.

Investigating instruction and program elements associated with children’s conceptual constructs and changes to those constructs is demanding and time-consuming. Uncovering how desirable changes in these constructs persist or change months or years after instruction is particularly important (Georgiades, 2000).

Although several longitudinal studies have been conducted on children’s conceptual constructs within the area of astronomy, only one by Kikas exceeded one year (Lelliott & Rollnick, 2009). Kikas (1998) uncovered that students showed a regression in their scientific understanding of the day/night cycle and attributed this to a “rote learning” memorization style of instruction.

Other studies on astronomy interventions show short-term success in changing children’s conceptual constructs (e.g. Hobson, Trundle, & Sackes, 2010; Plummer, 2009). However, determining if changes in children’s conceptual understanding persist across longer periods of time is an even more important question for the planetarium and science education communities. Further, identifying areas of instruction (both through planetarium programming and classroom instruction) that may lead to long-term positive impact can have a significant influence on the development of such future instruction.

As has been identified in national documents such as Framework for K-12 Science Education (NRC, 2012) and the Next Generation Science Standards (NGSS Lead States, 2013), science education should focus on observational astronomy in early elementary. Not only does this allow for an appropriate level of instruction for younger children, but it also may provide a foundation from which to build more complex explanations in later grades. This study focuses on early elementary-aged students’ conceptual constructs in the area of lunar observational astronomy content.

Methods: The research reported here is a significant extension of an earlier study (Small & Plummer, 2014), which examined the impact of classroom instruction and planetarium programming for first grade students’ understanding of lunar phenomena in a Philadelphia suburban school district. In the original study, children selected from four participating classes (N=36) were interviewed before and after instruction. In this current paper, we examined the extent to which a selection of those students’ retained what they learned from instruction one year later.

Instruction: The instructional interventions included in this study featured the following over a three-day period:

- A pre-visit introductory classroom lesson, taught by the first author, which allowed children to share their ideas about observing the day and night.
- A modular designed (combination of live interaction and pre-recorded video segments) planetarium program called The Moon, which was created by Audio Visual Imagineering. The program featured science practices such as scientific observation and creating representations.
- A post-visit assessment and application classroom lesson taught by the first author. Below is a summary of the major instructional elements that were part of each of the three lunar topics, each of which was addressed separately both in the classroom and in The Moon planetarium program.

1. The surface features of the moon

The planetarium instruction included live components that allowed students to compare and contrast the surface of the moon and the Earth and the surface of the near side and far side of the moon. Students were encouraged to use the vocabulary Maria, highlands and craters as they were comparing and contrasting. During the pre-recorded portions of the program, students watched a boy (the main character) drawing his observations of the moon’s surface features in a sketchbook.

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2. The daily apparent motion

The live components of the planetarium instruction encouraged students to actively engage by pointing to where they predicted the moon would rise in the sky, where it would set, and drawing with their arm the path that it would take throughout the day/night. During The Moon program this concept was modeled as the boy did the same gesturing. The boy also drew a sketch, similar to one of the interview question, of the daily apparent motion of the moon rising in the East, moving in a curved path, and setting in the West. The program respectively stated that this was the apparent motion of the moon in one day and mentioned that this was caused by the fact that the Earth rotates.

Classroom instruction included a manipulative opportunity for small groups of students to organize a set of images (with East and West labeled) of the moon at different times of the day to show rising, curved path motion, and setting. Students then drew pictures of the apparent motion of the moon in their small groups.

3. The monthly observations/ phases

Within the live components of the planetarium instruction, students were asked to state the different ways that they have seen the moon in the sky. As students responded they identified the phases of the moon that they thought was placed on the planetarium dome. Students also had time to discuss the amount of time that it takes to see the entire moon phase cycle. During the pre-recorded segments of the planetarium program, the boy organized moon phase cards into a complete cycle and watched the complete cycle in the sky.

Classroom instruction allowed students the opportunity to organize moon phase cards into a complete cycle.

Data collection

Sixteen of the children in the earlier study participated in a follow-up interview, one year later, using the same interview protocol. The interviews engaged children in creating models and drawings related to lunar phenomena. In all interviews (one week prior to instruction, one week after instruction, and a delayed one year after instruction), three lunar subtopics were featured: the surface features, the daily apparent motion of the moon, and monthly observations of the moon. Each student was originally only asked questions from two of the three subtopics resulting in 11 students interviewed for each subtopic in the longitudinal study. Interview questions focused on observational features rather than causal explanations (i.e. students were not taught or expected to know the reason for the phases of the moon; instead, they learned the monthly observable pattern).

Analysis: Codes describing students’ ideas were developed for each interview protocol and were used to analyze interviews collected at all three data collection time periods (pre-interviews, post-interviews, and delayed post-interviews). We first developed codes based on prior research on children’s conceptions about the moon (e.g. Plummer, 2009; Trundle et al., 2007a) and then developed additional codes to capture the essence of all interview responses. To determine whether or not codes could be used reliably, both authors coded a subset of the interviews (~20%) and an inter-rater agreement of at least 80% was reached for each category. A detailed interview protocol and coding document are available upon request.

The Wilcoxon signed-rank test was used to statistically compare student responses across the three time points. However, we note the limitations to this statistical analysis; the small sample size for the longitudinal group reduces the confidence in the findings. We present them here as a way to suggest possible trends that will allow us to draw tentative conclusions about the long-term durability of student learning through this instructional intervention.

Results: The results presented below include pre-, post-, and delayed post (1 year after) data. The analysis we present will focus on comparing students’ delayed-post responses to their immediate post-responses and their pre-instructional knowledge level to consider the relationship between students’ retention of new astronomy ideas and how this may relate to the instructional intervention.

1. The surface features of the moon

Students were asked to draw a picture of the moon. These drawings were coded for the number of scientifically correct surface features they included (Table 1). The desired response was for students to include three surface features (Maria, highland, and craters).

Statistical analysis using the Wilcoxon signed-rank test suggests that there was significant improvement between students’ pre- and post-instruction interviews (Z=2.879, p<0.01). There was also significant improvement between students’ pre-instructional and longitudinal interviews (Z=2.333, p<0.05), suggesting that students retained some of what they had learned a year later.

However, differences between students’ post-instruction and longitudinal interviews suggest that students did not retain all of what they had learned over that year (Z=2.271, p<0.05). When comparing the longitudinal to the post-instruction responses, zero students improved, five stayed the same, and six regressed; four of these six regressed back to their pre-instruction response while the other
two maintained a level higher than their pre-instructional level.

2. The daily apparent motion

Students were asked to illustrate how the moon would appear throughout the day/night on a piece of paper with East and West labeled at the bottom. To capture the levels of understanding, codes were developed with the desired scientific correct conception including that the moon rises in the East, moves across the sky in a curved path, and sets in the West. Table 2 summarizes the overall findings.

The Wilcoxon signed ranks test suggests that generally the students improved from pre-to-post instruction (Z=2.714, p<0.01) and retained the same level of knowledge from the end of Year 1 to the end of Year 2 (Z=1.063, p=0.288). Eight students showed improvement and three students remained the same (including one that was at the target level of understanding) from pre-instruction to delayed-post. Five students maintained the same level of knowledge, two students improved, and four students regressed from post-instruction to delayed-post instruction.

3. The monthly observations/phases

Students were asked to draw all of the ways/shapes that the moon could be seen in the sky. The desired scientific construct included representation of each of the eight phases (new, waxing crescent, first quarter, waxing gibbous, full, waning gibbous, last quarter, waning crescent).

Students drew a mean of 5 phases (S.D. = 2.7) prior to instruction, 7.6 phases (S.D. = 3.8) post-instruction, and 6.4 phases (S.D. = 3.9) in delayed-post interview. A paired-sample t-test was used to compare the number of moon shapes the children drew.

While none of the differences were significant at the p < 0.05 level, two of the comparisons suggest a trend. Students drew more lunar phase shapes immediately after instruction (t=2.189, p=0.053). There was limited improvement in comparing the longitudinal results to the students’ initial number of drawings (t=1.273, p = 0.195) and students drew somewhat fewer drawings from immediate post to the longitudinal interview (t=1.273, p=0.061).

Students were also asked how long in time it would take to observe the entire moon phase cycle. Prior to instruction 36% of students stated about one month. After instruction 73% reported about one month and 55% said the same in delayed-post interviews.

The organization of the moon phases that students drew was also analyzed with a target construct being a full cycle from new to full and back to new (Table 3). Students’ organization increased significantly from pre to post (Z=2.041, p=0.05). The comparison of students’ pre-instruction drawing to their longitudinal drawing was not significant at the 0.05 level but is suggestive of a trend towards improvement (Z=1.838, p=0.066). Because of the improvement found from pre to post, with no difference between post and longitudinal, we suggest that some of the improvement may have been maintained over the year, though the small number of students limits the strength of this conclusion.

Conclusions and Implications

Similar to other educational studies, positive post-instruction results reflect the significant short-term impact that intensive instruction can have on children’s understanding of science concepts.

Perhaps more important here was the duration of the desired conceptual change in many areas of the instruction. Similar to other longitudinal studies with students and pre-service teachers, some participants showed evidence of partial or full decay in their understanding of the target constructs as they shifted back towards their prior understanding (Kikas, 1998; Trundel et al., 2007b).

The topic that showed the least amount of decay in this study was the daily apparent motion of the moon. In interpreting these results, careful attention should be paid to the elements of instruction on the daily apparent

| Table 2. Students’ drawings of the appearance motion of the Moon |
|--------------------------|--------------------------|--------------------------|
|                         | Pre (N=11)               | Post (N=11)              | Delayed-Post (N=11)   |
| Moon rises E to W       | 1 (9 %)                  | 9 (82 %)                 | 6 (55 %)              |
| Moon rises and sets on  | 0                        | 1 (9 %)                  | 2 (18 %)              |
| opposite sides of the   |                          |                          |                        |
| sky (not E to W)        |                          |                          |                        |
| Moon appears to move    | 5 (45 %)                 | 0                        | 2 (18 %)              |
| Does not describe Moon’s| 5 (45 %)                 | 1 (9 %)                  | 1 (9 %)               |

| Table 3. Students’ drawings of the cycle of lunar phases |
|--------------------------|--------------------------|--------------------------|
|                         | Pre (N=11)               | Post (N=11)              | Year 2 (N=11)         |
| Full cycle              | 0                        | 4 (36 %)                 | 0                      |
| Half cycle              | 2 (18 %)                 | 1 (9 %)                  | 6 (55 %)              |
| Increasing pattern      | 0                        | 0                        | 0                      |
| Decreasing pattern      | 1 (9 %)                  | 1 (9 %)                  | 0                      |
| Random order            | 7 (64 %)                 | 4 (36 %)                 | 5 (45 %)              |
| Alternative pattern     | 1 (9 %)                  | 1 (9 %)                  | 0                      |

Figure 2. One student’s drawings of the apparent motion of the moon: pre-instruction (moon appears to move), post-instruction (moon rises/sets East to West), and delayed-post (moon rises/sets East to West).

Figure 3. One student’s drawings of the cycle of lunar phases: pre-instruction (random order), post-instruction (full cycle), and delayed-post (half-cycle, increasing pattern).
motion of the moon that the students experienced in order to understand why this topic had the most promising results for long-term student understanding of the scientific concepts.

The instruction for daily apparent motion of the moon included engagement in a variety of scientific practices, such as observing and predicting, and instructional modalities such as modeling, kinesthetic learning, and use of manipulatives. Instruction for the other two topics did less to fully engage students in constructing a new understanding through these types of instructional strategies.

Students were actively engaged in the apparent motion of the moon construct during both the planetarium and second classroom lesson; the second classroom lesson’s activities for the moon’s surface and lunar phases did not fully engage students in the aspects of the constructs that were most challenging to them and thus limited their opportunity to further work with the ideas they learned in the planetarium.

The instruction for this topic included activities that were more similar to the actual interview questions, which may have reinforced their understanding of the construct.

Students were asked to make predictions within this area of instruction allowing them to compare any alternative beliefs that they might have already to the scientific concept presented during instruction.

Implications of this study include the need for educators to pay close attention to how we match the constructs we are targeting for children to learn with how we design active instructional strategies, both in the planetarium and the classroom. We base this on our observation that the construct that students improved the most in, the apparent motion of the moon, was most directly targeted with instruction that engaged children both physically and mentally during the planetarium and classroom instruction.

Our findings also suggest that engaging children with scientific practices, such as predicting and modeling, may allow students to build on their current conceptual constructs and then modify or change them, if needed.

Trundle and colleagues (2007b) drew similar conclusions in a longitudinal study conducted with pre-service teachers focused on the moon. They suggest strengthening instruction by encouraging more “intentional learning” and providing a modest set of instructional activities that would actively engage participants in psychomotor modeling.

Trundle and colleagues also recommend that students predict and explain, preferably in writing prior to instruction, and then periodically compare observations and simulations with their pre-instruction views. Although such activities may seem daunting in a unique environment such as a planetarium, we encourage creative solutions to incorporate suggestions of these findings for lasting positive impacts on children’s conceptual constructs.

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References


New source for astronomy education research

A new educational research resource is debuting this month. It’s called the *Journal of Astronomy & Earth Sciences Education* (JAESE), and it’s got one of the top names currently in this niche research field as its editor in chief: Timothy F. Slater at the University of Wyoming.

The JAESE will publish refereed papers “that significantly contribute to the scholarly understanding of cutting edge issues across science education.

Using a wide range of systematic education research methods including statistical analysis, qualitative inquiry, analytical work, case studies, field research and historical analysis, articles examine significant science education research questions from a broad range of perspectives.”

It will be an open access journal that is “essential reading for academic education researchers and education professionals.”

JAESE will be looking for articles dealing with original discipline-based education research and evaluation, with an emphasis of significant scientific results derived from ethical observations and systematic experimentation in science education and evaluation. Research is welcome from across the broad area of Earth and space sciences, including astronomy, climatology, energy resource science, environmental science, geology, meteorology, planetary sciences, and oceanography.

Access to the articles in the quarterly publication will be free of charge, although there is a paper submission fee and, if the work is accepted, an open access fee based on the number of words (from $300 for shorter work; up to $1,100 for papers of 10,001 words or more).

International in scope, JAESE is one of the publications under the Clute Institute umbrella. The institute, which was founded in 1985, disseminates the latest academic research on a broad range of topics within academia.

The institute hosts the journal’s manuscript submission system and publications information, found online at: www.cluteinstitute.com/journals/journal-of-astronomy-earth-sciences-education-jaese.

A shorter address to use www.jaese.org, a launch pad to the Clute Institute site.

The JAESE Editor can be contacted via email at: JAESE.Editor@gmail.com

Articles submitted to Clute Institute publications are subjected to a double-blind, peer review process.

—Sharon Shanks
It’s Life Out There:
An astrobiological multimedia experience for digital planetariums

Abstract: Planetariums have a long history of experimentation with audio and visuals to create new multimedia experiences. We report on a series of innovative experiences that began in the Gates Planetarium at the Denver Museum of Nature & Science, combining live performances of music and navigation through scientific visualizations. The Life Out There productions featured a story showcasing astrobiology concepts at scales ranging from galactic to molecular, and told using video jockeying of immersive visualizations and musical performances from the House Band of the Universe. Partially funded by the NASA Astrobiology Institute’s JPL-Titan Team, these hour-long shows were broken into four separate themed musical movements, with an improvisatory mix of music, dome visuals, and spoken science narrative which resulted in no two performances being exactly alike.

Post-performance dissemination is continuing via a recorded version of the performance available as a DVD and online streaming video. Written evaluations from visitors who were present at the live shows reveal high satisfaction and subsequent interest in astrobiology topics. Life Out There concerts have been used to inaugurate a new evening program to draw in a younger audience demographic to DMNS, and have been taken on the road to other venues in other cities.
Introduction

Planetariums have a long history of experimentation with audio and visuals to create new multimedia experiences, starting with filmmaker Jordan Belson and composer Henry Jacobs’ Vortex concerts, shown between May 1957 and January 1959 at the Morrison Planetarium in San Francisco (Moritz 1999; Youngblood 1970).

The long affiliation of laser shows with planetariums began later with the Laserium concerts pioneered by Ivan Dryer at Griffith Observatory in Los Angeles (Daukantas 2010). Light show experiences using lasers and other staging effects have since become a mainstay of planetarium programming involving both pre-recorded and live music (Brill 1984; Kinsella 1984; Kaiser 1998).

The technology has now evolved to digital (Herbert & Rubin 2010), e.g., SonicVision (American Museum of Natural History 2003), Sounds of the Underground and Rock on Demand (Clark Planetarium 2003), Metavista (Mediendom Kiel 2006), and Bella Gaia (www.bellagaia.com).

Debate in the planetarium community about the appropriateness of musical light shows started almost immediately. Critics contended that such events are not consistent with the astronomy educational mission of planetariums, while advocates pointed out that light shows can help increase not only a facility’s revenue but also its public profile (Hare 1984).

Such tension between the goals of education and entertainment existed from the start: the Vortex concerts were ended after opposition from the Morrison Planetarium’s director, who was uncomfortable with the “Bohemian” element that they attracted (Marché 2005).

The Life Out There concerts followed a tradition of experimental programming that was first developed at the Gates Planetarium at the Denver Museum of Nature & Science (DMNS; Neafus & Yu 2007; Yu et al. 2009). With support from the NASA Astrobiology Institute’s JPL-Titan Team, the Life Out There program was a continuation of this experimentation. But this multimedia digital planetarium experience was also designed to be a more balanced mix of a musical light show and a presentation focused on concepts from astro-
biomolecules, therefore addressing the concerns of past critics of planetarium musical programs.

The key components of the 60- to 90-minute show include live performances from the House Band of the Universe, both scientific and abstract visualizations digitally projected onto digital planetariums and other venues, and a spoken-word narrative focusing on cosmic evolution, the importance of water and organic molecules to life, and the places elsewhere in the solar system that may be conducive to life.

Eleven Life Out There performances have taken place between 2009 and 2014. The debut show took place as a standalone event at DMNS’ Gates Planetarium on 3 November 2009. Two performances on 18 February 2010 occurred for DMNS’ inaugural Science Lounge, an evening event geared towards attracting adult audiences with ages 21 years and over.

Encore performances include ones on 7-8 July 2011 in the Gates Planetarium; on 24 September 2011 for a Lazos, Inc. fundraiser for the Asociación Nuevo Amanecer in Denver; and one on 13 July 2013 at the Center for the Arts Theater for the Art Association of Jackson Hole, Wyoming.

Success leads to national tour

Success with the Gates Planetarium programs led to NASA Astrobiology Institute funding that allowed for a national tour for the House Band of the Universe. The goals of this tour were not only to engage a wider audience for this type of programming, but to help gather visitor evaluation data to test this novel approach to astrobiology education and public outreach (EPO).


Although designed for a digital planetarium, demand for the program by organizers in venues without a dome (e.g., the Center for the Arts Theater in Jackson Hole, and the Navy Memorial Theater in Washington, D.C.) meant some of the programs were done with visuals from a laptop projected onto a large 2D theater screen.

Although this was not the same immersive experience as the planetarium programs, the development of a flat version of the show meant more venues and audiences could participate in the experience.

The Life Out There concept

The Life Out There show was broken up into four movements, with each movement containing a musical light show consisting of a performance of a song by the House Band of the Universe (including co-author Grinspoon), accompanied by a series of on-dome visuals.

Although each movement had a central musical selection and a set of visual assets that needed to be shown, the actual performances had an improvisatory component. Not only did the musicians play off of each other, responding to auditory clues, but they played off of the dome visuals as well.

At the same time, co-author Yu, who was manipulating and “flying through” the visual content, also was improvising to some extent in response to the musicians, leading to some level of two-way interactivity between the visual and sonic components.

For the audience, both the visible and audible components had some of the engaging fresh, spontaneous elements of improvisatory music such as jazz. Although the performances for each movement followed the same general theme, the actual performances were unique, with no two exactly alike.

The end of each song was followed by a partial recapitulation of the visuals that the audience had just seen, but paired with a spoken narrative describing what the audience had seen or was currently seeing.

The goal of this performance format was for the first part of each movement to provide an entertaining musical visual segment that could interest and engage an audience based on their aesthetic and creative tastes. The narrative that followed would impart scientific information to an audience based on their aesthetic and creative tastes. The narrative that followed would impart scientific information to an audience based on their aesthetic and creative tastes. The narrative that followed would impart scientific information to an audience based on their aesthetic and creative tastes.

The musical talent

The musical talent who joined together for Life Out There were local Denver musicians,
five of whom were from the indie rock-funk-jazz collective Perry Weissman 3. The various incarnations of the House Band of the Universe included Rick Benjamin-Tebelau (trombone), Merisa Bissinger (flute), Craig Gilbert (drums), co-author David Grinspoon (guitar), Sandy Pryor (guitar), Dan Sjogren (saxophone), Dane Terry (bass), Dave Watts (drums), and Matt Amundsen (drums).

The visual component included displays of scientific visualizations from real-time simulation software, pre-rendered fulldome movies, and abstract visualizations. The real-time aspect of much of the visuals mean that there is flexibility in the nature of the story and what is shown.

The Life Out There program has evolved substantially from its earliest iterations, with updating of some of the visuals as the software is upgraded. The Uniview visualization platform from SCISS AB has provided the majority of the content for the concerts. Tito Dupret provided spherical panoramic imagery that were used in story segments associated with the evolution of life and humans.

At the Gates Planetarium, additional visuals came from pre-rendered fulldome sequences, including a moon formation sequence from Cosmic Collisions (AMNH 2006) and a solar sequence from Cosmic Journey (DMNS 2011), and real-time abstract visualizations from Nebulus Design’s Phonic-FX, a VJ tool designed explicitly for multi-channel edge-blended video projection systems.

For shows “on the road” away from DMNS, content was generated exclusively using Uniview. We are currently exploring creating versions of Life Out There that can run from other real-time planetarium software, such as SkySkan’s Digital Sky, which will open up the program to those venues without a Uniview installation.

One challenge encountered was the need to provide clear amplified sound in dome settings—which are typically sonically dead—for a live band consisting of two electric guitars, one electric bass guitar, an electric vibraphone, a drum kit, saxophone, trombone, and flute.

We had a great sound engineer

Both the Denver and travelling versions of the show benefited greatly from the expertise of sound engineer Gannon Kashiwa, who used innovative signal processing to create a custom soundscape for this application.

Finally, most of the programs followed the main concert program with a question and answer session with the audience. Audience members were given the option to leave after the show or stay longer for the discussion. On each night when this was offered, the vast majority of the audience chose to stay. They were encouraged to ask questions about the scientific content, the nature of the visuals, or the music itself, and the process of combining these elements together. Audience questions were equally divided between all of these topics.

Although there were explanations during the four musical movements of what the audience was seeing, on balance, more time was spent on the purely musical sections than on the spoken narrative and thus many of the visuals were left un- or under-explained. This final briefing allowed inquisitive audience members to satisfy their curiosity.

The four musical movements

The four movements that make up the show have evolved slightly over time. Although original compositions dominate, the early shows also featured Thomas Mapfumo’s “Pidigori,” performed for the third movement, focusing on the central importance of water for life as we know it. Starting in 2013, this was replaced by the song “Outer My Way” by House Band member Sandy Pryor, for a new third movement focused on the Anthropocene Epoch, the current period in which human-driven change dominates all global environmental change on Earth (Cruzen & Stoermer 2000).

The most recent version of the show now involves all original musical compositions, which is preferable from a legal, financial, and performance rights perspective.

The first movement, “Light Bubble” (R. Benjamin-Tebelau & M. Serviolo), consisted of a journey through space-time from the beginning of the universe at the cosmic microwave background to the outer edge of the solar system’s Oort cloud. Using the Uniview software, the audience experienced flight through catalogs of quasars and galaxies from the Sloan Digital Sky Survey, nearby galaxies, a simulation of the dark matter halo around the Milky Way, and stars from the HIPPARCOS catalog.

The second movement, “Trip to the Sun” (D. Grinspoon), focused on the history of the solar system and the origins and evolution of life. Uniview visuals include the Oort cloud, the Kuiper belt, asteroids, and continental
drift on Earth. Pre-rendered sequences showed the impact formation of the moon, as well as the active sun.

In early Gates Planetarium shows, the Phonic-FX VJ software gave abstract depictions of molecular and cellular evolution. PowerPoint slides (and in later performances, slides embedded in the Uniview visualization software) were used to depict other scenes from the formation and evolution of the planets, as well as the evolution of life.

When the third movement focused on the theme of water and its importance to life (and featured “Pidigori”), visuals included solar system-related content from Uniview, abstract water modules from Phonic-FX, a pre-rendered sequence emphasizing the fractal-like recursive patterns often found in life, and spherical panoramic photography showing the diversity of living environments on Earth.

For the Anthropocene-focused third movement featuring “Outer My Way” in later shows, the evolution of life and humans on Earth is represented by 2D slides. Time series animations of global data layers showing black carbon and sulfate aerosols from fossil fuel burning show one aspect of the human impact on Earth, while the “Black Marble” dataset from the Suomi NPP satellite shows the electrified human footprint via the beautiful, but light polluting, pattern of night lights (Carlowicz 2012).

The final movement moved its spotlight to the Saturnian system, with the appropriately-titled “Titan Haze” (D. Sjogren). This sequence was dominated by Uniview flight showcasing the Galilean moons around Jupiter, Saturn, the Cassini spacecraft, Enceladus, and Titan.

The show closed with an in-depth exploration, accompanied by explanatory narration, of the many contemporary data-sets involving Titan from the Cassini/Huygens mission, a discussion of the astrobiological significance of Titan, and ideas about future exploration. Complementary slides showed the exotic yet familiar landscapes of Titan, including representative examples of mountains, lake-like features, and river systems.

Visitor evaluations

Extensive visitor evaluations were done for the February 2010 Science Lounge iteration of Life Out There. The Science Lounge was a new program at DMNS, marketed through social media and aimed at luring adults 21 years (the drinking age in the U.S.) and older, for “entertainment, mind-expanding science, and cocktails.”

Evaluation results suggest that these initial goals were met. Out of a N = 90 sample returned for analysis that night, 92.2% (83/90) indicated they learned something new from the experience. Roughly equal numbers were once-a-year/annual visitors (30%, 28/90) and regular visitors (once every 3-6 months; 28.9%; 26/90).

The audience expectations were exceeded for the most part (68.6%; 59/86), while a quarter felt the event met their expectations (25.6%; 22/86), while only 4.7% (4/86) felt that it was not as good as they had expected it to be.

This first Science Lounge event attracted a younger-skewing group than the audiences that normally attend evening programs at DMNS, with the under 40-year-old demographic making up 60% of the attendees (21-25 years old: 20.2%; 26-30: 14.6%; 31-35: 14.6%; 36-40: 14.6%).

Although evaluation results from the July 2011 shows were not as extensive as for the Science Lounge Life Out There, the audience satisfaction numbers were again high. Out of N = 10 and N = 13 responses for the July 7 and 8 shows, 80% (8/10) and 69% (9/13), respectively, felt the shows were better than they expected, while 20% (2/10) and 15% (2/13), respectively, felt that it was as good as they expected.

The 2013 Jackson Hole concert had over 200 attendees, from which N = 60 returned evaluation surveys after the program. When asked about whether they found the show interesting, the average score was M = 8.84, with a median score of 9 on a 1-10 scale. When asked something new they had learned from the program, 35% (21/60) of the replies mentioned Titan. Almost all of the attendees (90%; 54/60) mentioned that they wanted to learn more about science after watching the show.

An impact model for summer ‘14

For the Summer 2014 tour evaluations, we followed an education and public outreach (EPO) impact model developed by the NASA Astrobiology Institute (Davis & Scalice 2014). The model follows the recording of results following five different effects on participants (behavior, attitudes, skills, interest, and knowledge, or “BASIK”) normalized by a Rigor rating (from 1-3) to reflect the confidence of the data based on how they were collected.
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For example, evaluation results using comparisons between pre- and post-tests would have a higher rigor rating (3), compared to pre- and post-self report (Rigor of 2), versus a post-only survey (Rigor of 1). This process reflects the diversity of projects and the evaluation methods used within the EPO community. At the same time, it distills the evaluation results to a few numbers that can be used to compare widely different programs.

Based on a preliminary analyses, the participants from the Washington, D.C. concerts (N = 91) rated their interest in the show with an average of M = 9.2 (with a median of 10) on a 10-point scale. Although this is self-reported, meaning that Rigor=1 is low, the overall impact on interest is high=3.

Similarly for the audiences from the Chicago shows (N = 114) gave an Impact = Results × Rigor = 3 × 1 = 3. In Washington and Chicago, respectively, 89% and 92% of the participants reported that they were more interested in science after watching the Life Out There concerts, and 36% and 24% reported learning something new with regards to Titan.

The preliminary visitor evaluation data from the sold-out 2014 concerts reveal that the main objectives of the NASA-funded tour were met, including taking data to assess best methods to promote a novel approach to astrophotography EPO and gaining the momentum, while raising interest and excitement, to help book future shows in other venues to continue the Life Out There concerts.

We continue to analyze the data to identify what can be improved for future shows, since the just completed Life Out There presentations clearly demonstrated audience interest and enthusiasm, while increasing awareness of the science and content knowledge about Titan.

Continuing and future variations

Video footage from the July 2011 performances have been edited into a DVD. In addition to the disk being available upon request from the authors, online versions can also be streamed from https://vimeo.com/39717439 and http://solarsystem.nasa.gov/naititan/multimedia/.

Discussions are underway now with several venues for a possible tour in the summer or fall of 2015, which will incorporate lessons learned from the 2014 tour.

One challenge for this future tour will be financial. Can a tour like this be self-supporting, and not dependent upon outside funding, such as the NASA Astrobiology Institute grant that financed the 2014 tour?

It is quite expensive to go on the road with so many live musicians and technicians, and dome venues typically do not hold large audiences. Yet each of the 2014 shows sold out, often with minimal advertising, indicating that a show combining live music with exciting immersive digital imagery and authoritative scientific narration is appealing to public audiences.

This fact, plus the extremely enthusiastic audience response and reviews gained from the 2014 tour, suggests that audience demand might support longer runs at individual venues, with the total number of tickets sold combining to cover the costs of mounting the show.

One audience comment posted on the Goldstar Website after the last of the Adler Planetarium shows in 2014 perhaps exemplifies why the participants and attendees of this innovative show felt that it was, indeed, quite worthwhile, further encouraging us to continue this effort:

“...It is a wonderful show! The fact that it was real data (not an animation) makes it very special. I got the feeling of really belonging, being a part of the universe—How wonderful it is! The music was very good too. I took my 5-year-old with me and she loved it too. All morning she talks about “small sun” (like it’s seen from Saturn) and that she wants to fly and see the world with “lots of molecules” (I think she means Titan). The task of inspiring a new generation is accomplished.”

Acknowledgments

We would like to thank the other members of the House Band of the Universe, past and present, without whom Life Out There would not be possible. We would also like to acknowledge Gannon Kashwiwa, Dan Neafus, Tito Dupret, Greg Mancari, Liz Davis, Julia Spalding-Beegles, Sean Tseng, Terry Moore, David Champlin, and Deirdre Goldsworth, who enabled and helped stage the pioneering concerts at DMNS.

Additionally, we are grateful to the NASA Astrobiology Institute, especially Daniella Scalise, for considering our proposal and providing funding for the 2014 tour. Final kudos go to Emily Boespflug and Dave Muskat (Jackson Hole Center for the Arts; Cat Aboudara (Smithsonian Associates); and Mark Webb and Mark Subbarao (Adler Planetarium), who enabled the shows on the road in 2013-2014.

References


Hare, J. 1984, “(In-House) Laser Shows ... A Long Term Proposition,” The Planetarian, 13, 8-9.


NARRATED BY LIAM NEESON

D Y N A M I C
E A R T H
Exploring Earth’s Climate Engine

Public Choice Award
Short Film
Cinadh Humanist Film Festival 2011

Golden Star Award
South Korea
Planetarium Fest 2012

Award Winner
Marine Biophysics
Jena KinoMedia Festival 2011

Finalist
Jason Webb
Science Media Awards 2012

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Putting sustainability at the heart of managing the Rio Planetarium

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Rio de Janeiro, Brazil

From June 20 to 22, 2012, Rio de Janeiro hosted the United Nations Summit on Sustainable Development, known as the Rio+20 Conference. World leaders, along with thousands of participants from governments, the private sector, non-government organizations, and other groups, came together to shape the global debate on ways to reduce poverty, advance social equity, and ensure environmental protection on an ever more crowded planet.

In the wake of Rio+20 Conference, Rio Planetarium initiated in the same year a process of significant changes in its management model towards sustainability.

From the perspective of its stakeholders, Rio Planetarium put sustainability at the heart of its management. Aligned to its long-term role of diffusion of astronomy and related sciences, the institution began to think explicitly and intentionally about what sustainability is and why it matters to its present and future.

One of the assumptions for building a new management model is the understanding of marketing "Planetarium 3.0," an allusion to the concept of "Marketing 3.0" posed by Philip Kotler and others authors (see Box 1).

A new management model

One of the assumptions for building a new management model based on the three pillars of sustainability was the establishment of a dynamic management required for self-sustainability, dissemination of astronomy and related sciences in all social classes of Rio’s population, and low-carbon operations.

Such understanding supported both the design of a new model itself and the way to develop and perform innovative services aligned to an inclusive philosophy of educational and cultural services. This philosophy was expressed by a set of values called “Planetarium 3.0,” an allusion to the concept of “Marketing 3.0” posed by Philip Kotler and others authors (see Box 1).

According to them, the future of marketing lies in creating products, services, and organizational cultures that inspire, include, and reflect the values of target customers.

The new management model is presented in Fig. 1. It integrates management and strategic plan-
ning good practices to the concept of Planetarium 3.0. The core elements of this management model are:

- Analysis of driving forces from the external environment and diagnosis of strengths and weaknesses of the institution (internal environment);
- Establishment or revision of Rio Planetarium’s strategic drivers of mission, vision, and values;
- Strategic planning for defining strategic objectives, short, medium and long term goals, indicators and metrics for evaluating sustainability performance;
- Deployment of strategic objectives and goals into action plans comprising Rio Planetarium’s Tactical Plan; and
- Systematic evaluation of sustainability performance based on the concept and values of Planetarium 3.0.

Fostering a two-way, inclusive dialogue with stakeholders, ranging from collaborators, educational institutions, and NGOs to governments and civil society, was the key to the success of developing a participative and balanced process under sustainability pillars, as shown in Fig. 2 on facing page.

There was an opportunity for their voices to be heard, or for them to influence the strategic planning itself and future outcome in some way. Guided by the concepts first introduced by Kaplan and Norton, Rio Planetarium adopted the tool called Balanced Scorecard, aiming at effective measurement of organizational performance and also successful implementation of a strategy towards sustainability.

**Providing a framework**

The scorecard provided a comprehensive framework that translates Rio Planetarium’s strategic objectives into a coherent set of action plans and key performance indicators and metrics.

It represented a fundamental change in the underlying assumptions about performance and helped it to focus on institutional vision towards sustainability. It could demonstrate interrelated perspectives for examining Rio Planetarium’s success in resource accountability, intellectual production, public accessibility, and social and environmental perspectives of sustainability.

The process was structured in two phases as shown in Fig. 3.

Results from Phase 2 were consolidated on a
strategy map of Rio Planetarium, built in four perspectives: sustainability, customers, internal processes, and learning and growth. This strategy map illustrated in Fig. 4 shows graphically how Rio Planetarium creates value for its customers and stakeholders.

Strategy mapping started with creation of about 20 strategic objectives that were the building blocks of Rio Planetarium’s corporate strategy. The objectives were then linked in cause-effect relationships to create a strategy map. Once strategic objectives were developed and the map was collectively created, institutional values (Planetarium 3.0), performance indicators, and strategic initiatives could be clearly identified for each objective.

In Fig. 4, one can see how the pieces come together to tell the strategic story. The ovals in the Fig. are the strategic objectives, which are placed in perspective layers. The bottom two perspectives contain the driving objectives and the top two perspectives comprise the supporting objectives.

The top objectives—concerning sustainability—are the final desired outcomes that the institution has been working towards.

By linking the 20 objectives at corporate level with objectives at departmental areas and employee levels, line-of-site alignment among institutional mission, corporate and departmental strategy, and personal goals and accomplishments can be achieved. Likewise, strategic initiatives and performance indicators can be linked to each objective. The table below summarizes the results of Rio Planetarium’s strategic planning process.

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Strategic objectives 2013-2022</th>
<th>Initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainability</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Customers</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Internal processes</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Learning and growth</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>35</td>
</tr>
</tbody>
</table>

Measuring sustainability

Developing a set of sustainability indicators for Rio Planetarium was a real challenge! The main purpose was to provide a set of key performance indicators that may be used to measure progress towards becoming a sustainable institution. The data gathering for communicate performance is also crucial, since sustainability reporting became a powerful way for institutions getting funding to help them achieve sustainability goals.

Ultimately, a set of good indicators is a way of keeping an institution balanced, and making sure the outcomes of decisions that improve one area do not make another unsustainable.

At the international level, the annual reports of some major science and history museums and planetariums of Europe and North America have made little mention of sustainability. As a matter of fact, there are no indicators that have been specifically designed for planetariums and congener institutions.

In turn, there are general guidelines and models for measuring sustainable performance—e.g. Sustainability Reporting Guidelines Version 3.0 (G3) from Global Reporting Initiative—which can be adapted. Adaptation and alignment to GRI Guidelines were the assumptions for building a set of key performance indicators associated to the four perspectives of Rio Planetarium Strategy Map (Fig. 4).

By way of illustration, the table on the facing page shows a pair of indicators established for measuring performance and progress towards sustainability regarding the bottom two perspectives of Rio Planetarium Strategy Map (Fig. 4).

Concluding remarks

The sustainable management model and the process of strategic management presented in this paper involved approximately sixty collaborators from the many different areas of Rio Planetarium and several representatives of external stakeholders.

From 2013 onwards, both the management model focused on sustainability pillars and the Strategic Plan (2013-2022) have been disseminated throughout all internal and external stakeholders in special meetings and seminars.

As mentioned, we believe that the sustainable management model and the process of strategic management here described can be replicated by other congener institutions. In addition to encouraging planetariums to put sustainability at the heart of their management, as illustrated here by the case of Rio Planetarium, we recommend:

A consultation with the various stakeholders should be undertaken to ascertain what the institutions should consider for their sustainability, what is important to be measured concerning sustainability indicators, and what sustainability-related activities they should implement in short, medium and long terms. In conjunction with a deep review of existing government policies and legislation, this consultation may be useful for the revision of current indicators, and it may be used as a tool to achieve consensus on sustainability issues between Planetariums of a given region or country;

Establishment of local, regional or national policies to encourage balanced sustainability in all practices of planetariums. This would contribute to the development of action plans for sustainability to be implemented by the focused institutions. Comparable data would be easily collected as most planetariums would follow their state or municipal policies concerning sustainability;

A set of benchmarks or targets should be established for planetariums as reference points to guide these institutions on how to make their current practices sustainable. At the international level, as a suggestion, this initiative could be coordinated by the International Planetarium Society (IPS);

Permanent improvement of management methods and practices under the sustainability pillars and dissemination of planetariums’ sustainability good practices through periodic meetings organized for this purpose (local, national or international meetings); and

Collective construction of specific guidelines based on the planetarium experiences that could be addressed to Global Reporting Initiative as already occurred in other sectors that have specific guidelines based on their sustainability best practices.

References


Be prepared with great ideas!

Everyone’s Universe
(Second Edition)
by Noreen Grice

www.YouCanDoAstronomy.com
<table>
<thead>
<tr>
<th>Perspective</th>
<th>Rio Planetarium Strategic Objective</th>
<th>Alignment to GRI Indicator</th>
<th>Rio Planetarium Indicator</th>
</tr>
</thead>
</table>
| Sustainability   | S1. To achieve economic and financial self-sustainability in long term                               | EC1 – Direct economic value generated and distributed  
EC4 – Financial assistance received from government  
EC8 – Significant indirect economic impacts, including the extent of impacts                                                                                          | IS1 – Economic and financial sustainability index  
Composite indicator expressed in percentage terms, as follows:  
– Investment = [volume of funding from external sources / (volume of funding from external sources + institutional counterparts)]  
– Spending = [volume of raised resources / (volume of raised resources + volume of resources from the Municipal Treasury Fund)]  
– Spending reduction = [volume of saved resources / volume of costing resources from the previous year]  
|                  | S2. To create value by means of initiative and practices of social sustainability                   | SO1 - Percentage of operations with implemented local community engagement, impact assessments, and development programs.                                                                                      | IS2 – Economic and financial sustainability index  
Indicator expressed in percentage terms, as follows:  
– Number of people impacted by social projects / total number of visitors to physical facilities, cultural events, itinerant event and others / year |  
|                  | S3. To create value by implementing a low carbon strategy                                           | EN6 – Reduction of energy consumption  
EN10 – Percentage and total volume of water recycled and reused  
EN16 – Energy indirect greenhouse gas (GHG) emissions (Scope 2)  
EN17 – Other indirect greenhouse gas (GHG) emissions (Scope 3)  
EN23 – Total weight of waste by type and disposal method                                                                                                         | IS3 – Environmental sustainability index  
Composite indicator expressed by:  
– Energy efficiency by conservation initiatives: kWh/year saved by conservations initiatives / total number of visitors to physical facilities/year  
– Global greenhouse emissions: kg CO₂ eq/year  
– Water: m³ of reused water/year / total consumption of water/year  
– Waste generation: Mass of waste generated in kg/year / number of visitors to physical facilities/year                                                                 |  
| Customers        | C2. To attract new groups of visitors and develop innovative forms of customers relationships         | SO1 - Percentage of operations with implemented local community engagement, impact assessments, and development programs.  
EC8 – Significant indirect economic impacts, including the extent of impacts.                                                                                   | IC4 – Degree of attraction of new groups of visitors  
Composite indicator expressed in percentage terms, as follows:  
– Number of scientific, educational and cultural activities with high social impact / total of scientific, educational and cultural activities (e.g. Rio Planetarium without Frontiers; Social Planetarium)  
– Number of scientific, educational and cultural activities with impact on tourism / total of scientific, educational and cultural activities (e.g. Rio Planetarium-Tourism)  
– Number of online educational experiments / total of educational experiments (e.g. Spacecraft-School and Museum of Universe) |
The Indian Space Research Organisation, ISRO’s Telemetry Tracking and Command Network (ISTRAC) in Bangalore, India was the focus of attention of the entire country on the morning of 24 September 2014.

About 610 TV news channels of India telecasting in more than 15 different languages were showing the same scene and the same feed right from 6 (IST) in the morning. Experts of all hues from scientists, aerospace experts, professors, and science educators were airing their opinions on these channels.

The entire country was waiting with bated breath for the clock to strike 7:17 a.m., when the main engine and eight thrusters should start firing without any command from Earth and start the Mars orbit insertion manoeuvre.

But ISRO had no means of knowing what exactly was happening there in real-time because at that moment, the Mars Orbiter Mission (MOM) was not only in the shadow of Mars, operating on its batteries, but also was eclipsed from Earth. It was functioning on “autonomous” mode, which means the craft had brains to “think and act” on its own.

Its operations were now dependent on the commands from its onboard computer that had been uploaded on 15 September.

Thirteen minutes later (due to signal travel time from Mars), ISTRAC centre received the signal. The engines were required to run only for 24 minutes, so they should have stopped at 7:41 a.m. The Earth got the signal at 7:54 a.m. The command centre erupted with cheers, claps, hugs and pats.

MOM was in orbit!

Thus India’s MOM got successfully inserted into its orbit around Mars and with that, India became the fourth member of a select group that has done this before, joining USA, Russia, and ESA.

The mood in the control room became electric and erupted in joy as Indian Prime Minister Mr. Narendra Modi stood a happy witness.

The orbital insertion took place two days after NASA’s Mars Atmosphere and Volatile Evolution Mission (MAVEN), too, had successfully reached Mars on 22 September. In fact, on 22 September MOM’s liquid engine motor was test fired for 4 seconds after having lain idle for the past 300 days! As one expert said, we are wary because you leave your car home for two weeks and you are not sure whether it will start; here the motor was idle for 10 months.

Choked with joy and disbelief, a TV commentator said “India has become the first country to reach Mars in its maiden attempt.” This was repeated over and over again on several news channels and everyone seemed to have forgotten the Mars Express Mission of ESA, which also had reached Mars on its first attempt in 2004.

It is true that Mars has proved to be a veritable graveyard of probes. USA and Russia (then the USSR) had failed in their earlier attempts. It is also true that several failures cannot be attributed to Martian distance or harsh space environs, as many of them failed to reach even the Earth orbit for a variety of reasons.

The failures have been too many, 25 out of 45 attempts, or a staggering 58% failure rate! (Please refer to mars.nasa.gov/programmis/missions/missions/logi). Indian science and technology follows the Indian tradition of doing things in innovative and frugal ways. MOM was inspired by the success of its Chandrayaan-1, an orbiter that was sent to the moon in October 2008.

ISRO used almost the same design for its MOM. One expert quipped, “we have spent only $75 million for this 680 million kilometre journey; that works out to just 11 cents per kilometre, one third of what a taxi-cab charges per kilometre in India.” What many forgot was that the force of gravity that silently did its job when the engines were not burning.

ISRO chose 5 November 2013 as the launch date because it led to a minimum energy opportunity for Earth-Mars travel. On 1 December 2013, the Earth, Mars, and the sun offered this opportunity. In the meanwhile, the probe made about six loops around Earth and each time its orbit was elevated using thrusters.

Low fuel consumption and shortening of travel time were the primary considerations for choosing these dates. Had ISRO missed this opportunity, it would have had to wait for another 780 days until such favourable configuration would happen again.

Thus, on 1 December 2013, using very little fuel, the probe was catapulted from Earth or-
bit onto a hyperbolic trajectory toward Mars.

Everything about MOM is indigenous, right from its launcher (PSLV C25 rocket), its cryogenic engine, the satellite MOM, and its scientific payload. The project was approved by the government of India on 3 August 2012 and ISRO took just 15 months to get everything ready. NASA’s deep space network was used to track the spacecraft when it reached beyond the range of India’s IDSN (Indian Deep Space Network).

MOM’s objectives are simple and just two. The primary goal is the technology demonstration of having attained interplanetary travel capability. The MOM carries a modest payload weighing just 15 kg of five scientific instruments. This small-car-sized object weighs 1337 kg, accounting for the structure, solar panels and fuel.

The five scientific instruments aboard MOM are the Mars Colour Camera, Thermal Infrared Imaging Spectrometer, Methane Sensor, Mars Exospheric Neutral Composition Analyser, and Lyman Alpha Photometer. The Mars Colour Camera started sending the pictures of the red planet within hours of its orbital insertion.

MOM’s success will pave the way for ISRO’s future ambitions, like revisiting the moon with an unmanned rover, and human space-flight.

It will also be a boost for the development of indigenous technology. Indian companies like Larsen & Toubro, Godrej & Boyce, Walchand Nagar Industries, and Hindustan Aeronautics have contributed most of the parts; the first two alone have contributed almost two-thirds of the craft’s parts. The success of MOM also means engineering success for the part suppliers. This can expand to a huge business opportunity in future.

There is no dearth of detractors for India or its ISRO’s ambitions. Poverty and insanitation are often cited as examples of misplaced priorities. However, there is an answer to that. The 75 million dollar expenditure on MOM or the annual expenditure of 1.2 billion dollars to keep ISRO going is like small change for India’s two trillion dollar economy (based on GDP 2013-14), the latter being just 0.06% of its GDP.

Left: Prime Minister Mr. Narendra Modi (left) congratulating Dr. K. Radhakrishnan, the ISRO chief; center, launch of the MOM mission; right, a view of the Indian subcontinent, among the first images from MOM’s color camera. All pictures courtesy ISRO.
Seemingly hidden in the heart of Europe, the Czech Republic has had an interesting astronomical history since the Middle Ages. As early as 1410 (and maybe a few years earlier), one of the world’s most sophisticated astronomical clocks started ticking in the Old Town Square in Prague. Even today you can still read various times and the positions of the sun and moon, including the lunar phases, on its dial. It ranks among the world’s oldest astronomical clocks and it is a clock that has been the longest in operation.

Later on, the court of the Bohemian emperor Rudolf II invited Danish astronomer Tycho Brahe to become the official imperial astronomer. Brahe lived the rest of his life in Prague and is even buried here.

Tycho brought along another famous astronomer, Johannes Kepler. While there, Kepler observed the supernova of 1604, developed the first two of his three laws of planetary motion, and compiled the Rudolphine Tables forecasting the positions of the planets of the solar system for the next decades. These tables were then used by astronomers for the entire 17th century.

There are other big names connected with the Czech Republic. Ernst Mach was born and worked here; Albert Einstein worked in Prague for two years; Antonin Becvar drew an amazing piece of work, the Atlas of the Heavens, in the middle of the last century, which became a model for many modern star sky atlases; Antonin Rukl is an author of many moon maps, including the very popular Atlas of the Moon; and Lubos Kohoutek, a discoverer the 1973 comet and an author of a frequently quoted planetary nebulae catalog, also comes from the Czech Republic.

But the Czech Republic is not only the charming city of Prague with its many historical monuments. The second half of the 20th century saw an establishment of several projection planetariums here, with dome diameters of 6 to 23 meters. All of them were equipped with projectors from the company Carl Zeiss, understandable because of the isolation those days, which made another supplier out of the question. They were usually projectors ZKP-1, and later Spacemaster or Cosmorama.

For the whole time, all eight Czech plane-
tariums were run and financed from municipal or regional budgets. Unfortunately, due to the lack of motivation and since the Iron Curtain those days prevented any import of modern technology to the states under the Soviet influence, the planetariums were not usually modernized.

An interesting thing about the most Czech planetariums is the fact that they are parts of classic observatories. They offer educational programs under the planetarium’s artificial sky during the day and lead guided public observations of the real sky at night. The employees and collaborators of the observatories and planetariums are even engaged in various scientific activities, of which very popular are for example observations of variable stars, meteors and the Sun.

**A fight to survive**

The break up of the communist system (as well as the former Czechoslovakia) in the early 1990s was followed by two decades of transforming the whole society, a time when the existing planetariums literally fought to survive. The Czech people found the newly-gained freedom, the possibilities of traveling abroad, and other kinds of entertainment easily available then were much more attractive than astronomy. However, it was also the end of the embargo on modern technologies and the open borders made it possible to exchange experience with the rest of the world.

At the beginning of the 21th century, the turbulent period of economic and political changes ended and the Czech Republic, particularly the Ministry of Education, Youth and Sports, started supporting the dissemination of science, critical thinking, and, of course, the achievements of Czech scientists. The support program also includes the existing planetariums and several projects for building big science centers.

In addition to that, the Czech Republic has become a member of the European Southern Observatory and the European Space Agency and participates in constructing the Pierre Auger Observatory, ALMA, and CERN. Prague itself hosts one of the headquarters of the Galileo navigation system.

**Investing in the future**

In the last several years, the Czech Republic has invested over 100 million euros in construction works, new expositions, and audiovisual technology. There have been nine big science centers built here, of which five have new digital planetariums with fulldome projection. They have domes with a diameter of 5 to 17 meters and are equipped with 2D as well as 3D technologies with a resolution of 1k to 4k. Nowadays, the Czech Republic, with its population of 10 million, has as many as 6 digital planetariums.

Moreover, following global trends, the Czech planetariums are now revising the offer of their shows. While in the past they focused purely on basic astronomical education, they have changed into multimedia centers popularizing various scientific topics, organizing culture events, and informing on interesting scientific projects.

The Czech planetariums are now at the start of a great transformation. The total number of visitors is likely to reach over 750 thousand already in 2015. And yet their ambitions are even bigger. Some planetariums have set up teams that want to do their own shows and, of course, they are thinking of international cooperation. So if you ever visit the Czech Republic or just feel like cooperating with us, certainly contact us! The Czech planetariums are looking forward to meeting you.

**Czech Digital Planetariums**

**Brno Observatory and Planetarium**

Since November 2013. A building in a modern functionalist style with a planetarium. A projection screen of 17 m in diameter, 189 seats and a hybrid system 4k RSA Cosmos + GOTO Chronos II. Includes an observatory and a smaller interactive exposition.

**Observatory and Planetarium Hradec Kralove**

From January 2015. A projection screen of 12 m in diameter, 95 seats and a powerdome system from Carl Zeiss Jena. Includes an observatory and a smaller interactive exposition.

**iQLANDIA Science Center Liberec**

Since April 2014. A projection screen of 9 m in diameter, 52 seats and a system 2k 3D RSA Cosmos. A part of a big science center with more than 10 expositions.

**Citadel of Knowledge Olomouc**

From March 2015. A projection screen of 7 m in diameter, 50 seats and fish eye projection. A part of a bigger science center.

**Techmania Science Center Pilsen**

Since April 2014. A projection screen of 14 m in diameter, 90 seats and a system 4k 3D Sky Skan. A part of a big science center with a total area of 30,000 square meters.

**Planetarium Ostrava**

Since November 2014. A projection screen of 13 m in diameter, 100
Central European Fulldome Festival Brno 2015

No lectures, no workshops, only fulldome projections. What else to say? It is the Central European Fulldome Festival Brno, scheduled for 13-14 April 2015! The Central European Fulldome Festival Brno is to show the best of the fulldome production market and to connect the producers and creators from all round the world with new planetariums and planetarians from Central and Eastern Europe.

The Czech Republic is a charming country with friendly people. Here in Brno, we have one of the most beautiful planetariums in Europe and we are longing to watch fulldome shows. Moreover, it is not far from here to Prague, the jewel of Europe, or to Vienna, the capital of Austria.

Our fulldome festival is also connected with the biggest European festival of science documentary films. To make it more interesting, your show might be the winner of our competition. The Central European Fulldome Festival Brno 2015 is completely free for producers and planetarians, which means there are no fees for show presentations and you can have your booth in the premises of the Brno Observatory and Planetarium free of charge.

Or, if you like, you can just come to the festival as a member of the planetarium audience. We also would like to invite you, the producers, to social events in which you can hold further discussions with the representatives of the Central European planetariums, and they can do the same with you.

New planetariums already exist or are being prepared also in Poland, Hungary, Bulgaria, Romania, Ukraine, and the Baltic States.

The festival is organized by the Brno Observatory and Planetarium, Czech Republic, and it is not just about Central and Eastern Europe. Planetarians from all the world are welcome. See more and follow us on www.starrylab.com/festival. And put on your calendar Brno Observatory and Planetarium, 13-14 April 2015.

The Blind Man with Starry Eyes

The Blind Man with Starry Eyes is a lovely tale for young children. Introducing basic astronomical concepts such as night and day, rotation of the Earth, stars and the Sun, shooting stars and meteorites, the show is also a profound story about life, knowledge and our relationship to Nature.

23 minutes

Best Fulldome Show 3rd Prize at the 2013 International “Reflections of the Universe” Festival, Yaroslavl (Russia)

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the origins of flight

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WE ARE ALIENS!
ARE WE ALONE?
AVAILABLE IN FULLDOME 2D AND 3D NOW.

Your next must have Fulldome show will be revealed at IPS 2014. For those not in Beijing, follow our blog for announcements.

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NSC Creative is an award winning computer animation studio that specialises in immersive films for Fulldome and Stereoscopic 3D with over 10 years' experience. We offer a full production service for bespoke, original high-end content with the wow factor guaranteed and a library of top-quality films to license.

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A More Perfect Heaven: How Copernicus Revolutionized the Cosmos
Reviewed by Francine Jackson.
Anyone who has read any of Dava Sobel’s books knows that she really gets into the history of her subject. It was very evident with her first masterpiece, Longitude, and we see it again with her almost day-by-day account of the life of Copernicus.

We often think of him as just a person who did nothing in his life but sit around and contemplate the destruction of the age-old theory of the universe. In fact, he was, in addition to a cleric, a landowner, a politician, and a person who found himself mourning the life of his brother, who died at a young age of leprosy. Each of these facets of his life is given to us with the humanity we feel he desires, and the strength he needed to put all of his life together.

In an unusual aspect to her work, the author included a different way to acknowledge two very different aspects of his life, presented as “A Play in Two Acts.” One part of this shows the unique interaction believed to have occurred with a student, Rheticus, to whom he tries to teach his revolutionary new theory of the universe, and the reaction of this young person to such an idea.

The other is Copernicus and the Bishop of Varmia, to whom Copernicus must not only keep secret his heliocentricity, but also listen to charges of his (gasp!) having a female housekeeper under his roof.

Some of us in New England were privileged to see a sampling of this part of Sobel’s book when she appeared at Harvard College and played the part of Rheticus to Owen Gingerich’s Copernicus. It truly brought this time in history right out of her pages.

A More Perfect Heaven is more than just the life of someone we all have heard about in our history lessons. It brings the Copernican theory of the universe, and the man behind it, to the forefront, and then shows its implications to the study of astronomy, from Galileo and all the way to the Hubble Telescope, in an easy-to-read account that should please even the non-science-oriented reader. Sit back, and enjoy.

Impact Craters of Earth with Selected Craters Elsewhere
Reviewed by R. Scott Harris, Fernbank Science Center, Atlanta, Georgia, USA.
Although a current and concise compendium of Earth’s impact craters and structures would be a welcome addition to the libraries of both earth science educators and impact geologists, Impact Craters of Earth poses some challenges.

In the brief introduction, the author uses old and inaccurate terminology and demonstrates some fundamental misunderstandings of impact cratering and shock mineralogy. For example, the term “siderolite” is used to refer to iron meteorites. The correct, but still antiquated, term is “siderite.”

The author also implies that the raised rim around an impact crater results from the material “tossed out” of the hole, when, in fact, the raised rim is a characteristic structural element of shockwave excavation caused by both uplift and overturning of rock, not ejection.

As for the list of impact craters and structures, it might be assumed that the author would borrow from one of a number of authoritative databases. The author clearly recognizes the importance of the distinction between confirmed and unconfirmed craters. The section on putative Antarctic craters explains why proper geologic investigation of a few possible structures is understandably difficult in that environment.

The author could have elected to list and discuss both confirmed craters and those suspected of being craters based on ample, but incomplete, studies. However, the author instead seems to have created his own unique list that includes some barely possible craters while neglecting other highly probable sites. The author also includes some controversial possible structures, such as Aziuara and Rubielos de la Cerdia, and incorrectly states that coesite has been found at these sites.

Flags of the Night Sky: When Astronomy Meets National Pride
André G. Bordeleau, Springer, 2013
Reviewed by April Whitt, Fernbank Science Center, Atlanta, Georgia, USA.
First, accept apologies to the author. M. Bordeleau was kind enough to send an electronic copy of this great book months ago, and the review is only now appearing. I am really sorry, mostly that I haven’t shared this work with others before now. It’s a “must have.” It is available both in electronic and print form.

Flags of the Night Sky explores the stars and constellations found on national flags from numerous countries, all around the world. I have seen presentations on this topic by IPS past president Dale Smith, who has collected flag images in an impressive group of slides. This book tells the rest of the story.

We’ve all seen them: the southern cross on flags of New Zealand and Australia, the sun on Argentina’s banner, a single star on the flags of Israel and Vietnam, a crescent moon and star for Turkey or Pakistan, multiple stars arranged on China’s flag, and even stars in neat rows on the United States’ “star-span-gled banner.” This book explains those symbols from the sky, and offers an interesting way to teach some basic astronomy along the way.

Astronomical objects found on national flags are listed, and information about the political reasons for choosing those objects is included. You might check the Springer web site for the description of Brazil’s flag that includes a true sky chart.

The discussions of why particular objects were chosen, and how a particular flag evolved, are fascinating. One gathers an education in politics, science, and vexillology, all in one handy volume.

Consider this as a gift, as an item for your gift shop, as a wonderful browsing opportunity, and as a source of great information.
Hidden within some of mankind’s oldest monuments may lie the foundations of modern science.

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Andrew Kerr, Planetarium Manager
Andrew.Kerr@csn.edu

The Planetarium at the College of Southern Nevada is southern Nevada’s only public planetarium. We have a 30-ft dome (9 m), and 70 seats in a “Prince Valiant Cut” dome. Our Digistar 5 system gives us 1920x1920 pixels up on our screen, and allows us to do everything a digital projection system should for the audience.

Our audience is quite diverse. We cater to Las Vegas area students during the morning (9:30 and 11 a.m. time slots for tours), and then our own students at the college in the afternoons. On Fridays and Saturdays, we have our public shows. We are open for shows at 6, 7, and 8 p.m. both Friday and Saturday, as well as a 3:30 matinee on Saturdays.

Our shop is open for the public shows, and we sell a variety of science novelties and toys; the favorite is probably the freeze-dried astronaut food. We open our observatories after the 8 p.m. shows (weather permitting) and show off the night sky.

The Las Vegas Astronomical Society calls our dome home as well, holding their monthly meeting in the dome and helping out with telescopes for special events.

The Planetarium publishes the monthly magazine onOrbit, in conjunction with the Fleischmann Planetarium in Reno (at the University of Nevada Reno), which we send out to the friends and supporters of the two planetariums. Back issues can be found on our website (www.csn.edu/planetarium) in pdf form. In fact, as I write this, I should also be getting our December issue ready.

We have a small but dedicated staff here at The Planetarium. My name is Andrew Kerr, and I started as the planetarium manager here in July. I replaced the retiring Dale Etheridge, who was the only director the planetarium had until now.

I’ve been running planetariums for the last 11 years, starting at the University of Findlay in Ohio, moving on to Blakemore Planetarium in Midland, Texas, and finally arriving here to Las Vegas. My original plan was to teach physics and astronomy, but I fell in love with the planetarium world very quickly in Ohio.

Bob Pippin handles the duties at the controls of the planetarium and does it very well. Pam Maher keeps everything straight for us. In fact, I don’t even know how she handles everything that ends up dumped in her lap.

We also have several people who help in in many different ways, keeping us up and running and ready for the public shows on the weekends. Even with the transition, I think we’ve jelled very quickly, and the planetarium runs very well.

Of course, as with all planetariums, we are trying to adapt to the changing times. With entertainment available with the flick of a finger on a cell phone, it is a challenge to bring people out to learn about science. Add to that the incredible bright lights allure of Las Vegas, and we find ourselves competing for visitors.

To that end, we are planning to create our own content. Just like all actors (and make no mistake, anyone who has ever done a program inside a dome knows that they are entertainers as well as scientists), I want to direct.

Despite our problems, we also have a lot going for us as well. Our skies are normally clear. While we do have clouds, they are very occasional. We also have several astronomy professors at the College of Southern Nevada, and people like to be able to talk to an astronomer about their questions.

By far, the best part of being involved with a planetarium is the reaction when someone “gets it.” The eyes light up, and that look of recognition flashes across the whole face. It is often easier to see in children, and children are nearly always more receptive to astronomy than adults. That’s not to say that you can’t get the same experience with adults, but the fire to learn inside children just seems to burn that much brighter.

I have never been asked a silly question inside the dome (attempts at astronomy potty humor are always met with a serious answer), and if my expectations hold out, I never will be presented with a silly question.

The planetarium world is changing. We just need to remember that our audiences’ entertainment needs have changed as well. As long as we continue to accept those changes and adapt with the times, we should be able to stay strong and viable into the future.
The moment of inspiration when he decides to fly to Mars one day.

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When Pittsburgh Got Its Planetarium

By Glenn A. Walsh
SpaceWatchtower

It was one hundred years ago this past February that the concept of a projection planetarium was born at the Carl Zeiss Optical Works in Jena, Germany. The Deutsches Museum in Munich, which had opened in 1906 as the first modern-type science museum, was looking for a realistic way to reproduce the stars of the night sky, similar to a mechanical celestial sphere that had opened at the Chicago Academy of Sciences in 1913.

However, Chicago's Atwood Sphere only showed the stars, and German astronomer Max Wolfe urged the Munich museum to find a way to also display the motions of the sun, moon, and planets.

Two Carl Zeiss scientists, Walther Bauersfeld and Rudolf Straubel, offered an alterna-

The 75th anniversary of America’s 5th major planetarium

Glenn A. Walsh served as Astronomical Observatory coordinator and a planetarium Lecturer at Pittsburgh’s original Buhl Planetarium and Institute of Popular Science, then known as Buhl Science Center, during the 1980s and early 1990s. Additionally, he created, and served as curator for four years, of a very popular embryology exhibit where chicks, and occasionally ducklings, were hatched in front of visitors’ eyes every weekend, year-round. He served as a life trustee on the Board of Trustees of the Andrew Carnegie Free Library and Music Hall in the Pittsburgh suburb of Carnegie for five years in the second half of the 1990s. He now heads a small non-profit organization called Friends of the Zeiss and authors a blog called SpaceWatchtower at spacewatchtower.blogspot.com. This article ©2014 Glenn A. Walsh and used with permission; all rights reserved.
tive: replace the small celestial sphere with a giant hemispheric dome, and use a bright central lamp to project the planets and stars onto the dome sky.

In 1923, the Carl Zeiss scientists first demonstrated a large-scale projection planetarium in a 16-m dome set-up on the company's factory roof in Jena. Two years later, the Zeiss I planetarium projector was permanently installed in the Deutsches Museum. This new educational tool greatly impressed scientists and civic leaders in Germany, resulting in 11 other German cities receiving Zeiss planetarium projectors by the end of the decade. A much-improved Zeiss Model II soon superseded the Zeiss I.

In 1927, the first Zeiss projector outside of Germany was installed in Vienna, and then a projector was installed in Rome in 1928 and one in Moscow in 1929. Other European cities to receive planetarium projectors from the Carl Zeiss Company, prior to World War II, included Stockholm (1930), Milan (1930), and Paris (1937). The first Asian planetarium projectors appeared in Osaka in 1937 and Tokyo in 1938.

Five projectors came to America

Five Zeiss II projectors were installed in America during the 1930s. The first was in the new Adler Planetarium and Astronomy Museum in Chicago in 1930. In New York, the Hayden Planetarium was built as an addition to the American Museum of Natural History in 1935.

In Philadelphia, Fels Planetarium opened as part of the new Franklin Institute Science Museum in 1934. And, in Los Angeles, a new Griffith Observatory was built in 1935 with a planetarium, just above Hollywood.

This year marks the 75th anniversary of America's fifth major planetarium, and the last one built before World War II, the Buhl Planetarium and Institute of Popular Science in Pittsburgh.

Dedicated at a gala event on 24 October 1939, the new educational facility was constructed for $1.07 million by the Buhl Foundation and completely gifted and legally conveyed to the City of Pittsburgh. It was the first publicly-owned building in the city, and possibly in the state, built with air-conditioning.

The grand public opening of Buhl Planetarium came the next day. The first public planetarium show, Stars Over Pittsburgh, began at 3 p.m., with additional shows at 8 and 9 p.m. At that time, the five exhibit galleries (15,000 square feet of exhibition space in two galleries on the first floor and three on the lower level) in the Institute of Popular Science were open seven days a week from 10 a.m. to 10 p.m. and, for the first year, the exhibits were free of charge. There was a small charge for admission to a planetarium show.

It was closed only one day a year: originally New Year's Day, but in the 1960s that one day became Christmas Day.

It should be noted that another star projector, one which does not display the motions of the planets, was built in America and opened in Massachusetts in October of 1937. And, after a 1996 restoration project, the Korkosz star projector (see Planetarian Vol. 52, No. 3, September 2014) is the only original star projector that continues, to this day, providing educational star shows to the public.

The good folks at the Springfield Science Museum have shown that restoration of a pre-World War II star projector, for the continued presentation of star shows to the public, is quite doable without extravagant expenditures.

The genesis of Buhl Planetarium came from a North Side plumber, Leo Scanlon, who co-founded the Amateur Astronomers Association of Pittsburgh in 1929. A year later, Leo developed the world's first all-aluminum astronomical observatory dome for his backyard observatory, proving for the first time that aluminum was strong enough to hold up such a dome.

That same year, Leo and fellow amateur astronomers went to Chicago to visit the newly-
Beautiful astronomically-related reliefs by sculptor Sidney Waugh adorn the facade of the Buhl Planetarium building, and the names of seven historic astronomers are inscribed just below the outer planetarium dome. Astronomical art inside the building included murals by Benjamin Byrer displayed in black-light in the Hall of the Universe, the huge Nat Youngblood mural The Rise of Steel Technology, paintings on the mezzanine by Daniel Owen Stephens, and a 1985 painting of Halley's Comet from England donated by Pittsburgh industrialist Willard Rockwell, Jr. (and delivered to Buhl in his limousine).

Pittsburgh's Zeiss II was the only Zeiss II to never receive any major modifications. Hence, by the 1990s, it was the oldest operable major planetarium projector in the world. After being dismantled in 2002 to make-way for building reuse by the Children's Museum of Pittsburgh, in 2010 it was reassembled for display only at Pittsburgh's Carnegie Science Center, where it still can be found today.

Buhl's Zeiss II was the first such projector to be placed on an elevator. This special elevator, opened Adler Planetarium.

They were so impressed with this new astronomical institution that as soon as they returned home, they started lobbying for construction of a Pittsburgh planetarium. In 1935, the Buhl Foundation announced plans to build a planetarium and institute of popular science in the memory of Henry Buhl Jr., who had owned the Boggs and Buhl Department Store just one block south of the planetarium site.

At the same time the Buhl Planetarium was being built, just across West Ohio Street the city was converting the original Allegheny town square into Ober Park. Since that time, this park has been redeveloped twice, most recently in 2012 as Buhl Community Park at Allegheny Square.

An exciting opening

The opening of the Buhl Planetarium and Institute of Popular Science was a big deal, particularly coming in the middle of the Great Depression, at a time Pittsburgh only had six major museums.

Three of Pittsburgh's five radio stations carried the dedication ceremony. Attending the dedication were scientists from Franklin Institute in Philadelphia, Hayden Planetarium in New York, Perkins Observatory near Columbus, Ohio, and Cleveland Observatory, as well as the secretary of the Amateur Astronomers Association of America.

Buhl Planetarium was built in the center of the city's North Side business district on the site of the former Allegheny City Hall (Pittsburgh's "twin" city, Allegheny, was annexed by Pittsburgh in 1907), just across the Allegheny River from Downtown Pittsburgh.

At 40,000 square feet, the building was a modest facility, but it included one of the largest planetarium chambers in the nation, with an exterior dome size of 65 feet. The Theater of the Stars was designed to seat 500 visitors; the city fire marshal restricted the occupancy to 490.

Over the years, as the control console grew larger and laser show controls added, the permanent seating declined to 381, with portable seating increasing capacity to about 425 for the holiday shows and the busy spring school field trip season.

Beautiful astronomically-related reliefs by sculptor Sidney Waugh adorn the facade of the Buhl Planetarium building, and the names of seven historic astronomers are inscribed just below the outer planetarium dome. Astronomical art inside the building included murals by Benjamin Byrer displayed in black-light in the Hall of the Universe, the huge Nat Youngblood mural The Rise of Steel Technology, paintings on the mezzanine by Daniel Owen Stephens, and a 1985 painting of Halley's Comet from England donated by Pittsburgh industrialist Willard Rockwell, Jr. (and delivered to Buhl in his limousine).

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Buhl's Zeiss II was the first such projector to be placed on an elevator. This special elevator, (Continues on page 54)
Narrate by Benedict Cumberbatch

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with four huge worm gears, was custom-built by Pittsburgh’s Westinghouse Electric Company. When the projector was lowered below floor level into the Zeiss pit, a stage would be automatically installed above the projector, allowing the Theater of the Stars to be used for other presentations.

However, this was just one of two stages in the Theater of the Stars. Buhl Planetarium was the first planetarium to also include a permanent theatrical stage. The stage could be used where constructed, or, by the push of a button, the stage could be expanded into the planetarium theater.

Buhl Planetarium’s first director, Dr. James S. Stokley, had used a temporary stage when he directed Fels Planetarium at Franklin Institute in Philadelphia, to allow a costumed actor playing “St. Luke” to tell the Christmas story during the annual Star of Bethlehem planetarium sky drama. When he came to Pittsburgh to open Buhl Planetarium, he suggested a permanent theatrical stage be added during construction.

Additionally, this permanent theatrical stage was used for other presentations throughout the year, including student skits during the annual Foreign Language Festival.

Sound for the deaf

In 1939, Buhl Planetarium’s Theater of the Stars was also the first planetarium theater, and perhaps the first theater of any kind, to include a sound system specifically designed for the hearing-impaired. The hearing-impaired could pay a one-dollar deposit for a set of earphones, which would plug into special receptacles; the deposit would be returned to the visitor with return of the headsets. Two varieties of earphones were available: air-conduction and bone-conduction.

Buhl Planetarium’s People’s Observatory, located on the third floor, was dedicated on 19 November 1941, with the keynote address given by famous astronomer Harlow Shapley, then director of the Harvard College Observatory.

The primary instrument was a 10-inch refractor produced by the Gaertner Scientific Company of Chicago. The telescope used a sidereal coelostat or siderostat arrangement for accessing the sky. This allowed the public to use the telescope from a heated observing room, while the siderostat and most of the telescope remained in an open-air telescope room.

First light through the telescope was Saturn. On the evening of the observatory dedication, Buhl also started a new planetarium show and opened a new temporary exhibit. The sky show, Bombers by Starlight, showed how military aviators used celestial navigation to find targets at night; during World War II, military aviators were taught celestial navigation in Buhl Planetarium.

The new exhibit, titled “Can America Be Bombed?,” opened two and one-half weeks before the Japanese bombed Pearl Harbor.

It was the wrong telescope

Before the observatory was finished, Buhl used a 4-inch refractor telescope which had come with the planetarium projector from Carl Zeiss in 1939. But, the factory sent the wrong telescope, a terrestrial refractor instead of an astronomical refractor. Due to the outbreak of World War II, it could not be returned and replaced. It continues to be used at The Carnegie Science Center.

(Continue on page 56)

The People’s Observatory was constructed to research observatory specifications at a cost of $30,000, but was specifically designed to be a public observatory. Public observatories were a new idea in the 1930s, although there had been a couple earlier ones. Both the Cincinnati Observatory (1845) and the Allegheny Observatory (1861) had opened as public observatories, but some years later both became affiliated with universities.

However, when the new Allegheny Observatory opened in 1912, famous local telescope maker John Brashear insisted that one of the three domes (the smallest one housing the Observatory’s original 13-inch Fitch-Clark Refractor) be set-aside as a public observatory.

In the 1930s, public observatories also opened at Franklin Institute in Philadelphia (1934) and in Los Angeles, where Griffith Observatory was built with a planetarium (1935), before Buhl’s opened in 1941.

In 2008, Carnegie Science Center Co-Director Ron Baillie presented the master plan for expansion of the science center to the Pittsburgh Planning Commission. Although the master plan did not include a sidereal-type telescope observatory, Mr. Baillie agreed to provide the commission with the legal memorandum of understanding between the city and the science center, which states that the telescope would be reused in a building expansion. Although planning for this expansion continues, there is no timetable for construction.

Many physical sciences

In addition to astronomy exhibits (classic push-button and diorama exhibits, and the fifth largest meteorite fragment from Arizona’s Meteor Crater), Buhl’s Institute of Popular Science included exhibits in many other physical sciences, and even a few in the life sciences. As such, it joined the Deutsches Museum, Chicago’s Museum of Science and Industry, and Philadelphia’s Franklin Institute in pioneering the modern type science museum, today known as the science center.

Major facilities in the institute included a 250-seat lecture hall, later known as the Little Science Theater. A full chemistry/physics science lab table at the front of the theater allowed for many different types of science lectures and a large projection booth provided the ability to show educational films.

(Continue on page 56)
AVI Announces the latest installations of Omnistar:

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Amateur science clubs, such as the Amateur Astronomers Association and the Greater Pittsburgh Aquarium Society, met here monthly, and the theater was used several weeks in the spring for local rounds of the Western Pennsylvania Spelling Bee.

The Little Science Theater was also home to two life sciences programs. Beginning in the 1940s, the Micro-Zoo combined a microscope with an early version of an overhead projector to display miniature life, such as in a drop of water. Starting in 1965, Transpara the Talking Glass Lady was added; it was a transparent, life-sized model showing the major organs and bones of an adult woman, explained during a pre-recorded program.

The exhibit galleries included another very popular (particularly for young children) life sciences program in the 1980s, an embryology exhibit where chicks, and occasionally ducklings, were hatched in front of visitors’ eyes every weekend, year-round.

A sex-education program taught by a specially-trained nurse was offered to students in school groups, with permission of their parents.

As with most such educational institutions, Buhl Planetarium included a small science library available for public use by appointment, located in Buhl’s beautiful wood-paneled Board Room. At its peak, the library only reached 800 volumes, but fortunately a larger library was not necessary. Just across the street from Buhl was America’s first publicly-funded Carnegie Library (along with the very first Carnegie Hall, which also provided Buhl with steam heat (hence, Buhl had a boiler room with no boilers).

In the spring of 1940, Buhl started the Pittsburgh Regional School Science and Engineering Fair, which today is the oldest regional science fair in the country (two older fairs are state-wide fairs). For many years the students’ science projects were displayed throughout the Buhl Planetarium building, but in later years were displayed nearby in the Community College of Allegheny County gymnasium.

During the Christmas season of 1954, Buhl Planetarium opened the Miniature Railroad and Village, a display that had originated in the Brookville, Pennsylvania home of Charles Bowdish in 1920. One- to two-hour waiting lines, particularly during the Thanksgiving and Christmas holidays, to view the display quickly turned it into a Pittsburgh holiday icon. Each year, admission revenues from the four-month exhibition (November through February) would pretty much pay for the rest of the year’s operation of Buhl Planetarium.

From 1982 to 1991 the facility became known as the Buhl Science Center. In 1983, a Computer Learning Lab was added, along with an early touch-screen computer called Pixel Paint Pots, where the public could “paint” with their fingers on the screen. The 1980s also saw newer, large thematic exhibits on light and perception (Image/Imagination), sound (Sounds Sensational), and movement (The Right Moves).

By the 1980s, plans were being developed to either expand Buhl Planetarium to include a new, large underground exhibit gallery and an Omnimax Theater in the center of the Allegheny Square Plaza or to construct an entirely new science center building.

With the merger of Buhl Planetarium and Carnegie Museums in 1987, it was decided to build a new science center near Three Rivers Stadium, on the North Shore of the Ohio River. Buhl Planetarium closed as a public museum on 31 August 1991, and the Carnegie Science Center, with the new Henry Buhl Jr. Planetarium and Observatory (Digistar I and 50-ft dome with 156 seats; 16-in reflector telescope in an observatory dome), opened on 5 October 1991.

After using a Digistar 2 projector for several years, a $1 million Buhl Foundation grant allowed the planetarium to install a full-dome digital projection system in 2006.

Originally, classrooms were not built in the Carnegie Science Center, as the original Buhl Planetarium building was to be used for science center classes and special programs (the city had requested that the science center continue to use the original building). However, in a cost-cutting move, what was now called Carnegie Science Center Allegheny Square Annex was completely closed in February of 1994. The Children’s Museum, which had been founded across the street in the old Allegheny Post Office building in 1983, expanded into the Buhl Planetarium building in 2004.

More details on Buhl Planetarium history can be found at www.planetarium.cc.
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The WorldWide Telescope: Past, present and future

Mark SubbaRao
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With millions of users, WorldWide Telescope has become an indispensable tool for planetarians, educators, and amateur and professional astronomers. No wonder, then, that the rumors circulating in our community about uncertain future of WWT have engendered quite a bit of concern.

The reality of the situation is that there have been significant changes at Microsoft Research and these changes will impact the future of WWT.

As of the writing of this column there is still some uncertainty as to how things will move forward. However, the good news is that there is a commitment to continue with WWT technology and the planetarium community is being consulted in the process of shaping that future.

Here is the official word from Microsoft Research:

*We are working with the planetariums, museums, research and educational communities to plan the next phase of expanding access and utility of WWT technologies for even greater impact in the years ahead. Stay tuned for some of the exciting developments in the upcoming months.*

Considering that we are at a critical juncture in the history of WorldWide Telescope, I thought it would be an appropriate time to reflect on the capabilities and opportunities that WWT has opened up inside the dome, and why it is critical that these capabilities be maintained and the opportunities continue to be explored.

Some history

During an astrovizualization workshop hosted at the University of Chicago in 2005, Curtis Wong presented the idea of creating a platform to explore narrative and storytelling in the context of a content rich area like astronomy. The idea generated quite a bit of excitement, and encouragement from people at the conference (notably Alyssa Goodman from Harvard) convinced Curtis to make his concept reality.

A couple of years later, “genius programmer” Jonathan Fay had been brought on board and an early version of WWT was developed. The WorldWide Telescope combined narrative tools with a viewing platform for the Virtual Observatory (ivoa.net).

Cloud-based imagery from a variety of sources could be pulled in, stitched together and layered on the sky. From my perspective as a galaxy researcher, WWT was a revelation. For the first time I was able to see the objects I was studying in the context of the entire sky.

**Telling the story of scale**

As planetarians, perhaps the most powerful story we tell is the one of scale, using software to illustrate the tremendous distances between planets, stars, and galaxies. The sky mode of WWT opened up a new way to display the immensity of our universe by exploring the huge range in angular size that telescopes allow us to explore.

Around 2008, Dinoj Surendran, a computer scientist from University of Chicago who had taken a position with the WWT group at Microsoft Research, began to advocate for a planetarium version of WorldWide Telescope. At first the idea seemed to make no sense: WWT works by animating the field of view, but in a planetarium you are always looking at half the sky.

The solution was to place the sky imagery on a sphere, view that sphere with a virtual fisheye camera, and zoom in by moving that camera closer to the surface of the sphere. In the dome it gave the impression that the imagery was flatting out and squashing you on the head. Remarkably, the viewing of two-dimensional imagery became an engaging three-dimensional experience, with that third dimension serving as a proxy for the change in scale.

In 2011 we opened a sky show at the Adler Planetarium’s Grainger Sky Theater. Courtesy of Chris Gunn Photography.
The planetarium’s third wave

The sky mode of WorldWide Telescope opens up an entirely new type of sky show, the planetarium’s third wave.

The first wave simulates the naked eye view of stars and planets. Enabled by optomechanical star projectors, these shows tell stories of constellations, seasons, and planetary motions.

The second wave of planetarium shows simulates our models of the universe. Enabled by digital projection and datasets such as the American Museum of Natural History’s Digital Universe, these shows explore the scale, structure and evolution of the Universe.

The third wave simulates our telescopic view of the universe. Enabled by WorldWide Telescope and the Virtual Observatory, these shows tell the story of contemporary astrophysical research using real imagery.

This framework provides a useful way to talk about the spectrum of planetarium experiences. Here are three different ways to conceptualize the universe, and each of these is reflected by what we present in the dome. One wave doesn’t replace the previous; they build upon each other.

At Adler we are simultaneously showing first, second, and third wave shows.

This framework also avoids some of the stale arguments in our community. Let’s talk about the experience we are trying to create, not the technology used (optical vs. digital) or what the computers are doing (real-time vs. playback).

From this perspective, the importance of WWT to our community is clear. It has opened up a new class of planetarium experience, providing a natural platform for exploring tremendous quantity of imagery flowing in from the world’s observatories. It is critical for the health of our community that the capabilities enabled by WWT are maintained and expanded upon.

Tutorial: Visualizing GRB in WWT

I’ve gotten some nice feedback about last month’s column which took the format of a tutorial, using Python to process and visualize a dataset. As a result we will include a tutorial as part of each month’s Data to Dome column. The code (and often results) for the tutorials in the columns (and others) is available on the IPS Science and Data Visualization Task Force webpage (www.ips-planetarium.org/?page=visualization).

For this month’s tutorial, we will create a visualization of gamma ray bursts. The tutorial was created for a Kavli Institute for Cosmological Physics short course for museum and planetarium staff about the Evolving Universe (kicp.courses.uchicago.edu/2014/index.php) held this September.

Here we will only visualize the data in WWT. While similar visualizations are possible in other planetarium software packages, the process of creating them is somewhat awkward.

The time domain is the next great frontier for astronomy, and I encourage software vendors to follow along with the tutorial and think about how they can streamline the process of creating a similar visualization using their software.

Step 0: Setup

We will use astroquery to connect to the VizieR catalogue access tool which contains roughly 13,000 astronomical catalogs.

```python
# Import python modules
from astropy.table import Table, Column
from astropy.time import Time
from astroquery.vizier import Vizier
from pywwt.mods import *

# Create Vizier object, turn off default row limit
v = Vizier()
v.ROW_LIMIT = -1

# Connect to WWT
wwt = WWTClient() #Can pass a IP address here if WWT is running on a remote machine
wwt.new_layer_group("Sky", "Dynamic Universe")
```

Step 1: Acquire Data

For our data catalog we’ll choose the second Fermi/GBM GRB catalog (von Kienlin et all., 2014, Vizier catalog id: J/ApJS/211/13/GBM). This catalog contains Fermi GRB events from July 2007 to July 2012.

```python
grbCat = v.get_catalogs('J/ApJS/211/13/GBM')
grbCat.keep_columns(['GRB', 'RAJ2000', 'DEJ2000', 'Time', 'ObsTime', 'Fl.w', 'Fl.n'])
grbCat.rename_column('RAJ2000', 'RA')
grbCat.rename_column('DEJ2000', 'dec')
grbCat.sort('GRB')
grabCat # print the table
```

```
<table>
<thead>
<tr>
<th>GRB</th>
<th>ObsTime</th>
<th>RA</th>
<th>dec</th>
<th>Time</th>
<th>Fl.w</th>
<th>Fl.n</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;h:m:s&quot;</td>
<td>deg</td>
<td>deg</td>
<td>ms</td>
<td>mJ / m2</td>
<td>mJ / m2</td>
<td></td>
</tr>
<tr>
<td>080714A</td>
<td>02:04:12.0534</td>
<td>41.9</td>
<td>8.5</td>
<td>512</td>
<td>6.8e-07</td>
<td>3.5e-07</td>
</tr>
<tr>
<td>080714C</td>
<td>10:12:01.8376</td>
<td>187.5</td>
<td>-74.0</td>
<td>4096</td>
<td>1.8e-07</td>
<td>9.8e-07</td>
</tr>
<tr>
<td>080714A</td>
<td>17:52:54.0234</td>
<td>188.1</td>
<td>-60.2</td>
<td>1024</td>
<td>3.3e-06</td>
<td>3.3e-06</td>
</tr>
<tr>
<td>080715A</td>
<td>22:48:40.1634</td>
<td>214.7</td>
<td>56</td>
<td>256</td>
<td>2.5e-06</td>
<td>2.5e-06</td>
</tr>
<tr>
<td>080717A</td>
<td>13:02:35.2207</td>
<td>147.3</td>
<td>-70.0</td>
<td>4096</td>
<td>2.4e-06</td>
<td>2.4e-06</td>
</tr>
<tr>
<td>080719A</td>
<td>12:41:40.9578</td>
<td>153.2</td>
<td>-61.3</td>
<td>4096</td>
<td>7.7e-07</td>
<td>3.9e-07</td>
</tr>
</tbody>
</table>
```

Extracting the time of the GRB event from this table is tricky. The time of day is in the ObsTime column, but the date is embedded in the GRB name. We’ll do some string operations to extract the date from the GRB name and combine that with ObsTime column in the format that WWT can read.

```python
#Add GRB event time in WWT format to table
grbList=grbCat['GRB']
timeList=[]
for i in range(len(grbList)):
    timeString= grbList[i][:2]*"/"+grbList[i][4:6]*"/"+"20"+grbList[i][0:2]*"/"
    +grbCat[‘ObsTime’][i]
    timeList.append(timeString)
grbCat.add_column(Column(timeList,name='TimeAndDate'))
```

(Continues on page 63)
150+ theaters, 16 languages and counting...
Even though the school year started several months ago, I feel it is important to mention a few things that have happened this year.

This year is a rebuilding one for my curriculum, meaning I have been going through every presentation, clip, and video vignette with the goal of re-rendering improved versions of everything. This is also the year I got to rebuild my render farm from the ground up because of a computer program issue. Which, as you may predict, really slowed the re-rendering, to the point I am only about 5% done.

I really wanted to focus on fine tuning my lessons and activities to match my instructional goals. I know they are in alignment, but there are times that I have made notes of possible changes to activities after completing the lesson.

This is not something new and visionary; master teachers have been doing this for centuries. The hard part is finding the time to implement the changes (other than 20 minutes before you do the lesson).

I worked with my principal to get some time once a week to spend 45 minutes evaluating my curriculum. So far this has worked quite nicely, and I am seeing a change in how my students and visitors are engaged in the lesson.

Sequencing activity

I observed from the students they had some very odd misconceptions about sequence of events in the life cycle of a star. I had a couple of presentations that I thought addressed this problem, but it evidently wasn’t enough.

As a result, I went down the hall and talked with my physical education teacher, who has students use descriptive writing to prepare a plan for how to do different athletic activities. Personally, I was very impressed with some of the students’ steps for how to do a basketball free throw.

She suggested that I use a “Before-Then-After-Later-End” format. I kind of gave her a dazed expression, thinking she just said a bunch of random words. Then it got me thinking about the script writing workshop from WAC 2014, “The Power of 3 Framing Science Stories for the Dome” by Toshi Komatsu, and there were enough parallels to make this work.

The format of the organizer is pretty simple. Each of the five terms is the topic of a square or area the students can write in. I tried to make it cute by making the writing areas “thought bubbles” off the word, but the students were more likely to make a mistake and not understand the sequencing. It is just a little easier to keep it simple with just squares with one word in them.

Below is a sample of one sequence from when we were talking about the birth of a star. Students, at times, will get the grand idea but miss parts of the process and I found this worked quite well for bring it in focus.

This chain idea was useful for understanding stellar evolution, but I think it would useful also for teaching the change of potential and kinetic energy and chemical reactions.

Activity: Perceived color

Print out the Color Code Worksheet stored at kingscience.ops.org/LinkClick.aspx?fileticket=p9aHYXuqY%3d&tabid=527&portalid=0&mid=3491&forcdownload=tr

You might notice that Round 7 is violet or magenta, because my dome’s violet is rather dim. With a small group it is fine, but with a larger group it seemed to work better with magenta.

When you trigger the first round, the dome will turn red and the students who have the color coding chart will record the color they see for each of the color swatches.

Most of the kids are willing to advise each other, but I wanted to make sure everyone gets an opportunity to try and see the colors, so with each round the paper is passed one person to the left. When it reaches the end of the row it is passed back to the start.

The first few times I ran this presentation I found it went too slowly and ate up a lot of time. A teacher I work with suggested that I have an interval timer at the console that gave the students 45-55 seconds to check out the colors and 10 seconds to pass the paper. I used www.online-stopwatch.com/interval-timer and ran it on a computer plugged into the planetarium’s sound system so it would keep going even if I was working with a student.

Generally, by round 4 the students have guessed the colors and the rest of the rounds are the students predicting the color that the “red” might become. During one of my test groups we experimented with taking the cove
back to off between each color, but found that it would cause the students to think we were going to take a break from the activity and do some more stars.

After the third time they were denied stars the kids got a little cranky. It is just easier to do a 5-second transition between each color. I have also experimented with the students using anaglyph glasses and seeing the dome cycle through a series of colors, but most of the students complained that the original part of the lab were they did the writing and passing of the color paper was better, so I don’t think I will add that into the lesson.

**Conclusion**

When was the last time you cleaned house on your activities and presentation materials? It may seem like a great deal of work, but it is worth it. I find it very powerful that I now know my tried and true activities are now better focused on the instructional goals.

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**Step 2: Visualize Data**

Now we can send the data table to WWT for visualization. Now inside WWT, we can choose how we visualize the data, we can show all the data at once or playback the events as they happen watching the GRB’s go off like popcorn across the sky.

```python
# Set up WWT layer
grb_layer = wwt.new_layer("Dynamic Universe", "Gamma Ray Bursts", grbCat.colnames)
# Set visualization parameters in WWT
props_dict = {
    "CoordinatesType": "Spherical",
    "MarkerScale": "Screen",
    "PointScaleType": "Constant",
    "ScaleFactor": "64",
    "ShowFarSide": "True",
    "RaUnits": "Degrees",
    "PlotType": "Gaussian",
    "TimeSeries": "False"
}
grb_layer.set_properties(props_dict)
# Send data to WWT client
grb_layer.update(data=grbCat, purge_all=True, no_purge=False, show=True)
```
The IPS Education Committee
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I’m happy to report that the IPS Education Committee is very busy. The committee, which reorganized this summer, consists of many enthusiastic educators from different countries. A list of the committed individuals appears below.

An original list of possible IPS Education Committee goals and projects was prepared. During the last two months these have been refined by comments from many committee members. Below is a revised list our goals.

The IPS Education Committee will:

• Initiate international participation.
• Collaborate with other IPS committees on relevant projects.
• Initiate the collection of information about astronomy education, related other science education, and planetarium education programs in different countries. The committee will prepare and disseminate a set of guidelines to assist collectors of in The committee will facilitate publication of this information in Planetarian. The committee will develop and post an online survey to help collect information.
• Work in various ways to help substantiate the important role of planetarium use in astronomy education, and, as possible, in other subject programs presented in the planetarium.
• Encourage educational research in planetariums and suggest topics for planetarium research. The committee recognizes that there great diversity in planetarium facilities and audiences, so different research programs are appropriate in different facilities with different audiences.
• Share results from both general educational research and from specific planetarium research and encourage publication of planetarium research details in Planetarian.
• Promote and participate in developing IPS standards for certification at IPS-sponsored planetarium workshops.
• Prepare a document that can be used by different planetariums to convince teachers and administrators that use of the planetarium is important and worthwhile.

Currently, in a number of areas worldwide, individuals have begun collection of astronomy education information and how planetariums are involved in astronomy education in Argentina, Scandinavia, Italy, Japan, Malaysia, New Zealand, and Newfoundland, with Spain soon to follow. By sharing what is happening in astronomy education with planetariums we have a foundation for understanding and collaboration within our organization.

Rachel Thompson is working to design a survey that will assist in the collection of information. We hope to have the survey online by early 2015.

Working toward an archive

Although it may be difficult, the committee hopes to eventually build an archive of topic/method lessons found successful in different planetariums worldwide at different age levels. Both IPS member response and research will be important factors.

I am delighted that several experts in planetarium research have joined the IPS Education Committee, namely Ka Chun Yu, Shannon Schmoll, and Julia Plummer. Each has completed major research projects in the planetarium.

Research allows us to learn the best, or at least better, methods of doing something. A lot of things explored in research projects, although not in planetariums, can be extrapolated into the planetarium setting.

I did this with the article in the September issue of Planetarian, “Suggestions for Some Best Educational Practices.” In this column I will continue to share very interesting conclusions from non-planetarium research studies. However, it would be best if methods could be tested specifically in a planetarium setting.

Yes, research takes some additional work—design, implementation of alternate methods, and evaluation—and it is best if an expert in research design works with the planetarium to ensure that the project is done well. The outcome of a good research project can show how to make the most of the limited time we have with an audience.

Many would agree that a planetarium is a unique laboratory. A planetarium is primarily visual. The eyes record 10 of the 11 million possible simultaneous sensory signals impacting the body. Perhaps in the spatial visual setting of a planetarium, not all extrapolation from educational research in other settings applies.

Can other research be applied?

Let’s look at some possibilities for applying other research ideas specifically to the planetarium.

David Sousa, in How the Brain Learns (4th ed., 2011, Corwin), reports changes in retention during a 40-minute learning period—a typical time for a planetarium program.

In a non-planetarium setting, researchers found that there was a “prime-time 1,” a period of about 7 minutes between the 5-minute mark and 12-minute mark in a lecture when retention was at a very high level, the highest in the 40 minutes. Between 20 and 25 minutes into the lecture, there was a distinct “down time,” in which retention was much less. Then at 35 to 40 minutes, again there was an optimal time, a “prime-time 2,” in which learning was almost as high as in prime-time 1.

If we can extrapolate this to one of our planetarium programs, it seems that we might want to try one or more novel methods of presentation in the 5- to 12-minute period, and we might want to pack prime-time periods with more information.

But is an extrapolation to the planetarium warranted? Is the planetarium itself novel enough so that the retention cycle found elsewhere does not really apply?

The IPS Education Committee

(E-mail information for committee members can be found on the IPS website: www.ips-planetarium.org/?page=edcom.

Please contact me if you would like to join this working Committee.

Azreena Ahmad, Malaysia
Simonetta Ercoli, Italy
Fernando Jauregui and Nieves Gordon, Spain
Alan Gould, USA
Thomas Graf, Czech Republic
Francine Jackson, USA
Aase Roland Jacobson, Denmark
Jill Jessop, New Zealand
Kaoru Kimura, Japan
Oded Kindermann, Argentina
Jack Northrup, USA
Julia Plummer, USA
Shannon Schmoll, USA
Patricia Seaton, USA
Jenny Shipway, UK
Anita Sohus, USA
Rachel Thompson, USA
Michele Wistisen, USA
Ka Chun Yu, USA

December 2014
How about setting up a research project for a particular program you give to a particular age group in which you vary what is done in the period identified in lecture situations as down time? A basic premise of research is that you vary only one thing at a time, to see what makes the difference.

With people, this is always difficult. But one can match two audiences as closely as possible or have the same class return to the planetarium and receive a different method in the down time. One could evaluate differences in retention with a simple recall test at the end of the program or possibly use behavioral observations during the presentations.

At the recent Great Lakes Planetarium Association meeting in Muncie, Indiana, Tim Slater of the University of Wyoming emphasized the value of story-telling in teaching and learning. Framing a message in the form of a story pulls in the learner, focusing attention.

Research into story messages

A research project could explore the effectiveness of placing a story message in the asserted down period of learning in a planetarium program. Independent of a possible down-time effect, if one plans to use story-telling at some point in a given program, the timing of the story method could be varied to find its optimum location within a program.

It is well documented that a person’s working memory easily becomes overwhelmed when novel terms and information are presented.

A research project in which the number of specialized astronomy terms used in a planetarium program could be the variable in how well an astronomy concept like seasons or moon phases is understood. (Just be sure to test the concept learning without using the specialized terms.)

Previous research has shown that children are strongly affected by adult gestures. It seems to apply in television and movies, as well as in live conversations. Would it be more effective for a planetarium teacher to be partly visible to an audience, using enthusiastic gestures, to convey information than to talk in complete darkness?

A research project also could compare learning with and without lighting. This could be evaluated with a simple written test or with a follow-up survey checking student enthusiasm for the astronomy topic. After all, interest and motivation to learn more about astronomy can and should be an important goal of our planetarium programs.

Some thought-provoking ideas

Ka Chun Yu offers these thought-provoking ideas on areas for productive planetarium research projects. The first two deal with perception, an important part of learning in the planetarium.

First, for smaller planetarium theaters, audience members sit closer to the surface of the dome than in larger theaters. Therefore, there are more visual cues to make you sense that you are seeing projected visuals. Does this difference cause detectable difference in one or more factors—retention, engagement, attitude? What exactly are the cues that cause the experience to seem less real?

Ed Lantz suggested that visual accommodation (focusing on imagery at the screen distance) and binocular disparity (the differing parallax angles of the two eyes) as the two effects. Could we confirm this? One possible test is to mask one eye so that vision is from the other eye only. This will remove binocular disparity as a possible effect.

Second, what are results of simulated motion in the planetarium? How fast can we travel before motion sickness becomes appreciable? Are there best ways of producing virtual motion (smooth versus jumpy) that are best for learning particular content?

And third, can we learn just what aspect or aspects of a live planetarium presentation makes the program effective? Is it merely the presence of a live person? What is the effect of recording the presentation of a live presenter and then playing this back with live visuals? Does seeing a person in the room or knowing that there is someone to ask questions that heightens effectiveness?

Two big areas for research

Shannon Schnoll says that the following possible planetarium research areas are “two big ones I think about a lot.”

1. What are the best practices that support student learning during a planetarium presentation visit that help them make connections to classroom learning? She notes that her dissertation explored this with a small sample size. She would like to see similar work done in different planetarium situations.

2. How does choice and control in learning within a planetarium affect learning? How do clicker devices and audience voting on how to proceed in a program affect learning and motivation? And how do the different varieties of choice and control affect learning?

If you would like to carry out one or more research projects at your planetarium, guided by someone familiar with educational research, ask questions that will help you in your day-to-day operations.

Even though your results are best applied to your audiences and your types of programs, please share them with all planetarians via an article in Planetarian.

Although the Education Committee first thought about posing a few questions that might be explored by many planetariums, we soon realized that planetariums and their audiences are too diverse to make such a sweeping project meaningful.
Congratulations to AMNH

The finalist screenings in the Immersive Cinema (Fulldome) category from the 2014 Science Media Awards were held at the Boston Museum of Science on September 16, thanks to generous sponsors Sky-Skan and the Charles Hayden Planetarium.

The finalists were Moons: Worlds of Mystery, Charles Hayden Planetarium & Boston Museum of Science; Bella Gaia: Beautiful Earth (performed live featuring Kenji Williams), Remedy Arts, LLC & Denver Museum of Nature & Science; and Supervolcanoes, Spitz Creative Media, Mirage3D & Thomas Lucas Productions in association with Denver Museum of Nature & Science.

And the winner was Dark Universe, American Museum of Natural History.

Congratulations to out to the entire AMNH production team: Curator Mordecai-Mark Mac Low, writer Timothy Ferris, composer Robert Miller, Dark Universe curator and executive producer Rosamond Kinzler, and director Carter Emmart.

Carter Emmart, the AMNH’s director of astrovizualization, has been involved in all five of the museum’s space shows, four of which are now playing in planetariums all over the world.

Emmart directs the in-house space show production at the museum. Emmart, who previously worked at NASA Ames Research Center and the National Center for Atmospheric Research, received his bachelor’s degree in geophysics from the University of Colorado, where he was an organizer of the “Case for Mars” conference series. In May 2006, he received an honorary Ph.D. from Linköping University in Sweden.

Receiving the award on behalf of the AMNH production team was Dark Universe Producer Vivian Trakinski.

As the director of “Science Bulletins,” the museum’s current science exhibition and online program, Vivian Trakinski has overseen the production of more than 50 short documentaries about researchers working in all parts of the world, as well as an ongoing stream of Earth and space science visualizations.

Trakinski began her career at the Children’s Television Workshop’s award-winning PBS science series “3-2-1 CONTACT” and has since gone on to write, direct, and produce media for a variety of audiences and venues. She joined the Museum in 1999 and received her bachelor’s degree from Wesleyan University in Connecticut.

International Fulldome Arts Alliance (IFAA)

The fulldome arts and entertainment network of venues will launch a new web site. IFAA seeks to secure full-dome film showcases, technology sessions and the next phase of fulldome standards efforts. As in previous years, the summit will have abundant opportunities for networking and discovery. Presentations will cover: “The Present and Future of Immersive Content,” “Defining Our Medium,” “Business Stories,” “Building Your Audience,” and “Thinking Outside the Dome.” Visit Imersa.org for information.

Central European Fulldome Festival Brno, April 13-14, 2015, a festival focusing purely on showing fulldome content, held in conjunction with the Academia Film Olomouc Festival, the biggest European festival of popular science documentary films. starrylab.org/festival

FullDome Festival, May 28-30, 2015, the ninth annual gathering in Jena, Germany, will take the theme “romantic circles.” fulldome-festival.de

SIGGRAPH, August 9-13, 2015, Los Angeles, California. The annual SIGGRAPH conference is a five-day interdisciplinary educational experience in the latest computer graphics and interactive techniques.

Fiske Fulldome Festival, August 6-15, 2015, a festival that will include a public showcase for fulldome films as well as a three-day showcase for filmmakers and professional judges. fiskefest.com

Join the sizzle reel

Finally, are you looking for a fulldome experience that demonstrates the impact of immersive cinema? IMERSA is excited to announce that the IMERSA Sizzle Reel 2014 is now available. This 5-minute fulldome montage features the work of dozens of innovative producers. IMERSA has arranged with them to distribute the Sizzle Reel 2014 at no cost.

To learn how to receive your free copy contact Info@IMERSA.org for all the details.

The IMERSA team is hard at work on a new Sizzle Reel 2015. Do you want to highlight your work and see your favorite fulldome scenes included? Just send your suggestions to Info@IMERSA.org and we will arrange to audition your clip for possible inclusion in the 2015 reel.
We created our 4K system with educational planetariums in mind. The SciDome 4K projection system is unlike any other 4K system available. It uses laser light illumination instead of conventional lamps, so the light source lasts an amazing 20,000 hours. With a total of 24,000 lumens and a expanded color space, SciDome 4K is one of the brightest and most colorful projection systems available.

And like all SciDome systems, it’s designed for education. SciDome is powered by Starry Night and The Layered earth, with dozens of premade lessons for comprehensive space and earth-science teaching.
The International News column is built on contributions from IPS Affiliate Association representatives. For contributions to this International News column, I sincerely thank Vadim Belov, Bart Benjamin, Ignacio Castro, Alex Delivorias, Jack Dunn, John Hare, Loris Ramponi, Aase Roland Jacobsen, Patty Seaton, Christian Theis, and Rachel Thompson.

For me, it is time to say goodbye. For 19 years I have been an associate editor of Planetary, in charge of the International News column—or, as it was called in the beginning, Regional Roundup, editing a total of 76 columns.

During the years 1996-2005, John Mosley was Planetary's editor, and since 2006, Sharon Shanks. Many thanks to both of you—it has been a rewarding task to work with you. John was a rigorous editor and he taught me some strict rules: Never ever submit your manuscript after deadline. Never send additional material after your submission. Sharon has always accepted my submissions with no complaint. You both gave me a feeling that my work was for the good of the planetarium community.

When I write this, I don’t know who will take over International News after me, but whoever you are, I wish you good luck with your new task. It is really interesting to have regular and friendly contacts with planetarians all over the world and to help planetarians keep track of what goes on in the planetarium field worldwide.

Association of Mexican Planetariums

AMPAC’s International Planetarium Festival, part of its XXXVI annual meeting, took place 3-7 December 2014 at the Planetarium Torréon, in the State of Coahuila, Mexico, hosted by Eduardo Hernandez, director in collaboration-sponsorship of the Mexican Science and Technology Council (CONACYT).

It was indeed an international event, and invited speakers included Lucia Sendón, director, Buenos Aires Planetarium Galileo Galilei, Argentina, as well as Dr. Thomas Kraupe, Planetarium Hamburg director and IPS president.

It was the most relevant event for AMPAC since the 1984 IPS Conference, which was held at the Alfa Planetarium, Monterrey, Mexico.

Sendón spoke about the Challenges of Diffusion of Astronomy and the hybrid projection system the planetarium has, and Kraupe participated in a panel with three other Mexican planetarium directors on the “Tendencies of Mexican Planetariums Towards Year 2020” as part of the IPS Vision 2020 white paper.

Simultaneous workshops included: developing and presentation of a planetarium’s own content, alternative diffusion and thematic, and development of scientific and outreach scripts. An excursion to Cuatrociénegas took place, with a star gazing night in the Coahuila desert, narration of sky legends and other cultural activities.

The end of the year end is near and star gazing activities have again been key issues supported by the national committee of participating planetariums, astronomy associations, and academic institutions in 52 cities in various states in Mexico, such as the 29 November star gazing party Noche de las Estrellas. This year theme is “The Universe as seen through the crystal it is looked upon.” Mobile planetariums participated as well, among them the Ekbe Planetarium in Queretaro.

Planetario Dr. Arcadio Poveda, part of Sinaloa Science Center, in collaboration with the Sinaloa Astronomy Association, held a series of astronomy activities, which included moon and celestial bodies viewing through telescopes, specially oriented for children and the general public to foster interest in astronomy.

European/Mediterranean Planetarium Association

There is not much news from the EMPA corner of the world this time, so the Eugenides Planetarium staff got in touch with their colleagues in the planetarium of Biblioteca Alexandrina, in Alexandria, Egypt. What follows is their input:

The Planetarium Science Center of the Bibliotheca Alexandrina, which hosted the 20th IPS conference in 2010, organized on 11 September 2014 a new “Astronomy Night.” The monthly program began with a public astronomy lecture, given by Prof. Ashraf Tadross, head of the astronomy department of the National Research Institute of Astronomy and Geophysics.

Through numerous interesting pictures and movies, Prof. Tadross presented basic concepts in astronomy and also highlighted the key differences between astronomy and astrology.

The lecture was followed by the regular planetarium live show, an astronomy contest, and an observing session. During the night sky watch, visitors had the opportunity to observe the planets Saturn and Mars and learned how to identify some of the brightest stars and important constellations of the autumnal skies. About 150 persons, mostly youth and children, joined the September event.

Great Lakes Planetarium Association

Illinois. Complementing the Peoria Riverfront Museum’s major summer exhibit The Science of Ripley’s Believe It or Not, the planetarium ran a popular live show titled The Astonishing Universe: Believe It or Not! It took visitors on a whirlwind tour of some of the most incredible places in the universe, using their...
Zeiss ZKP4 system and Uniview.

This autumn, the William M. Staerkel Planetarium at Parkland College in Champaign presented Fall Prairie Skies, Dynamic Earth, and both fulldome Zula Patrol programs. In November, Santa’s Secret Star and Loch Ness’ Season of Light returned to the dome. Their World of Science lecture series returned for the 2014-2015 academic year.

The Cernan Earth & Space Center was one of several campus beneficiaries of an environmental grant obtained by its parent institution, Triton College. Among other projects, the grant funded the construction of an array of solar panels atop the Cernan Center roof that creates electricity for the Triton College power plant. In an artistic flair, project designers augmented two solar panel structures on the south wall of the building with a space-related theme. (See photographs.)

Indiana’s newest planetarium that opened early in 2014—the Koch Immersive Theater within the Evansville Museum—had a strong spring and summer. The remainder of the year featured two children’s shows, three weekly installments of its Skies Over Evansville, and a new general audience show.

The Edwin Clark Schouweiler Memorial Planetarium, University of Saint Francis, Fort Wayne had a busy summer with production work and its participation in the city’s annual Three Rivers Festival. Work is under way on the Schouweiler version of SEPA’s The Planets. Veteran four-year Planetarium Educator Niki Habegger left in July for graduate school in Charleston, South Carolina.

Indiana now boasts being the home state for two world-class planetarium vendors. The first of these is GOTO’s USA liaison officer Ken Miller, who recently moved from Hawaii to Indianapolis.

Lake Erie Nature and Science Center opened the doors to their completely renovated Walter R. Schuele Planetarium on 14 June. Director Fran Ratka writes that “we celebrated with 12 hours of fun indoor and outdoor astronomy activities as well as a special preview of our new OmniStar digital projector. We were blessed with almost 1,000 visitors and clear skies for our evening stargazing. Our public programs have been very well attended since then.”

Installation of the new Spitz SciDome Touch XD fulldome system is complete at the Bowling Green State University Planetarium. It is the first cove-mounted SciDome system. The planetarium’s infrastructure was renovated in the summer of 2013, including new seats, new floor, and wall carpet, repainting of the dome, and installation of a star projector elevator. Director Dale Smith is keeping the Minolta, so both traditional and fulldome programs will be available.

Wisconsin/Minnesota. Planetarians in Minnesota are pleased to announce that the state has awarded funds to the University of Minnesota to build a new Bell Museum of Natural History and Planetarium. It will be a 8300 m² (92,500 square foot) facility with a 120-seat planetarium and visualization theater, built on 12 acres of land on the University’s St. Paul campus. Groundbreaking is tentatively set for 2015, with an estimated 24-month build time.

From Larry Mascotti, “It has been a pleasure to be inspired by your dedicated efforts to support my work as an astronomy educator. I have officially retired from the Mayo High School Planetarium and it is my pleasure to introduce Paul Larson as the new planetarium director for the Rochester, Minnesota School System. Best wishes to all.”

This fall, the Allen F. Blocher Planetarium...
in Stevens Point, Wisconsin presented Aurora in September and October, changing to The Star Gazer in November. The nearby Arthur J. Pejsa Observatory reopened this fall after last year’s total renovation of the dome, cameras, and telescope computer controls.

The UW-Eau Claire Planetarium held another successful Astronomy Day for the Chippewa Valley last May, which was held in partnership with the Chippewa Valley Astronomical Society. The planetarium director, Lauren Likkel, with support from the CVAS, coordinates a monthly astronomy column in the local newspaper to help promote the planetarium and CVAS outreach.

The UW-Milwaukee Planetarium started the semester with The Red Planet, which reviews our exploration of Mars and plans for the future. Later in the fall, the Friday night program changed to The Constellations of the Zodiac. The October lunar eclipse was observed (according to plans) despite the unfortunate early morning time it occurred.

**Great Plains Planetarium Association**

Jack Dunn has retired as the planetarium coordinator for Mueller Planetarium at University of Nebraska-Lincoln after some 43 years in that post. He remains as GPPA President till the end of 2014. At the GPPA meeting at the Western Alliance Conference in Arlington, Texas new officers were elected and will assume their duties at the beginning of 2015. Jack Northrup of King Middle Magnet School Planetarium in Omaha becomes GPPA president. Kristin Testin of University of Nebraska at Omaha Kountze Planetarium becomes treasurer and Zach Thompson of Mueller Planetarium becomes secretary. Jack Dunn will be past president.

Most important for GPPA at the Arlington meeting, the organization adopted a new set of by-laws to replace the old ones which were sorely out of date. GPPA has agreed to hold an informal meeting at Science City in Kansas City in the fall. As usual, there’s no registration fee for these informal meetings.

In Arlington, GPPA members enjoyed a terrific conference hosted by Levent Gurdemir. From the shows to the amazing Turkish restaurant to fine Texas hospitality, we had a great time. We were pleased at the good delegate attendance as well as strong vendor participation. All bodes well for the next WAC, which will be held in Albuquerque, New Mexico in 2015.

**Italian Association of Planetaria**

During the summer StarLight, a hand planetarium, developed its “Villages under a Starry Sky” project by organizing some star parties in small villages in the Perugia territory where there is low light pollution. The events consisted of the explanation of the phenomena and the sky on the day of each party and of the observation of the night sky by naked eye and by telescope. Those present participated in some simple workshops, for example the construction of a miniature solar system and the simulation of a comet.

Another experience, new for StarLight, was the participation in the first Amateur Historical-Archaeological Documentary Festival organized by the Perusia Archaeological Group (GAP).

The association presented two works: Augusta Perusia, a video made for the From Perugia to Brescia on a Starry Night event which was presented by a panel at the IPS Conference in Beijing, and “Under the Dendera Sky,” a report that traces the ancient Egyptian view of the sky as it is represented in the Hathor temple in Dendera. The first video won third place and the second, fifth place. StarLight will be in partnership with the GAP for the organization of the 2015 festival, where the basic topic will be light, as next year will be the International Year of Light.

The 29th PlanIt Meeting was at the Francesco Martino Planetarium in Modena on 13-14 April 2014. It was very interesting and full of new proposals, for example three PlanIt Prizes: PlanIt prize, talking with stars, and tell your experience. There were many speakers, many of whom were teachers, who talked about the importance of the planetarium in education. Some Italian planetarium operators spoke about their experiences in schools and with the general public.

Much interest was aroused by the 10-m (33-ft) portable planetarium, inflatable in 3 hours, which was demonstrated by the Russian company Fulldome.pro in a garden near the planetarium. Its projection system is the Fulldome.

(Continues on page 72)
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The astronomical association of Brescia and Perugia invites colleagues from everywhere to two Italian cities, both world heritage sites, Brescia and Perugia, the first only one hour from Milan and the second between Florence and Rome. The itinerary also includes Astronomical Trails in Brescia and Perugia where the historical and scientific sites of both cities can be discovered.

The invitation was described this past June during the IPS conference in China.

Interested parties are invited to contact Starlight Association at minus7678@gmail.com, or Centro Studi e Ricerche Serafino Zani at osservatorio@serafinozani.it.

Middle Atlantic Planetarium Society

In its second year of a collaborative effort, George Mason University of Fairfax, Virginia and the Winkler Botanical Preserve of Alexandria, Virginia successfully implemented a portable planetarium program about the moon with science camp students in the summer of 2014.

This year’s new program was titled The Moon & Apollo Missions. It was designed to help teach about the moon and to honor the 45th anniversary of the Apollo 11 mission. The 2013 planetarium program was titled Constellations & Asterisms.

The Moon & Apollo Missions planetarium program was field tested in the spring of 2014 with 100 students from the Mount Vernon Elementary School of the Alexandria City Public School System.

Fourth grade students were enrolled in an afterschool reading program for at-risk students. These students spent a month reading books about the moon and then participated in a field trip to the Winkler Botanical Preserve, where they were exposed to the Starlab Portable Planetarium System and the moon.

The full lunar program was implemented during the 10-week summer session that started in late June and drew more than 550 children during the months of June, July and August. The program integrated the Starlab, an interactive PowerPoint presentation, and video presentations, and concluded with an outdoor hike that tested the students’ knowledge as presented in the planetarium program. The Winkler Botanical Preserve invested in a customized Starlab cylinder to add to the planetarium system inventory.

At the George Mason University Observatory, scientists and students have been monitoring exoplanet HD189733b to measure the dimming of its sun when it passes between it and observers at GMU. A current proposal is in place which would allow teams of students and scientists to attempt to gather data on the atmosphere of the planet.

They are also part of an international network of observatories that the International Dark Sky Association put together with help from the Vatican Observatory working to map the night time sky as far as its actual brightness. The observatory also houses a weather station, making the observatory a multi-purpose facility centered around their 32-in Ritchey-Chretien telescope.

Steven LJ Russo, director of East Kentucky Science Center and Planetarium (an active MAPS member even though his facility is technically outside our geographic region), reports continued success with outreach programs, including Astronomy Day in May 2014 with over 200 people in attendance for planetarium shows, hands-on astronomy activities, NASA handouts, and some outdoor solar observing.

The EKSC opened up the new show Solar Quest from the Buhl Planetarium. After this 11-minute recorded program on the sun and space weather, the staff at EKSC adds on a 10-minute live section showing current views of the Sun via SOHO and SDO, and a 15-minute live night sky/question and answer session.

They held 10 summer camps on a variety of topics.
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science topics, including astronomy, rocketry, chemistry, biology, magnetism, and robotics. All camps were filled to capacity with 30 students in each. They also offered outreach programs to housing projects in surrounding counties, and programs in the library system as part of the Fizz, Boom, Read nationwide Collaborative Summer Library Program. This summer’s program was a science based theme, and was designed to keep kids reading over the summer.

Support for the EKSC remains strong in the community as proven by the money raised in the annual William G. Duke Golf Scramble. Each year, Big Sandy Community and Technical College (the organization that runs the EKSC) holds this annual fund raiser. The president of the college chose the science center to receive the proceeds from this year’s scramble, which raised almost $30,000 from a town of only 3400 people.

**Nordic Planetarium Association**

The new Energy Discovery Center just re-opened this July. It is situated in a very remarkable building, a 101-year-old former electric power plant, and the building itself is a unique industrial monument and a historic landmark.

The Cosmic Electric Center is located in the heart of the city of Tallinn, capital of Estonia. Here you can discover the secrets and interactive exhibits of the power plant, travel to distant planets and learn about discoveries in space, raise your hair by walking on a lightning bridge, and see a unique lightning demonstration.

Visitors also have a chance to discover space in a virtual planetarium and learn about different scientific phenomena at the science theatre, workshops, and special educational programs.

The history of Energy Center Planetarium started in 2009 when Estonia's first fully digital planetarium was opened for visitors. In 2012 the center was closed for renovation. At the same time when Energy Science Centre was being built, Rauno Pilvik started to develop planetarium programs for the center.

A temporary discovery center was set up underground at the Freedom square in Tallinn. Unfortunately, there was no specific place to conduct planetarium shows. The solution came unexpectedly when one room was left over, an old office. Pilvik and his team decided to design this room to somewhat of a "stargate" platform, and they used spray cans to make a floating "plasma gate" to space. In the middle is a white square that used Starry Night Pro 6 projection software.

This room was used for one year before the renovated center was re-opened 1 July 2014.

The renovated center has a 10-m planetarium. The topics of the shows are the science of celestial cartography, Estonian space discoveries, and events in the night sky. Memorable movie nights are also held here. The planetarium seats up to 40 people.

For conducting shows, Starry Night Pro Plus 7 is used and the programs last from 30 to 40 minutes. The planetarium dome is also used as an interactive landscape model, for example to introduce shale quarry dynamics, how shale is mined underground, and how electricity comes from the power plant to your home.

There are three different planetarium shows to choose from: Star Family, Estonian Space Discoveries, and Twelve Months and Starry Night, and they can be booked for groups spoken in Estonian, English, Finnish, Norwegian, and Russian.

In addition, the center keeps people up-to-date with Estonia’s first satellite. ESTCube-1 was launched into orbit at Kourou on 7 May 2013. Its main mission is to test its electric solar wind sail.

The most important showpiece of the center is a Tesla transformer, which is surrounded by a Faraday cage. The device can make imitations of lightning up to 3 meters large.

The center is in the middle of beginning a collaboration with Tallinn University of Technology. The project aims is to spot satellites moving by and locate their position in real time. An antenna will be placed on the roof of the building, and a television screen will be placed somewhere near the planetarium to receive the live feed; the feed can also be projected to the planetarium itself.

In the planetarium the biggest attention is on planetarium guides and their performance skills. All events are live presentations so the audience can ask questions and add subjects in the discussion. Sometimes they also show a short film, and in the future they are planning to get a new projection system.

(Continues on page 76)
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Russian Planetariums Association

Barnaul. As usual, the planetarium had lots of festivities on 1 September, the Day of Knowledge. Serious, well-groomed high school students and laughing, beautifully-dressed first-graders all were joyful and excited from interesting meetings and a sense of a triumphal moment.

Wise Skywatcher was checking how much the schoolchildren managed to forget during the summer and called upon their resourcefulness and imagination. Cheerful but hapless “Don’t Know” kept provoking the kids with tricks. Celebratory assemblies and funny contests and trivia games on the astronomy site or in the star hall continued alternating with each other.

At mid-day balloons with the word “Planetarium” went off to the sky. Overall, 300 people visited the planetarium that day; festivities included six celebratory assemblies in front of the planetarium and six shows.

Moscow. On 1 September Moscow Planetarium officially opened its small observatory with a state-of-the-art 40-cm Ritchey-Chretien refracting telescope. By the start of an annual international event—100 Hours of Astronomy—the astronomy site in the planetarium formed a robust astronomy set: a Zeiss-300 refracting telescope in the large observatory, and a radio telescope and a refracting telescope in the small observatory.

The large observatory welcomes visitors for mass observations of the moon, planets, nebula, multiple stars, and star clusters. Amateur astronomers typically participate in the event very actively, bringing their own instruments. Visitors’ communications with scholars promise to be very interesting.

Nizhny Novgorod. On 24 September, the Planetarium organized a fall research-and-methodology conference on astronomy for school teachers of natural sciences, called Astro-Space Education in the Modern School. The Head of the Methodology Department, E. Zasypkina, presented a new program in the planetarium, The Palette of the Universe.

A senior researcher of the Institute of Applied Physics, L. Pirogov, discussed the latest author’s studies on radio astronomy and birth of stars. A researcher of the State Educational University and Planetarium, A. Kiselyov, shared vast materials about the “First Results of the Rosetta Mission.”

A scholar of the Institute for Educational Development, A. Belenov, showed Elements of Quantum Physics in the “Author’s Course on Astronomy.” The planetarium hall was full of guests who were very interested in the presentations.

Novosibirsk. The weekend of 26-28 September was marked with KinoKupol International Multidome Festival. Its signature feature was multiple domes: the sites included the 16-m dome of Large Novosibirsk Planetarium and several 7-m assembly domes installed in different districts of Novosibirsk.

The festival brought together representatives of planetariums from Russia and abroad: research and educational centers, universities and institutions of culture, Russian and foreign producers of full-dome content, and representatives of Russian and foreign suppliers of equipment and software.

Over 30 films were demonstrated. The leaders included Journey Through the Solar System from Donetsk Planetarium, Ukraine; The Navigator of Outer Space from Point du Jour, France; Journey to a Billion Suns from ESA, Germany; We are Aliens from NSC Creative, UK; To Space and Back from Sky-Skan, USA; Flight of Fancy from Fulldome Film Society, Russia; Gopal: Prince of the Cow’s Planet from Full domelab, Thailand; and Faces of the Sun from Large Novosibirsk Planetarium, Russia.

Society of the German-Speaking Planetariums

In 2013, 10 planetariums in Germany cooperated to produce a new show about the history of the universe, called Time Travel-From The Big Bang To Mankind. This show combines astrophysics with other sciences. It takes the viewer on a journey through time, from the big bang and the birth of the first stars, past the formation of the galaxy, the sun and the earth, towards the emergence of life, animals, and finally, mankind.

On 31 July 2014, the show had its first opening at the planetarium in Münster, followed by the other participating planetariums all over Germany.

This production was the largest cooperative project that German planetariums have realized so far. It was only achieved through the contributed funds and assets of all 10 partners, as well as the advice of more than 20 contributing scientists. The production was coordinated in Münster and in Bochum.

It is the second such project done by a group of planetariums in Germany, and will be followed by a third one that has just started.

Since Spring 2014, Planetarium Hamburg uses a unique new sound system and is the first planetarium in the world combining Fulldome 3D Sound and Vision, offering a new dimension of immersion and audience experience.

The new Atmosphea sound system uses 64 speakers and is based on SpatialSound technology of Fraunhofer Institute for Digital Media Technology (IDMT). Atmosphea is the result of a collaboration between the Fraunhofer IDMT and Shure Europe GmbH.

Directional audio content and acoustic environments are now conveyed in three dimensions. Audiovisual objects can be placed anywhere in the room opening up new and virtually untapped possibilities for staging immersive media content.

The poetic musical (Continues on page 78)
the ACCIDENTAL ASTRONAUTS

An Earth Sun Moon Adventure

Clark Planetarium Productions newest show, The Accidental Astronauts, is a space adventure for all ages. Explore the Earth, Sun and Moon system with Cy and Annie, their dog Armstrong, and a wise-cracking starship computer. Available in February 2015.

Visit www.clarkplanetarium.org/distribution for more details.
journey Lichtmond-Universe of Light has already been adapted to the new 3D sound system and the world premiere of Tabaluga and the Signs of Time was making use of this system.

Tabaluga is a unique collaboration with the German Rock legend Peter Maffay and his team. This family entertainment show centers around the fantasy figure of a young and curious dragon, which is exploring the world around him. Since the world premiere in Hamburg, this family entertainment show is now already playing in half a dozen planetariums in Germany.

The use of the immersive sound has proven to be an extremely attractive asset towards creative minds and for tapping into new audiences. Since July 2014 Planetarium Hamburg is even offering pure audio experiences three times a week.

In collaboration with Sony Family Entertainment, three new stories of the very popular three detectives (Called the 3 Question-marks in Germany) were produced for the Atmosphéa sound system and are presented exclusively at Hamburg Planetarium as a pure, 90-minute long listening experiences in complete darkness under the dome. Since July the three weekly shows have been selling out weeks in advance.

Southwestern Association of Planetariums

The Planetarium at University of Texas-Arlington hosted a very successful Western Alliance Conference (WAC) this July in Arlington, Texas. Over 90 delegates and vendors attended the conference, despite temperatures around 100 degrees F. The four-day conference schedule was packed with two laser demos, several projector and software demos, two inflatable planetariums, dozens of fulldome shows, workshops in Blender, Light Wave, After Effects, Illustrator and fisheye photography, paper presentations covering a variety of topics and much more. The conference included a mid-conference tour to the Perot Museum of Science, followed by an amazing Turkish meal at Istanbul Grill.

Jack Dunn, past GPPA president, spent a few minutes during lunch to reminisce on his career as a planetarian as he prepared for retirement this summer. The post conference tour included a trip to the Fort Worth Museum of Science and History and the Historic Stockyards District. Thank you to everyone who attended the conference and to the conference hosts and that entire team at the planetarium for a successful conference!

On 4 September, the Noble Planetarium (Fort Worth Museum of Science and History) and Portable Universe Planetarium (Perot Museum of Nature and Science) brought staff together in a workshop for planetarium presenters. Over a dozen staff, working in groups of two or three, performed night sky talks in miniature.

In each presentation, peers gave immediate feedback. This allowed each presenter an opportunity to work on volume, speed, clarity, and delivery of information.

Southeastern Planetarium Association

Plans for the 2015 SEPA conference are proceeding. The conference will be hosted by the Tellus Museum in Cartersville, Georgia. Conference dates are 23 June thru 27 June, 2015. Cartersville is situated in the mountains of North Georgia, just a little over one hour north of Atlanta on Interstate 75. The central location makes it easy to drive or fly to the conference site and a large turnout is expected. Watch this column for more information.

A new slate of officers has been elected and will serve two-year terms beginning 1 January, 2015. President elect, Derek Demeter; secretary/treasurer, Patsy Wilson; and IPS Council representative, John Hare.

Continuing officers include Ken Brandt, who will move from president elect to president; and David Dundee, who will move from president to past president.

Further information regarding SEPA can be found at sepadomes.org.

SEPA: President Elect Derek Demeter. Photo by John Hare.
The Universe Exposed is a captivating show celebrating the Astronomy Photographer of the Year competition, showcasing spectacular images of the night sky from around the world and explaining how to take your own pictures with a digital camera. Follow Luna and Jeff (and their fictional super-powered phone app, Tycho) on a journey from their back garden to beyond our own galaxy, as they discover the wonders of the universe around us and explore the fascinating hobby of photographing the cosmos.

The beautiful images submitted every year never fail to capture the imaginations of adults and children alike, generating substantial press and media interest. The competition presents an opportunity for planetaria who want to get involved in encouraging participation, promoting astronomy and attracting new audiences.

The 2015 competition will launch in early January, with the winners announced in September 2015. For more information on APY and associated exhibitions and products visit our website at http://www.rmg.co.uk/APY

To get free APY content onto your dome now contact Royal Observatory Greenwich astronomer Edward Bloomer: EBloomer@rmg.co.uk

Produced by the Royal Observatory Greenwich
American in Italy

Congratulations to ShiAnne Kattner from Casper, Wyoming!

ShiAnne has been selected to represent the American planetarium community in Italy for 2015.

We congratulate her on all of the fine work that she has done, first in California and now at the Casper Planetarium, in the field of astronomy education and research.

We know that she will do an excellent job providing planetarium experiences to the students and the Italian planetarium community. Her talented ability will admirably represent the culture of America and will be a treat for the students she will be working with in Italy.

Her lesson, The Multi-Wave Universe, will introduce the different wavelengths found in the universe and will provide students with visuals of what celestial objects look like in these different wavelengths.

Participants in the presentation will:
• Investigate the electromagnetic spectrum;
• Directly analyze the visible, infrared, and ultraviolet light and specific examples of how to detect each form of energy;
• Comprehend what a wavelength is;
• Evaluate the other forms of energy by studying the electromagnetic spectrum; and
• Learn about night sky and some celestial objects found in different seasons.

I look forward to hearing her impressions when she comes back! I will share the report of her experience in a future column. Meanwhile, we will be looking for applications for 2016. Start planning now; remember the deadline is 15 September 2015!

Argentina

News continues to flow from Argentina, thanks to Oded Kindermann, a valuable contact. He wrote, "I'm attaching a report from a mobile planetarium director in Argentina who started his activities last year. He is actually a friend from who I had the opportunity to advise for several months before he decided to go for it and buy the planetarium after resigning from his actual job that he worked for the past 10 years. It was a very important decision in his life and I'm happy to be part of it."

Oded's friend, Denis C. Martinez, reports, "I have felt the passion for astronomy and everything related to space since I was a young kid. In 1994 I purchased my first telescope and ever since that moment my dream has been to dedicate myself to this great science. I'm also lucky to live in a region where the skies are not contaminated much by city lights and pollution.

"In 2008 I established the first astronomy club in the region with the purpose to teach this science and motivate others to continue with observational activities. Since then I have been searching for new educational methods and proper tools to achieve this goal.

"Then, in 2013, I discovered the amazing world of mobile planetariums and Mr. Oded Kindermann from Jujuy, Argentina, who helped me with much good advice and many suggestions that enabled me to make the correct decisions for buying the Mobile Planetarium with my personal budget and help from my partner.

"I purchased the Genesis HD Digital projection system with a fish-eye and I use it in the center of my 5-meter dome. Most of the shows I do are for educational purposes at the elementary, primary, and high school level. But I also do special events for general audiences, like in museums for example."

"I work with the planetarium a few days almost every week of the year, visiting different schools from the region. The subjects we talk about in the shows are usually changed depending the age of the students, but normally I like to talk about the sun, the moon, constellations, space missions, Mars and Saturn. I'm also reading and searching for space news and information about fulldome shows.

"If you ask me what the most frustrating part of my job is, I must say that when you do what you like, how can you have any frustrating moments? The best parts of my job are, of course, the happiness and smiling faces of young kids during the shows, and when you find out that in their homes they share with plenty of enthusiasm what they have learned in the planetarium; those are the moments when you say 'Mission Accomplished.'"

"With the planetarium I have discovered new ways to teach space science and astronomy. (Continues on page 82)"
CENTRAL EUROPEAN FULLDOME FESTIVAL BRNO

13–14 April 2015

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om, a beautiful way of touching the stars with our hands and to feel immersed in the cosmos!”

Contact Information: Denismartineznqn@gmail.com.

England

In September, Mario Di Maggio sent me an update about his new work. He announced:

“After a year of working freelance I’m beginning to really enjoy it. I have two upcoming mobile dome projects you may be interested in for the Planetarian.

“This past weekend the first performance of ‘E-x-p-a-n-d-i-n-g: The History of the Universe in 45 minutes’ successfully took place in my 7m mobile digital planetarium in Bridgnorth, Shropshire with an audience of 25 people: http://bit.ly/e-x-p-n. Funded by Arts Council England, ‘E-x-p-a-n-d-i-n-g’ is a Dome Club-type experience that will be travelling to arts and literature festivals in England next year.

“I’ve just secured funding to take a mobile dome experience to all 35 of Birmingham’s Community Libraries. This has been as a result of a few visits I made earlier this year: http://bit.ly/brumilbs. What really helps is the 4m dome, as most of these libraries are tiny.

“I’ll have more news and photos to share once those projects get underway.”

“Tame has just moved to Bristol. Quite typically, now that I’ve left Birmingham I land a big project that will see me travelling back regularly!”

In October, Mario wrote, “The library project kicked off last Saturday (4 October 2014) and I’ll be filling this album with images, feedback and other updates bit.ly/bcctiab.

“Interestingly, at today’s library (in a wealthy part of the city), the librarian, who has been there 38 years (her entire career), has not only never had a mobile dome in her library before—but she didn’t even know these things existed. And she’s not only an education professional but also a grandmother, so her children and grandchildren have not experienced one yet.

“In my mind this is further evidence that there is as yet no ‘fulldome industry’; in fact, in most parts of the world, there is barely a planetarium industry. It is people like you and me and other mobile operators who are laying the groundwork...

“At least mobile planetariums daily penetrate the community. We are not only exposing citizens to fulldome, but creating a desire for fulldome. We are forging the fulldome industry. Fulldome industry does not yet exist.”

Thank you Mario. I suspect this is true in many countries and, as you know, I feel the portables are a most excellent vehicle for educating and inspiring citizens whether the portable is fulldome or not! They are certainly a very dramatic venue and provide an unforgettable personal experience where fulldome content is compounded because of the intimacy in a small dome.

Contact information: mario@immersive-theatres.com.

Thailand

I am extremely happy to hear that portables are very active in Thailand. This news makes me want to go there and help because there is such a huge need!

Thank you Mario. I suspect this is true in many countries and, as you know, I feel the portables are a most excellent vehicle for educating and inspiring citizens whether the portable is fulldome or not! They are certainly a very dramatic venue and provide an unforgettable personal experience where fulldome content is compounded because of the intimacy in a small dome.

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I recently heard from Anthony Kuria from Uganda, on the eastern side of Africa. Anthony wrote that he found me through IPS. He explained that he wants to acquire a mobile planetarium for a young amateur astronomers group. They want to teach school children in their society. It is very exciting to hear about another initiative in this vast continent that has so few planetariums!

I pointed him to the documents on the IPS Portable Planetarium Committee webpage, especially “What Projector Should I Purchase?” The other documents do not list all the projectors and domes in the world but will certainly give him some of the major manufacturers. (www.ips-planetarium.org/?page=portablecom)

Hopefully he can get a look at several models to help him decide. I also explained that price really matters in the quality of the products. For first time experiences, audiences will be impressed with the lower cost versions, however, either digital or analog!

I also suggested that they could even try to build their own. I electronically sent him the IPS Handbook for Portables. I mentioned that the section on equipment is especially outdated, but the lessons and other material he should find very useful.

I look forward to hearing more from him about the progress they make! If you want to help support him in his research, you can email him at: tonidaokabs@gmail.com.

Africa

Johan Gijsenbergs, gysenbergs@skykan.com; Sukhumvit 101, 713/16 Punnaithi 25, Phrakanong, 10260 Bangkok, Thailand.
COSMIC ADVENTURE

Narrated by Nancy Cartwright

a new fulldome show for families!
Asteroid John Schroer

Look to the skies some dark evening this winter, when the air is still and the seeing great, and imagine your can see asteroid 10056 John Schroer (1988 BX3), a main belt asteroid named for the late John A. Schroer IV (1956-2014). The asteroid was discovered in 1988 by H. Debehogne at the European Southern Observatory.

As many planetarians know, John was a planetarium and space science educator for the Michigan Science Center in Detroit. He was also former president of the Great Lakes Planetarium Association and an avid amateur radio operator. His enthusiasm and love of astronomy opened the universe to school children and the public at large.

Here’s looking at you, 10056 John Schroer.

Where inspiration comes from

Did you know that there is a market research firm located in Saratoga Springs, New York, that took its inspiration from a planetarium, perhaps an inspiration that stuck in a young mind years ago from a high school planetarium?

Now you do. It’s called Planetarium, and the founder/managing director, Bob Mason, said that his company emerged from “planning,” i.e. strategic, account, brand, and communication planning, with the intent of “connecting the dots” and “bring insight into the mix to make the marketing efforts more clear, focused and impactful.”

Mason remembers attending a planetarium “as a kid just outside of Detroit in a city called Roseville.” It was called Carl Brablec High School at the time; now it is known as Roseville Community Schools/Roseville Senior High.

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From the company’s website (the-planetarium.com): “Did you ever visit a planetarium when you were a kid? The lights went out. The night sky appeared black, but tiny pinpoints of light emerged. The moderator began illuminating images that weren’t immediately visible. The stars began to connect into patterns and the patterns began to weave stories. The vastness of the universe felt suddenly navigable. Wonder and curiosity evolved into newfound understanding.”

That sounds about right.

Hamilton books visit Germany

Thomas Wm. Hamilton (Staten Island, New York) had two of his books promoted to an international audience at the recent 14th annual Frankfurt Book Fair in Germany.

On display was his 2013 anthology of 27 science fiction and fantasy stories, The Mountain of Long Eyes, as well as the just published Impact Craters of Earth. Among the craters it lists is the only one known in New York State, not far from the popular tourist location of Saratoga Springs, nearly circled by Esopus Creek.

Hamilton, who worked on the Apollo Project for NASA, directed a planetarium and taught astronomy on Staten Island and for 32 years, finally retiring to write after 2003.
While hunting for fossils, The Zula Patrol discovers that the villainous Deliria Delight has been illegally dumping her company’s toxic trash in Earth’s prehistoric past. The Zula Patrol must find and catch her, before her actions ruin the planet. In the process, our heroes learn all about the formation and development of Earth, and the life forms who call it home. 24 minutes.

The Zula Patrol is on a scientific expedition using their loyal pet Gorga’s ability to collect and bottle all kinds of weather. When nefarious villain Dark Truder tricks Gorga into stealing the weather from Earth and other planets, The Zula Patrol goes after him, learning all about weather - both terrestrial and interplanetary. 24 minutes.

150+ theaters worldwide, 20+ languages, millions of viewers
Based on the hit TV series, The Zula Patrol®, now reaching 300 million households worldwide.
Target audience: ages 4-9, and families
2014
31 December. Deadline of the prize “Page of stars” organized by IPS Portable Planetarium Committee in collaboration with Serafino Zani Astronomical Observatory. The prize rules are available at the IPS Mobile Planetarium Committee web page. Contact: Susan Reynolds Button, sbuttonq2c@gmail.com

2015
6-7 February. Morrison Planetarium, Second Annual Open House, free to all interested planetarium professionals, San Francisco, California, USA. www.calacademy.org/fulldome-show-licensing
28 February. Deadline of PlanIt Prize for an original video production, organized each year by Italian Association of Planetaria (PlanIt), Italy. The prize is open to everyone. First prize 500 euro. www.planetari.org Contact: premi@planetari.org
10-12 April. Italian Association of Planetaria (PlanIt), XXX National Conference, Infini.To Planetarium, Turin, Italy. www.planetari.org Contact: osservatorio@serafinozani.it
13-14 April. Central European Fulldome Festival Brno 2015, Brno Observatory and Planetarium, Kravi hora 1, Brno, Czech Republic. Contact: Jiri Dusek, director@hvezdarna.cz, starrylab.cz/festival
1-4 May. Gesellschaft Deutschsprachiger Planetarien e.V., GDP 2015, Annual meeting of Society of German-Speaking Planetariums, Potsdam, Berlin. Contact: Karin Flegel: k.flegel@urania-potsdam.de www.gdp-planetarium.org
7-10 May. Association of French Speaking Planetariums (APLF), AHP 2015, Yearly Meeting, Planétarium de Reims, France. Contact: philippe.simonnet@mairie-reims.fr www.aplf-planetariums.org
13-16 May. Middle Atlantic Planetarium Society (MAPS), Annual Conference, Cradle of Aviation Museum/Nassau Community College, Garden City, New York (USA). Contact: Patty Seaton, pxts1@yahoo.com; www.mapslanshave.org
18 May. International Museums Day, icom.museum
27-30 May. 9th Fulldome Festival, Jena-Neukirchen e.V. Planetarium, Jena, Germany. Contact: info@fulldome-festival.de or Volkmann, schorcht@zeiss.de, www.fulldome-festival.de
11-13 June. European Network of Science Centres and Museums (ECSITE), Annual Conference, “Food for curious minds”, MUSE, Trento, Italy. www.ecsite.eu
3-4 August. International Astronomical Union, XXIX General Assembly, Hawai’i Convention Center, Honolulu, Hawaii, USA. astronomy2015.org
6-15 August. Fiske Fulldome Film Festival, Boulder, Colorado, USA. www.fiskefest.com
7-8 August. International Planetarium Society Council meeting at the Planétarium Rio Tinto Alcan/Espace pour la vie in Montréal, Québec, Canada.
9-13 August. 42nd International conference and exhibition on computer graphics and interactive techniques, SIGGRAPH 2015, Los Angeles, California, USA. www.siggraph.org
4-6 September. Nordic Planetarium Association Biennial Conference, AHHA Science Center, Heureka, The Finnish Science Centre, Helsinki, Finland. www.heureka.fi Contact: Kai Santavouri, kai.santavouri@heureka.fi
25-26 September. British Association of Planetaria (BAP), annual meeting, Winchester Science Centre and Planetarium, United Kingdom. Contact: BAP President, Mark Watson, m.watson.bap@gmail.com www.planetaria.org.uk; bapconference.org.uk
14-17 October. Great Lakes Planetarium Association Annual Conference, the 50th anniversary of GLPA, Grand Rapids, Michigan, USA. www.glpaweb.org
17-20 October. Association of Science-Technology Centers (ASTC) Annual Conference, Montreal Science Centre, Montreal, Quebec, Canada. www.astc.org

2016
26-28 May. 10th FullDome Festival in the Jena-Neukirchen e.V. Planetarium, “Frameless Frenzy,” Jena-Neukirchen e.V. Planetarium, Germany. Grand opening 25 May (in the evening). Contact: info@fulldome-festival.de or Volkmann, schorcht@zeiss.de, www.fulldome-festival.de
June. International Planetarium Society Council Meeting, Warsaw, Poland.
19-25 June. 23rd International Planetarium Society Conference, Heavens of Copernicus Planetarium, Copernicus Science Center, Warsaw, Poland. Contact: maciejligowski@kopernik.org.pl

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 is also available online at the IPS Calendar of Events at www.ips-planetarium.org
Now Available
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TOM WILKINSON

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from "Space Junk" starring Melissa R. Dutts and Kimberly A. Rowe

A Melræe Pictures production

@Melræe Pictures
Aren't thank-you notes the nicest surprise? Especially the ones from our youngest visitors?

Keith Johnson, at Edelman Planetarium in Glassboro, New Jersey, shared some of his favorites in a poster presentation at the Middle Atlantic Planetarium Society meeting this past September. With his kind permission, here are some of them:

My favorite part was the ski show.
Thank you for making the chairs comfy.

The third thing I learned that the sun is a star.
Not even my Mom knew that!

I brought some licorice into the show and threw some in the theater during the movie.
I want to apologize to you for doing this…our school is normally pretty good.

Io…is the volcanoest moon.
Thank you for letting us come. I wasn’t there, but I have been down there before.

It was fun because we did not have to do any work.

I wish I was there but I got a crayon stuck in my ear. By Becky
I enjoyed talking about Saturn.

One thing you forgot was when you have to sneeze and you can not get it out look at the sun and it will make you sneeze.
I liked the moon. Because it looked nice to live on.
I think the word gravity is very intense.

Thank you for teaching us about space and comets and garbage.
Next time I would like to see Star Wars.
Thank you for keeping us up at 2 o’clock in the morning.
I’m going to try to drag my parents there…Someone in our class said that they found a tenth planet.
I liked the show. It was neat. I don’t know why I almost fell asleep.
I also learned there are things in the sky.
I liked the stars show. Even though I wasn’t there, I had the flu.
That place was educed.
Thank you for allowing our Craniums to expand.

I learned a lot about the planets…and that Pluto is the biggest planet.
I learned that the galaxy is bigger than I thought.

I know that Pluto is the coldest planet, but it is making me cold saying it.
I’m sure I liked it.

It was awesome with the star thing. Have you explored Mars? I am going to.
Thank you for filling my brain with goodies.

Thank you for making the stars on the screen it was the coolest thing I ever seen because I’d never seen a thing that could put the stars on the screen and it was cool watching it. How come it has to be called the planetarium? Why couldn’t it be called the moon lander or something? But I like it plateiern it sounds better that way. Do you think that you’ll have any more ideas? Like making the theater move? Or something like that. I’d like making the theater move it will be awesome to make it move.

Do you like being a scintist? Because if it is fun I would like to be a scintist when I grow up. And if I am not dead I will be a officer.

When the stars moved it felt like the stars were moving.

I liked how it looked like you were in the sky. I just wanted to get up and touch the sky and see how it feels.

I felt like I was in space. I still haven’t come back to Earth yet.

When you are not doing schools what is it like? Is it much like the other? I’ll bet it isn’t.

I wish I could come back today but I live in Fallon maybe you can build some kind of planetarium here. Maybe a big one. Maybe a small one who knows.

I didn’t get to go to the planetarium but I was having a good time in California.
Thank you for having us come. I’m sure it was fun.

I’m going to be a scienctist when I get older like you I’ll be like you, except I’ll be a girl not a boy.

I learned that the sun might disappear some day. I hope the planetarium stays there forever.

Above, remember that big sunspot that was visible during the October partial solar eclipse? Martin Ratcliffe was kind enough to share his photo with to-scale images of Jupiter and Earth added. Image by Martin Ratcliffe. Used with permission (and thanks!) Closer to home on the left, master gardeners at Fernbank Science Center planted a Milky Way Garden, complete with a (nowhere near scale sized) glass Earth model. Several varieties of mustard bloom with reddish blossoms (central bar) and wispy white blooms (spiral arms). Photograph by the author.
No matter the shape
We have you covered

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