Editor's note: During the conference, the technology didn't show the slides and images that Steve had prepared. He assembled them in a 100-second file, listed at the end of this paper.

"Fresh Courage Glimmers from Planets"

Steve Fentress

Director, RMSC Strasenburgh Planetarium,

657 East Avenue, Rochester, NY 14607

sfentress@rmsc.org

May 2022

Abstract: The title comes from a poem by Joy Harjo. Each of us receives some inheritance, tangible or intangible, and leaves some legacy. Along the way there may be sharp turns, intentional reversals, or tedious, drill-like progress. What is there to hold on to? We can count on the majestic vastness of nature, our sense of wonder, and our capacity to conceive ideals.

—----------

Before I go on – let's generate some statistics we can take home. By a show of hands – how many of us have had someone bring us, or call us about, a rock, wanting to know if it was a meteorite? OK, now, in how many cases was there even a good possibility that it really was a meteorite? OK. Now we can go home and say that "at a recent convention of planetarium directors from all over the eastern U.S., with centuries of combined experience, we found that the chance that you have a meteorite is one percent."

Second poll: how many of us, in the last two years, have done live online programs on Zoom, or Google Meet, or the like? OK. Out of that sample, how many did a program from somewhere other than home or office, such as a coffee shop, or parked outside a McDonald's, using their wifi?

Margaret Noble, the person we honor tonight, can be Googled how far back? 1958, thanks to this scan by Sharon Shanks for IPS: "Planetaria and Their Use for Education" at the Cranbrook Institute of Science in Michigan.

Margaret Noble's paper: "Teaching Aids Used to Correlate Classwork in the elementary Grades with the Planetarium."

Her idea: if students are going to get only one precious hour in a year in the Planetarium, prepare them before the trip.

For example, make a model of retrograde motion. Dig those light sockets.

Black girls being taught astronomy in 1958. I think we can all say we want to be associated with that.

A lot of interesting papers in this Cranbrook program. Donald Menzel, 15 single-spaced pages on Observatories in Space.

Claudia Robinson, from Dallas, Texas, summed up the Sputnik era:

> Since the last war, the one that ended in '45, the American adult has indulged himself in a scientific inferiority complex. Having grown up in total ignorance of astronomy, he regarded his children's space talk as twentieth-century pig-latin for astrology, and turned to the sports page. Then one morning less than twelve months ago he awoke and found he was living on the moon. Having survived in a state of shock until now, this twentieth century adult is beginning to take stock of his surroundings, and a few are attempting to adjust to the new situation. How can we help? Our survival in a free world depends upon the speed with which *these concerned few* [emphasis mine] make an adequate adjustment. Fortunately we have the planetarium instrument, a medium of rare dramatic potential capable of quickly transforming scientific facts into visual imagery.

My title, "Fresh courage glimmers from planets," is a line from a poem by Joy Harjo, a Native American poet now in her third term as United States Poet Laureate.

The poem is "A Map to the Next World." It begins

> In the last days of the fourth world I wished to make a map for
>
> those who would climb through the hole in the sky.

The poem is based on the Native American idea that living beings have passed through a series of worlds since the beginning of time. The poem says "as we enter the fifth world / there will be no X, no guidebook with words you can carry." and finally, "You must make your own map." You can read the entire poem on poetryfoundation.org.

I am not qualified to comment on the Native American ideas and traditions in Harjo's poetry. But I am qualified to admire that one line, "Fresh courage glimmers from planets." She says glimmers, not shines, or dazzles, or blazes forth. Think about how planets look when they are just visible in twilight – like the planets lining up in our morning sky right now. Glimmers is just the right word, isn't it? The signal is clear enough once you make the effort to find it.

She says planets, not stars. Planets move. Planets are destinations.

And she says *fresh* courage. There was courage before, but now it will be freshened.

In 1958, the Sputnik era, it appears they had a map to their next world. Do we? I'm not sure we have a map, but we have awesome power if used wisely.

Now, the autobiographical section.

In these talks, it's traditional to be a little autobiographical. Let's keep it snappy and planetarium-relevant. I will concentrate on things I have inherited that have influenced how I do my job.

Dad was in TV news. I remember Dad taking me to work one Saturday morning at WGN Television in Tribune Tower in Chicago when I was a tyke.

I remember lots of lights, typewriters, teletype machines, big cameras. The smell of hot electronics and tobacco meant manhood.

Planetarium relevance: new technology theme.

During the war, Dad had been an Army corporal serving in Germany. According to family lore, he had met the famous CBS radio journalist Edward R. Murrow. Murrow said, "You know, Steve, there's this new thing, television. After the war it's going to be huge. And no one knows what to do with it. We can write the textbook."

Planetarium relevance: equipment upgrade theme.

After Mom died, I found memos Dad wrote to WGN management. "Our news program is a joke around town. We need to invest. Car phones for reporters. More use of film." Reply from management: "The sponsors are happy with what we do now, reading wire service stories three times a day."

Flash forward. Dad works for KMOX-TV, the CBS station in St. Louis, home of McDonnell Aircraft, manufacturer of the Mercury and Gemini spacecraft. They built this setup so Walter Cronkite could say, "Let's look at a re-enactment of what the astronauts are probably doing right now." I got to visit this set early one morning when I was a bratty space cadet. I saw media technology being used to cover a space mission.

My first planetarium: McDonnell, St. Louis, shortly after it opened.

I don't remember the stars. Strongest impressions: the control panel, the lecturer's voice in the dark, and the blue twilight after the show that reminded me of the quiet early morning time when no one else was awake.

High school. Moved to Los Angeles when dad switched from CBS to NBC. Started seeing shows at Griffith Observatory.

One time I went to Griffith with my high school physics friend Steve Cooperman. In his pocket he concealed a projector he made from a flashlight. This homemade device was intended to project Starship Enterprise in the Griffith stars, and the lecturer wouldn't know where it came from. We did not get in trouble because the image was so dim you could hardly see it even if you knew where to look. Lesson learned: why projector lamps are hot.

Four years later, both Steve and I were employed at Griffith. Steve still is, I think.

I majored in physics at UCLA. The place was overwhelmingly huge. But in the afternoon physics colloquia I saw, in person, Richard Feynman, Murray Gell-Mann, Hans Bethe who figured out nucleosynthesis in stars, Ray Davis who measured solar neutrinos.

Time for a job. I wrote a letter to Griffith Observatory.

Courteous reply from the new director, Dr. E.C. Krupp. Possibly I could be an Observatory Guide, part time.

I was hired. I had keys to one of the great buildings of Los Angeles.

I learned that even though I was a physics dweeb I could function in the real world, managing crowds in a city park at night.

At quiet times between busy shows, Observatory Guides could work on their exhibit talks: the Tesla coil, the Foucault pendulum, the solar spectroscope, the ceiling paintings by Hugo Ballin, the picture of Griffith J. Griffith. How much you wanted to do was up to you. Instructive experience: your audience could simply walk away if they were bored.

With that experience, I applied to move up from Guide to Lecturer, presenting public shows in the planetarium.

The control panel for the Zeiss IV had big knobs and switches on big boards.

To reach them you use the same big muscles you use to expand your lungs to speak to a large group. Arranged so you can learn to find most of them in the dark.

When I left Griffith I estimated I had done 1600 one-hour shows with that Zeiss IV. At the time that seemed like a lot.

I liked doing live shows. People said I was good at it and I believed them. After one show, a woman came up to the console. "Do you know who that was talking during the show?" she asked. I thought she had found my presentation so suave that it sounded like a carefully edited tape. "Oh," I said modestly, "That was just me talking on this microphone." She pointed a finger at my chest. "No. That was the Devil talking through you."

Planetarium management relevance: Intentionally or not, Griffith had a pipeline for people to come in, learn the business, develop their skills, and move up, at least to the level of a public lecturer.

Some Griffith people:

Dr. Krupp earned his Ph.D. Working on galaxy clusters with George Abell. Then he turned to archeoastronomy. He started with Stonehenge and worked his way out. He visited all the sites in the U.K., then northern France, then the Americas, the Near East, and China.

But when the big Griffith renovation happened in the early 2000s, he returned to galaxy clusters with the Big Picture, the gigantic photograph of the Coma cluster in the new underground gallery.

Dr. Krupp gave me my start in this business, and still writes friendly notes whenever I send in another Griffith Observer article.

Ron Oriti. Meteorite collector, outdoorsman, chief selector of music for planetarium shows. I locked horns with Ron over his conservative musical taste. But Ron, an opera lover, understood music as drama, not just background or referencing. His work got me excited about what music could do in a Planetarium show.

Edward K. L. Upton, one of the people in charge of writing show scripts, for a time. A brilliant storyteller and writer. He wrote a devastating and entertaining debunking of Gribbin and Plagemann's Jupiter Effect book..

Live performance theme: A planetarium gem from Upton. In the dome, when creating a sunset scene, have the blues (the blue dome wash lights) up full. Then turn the Zeiss stars on to full brightness with slow daily motion. They'll hardly show. Now slowly fade the blues. The stars emerge from the twilight just like they do on a clear evening.

Lois Cohen, artist who created lively paintings to be photographed for the dome. Sanity theme: Lois's method: mornings were for new work. Afternoons were devoted entirely to preparing for the next morning — cleaning, planning, organizing. With that plan she stayed sane and happy, in retirement painting every day until her last at age 90.

Paul Roques, officially titled Astronomical Observer. A living legend by the time I arrived. Paul had worked with Hubble and Zwicky at Mount Wilson.

Interesting observation from Roques: what makes a planetarium star field immersive is *the peripheral perception of many faint stars*.

Harbinger of the future theme: A fellow part-time lecturer, Kerry Manos, one of the few women in Griffith history up to that time, said, more than once, "You guys draw on a long Griffith

tradition. You keep your shows going with puns and wisecracks and jokes. That kind of humor coming from me doesn't sound right." She developed her own style to gain the audience's attention and respect.

Psychological effect of architecture theme.

The Griffith Observatory building is powerfully optimistic. It expresses ideals. It creates expectations. Tony Cook, Griffith's Astronomical Observer, rediscovered in the early 2000s that the earliest sketches of the design were done by none other than Russell W. Porter.

Shops in the Griffith basement with a multi-million dollar view. I understand there was a caretaker's apartment somewhere down there. The most romantic building I've ever been in. A location halfway between the city of angels and the sky.

Now cruising along at Griffith, I added another part-time job, as "the man who will finally make something happen" for the Friday night public programs at Los Angeles Valley College Planetarium, a 1960s facility with a Spitz A3P, one slide projector, and a reel-to-reel tape deck I could use to play any music I wanted. That's Bob Cooney, the astronomy instructor who hired me.

Psychological effect of architecture theme. A community college should be welcoming and nonjudgmental. This little building said that. Blending indoors and outdoors in California style, with a cozy instructor's office, nice storage closets, current-events bulletin boards, black lights over the chalkboard in the Planetarium chamber. Alas, no air conditioning then. On the roof, a Celestron 14 for looking at Jupiter and Albireo through the smog.

Now how about a full-time job? One day on the UCLA job board, a posting from the Caltech Jet Propulsion Laboratory.

"Audio-visual aide. Experience with projectors needed." It was real. I went. They hired me.

I was in the audio-visual section of the public affairs department. I thought I was smart because I had just finished a physics degree. The guys I worked with thought *they* were smart because they got two-year technology degrees and went right to work. JPL paid well, at all levels.

My job was to help JPL public affairs handle the Viking landings on Mars. The plan, at first anyway, was that I would take over routine jobs while senior people turned to Viking.

My usual home building was JPL's Von Karman Auditorium, just past the main security gate, the venue of choice for big public events.

Installed in the auditorium was a 15-or-20-minute dramatic prerecorded six-projector slide show about JPL's past, present and future. It was ready to go with a press of the keypad combination for any audience from a visiting school group to a Congressional committee.

Once, JPL's Deputy Director, Air Force General Charles Terhune, said, "Most people, when they visit here, are looking for a swift kick in the ass. And that show gives it to them." Do we all have a show at home that serves that function?

Typical jobs for me: check 16mm films in and out of the library, break down hundreds of cardboard boxes that television equipment came in, solder connectors in an intercom system, straighten up waist-deep piles of JPL brochures and educational handouts, serve as the projectionist at meetings all over the lab.

When Viking Orbiter 1 reached Mars, daily press conferences started in Von Karman auditorium. The world's media were there, because this was the first, and so far the only, search for life on Mars *in the present*. The demand was more than anyone expected. So I got to participate in Viking press conferences. I was usually the projectionist. I saw all the famous Viking images of Mars when they were slides still damp from the photo lab. Sometimes I did sound mixing, sometimes lights.

The day Viking 1 landed I worked 27 hours straight. Nowhere else in the universe would I rather have been. Von Karman Auditorium was packed all night. Ray Bradbury held court. Governor Jerry Brown stopped by. I plugged and unplugged audio cables and diagnosed overheated coffee urns as assigned.

The descent and landing was around 4am. I was in the control room running the sound board for JPL's live commentary as the first picture from the lander came in, a few vertical lines at a time.

Soon came the first picture from Viking Lander 1 in color – with a blue sky. The people processing the image had not taken into account the fact that the lander's blue sensor was also slightly sensitive to infrared, so it reported more blue than was really there. Carl Sagan stood up the next day and gleefully announced that the sky on Mars "was, in fact, *pink*…which is an okay color."

A few weeks later, when Viking 2 landed, I overheard, from the control room, off the air, a heated discussion between Tim Mutch, Brown University geologist and head of the lander imaging team, and Al Hibbs, JPL's science commentator. Mutch had a color image but would not allow it to be put on television. Hibbs said, "the people out there paid for it. Let them see it." Mutch said, "We'll let everyone see it when it's ready. We just want time to make sure we've got it right."

From my point of view as a junior a/v technician, I saw what I think is a significant journalistic phenomenon.

The results from Viking's life detection instruments were complicated, so press conferences happened almost daily for months. I saw pretty much the same journalists in the seats, and the

same scientists and engineers on the dais, on television together day after day. I think this relationship altered the behavior of at least some of them.

In the 1987 movie Broadcast News, a sleazy news producer talks about "that bonding thing" that happens between the audience and an anchorman. I saw something like that happening here. Some journalists cultivated an image of being insiders, close to the scientists and their discussions. An example was Jonathan Eberhart writing for Science News (https://www.sciencenews.org/article/jonathan-eberhart-1942-2003). A somewhat similar approach today comes from Dennis Overbye at the New York Times.

Others just wanted the simple headline as part of their personal brand, such as NBC's Roy Neal: "Is there life on Mars, or not? Yes or no?"

Others really wanted to write reports that told the complicated story as clearly as possible in limited time. One of those was Cecilia Pedroza (https://www.laradio.com/wherep.htm), from one of the all-news AM radio stations in L.A. She and her sister Inez were among the few Hispanic women in English-language L.A. radio at the time. To JPL's credit, as far as I could see, Pedroza got the same respect in the press room as everyone else. After each press conference, she went out to her radio car and produced a reliable, clear 60-second report on what happened with Viking that day.

I think some of the scientists came to enjoy being on TV. Carl Sagan certainly did.

Since then I have watched for the bonding thing in other press events that repeat day after day – for example, General Schwartzkopf's briefings on the invasion of Kuwait, or the daily New Horizons Pluto encounter press conferences, or Governor Cuomo's daily COVID-19 events. I watch for journalists evolving into fans. To understand and report on something as complicated as atmospheric cycles on Mars you have to become a fan to a certain extent. But if you're a journalist you have to be willing to go beyond the fun answers if it becomes necessary.

Here's a famous visitor to Von Karman from sometime in the late 70s, in a photo from JPL's Facebook page. The great Sidney Poitier, with JPL director Bruce Murray. And, looking over Poitier's shoulder, that man with the mustache and 70s haircut — how did he get there — one of the most famous, in a way, figures from Project Viking — it's Richard C. Hoagland.

When Viking 1 was orbiting Mars searching for a landing site it sent back hundreds of pictures of mostly flat places. In one of them, missing pixels plus a hill created the impression of a vaguely Egyptian face.

Most people chuckled. Hoagland launched a career. His idea was that NASA was hiding an alien city on Mars. Hats off to his entrepreneurship.

Viking quieted down after about nine months, without a definite yes for life on Mars. I went back to school. Cal State Northridge, to study music. Thank you, California taxpayers.

Planetarium relevance: pedagogy Gems from my CSUN teachers:

> Orchestral conductor Larry Christianson: if you stand in front of a group of 75 skilled people and waste one minute, you've wasted 75 minutes.
>
> From my choral conducting teacher John Alexander: a sure way to wake up a group is to rearrange the furniture. Even better, make them rearrange the furniture.

My point is that Southern California gave me a rich environment of big, strong, taxpayer-funded institutions. A twenty-something could bounce around between them finding himself.

I went to the Indiana University music school to study choral conducting. Also worked at the classical public radio station WFIU. Planetarium relevance: technical skill, learning to subtract time. If a piece of music lasts 12 minutes 43 seconds and you need it to end at exactly 9:59pm, what time should it start?

Toward the end of my time I was hired to write and narrate a daily two-minute radio program about science, especially Indiana University science, modeled after the "Star Date" show. Ours was "A Moment of Science." I learned that producing 105 seconds of responsible scientific content five times a week is a full-time job.

Climate theme: Working on "A Moment of Science," I went to an IU physics colloquium presented by climate scientist James Hansen from the NASA Goddard Institute of Space Studies, around the time he made his famous appearance in front of Congress announcing that a human signal had appeared in the climate record. I saw him show a giant die with five blue faces and one red face representing an extra-hot summer. I heard Hansen say that in a few decades that die would have two red faces.

A few years at Indiana went by. The best thing was meeting a graduate student in art, Kathy Vajda. We have now been married 32 years.

The music school at that time leaned toward old traditional opera, which wasn't grabbing me. The planetarium world was calling me back. I sent letters and resumes all over. Check your old files. I got a nibble from Don Hall at the Strasenburgh Planetarium.

I was hired for a low, low salary, and my first job was producing soundtracks for shows. I had the fabulous job of staff composer at the Strasenburgh Planetarium! Actually, I was to use production library music or compose my own, whatever. Just get a 45-minute show done in three weeks. Technician Joe Ricci patiently explained all the technical steps to me.

I came in at the end of the 1980s, a lost decade: Viking and Voyager were in the past, Uranus and Halley meh, Challenger disaster heartbreaking. It was tough. Planetariums had to think of more and more twisted ways to do the same astronomy.

I had a lot of ideas. I pushed myself into things. When Voyager 2 flew by Neptune, with daily video updates from JPL, Rob Landis and I produced a series of shows we called "Neptune Tonight" using a satellite dish and U-matic videotape machines left over from a museum exhibit. Rob loves to tell the story. We filled the place every night for about a week. I was using media technology to produce coverage of a space mission.

Here are some illustrious Strasenburgh interns, as they were called at the time: Marc Taylor, now in Yonkers, Rob Landis, now with NASA, and your recent fearless leader, Paul Krupinski.

Later, I was assigned to manage Strasenburgh Planetarium's Girl Scout camp-ins – ten overnights per winter, 120 people at each one. Mr. K. was vital for these, especially delivering the morning star show after I'd been up half the night.

Intern Mark Bourne was the force behind our show Space Bus, which became a hit show kit.

Mark came up with the scenario and directed the child actors for the soundtrack. I composed the music and did the sound effects. Tragically, Mark died young about ten years ago – a heart problem, apparently.

Somewhere along here, Don Hall said two things. One, I'm retiring soon. Two, think movie. That is, the film format known as 870, a sort of junior IMAX. Some famous movies like Everest and Dolphins were being printed in 870. Don called our version "Cinemagic 870." Giant screen was the thing then. Around this time, ASTC had a conference in which the unofficial theme seemed to be "Museum of Science Boston made a bundle on the IMAX Everest movie. What's the matter with *you*?"

We put in a contraption to haul the film projector up into a hole in the floor with a giant screw.

By "think movie," Don meant, in his words, "projectionist, ticket seller and light bulb changer."

So this was going to be it for the Strasenburgh Planetarium of the future? I was about to make an appointment with the secretary to Richard Shultz, the Museum president, to ask, "Is this going to be it?" But Mr. Shultz called me in first and said "Write me a memo about what you would do if you were the next Planetarium director."

I wrote about the information superhighway, Hubble, the need for a trustworthy guide in a swamp of information and misinformation.

So, contrary to what I think Don was expecting, I found myself sitting at the desk of the directorship of the Cinemagic 870 slash planetarium something. Could this place continue to be a planetarium?

We had already produced a school show for the K-2 age range, “Sun, Moon and Stars,” featuring simple constellation finding, with stars on the dome. It’s still running because it sells thousands of tickets every year.

Next attempt, shoehorned in between the Ring of Fires and Super Speedways: a current-events show, “The Universe Tonight.” We would download pictures from the Information Superhighway, run them through a film recorder, and take the film to an overnight lab to get 35mm slides.

I inherited a culture of innovation from the people at Strasenburgh.

Fran Biddy, at heart, an essayist for whom the narrator’s words were the foundation of a show. His wife Barbara Biddy ran a small theater company that was edgier than the big professional theater in town.

Don Hall woke up every morning trying to think of new ways for the Planetarium to make money. Don got us into weddings, rental parties, shows for young children, and show kits. He had to. In those days the payroll had nine full-time salaried people plus a shared-time teacher and a low-paid intern. Don was also the link back to Mr. and Mrs. Strasenburgh, whom he had known personally.

Elmer Bataitis, electronics technician who said “anything the hand of man can make, the hand of man can re-make.”

Vic Costanzo, our legendary artist, had a cheerful curious quality in every object he painted, whether natural or human-made. I learned Photoshop from Vic. Near retirement he still moved faster than most people half his age. His basement studio was one of the happiest workspaces I’ve ever been in.

Technician Joe Ricci, still saving our skins every day, is the last real technician still on the RMSC staff. Just one example of his work:. He wired up a single switch that turns on the Star Theater work lights *and* opens the doors, so custodians or caterers can get in without calling a planetarium specialist. Huge time saver. And he produces all the laser shows, including the incredibly reliable annual Holiday Laser.

Early 2000s, clearly something needed to be done. We were running 35mm slides. Despite the many breathtaking Valles Marineris flythroughs demonstrated by vendors at IPS 2002, we didn’t find fulldome a wise investment yet. Joe found Dataton Watchout, which gave us still or moving

images over a windshield-shaped rectangular area. Watchout freed us from slides and kept us going for a decade.

But our public was looking for a real upgrade to the 21st century. I felt I had to explain to our then-administration and development department that, as a rule, large public Planetariums in the United States are built with large private gifts from lead donors who like the idea of a planetarium.

Donor cultivation theme. A Rochester optical engineer, amateur astronomer and mathematician, John Bruning, got interested in us. He had made a success from a precision optics company, Tropel Corporation. He asked me a lot of questions about how images were projected and blended on a dome. I suggested he attend IPS 2012 in Baton Rouge to see the trade show and vendor demos.

He did. Fortunately everyone there behaved well. John was impressed by the variety and competition. He asked me what I would do with the Planetarium *if*.... I wrote a series of scenarios for different equipment selections.

John's friends, and ours, included Jim Meyer, retired director of Kodak Research Laboratories, and Julian Goldstein, CEO of Navitar, a Rochester maker of hemispherical projection lenses.

Finally, one day in December 2017, John sat down, once again, to ask for my latest ideas on how we'd renovate. I told him. He said he'd back the project. Go.

Strasenburgh is a big planetarium for its market – 65 foot dome and, pre-renovation, 225 seats. Edwin and Clara Strasenburgh's lawyer said, "They wanted their planetarium to be the best." Exactly what that meant may not have been clearly defined. The 1968 building was the dream project for Rochester architect Carl Kaelber, who, in consultation with 27-year-old Planetarium director Ian McLennan from Edmonton, designed as if money was not going to be an issue.

The fact that a building as modern in style as the Strasenburgh Planetarium ever got built on Rochester's historic East Avenue may be a tribute to the influence of the Strasenburghs in Rochester society in the 1960s.

Psychological effect of architecture theme. In this 1968 aerial shot, see how the radically new Planetarium faces in roughly the same direction as the 1942 museum building, but is completely detached.

Then, in the 1980's, an expansion of the Museum building happened…for some reason, on the upper right corner in this picture. So now the two major buildings have public entrances that face away from each other. For visitors, staff, and management, this awkward physical arrangement adds cost to everything. Observe and learn.

Back to the Planetarium building. It's big, it's unusual, so it creates expectations. Renovation. Renovation to what?

I recommended using guiding principles to plan and select equipment.

1. Quality of customer experience. People should be proud to bring their out-of-town guests to see their Planetarium
2. Connectivity. To modern data, to other planetariums (again).
3. Flexibility. To adapt to functions we cannot now foresee.

We wanted dome imagery so bright that you could eat dinner under the stars. We wanted to take advantage of Julian Goldstein's offer of Navitar lenses, because boosting Rochester precision manufacturing is important to us. (Are you listening, NASA education?) That led us to Christie Boxer projectors. Digistar software gave us both astronomy and alternative content such as movies. Those were our priorities; yours may well be different.

I thought often about Kris McCall's article about the new Sudekum Planetarium in Nashville in the December 2010 *Planetarian*. She said you don't have complete control in a renovation. You won't get everything you want. But you'll get a lot.

I will add that any sudden injection of a large amount of cash attracts attention and must be watched carefully. Right at the beginning, set up a tracking system. If it seems too strict that's about right.

We decided to have an open floor with moveable and removable seats. We use mostly folding camp chairs, plus some upright armchairs and beanbags.

Work began. Old chairs, filthy carpet, and the 870 movie projector, out. Much dirty, sweaty work, decluttering. We're still not done.

Here's Paul Krupinski uncovering an old projector port in the theater wall. It is now a little window, very cool for something.

I climbed and crawled everywhere. Inside the walls of this radical experimental building, looking at structures and systems, I saw things that were awe-inspiring, and things that were appalling.

Renovation management theme. People asked me, "Are you excited?" I think the correct answer is no. The audience should be excited. But excitement in management leads to selective listening, haste, and mistakes.

We had some wonderful craftsmen. Chuck, floor covering expert, spent Thanksgiving weekend grinding the Star Theater floor flat because he refused to lay carpet over little bumps left by old conduits that once carried audio wires to the seats.

Other masters added wooden railings to the Star Theater, and a food/beverage service bar out in the lobby, that meticulously honor the 1968 design and materials.

So now, after the renovation, the Strasenburgh Planetarium is a flexible instrument, with a digital dataset, programmable lighting, great sound, lasers, everything automatable when that's needed, moveable chairs, and a Zeiss VI on a hydraulic elevator. My supervisor since 2018 is Hillary Olson. She understands and supports planetariums, and that helps a lot.

For the most part, people were delighted to see the Planetarium get the upgrade it deserved. Some, who could be quite vocal and articulate, missed the past and wanted me to make 1974 great again. Much more numerous have been the kids who will probably live to see the 22nd century.

Then there was the local TV reporter who, after seeing a demonstration of the Digistar software and its new capabilities, said, "I know, change is hard. At the station they made us change to new video editing software. It was hard."

Out in the lobby, new exhibits are going in. On one side, indigenous sky lore as expressed in items from the Museum's collection. On the other side, extensive explanation of the once-top-secret Kodak Gambit satellite reconnaissance camera that the Rochester Museum & Science Center recently received on long-term loan from the National Reconnaissance Organization.

We still have our problems. The building's electrical system is old and hard to figure out. One thing after another needs replacing in the HVAC system. People regularly startle each other in the narrow, dark, curving office hallway.

The renovated Star Theater reopened in 2019. Some things I have learned so far that might be of general interest:

- After our renovation, average attendance per performance increased by about a third, but admissions revenue dollars almost doubled. (We raised ticket prices and eliminated many discounts.) The conclusion I draw: improve the product, people will pay more.
- More passion than I expected about the original 1968 Carl Zeiss VI star projector, even if we only rarely turn it on. People love to watch it go up and down on its elevator. They take pictures of their kids with it. We do a "Stars with Carl" show about once a month.
- Some things that have *not* really taken off: gaming in the dome; and the dome-lab idea, in which come-one-come-all community members are supposed to create imagery for the dome and try it out. However, several of Rochester's established performing arts groups have independently thought of the idea of performing with dome visualizations either created by them or created by me with their structure and guidance.
- Another thing that *has* taken off: weddings, birthday parties, proposals, dinners under the stars. Our Valentine's Day dinner under the stars and Mother's Day brunch sold out fast at $75 per person.

- And, recently, the experience we call “Impressions of the Infinite,” live performance by the Rochester jazz-funk-electronic band Vanishing Sun, 45 minutes of new music composed just for us, with Digistar environments created for the music. One hundred twenty people happily paid $24 a seat for this last weekend.

So those are some things I have inherited. I, like all of us, have also inherited this community of planetarium experts. During the last two years, the sharing of experiences, technical tips, and encouragement has kept us going. I don’t know what we would have done without our network.

Each of us here has their own significant trail of experiences that told us what is important, what is worth working for. In a troubled world each of us has seen some promise that things can be better. To borrow, out of context, the idea that Joy Harjo writes about, we see a next world.

So where can we find clues to a new map? What new planets are glimmering in the twilight?

Some of my coworkers at RMSC have had their first children in the last few months. Having a child is a pretty optimistic thing to do, it seems to me. I asked them what made them optimistic about the future.

One person said: it’s exciting to see how many possibilities there are today for things to do, and how many avenues to get there. There are so many things you can accomplish if you’re willing to put in the work.

Another new parent said: space has never been more exciting. SpaceX. Transparency. You can communicate with famous astronauts and astronomers on Twitter. His daughter will see the next moon landing when she is the same age his mother was when she saw the first one.

There are fresh minds coming along. Some of the most inspiring questions from grade school children this spring:

- If the Sun is a star, then what are those things we see at night?
- You always talk about hot stars with cold planets going around them. Is there anywhere a cold star with hot planets?
- Does the Zeiss star projector have solar panels?

I’ve been talking this week to some students just finishing masters’ degrees. They are excited about science, they want to show other people how exciting science is, they are proud of science as an identity and a force for good, and they want to be sure anyone, from anywhere, can participate in science.

Our new map, it seems to me, will come from that enthusiasm and dedication. And willingness and flexibility to write a new textbook.

I woke up a week ago Sunday and scrolled through the New York Times headlines. They were all bad. Really bad.

But we have something unique. We have the planetarium, and the ideals it represents. Who else does what we do? I remember Lynn Moroney bringing up this point at a conference many years ago. Who else in our society makes a daily promise to create a worthwhile and meaningful experience for people of all walks of life and all backgrounds and social classes – *in the same room at the same time?* Who even tries that? The dome has many significances: it's an eye, it's a cranium, it's an ideal geometrical form, it's a model of the cosmos. Inside, we sit down together. We dim the lights. The superficialities by which we judge each other in everyday life – skin color, hair style, clothing – practically disappear in the dark. We look up, together. We contemplate things that inspire us with their beauty, challenge our imaginations, things that are the same for everyone, and bigger than any of us.

Addendum:

The 1958 symposium on planetarium in education, still interesting after all these years:

https://cdn.ymaws.com/www.ips-planetarium.org/resource/resmgr/pdf-pubs/1958_cranbrook_proceedings.pdf

The slides for this talk, compressed into 100 seconds:
https://youtu.be/Nx5j7u1uNKE