

Trends in Fulldome Production and Distribution

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Abstract. This paper presents an introduction to what's involved in creating, promoting and successfully distributing a pre-rendered fulldome show. We'll look at the business case for producing an original show (nearly 100 titles are currently available or in development), including an overview of "typical" show production costs and development cycles, creative and technology requirements, realistic distribution/revenue expectations and average license fees for a range of theatre types. Several recent partnerships and collaborative productions, including *The Zula Patrol: Under the Weather* and *Black Holes: the Other Side of Infinity* will also be discussed.

Introduction

It's been nearly 10 years since the first permanent fulldome planetarium system -- an Evans & Sutherland StarRider® - launched at Chicago's Adler Planetarium, followed shortly after by the reopening of the retooled Hayden Planetarium at the American Museum of Natural History (AMNH) in New York City. Since then, the floodgates have opened and some 400 fulldome theaters, large and small, have blossomed around the globe, quite a feat considering it took the giant-screen film industry more than 30 years to build a similar size network. With such phenomenal growth, regular industry events like Domefest, ASTC Fulldome Showcase and the launch of IMERSA (a professional organization for fulldomers), more than a few producers are probably wondering whether the time is right to make a fulldome movie. The answer is "Yes," and we'll explore why in the following.

The changing landscape. Fulldome theater growth is robust -- virtually all new planetariums incorporate fulldome video and digital planetariums are outselling optical projectors by a factor of 10 to 1. Nearly every major city in the U.S., home to about half of existing venues, has a fulldome theater; the rest are located in forty countries around the world, from Canada to Brazil; from Israel to Malaysia. Sixty or more permanent theaters are added globally each year, with a projected total of around 600 in operation by 2010. Most of the larger venues (the biggest licensors of content) are located in museums and science centers, with schools, colleges and universities accounting for the bulk of the smaller facilities. In addition, we are starting to see the medium expand into other areas: commercial uses of fulldome technology in special-venue entertainment, art installations, trade shows and elsewhere.

What is fueling this impressive growth? Relatively low technology costs, coupled with versatility (easy-to-use real-time astronomy tools and the ability to play back linear movies), high audience impact and a large population of aging "white elephant" domes in need of renovation have driven expansion of fulldome among planetarium users. Distribution standards -- non-existent before fulldome -- have likewise stimulated the growth of an impressive show library, currently numbering nearly 100 titles.

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It's now possible for a producer to finance a production and make a return on investment by licensing it to multiple users, something that was unimaginable only a few years ago. The availability of a library of shows has, in turn, encouraged others to invest in fulldome technology, expanding the user base and offering a glimpse of a promising future. And this is just the beginning - a continual stream of quality, reasonably priced content will be needed if these venues are to attract new audiences, encourage repeat visitation and create sustainable businesses.

Assuming we have reached critical mass, then, the big questions are: What's the business model? How do you make the numbers work? And how do you make a good show at the same time? We'll have a closer look at these in the following.

A brief history. In the early days, the system manufacturers essentially subsidized the development of fulldome shows to sell equipment and grow the industry. Examples include some of the more widely distributed shows: Evans & Sutherland's *Wonders of the Universe*, Spitz's *Oasis In Space* and Sky-Skan's *Infinity Express*.

Next to follow were institutions that made shows for their own box offices and secondarily, for distribution to others. On the high end (read: expensive, big-budget), shows like AMNH's *Passport to the Universe* and *Search for Life: Are We Alone?* come to mind, while planetariums like the Burke Baker in Houston (*Fantasy Worlds*), the National Space Centre in the UK (*Big*), the Clark Planetarium in Salt Lake City (*Cardboard Rocket*) and others began to create content with more modest budgets. Fast forward, and today, we have a big library with two out of three titles produced by planetariums. This trend seems to be on an upswing as more planetariums get into the content business.

Most recently, several films originally released in Imax format have been digitally reformatted for the hemispherical screen and will premiere as fulldome movies. Evans & Sutherland and Spitz will be distributing two of these: nWave Pictures' *Fly Me to the Moon* and Graphic Films' *Africa: the Serengeti*. If they are successful, we will likely see more large-format titles converted in the future.

A new ballgame. With so many available movies, why is now a good time to consider making another? Because, essentially, it's a new ballgame. Unlike the early days, there are now many theaters looking for compelling, new content. Much of what's been produced over the past ten years is dated or of uneven quality, and many programs are showing their age -- probably less than 20% of available titles produce significant revenue. It's the more recent, better funded shows like *Black Holes: the Other Side of Infinity*, *Cosmic Collisions*, *The Zula Patrol: Under the Weather* and *Dawn of the Space Age* that are gaining most traction in the marketplace. These are all ambitious projects, and most are well on their way to making back their production costs and more. We'll take a closer look at two of these in a bit.

Know your market. Most fulldome titles (and the most successful shows) currently favor space science themes, though in the past few years, there has been increasing interest in programs on earth science, biology, chemistry, history, climate change, and more. Shows like Evans &

Sutherland's *Seven Wonders* and *Stars of the Pharaohs*, which combine space science with cultural history, and National Space Centre's *Astronaut*, which blends human biology and space science, have also done well, so cross-over subjects may be worth consideration. Space science shows will likely continue to dominate at least for the short term, until fulldome gets established elsewhere and new markets and programming genres emerge. A few theaters are experimenting with music and entertainment shows, but for the time being, astronomy is king.

Funding your project. There are several funding models, though most fall into one of three categories: grant-funded, a combination of grant funding and private equity, and private equity. There's no rule about how most shows have been funded to date, except to say that the more expensive projects typically have a large grant component.

Federal funding sources: National Science Foundation is probably the most notable, but the application process can be extremely (with a capital E) competitive, time-consuming and expensive. Other sources include National Institute of Health (for health-related subjects), and NASA (many different directorates) for space-related subjects. All have funded fulldome projects already.

Private foundations: Private foundations with special interests may be supportive of your project. These are usually formed by wealthy corporations, trusts and individuals to benefit individuals and small businesses. These organizations are required to distribute a percentage of their total assets each year to keep their tax exempt status. Sniff these out online or with the help of an experienced development person.

State and local funding sources: Check with your state or local film board to learn about tax-credit programs or grant opportunities for theatrical release movies; your fulldome project may qualify. One of our projects was recently awarded a "Creativity in Focus" grant that will cover 20% of the cost of the production.

Grant funding/private equity: This is similar to the above model, with the addition of private equity. It may strengthen your proposal in the reviewers' eyes to see that your budget includes a chunk of cash that has already been committed by yourself or an investor.

Private equity: A single investor, a group of investors or small consortium each with an equity interest in the project, or who may want a license for their theater in exchange for a discounted, pre-release fee; or the ability to resell the product within a specific geographic region. The deals can be very creative, so don't be afraid to explore all possibilities.

How much should I spend? Once you've figured out your source of funding, create sales projections to project future revenue based on the genre of your project, your track record as a producer, your expected revenues vs. expenses, etc. Your financial backers (owners, partners, investors) will want to see these in the form of a business plan before agreeing to finance your project. If you can find sponsors, grant money, or customers willing to invest in your project before it's completed, you are that much ahead of the game.

Depending on the kind of show you are hoping to make, and the depth of your pockets, expect to spend \$150,000 on the low end to more than \$1 million (in USD). A typical average of what most are spending for a 24-minute 3D animated program (4k x 4k resolution) is probably somewhere in the middle, between \$300,000 and \$600,000, or from \$15,000 to \$25,000 per finished minute. These figures are based on our experience working in the U.S., and do not consider outsourcing work to near shore or offshore animation companies.

Marketing and promotion. To your production budget, add marketing, promotion and rollout costs (these are variable, but reserve a reasonable budget) plus a percentage (typically 20% to 30%) if you are planning to use a distributor. Working with a distributor will assure you best exposure to your future customers. A distributor will promote your show through a variety of channels including websites, direct mail, list-serves, targeted ads, promotion at industry trade show events and the like. A distributor will also negotiate licenses with end-users, provide formatting, encoding and quality control services, coordinate installation, collect license fees and send you those royalty checks you have worked so hard for. Make sure to support your customers with a solid press kit, poster artwork, web trailers, teacher workshops, Educator Guides, etc. Work closely with the PR departments at the licensor museums to make sure that your show’s launch goes off smoothly.

Licensing your show. Next, we’ll take a look at what museums/planetariums are paying to license dome content. This is hard to quantify definitively, since content is available at many price points – there are cheap shows, medium priced shows and expensive shows – as well as different size venues paying different fees for the same program based on criteria like attendance, number of seats, dome size, etc. For purposes of discussion, what we can offer here are some general guidelines [1].

Fulldome Show Licensing Rates (in USD)	
Portables (mirror or fisheye systems)	\$2,000 - \$5,000
Small domes (usually fisheye systems)	\$5,000 - \$12,000
Medium domes (mostly multi-channel)	\$15,000 - \$25,000
Large domes (mostly multi-channel)	\$25,000 and up
Large domes (mostly multi-channel)	gate share – fee per ticket or percentage of gross

Figure 1. Typical rates for licensing fulldome shows, by theater size

So, assuming a production cost of around \$400,000 and a 25% distribution fee inclusive of marketing costs, the project would need to gross around \$535,000 to break even. This translates into licensing our hypothetical show 20 times at \$8,000 each, and another 15 times at \$25,000 each to gross this amount, or some combination that yields similar results. Looking at it another way, our show would need to play in about 10% of the existing 400 theaters, for an average fee of \$13,000.

How long will it take to do this? It all depends on the quality of the show and how aggressively it is promoted. If it becomes popular, anywhere from a year to three years; if you approach your project with an eye to the longer term (three to five years), all the more chance you’ll meet your

expectations. It's also possible to make a flop and never make back your investment. This is why it's so important to do your homework first and make sure that you don't have another *Heaven's Gate* in the making – and definitely don't count on revenue from DVD sales!

Challenges. We've worked on a number of fulldome projects and have found all sorts of challenges along the way, from pre-production through distribution of the finished product. Here's a short list of what to expect:

Start-up costs: 3D animation is expensive, fulldome animation even more so; producing 4k x 4k dome masters is not trivial. A significant and ongoing investment in infrastructure (computer workstations, rendering, storage, software) is a starting point. A dome preview facility is a prerequisite for viewing tests, dailies and the finished product.

Staffing and personnel: You'll need an efficient production pipeline and work-flow methodology implemented by a solid creative and technical team skilled at all aspects of 3D production, network administration, hardware troubleshooting and more. Hire the best talent and expect to pay for it; be realistic about what you can tackle with your resources. Websites like www.payscale.com and others can give you some guidance about prevailing wage in your area if you are looking to hire staff.

Pricing pressure: There has been a general downward pressure on show license fees since the first fulldome show hit the screen ten years ago. More choice and lower cost is good news for exhibitors, perhaps not so good for producers. Price your show to compete relative to other shows, explain your rationale if it costs more, and don't be surprised to hear "that's so expensive!"

New theaters don't mean immediate opportunities: With more theaters opening, there will ultimately be more opportunity to license content – but not necessarily right away. The newly created slots are often already taken by content that has been bundled with hardware, so these theaters may not need or be able to acquire new programs for several years.

Not all theaters are regular customers: Many smaller theaters -- the biggest growth area for fulldome -- often don't have a regular show schedule. They are used primarily as teaching classrooms, not for playing movies for the public. If they serve school groups and can fund the purchase of a show or two, when these prove successful and popular, it's easier to find funding for new titles.

Long lead time: Savvy theater managers plan their schedules a year or more in advance, so making them aware of your project in plenty of time is also important if you want to hit the ground running on completion. It can take a while to get your show into distribution.

Partnering for success. We have been fortunate to have been involved in two very successful fulldome projects in the past couple of years: *Black Holes: the Other Side of Infinity*, a high-end sci-viz production that brings the current science of black holes to the dome screen, for general

audiences; and *The Zula Patrol: Under the Weather*, a show for kids ages 5-9 and their families about weather on Earth and other planets. We learned a lot from both projects, and the lessons learned may apply to your project too.

Black Holes is a collaboration with a great group of partners: the Denver Museum of Nature & Science, Thomas Lucas Productions, the National Center for Supercomputing Applications and NOVA. The project was funded with NASA seed money and a grant from the National Science Foundation. On this project, Spitz did some interesting fulldome standards research, contributed a few minutes of animation, and managed the eventual distribution of the show. Within two years of its launch in Denver, we have licensed *Black Holes* to more than 50 theaters around the world, and it has been translated into multiple languages. The project leverages the talented DMNS team; Tom Lucas, a seasoned science writer/producer/director with extensive broadcast experience, Donna Cox's scientific visualization team at the National Center for Supercomputing Applications, and a group of expert science advisors.



The Zula Patrol: Under the Weather, a Zula USA, LLC and Spitz joint venture, has been similarly successful, with more than 25 licenses since its release last summer. It was self-funded with several pre-release licenses signed, and a promise to launch at Chicago's Adler Planetarium. *Under the Weather* is based on *The Zula Patrol* space science TV series that today reaches close to 200 million households worldwide in the US and internationally. The show was a collaboration, taking advantage of Zula's expert team of writers, producers and educators and Spitz's 3D dome animation experience. Produced over a period of about two years, the project successfully leverages the Zula brand and builds on Zula USA's commitment to developing science literacy in young children through a variety of media channels.

Feedback on both projects gives us some insight into why they are successful:

Evergreen topics: Both black holes and weather are inherently interesting and appealing subjects to audiences; both subjects have a long shelf life.

Clear writing: Both projects used professional writers, educators and scientists for script development and review. You are selling to scientists, get the science right!

Curriculum connection: Both projects support national and state science education standards – your show will be evaluated by some institution's education department, who will either bless it for further scrutiny or pass on it.

Collaborate with the best: Work with great partners from concept, through production, and into launch. Leverage name brands wherever you can and partner with folks with great track records.

Celebrity drawing card: Make your show stand out from the pack -- a celebrity narrator is a plus (but not enough to save a bad show).

Evaluate, evaluate, evaluate: Test screenings of your project at various stages will tell you what works and where your story needs help.

Summary

Fulldome technology, now established in a network of more than 400 theaters, is helping planetariums to reinvent themselves. Distribution standards make it possible for shows to be played on a variety of hardware platforms, allowing content producers to recoup development costs through wide distribution channels. Assuming production costs of \$300,000 to \$600,000, it is possible to make a return on one's investment in three to five years, or less. Leveraging name brands, partnering with experienced producers and selecting an evergreen topic can create demand for your program while mitigating risk. Finally, an ongoing supply of better funded, high quality shows should produce positive results industry-wide: for producers, a return on their investment; for manufacturers, more theater sales; for theater operators, an improved bottom line; and for audiences, a more memorable and satisfying experience.