DISCUSS DIGSS!

By John W. Jacobsen

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Managers of giant-screen theaters in North American science centers believe that converting their theaters to digital projection is in their future, and yet they are unhappy with the solutions being offered. According to a survey recently completed by the **White Oak Institute**, 95% of the responding science center professionals say "yes, we need to be proactive" and support the GS institutional community getting together to define shared museum standards for digital projection and distribution.

The White Oak Institute and our partners, the **Giant Screen Cinema Association**, the **International Planetarium Society**, the **Association of Science-Technology Centers**, the **Institute for Learning Innovation**, *LF Examiner*, and the **MacGillivray Freeman Films Educational Foundation**, are seeking funds from the **National Science Foundation** to convene the **Digital Immersive Screen Colloquium for Unified Standards and Specifications** (DISCUSS). If the grant is awarded, it will cover a three-day colloquium of science center leaders and technical experts in the giant-screen theater and digital planetarium fields; they will be briefed on relevant research and will discuss establishing shared Digital Immersive Giant Screen Specifications (DIGSS).

Such shared protocols will set the stage for transformative innovations in museum-quality learning experiences by helping the global network of 260 institutional IMAX and other institutionally-oriented GS theaters embrace the digital age with a format that serves museums' needs for both immersive learning and economic sustainability.

This is the objective of the DIGSS Initiative, which kicks-off with the DISCUSS colloquium, ideally next year. That acronym also expresses our pre-colloquium strategy: Get discussions going everywhere in the field, and funnel the conversations into the process. DIGSS is a community project, and you, dear readers, are the community.

The Need

During the analog, film-based giant-screen era that began in the early 1970s, an estimated one billion dollars of capital was invested by museums, educators, the NSF, and others to create a global network of 207 institutional GS theaters and over 215 educational films. The NSF has invested in at least 30 GS films, many of which are still in distribution.

Now that investment is at risk. While audience demand remains strong for the medium, and its learning impact continues to improve, the conversion to digital projection by the conventional cinema industry points to an eventual phasing out of analog film stock and processing laboratories.

We believe the following:

- The size of the global network of flat and dome GS theaters enables competitive film production, resulting in a large and diverse library of films produced by experienced professionals.
- The overall quality of the library and of the field's talent and expertise is related to the health, size, and continuity of the theater network.
- For institutional GS theaters, good educational films made by professionals for the institutional network are better, in terms of mission and margin, than Hollywood films made for conventional theaters and re-purposed for GS screens.

- This international network of analog GS theaters attracts repeating audiences because it is large enough to support an average of 10 new additions to the non-fiction film library per year (over the last five years).
- For museum visitors, giant screens are distinctly different from conventional screens in that their greater resolution, brightness, and size can produce viscerally immersive experiences, unlike conventional screens.
- Used well, GS films can be powerful, both educationally and economically, through the medium's experiential learning and box office appeal.
- The institutional share of this network want digital solutions that work at least as well as the current analog systems, if not better.
- The survival of the global network of institutional theaters depends on our working together to establish our own standards that will enable an open market of system manufacturers, suppliers, producers, and distributors that can help us transition to the digital world on our terms and leverage our significant investments in this powerful educational and economic medium.

At the same time, the digital planetarium (also known as "fulldome") field is maturing. Any look forward must also think about economic and technical convergence of institutional GS theaters with the world's 432 fulldome theaters. "Digital Immersive Giant Screens" is a term that embraces GS flat and dome screens as well as fulldomes and planetariums. While the current market and technical distinctions are important, now is the time for both industries to at least consider what convergence might mean for the future of digital immersive learning experiences.

However, without coordination and high-level leadership, this convergence will happen neither quickly nor easily. 95% of July, 2008 survey respondents believed they have an average of about six years before they must convert to digital projection. In that time, our field has to formulate shared standards (DIGSS), agree and adopt them, and then the market has to respond with systems that meet our standards, museums have to raise the money, and finally, convert to digital – all a tall order, but let's get started!

The Issue

Currently, none of the digital chip manufacturers has announced plans to create a high-resolution digital chip that is the correct aspect ratio for existing GS theaters. As a result, all suppliers, including IMAX, are focusing on the Hollywood aspect ratios. Museums, with their commitment to unique and immersive learning experiences, have succeeded with analog GS theaters precisely because they are unlike Hollywood and offer a level of experience unmatched by other formats (Flagg 1998, 2005; GSTA 2005).

For the relatively small market of such theaters, compared to Hollywood venues, this means that we must take an active role in specifying the digital format that is right for museums, to encourage manufacturers to develop appropriate digital technologies. A significant partner in this venture could be the world's inventory of 432 (and growing rapidly) fulldome theaters. Without this proactive stance, museum giant-screen theaters might be forced to convert to Hollywood standards, or close.

A clear set of shared, open specifications for brightness, resolution, aspect ratio, digital file transfers, and other factors will put a transition plan in place for the institutional segment of the GS field to go digital. These specifications may enable and broker a convergence of both fields to create a much larger global network than either field has ever enjoyed alone. Once such specifications are adopted and published, equipment manufacturers and show producers will be better able to raise capital with a justifiable hope for better returns. Such shared protocols will also help catalyze economic development.

Imax Corporation, the leading supplier of GS theater equipment, has announced a digital projector, but it is currently limited to flat screens of modest scale and will use a Hollywood aspect ratio (1.9 to 1) rather than the squarer, more immersive, 1.33 to 1.

Classic flat IMAX screens have aspect ratios that are taller than conventional cinemas. This added height contributes to the sense of being inside the image, as the viewers' cone of vision does not perceive edges; the immersive size, brightness, and resolution make the moving image seem like a real experience. GS domes are even more immersive, as they envelop the audience overhead and to the sides. The steep tilt of the seating platform in both flat and dome GS theaters allows for a visceral sensation of soaring that turns audiences into participants in an immersive journey.

Fulldomes are also immersive, but are seldom tilted as much as GS domes. Planetarium/fulldome technology, which has been going digital for some time, is advancing rapidly, albeit with some significant limitations from the GS theater perspective. Since their shows largely focus on astronomical objects in the night sky, the fulldome community is less concerned about the brightness and resolution needed for live-action photography. Fulldome production has relied on computer graphics, generating most of its imagery from virtual animation rather than real-world photography.

In comparison to GS budgets and expertise, fulldome production remains a cottage industry, and no fulldome show has ever come close to earning the box-office revenues of the top GS films.

Nevertheless, fulldome technology may be one of the routes of salvation for GS dome theaters. In return, fulldomes could benefit from the GS field's relative success at audience-attracting film productions and at generating revenues from its well-established, multi-platform, distribution networks.

There are at least two GS theaters that have already incorporated digital systems, and others must be in discussions about conversions. Without the DISCUSS Colloquium, sporadic conversions will proceed idiosyncratically, requiring multiple and costly distribution formats, or at worst, unique and incompatible libraries. If there is no initiative for industry-wide standards to support digital program production of the scale and quality that we have enjoyed in the analog era, the network could fracture in a babble of incompatible systems.

So, dear reader, please discuss DIGSS among your colleagues and let us know what you think — we want as much input as we can get before the colloquium, provided NSF or some other source agrees to fund it.

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GS Managers Survey Findings

The **White Oak Institute** conducted a Front-End Survey in June and July 2008 to assess current attitudes among professionals on the institutional side of the giant-screen industry toward the potential shift from analog to digital projection. One hundred forty-three mail-in surveys were sent out and 43 science center professionals (response rate of 30%) returned the 12-question survey.

The responses represent 39 giant-screen theaters, 29 of which are IMAX-branded, and 18 planetariums and fulldomes. Some managers oversee multiple theaters, and some institutions offered responses from both the director and the theater manager, which was our intent. (The survey was intended to assess the current professional opinions of individuals, not an institution's official position.) Twenty-seven museum directors and departmental VPs responded, as did 22 GS theater and planetarium managers. Five of these are double counts of respondents who manage two or more theaters.

Only museum professionals at predominantly science-related institutions were surveyed. One of the project's objectives is to heighten awareness of the potential for shared digital protocols and increase attitudes toward their adoption among informal science educators, and this survey provides benchmark data.

Findings

Timing: On a calculated average, the respondents felt their GS theater would have to convert to digital within 6.35 years. Actual responses showed a range from zero to more than 12 years, with the most significant clustering at four to seven years. A small subset indicated that they were considering alternate uses for their GS theater.

Change Motivator: There were a wide range of beliefs about when the GS theater should start its conversion process, which is best described by showing the results:

6 As soon as possible with whatever systems are available
6 As late as possible with whatever seems best at the time
0 When Imax Corporation has any kind of digital projector available
17 When Imax Corporation has a GS digital projector reasonably equivalent in size, brightness, and resolution to our current analog system
6 After a number of other theaters have successfully converted to digital
8 We will convert to an alternate use when it looks better than continuing with GS programming
4 Not sure/haven't thought enough about it

Brand Loyalty: 42% want to continue with IMAX in some way, although two-thirds of these would prefer to do so under an ownership model with no use restrictions. 44% percent do not care about brand as much as other factors, and 14% were not sure or haven't thought enough about it.

Partial Screen Coverage: The majority of respondents (71%) would not support going with an IMAX MPX or digital projector that filled only part of their screens, for instance using the shorter MPX aspect ratio. On the other hand, 19% would accept that format, and 10% were not sure.

Shared Standards: An overwhelming majority (95%) and all the upper managers believe that the GS institutional community needs to get together to define shared standards for digital projection distribution. Only two respondents felt that the marketplace would provide the solutions. This is the key finding for the DISCUSS proposal to the **National Science Foundation** as it indicates field-wide support for the objectives of the DIGSS Initiative and its first step, the DISCUSS Colloquium.

Fulldomes: Since the DIGSS process aspires to incorporate prior work from the fulldome field and share with them perspectives on the future of immersive learning media, a number of North American planetarium and fulldome managers were also sent the survey, and 22 of them responded. Within that group, 77% had digital fulldome capability or were planning on implementing it within five years. However, 18% intend to continue primarily as an optical planetarium. Forty-seven percent say they are compliant with the IPS domemaster standard, or will try to become so in the future. However, 43% will either follow their own standards, or were not aware of the domemaster standard, or had not thought about it. 52% percent believe their planetarium/fulldome should eventually be able to show digital GS-type films, yet 24% thought that planetariums/fulldomes should go in a different direction from GS theaters, with one quarter of 21 respondents to that question not sure.

DISCUSS front-end survey responses

1. My Name/Institution: 43 responses

2. Our Institution Has: (Check all that apply)
- 15 IMAX Flat Screen
- 14 IMAX Dome Screen
- 4 Non-IMAX GS Flat Screen
- 6 Non-IMAX GS Dome Screen
- 6 Planetarium with primarily an optical star field
- 12 Planetarium/Fulldome including video/digital projection covering most or all of the dome

3. Please tell us your role at the science center/museum (please check those that most apply, more than one responsibility is possible):
- 19 Museum CEO/Director/Manager
- 8 Departmental VP/Manager
- 18 GS Theater Director/Manager
- 4 Planetarium/Fulldome Director/Manager

The next questions are seeking your current individual professional opinion, not your institution's official position. If you have a GS Theater, please proceed with the next questions; if only a Planetarium/Fulldome, please skip to Q10.

4. When do you believe your GS Theater will have to convert to digital because a sufficient number of analog films will no longer be available (Please check only one):
- 7 Within 0-3 years
- 21 Within 4-7 years
- 10 Within 8-12 years
- 2 12+ Years
- 0 Never
- 3 Not Sure/haven't thought enough about it
- 3 We are considering alternate uses for our GS theater

5. When do you believe your GS Theater should start the conversion process (if more than one apply, please indicate your priority, with 1 being highest.)
- 6 As soon as possible with whatever systems are available
- 6 As late as possible with whatever seems best at the time
- 0 When IMAX has any kind of digital projector available
- 17 When IMAX has a GS digital projector reasonably equivalent in size, brightness and resolution to our current analog system
- 6 After a number of other theaters have successfully converted to digital
- 8 We will convert to an alternate use when it looks better than continuing with GS programming
- 4 Not sure/haven't thought enough about it

6. Do you want your future digital theater to be:
- 6 IMAX branded under a similar business model to what they currently offer
- 12 IMAX branded under an ownership model with no use restrictions
- 19 I don't care about brand as long as it:
  - 14 serves our own specific needs, even if those are shared by only a few other digital GS theaters
  - 5 is like many other digital GS theaters

6 Not sure/haven't thought enough about it

7. Would you support going with an IMAX or other digital projector that filled only part of your screen, for instance, using the shorter MPX aspect ratio?
8 Yes
29 No
4 Not sure, haven't though enough about it

8.Would you support using lenses or resizing or other digital processes to adjust a shorter image to fill your screen if it could be done with minimal distortion?
11 Yes
7 No
9 Not sure, haven't though enough about it
17 I doubt such adjustments can be made without problematical distortion

9. Do you believe the GS institutional community needs to get together to define shared standards for digital projection and distribution?
40 Yes, we need to be pro-active
1 No, IMAX will develop solutions which we will adopt when ready
1 No, the marketplace will present alternative solutions and we will choose what works best for us
0 Not sure/haven't thought enough about it

If you do not have or do not manage a Planetarium/Fulldome, skip the next questions.

10. Our Planetarium/Fulldome:
8 Converted to all digital in _____
10 Plans to convert to all-dome digital in _____
4 Will remain primarily an optical planetarium for the foreseeable future
Not sure/haven't thought enough about it

11. Our Planetarium/Fulldome:
7 Is compliant with the IPS "Domemaster" standard for fulldomes
4 Will try to become compliant with the IPS standards for fulldomes
5 Will follow standards specific to our needs
5 Is not aware of the IPS standards for fulldomes
2 Not sure/haven't thought enough about it

12. I believe our Planetarium/Fulldome, while retaining the abilities to show interactive star fields, computer graphics and the library of fulldome productions:
11 Should eventually be able to also show digital GS-type films
5 Should go in a different direction from GS dome theaters
5 Not sure/haven't thought enough about it