

**Giant Screen Professionals’
Awareness and Attitudes Towards
the Development of
Digital Immersive Giant Screen Specifications
(DIGSS)**

**Summative Evaluation for the Digital
Immersive Screen Colloquium for Unified
Standards and Specifications (DISCUSS)**

NSF ISE #0946691

December 2011

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Executive Summary

The National Science Foundation provided funding through NSF-ISE# 0946691 to support the Digital Immersive Screen Colloquium for Unified Standards and Specifications (DISCUSS), a seed initiative to nurture a shared Digital Immersive Giant Screen Specifications (DIGSS) for STEM learning film production at a scale and quality that is sustainable in the informal science education (ISE) community. The DISCUSS initiative engaged technical experts from across the GS community in concert with the Giant Screen Cinema Association (GSCA) and developed a first draft specification that was presented to the industry at the GSCA's annual conference in September 2010. That presentation was followed by a year-long public commentary phase for industry input. The specifications built on the Digital Cinema Initiative (DCI) by advancing a clear set of shared, open specifications for brightness, resolution, aspect ratio, digital file transfers and other factors relevant to one of the most unique formats for science and informal learning films. DIGSS was intended to help establish a known expectation and help the theater operators, film producers, and film makers, determine their needs, expectations and a logical transition plan that can help the institutional segment of the Giant Screen (GS) field to "go digital."

The non-profit Institute for Learning Innovation (ILI) served as the external, independent evaluator for the DISCUSS project. This report presents results from a November and December 2011 survey of GS film professionals' knowledge, awareness, and attitudes towards the DIGSS 1.0 and the future of the shared specification at close of the project. This study is the second in a set of studies undertaken to assess impact on professional knowledge, the first published separately, explored knowledge and attitude impacts for attendees at the GSCA conference immediately after the first draft of the specification was made available. This second study used an online survey of a potential audience of over 1000 industry professionals recruited through a direct email to GSCA members and a second invitation distributed to the readership of the industry journal LF Examiner in December 2011. The survey sought. The survey had a total of 107 respondents with 59 completing the entire survey.

Summary of Key Findings:

1. Survey respondents were familiar with the DIGSS effort: 67% had been aware of the DIGSS effort for more than 6 months; 71% indicated they had some involvement with the DIGSS process, including attending conference sessions and talking to colleagues in the field; and 49% had looked at the DIGSS 1.0 draft. Based on these results, the project has increased industry knowledge, awareness and positively impacted attitudes about the factors related to digital conversion of GS theaters consistent with the aim of the original NSF grant proposal.
2. Respondents' answers to questions on how DIGSS contributed to their learning demonstrated statistically significant positive increases in knowledge of the technical issues related to DIGSS.
3. Over half of the respondents claimed that they commented on the specifications during development achieving the target goals outlined by the principal investigators.
4. Preserving the quality of the picture was a top-level concern for all respondents, especially where productions are intended to serve both the fulldome and GS format. 40% of those surveyed mentioned that digital technology will need to be improved for crossover to occur without a loss of quality and 23% felt that cross-over is going to be challenging and might have a negative effect on GS theaters by reducing picture quality. This concern demonstrates an increased understanding of the affordances and limitations that affect GS theaters.

5. Respondents were somewhat ambivalent on their support of DIGSS, demonstrating a relatively neutral stance towards supporting the outcomes (mean=4.93 on a 7 point scale). The project may have increased literacy surrounding the topic, but actual adoption of these specifications cannot be predicted because these ambivalent responses suggest low intentionality to pursue conversion based on this version of DIGSS.
6. Open-ended responses revealed a mixed view on how DIGSS had changed their thoughts about conversion to digital GS projection: 34% were more encouraged about conversation as a result of DIGSS, finding it helpful in understanding the importance of coordinating an effort to establish industry standards whereas 30% had increased doubts about the cost and time that might complicate conversion efforts. In either case, attitudinal change was noted as a result of this project.
7. The greatest common concern expressed by respondents was industry buy-in to a standard and a neutral response about the impact of the specifications on the industry, an attitude that may be more common given the generally neutral results from this survey (N=59) in comparison to the nearly 20% response rate for the post 2010 conference (N=77). Despite this response, it is noted that the GSCA board unanimously adopted DIGSS as an initial standard and have committed to pursuing this shared specification on behalf of the industry, suggesting that the concern about industry buy-in may be perception of the respondents rather than representative of the industry.
8. Respondents were generally positive about how DIGSS may impact the unique quality of GS theaters: 33% felt DIGSS would preserve or enhance the existing benefits of GS theaters, 13% emphasized improved accessibility and flexibility with software and film content and another 13% focused on the general positive impacts of DIGSS.
9. Respondents were neutral on whether DIGSS would be able to keep pace with the “rapid evolution of technology” with some noting concerns about the pace of specifications development in the face of technology companies’ work to advance digital technology in side-by-side testing of new proprietary equipment and systems, a contrast to the concern about buy-in noted in 7 above.
10. A substantial group of respondents (38%) indicated that DIGSS 1.0 needed either “minimal” or “significant changes” to be useful for the field. These respondents sought more detail and clarity around technical terms. These respondents were also quite concerned about a possible lack of buy-in from across the field and the technical issues that still remain to be addressed to support the conversion process.
11. A small group of respondents focused on specific technical issues related to conversion of existing theaters that they believe may hinder industry consensus.
12. There was clear concern that maintaining the picture quality that is attributed to traditional film was a key priority for most respondents.

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Introduction

The National Science Foundation provided funding through NSF-ISE# 0946691 to support the DISCUSS Colloquium, an initiative to nurture a shared Digital Immersive Giant Screen Specifications (DIGSS) for STEM learning film production at a scale and quality that is sustainable in the informal science education (ISE) community. Concurrently, planetarium/fulldome technology has been advancing rapidly alongside the emergence of the Hollywood Digital Cinema Initiative (DCI) a standard that ensures copyright protection and distribution security of new digital films. The DISCUSS initiative focused on developing specifications to uniquely represent the technologies associated with Giant Screen film formats to support the GS community through the conversion to digital formats. It was the intention of the initiative to develop an initial set of specifications to enable the GS industry to speak as a single voice for education outcomes in a new global network. It was anticipated that publication and adoption of shared specifications would help equipment manufacturers and show producers raise capital to make and distribute films that would serve this GS network.

The non-profit Institute for Learning Innovation (ILI) served as the external, independent evaluator for the DISCUSS project. ILI staff previously evaluated the DISCUSS Colloquium and online Wiki and the introduction of DIGSS at the September 2010 GSCA conference. This document reports on the findings of a summative study conducted at the close of the project. The goal of the study was design to measure members of the giant-screen field's knowledge, awareness, and attitudes towards the initial draft, DIGSS 1.0, and the future of DIGSS.

Research Purposes and Questions

The survey was designed to measure the impacts on professional audiences identified by the DISCUSS project team (Table 1). Specifically, this survey sought to assess whether the DISCUSS effort built awareness, understanding, interest and increased more positive attitudes toward the potential of digital conversion among GS professionals. It focused on the general professional audiences' perceived need for shared specifications for digital immersive giant screens and whether they felt engaged in the debate and development of those specifications, and whether the framework itself serves the needs of this community.

Table 1: Anticipated Professional Audience Impacts

Impact	Impact Category	Audience Objectives	Evidence
Build <i>awareness</i> of the need for shared specifications among the primary professional audience.	Awareness	Professionals in the field of giant screen theaters are aware of DIGSS and support the basic premise.	A majority of respondents to a national survey of GS professionals, are aware of the initiative and support the underlying premise.
Build <i>understanding</i> of a possible convergence (or thoughtful divergence) among both fulldome and GS theater professionals.	Knowledge/ Understanding	Professionals in the field of digital GS theaters and fulldome planetariums will have a broader understanding of each others technological affordances and limitations.	On a national survey, the majority of respondents express an increased understanding of technological affordances and limitations that affect fulldome and GS.

Note: Anticipated professional audience outcomes at the outset of the project.



The long-term impact on professional audiences will only be measurable when a sufficient number of digital immersive screens install compatible systems so that a sustainable library of programs will continue to be produced and distributed. That outcome cannot be measured during the period of this grant funded program, but intention to pursue conversion based on the aspirational specifications developed through this project was assessed to consider the likelihood of this outcome.

Methods

ILLI researchers designed a study to gather data from members of the giant-screen field on their knowledge, awareness, and attitudes towards DIGSS at the end of the DISCUSS project, in the fall of 2011. Data were collected using an updated version of the questionnaire that was distributed to attendees of the September 2010 GSCA conference. The summative survey gathered information on:

1. Respondents' familiarity with DIGSS, including when they first heard of DIGSS, level of involvement in the development of DIGSS, and familiarity with the current draft (DIGSS 1.0).
2. Changes in knowledge, awareness, and attitudes towards topics that form the core of the DIGSS effort, including support for the effort, the potential for DIGSS to impact their work, the ability of DIGSS to keep pace with technological evolution, and how those attitudes might be predictive of future adoption of a DIGSS conforming technology.
3. Demographic information about the respondents, including length of time in the giant-screen film industry, work focus (i.e. film maker/producer/distributor, museum theater operator/manager, equipment manufacturer/leasing agent/sales), and types of theater operated if employed in theater operations. Demographics were used as independent variables during the course of data analysis.

The survey included open-ended, essay style questions; close-ended questions (choose one, select all that apply); and Likert-type rating scale questions. Post with retrospective-pre items were used to assess participant's attitudes and awareness of DIGSS prior to hearing of DIGSS and at the time of completing the survey. Participants were asked to state their level of agreement twice for each of 13 statements, rating each statement "before" becoming aware of DIGSS and "today" (i.e. retrospective-pre and post) from strongly disagree to strongly agree. For statistical analysis, results were converted to a score on a seven point scale, with 1 representing strongly disagree, 4 representing neither agree nor disagree response, and 7 representing the strongly agree response.

Invitations to participate in the survey were distributed by the GSCA through a direct email to their membership under cover of their Executive Director (original invitation email sent on November 15, 2011; reminder email sent on December 6, 2011). The invitation and the reminder email included a link to the online survey hosted by Qualtrics. By clicking on the link, respondents were taken to the introduction page of the survey. It is important to note that members of GSCA were told of the association's acceptance of "the role of stewardship of DIGSS with a goal of further developing the recommendations" in the invitation to participate in the survey. The board of GSCA had previously approved of this role, but the survey invitation may have been the first time many GSCA members had heard of this new role for the association.

The survey was open and active on the Qualtrics survey website from November 15 through December 19, 2011. Respondents were free to exit the survey without completing all questions; all data received was included in the analysis whether the surveys were complete or not. Data from the survey were

downloaded to SPSS for analysis. Quantitative analysis consisted of descriptive and inferential statistics. Qualitative data were reviewed for emergent trends. These trends were used to create a rubric, allowing the data to be synthesized for reporting.

Participants

The survey link was clicked a total of 135 times; 107 individuals completed at least one question in the survey, with 59 individuals completing the entire survey.

Demographic information revealed that more than half (62%) of respondents had more than 12 years experience working in the giant-screen industry (Table 2). A majority (59%) stated their primary work focus was museum-related (Table 3); this included respondents identifying as museum theatre operators/managers (46% of the total sample), museum education professionals/managers (11%), and other museum employees (6%). Those involved in film making accounted for 33% of the overall sample, including those involved in film making/production/distribution (30% of the total sample) and film editing/post-production/technical aspects (11%). These results suggest that the survey represented a cross-section of industry professionals.

Table 2: Respondents' length of time in giant-screen industry (n=63)

Categories	n	Percent
Less than 2 years	4	6%
2 to 5 years	7	11%
5 to 10 years	11	18%
10 to 12 years	2	3%
More than 12 years	39	62%



Table 3: Respondents’ primary work focus in the giant-screen industry (n=63)

Categories	n	Percent*
All Museum-related positions	37	59%
<i>Museum theater operator/manager</i>	29	46%
<i>Museum education professional/manager</i>	7	11%
<i>Promotion/marketing for GS venue</i>	6	10%
<i>Other museum role</i>	4	6%
All Film-making related positions	21	33%
<i>Film maker/producer/distributor</i>	19	30%
<i>Film editing/post-production/technical</i>	7	11%
Equipment-related positions	9	14%
<i>Equipment manufacturer/leasing agent/sales</i>	6	10%
<i>Equipment inventor/developer</i>	4	6%
<i>Equipment support/maintenance professional</i>	3	5%
Industry Promotion/marketing-related positions	1	2%
Journalism/academic/consulting	2	3%
Other: Non-museum position	5	8%

Note: Multiple responses allowed. Percentages total more than 100%.

Respondents who listed their primary work focus as museum theater operator/manager were asked to select the type of giant-screen venue their facility operates. Because some theaters have more than one format, participants were able to choose all that apply (results exceed 100%, n=29). More than half (52%) of museum theater operators/managers indicated their facility has a flat giant-screen, 48% had a dome, 48% a 2D/3D screen , 24% Full-Dome/Planetarium, and 7% with a commercial size 3D Digital screen.

The museum theater operator/manager respondents (n=29) were also asked to indicate when they believe their theater “will have to convert to digital because of a sufficient number of analog films will no longer be available.” The majority (62%) indicated they anticipate the conversion occurring within the next 3 years. Another 31% believed this conversion would happen at their theater in 4 to 7 years, and 7% within 8 to 12 years.

Findings

Familiarity with DIGSS

Respondents were asked a number of questions to determine when their level of familiarity with the DIGSS effort, the process used to develop it, and the current draft, DIGSS 1.0. The majority of those taking the survey (67%) were aware of the DIGSS effort for more than 6 months (Table 4). Another 14% first became aware of the DIGSS effort in the past 6 months, and 19% indicated that taking the survey was their first exposure to DIGSS. Length of time in the giant-screen industry and primary work focus were not factors in whether an individual was aware of the DIGSS effort before taking the survey.

Table 4: When respondents first became aware of the DIGSS effort (n=100)

Categories	n	Percent
Within the past six months	14	14%
Between 6-12 months ago	14	14%
Between 12-18 months ago	22	22%
More than 18 months ago	31	31%
This survey is the first time I heard of DIGSS	19	19%

Respondents were asked to identify what type(s) of involvement they had in the DIGSS process. The majority (71%) identified at least one type of involvement, with many respondents indicating multiple types of involvement (Table 5). The most common responses included 1) attending sessions at conferences or professional meetings that talked about DIGSS (52%), 2) talking with colleagues about DIGSS (49%), and 3) reading about DIGSS in the industry press (47%).

A total of 29% of respondents indicated no involvement with the DIGSS process at the time of the survey and had therefore not heard of DIGSS, also said they had no involvement in development of the draft specification ($\chi^2= 34.726$, $N=100$, $p=.000$). The other demographic variables, such as years in the field and primary work focus, were unrelated to having had no involvement in the DIGSS process.

Table 5: Respondents' involvement with the DIGSS process (n=100)

Categories	n	Percent*
Attended conference sessions at GSCA or other professional meetings that talked about DIGSS	52	52%
Talked with colleagues or co-workers about DIGSS	49	49%
Read about DIGSS in film industry trade press	47	47%
Participated in/looked at on-line forums about DIGSS	17	17%
Attended the June 2010 DIGSS colloquium in Marblehead, MA	3	3%
Other types of involvement	8	8%
No Involvement	29	29%

Note: Multiple responses allowed. Percentages total more than 100%.

Respondents were asked about their level of exposure to the draft DIGSS 1.0. More than a third of those surveyed (37%, $n=37$) had not read anything about the technical details of the DIGSS and 13% ($n=13$) had read about the specifications elsewhere but had not read the DIGSS 1.0 report itself. Nearly half of the sample (49%, $n=49$) had looked at the DIGSS 1.0 draft. Of those who had looked the draft report DIGSS 1.0 ($n=49$), 57% ($n=28$) indicated they had "skimmed" it and 43% ($n=21$) had read it. As might be expected, those for whom the survey was the first time they had heard of DIGSS were significantly more likely to not have read anything about the technical specifications in the DIGSS 1.0 draft ($\chi^2= 39.399$, $N=99$, $p=0.000$). Other demographic variables, such as years in the field and primary work focus, were not related to having had no involvement in the DIGSS process.

Knowledge, Awareness, and Attitudes towards DIGSS

Two methods were used to determine respondent's knowledge, attitudes, and awareness towards DIGSS: rating statements and open-ended responses. The primary method employed retrospective-pre



and post ratings. Respondents were shown a set of 13 statements and asked to rate each statement twice, once “before” having heard of DIGSS and “today”. Paired samples t-tests were used to determine if there were any statistical differences in respondents’ ratings pre-to-post. Here it is important to note that the number of responses for these tests exceeded the minimum required 64 to ensure statistical validity.

Analysis indicates that respondents’ knowledge, awareness, and attitudes were significantly impacted by the DIGSS effort (Table 6). All of the 12 positively worded statements showed statistically significant changes in how they were rated pre to post. The only statement that did not demonstrate statistical significance was *We should change the giant flat and dome screen film formats to conform to conventional shapes instead of creating a different "giant" specification*; a negatively worded statement that would have indicated a contrarian response or no impact from the efforts. The lack of statistical significance confirmed the other responses and demonstrated that respondents were attentive to the rating scale system.

When looking at how the statements were rated, there were clear differences in how respondents thought about these issues. For example, *The eventual conversion from analog to digital film projectors for institutional giant-screen theaters is inevitable and I am aware of how the conversion to digital in the film industry is creating new challenges and opportunities for giant-screen and dome theaters* received the highest ratings (over 6.0 out of 7), indicating strong agreement with these statements. Another set of statements that included *There is a need for institutional giant-screen theaters to establish shared exchange standards for digital giant screens* and *There is a need for institutional giant-screen theaters to have Digital Immersive Giant-Screen Standards (DIGSS)* had ratings in the 5.0 to 6.0 range both pre and post, indicating that overall support for these statements is moderate.

Another set of statements demonstrates an overall neutral stance on the issue with ratings in the 4.0 to 5.0 range. This includes the statements *Developing DIGSS is necessary to ensure the future success of institutional giant-screen theaters* and *I will support the outcome of the DIGSS development process*. Although these statements showed positive change pre-to-post in the direction of greater agreement, respondents still felt rather neutral towards these issues. In fact, *I will support the outcome of the DIGSS development process* had the lowest post-ratings of any of the statements (with the exception of the statement not designed to measure change), with a mean of 4.93. Finally the statement with the lowest rating, indicating moderate disagreement was *We should change the giant flat and dome screen film formats to conform to conventional shapes instead of creating a different "giant" specification*; this was an expected finding as this statement was used as a negative item within the overall like of positive statements.

Table 6: Respondents' knowledge, awareness, and attitudes change ratings "before you heard about DIGSS" and "today" (scale: 1=strongly disagree and 7=strongly agree)

Rating Statements	Pre-Ratings		Post-Ratings		t value	p value
	Mean	SD	Mean	SD		
I am aware of how the conversion to digital in the film industry is creating new challenges and opportunities for giant-screen and dome theaters. (n=72)	6.25	1.148	6.49	.888	-2.854	.006**
The eventual conversion from analog to digital film projectors for institutional giant-screen theaters is inevitable. (n=71)	6.10	1.173	6.31	1.129	-3.188	.002**
There is a need for institutional giant-screen theaters to establish shared exchange standards for digital giant screens. (n=71)	5.62	1.335	5.83	1.483	-2.727	.008**
I am aware that there are many options for digital conversion of existing giant-screen theaters, at various quality levels. (n=71)	5.59	1.369	5.96	1.325	-3.961	.000**
I am knowledgeable about the technical criteria that are required to make a quality giant-screen experience. (n=70)	5.51	1.370	5.70	1.323	-2.845	.006**
There is a need for institutional giant-screen theaters to have Digital Immersive Giant-Screen Standards (DIGSS). (n=70)	5.30	1.554	5.56	1.758	-2.359	.012*
It is necessary for DIGSS to address the needs of both flat and dome screens. (n=71)	5.28	1.244	5.69	1.237	-3.877	.000**
Once DIGSS is fully developed, the outcome will affect the kind of work I am currently doing. (n=69)	4.65	1.359	5.09	1.534	-3.879	.000**
I intend to support the effort to develop DIGSS. (n=70)	4.59	1.123	5.24	1.313	-4.359	.000**
I will support the outcome of the DIGSS development process. (n=70)	4.53	.912	4.93	1.311	-3.352	.001**
I am aware of the current efforts to develop DIGSS. (n=69)	4.52	1.686	5.68	1.377	-5.713	.000**
Developing DIGSS is necessary to ensure the future success of institutional giant-screen theaters. (n=70)	4.47	1.491	5.04	1.845	-3.391	.001**
We should change the giant flat and dome screen film formats to conform to conventional shapes instead of creating a different "giant" specification. (n=71)	2.69	1.430	2.55	1.611	1.235	.221

Note. A paired samples t-test was used to test for statistical significance.

* Significant at the p<.05 level. ** Significant at the p<.01 level.

Additional analysis was undertaken to determine if variables such as years in the field and primary work focus had any impact on how respondents rated the statements. An Analysis of Variance (ANOVA) was run using years in the field as an independent variable and the rating of each statement pre and post as dependent variables. An independent samples t-test was run using primary work focus as an



independent variable and the rating of each statement pre and post as dependent variables. Areas of significant difference are reported below:

- Those who were in the field less than 5 years were more likely to rate the statement *We should change the giant flat and dome screen film formats to conform to conventional shapes instead of creating a different "giant" specification* higher than those in the field 5 to 12 years or more than 12 years. n ($F(2, 57) = 3.836$, $p = .027$).
- Those in film-making related positions were more likely to anticipate concern about the impact of DIGSS on their work even before they learned about the DIGSS effort. This was indicated by their more high ratings of: *Once DIGSS is fully developed, the outcome will affect the kind of work I am currently doing higher than those not in film-making* ($t(57) = 2.312$, $p = .028$).
- Those in museum-related positions rated the pre-statement *I am aware of how the conversion to digital in the film industry is creating new challenges and opportunities for giant-screen and dome theaters significantly lower than those not in the museum field* ($t(58) = -2.129$, $p = .038$).
- Those in film-making related positions rated the post-statement *I am aware of how the conversion to digital in the film industry is creating new challenges and opportunities for giant-screen and dome theaters significantly higher than those not in film-making* ($t(57) = 2.288$, $p = .026$).

Three open-ended response questions were used in the survey as another method to gather data on respondent's attitudes towards DIGSS. The survey asked respondents to describe how the DIGSS effort has changed their thoughts about the conversion to digital GS projection. There were mixed opinions regarding DIGSS efforts (Table 7). Thirty-four percent ($n=15$) of respondents were more encouraged about conversion by the DIGSS effort and found it helpful in understanding the importance of coordinating an effort to establish industry standards. One respondent was *"pleased to see that progress is being made, and standards are being set."* Conversely, 30% ($n=13$) were more doubtful about the conversion effort due to DIGSS. Respondents were concerned that DIGSS would lengthen the conversion time frame, complicate the effort, or be cost prohibitive. Some worried about the *"adherence to the 4:3 aspect ratio"* required for conversion. Those who have not changed their thoughts (21%) felt the conversion to digital GS projection was unavoidable.

Museum professionals were more likely to express doubts about the DIGSS effort (42% compared to 11% outside the museum field; $\chi^2 = 4.973$, $N=44$, $p=0.026$). Representatives from other fields (outside of the film or museum industry) were significantly more likely to be unsure or have no opinion on how the DIGSS effort has changed their thoughts about the conversion to digital GS projection (33% compared to 3% outside the museum field; $\chi^2 = 7.497$, $N=44$, $p=0.006$). Only those who read or skimmed the draft DIGSS 1.0 or sections of the proposed specifications expressed doubts about the DIGSS effort (38% compared to 0% who did not read the actual document or who are not familiar with the technical details found in DIGSS; $\chi^2 = 5.427$, $N=44$, $p=0.020$).

Table 7: How DIGSS efforts have changed respondents thoughts about digital conversion (n=44)

Categories	n	Percent*
More encouraged as a result of the DIGSS effort	15	34%
More doubtful as a result of the DIGSS effort	13	30%
No change	9	21%
Increased awareness regarding standards for specifications	8	18%
Unsure or no opinion	6	14%
New models outside of conversion	3	7%

When asked to describe how the DIGSS effort might impact the unique qualities of Giant Screen theaters, respondents most frequently indicated that DIGSS would have a positive impact by preserving or adding to the existing benefits of GS theaters (33%, Table 8). DIGSS would preserve the high quality picture and immersive experience associated with Giant Screen theaters, as seen in the following quote.

The unique qualities are: the giant screen, the stadium style seating, the sound system, and historically (although much less so now) a specific style of film that has set the industry apart from mainstream. I would expect that DIGSS would enhance the impact of these unique qualities.

Additional positive responses emphasized improved accessibility and flexibility with software and film content (13%, n=5) or focused on the general positive impacts of DIGSS (13%, n=5). There were also respondents who felt that DIGSS would have a negative impact on the industry (13%, n=5), discouraging innovative thought, tying theaters to one aspect ratio, being cost prohibitive. Others indicated that DIGSS would not have an impact or were unsure of the impact on the unique qualities of GS theaters.

Respondents who were part of the museum field were less likely to indicate that the DIGSS effort will preserve or add to the unique qualities of Giant Screen theaters (86% compared to 44% outside the museum field; $\chi^2= 7.429$, $N=39$, $p=0.006$). As expected, those unfamiliar with the DIGSS 1.0 draft were significantly more likely to not know or be unsure about how DIGSS might impact the unique qualities of GS theaters (46% compared to 0% of respondents who actually read or skimmed the DIGSS document; $\chi^2= 15.065$, $N=40$, $p=0.000$).



Table 8: Perceptions of how DIGSS might impact the unique qualities of GS theaters (n=40)

Categories	n	Percent*
Preserve or add to the unique qualities	13	33%
General positive impact	5	13%
Improve accessibility / flexibility of content	5	13%
DIGSS will have a negative impact	5	13%
Don't know or unsure of impact	5	13%
DIGSS will not have an impact	3	8%
Other type of impact	4	10%

Respondents also were asked to discuss their beliefs about the cross-over between new digital technologies for fulldome theaters and the digital technologies emerging for other types of GS screens. As shown in Table 9, respondents most frequently mentioned that digital technology will need to be improved for crossover to occur without a loss of quality (40%, n=17). Responses mentioned current technical issues or necessary specifications for cross-over. About a fourth of respondents (26%, n=11) believed that convergence of fulldome and other GS technology is necessary and important. They felt the cross-over was inevitable and could serve as an equalizer to make quality and/or content the same:

I believe that convergence between digital fulldome and the digital retrofit of giant-screen film dome theaters is inevitable.

It is a step that we will have to take.

Some respondents (23%, n=10) felt that cross-over is going to be challenging and might have a negative effect on GS theaters by reducing picture quality. Several mentioned the distinct characteristics of fulldome and other GS theaters citing their different purposes and separate functions (12%, n=5). Those with a film-making related position were much more likely to indicate that fulldome theaters and other types of GS screens are distinctly different (29% compared to 3% of those not in film-making; $\chi^2= 5.799$, $N=43$, $p=0.016$).

Table 9: Beliefs about the cross-over between digital technologies for fulldome theatres and other GS screens (n=43)

Categories	n	Percent*
Digital technology will need to be improved for cross-over	17	40%
Convergence is necessary and important	11	26%
Cross-over is going to be challenging	10	23%
Dome & other GS are distinctly different	5	12%
No opinion	4	9%
Other	6	14%

Attitudes on the Future of the DIGSS Effort

Respondents were asked to rate their agreement with following statement: *The DIGSS effort cannot keep pace with the rapid evolution of technology.* As seen in Table 10, more than a third of respondents rated the statement as “neither agree nor disagree.” The mean rating for this statement was 4.08 (1=“strongly disagree” and 7=“strongly agree”) indicating that the sample as a whole had a neutral attitude towards this issue. The standard deviation was 1.41, indicating that there was not a great deal of variation in how the statement was rated. Years an individual has been in the field, work focus, and having read DIGSS 1.0 did not make a significant difference in how respondents rated the statement.

Table 10: Perceived ability of DIGSS to keep pace with rapidly evolving technologies (n=66)

Categories	n	Percent
Strongly agree	4	6%
Moderately agree	9	14%
Agree	6	9%
Neither agree nor disagree	24	36%
Disagree	17	26%
Moderately disagree	4	6%
Strongly disagree	2	3%

Respondents were asked to provide an explanation to support their ratings. It is useful to consider these comments with respect to the rating given; this analysis is presented below.

Agreement: Those who agreed with the statement tended to emphasize the fast pace of change in the industry. Some emphasized that DIGSS is already falling behind. *“Technology is changing so fast that no one can keep up with it”* indicated one respondent, while another said *“It already is losing ground to new developments in giant screen.”* Others felt that while DIGSS could fall behind *“that is many years away.”*

Some who agreed with the statement indicated that the DIGSS need to be flexible and fluid, with continual re-evaluation to prevent from falling behind: *“Every few years there needs to be an evaluation & possible revision of the standards in relation to current and upcoming technology.”* A few respondents felt that the industry should stop pushing for the specifications and follow as much as possible the developments in the commercial industry.

Neither Agree nor Disagree: Many of those who neither agreed nor disagreed indicated they did not have enough information to rate the statement. They had just recently heard of DIGSS or were not familiar with the specifications. Another group of respondents felt that time would tell whether or not DIGSS could keep pace with technology: *“I don't think that can be answered until the DIGSS effort has had a chance to be put to the test.”* For these respondents, whether DIGSS would be successful depended both on leadership of those tasked with creating the DIGSS and on the manufacturers and other parts of the industry.

Disagreement: Those who did not agree with the statement took a variety of perspectives. Some felt that specifications could be “future-proofed” if leaders of the specification development take responsibility for keeping pace with change. As one respondent wrote, *“The evolution is not secret.”*



There is plenty of information available for an informed group to make the required decisions.” Another said “It is DIGSS’s role and mandate, surely, to do that very thing ie. to keep pace, and to report and advise on it. If not, there is no point.”

Others worried about possible in-fighting in the field or a lack of buy-in from museum leadership. These issues could derail DIGSS if not managed: *“What’s more difficult is control and adopting or kicking out powerful players who are not well following the rules”* wrote one respondent. Another responded the *“pace of technological development less important than buy-in from museum leadership in the value and contribution of documentary programming in their institutions.”*

Finally, a few thought that as technology progresses the need for specifications will diminish; for them, DIGSS deals with a current problem that will soon cease to be an issue: *“As the process goes digital, the upgrades will become plug and play, or software based, and very easily achieved, so the standard should be fairly easily adapted.”*

Respondents were asked to choose one statement from a list that represented their view on the future of DIGSS. Only 14% chose the statement that indicated that DIGSS 1.0 would set an industry standard. A full 38% chose one of the two responses that indicated DIGSS 1.0 needed either “minimal” or “significant changes” to be useful for the field.

Table 11: Respondents’ opinions on the future of DIGSS (n=63)

Categories	n	Percent*
DIGSS 1.0 will set the standard for the future of GS film.	9	14%
DIGSS 1.0 requires minimal changes to improve the future for GS film.	12	19%
DIGSS 1.0 requires significant changes to be useful to the field.	12	19%
DIGSS 1.0 is of little value to the GS film industry but is still useful as a document.	6	10%
DIGSS 1.0 is not relevant to the GS film industry.	1	2%
DIGSS 1.0 is harmful to the GS film industry.	3	5%
Other	20	32%

Note: Multiple responses allowed. Percentages total more than 100%.

Respondents were asked to provide an explanation to support their answer for this question. As may be expected, many other those who marked “other” felt they did not have enough information to comment on the viability of DIGSS 1.0. Of those who provided an explanation for their answer, a few trends emerged. These are highlighted below:

- More details and clarity: This trend was most often mentioned by those who indicated that “significant changes” need to be made to DIGSS. They indicated that more details and clarity to be added to DIGSS 1.0 to make it usable. For example, one respondent wrote *“there is no clear plan for implementation and many details are missing, especially in the area of how to create the content to showcase these theaters.”* Others wondered how it would be implemented and “enforced.”
- Buy-in, who and when: This trend was apparent across the diverse response areas—those who found value in DIGSS 1.0 and those who felt it need changes raised this issue. These respondents are concerned that the effort may not get off the ground or will stall based on the level of buy-in it has. For example, one respondent wrote *“Future of DIGSS really depends on Museum engagement.”* Others felt that a “wait and see” approach will end up costing the industry time

and money. If too much time passes without a clear level of buy-in, the usefulness of DIGSS would be diminished.

- Technical issues to overcome: Some respondents worried that the standards will not be useful until certain technical issues are solved. This includes issues of aspect ratio and different standards for domes versus flat screens. *“At best, I believe DIGSS 1.0 to be of little value due to the inherent flaws in the rationale for a unique aspect ratio,”* wrote one respondent.
- Minimum standards: A few respondents voiced the need for minimum standards to protect the giant-screen “brand”. *“The theaters which show substandard films in substandard projection not only hurt themselves -- they hurt us all”* indicated one respondent, while another hoped that minimum standards on brightness would be set.
- Practicality: A few respondents called for the standards to be practical. They wanted to have assurances that the DIGSS standards would work for those who have already converted their theaters: *“Are we to disregard our current equipment and invest in another set of compliant equipment?...Consideration should be given to the technologies that have already been adopted by converted theaters to ensure that specifications match what is currently being utilized.”* Another concern was to work within the *“practical realities of how producers/distributors will deliver content.”*

Limitations

This study explored attitudes, knowledge change, and the future of the DIGSS effort among GS professionals with a focus explicitly on those involved in the production of science-related learning films. While there were demonstrable gains in digital conversion technology literacy, there remains trepidation about pace of technical change and industry buy-in that will challenge the GSCA’s efforts to pursue a standardized specification. Even though the GS field is relatively small and involves people working in widely divergent professions, the low level of response to these surveys suggests that these findings may not predict whether the DIGSS effort will have broad enough support to ensure adoption.

We suggest that the technical concerns raised in this study appear to be very specific and will continue to challenge those professionals working to find common ground. Further study using more broad and purposive sampling techniques may offer greater insight into the impact of this effort, as will ongoing updates on the evolution of DIGSS whether explicitly stated or implicit in the technical choices made by members of the association and format experiments being undertaken by Hollywood studios as higher resolution projectors come online.

We note that this survey was undertaken a full year after the first presentation was made public and following a period of open-access for public comment on the specifications and after the GSCA board adopted the specification but before an announcement was issued informing the industry of that new commitment. Given this one year dissemination effort that increased the opportunity for input, and the discussion of DIGSS at the GSCA board meeting, this survey may have come on the heels of enough discussion about the topic that some potential respondents chose not to respond simply because they felt they had already offered their opinions in a variety of other venues and that the decisions about adoption had already been made. Furthermore, the survey was also coincident with the release of a major motion picture in digital GS release (Mission Impossible: Ghost Protocol) that generated a great deal of discussion about the quality and experience of digital GS formats. In this latter case, those with more knowledge of the specifications and interest in their adoption may have chosen not to respond



because a new technical format appeared to have emerged out of the Hollywood system whether that standard matched DIGSS or not. In any of these cases, there is sufficient evidence to suggest that all professional views may not be represented in this survey.

Lastly, we urge caution in the use and interpretation of these data because the sample size remained relatively small and represented only a small cross-section of highly interested respondents. We suspect that the knowledge and attitude gains represented here may not be as common among those who chose not to respond to the survey and speculate that they may have perceived the invitation to be technically beyond their capacity and therefore not something they could offer an opinion about.

Irrespective of these notes, we believe that these data, in combination with the efforts made by the project researchers to disseminate the material through a variety of means constitute a substantial effort that has resulted in change. These results show that professional knowledge increases were achieved and that awareness of the issues has been heightened, even if people do not believe the political climate supports adoption of this first draft of DIGSS.


Conclusions

The project sought to build awareness of the need for shared specifications among the primary professional audience of film producers, distributors and venue operators supporting GS science learning films. While a majority of respondents to the survey did demonstrate awareness, the low response rate cannot be considered representative of the field and should not be used as the only source of information from which to draw this conclusion. These results, in combination with the acceptance of the specification by the Giant Screen Cinema Association and the results of the 2010 post-conference symposium where the topic was first introduced suggest that awareness of the technical issues associated with digital conversion was achieved.

The project also sought to build understanding or thoughtful divergence among both all types of GS theater professionals including those working in fulldome theaters or formats and those working in the flat screen formats. Again, the majority of respondents did express an increased understanding of the technological affordances and limitations that affect the film experience. Again, the low number of respondents cannot be inferred to represent the profession, even though there were enough respondents to undertake statistical analysis. The detailed comments provided in this summative analysis does reveal that many have taken an active interest in the outcomes and that this raised level of understanding will continue to be an ongoing discussion in the field.

Lastly, the principle investigators set a goal of achieving widespread contribution to the development of the specifications from the field. Over 50% of the respondents to the summative survey claimed to have contributed commentary in some form or another over the life of the project in its public comment phase, leading us to conclude that the project achieved this anticipated outcome.

The general demographic differences in respondents suggest that the knowledge and attitude outcomes achieved through this project are represented across the various professional skills sets that constitute the field. Ongoing concerns about lack of buy-in or political disagreement may limit the aspirations of the project leadership from achieving the consensus and scale on which they believe future funding and support may rest, but this does not preclude the finding that the project achieved the outcomes that it set out to achieve. On that basis, we conclude that the project achieved the outcomes as outlined in the original grant proposal.

 End of Report: December 30th, 2011



Appendix Summative Evaluation Instrument

[Intro Screen, Page 1]

You have been asked to take part in this survey because you are a member of the Giant Screen Cinema Association (GSCA) or a subscriber to the LF Examiner's e-Updates. The White Oak Institute has partnered with GSCA and the Institute for Learning Innovation to conduct this survey on the Digital Immersive Giant-Screen Specifications (DIGSS). This survey is designed to gather feedback from members of the giant screen field relative to DIGSS. The survey will help the White Oak Institute to determine the degree to which they have met their goals for their DIGSS-related project, which was funded by a National Science Foundation grant (#0946691).

The survey should only take about 10 minutes to complete and does not pose any risk and/or discomfort. Your answers will be anonymous. No identifying information will be included in any reports resulting from this study. Your e-mail address and name will not be associated with your responses, and your IP address will not be collected during this survey. Taking part in this study is completely voluntary and you are free to quit the survey at any time.

If you have questions about this study or would like a copy of this consent page, please contact the director of the evaluation study: John Fraser, PhD, AIA Director, ILI New York Institute for Learning Innovation fraser@ilinet.org (410) 956-5144. By clicking arrow button below, I indicate that I have read the above information and I consent to take part in the study.

[Page 2]

The National Science Foundation has funded an effort to bring together industry leaders in the giant-screen (GS) theater field and technical experts to develop Digital Immersive Giant Screen Specifications (DIGSS) to address change in the industry that is leading to the conversion of analog film-based science-oriented theaters to new formats. This survey is designed to gather feedback from the field on DIGSS and the process used to create the specifications.

When did you first become aware of the DIGSS effort?

- Within the past six months
- Between 6-12 months ago
- Between 12-18 months ago
- More than 18 months ago
- This survey is the first time I heard of DIGSS

Up to this point, what type of involvement have you had with the DIGSS process? Please check all that apply.

- Read about DIGSS in film industry trade press
- Attended conference sessions at GSCA or other professional meetings that talked about DIGSS
- Talked with colleagues or co-workers about DIGSS
- Attended the June 2010 DIGSS colloquium in Marblehead, MA
- Participated in/looked at on-line forums about DIGSS
- No Involvement
- Other types of involvement (please specify below) _____

Have you looked at the draft DIGSS 1.0 or sections of the proposed specifications?

- Yes, I read the draft in depth.
- Yes, I skimmed the draft.
- I've read reports about portions of the specification but I have not read not the actual document.
- I haven't read anything about the technical details contained in DIGSS.

[Page 3]

Please Indicate how much you agree or disagree with these statements. Use the drop-down menu choices to select one answer for BEFORE you heard about DIGSS and one for how you feel TODAY.

[For each of the statements below participants could choose from among the following choices, and rated each question twice]:

- Strongly disagree
- Moderately disagree
- Disagree
- Neither agree nor disagree
- Agree
- Moderately agree
- Strongly agree



I am aware of how the conversion to digital in the film industry is creating new challenges and opportunities for giant-screen and dome theaters.

There is a need for institutional giant-screen theaters to establish shared exchange standards for digital giant screens.

There is a need for institutional giant-screen theaters to have Digital Immersive Giant-Screen Standards (DIGSS).

I am aware of the current efforts to develop DIGSS.

Developing DIGSS is necessary to ensure the future success of institutional giant-screen theaters.

Once DIGSS is fully developed, the outcome will affect the kind of work I am currently doing.

I intend to support the effort to develop DIGSS.

I will support the outcome of the DIGSS development process.

We should change the giant flat and dome screen film formats to conform to conventional shapes instead of creating a different "giant" specification.

It is necessary for DIGSS to address the needs of both flat and dome screens.

The eventual conversion from analog to digital film projectors for institutional giant-screen theaters is inevitable.

I am knowledgeable about the technical criteria that are required to make a quality giant-screen experience.

I am aware that there are many options for digital conversion of existing giant-screen theaters, at various quality levels.

[Page 4]

Please tell us what you believe about the cross-over between new digital technologies for fulldome theaters and the digital technologies emerging for other types of GS screens.

[Open-ended response text box]

Please describe how the DIGSS effort has changed your thoughts about the conversion to digital GS projection.

[Open-ended response text box]

Please describe how the DIGSS effort might impact what you believe are the unique qualities of Giant Screen theaters.

[Open-ended response text box]

[Page 5]

Please rate your level of agreement with the following statement: The DIGSS effort cannot keep pace with the rapid evolution of technology.

- Strongly disagree
- Moderately disagree
- Disagree
- Neither agree nor disagree
- Agree
- Moderately agree
- Strongly Agree

Please explain your rating for the above statement.

[Open-ended response text box]

[Page 6]

How do you feel about the future of DIGSS?

- DIGSS 1.0 will set the standard for the future of GS film.
- DIGSS 1.0 requires minimal changes to improve the future for GS film.
- DIGSS 1.0 requires significant changes to be useful to the field.
- DIGSS 1.0 is of little value to the GS film industry but is still useful as a document.
- DIGSS 1.0 is not relevant to the GS film industry.
- DIGSS 1.0 is harmful to the GS film industry.
- Other (please specify below) _____

Please offer a short explanation for your answer to the previous question.

[Open-ended response text box]

[Page 7]

The following questions will help us learn a bit more about your professional experience to help us reflect the breadth of thoughts on this topic.

How long have you worked in the giant-screen film industry?

- Less than 2 years
- 2-5 years
- 5-10 years
- 10-12 years
- More than 12 years



What is your primary work focus? Please check all that apply.

- Film maker/producer/distributor
- Film editing/post-production/technical
- Museum theater operator/manager
- Museum education professional/manager
- Equipment inventor/developer
- Equipment manufacturer/leasing agent/sales
- Equipment support/maintenance professional
- Journalism/academic/consulting
- Promotion/marketing for film industry
- Promotion/marketing for GS venue
- Other (please specify below) _____

If Museum theater operator/man... Is Selected, Then Skip To: Page 8.

If Museum theater operator/man... Is Not Selected, Then Skip To: Page 9.

[Page 8]

What type of theaters does your facility operate? Please check all that apply.

- Giant-screen flat
- Giant-screen dome
- 2D/3D
- Fulldome/planetarium
- Commercial 3D digital (smaller screen)

When do you believe your giant-screen theater will have to convert to digital because of a sufficient number of analog films will no longer be available? Please check only one.

- Within 0-3 years
- Within 4-7 years
- Within 8-12 years
- 12 or more years
- Not sure/I haven't thought enough about it
- We are considering alternate non-GS film uses for our current theater

[Page 9]

Thank you for completing the survey. Your response will be included in the report on the impacts of this National Science Foundation supported effort. If you have questions about this project or would like to receive a copy of the final report, please contact Dr. John Fraser at fraser@ilinet.org. If you are interested in reviewing a copy of DIGSS, please contact the White Oak Institute and request a copy from John Jacobsen at jjacobsen@whiteoakinstitute.org or visit www.whiteoakinstitute.org and look for DIGSS 1.0. This project was made possible through a grant from the National Science Foundation (DRL-ISE #0946691).