

GIANT SCREEN DIGITAL THEATER GLOSSARY

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Common Acronyms

ASTC: Association of Science-Technology Centers

DCI: Digital Cinema Initiatives

DLP™: Digital Light Processing (a trademark of Texas Instruments)

DIGSS 1.0: Digital Immersive Giant Screen Specifications (aspirational exchange protocol)

DIGSS 1.0 – PRM: A version that is achievable by October 2012. PRM wants its giant screen theater to be DIGSS-compliant in all areas with the exception of resolution and luminance, which is expected to start at acceptable levels and upgrade over time.

DISCUSS: Digital Immersive Screen Colloquium for Unified Standards and Specifications

Domemaster: Exchange protocol in the fulldome (digital planetarium) field

GSCA: Giant Screen Cinema Association

IPS: International Planetarium Society

LCoS™: Liquid Crystal on Silicon (a trademark of Brillian Corporation)

Aspect Ratio – Popular Screen Formats

An aspect ratio is a numerical way of describing a rectangular shape, like the screen. Professional cinematographers prefer a single number to describe screen shapes and refer to the 4:3 television ratio as 1.33:1, or just 1.33.

- **Wide Screen:** sometimes available in conventional movie theaters – 2.35:1
- **Conventional Cinema:** for Hollywood movies – 1.85:1. This would fill the width of Peoria Riverfront Museum's 70-foot screen but would only use 38 feet of the 52-foot height.

- HD TV: The aspect ratio of HD televisions is 16:9, or 1.77:1
- Giant Screens: The aspect ratio for classic films as well as of standard televisions was 4:3 before HD. This means that the picture is 4 “units” wide and 3 “units” high. Classic giant screen movies and screens usually seen in museums have an aspect ratio of 1.33, which would fill the entire 70-by-52-foot screen in the PRM giant screen theater.

Immersive Experiences

Experiential theater works through the careful orchestration of multiple sensory inputs and through the equally important removal of reminders of the actual architecture and its machinery. The National Research Council’s study on informal science learning found that “The scale and setting of a giant-screen film may result in a uniquely immersive experience compared with other screen experiences. Because of the large frame size and extremely high resolution of the film, this technology immerses viewers into the projected image, whether photographed with special cameras or computer-generated.”

Experiential theaters use dimensional and surrounding media technologies and architecture to create the illusion of being inside the action/frame. In conventional movie theaters, a rectangle inside the field of view from the reference seat separates the program from the audience. PRM’s giant screen theater is designed for immersion by minimizing this separation so the viewer enjoys an extraordinary immersive experience.

Pixels

A pixel is a dot of light on the screen, and it is the smallest visual unit of a projector of a certain resolution. The more pixels on the screen, the higher the resolution.

Resolution – 2K or 4K

4K is the emerging standard for resolution in digital film and computer graphics and will be PRM’s choice. Resolution in this context refers to the number of pixels on the screen (measured

horizontally). The term "4K" comes from its approximately 4,000 pixels of horizontal resolution (likewise 2,000 pixels is known as 2K). The terms 2K or 4K describe the horizontal resolution, as opposed to home televisions, which refer to resolutions of 720p and 1080p, which both stand for the number of vertical pixels.

Digital Projectors

There are currently two types of projectors for digital cinema: Digital Light Processing (DLP) and Liquid Crystal on Silicon (LCoS). The DCI specification for digital projectors calls for two levels of playback to be supported: 2K (2048x1080) or 2.2 million pixels at 24 or 48 frames per second, and 4K (4096x2160) or 8.85 million pixels at 24 frames per second. A 4K DLP projector will be available in early 2011; LCoS 4Ks are on the market already, but are not as bright.

Three manufacturers have licensed the DLP Cinema technology developed by Texas Instruments: Christie Digital Systems, Barco and NEC. As of 2009, there were more than 6,000 DLP-based Digital Cinema systems installed worldwide, with 80 percent located in North America.

Early DLP projectors, which were deployed primarily in the United States, used limited 1280x1024 resolution or the equivalent of 1.3 MP (megapixels – or millions of pixels). They are still widely used for pre-show advertising but not usually for feature presentations.

The other technology is made by Sony and is labeled "SXRD" (LCoS) technology. The projectors, SRXR220 and SRXR320, offer 4096 x 2160 (4K) resolution and produce four times the number of pixels of 2K projection.

DCI Compliance (exchange protocol for conventional digital movie theaters)

The Society of Motion Picture and Television Engineers began work on standards for digital cinema in 2001. Digital Cinema Initiatives (DCI) was formed in March 2002 as a joint project of many motion picture studios (Disney, Fox, MGM, Paramount, Sony Pictures Entertainment, Universal and Warner Bros. Studios) to develop a system specification for digital cinema. The PRM giant screen theater must have projectors that comply with the DCI standards if the museum

wants to show Hollywood movies. DCI standards are not necessary for showing traditional museum-oriented, classic giant screen films (such as “Everest” or “To Fly”). DCI standards are concerned with protection against piracy, calling for a standardized method of picture encoding.

DIGSS 1.0 Standards and Compliance (exchange protocol for giant screen museum theaters)

These standards (some of which are provisional) for digital giant screen theaters emerged from a conference of giant screen professionals (DISCUSS) held in 2010 and supported by the National Science Foundation. DIGSS 1.0, built on Digital Cinema Initiatives (DCI), specifies additional levels of quality and size to meet museums’ need for an immersive learning environment. Some DIGSS 1.0 specs are aspirational, as technologies are not yet equal to analog film.

Potential systems integrators for the PRM project have been asked to come as close to the DIGSS standards as they can. As this is a moving target, a flexible arrangement with a flexible vendor who shares the goal is essential.

Giant Screen

The size of conventional cinema screens varies widely. The average size is 52 feet wide by 22 feet high, but can range from 50- to 70-feet wide, and about 25- to 50-feet high. The Peoria Riverfront Museum screen will be 70 feet wide by 52 feet high.

The GSCA has adopted minimum definitions for what qualifies as a giant screen theater:

- At least 70 feet (21.3 meters) wide, or
- At least 3,100 square feet (288 square meters) in total area for flat screens, or
- At least 60 feet (18.3 meters) in diameter for domes, and
- Place all seating within one screen width of the screen plane

Theaters that meet this definition can use the GSCA’s “Bigger. Bolder. Better.” certification and marketing program. PRM’s theater will meet this definition.