デジタルドームシアターの国際的な動向と Large-scale Digital Immersive Media の可能性について

宇宙科学情報解析シンポジウム
Feb 14, 2014

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Japan Science Foundation,
Science Museum, Tokyo

History of Planetarium

History of Planetarium

Eise Eisinga Planetarium

Franeker, Netherlands

1774 ~ 1781年に製作

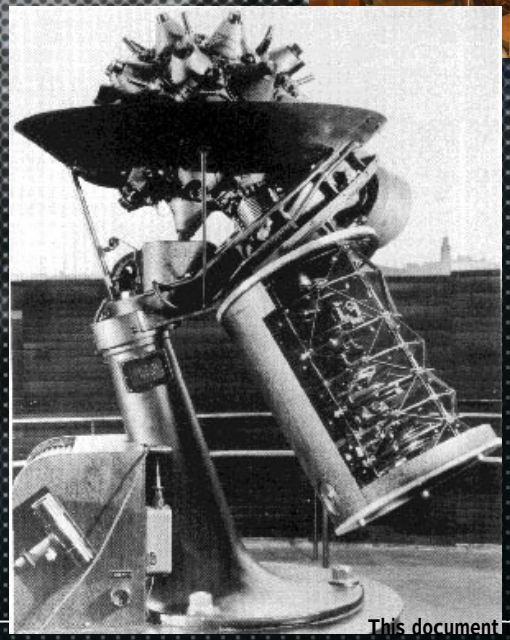
1774年　月・惑星の会合を説明

Zeiss Planetarium Projector

Deutsches Museum, Deutschland

1923年8月　Model Ⅰ

月・惑星の動きを星空の中で説明



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History of Planetarium

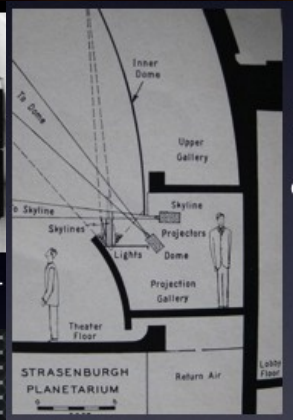
Strasenburgh Planetarium

Rochester Museum & Science Center, USA

1968年9月

世界初　補助投影機を導入

PDP-8 w/ 32 K (8 4K banks) - (on a good day)



First projection gallery & cove - hard to believe

< Note the well-dressed techies

Reuben H. Fleet Space Theater

Reuben H. Fleet Science Theater & Science Center, USA

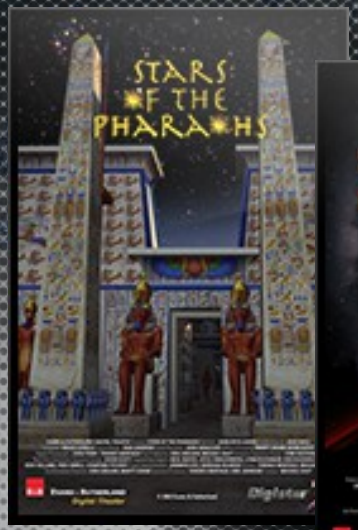
1973年　OMNIMAX

65mm Film, produced by Graphic Films

History of Planetarium

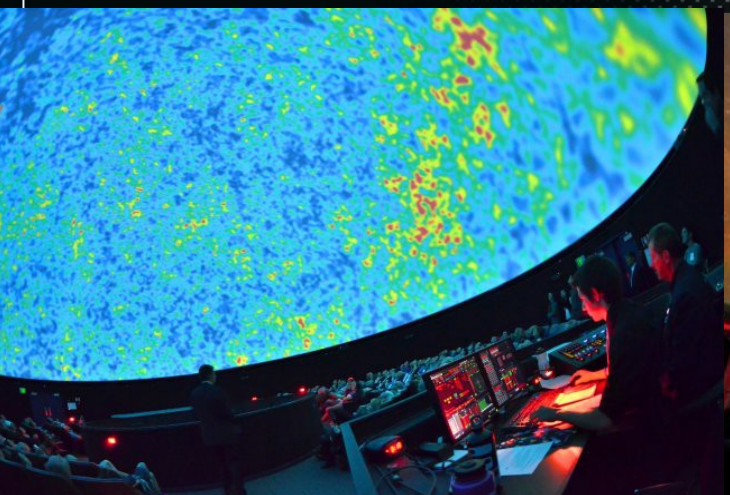
Evans & Sutherland Digistar

Evans & Sutherland
1970年代後半
Flldome video projectionの登場



Fulldome systems

8K resolution, 60 frames per second and in stereo 3D

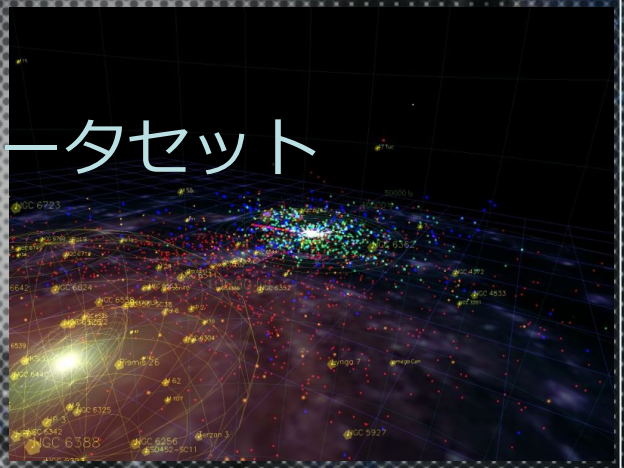


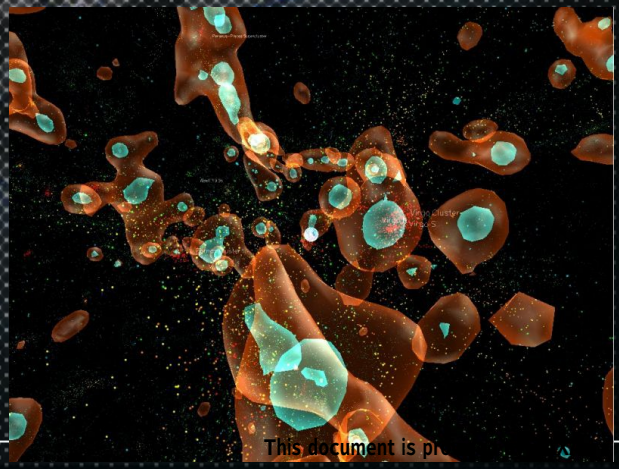
Digital Universe

American Museum of Natural History & NASA

1998年
世界最大規模の３次元宇宙モデルデータセット

- ヒッパルコス
- Tully銀河カタログ
- SDSS銀河カタログ
- SDSSクエーサーカタログ
- WMAP
- Deep Sky 画像
- 2dF銀河カタログ などなど…





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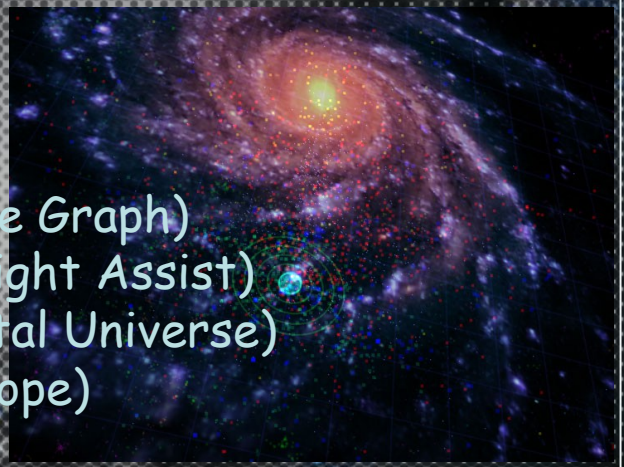
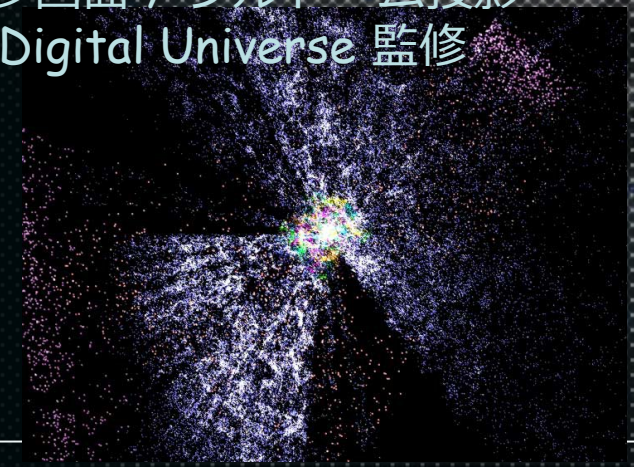
Uniview

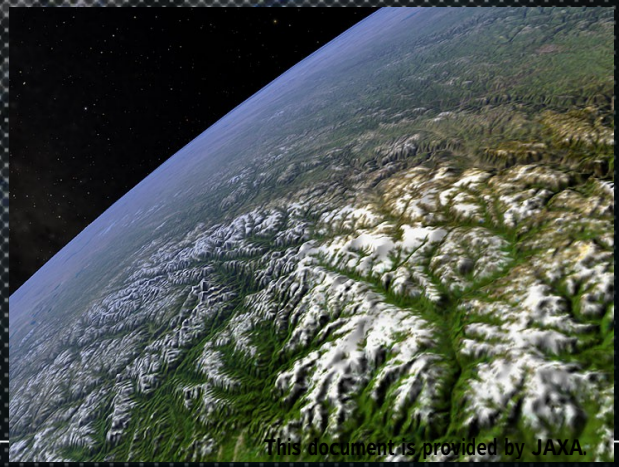
SCISS & オリハルコンテクノロジーズ

2003年
天文可視化プラットフォーム

- 地球から宇宙の果てまでを高精度に可視化 (Scale Graph)
- スムーズなナビゲーションを実現する操作性 (Flight Assist)
- 世界最高峰の３Ｄ宇宙データベースを内包 (Digital Universe)
- 最新の地表データのストリーミング描画 (GeoScope)
- 遠隔コラボレーション機能 (Octopus)
- PCクラスタによる多画面 / フルドーム投影
- NASA / AMNH / Digital Universe 監修







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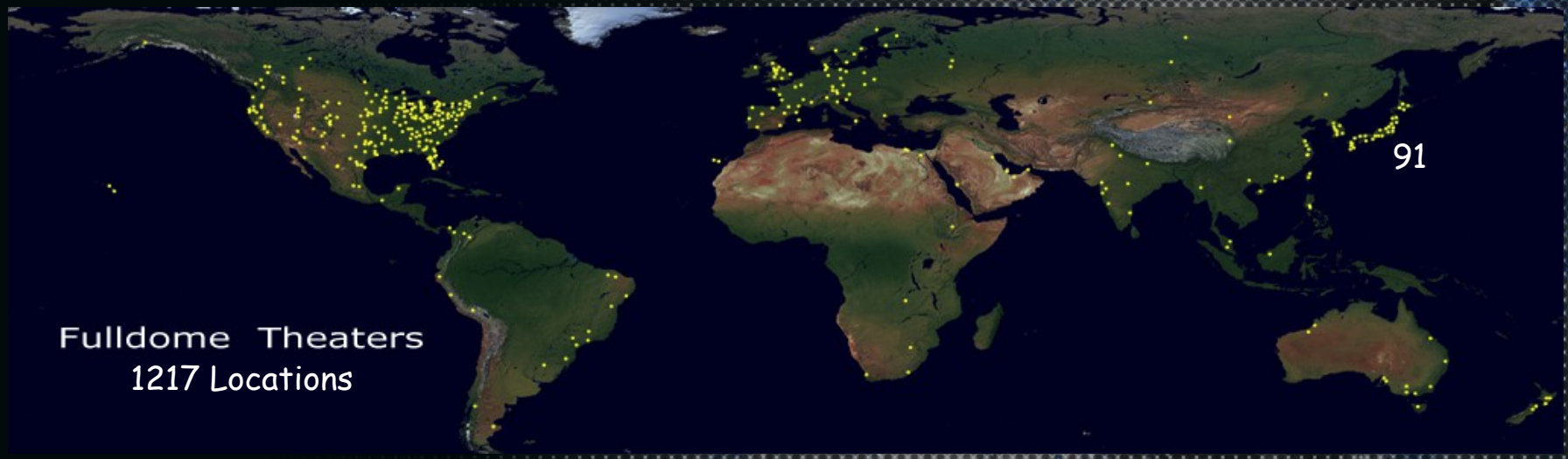
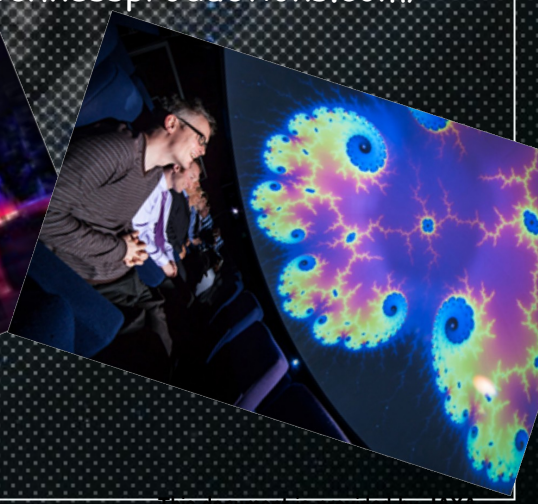
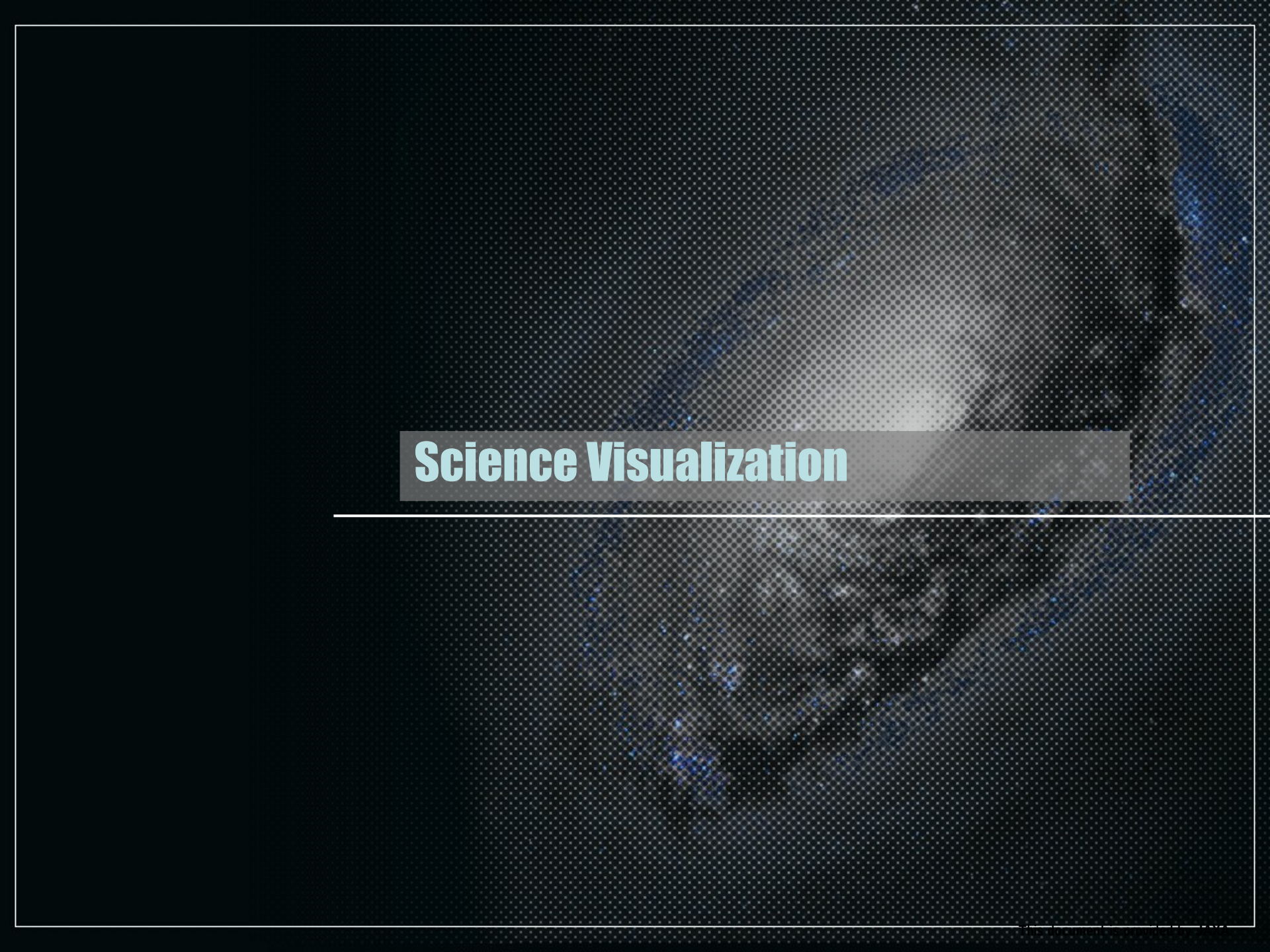
Fulldome Theater



http://www.lochnessproductions.com/



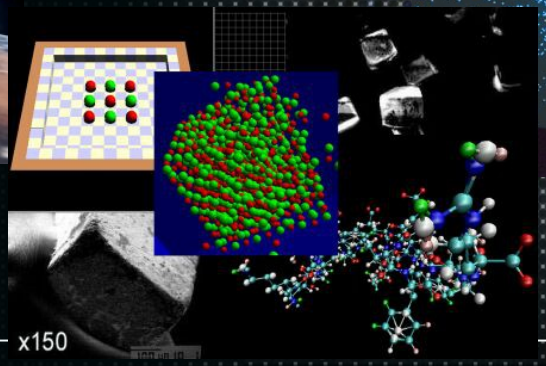

Science Visualization

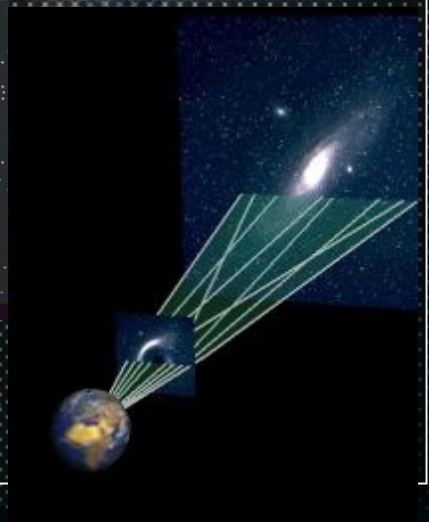
Science Visualization

UNIVERSE
SCIENTIFIC LIVE SHOW

UNIVERSE
SCIENCE LIVE SHOW

- 1996年4月 科学技術館　Team Chimons
- 3D コンピュータグラフィックスとシミュレーション
- 重力多体問題計算専用の高速コンピュータ





Space Visualization Laboratory

- 1996年4月 Adler Planetarium+U of Chicago
- Sloan Digital Sky Survey
- 可視化のプロセスと技術

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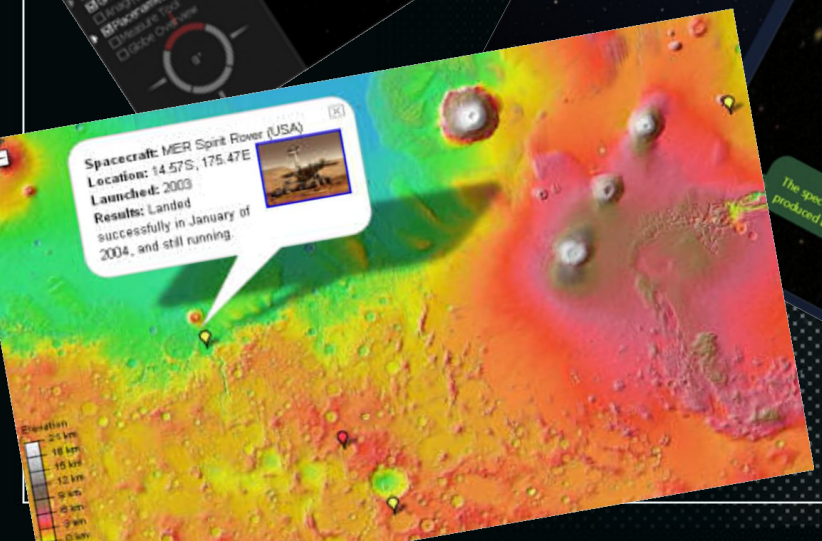
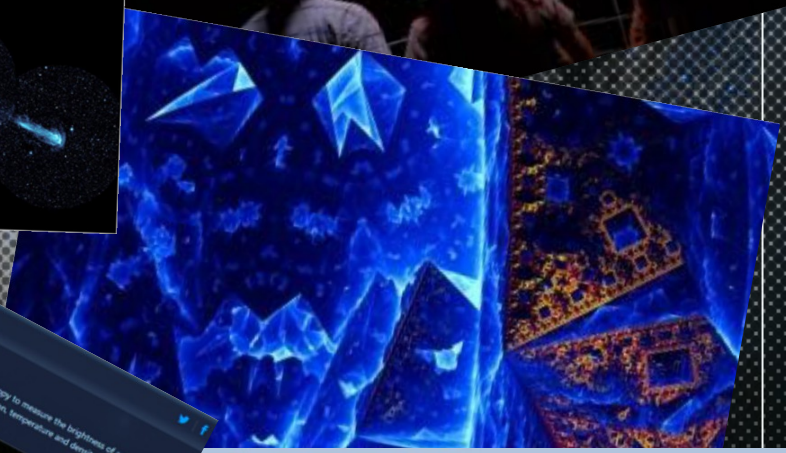
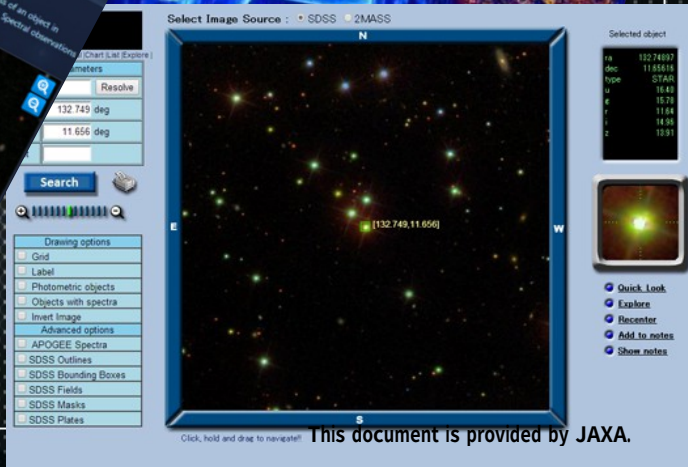
3 Types Science Visualization

Science Visualization

- DATA Visualization
- Animation
- Interactive Visualization







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Immersive digital experiences

Hollywood vs Academia

Hollywood

- Animation
- Tell story
- Simple physics
- Complex geometry
- Complex lighting
- Complex camera
- Heavy compositing
- Whatever looks good
- Emotional
- Right brain
- Aesthetics

Fantasy

Academia

- Simulation
- Illustrate point
- Complex physics
- Simple geometry
- Simple lighting
- Simple camera
- No compositing
- Exact / approximate
- Intellectual
- Left brain
- Accuracy

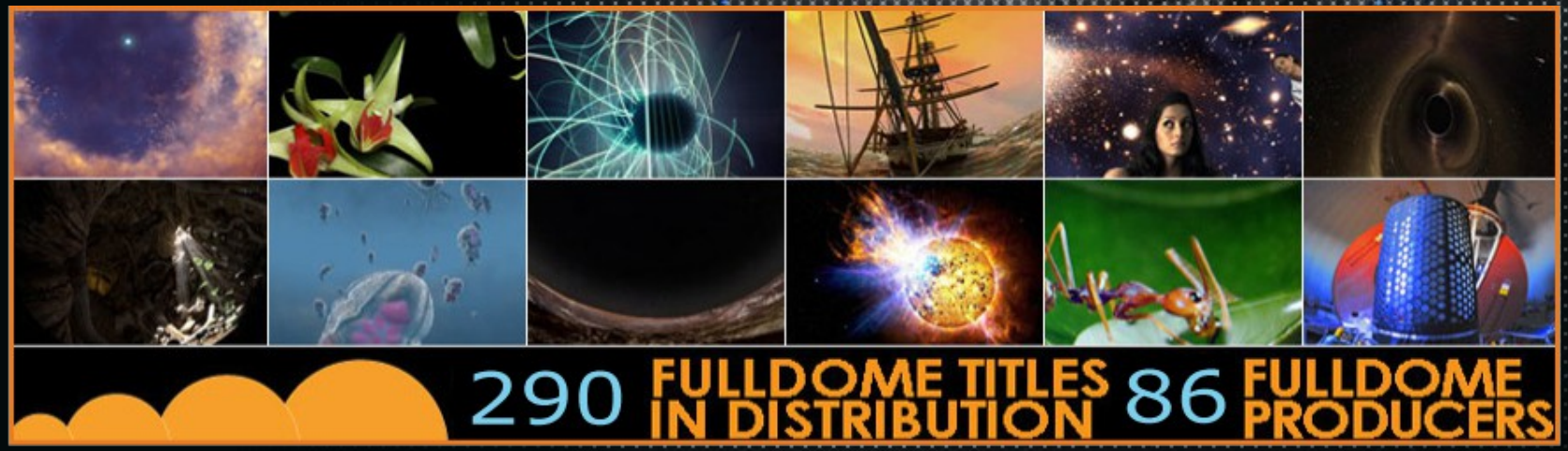
Verité

IMERSA

Immersive Media, Education, Entertainment, Research, Science and Arts

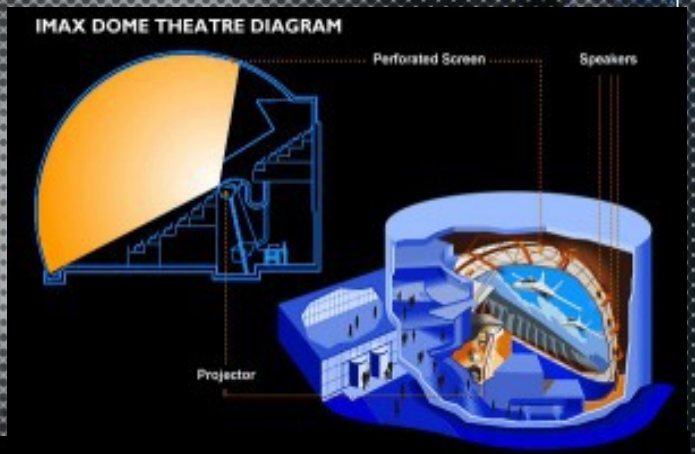
To build an international community of professionals who create large-scale immersive digital experiences.

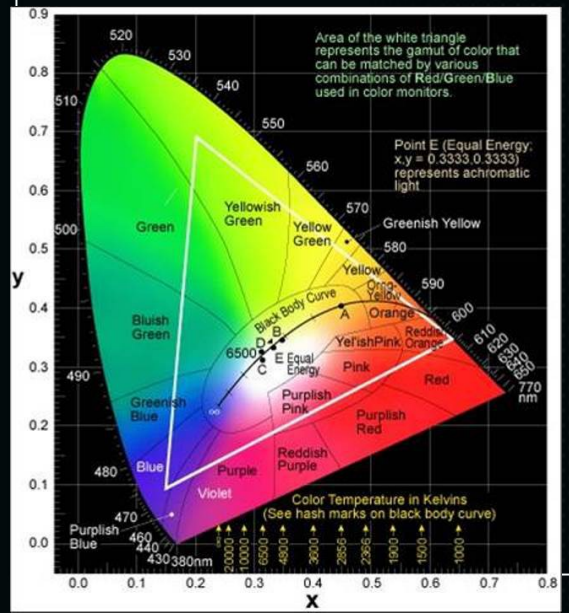
→ Bridge to many disciplines, including research, art and technology

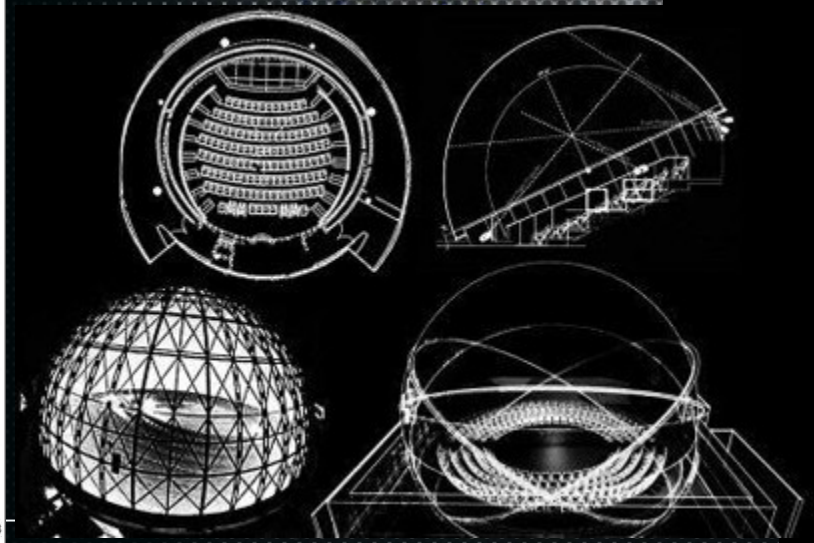


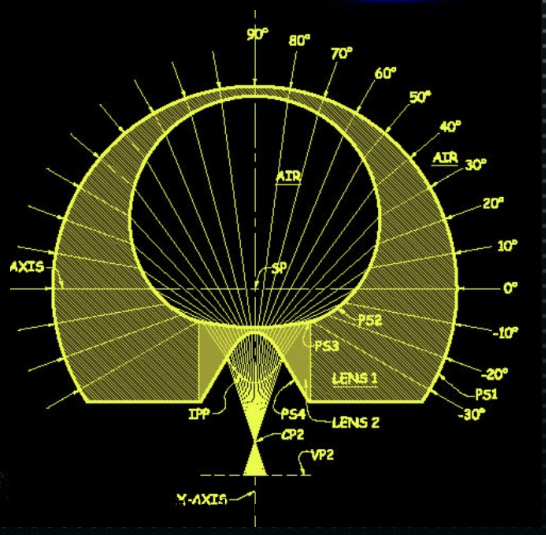
Immersive projection environments

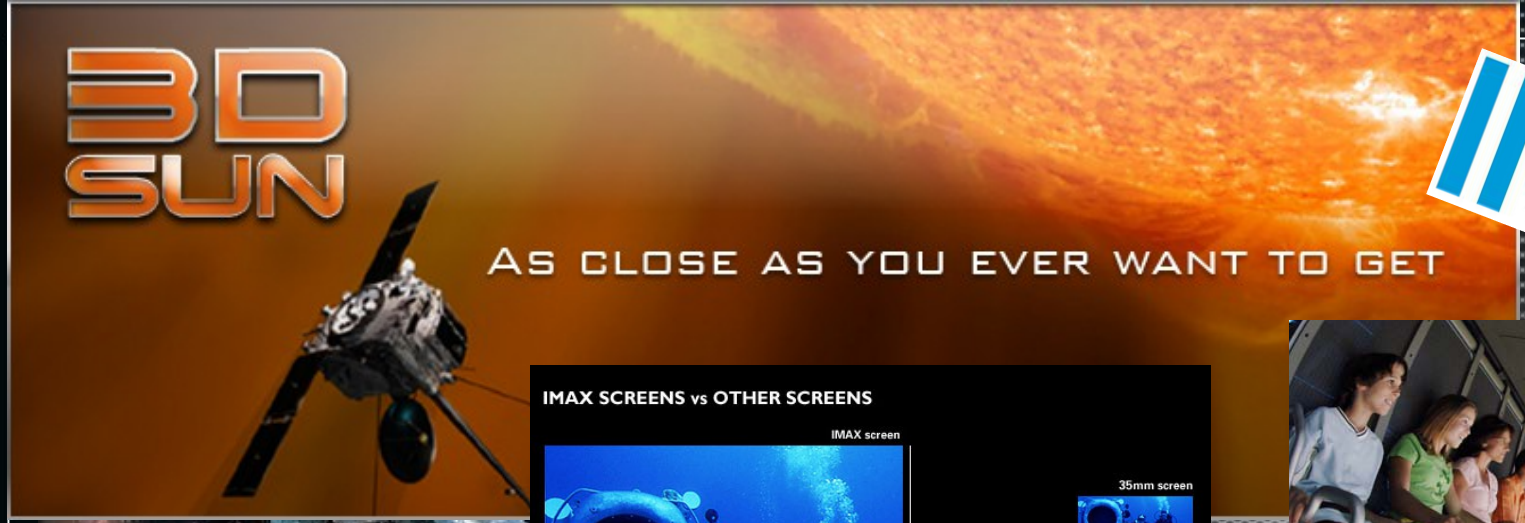
- Art and Science of large-scale digital immersive media
- Fulldome
- Digital planetarium
- Themed entertainment and giant screen theater











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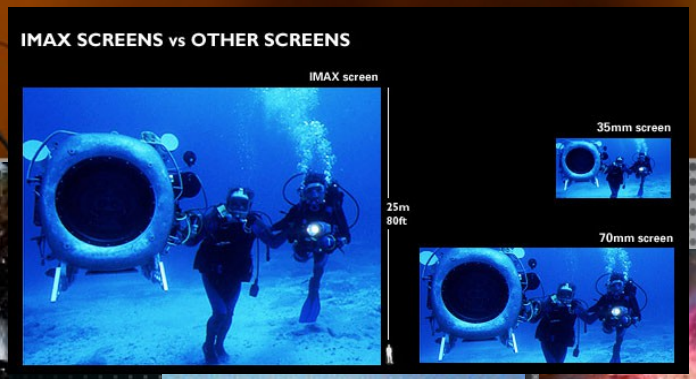

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International Planetarium Society

- Data to Dome
- Provide a powerful and lasting inspirational experience.
- The big data era and the nexus of science and education
- The poential for scientific communication and storytelling in the planetarium
- Standards for real-time, or near real-time, scientific content distribution: imagery, videos, tabular data etc.

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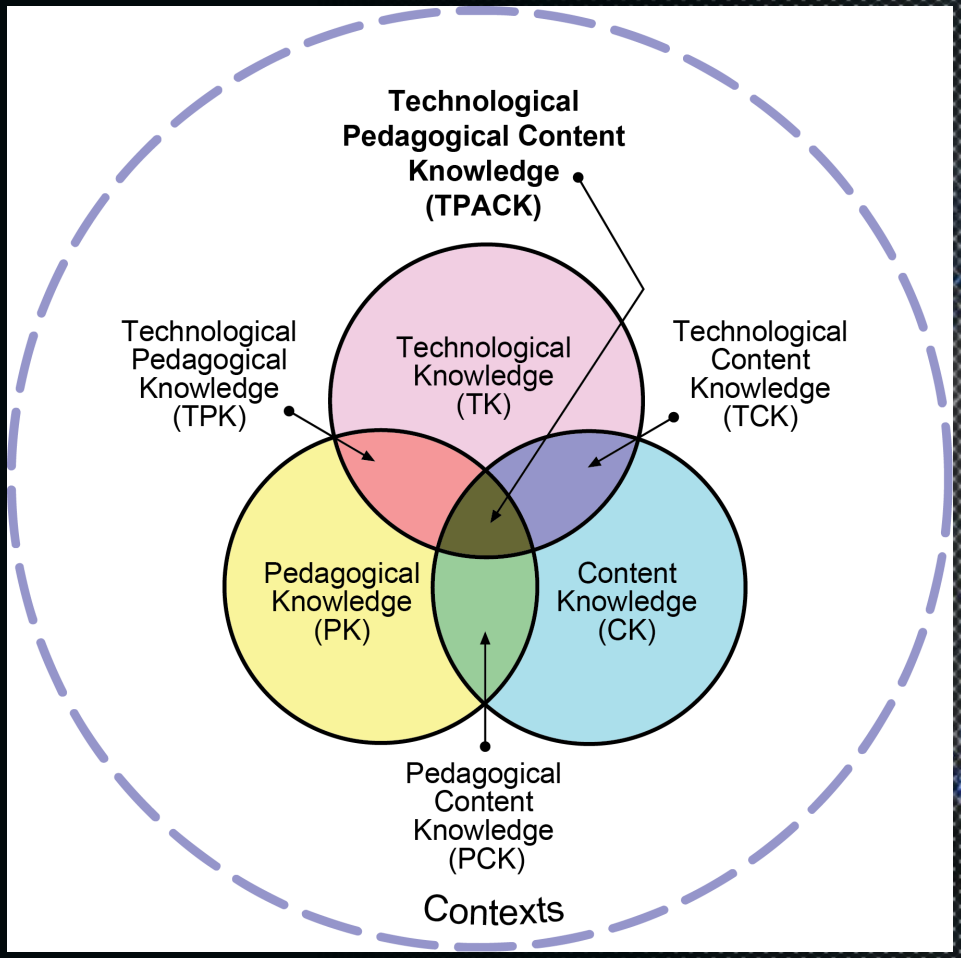
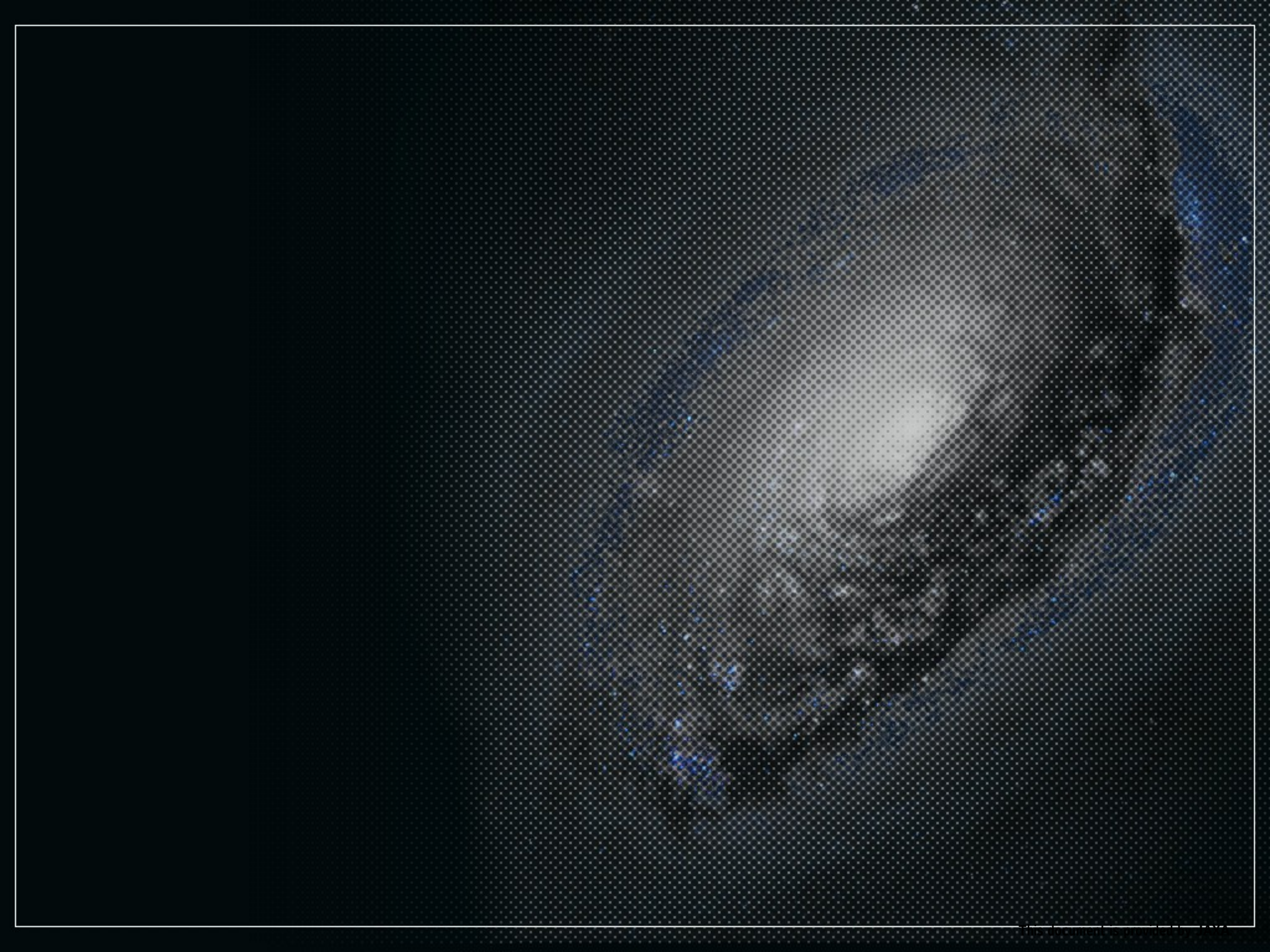
Using Art to Education

Art is a powerful communicating Tool



Technological Pedagogical Content Knowledge

Effective technology integration for pedagogy around specific subject matter requires developing sensitivity to the dynamic, transactional relationship between these components of knowledge situated in unique contexts.

http://www.matt-koehler.com/tpack/tpack-explained/