

Data to Dome: How do we make it live and interactive?

Dayna Thompson, Charles W. Brown Planetarium at Ball State University, Asst. Pltm. Director; dlthompson3@bsu.edu
Dr. Keith W. Davis, Director, Digital Visualization Theater at the University of Notre Dame, Keith.Davis.DVT@nd.edu
Dr. Mark SubbaRao, Director of the Space Visualization Laboratory, Adler Planetarium, msubbarao@adlerplanetarium.org
Ryan Wyatt, Director of Science Visualization, California Academy of Sciences, rwatt@calacademy.org

BIOGRAPHIES

Dayna Thompson has been Assistant Planetarium Director at Ball State University since 2012. With a M.S. in Physics, she researches, creates, and implements interactive presentation styles.

Dr. Keith Davis is currently the Director of the Digital Visualization Theater at the University of Notre Dame. He works on developing ways to bring complex data to the public.

Dr. Mark SubbaRao is an astronomer and Director of the Space Visualization Laboratory at the Adler Planetarium. He chairs the Science and Data Visualization Task Force of the International Planetarium Society.

Ryan Wyatt is director of Morrison Planetarium and Science Visualization at the California Academy of Sciences. He wrote and directed the academy's award-winning full-dome video planetarium programs *Fragile Planet*, *Life: A Cosmic Story*, *Earthquake*, *Habitat Earth*, and *Incoming!*.

ABSTRACT

The International Planetarium Society's (IPS) Data to Dome initiative is making it easier to bring cutting edge scientific data into the planetarium. This workshop will focus on the question: Once we get the data on the dome, how do we talk about it with our guests? Help us explore how to engage our audiences in discussions concerning current science, supported with data-rich visualizations. Presenters will also invite feedback from the audience on what barriers are preventing them from implementing data-driven presentations in their domes. This session is an accompaniment to a March 2017 workshop presented in association with the National Astronomical Observatory of Japan (NAOJ) and a July 2017 workshop presented at the Live, Interactive Planetarium Symposium meeting.

INTRODUCTION

Roughly 35 IPS 2018 registrants attended this Data to Dome workshop on making it live and interactive early morning on the last day of the conference. Participants in the hour-long workshop teamed up to choose datasets, to consider audience needs in making sense of data, and to develop strategies for helping interact with data. In this write-up, we will summarize the workshop materials and collected responses from participants.

I. WE ARE COMMUNICATORS OF INFORMATION

To start the workshop, we reminded participants that as presenters, we are the communicators of the information. We can turn data into a story. However, we can also move beyond informing and *influence*. We are there to help people understand something better in order to take action. We asked participants what an example of a take away or call to action could be – for instance when discussing the percentage of the federal budget space agencies receive during a planetarium show. A workshop participant said the call to action could be for audience members to write their local representatives.

I.1 When should we use data?

There is immense value in having visuals that make data accessible. Visuals help audience understand or remember and can help prompt recall. We provided participants with a few instances where data may enhance presentations. For instance, when you want to help your audience understand or remember. Or when your audience needs data. As in, do you need data to make yourself or the topic seem more credible? Does the audience need data to help them understand something better? Does the audience need see the authenticity of the information (to show validity of data or to remove doubt)? Also, you can use data when you want to make content more relevant to people, showing them connections to their day-to-day lives. We then opened the discussion up to participants on when we should use data, here are some of their suggestions: when teaching the scientific process and/or to show data that we do not understand (yet) to do science with the audience.

I.2 What barriers are preventing you from implementing data-driven presentations in your domes?

During the workshop we also discussed some barriers in the dome that prevent participants from implementing data-driven presentations. To start it off, we offered the barrier: it is hard to discuss content because it may come across as pushy or bossy to audiences when trying to tell them how to think or what their action should be because of the data. Some tips were given to help with this issue. For instance: greeting people while they enter the dome to make a personal connection at the beginning and/or adding stories of your own struggles or experience with changing personal habits due to data-driven choices to your presentations. Other barriers were: internet connectivity and audiences who don't seem to want an interactive experience (we suggest making use of the tips listed in Section II.2 to help with this).

II. WORKSHOP INFORMATION AND TIPS

The following resources and tips were provided to participants at the start of the workshop.

II.1 QUICK RESOURCES

<http://visualizingscience.ryanwyatt.net/resources/>

<http://www.storytellingwithdata.com>

II.2 TIPS TO MAKING IT LIVE AND INTERACTIVE

- Talk to your audience and ask questions, as well as answer their questions, to facilitate the learning process and turn your presentation into an interactive experience.
- Avoid getting caught up in the facts, figures, or data and check-in with your audience throughout the presentation. Use phrases that start with the following to help maintain a dialogue when presenting:
 - “I want you to do something for me...”
 - “I know that many of you may be thinking that...”
 - “Imagine if/what...”
- Be comfortable asking your audience questions. For instance:
 - Ask a question about their comprehension of the data early on. Ask if there is anything that you haven't yet said that would help them understand the data better.
 - Ask audience to consider/predict what would happen if _____. For instance, “what would happen if a trend keeps on going over the years in the data?”
 - Have the audience consider how the information affects them directly. Or ask, “how would it make you feel if...?”
 - Ask phrases like: “Given the data, what should be the course of action if...?”
 - Ask audience in a show of hands if what they saw/heard/experienced changed the way they think about something. Ask how they may change their behavior or take action based on what they now know.
 - Have your audience members make a statement, specifically committing to change.
- Challenge yourself to tell a story – don't talk yourself out of it unless that is what's right for the audience.
- Tell your audience what they should be getting from the data. Be direct. “Here is the data, and this is what you should get from it or how you should act based on it.” This gives the audience something to react to and starts a conversation (even if they disagree). This is a conversation that often gets missed by just simply showing data.
- Create logical connections between parts of a presentation/story so you do not lose your audience. (These have to be connections that are logical to your audience and not just to you.)
- Use amazing visuals to “take” your audience places, creating an emotional and visceral connection (suspension of disbelief). This is a good hook that can lead to audience members exploring the topic more deeply on their own.
- When changing scale in visuals, include continuity to convey connectedness. For example, you can start at something on a human scale, then go to a larger regional and then global scale to explore large phenomenon.
- Include a personal story to help make you more relatable to your audience. (People enjoy learning from someone they can connect with.)
- Practice. Practice talking through data out loud. Practice telling/delivering a story.

III. WORKSHOP ACTIVITY

During the workshop, we asked participants to work on an activity. Groups were asked to pick a data set and then determine a “big idea” for a presentation. The “big idea” defines the purpose of the presentation, but does not just state your thesis – it inspires and creates action. The “big idea” should be a complete sentence. For example: if your data set is “cherry blossom data going back 1,000+ years” your big idea could be “Earth's climate is changing, but you can reduce global warming emissions to help.”

III.1 Activity Questions

After groups had their data set and big idea, they then answered the following questions to build their talk:

- 1) Who is the audience and how is your story/data relevant to them?

- 2) What does your audience NOT know about the data? What do you want your audience to know?
- 3) How will you use data visualization storytelling and interaction to make your point? Be specific and list example phrases and/or questions you'll ask your audience.
- 4) How will the audience be able to use the information to make changes, reinforce habits, or spark conversation? What questions will you ask them to help foster these actions?

III.2 Audience responses

Fourteen (14) groups handed in their activity worksheets at the end of the workshop. You can find the scanned worksheets here: <https://tinyurl.com/y7aagy52> or email dlthompson3@bsu.edu. To summarize, groups came up with the following data set/big idea examples to build their talks:

Group 1:

DATA SET: Earthquakes over time in US

BIG IDEA: We can use past earthquake locations to help predict future locations and you can take steps to help your community and selves to be safer.

Group 2:

DATA SET: Orbital trajectories of space junk

BIG IDEA: Human presence in space is cluttering up the near-space areas; how can we clean up after ourselves?

Group 3:

DATA SET: Microplastics

BIG IDEA: Microplastics affect living things, but we can still change.

Group 4:

DATA SET: Moons of solar system

BIG IDEA: You can discover clues to a moons origin based on its orbit.

Group 5:

DATA SET: LSST Alert Stream

BIG IDEA: We live in “the age of exploration” now.

Group 6:

DATA SET: Sea currents data

BIG IDEA: Europe’s climate benefits from the warmth of the sea current; what happens if these would change?

Group 7:

DATA SET: Exoplanets

BIG IDEA: Everything we know about solar systems is wrong.

Group 8:

DATA SET: Gaia Data Set

BIG IDEA: How do you appreciate how large and populated the galaxy is?

Group 9:

DATA SET: Time sequences [] of a planetary nebula

BIG IDEA: Planetary nebula expands in 3D over human perceptions.

Group 10:

DATA SET: Catalog of bright galaxies

BIG IDEA: Show diversity of galaxies – classify, learn, identify.

Group 11:

DATA SET: Multi-wavelength observations of (astronomical objects) a dark clod against a starry sky.

BIG IDEA: Look at the world from different perspectives.

Group 12:

DATA SET: Health/deaths/life expectancy data sets and history and GDP

BIG IDEA: How vaccines have improved the world child death expectancy.

Group 13:

DATA SET: Earth at night map

BIG IDEA: We can waste a lot of light to space, so you can help by buying shielded lights.

Group 14:

DATA SET: Geography

BIG IDEA: Show different layers of data to different audiences, for example: atmosphere, vegetation, or soils.

IV. CONCLUSION

In one short hour, we got people thinking about how to think about their audiences and how to contextualize data to achieve desired outcomes, with an eye to making it interactive. We hope this is just the beginning to the design of more live and interactive data-driven presentations.