

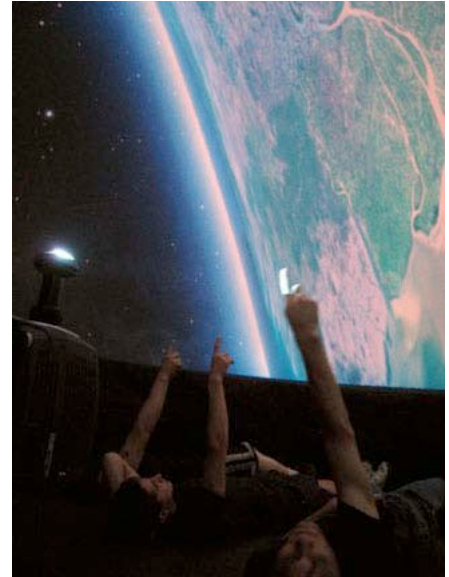
Data-scaling and Learning

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You may be familiar with the Minnesota Planetarium Society's portable, interactive, visualization lab known as the *ExploraDome*. What you may not know is that *Uniview*, the data scaling software used in this dome, is also used to host interactive *dome-cast* sessions between members of the *Minnesota Planetarium Society Regional Network* and with NASA scientists. This session will demonstrate *dome-casting* and the process of guided inquiry, which is used to infer knowledge through real-time scaling of earth and astronomical data.



While it is entertaining to demonstrate this maturing technology, the purpose of this session is to stimulate a conversation with educators about the role of immersive visualization and learning. **A supposition:** *A critical literacy of the future is data literacy - the ability to use real data in meaningful ways to infer knowledge. What does this literacy look like? How do we measure it? Perhaps most important for the educators, how do we build learning environments and curriculum that capitalizes on this potential?*

These are big questions that you will better understand and appreciate after the session. While there are free and low cost tools you can use today in your classroom, the MnPS would be pleased to one day make the *ExploraDome* obsolete due to an explosion of schools investing in *domed immersive learning spaces*. This is a bold statement based on some recent history as a guide. In the early 90's most educators would not have foreseen the role the Internet would play in shaping teaching and learning. For example, early dial-up Internet access projects like *InforMNs* (Internet for MN Schools) were a training ground, which introduced the Internet to educators, and helped school officials justify the educational value of and the need to invest in school networks. In hindsight it seems comical to think that the value of the Internet needed to be educationally justified. However, it was also a time when teachers shared a phone in the teachers' lounge, and classroom access to the Internet seemed unfathomable.

Fast forward to today and this rhetorical question: *Why do we build chemistry Labs in schools? – Because experimentation is critical to the understanding of chemistry.* Similarly for less than the cost of a chemistry lab, we can now build visualization spaces that mirror the hemisphere of the human brain (ie a dome), and help students infer knowledge using data. Essentially facilitate student fluency in data literacy. This concept in K-12 schools is nascent but it is starting to take hold with origins in Minnesota schools. Today there are four Minnesota school districts that run an interactive domed visualization space like the *ExploraDome*. Three of these sites also happen to be renovations of traditional planetariums, and are also the first K-12 sites in the world to incorporate the interactive tool *Uniview*.

- Mayo High School Planetarium - Rochester

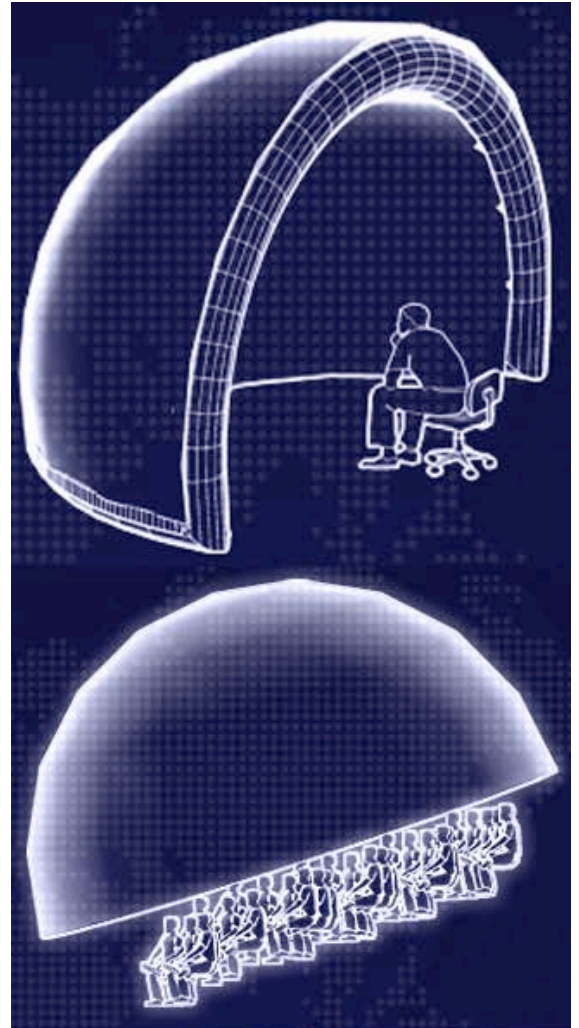
- Como Elementary School Planetarium - Saint Paul
- Mankato East High School Planetarium

This first wave of investment happened because dedicated educators were able to demonstrate the value and convince their school administrators of the need. These sites are members of the *MnPS Regional Network*ⁱ which is currently comprised of 8 interoperable domed systems. This network has negotiated a shared software license agreement and regularly tests and shares a variety of strategies for successful student experiences. *Is there a second wave?* It is coming and there are some cost effective solutions that don't necessarily require construction of more expensive domed theater environments. Here are a few examples:

- A partial hemisphere that can fit in a classroom known as a *Portal*. (This type was recently acquired by the Anoka Hennepin School District)
- A renovated planetarium known as an *Evolver*
- A community based project like the wooden dome pictured
- Portable systems like the MnPS ExploraDome, also known as a GeoDome

The *MnPS Regional Network* sites are legitimate *regional STEM Center's of Excellence*. Why? Each site is a unique learning laboratory designed to visually reinforce classroom lessons. Inside these domes students have an opportunity for observation, measurement, logical analysis and an infinite testing ground under a controlled classroom setting. This laboratory approach to instruction inside the dome means that students are not passive receptors of scientific facts but are immersed in the information. Larry Mascotti, Mayo Planetarium put it this way:

"I see no tool more important than this software combined with the right data for recreating in the human mind and spirit that first moment of seeing the reality of earth from space. I have witnessed how this combination of resources is a conversation starter and changer. Our impact on our environment is shaped by how we think about our environment. This tool will help us reinvent the global response that is needed for our children and us to survive. Creating awareness is the first step on the journey of our call to action. As Chief Seattle so well reminds us, 'We have not inherited the



earth from our fathers; we are borrowing it from our children.' Our generation has a tremendous obligation to those yet to come. Our dome network is in a unique position to 'write the book' and have our students and teachers play a major contributing role in defining what the science classroom of the future looks like, and how it operates."

What is perhaps most compelling is that teachers in these domes are able to break through artificial scientific barriers, and put *all* topics in a proper contextual place and scale. Quite literally, they can seamlessly travel from the edge of the universe to a nano-scale and their audience can be PHD physicist or pre-school children. Everyone is able to view the same data, and learn at an age, and knowledge appropriate level. They are able to target the skills critical to science literacy: *the ability for students to use scientific data to infer deeper meaning through investigation and inquiry*. There is nothing about a seemingly difficult topics like *cosmology* that should keep it out of the reach of a 5th grade student, except for our ability to provide a proper visual reference. Once barriers are removed, there is no end to what people can learn, appreciate, and comprehend.

In a nutshell, immersive environments are becoming a standard tool in education; *when is your school planning to add one?*

Additional Information:

1. More information about Uniview can be found at: www.scalingtheuniverse.com
2. More information about the ExploraDome can be found at: mplanetarium.org/exploradome.htm
3. An Informational guide to Uniview. This document describes the technology and includes narrative summaries from a variety of users. <https://mplanetarium.sharefile.com/d/s5ec312d03ba481c8>
4. *Showing Darkness in a Whole New Light* An article from the Nov-Dec 2009 issue of the MN School Board Association Journal. It features the work of Mayo, Mankato, and Como planetariums. <https://mplanetarium.sharefile.com/d/s932505facd34f8b9>ⁱⁱ
5. The GeoDome WWW site is where you can learn more about the technology used in the ExploraDome and the school sites. This site is from Elumenati, the company that designs and builds portable systems like the ExploraDome (aka GeoDome) and offers a variety of solutions for immersive environments, like the renovations in the MN schools mentioned. <http://www.geodome.info>
6. In November 2010 the *Minnesota Planetarium Society* and the *MnPS Regional Network* partners won a Tekne Award from the Minnesota High Technology Association. The Minnesota Tekne Awards honor companies, innovations, and individuals that positively impact Minnesota's technology-based economy. The ExploraDome and regional network won for: *Technology Excellence in Higher Education or Non-Profit Organization*. www.tekneawards.org

ⁱ Current members in the *MnPS Regional Network* include: The MnPS Society ExploraDome, Minneapolis, MN; Mayo HS Planetarium, Rochester, MN; Mankato East HS Planetarium; Como Elementary School Planetarium, St Paul, MN; Jackson Middle School Observatory Portal, Champlin, MN; Southwest State University Planetarium, Marshall, MN; Journey Museum GeoDome, Rapid City, SD; University of North Dakota, College of Education GeoDome, Grand Forks, ND.