Accessible technologies and innovation for the planetarium environment

As planetarians, we are often given the opportunity to serve visitors with special needs. Those needs vary widely and although there is no “one size fits all” category for the visitors that come through our doors, there are some ways to make everyone feel welcome and help them enjoy the experience to the fullest extent possible. This is often referred to as a “least restrictive environment.” In other words, a planetarium experience certainly will not be the same for all participants, but it is important for planetarians to be aware of various resources and technologies that help create the least restrictive environment for those with special needs.

This paper will highlight some of the techniques, technology and interventions that 3 planetariums in France, England and United States have used to create least restrictive environments. To this end, our desire is to offer real life experiences and resources that we hope can be utilized in your facility. In addition, we hope to generate discussion regarding a repository for materials used by planetariums for visitors and employees with special needs.

France:

Two years ago, the planetarium at Cité des sciences et de l’industrie (CSI) in Paris developed a device for hearing impaired people. These are connected glasses storing video sequences with subtitles and the video of an interpreter signing. In this way, people with hearing impairments can attend any session with the other visitors. The immersive impression is preserved and it’s very inclusive.

In order to also meet the needs of those who are blind and visually impaired, the Cité des sciences planetarium has focused on developing and offering immersive experiences for the blind and visually impaired public. To do this, the team takes particular care with sound effects, the sound spatialization and audiodescription.

In addition to the audiodescription, the Planetarium wanted to highlight the complexities of our universe, like a galaxy with spiral arms, a black hole, a supernova, the difference in scale between celestial objects. To do this, they considered Braille books, but gave priority to tools that would not interfere with the audio descriptions that were still an important component for their least restrictive environment.

However, CSI’s planetarium was not content with the audio and wanted to highlight the intricacies of our universe, like a galaxy with spiral arms, a black
hole, a supernova, the difference in scale between celestial objects? To do this, they considered Braille books, but gave priority to tools that would not interfere with the audio descriptions that were still an important component for their least restrictive environment.

Thanks to the Accessibility Department, a group of users was able to help the planetarium develop a first prototype. At the same time, CSI’s planetarium presented it to the Space Museum’s symposium of Planetariums (France, 2019). The feedback was useful to enhance the choice of illustrations, the number of pages, and the number of objects on a page.

Some of the conclusions were:

1. Braille is complex to read and takes too much time during a show. Therefore, it is best to avoid too much information on the same page, such as legends, which require the user to flip back-and-forth between pages.

2. The text should not be redundant with the audio description

3. Just because a person might be “visually impaired” does not mean s/he is “blind.” Often, colored illustrations for booklets is sufficient, and this too increases the inclusive environment of the planetarium. These booklets can also be handed out in advance so that the user(s) can review it ahead of time.

These conclusions and more are now built into the show “The Sky in the Middle Ages” which was produced by the Cité des sciences et de l’industrie.

**England**

Winchester Science Centre changed its mission in 2018 for us “to build science capital for all”, since then we have focused on the final word of that mission, and to make the centre more accessible to those with a disability, illness, or impairment. To enable this major capital projects have taken place, one of which was a full upgrade of the planetarium system to give greater capability, and flexibility. Working with Skypoint Planetariums in Italy, and Evans & Sutherland we have started incorporating subtitles to most of our fulldome film shows, installed multiple assistive listening systems, and additional non-obstructive lighting systems, with many more technological advances planned for the coming years that will seamlessly link into the planetarium system. Additional partnerships with the University of Portsmouth are enabling us to produce and test planetarium
specific tactile resources based on their tactile universe project, to assist those with a visual impairment. This is just the start of what we hope to one day offer with new technology that is being developed.

**United States**

For over 17 years, the Edinboro University Planetarium in Edinboro, Pennsylvania has worked with students and visitors who are blind and visually impaired. During this time, Dr. David Hurd from Edinboro has collaborated with Dr. Cass Runyon from College of Charleston and NASA on 7 different books highlighting NASA missions and space related themes. Through the support of NASA, these books have been distributed and used internationally and include recent productions highlighting a tactile guide to the South American eclipses of 2019 and 2020 (Abre Tus Sentidos A Los Eclipses: Sudamerica) and anniversaries of the Apollo missions and lunar craters. Research and beta testing with those who are blind has resulted in refined products and usage and underscores the importance of the findings of work done by Cité's new planetarium.

As the resources available to the blind and visually impaired continue to increase, as well as other resources for those with disabilities, Hurd and Runyon are hoping to start a repository for these resources and are looking for your suggestions.