

How to feel the Universe

There are over 11 million people in the UK alone with a long-term limiting illness, impairment or disability. So how do they get to experience the Space Age?

by **Russ Palmer, SRAT(M), FBIS**

Since childhood I have always been fascinated with astronomy, the planets and the American and Russian space programmes. Most of my life I have been able to see exhibits, photographs and online planetary websites. However, my vision has deteriorated over the years due to a genetic condition known as Usher's syndrome – deafness with RP (*retinitis pigmentosa*) resulting in tunnel vision and night blindness. This affects both my hearing and sight, and that means now I am both hearing and visually impaired.

This is quite challenging at times, especially now that I am blind and I cannot see these beautiful photographs or great exhibits, or what the Universe looks like through Hubble telescope or from the probes that have been sent. My last visual encounter was in 2015 with those fabulous pictures of Pluto that were downloaded to good old planet Earth. For me it was a mind-blowing experience to see the last discovered planet, Pluto, with its ice canyons. I also remember seeing the heart-shaped Tombaugh Regio with my limited vision. Unfortunately now my vision has got to a point where I cannot read print or see photos anymore. So what does one do? Give up? No! Believe me, there are ways of getting round this and I would like to share those with you, for those too in my position.

I will try to analyse some of the options available on how museums make their venues accessible to various disabled groups. I will mainly focus on my personal point of view as I am not an expert on wheelchair accessibility issues but I will try to give examples where applicable. One needs to appreciate that disability access is highly variable and comes down to individual needs. I have noticed that being open about your own disability to others allows one to have a unique

museum experience.

All too often the word disability can have several meanings or interpretations and very often people think about wheelchair access and physical disabilities when there are also sensory impairments which are hidden to others. In many cases these disabilities overlap, e.g. blind people may use various ramps to avoid walking up and down steps.

MOBILITY

For people who may have mobility issues such as using a wheelchair, using mobility aids or walking sticks, many museums have ramps to get around and lifts to move between floors or height levels for viewing the exhibits accordingly. At the same time this can be extremely helpful for people with visual impairments and blindness as it means they do not have to concentrate in navigating steps. Accessible toilets can also play an important role when needed! The reason I say this is that many of my PAs are females, so it makes life a little bit easier and less embarrassing for them – and me. On some occasions there has been some issues with main entrances, especially with sliding or rotating doors. These have to be carefully timed so that one does not become trapped in between! On a wider issue, I do have to say there is greater awareness in Northern and Western Europe.

Discussion with the National Space Centre in Leicester also highlighted some interesting options for mobility access, which included also welcoming »

RIGHT

Thor and Blue Streak share display space at The National Space Centre, outside Leicester – a museum recognized for supporting the needs of the disabled and impaired.





« trained and insured Assistance Dogs with drinking water on request. Furthermore, carers and personal assistants are allowed free access. This is relevant for all disabled groups as it allows the disabled person to have an equal access to museums.

Whenever I go to a museum, I seem to be accompanied by two female communicator-guides (PAs) or interpreters. Actually, on one occasion they were called my committee! This has some unique advantages. Some places give you preferential treatment, which certainly saves a lot of hassle and time. One has to realise that museums tend to be noisy, and since I also have a hearing impairment and use cochlear implants (internal hearing device), that presents its own challenges. I am not able to follow lip-reading patterns so I have to rely on my cochlear implants for audio information. This also applies to those of us using hearing aids, where noisy environments can present a problem. And for those of us relying on lip-reading, some museums are quite dimly lit.

So how do I get around this problem of having an exhibit such as a Lunar Module, a rocket or a space suit in front of me? This is done by describing the exhibit using audio description. Audio description is describing visual elements into spoken language [1, 2]. One PA will describe the exhibit by speaking to me, either directly into my hearing devices or through assistive listening devices, such as a radio microphone, while the other draws the outline followed by details onto my back and/or arm or hand. The PAs work in

ABOVE
The Saturn V exhibit at the Kennedy Space Center presents challenges for the visually impaired.

BELOW
The Shuttle Atlantis in the Visitor Information Center could benefit from an audio description for visually impaired visitors.

unison as a team. The PA speaking will describe first the overall shape and size of the exhibit. This will sometimes be enhanced by using my white cane as a guide marker to the dimensions of the object. This may be supplemented by walking from one end of the exhibit to the other, or around it, like the rockets hanging above you in Science Museum.

KENNEDY SPACE CENTER

During a visit to the Kennedy Space Center in 2009 I still was able to see with very limited tunnel vision (like watching through a 2-deg fogged-up eyepiece all the time scanning around). I saw the giant Saturn V rocket lying down on its side among others. That was a unique



experience. On this occasion my wife Riitta was with me and she would start at the bottom of the first stage and walk me to the top end of the Saturn V. This gave me a good impression of how large this monster was. Also, the size of the F1 engines on the first stage was truly unbelievable. This was done using my white cane as a measuring device for the height as well as walking around it.

There was also an opportunity to go inside the replicas of Mercury, Gemini and Apollo capsules. For me this was the ultimate experience! Getting into the Mercury capsule took me about 10 minutes. Riitta had to describe into my radio microphone as well as show me the orientation point on my left side. An orientation point allows me to orientate to the capsule. This is how I entered the capsule.

I had the orientation point on my left hand, then tilted my head down to left. I put my left leg on the seat, then I crouched in, brought my right leg over, supported myself with right hand on the ledge of the hatch, left hand on the support handle above my head and pivoted myself, slid my left leg up on the floor, then wiggled myself sideways up. All the time I had to check I didn't hurt myself anywhere or bump my head. Mind you, I didn't see where I was going and knew there was the control panel in the way somewhere.

Try to imagine climbing into the capsule with your eyes closed, then you'll see what I mean. When I finally got onto the seat, I just sat there for 10 minutes feeling quite exhausted, taking in the experience and of course enjoying it thoroughly. Lying on my back, I then explored the capsule, feeling the control panel, felt the shape of the capsule and realised how cramped and claustrophobic it was. This made me realise how difficult it must have been for an astronaut to get out in a hurry, especially Virgil Grissom when his capsule hatch blew off in the open seas.

Getting into the Gemini and Apollo capsules was much more straightforward, as I'd done the Mercury capsule first. I was also privileged to be given a guided tour of a Shuttle mock up, walking through the hatch and up the ladder to the upper flight deck and saw the payload bay through the windows. This gave me a good impression of the size and shape of the Shuttle compared to the capsules. On this occasion it was clear that people who may have mobility issues require additional support from staff to experience the inside of the facilities. Most of these exhibits had ramped access for wheelchair users. That was a nice surprise. It helped me too.

MINIATURE SPACE

Scale models allow people with a visual impairment to get a grasp of large-scale objects and structures more easily. For example a scale model of the Saturn V can be broken down into stages. The Science Museum in London has this available as a part of their touch tour session. The scale model gives you the possibility to study the different parts of the exhibit and their dimensions. After studying the model, you can scale it up to the actual exhibit. The models can be used as an introduction to the engineering challenges and the complexity of the life-size exhibits.

Furthermore, The SpaceExpo Centre in the Netherlands provides space suit item replicas within their touch sessions, such as a Moon boot, gloves »

COLUMBIA GETS A MAKEOVER

THE PANDEMIC HAS SHUTTERED museums around the world, and that is true in Washington, DC, home of the Smithsonian's National Air and Space Museum. Just outside of Washington, near Dulles International Airport, is the Smithsonian's Steven F. Udvar-Hazy Center, which holds many of the museum's artefacts that are too big to display downtown. Because of Udvar-Hazy's large open space and the fact that it resides in Virginia, which had loosened its pandemic restrictions before the District of Columbia, the Smithsonian was able to open it to limited numbers of visitors in late July.

Visitors were still surprised to see many large artefacts, including the Apollo 11 capsule Columbia, covered in plastic due to roof repairs and repainting going on in the sprawling museum. The museum has plans to eventually move Columbia back downtown to a new display, although schedules for all museum activities remain in constant flux.

As of early October, the downtown museum remained closed to visitors due to pandemic restrictions. But the museum is also undergoing a massive renovation that involves removing and replacing all of the interior walls as well as the museum's granite exterior. The museum's heating, cooling, electrical and communications infrastructure is also being replaced, resulting in what will essentially be a new building.

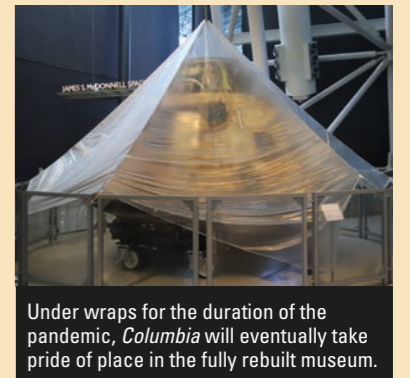
An earthquake that struck the area in summer 2011 exposed flaws in the construction of the building, which first opened in 1976 and therefore is in need of overhaul of its aging infrastructure, particularly the cooling system that has to deal with Washington's summers.

Currently, nearly half of the museum has been emptied of artefacts while the renovations are underway, and eventually the work will shift to the other parts of the museum. Ironically, although the construction sign out front declares "We're open!" the museum has been closed to visitors since mid-March 2020. The construction work is expected to continue for many years, but eventually the museum will feature an all new Apollo display. Columbia will be trucked back downtown and put in its place of honour, without the plastic covering it up. »

Dwayne Day



The Apollo 11 CM before it was removed for renovation of the museum.



Under wraps for the duration of the pandemic, Columbia will eventually take pride of place in the fully rebuilt museum.



The National Air and Space Museum receives the greatest number of visitors of any museum in the world – many with disabilities.

« and a helmet. This allows the person to actually wear or at least touch them to experience their material, texture, thickness, weight, bulkiness and the possible restrictions for movements when wearing them. During my enquiries with the National Space Centre in Leicester, I learned that they have these touch sessions available. Furthermore, they also have extremely good hearing impaired facilities such as induction loops and subtitles for audiovisual material, including films.

You might be surprised how easy it is to use these scale models if the objects themselves are in a display cabinet and cannot be touched. This is one reason why people with visual impairment need extra time to experience and explore these objects.

Published diagrams or photographs of objects or representations of a special exhibit require some additional thoughts in describing the different environmental settings. For instance, a cut-away diagram of a rocket or a spacecraft can be quite complex. First the describer should concentrate on the whole of the exhibit, drawing the outline on the back or back of my hand. In some cases one can take both hands and draw the photograph or sketch in the air hand in hand. This is the case especially if there's an exploded view of the object. The next stage is to describe and draw the details inside the object stage by stage. This will also be supported by spoken language. A relief pattern or a 3D object would be ideal for individual study.

During the BIS lectures at Headquarters in London (remember those!) some of you may have noticed I have had either Riitta or Stina by my side drawing different aspects of information on my back, especially the slide contents. The following may help you to appreciate what I am missing. For example during David Baker's Apollo 8 lecture he explained about the orbital rendezvous procedures and the Trans Lunar Injection processes as well as the launch windows for space flight for travelling to the Moon. Stina had to improvise because the orbital dance between the Earth and the Moon has to be taken into account when calculating the launch windows. An orrery would be one option to illustrate the Moon's orbit [3].

On the first part of the talk Stina needed to access my knee area to be used as at KSC, because my left

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RIGHT
Visitors to the "Making the Modern World" exhibition at the Science Museum in London.

BELOW
Describing a detailed vignette depicting, with models, a German V-2 launch complex represents a particular challenge for those assisting the visually impaired.



hand was the Moon and the right hand was the Apollo spacecraft. The second part changed the picture: now my right hand was the Earth and the left hand was drawing all the different orbital inclinations in different seasons required to reach the Moon. The third part of the lecture saw my left hand as Gemini and my right hand as Agena, and then I grasped all the different rendezvous approaches available highlighting the acceleration, deceleration and the fuel consumption differences on approaches. This clearly shows how versatile and flexible the accompanying person has to be in the way they pass the information. This requires multitasking skills. One creates 3D snapshots of moments.

CONCLUSIONS

Accessibility to 3D models of spacecraft, planetary landscapes and features, the solar system and the elements of the Universe would enable blind people to have a greater understanding of all things related to space and planetary exploration. In particular if one goes back to the Apollo Moon landings and their landing sites, a 3D model of the Moon with the position of the LM and the experimental equipment, the Lunar Roving Vehicle and the lunar features like Hadley Rille and the big rock would allow blind people to get a real sense of the challenges that were involved.

Furthermore, to learn and understand the mechanics and trajectories of the Apollo spacecraft

leaving the Earth and going to the Moon would help to explain the complex mathematics involved. This was highlighted during the Apollo 8 lecture by David Baker. To illustrate the various planets with their moons and orbits an orrery would be ideal to do this. For further information on orreries, please visit Staines & Sons [3]. To be usable for educational purposes a model has to be strong and robust enough to be touched over and over again.

Some of the museum exhibits can be very large and not accessible to touch. Also, museums could benefit to have scale models available to the tour guide explaining the various exhibits. In my experience replicas and scale models can provide an easy and accessible option for visually impaired users. Various touch tours and touch sessions are available at least in SpaceExpo in Amsterdam, the Netherlands, The National Space Centre in Leicester, the Science Museum in London and the KSC Visitor Information Center in the USA. In addition, the use of raised relief pictures allows blind people greater access to photographs and maps.

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LEFT
Museums need to facilitate public access by using ramps instead of steps, as with the design and layout of the KSC Saturn V Visitor Center, Florida, USA.

REFERENCES

- [1] www.russpalmer.com
- [2] Lahtinen, Palmer, Lahtinen 2010. Environmental Description. A1 Management UK.
- [3] www.orrerydesign.com