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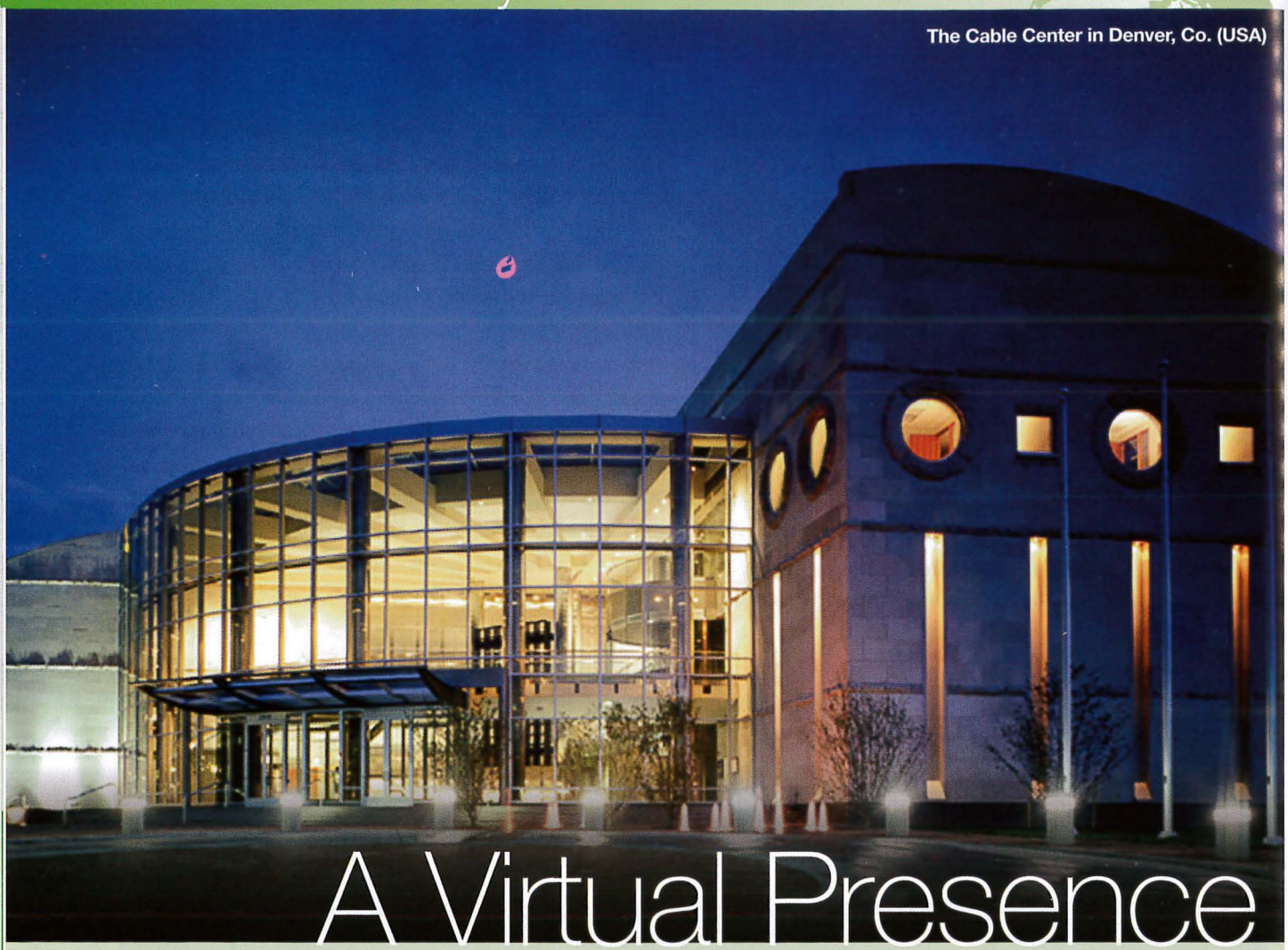
in this issue:

- Virtual Reality Close-Up
- Voice and Data Services
- 4K QAM

and much more....



The Cable Center in Denver, Co. (USA)

A Virtual Presence

The Cable Center's Virtual Reality exhibit is designed to blaze a trail for immersive educational experiences.

Established in 1985, The Cable Center in the US is a nonprofit educational organisation which plays an integral role in the cable telecommunications industry. The Center tells the story of the cable industry and highlights the significant contributions made to technology, society and culture. It is headquartered in Denver, Colorado, but its presence extends around the globe wherever cable professionals work and wherever customers live.

But The Cable Center isn't just about looking back to capture history. With The Center's pioneering Virtual Reality (VR) exhibit, it is looking forward, providing a groundbreaking immersive experience and unprecedented access for students, historians and cable professionals. The vision for this project goes back to 2013. The Center recognised that the audience for its collection is global, yet its physical location is in Denver. Its challenge was to find a better way to provide global access that transcends location.

An eye on re-design

The first step was overhauling the website.

"We changed the way we thought about the role of our website," said Diane Christman, The Center's SVP of programmes and development. "Instead of having the site as a static description of our mission and programmes, we decided to utilise our online presence to provide interactive access to our collections and create a living, breathing, evolving resource. The site will continue to evolve and add more objects and materials from The Center's collections for study and exploration."

One example of how this change was made is the Hauser Oral and Video History Project's online presence. The Center has been gathering oral histories from cable industry executives since its inception. To date, it has over 350 video and audio histories with more being added every year. Now, via the website, interested parties can search and listen to this collection.

If you are interested in how cable in the US grew from "mom-and-pop" businesses to a multi-billion-dollar transformative industry, The Center's online exhibits feature information on the people, places and events that made it happen. You can also visit the 'Wired to Win' exhibit, which features chapters from a book written about 21 members of the cable industry's Entrepreneurs Club, whose contributions substantially aided the growth of the cable industry. Or the 'Three Generations of Cable Exhibit', narrated by Les Read, executive director of the Cable Pioneers and former HBO and TelePrompter executive, telling this story with historic photos gleaned from The Center's archives.

Virtual reality in focus

The website re-design helped queue up The Center's foray into virtual reality, taking global access one significant step further. Enter Steve Luiting. He is the project leader and visionary of The Center's Virtual Reality (VR) exhibit project. The organisation's design and development manager, Luiting took it upon himself to study the subject, whose commercial potential was just beginning to emerge.

"For years, Brian Kenny (The Center's librarian and archivist) and I had been wanting to show 3D models of our archived items on the website," he said. "But the technology we needed to do this was not available for any long-range plan to accomplish this."

However, in 2013, Luiting was exploring Kickstarter and became aware of the work around Oculus Rift, one of the first virtual reality systems. Oculus Rift had sought to raise money on the crowdfunding site to build 100 sets and appealed to a small but passionate group of VR enthusiasts for support, which resulted in the company's formation and its explosive growth.

At the same time, Luiting began studying a new HTML programming language for 3D called WebGL (Web Graphics Library). WebGL promised to allow for actual computer graphics inside a webpage without plugins. Luiting saw this as a way to enable 3D models of The Center's archived equipment on the web. He also did some testing with JanusVR, a web browser designed to create web-based immersive virtual reality spaces and communities.

"Once we had studied these options," said Luiting, "it became clear that WebGL wasn't ready for primetime yet and JanusVR as a web browser was not going to saturate the market. Instead, I decided to start with what we had, a CAD drawing and Google Sketchup model of The Cable Center that I had found. The Sketchup model was very basic, with mostly only a floor plan and a few walls."

Serendipitously, The Center had hired an intern that summer, Nic van Dessel (now a full-time staff member and part of the

Virtual Reality in action: Nic van Dessel, The Cable Center's Virtual Reality specialist, tests a model using VR goggles.

"Whereas 3D enhances the viewing experience, virtual reality creates a truly immersive experience."

core VR team), who was originally hired to assist Brian Kenny in the library. "But it quickly became clear to us that he had other skills to offer," said Kenny. Through classes at the University of Denver where Nic was pursuing a degree in Emergent Digital Practices, Nic learned Sketchup and also had experience using Unity, a virtual reality gaming development platform. Nic spent the summer building the Sketchup model and scanning selected items.

Under Christman's direction, this small team of four - Steve Luiting, Brian Kenny, Nic van Dessel and Matt Hollingsworth - recognized the possibilities that virtual reality posed for The Center. "The primary applications for virtual reality so far have been in gaming," said Luiting. "But it isn't hard to extrapolate how the technologies used in gaming could have exciting applications for business and education." Inspired by The British Museum's "History of the World in 100 Objects", the team proposed the idea for a virtual exhibit comprised of 40+ items that would tell the story of both the technological and innovative contributions of the cable industry.

"This project is a logical extension of what librarians and archivists have always done, which is building collections and providing access to them," explains Kenny. "Librarianship is primarily about enabling access. And the latest and most ambitious way to provide access is through virtual reality."

Enabling access through VR

Some other museums, such as the Smithsonian, have also embraced VR as a platform to increase their accessibility. The Smithsonian has taken a Google Street View-style approach. Through the use of 360 photospheres, you can click through their building and experience what it is like to go to one of the most renowned museums in the world.

"Our approach is slightly different," notes Luiting. "By using 3D models of our building and archived objects you can walk around our building, and virtually pick up the objects and interact with them."

"Virtual Reality is often confused with 3D, but here is the difference," explains van Dessel. "3D refers to any 3D content,

Members of The Cable Center VR Advisory Committee and the Cable Center VR team examine possible entries into the VR exhibit. Left to right: Ron Hranac, Cody Maxwell, Nic van Dessel, Brian Kenny, Lew Suders, Steve Luiting, Mike Hayashi and Jim Chiddix.

"When people come to the Virtual Cable Center, they will be greeted by avatars (digital representations) of other visitors."

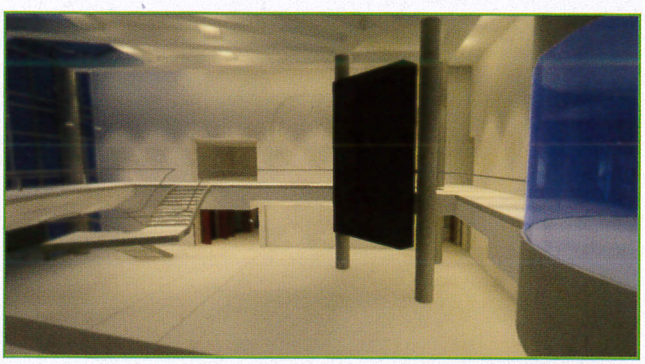
usually objects, but can also be video or photographs shot with a 3D camera. You can view 3D rendered images on websites, in movies and on many television sets. And, except in cinemas, it doesn't require special glasses or headgear. Virtual reality, on the other hand, typically immerses the viewer (by wearing goggles) into the 3D content so they can look and move around in 360 degrees. Whereas 3D enhances the viewing experience, virtual reality creates a truly immersive experience."

Using the Artec Space Spider, which has a 0.05mm 3D point accuracy rating, the team has so far scanned 30 physical objects over the last three months, making a small impact on The Center's collection of more than 2,500 items. Through the use of Unity3D, they have brought the 3D replica of the building into a virtual world, and then populated it with these 3D scans. This allows someone to step into The Cable Center as if they were physically there. A virtual visitor can move around the building, pick up and interact with objects, and read about them with an interface that appears when you get close to the object.

These 3D scans will also be put onto The Center's website where, even without a virtual reality headset, they can be manipulated to be viewed from every possible angle, with supporting material that provides information about the object such as its history, what it was used for and how it was used. Kenny took the first pass at curating the 40 objects for this exhibit, which includes both technology and pop culture items. Then, this year, the team created a VR Advisory Committee comprised of cable engineers, to finalise the selection of 40 (now 48) items to best tell the story.

"Through our VR exhibit, we can tell the story of cable in a highly engaging way," said Jim Chiddix, Advisory Committee Chair. "I believe that virtual reality offers more immersive learning than traditional media and that, by providing a heightened sensory experience, imparts knowledge in a way that is better absorbed and more easily retained."

Not only will this exhibit include artifacts that anyone can pick up and manipulate from anywhere but also 360 videos. 360 video is a perfect complement to VR, by changing the video viewing experience from looking through a 2D window to feeling as if one is actually in the room with the person interviewed



The Cable Center's Great Hall as it appears in the virtual reality exhibit.

or the place being captured. All of these elements are brought together inside the Unity3D game engine that allows The Center to add support for the various headsets available to consumers, as well as functionality within the experience.

"We are learning as we go by applying the Unity video game engine to an immersive museum experience," said van Dessel, "and we are one of very few teams doing this."

"I'm so proud of our small but mighty team," said Mike Hayashi, Advisory Committee Member. "Not only are they mastering new technology, they are inventing new technology as they go. I am amazed that they have managed to achieve this with a team of just four Center employees plus new intern, Gregg Hardie, where only one person (Nic van Dessel) has the Virtual Reality exhibit as his full-time job."

The VR exhibit, telling the history of cable in 40+ objects, is expected to be completed by the end of 2016. But it is just the first phase of The Center's virtual reality plans.

Phase 2 planning

"Our plans for Phase 2 are even more ambitious," said Christman. One of The Center's Phase 2 goals is to create a multi-user capability where other users can be present in the same environment at the same time and interact with each other. When people come to the Virtual Cable Center, they will be greeted by avatars (digital representations) of other visitors. They will be able to converse, experience and enjoy The Center with others as if they were physically present.

"Imagine a conference held at The VR Cable Center, where attendees from all over the world can participate in real-time," adds Christman.

Virtual reality blends with the real world as Brian Kenny, The Cable Center's Librarian, examines an artifact in the virtual library using the HTC Vive.

Another Phase 2 goal is for future oral histories to be shot as 360 video. These, as well as older 2D video versions, will display virtually in The Center's Malone Theater. While you're watching the video, additional information can be displayed to the right or left of the people being interviewed.

In addition, the plan is to shoot The Cable Hall of Fame honourees in 360 video starting with the 2017 class next year. The Center is hoping to full-body-scan the honourees when they are inducted. The scan would also be used for each oral history, if possible. So, when in VR mode, a person can actually see a simulation of the person being interviewed or inducted into the Cable Hall of Fame.

The thoughts on Phase 3 aspire even further. As this technology evolves, there is the possibility that Artificial Intelligence (AI) can be added for an interactive experience. This means that a viewer could ask simple questions and the AI in the scanned character would respond with answers in a way that the intelligent system believes the honouree would respond and even take on the mannerisms of the actual person. Voice matching can make them sound like the original people and machine learning by the AI will be used to fill in any background information needed if someone asks a question, such as "Where were you born?"

These potentially near-term capabilities seem the stuff of science fiction, but are becoming more possible every day. The Cable Center is utilising VR to provide global access and immersive experiences to historians, students, industry professionals and anyone with curiosity about the industry.

"So far, we've accomplished so much with limited resources. The gating factor on these, and other, virtual reality advances is whether we can fund our efforts," said Christman. "At a minimum, we would need US$ 200,000 to begin Phase 2. We are seeking forward-thinking donors to support these groundbreaking initiatives so that we can share more of our unique collections with the world."

To donate to The Cable Center's virtual reality programme, please email Diane Christman on **dchristman@cablecenter.org**.