Success Story

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—Bill Jepson,
Urban Simulation Lab Director,
UCLA

Opening Eyes and Expanding Minds

UCLA Gets Immersed in the Visual Power of SGI® Reality Center™ Technology

The Challenge
- Advance visualization-based research across all disciplines
- Develop an immersive visualization solution that enhances understanding at all academic levels

The SGI Solution
- SGI Reality Center facility powered by:
  - An SGI® Onyx® 3400 system with 12 600 MHz processors and InfiniteReality4™ graphics
  - A Silicon Graphics® Onyx2® system with InfiniteReality3™ graphics

The Result
- The SGI Reality Center facility serves as a showcase for UCLA's cutting-edge research
- UCLA researchers take on immersive visualization projects of significantly increased complexity
- The SGI Reality Center facility has proved influential in attracting research grants and private funding
- Professors provide students with a level of classroom learning previously unavailable

Students, academics, and dignitaries walk away from the Visualization Portal on the UCLA campus thinking that a picture's ability to speak a thousand words doesn't hold a candle to the 3D immersive visualization they encounter there. The technology leaves viewers awestruck, eager to see and learn more.

Total Immersion
The Visualization Portal uses the latest SGI Reality Center technology to drive the applications that immerse the various audiences that pass through the facility's doors. The 3D facility supports multidisciplinary research projects and teaching efforts from every corner of the UCLA campus.

Urban Development: Bill Jepson, director of the university's Urban Simulation Lab, has been using a combination of SGI® workstations and SGI high-performance computers in his lab since 1987. The portal provides Jepson and his staff an ideal venue for high-level presentations. "The portal's ability to immerse its audience," Jepson said, "is a sensation that few have ever experienced. It activates people's peripheral vision and really gives them a sense of motion."

One project that has benefited significantly from the use of the Visualization Portal is Virtual L.A., a project-by-project effort to create a 3D model of the entire City of Los Angeles and its surrounding environs, some 320 square miles. The models are accurate down to the signs in the windows and the graffiti on the walls. Virtual L.A., which is funded by Los Angeles civic and government agencies, utilizes the skills of Jepson's team and the immersive visualization capabilities of the portal to provide a factual and unbiased view of proposed urbanization projects. The portal has helped all parties involved make more informed decisions on the viability of projects, in less time.

The UCLA campus itself has also benefited from the unique capabilities of Jepson's Urban Simulation Team and the Visualization Portal. Mick DeLuca, director of UCLA recreation, points to a recent presentation made to a potential donor who was considering funding the departments' new swimming pool/stadium complex. "First and foremost," said DeLuca, "it immediately validated our project. Seeing a 3D model of the project was extremely inspirational for both the donor and UCLA officials involved in the project."

Archaeology: Dr. Bernard Frischer, UCLA professor and director of the university's Cultural Virtual Reality (CVR) Lab, credits the portal for having an enormously positive impact on his work in developing digital archaeological renderings.

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—Dr. Bernard Frischer, Professor and Cultural Virtual Reality Lab Director, UCLA

"Overall," said Frischer, "the portal and its SGI Reality Center technologies allow us to take on projects that are more ambitious and more data-rich than those conducted by other researchers limited to the PC platform and the Internet as their delivery vehicle. They have enabled us to pursue research in areas that no one else is pursuing, and yet these areas will clearly impact the entirety of the archaeological and architectural curriculum in the 21st century."

Frischer's mission, and that of the CVR Lab, is to create highly accurate 3D computer models of culturally significant sites around the world. Models for any given site are under the scrutiny of an appointed scientific committee made up of the world's leading archaeological authorities. The committee ensures that each 3D model conveys the highest possible scientific accuracy, and is scientifically authenticated. Then, and only then, is the 3D site model considered ready for release to the world at large.

"There was, and still is, no alternative hardware solution to SGI for researchers like us who want to create a virtual 'time machine' of human cultural history," said Frischer.

Astronomy: For Matt Malkan, a professor of physics and astronomy at UCLA, the ability both to see the cosmos in great detail and to move through it in real time is a breakthrough made possible only by supercomputers, such as those from SGI.

The SGI high-performance computing and graphics capabilities of the Visualization Portal and Visualization Lab are helping Malkan create what he thinks is a more accurate model of how the universe evolved. "It moves us away from pure theory and speculation and begins making some very specific predictions," he said. "Specifically, it enables us to visualize how galaxies form—how they merge or collide, how they are clustered, and how they form groups and chains."

Malkan, who also uses the Visualization Portal to complement his standard classroom teachings, was quick to point out, "You can show students picture upon picture and talk theory for hours, but it doesn't even come close to the overall impact of an immersive presentation in the portal. Whether you're using it to introduce astronomy to first-year students or support graduate-level studies, the Visualization Portal is an excellent teaching tool. It gives students a unique perspective of the cosmos, one that's impossible to convey with two-dimensional images."

Partnering with Academia

Marsha Smith, head of UCLA's Academic Technology Services (ATS), worked collaboratively with a number of campus groups to create the portal. Smith and her colleagues chose SGI Reality Center technologies as the computing and visualization backbone of the portal because of the ongoing leadership role that SGI assumes in providing fully integrated, scalable Reality Center solutions to academia for the purpose of establishing and advancing immersive visualization-based research. The scalability of SGI hardware proved equally important, allowing the university to take on the high-performance computing power it needed initially, and enabling it to grow the system incrementally as the demand for usage increased.

Paul Hoffman, manager of advanced technologies and associate director of ATS, worked closely with Smith to help make the Visualization Portal a reality. "The Visualization Portal enables researchers to turn huge amounts of raw data into visual 3D models that quickly communicate research findings," said Hoffman. "As an instructional tool, it enriches classroom learning. For reaching out to funding agencies, the media, and the public at large, it's an impressive visual gateway to the high-end research efforts taking place at UCLA."

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Inside the Portal

The Visualization Portal provides theater-style seating for up to 45 people and features a 160-degree x 40-degree (24-foot x 8-foot) spherical screen that provides a fully immersive visualization experience for all attendees. Audio output capabilities include high-definition stereographic and localized and surround-sound formats.

The Visualization Portal has recently extended its performance capabilities with the installation of a second SGI supercomputer: the SGI Onyx 3400 system equipped with 12 600 MHz processors. Advanced visualization capabilities will also be provided by an SGI InfiniteReality4 graphics subsystem. The SGI Onyx 3400 system will serve as the mainstay for the portal's advanced visualization projects. A Silicon Graphics Onyx2 system with InfiniteReality3 graphics, also used by the portal, will provide additional support power for the adjacent Visualization Lab.

Pieter Lechner, manager of the Visualization Portal, said, "The SGI Onyx 3400 system, together with InfiniteReality4 graphics, will enhance significantly our ability to accommodate the ever-increasing complexity of research projects that the portal is asked to support. In particular, 3D urban simulations, such as those being assembled in the nearby UCLA Urban Simulation Lab and displayed at the portal, contain millions of polygonal shapes covered by myriad complex textures. These simulations require an immense amount of computing performance to display them in real time. The increased horsepower of the SGI Onyx 3400 system will allow researchers to display their full presentation and eliminate the need to create a less complex alternative version."

The Visualization Lab adjacent to the Visualization Portal is where many of the research projects destined for full presentation at the portal undergo development and/or final preparation. The core focus of the lab is to assist in the development of research and instructional projects, utilizing visualization and three-dimensional modeling that best take advantage of the SGI Reality Center technologies.

Impact on Future Funding

The research and instructional work accomplished using SGI Reality Center technologies at the Visualization Portal have proved influential in attracting grants and private funding from a variety of sources. The agencies point to the portal's ability to extend the understanding of the universe beyond the research community and into the student and public sectors, an effort that they hope will bolster interest in astronomy and space study. Smith is pleased with the

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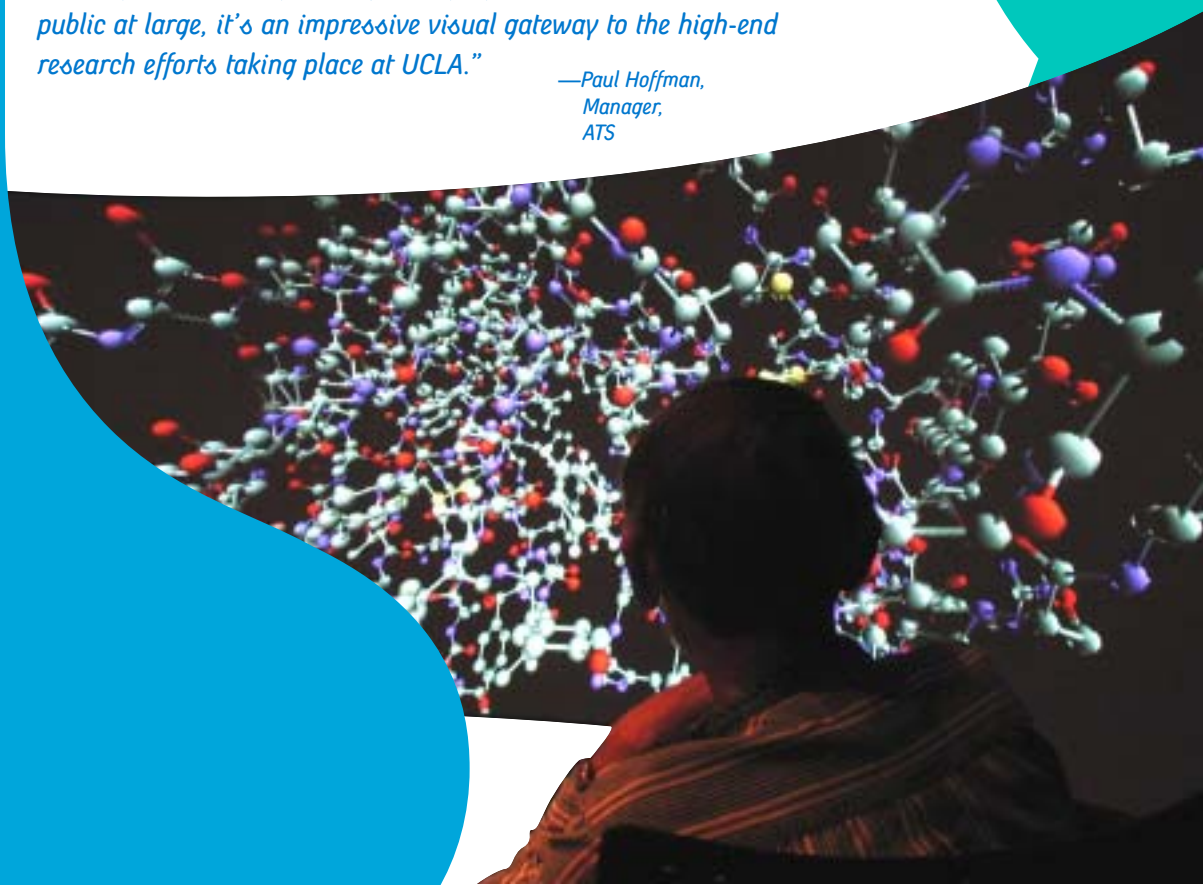

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recognition the portal has brought for the university. "The portal serves as a showcase for UCLA's technological capabilities and the resulting high-caliber research achievements that have come to represent UCLA," she said.

Visualizing the Future Together

Under the guidance of UCLA Academic Technology Services, the portal is an integral part of the university infrastructure. Its high-performance computing and advanced visualization capabilities play a leading role in supporting UCLA's multidisciplinary cross-campus research efforts.

SGI will continue to work collaboratively with ATS leadership to guarantee the department's ability to serve ongoing portal users while increasing its outreach efforts to interested faculty and students. Together, ATS and SGI meet with university researchers, faculty, students, interns, and administrators, among others, to determine the most efficient and effective way to advance SGI Reality Center technologies within the portal and make certain that they keep pace with UCLA's high-level research efforts.

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