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Collaborative Decision Making... 'THEATER STYLE'

How Arizona State University's Decision Theater Uses Visualization and Simulation for Collaboration

By Angelo Fernando

You are driving through a densely populated city looking at a potential site for a block of high-rise condominiums. You wonder what traffic congestion might look like five years from now. How tall a parking structure would you need? Will that brown cloud over the downtown area twenty miles west someday head in this direction? What would it take to adjust the window offsets, so that residents get a better view of the nearby mountains?

You could do all this if you were 'driving' through a geographically accurate 3D model of the city at the Decision Theater, a high-tech visualization and modeling facility at Arizona State University. This 25-person facility draws city developers, water managers, experts in sustainability and education policy who take advantage of this unique immersive environment to make complex decisions.

The combination of visualization, simulation and collaborative decision tools allow clients to solve problems in a single working session that would otherwise take weeks or months. It has been used to calculate building geometry and arrive at height regulations, create groundwater policy by visualizing population projections and how it could deplete aquifers, or plan for disaster response by simulating a disaster zone. The visualization software then shows in real-time what alternative scenarios are available to quickly build consensus. "A continual problem in approving new policies and plans is the need for senior level decision makers to exchange views and ideas to craft successful strategies," says Gary Graf, assistant director of solutions and services. "The visualizations and interactivity built into our models are

designed to facilitate that process. It frequently leads to new ideas and insights which can be instantly evaluated and discussed."

At the heart of the facility is what's known as the "Drum," essentially a room with seven floor-to-ceiling screens that create a 260-degree perspective of a complex situation or a vexing problem. It resembles a situation room you typically see in movies, and it could very well serve as a war room or a command-and-control center. State-of-the-art projectors knit together high resolution 2 or 3D graphics to create a simulation, interactive charts, a map – or all three. A moderator using a wand navigates through and around the model of a building, an aircraft interior, or an entire city, while powerful computing clusters behind the scenes pull up data sets from government and academic sources. Visualization on this scale brings new insight. "It's not unusual to hear people on the opposite sides of an issue say 'I never thought of it that way before'", says Graf.

A TOOL NOT A PLACE

Calling the facility a "theater" is somewhat of a misnomer, since it involves much more than a visual experience. This ain't IMAX, for sure! ASU calls the Drum a "toolbox" for good reason. In the recent past, researchers and epidemiologists have exploited the tool to understand the spread of West Nile virus in the Phoenix area in 2004 and 2005. The Department of Health Services needed a way to monitor the outbreak that infected 500 people. Scientists at the Decision Theater created a 3D spatial modeling platform with a sophisticated interface to analyze complex epidemiological data sets. Simply, the team was able to track the virus outbreak using the tool, and

quickly agree on policies and mitigation strategies for public health and safety. The best part was, they could do all this in one place, in real-time. Likewise, officials from the City of Tempe, Arizona have used the tool to model proposed developments and visualize building height restrictions in the downtown area.

This tool isn't all technology, but a blend of the university's top scientists and technology, bundled into what is best described as assisted collaborative decision making (ACDM.) An ongoing project involves the East Valley Water Forum, a consortium of public, private and tribal water agencies entrusted with managing the groundwater aquifers. Since groundwater depletion, like virus propagation, is not easy to discuss without visualization, the Decision Theater used the Forum's data to create 3D models showing the impact that urban expansion would have on the aquifers over 10, 20 and 30 year periods. The interactive nature of the exercise is giving these managers a way to simulate a drought, and play with what-if scenarios to evaluate decisions taken in the room.

STRATEGIC PLANNING MEETS SCENARIO PLANNING

Scenario planning using visualization has come a long way, moving from the realm of games to taking on real-world issues. Many universities today employ computer-generated imagery (CGI) or are looking into how virtual worlds or 'Sims' can assist internal problem-solving. Data-visualization is being used in bio surveillance, energy analysis, and, of course, product design.

What's unique about the Decision Theater is how it opens up this cutting edge technology and research and puts it in the hands of the community through an interface that is non-threatening. It is part of the Global Institute of Sustainability, which explains its focus on public health, education, urban growth and environment. China and the Emirate of Dubai have expressed interest in building similar facilities.

As any organization knows, strategic planning involves wrestling with different sets of choices, even contentious decisions. Scenario planning through visualization and modeling gives both public and private sector organizations a whole new way to arrive at informed decisions. "I have seen managers come in with strong opinions, but become highly collaborative once they see their data in a whole new light," says Tim Lant, Ph.D, a mathematician and the acting director of Decision Theater. "They are able to make up their minds – and make up their minds fast."

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Angelo Fernando is a Mesa, AZ-based writer covering technology, marketing and new media.



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