

# Hi-tech maps promise savings

## Latitude 33 engineering tries out infrastructure maps at UCSD

By [Roger Showley](#) (</staff/roger-showley/>) 6 a.m. Jan. 10, 2015 Updated 12:26 p.m.

Imagine a water main break that went on for hours until engineers found the right valve to turn off the flood.

Or what if a water pump operated round-the-clock, detected only after bean counters wondered why the energy bill had spiked by \$13,500 per month?

Such snafus can occur in city streets, on school campuses and at any other major institution sitting atop a spaghetti of underground sewer, water, electrical, natural gas and communications utility lines.

In such emergencies, utility crews race to the scene and use paper maps and drawings to find the culprit and seal off the affected pipe, close a valve or shut off the pump.

Such mishaps should be a thing of the past with an app developed by [Latitude 33 \(http://www.latitude33.com\)](http://www.latitude33.com), a Scripps Ranch planning and engineering firm. The app takes the place of roomfuls of maps and architects' drawings.

Latitude 33 mapped utility lines at the county's Kearny Mesa operations center as it was being rebuilt over the past few years.

"What we found was a complete disaster of 70 years of drawings and documents," said Latitude's John Eardensohn. "There was every kind of plan file you can imagine."

Even if the right plan could be found for the system, he said, the drawings didn't necessarily match what was built, added to and reworked over the decades.

When pipes break and floods ensue, the traditional solution often relies on the institutional knowledge of a county employee who could remember where the valves, pipes, pumps and backup plans are located. Now, if the old plans are checked against field conditions, updated and digitized, anyone who can operate a smartphone — and has authorization to do so — can access the information and perform routine maintenance and leap into action if there's a problem.

After working on the county property, Latitude was hired to untangle the records at UC San Diego's sprawling campus and create a software data base program to monitor utility lines and equipment via a interactive mapping system.

Tag along with Jennifer Woods, a 21-year-old UCSD environmental sciences senior from Fresno, who spends about 15 hours a week checking on campus electrical transformers, generators and other equipment.

She doesn't carry a notebook or 20-pound pile of building plans. She uses an iPad to call up an installation, log its condition and take care of any minor maintenance, such as sweeping away leaves and rainwater.

"It can be a manual labor challenge," she said of the sweeping duties.

If Woods' iPad system had been in place, it would have taken only a few minutes to identify the location of the right valve that could shut off the water leak on campus or the open valve that caused the pumps to grind on incessantly. Then crews could have shut them off immediately and saved time, energy and the environment.

"We have found the biggest thing is users don't know what they have, much less an organized way of going back to it," Eardensohn said.

At a cost of about \$700,000 over the past three years, Eardensohn and his team, including Brad Sager and Kyle Boyce, have mapped UCSD's netherworld and begun surveying key equipment inside buildings.

"We were asked to go out and in effect tell them where are their water lines, how big are they, when were they built and so forth," Eardensohn said.

But if that's all Latitude 33 did, the university would just get maps that would have to be updated again in the future.

"That's not a living document," he said. "That's step above paper prints but they're still a static and a fixed document. It doesn't tell you a whole lot about the infrastructure and its status, when it was last maintained, who did it and what were the results."

They digitized old files, drove hundreds of holes into streets and landscaping and ran tiny cameras through pipes to verify the location of all the systems that make a modern college campus function. Then they exported the information onto the regional SanGIS mapping system and added hyperlinks to maintenance reports, photographs and other data. (GIS stands for geographic information systems, digital mapping software used to pinpoint locations.)

The result was a living atlas that Woods and other student workers can draw on — with the proper security protocols built in — as they make their daily rounds of transformers, generators and other key systems.

Latitude 33 now is offering its services to other colleges that, without the institutional knowledge of veteran building maintenance crews, are similarly clueless about lies beneath them. Eardensohn said utilities like SDG&E are required to help schools, water districts and other institutions reduce energy and water use and active mapping provides an easy tool to manage their infrastructure.

In the wake of the Sony Pictures hack attack, of course, wouldn't these electronic maps become an easy target for a curious computer science student or a terrorist to use to shut down UCSD's computers, labs and faculty research projects?

Esri, the Redlands software company whose ArcInfo program was used to build Latitude 33's maps for the county and UCSD, has clients that include the national and international intelligence agencies and government agencies and corporations, and advises them on ways to secure sensitive infrastructure data from unauthorized break-ins.

"You can imagine having the national power grid mapped and available to a terrorist regime — that's something that we can't have," said David Peirce, ESRI's national accounts manager for the U.S. Department of Energy. "There are, of course, ways to lock down all that information."

Some users store their baseline data on nonpublic, internal "clouds" that cannot be accessed by the outside. Great care has to be taken in determining who has access to what maps and underlying data. The infrastructure, research and institutional records can be separately archived so that there is no one master key that opens all digital doors.

But the benefits of digitizing and mapping building and infrastructure records, assuming such controls are in place, are self-evident, especially when it comes to maintenance, repairs and efficiency.

"I came here from the building industry," said Pat Wallis, who heads Esri's facilities practice group. "This is an industry wasting the most energy, a huge amount of our total economy. If we can make this (industry) more efficient, whether it's one piece at a time or in great chunks at a time, it's going to make a big difference."

© Copyright 2015 The San Diego Union-Tribune, LLC. An MLIM LLC Company. All rights reserved.