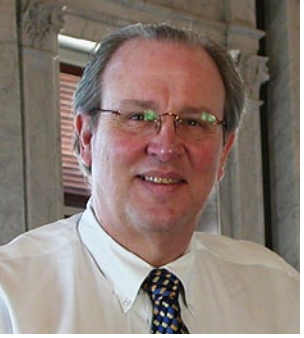

Editorial

>> Marc Cheves, LS

SPAR 2010

Under the banner of Innovate, Connect & Learn, the seventh annual SPAR laser scanning conference was held in Houston in February. In comparison to attendance in 2009, which had decreased slightly from the previous year to 630, attendance this year roared back to nearly 800. Of these attendees, 25 percent came from outside the U.S. Conference organizer Tom Greaves kicked off the keynotes by calling attention to all the new hardware and software, and to the rising interest in both scanning for BIM and CADD/GIS integration. Greaves heralded the potential profitability, reminding the audience of the "Scan once, use many times" approach to the marketing of laser scanning services.

Very visible at the show were the six mobile scanners parked outside. Optech seems to have captured the survey-grade U.S. market so far with more than eight of its Lynx units sold. While I'm not privy to sales statistics, other manufacturers are close behind, and it will be interesting to see how the market develops.

Greaves describes mobile scanning as "disruptive technology", and gave three scenarios: 1) buy; 2) partner; and 3) hope it goes away (with the last being the riskiest). He also warned that this niche is not protected; customers (such as governments) are driving the need, and as with much of today's technology, users are now able to do things independently that previously always required a surveyor (but as you'll see below, surveyors still have a vital role). Greaves also mentioned the huge growth area in 3D navigation. Companies such as Google, Microsoft and Nokia have already paid for 2D databases: next will be 3D.

My take on mobile scanning is much the same as terrestrial scanning: without a doubt, both represent the future. After all, who wouldn't want millions of discrete *xyz* points as opposed to *xyz* points gathered one at a time? Mobile scanning will have to achieve higher accuracies for some uses, but that will come with time. The main near-term blocker will be price. But just as in the days when GPS gear was $100-150K, over time I believe we'll see more affordable pricing.

Forensics and security were also topics Greaves addressed. It is apparent that government funding for both of these areas will not be a problem. And in terms of historical preservation, the applications for scanning are wide. Greaves displayed a photo of an ancient wooden gate–a national icon–in Seoul, South Korea. The gate burned, but fortunately, it had been scanned and is being rebuilt. This is what CyArk is attempting to do: scan historical treasures all over the world so in the event something is damaged or destroyed it can be restored. Eventually, we'll have the capability of realistically "visiting" these treasures from the comfort of our computer.

Dr. Allan Carswell, the founder of Optech, gave a fascinating keynote on the history of lasers. 2010 marks the 50th anniversary of the invention of the laser, and Carswell took us from the early days of three pulses per minute to today's 200KHz scanners that are capable of 400,000 measurements per second. Interestingly, Carswell discussed how sensor synergy allows 1 + 1 to equal more than 2. That is, the output from combined sensors can be more useful than the output from either single sensor. He discussed how coherent lasers are allowing wind farm operators to "look ahead" for several kilometers to detect gusts or other threats to expensive equipment. And Carswell said that it's not just about *xyz* and *i* (intensity); he used as an example the ability to detect different materials–such as sulfur dioxide–within a smokestack plume.

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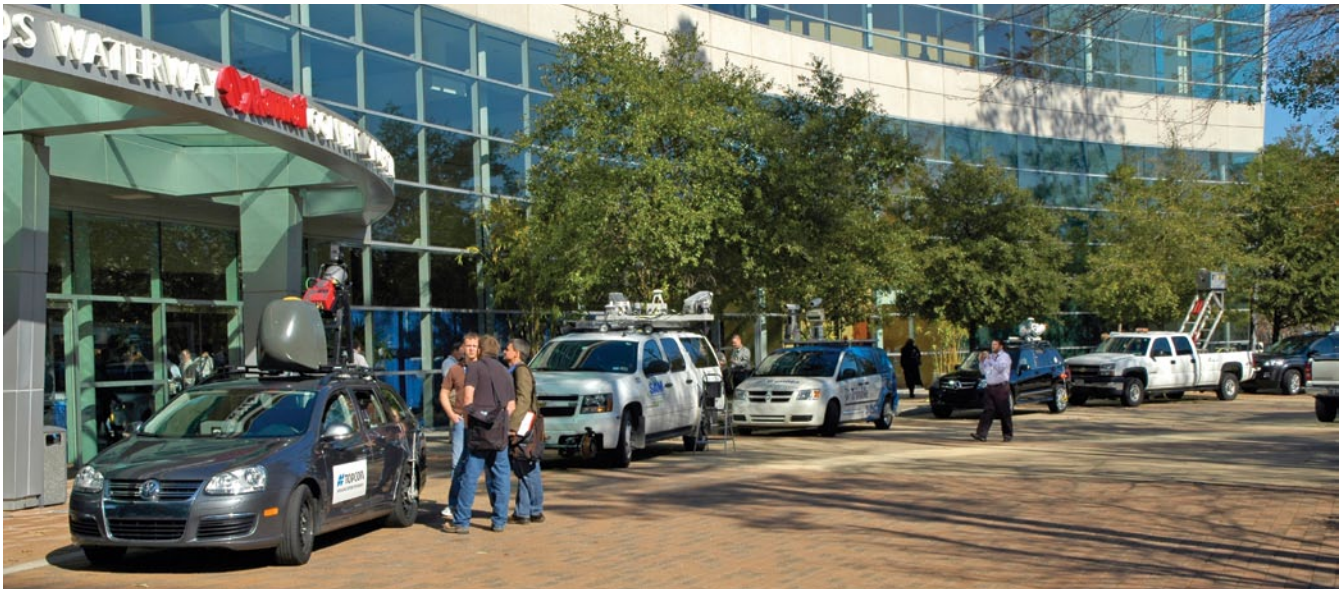

For me, the most exciting part of these conferences is the peek at new technologies. Of these, 3D Flash LiDAR (also known as burst LiDAR) seems very promising. Envision a system that, instead of sending one laser pulse and getting one return for one *xyz* point, emits a single pulse of laser light per 3D frame of data where all the photons are registered on all the points in the focal plane nearly simultaneously. In other words, there are 16,384 pixels per laser pulse vs. one pixel for a normal scanner. Born out of military needs for "seeing" through obscuration such as underwater, and into dust, smoke, fog and rain, examples for its use include brownouts created by helicopter rotors and firefighters struggling to see through smoke. Other uses include surveillance and autonomous vehicle operation.

In a session by Dr. Roger Stettner from Advanced Scientific Concepts, Inc. (ASC), we learned that the current ASC Flash LiDAR CC Hybrid Sensor 3D chip (GaAs + CMOS) is an array of only 128x128 3D range-finding pixels–work is underway on a 256x256 and larger chips–but behind each pixel on the chip is its own microprocessor engine. (By way of comparison, a low-end 2D consumer digital camera contains a 3-megapixel CCD–2,048 x 1,536 pixels–but no 3D depth data.) What all this means is that the ASC chip is the equivalent of 16,000 early-day scanners. The unit can gather 30 pulses per second, and all pixels are registered. It's not affected by motion: we saw one example of an airplane propeller frozen in flight. One ultimate goal of ASC's research is a coffee-cup-sized 3D camera.

There was much discussion at the conference about the growing importance of geodatabases. Leading the charge on this is ESRI, and in a vendor session I learned that ArcGIS easily handles billions of points. Within six months of 9/11, New York City issued a mandate calling for Emergency Action Plans for every building more than 15 stories tall. Whereas BIM is being more widely applied in architecture and construction, this mandate resulted in the gathering of thousands of existing floor plans. In addition to creating a need for external and interior information, in particular, the fire department wanted to know the location of standpipes.

ESRI has created the Building Interior Spatial Data Model to deal with interior spaces. Not simply a 2D repository for the floor plans, BISDM is a 3D model that enables 3D analysis inside a building. Uses include such things as fire hose reach and the location of defibrillators. The former is self-explanatory, and the latter fills a requirement that this equipment be located within a certain distance from anyone in the building. Because it "knew" to not use elevators during a fire event, it was cool to see the software analyze different paths through the building stairwells to determine a shortest evacuation route. The Internet enables mobile access to the information by inspectors, fire and police. At the show Applanix announced its indoor mapping solution for gathering interior information. Combining a laser, camera and inertial guidance, the system is capable of accurately mapping an entire building in a day.

A common voice throughout all the sessions was the critical need for surveyor involvement for the control aspects. Just like machine control and the need for ensuring that the dozer is working in the right spot on the project, someone also needs to ensure that point clouds are in the right place. This is what surveyors specialize in.

I spoke with Ted Knaak, the president of Riegl, and he made the eye-opening comment, "Here we are, nearly ten years in, and some scanner operators are still struggling to make money with scanning." To address this, all the manufacturers and software developers are busy, looking for ways to improve productivity and make the business case.

We *have* made enormous strides in scanning. When I first interviewed Ben Kacyra back in 1999, the time to model was 40 hours in the office to one hour in the field. A few years ago, it was down to 8 to 1, and now, it's down to 2-3 to 1. Still not where it needs to be, but useful for many applications nonetheless. Speaking of modeling, a common complaint among users is that a half dozen or more software packages are necessary to get to a client deliverable. Rest assured, this is being worked on.

Surveyor friends from across the country have called to ask me if they should get into scanning. As with all technology, it's not enough for management to have "the vision"; capable people are also necessary. Success is largely dependent on two things: a motivated person inside and a motivated person outside. Nobody wants to see expensive equipment just sitting on a shelf. A team that asks, "What do we need to do to make this work?" and "What else can we do with this technology?" will have the best chance of success.