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CYGNUS BUSINESS MEDIA

OCTOBER 2013 | VOL. 7.00

EMS WORLD

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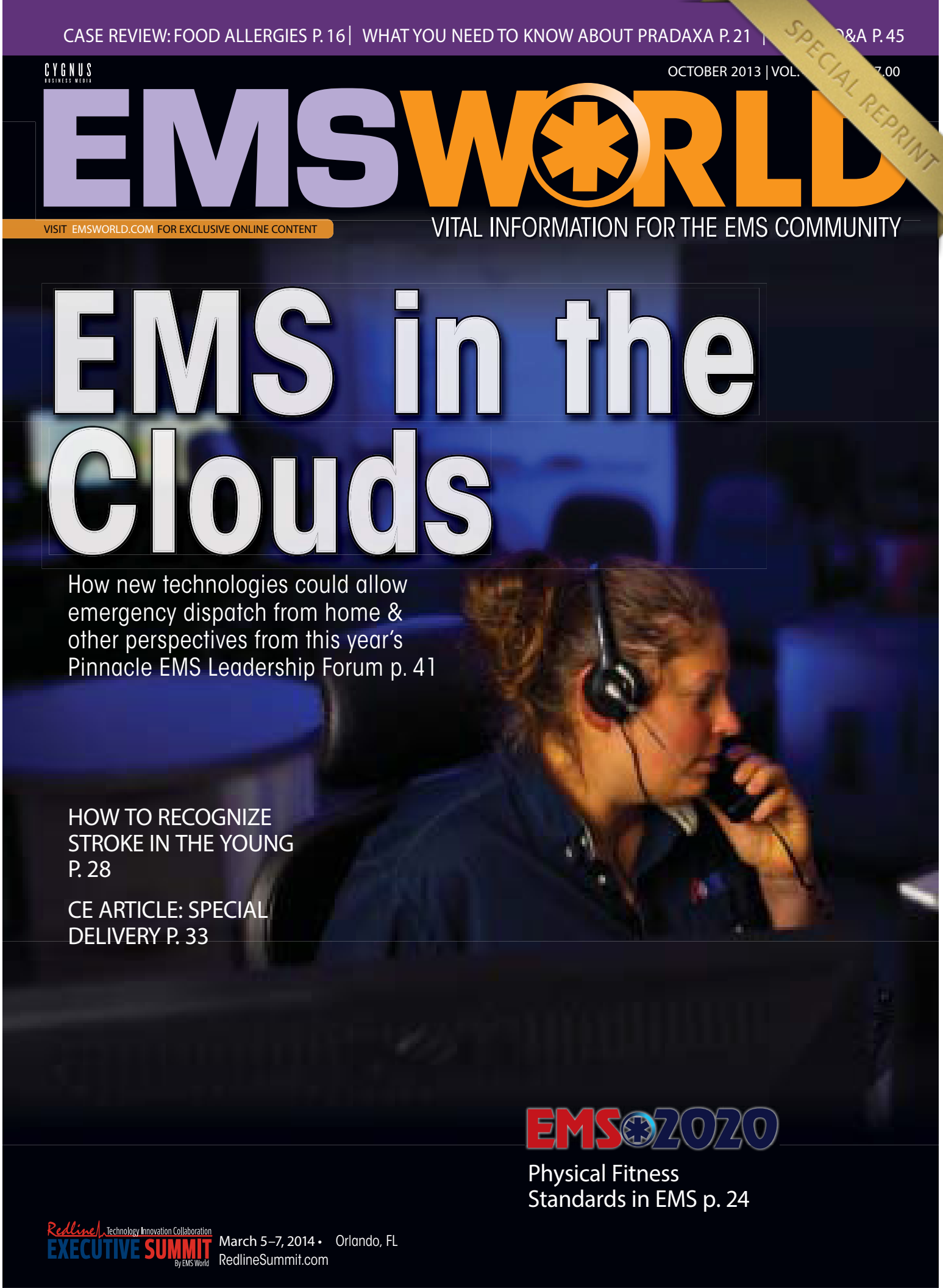

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| By John Erich, Associate Editor

EMS in the CLOUDS

How cheap new communications technologies could someday allow emergency dispatch from home

Centralized communication centers may be vulnerable to disruptive innovation.

NHTSA

In the business world there's a concept called disruptive innovation. Generally that's an innovation that begins with some simple application at the lower end of a market, then fundamentally reshapes that market's value network and grows to displace previous technologies.

The guy who coined the term, Harvard business professor Clayton Christensen, illustrated it using an example of big integrated steel mills. Their business model was disrupted by mini-mills that could produce a narrower range of steel product—just rebar, for instance—at lower cost. Rather than compete for such small, minimally profitable market segments, the big mills ceded that ground to the mini-mills and stepped away from making rebar. The industry transitioned, prices fell and profits shrank.

Then another mini-mill started making angle iron cheaper.

As this process was repeated, it largely led to the demise of the big integrated mills. And here's where it becomes relevant to EMS.

When low-cost replaces high-cost, explained Guillermo Fuentes, MBA, a partner at prominent EMS consultants Fitch & Associates, at this year's Pinnacle EMS Leadership Forum, it drives unexpected change into systems and has consequences downstream. That's disruptive innovation, and it ultimately sees transformation of complicated, expensive products into simpler, more affordable ones. Think of what's happened with personal computers and smart phones.

"Economics will drive what changes in EMS—that's the most important thing for people to know," says Fuentes. "We're seeing it throughout healthcare. It has less to do with patient-centric or customer-driven demands; the economic modeling is going to change a lot of what EMS does and how it delivers service in the future."

At Pinnacle, Fuentes kicked off a four-part look at how communication center technology can revolutionize EMS operations. Comm centers are environments ripe for disruptive innovation. They are large, complicated, costly endeavors whose functions can increasingly be accomplished by distributed, decentralized technologies that are widely available and cost less.

Imagine a day when you can dispatch your EMS system from home using VoIP and the Internet.

"That's how commercial call centers were brought back to North America," notes Fuentes. "We moved them offshore for lower labor costs. Then VoIP technology became so common you could actually shift from one regional environment to another seamlessly. Now we see them coming back, and the way they're being competitive is, they're fundamentally distributing their function. People can work from their homes with a computer and a phone. You measure how many calls they receive and pay them by the call. You have no infrastructure costs and only pay for transactions that actually occur, so it's a very good business model."

That's happening in the business world, and it's not hard to imagine it in emergency services call-taking/dispatch. The key is cloud-based infrastructure, now so broadly accessible and accepted. In a world where individuals readily trust their personal e-mail to Google or Yahoo!, what need is there for emergency systems to host all their own servers? Fuentes predicts virtually all services will shed theirs for the cloud within a decade or so. Nothing says a CAD can't run over the Web.

We'll have some special requirements, of course. Connectivity will have to be redundant and unimpeachable; 9-1-1 calls can't be dropped. And all operations will have to be proven secure. Among old-liners in particular, suspicion lingers that information trafficked on the Internet is vulnerable to interception and loss. But for younger ascending leaders and emergency callers who've grown up in the Internet era, it will feel natural.

"Look at every kid who uses Apple products—the whole concept of the Apple platform is cloud-based technology," Fuentes says. "That generation won't understand why we wouldn't do this. To them it makes intuitive sense. They've done everything over their iPads and iPods basically from the day they were born."

Agencies can approach the process in small steps. Start by shedding basic administrative technologies in favor of hosted solutions. That will help establish comfort with using Internet-based platforms. Then take that in-house server farm and move it somewhere else.

"Once you realize you can move your own servers off site," Fuentes says, "you'll have a level of control and comfort with it. Then the logical step after that is to ask yourself, 'Do I really need control over my server farm?' And you can divest yourself of the server farm because you'll get comfortable with the fact that it's not there but readily accessible."

It's doubtful EMS call-taking and dispatch will ever be fully decentralized, but it's well possible that low-volume call centers merge, amalgamate or shift responsibilities at different hours of the day. Switching voice lines and virtual computerized dispatch systems will be that easy. Theoretically, a service could dispatch across a county or across the country with no difficulty at all.

"Based on virtual infrastructure, the sky's the limit," says Fuentes. "And it's coming. There's nobody who's going to avoid this evolution. It's going to happen."

By Rob Lawrence

Richmond Ambulance Authority Goes Virtual

The Richmond Ambulance Authority (RAA) recently turned its CAD and IT systems off over two afternoons and reverted to paper, pen and map board. This was not the result of a power outage or other disaster, but part of a planned takedown to install virtual servers.

RAA is sold on the notion that virtual servers are the first step toward being able to move to an effective cloud solution and had included the upgrade as part of its program for a while. The wisdom of this decision was confirmed after RAA CEO Chip Decker and Director of Information Technology Christopher Wishart attended Guillermo Fuentes' session at the Pinnacle Leadership Forum in July. The most likely next step will be to work toward a private cloud environment, at which time a public cloud option could be also be assessed.

With the installation of virtual servers for the RAA CAD, the physical number of servers was reduced by half, enabling the center to use less power to run physical machines. It is literally a cool idea, as the smaller amount of hardware on site reduces the heat buildup in the data center, lowering related cooling power costs.

From a continuity-of-operations perspective, this type of setup offers the best disaster recovery model at the lowest cost. The virtual machines are more fault-tolerant than physical machines, as they can be redeployed in a matter of minutes versus hours in the case of a failure. They also save management time, as the IT department can manage all four CAD virtual machines from a "single pane of glass," which means they can be accessed from a single window rather than having to connect to all four separately.

The additional technology bonus according to Wishart is that old can still operate with new: "Using virtual machines allows us to run legacy 32-bit servers on the same hardware that is running 64-bit servers, which was a major factor in the decision to virtualize." Contact RAA Director of IT Christopher Wishart with questions at Cwishart@raaems.org.

Rob Lawrence is the chief operating officer for the Richmond Ambulance Authority.

A Real-Time Look at the System: How Dashboards Keep Leaders in the Moment

In EMS we're pretty good at analysis after the fact. We review patient charts and assemble AARs on critical events. But that's a tough way to promote change. Telling Joe Paramedic to do something differently weeks or months after he did it is far less effective than correcting him within moments of the act.

Dashboards—visualized displays of real-time data that let leaders monitor key performance indicators as things happen—shrink that interval.

"With EMS people, if you catch us while something is fresh in our minds, what you tell us will resonate," says Todd Stout, founder and president of FirstWatch, which helps agencies marshal data for situational awareness, operations and clinical improvement. "What the real-time dashboards do is let us make changes right after or as things are happening and really affect how people function, rather than try to intellectually tell them, 'If you get that kind of call again, do it this way.' They might not get that call again for days!"

Stout provided some examples at Pinnacle that included a dashboard for Priority Dispatch's ProQA dispatch system. That might show you, for example, a call-taker who takes longer than expected to handle a certain call. Leaders can investigate that in near-real time, and if that call-taker is doing something wrong, bosses can remediate them now, before it becomes habitual or harmful.

By the same token, notes Stout, "There are thousands of agencies that use ProQA. And if people can figure out who's good at this, who does it well, then we have the opportunity to learn from those people too."

This can have some large financial implications. Looking at call volume for one California client, Stout said, FirstWatch found something interesting: Transient increases in call volume didn't mean volume would stay high. However, decreases in volume below a statistical level almost always meant volume would stay lower than normal for the next 6–8 hours. If a boss knows something like that, they can send crews home early or not fill empty slots, better matching supply to demand and reducing labor costs.

North Shore–Center for EMS (CEMS), Long Island, NY. Photo courtesy FirstWatch.

FirstWatch customers use dashboards (visualized displays of data) to monitor key performance indicators in real time.

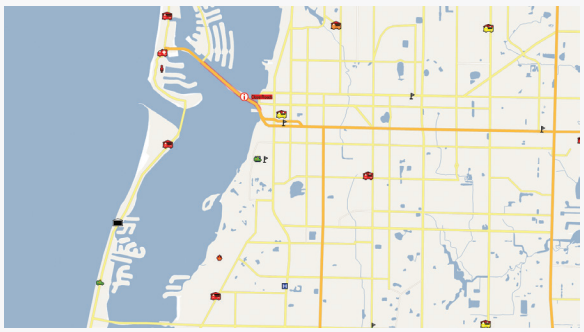
In Sedgwick Co., KS, they're using dashboards toward clinical goals. One example is patients with severe respiratory distress. Leaders want the SpO_2 levels of these patients above a certain threshold by the time they reach the ED. Thus they look in real time at relevant patient records using a dashboard that shows providers' percentage compliance with that SpO_2 goal. If a provider isn't getting those saturations up, it can be promptly addressed. "People always say, 'Oh, in EMS we only measure response times, and those don't matter!'" says Stout. "Well, you don't have to just do that. You just have to pick something else and start working on it. Doing that in real time—seeing which medics do what, which kinds of calls we can improve on—can really change a lot."

For more: www.firstwatch.net.

What Will You Do When the Bridge Falls Down? Modeling for Better Response

EMS systems have gotten better at incorporating historical data into their operations and planning. Odds are you deploy your workforce in response to established demand patterns and have major-incident plans that reflect known hazards like floodplains and hazmat sources.

Still, when planning for the future or even when daily events heat up, it can be challenging to process all that's at your disposal. How can you integrate all the sources of data you have and operationalize it all to maximum benefit? That's daunting.



This screen shot shows a call on an island (red person) with a closed bridge. Knowing that route is inaccessible can help dispatchers deploy other resources.

Optima Corp.

"How resources are positioned, what kind of additional resources we bring into or take out of a system—those are leadership decisions that can drastically impact efficiency and cost-effectiveness," says Chris Callsen, COO for North America for the Optima Corp., which produces optimization and simulation software for EMS and other industries. "A lot of organizations tend to let them happen in an ad hoc way."

Optima brings a bit of science to the process. Its Optima predict applies proposed changes to actual situations in discrete event simulations. Basically it lets leaders experiment with "what if?" and see what happens differently in a response system if they alter certain variables.

Say you want to gauge the impact of adding a station. You place it on a map, and the last year's worth of calls are replayed as if it were there. Perhaps

the first call near the station would have been run by that unit, freeing up the unit that actually did run it. That unit would then answer a different call. In complex EMS systems, you can imagine how rapidly that cascades.

"There are a lot of interrelationships and factors that impact one another as a system runs its activities," notes Callsen. "Understanding how all those things interact with one another lets you plan without making a bunch of assumptions."

Imagine having a firmer idea what might happen if you lost a key road or bridge. At Pinnacle, Callsen cited the example of Christchurch, New Zealand, which in February 2011 suffered a powerful earthquake that killed 185. As their operational environment evolved, leaders tracked conditions and used modeling to answer questions like where they should put temporary facilities; such modeling is also now informing rebuilding efforts and determining how the city can be better designed—for instance, where ambulance stations should be put—for future contingencies.

To realize possibilities like these, leaders first need a picture of their systems' data capabilities: Can they collect geospatial data about vehicles and responses? Can they collect time, location and management info on calls? Does their CAD system collect time stamps? Can all these data sources accurately depict what a system's done historically and is doing now?

Once you have all that information, the second priority is simple: Don't be shy about applying it through modeling, planning and in daily operations. Your citizens deserve better than guesswork.

"Technology will become increasingly important," adds Callsen, "both for how to select which resources to send on calls and how to best deploy what resources you have to do the most good."

For more: www.theoptimacorporation.com.

Dying Despite Defibrillators: What if Call-Takers Knew Where They Were?

TV newsman Tim Russert died of cardiac arrest in 2008 in a studio that had an AED on site. According to Russert's doctor, coworkers were preparing to use it as EMS arrived—almost 15 minutes after Russert collapsed. The doc described the interval to first shock as "significant—more than you would want."[1]

Russert isn't the only person to die in a building with an AED. Others have, like Russert, simply because bystanders didn't know there was one nearby.

"You can't get an AED if you don't know where one is," says Elliot Fisch, president and CEO of Florida-based Atrus, Inc., which maintains a national registry of AEDs for use in emergencies. "If survival from out-of-hospital cardiac arrest starts with calling 9-1-1, then 9-1-1 needs to know where those AEDs are."

Atrus' effort to solve that problem is AED Link, which displays the locations of devices listed in its National AED Registry to 9-1-1 personnel receiving cardiac arrest calls. Having such information quickly on hand can facilitate AEDs' retrieval and use, and improve victims' chances of survival.

Per the Cardiac Arrest Registry to Enhance Survival (CARES), AEDs are used in less than 5% of resuscitation attempts. A white paper from Atrus cites numerous tragic cases where they could have been, had someone known they were around when a victim collapsed.

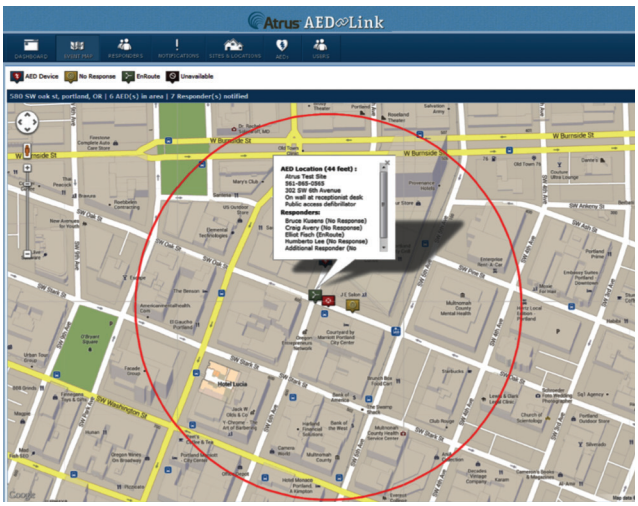
"Right at that moment," says Fisch, "we believe 9-1-1 should be able to say, 'I see there's a defibrillator at this location. Is there somebody with you who can go retrieve it?'"

The registry maintains an owner's name for each device, and AED Link pages them as part of any response. It also tracks availability: If a device is only accessible during 9–5 business hours, for example, it won't show as available outside those hours. And AED Link provides automatic maintenance reminders for AED owners for things like pads and batteries. It operates independently of CAD type and doesn't require a custom interface.

The National AED Registry is a Web-based cloud service, with AED owners responsible for maintaining the quality of their data. It also informs the unrelated but complementary Pulse Point app, which provides registered AED locations as part of its crowd-sourced approach to CPR.

The ongoing challenge, of course, is getting all those defibrillators and their locations identified and listed in the database.

"That challenge is a constant," says Fisch. "We know we'll never capture everything. But we can start with what we know. And we know



Atrus

there are AEDs in city, county and government buildings. We know they're in schools and parks and recreation centers and golf courses. So there are a certain number of AEDs we know are public access. We start with those, then provide a public information program with guidance for going out into communities and registering devices."

For more: www.atrusinc.com, www.aedlink.com, www.nationalaedregistry.com.

REFERENCE

1. Parker-Pope T. Could a Defibrillator Have Saved Tim Russert? *New York Times,* 2008 Jun 19.