R.I.P., 3-1-1: Washington feels your pain

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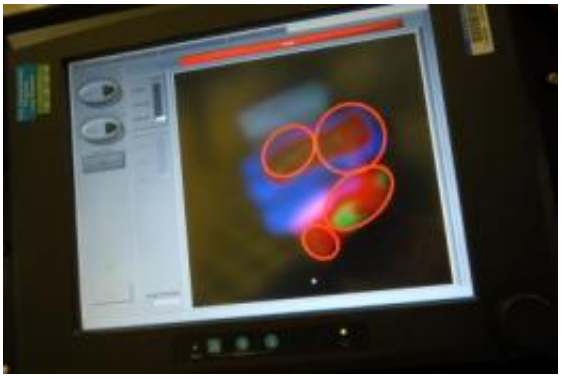


Thanks to a user-friendly human interface, there's no mistaking where the threats are in this MagViz screen image. Credit: DHS S&T and LANL

Remember 2005, when you could still board a plane with shampoo in your bag, toothpaste in your purse, a can of soda in your hand? Do those fluid memories hurt right down to your denture cream?

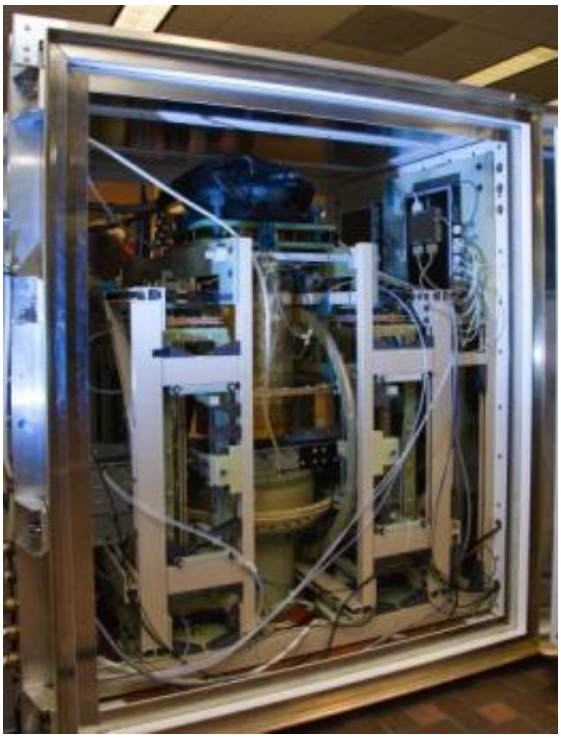
Washington feels your pain. As reported in 2008, researchers at the Energy Department's Los Alamos National Laboratory (LANL) have been fine-tuning magnetic resonance imaging (MRI) technology. By detecting ultralow magnetic fields, the lab's creation—the Magnetic Vision Innovative Prototype (or MagViz)—can peer through whatever container you're carrying, divine what's in it, and let you pass with your bottled water or—during flu season—your hand sanitizer.

The first MagViz was an overachiever. It was programmed to be

extremely sensitive, but it came off a bit paranoid. It "saw" danger in certain off-brand shampoos and sport drinks. Since then, with funding and guidance from the Department of Homeland Security's Science and Technology Directorate (S&T), the LANL team has fine-tuned the technology.

Last year, to test the new model's selectivity, Department program evaluators planted a minefield of surprise liquids at Albuquerque International Airport. Their faith proved well-placed: Nothing nasty slipped past LANL's brainchild; MagViz correctly flagged all liquid-bomb ingredients.

At the same time, MagViz gave the green light to all but one friendly fluid. And it withstood everyday mishaps—an outsize bag; a refrigerator magnet from the airport gift shop; a stuck-open door; a false loading, wherein an edgy passenger snatched back her half-inserted purse. On the operator's display, threats were circled and lit up like Vegas, to the delight of screeners from the Transportation Security Administration (TSA).



Flyers may be able to board with liquids and gels if manufacturers can engineer smaller versions of this MagViz prototype. Credit: DHS S&T and LANL

And yet, MagViz's precision does come with some challenges. In Albuquerque, the prototype had to be shielded from electromagnetic interference radiating from fluorescent ballasts, Wi-Fi laptops—even smartphones. That shielding came in the form of a hulking exoframe that would be too bulky for a real operational setting. To engineer a shielded MagViz in a compact enclosure, the Department will look to the private sector, where ingenuity often spells profit.

Envisioning far-reaching applications for the new invention, R&D Magazine recognized the LANL team with a coveted 2009 R&D 100 Award. Such laurels are welcome validators, says MagViz program manager Stephen Surko of S&T's Homeland Security Advanced Research Projects Agency (HSARPA). But if MagViz is to earn its place

behind thousands of X-ray stations, it must catch dangerous liquids reliably, affordably, and swiftly, while flagging few types of liquors as evil spirits.

To this end, Surko is evaluating a variety of concepts of operation. In most, MagViz would be placed immediately behind the X-ray machine, giving each carry-on a second scan. In smaller airports, where the screening area may be too short for a tandem arrangement, MagViz would sit off to the side. "You'd have to wait in a separate line," concedes Surko, "but at least you could bring along that large bottle of H_20."

MagViz would be a tremendous improvement, but don't expect miracles. Unlike a fingerprint, nuclear magnetic resonance signatures can vary. If, for example, a liquid is slightly warmer or cooler than expected, or its pH a bit more acidic or basic, the reading can change. "MagViz can see all these differences easily," says Surko. "We need to learn how well we can predict them and account for them."

The challenges—accounting for each such variance and shielding MagViz while keeping it trim—may prove a bridge too far. But if the departments of Homeland Security and Energy and the free market can cross each bridge, then traveling with toiletries, snow globes, and drinks may be a thing of the future, rather than the past.

Provided by US Department of Homeland Security