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Civilian Targets

Raytheon goes looking for innovative growth beyond the battlefield.

By Asher Hawkins

Engineer H. Alex Sanchez uses the tweezers in hand to grasp a pebble-size radio-frequency chip. With his left hand he applies glue to the chip using a toothpick. In a moment the employee of defense contractor Raytheon will attach the sticky radio chip to a mobile sensor that can detect the presence of chemical weapons or narcotics over a wide area. It's delicate work. This sensor is extremely sensitive to odors and first had to be sedated. It's a honeybee, one of hundreds Sanchez keeps in a plastic shed here at a cranberry bog near Cape Cod.

Raytheon, the world's biggest missile manufacturer, is turning to bees, office snooping software, border security and toll-road collecting in the hopes of moving beyond weapons and defense, which generate all of its \$21 billion in revenue. Aware that civilian projects often blow up for defense contractors, the Waltham, Mass. firm is looking for innovations that are cheap to fund, and ways to use in-house technology to improve existing products on the market.

The idea of flying-insect detectors has been around for at least 15 years without a success story. Existing schemes require the bugs to be in line of sight, but Raytheon's improvement is to equip a handful of bees in a swarm with radio chips that can alert a minder to the swarm's location in a crowded warehouse.

Defense contractors embrace civilian projects at their own peril. Norman Augustine, chairman of Lockheed Martin in the 1990s, once quipped that the industry enjoys "a record unblemished by success" in commercial markets. For instance, in the mid-1990s Northrop Grumman spent \$50 million on a failed project to make lighter, tougher city buses out of stealth bomber material. Raytheon higher-ups are aware of their industry's poor record. "That's one thing Bill made clear: We're not going far afield," says Thomas Culligan,

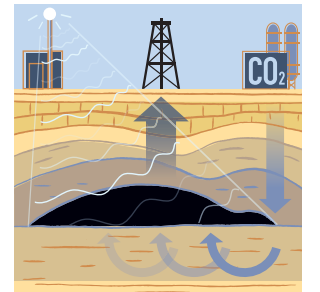
SWORDS INTO PLOUGHSHARES



DETECTION BY BEE *Raytheon will train Mother Nature's sharpest smellers to associate food with dangerous chemicals and track their whereabouts using radio chips attached to the back of a few hungry bees.*



OPEN-ROAD TOLLING *No searching for change, no waiting in lanes. Raytheon's toll road systems allow drivers with special transponders to pass under laser-equipped arches at or near the speed limit.*



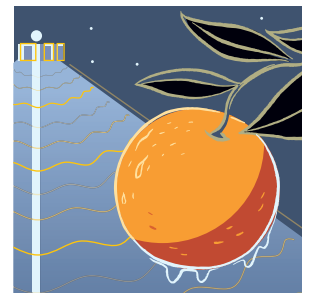
OIL FROM SHALE *Unlocking the shale is the latest energy imperative. Raytheon's idea is to free oil from rock by pumping liquid carbon dioxide into shale deposits heated up by lengthy blasts of radio waves.*



E-BORDERS *Raytheon is helping countries like the U.K. set up electronic networks that can double-check passenger lists from rail, sea or air carriers against names on a watch list and alert border agents.*



OAKLEY NETWORKS *Raytheon's purchase of this data security firm should attract customers both public and private. Its main product alerts bosses when employees try to sneak off-limits files out of the office.*



FROST PROTECTION *Raytheon hates to let weather fluctuations steal your daily dose of OJ. Towers topped with microwave generators warm shivering crops, like those at Paramount Citrus in Visalia, Calif.*

Raytheon's executive vice president for business development, referring to Chief Executive William Swanson.

Raytheon, the fourth-largest U.S. defense company by revenue, is best known for its missile business. Patriots, Tomahawks and the like still account for nearly a quarter of sales—Raytheon's largest segment—but it's no longer the fastest-growing one (that would be networks and airspace surveillance). "Missile procurement probably plateaued a decade ago when the Cold War spending blitz wrapped up," says Christopher Hellman, military policy fellow at the Center for Arms Control & Non-Proliferation in Washington. "I don't think any company sees the future of their growth in their missile division."

The three biggest U.S. defense contractors, Lockheed Martin, Boeing

and Northrop Grumman, have healthy nonbattlefield revenue streams to buoy them, such as Boeing's commercial aerospace business. Raytheon early last year sold its struggling commercial aircraft arm, which makes Beechcraft and Hawker planes, to private equity firm Onex Corp. and Goldman Sachs for \$3.3 billion. Robert Spingarn at Credit Suisse expects Raytheon's annual sales growth to drop from 8% last year to less than 5% by 2011.

Raytheon intends to make up for lost nonbattlefield revenue by exploiting the fears of the new millennium. Late last year Raytheon won a ten-year, \$1.5 billion contract from the U.K. Border Agency to create a computerized border security system. Prior to departure 200 air, rail and sea carriers will electronically submit to the agency all international passengers' data twice. That information is checked against a watch list using a Raytheon-designed data-mining program; the system will also tell the Brits which visitors have overstayed their visas. Raytheon expects that "e-Borders" will cover 95% of the country's international travelers in time for the 2012 Summer Olympics in London. Raytheon is reportedly a top contender for a \$10 billion contract to help Saudi Arabia create a border fence complete with buried motion detectors.

Raytheon is plying its radiation prowess in new markets, the most successful so far being toll collecting. Raytheon sells those soaring gantries that span all lanes on a highway and are hung with laser, video and transponder gear. The lasers can be used to measure a vehicle's size so a state can collect heftier tolls from trucks and RVs. The transponders overhead can deduct tolls from vehicles without their slowing down. This relieves toll plaza congestion, a big contributor to carbon emissions. At the Minneapolis-area toll system installed by Raytheon in 2005, drivers fly through at speeds of 50mph and up. Raytheon has snagged toll-road contracts from Florida, Texas, Israel, Canada and Brazil.

Raytheon is applying radio technology to the oil business, too. Earlier

this year it sold Schlumberger an extraction technology that might help drillers rushing to get at the oil trapped in the layers of shale deep underground in the American West. (Some estimates put recoverable U.S. shale reserves at 800 billion barrels of oil, or half the world's proved reserves.) Under Raytheon's plan, radio-frequency transmitters will sit atop standard well-heads; extendable antennas will be lowered down the shaft to heat and melt the shale. Then liquid carbon dioxide is pumped in as a dilutant to lift the oil out. The technology won't be ready for field tests until next year. Raytheon expects to someday earn royalties on its use. Another heating application was hatched last summer and tested in California: towers topped with microwave emitters that bathe orange groves in heat to keep them from frosting over.

In October 2007 Raytheon spent \$193 million on Oakley Networks, a six-year-old Salt Lake City data security company with 200 employees. Oakley's biggest product is software that gives employers real-time recordings of what Web sites workers are visiting, what they're saying in their e-mails and what they're transferring from their terminals' USB ports onto easy-to-conceal flash drives.

That product, called SureView, fingers suspicious behavior, such as when an employee copies a file, renames it, encrypts the new version, e-mails it outside the company and then deletes it. SureView's perpetual license fees range between \$200,000 and \$2 million, depending on company size. Raytheon won't identify its corporate Oakley clients, but Wal-Mart is reportedly one. Raytheon expects that within five years data security will be the largest of the seven product lines in Raytheon's \$2.7 billion information services division.

The bee project, if it works, won't be ready for commercial use for at least another two years. **F**