Frequently Asked Questions

What is Defentect doing?

Defentect is pioneering a new era of threat event detection technology, providing a cost-effective means of detection for facilities, public infrastructure and points of domestic entry to safeguard people and places from the threat of radiological dispersal devices (RDDs) or dirty bombs.

What is Defentect's vision?

Defentect is committed to creating a critical part of the protection network against terrorism, seeking to commercialize emerging technologies for homeland and physical security. Defentect's DM3™ architecture is designed to protect and defend against threat event disruption in economically or politically vulnerable locations such as domestic or foreign airports, seaports, border crossings, financial centers, landmarks, stadiums, military and government facilities and transportation hubs.

What is Defentect's DM3™?

Defentect's DM3™ is software that integrates with threat sensors to provide the management, monitoring and messaging central to Defentect's solutions. Defentect's gamma radiation / multiple threat event detection system sends data from broadly deployed radiation or CBRNE sensors to an incident command center. DM3™ is networked using IP and managed over the Web. When high-energy gamma rays from dirty bomb components interact with Defentect's Gammatect™ sensors, DM3's™ proprietary algorithms analyze the data and alert authorities to radiation that may pose a security threat. Communication features of DM3™ provide the ability to receive and process data over a network from the radiation sensor to the command center as well to PDAs, cellphones or pagers. The addition of strategically placed Gammatect Plus™ sensors enables Defentect to identify the isotope causing the radiation, providing control over innocent positive alarms.

What is Gammatect™?

Gammatect™ sensors detect gamma radiation above 20 mR/hr in less than one second and will detect a dirty bomb made with 60 curies of Cesium-137 at a distance of 29.5 meters, or about 100 feet. Sensors can be positioned adjacent to security cameras to provide visual identification of a threat. They can be hidden above ceilings or behind walls to prevent compromise by terrorists. Gammatect™ has been validated at highly respected commercial radiation laboratories including Oak Ridge National Laboratories.

What is Gammatect Plus™?

Gammatect Plus™ is a scintillator-based gamma radiation sensor enabling real-time alerts and gamma radiation isotope identification in an unattended perimeter or portal network. If threat-level violations occur during a high gamma radiation count event, isotope ID and date are sent to a remote command center, triggering an alarm. System administrators can designate alerts to be triggered to PDAs, cell phones, pagers or other mobile clients. Gammatect Plus™ combines passive surveillance with active alarms and can be set to ignore medical or other benign environmental isotopes. Even high radiation areas may be monitored since the system automatically subtracts predictive background radiation. Set in 'patient mode,' individuals undergoing medical treatments pass without triggering innocent alarms.

What is Defentect's competition?

Competitive product categories include portal-monitor technology, personal monitoring sensors, handhelds and distributed sensors to detect radiation. **Portals** -Radiation detection portals range from large installations that monitor vehicles to smaller personal portals. In both cases, expensive and labor-intensive installation of dedicated equipment is required in order for objects to pass through a designated space. "The U.S. Department of Homeland Security (DHS) cost-benefit analysis does not provide a sound analytical basis for its decision to purchase and deploy new portal monitor technology," -U.S. Government Accountability Office (GAO) -March 29, 2007. **Personal Monitoring Sensors -** Personal monitoring sensors are limited to ensuring employees do not exceed threshold exposure to radiation and for situational awareness by first responders. Used by front-line personnel, personal monitoring sensors must be in the immediate vicinity of a radiological source. There is no realistic way to implement 24x7/365 coverage of all identified targets. **Handheld Sensors** -Handheld detectors are cumbersome and require humans to physically enter an area that may already be contaminated. **Distributed** sensors integrated with Defentect's DM3™ software, providing active alerts 24/7, connected over IP to an incident command center, are the preferred solution.

What are the market applications for Defentect radiation detection systems?

Defentect solutions should be deployed at sites that store radiological materials for medical or industrial purposes, such as at hospitals and food irradiation plants. DM3™ allows for continuous threat management, monitoring and alert messaging in the event of illicit removal. Defentect product installation is appropriate at transit choke-points (toll plazas; tunnels; weigh stations; border and port entries, etc.) to enable detection in the event that illicit radiological materials or dirty bomb components are being moved. DM3™ should be deployed at dirty bomb targets (i.e., public and government facilities; high-value and landmark targets; transportation infrastructure; commercial and financial centers, etc.) to create a much-needed layer of 24/7 public protection against terrorist threats.

How has Defentect segmented its market?

The U.S. Department of Homeland Security (DHS) has classified approximately 100,000 locations as "critical infrastructure" in the United States alone. Segments include:

- Transportation Infrastructure — airports, train stations, distribution centers, subway stations, seaports, etc.
- Public Facilities — government/military, courts, hospitals, etc.
- High Value Targets/landmark buildings — skyscrapers; economic centers such as Wall Street and other city financial centers in major metro areas
- Entertainment and Shopping Venues — stadiums, theme parks, casinos, etc.

• Industrial Facilities — petroleum refineries, chemical plants, university research facilities, power plants, factories, food irradiation plants, other locations that store radioactive material, etc.

What is the projected size of the U.S. market?

The Civitas Group currently forecasts the market for Nuclear/Radiological Prevention in the United States for the five year period 2007–2011 at $3 billion. Source: Civitas Group Homeland Security Market Update – November, 2006.

What is the growth rate of the radiation detection market?

There is significant demand worldwide for these products, which offer customers a new layer of protection from improper transport of high energy materials. The homeland security market shows significant size and growth potential. The Civitas Group estimates the U.S. market size for Nuclear and Radiological Security was $2.4 billion in 2007 and will be $13.5 billion in the next five years. Sensors and related technology represent 20-25% of these expenditures. With terrorism being a global issue, the worldwide market for Defentect's products will be a substantial multiple of this number. http://www.civitasgroup.com/reports/20070717.pdf

How much does the U.S. Government budget for radiation detection systems?

The U.S. Government budgeted over $1B in 2007 for radiation detection systems, although it is reportedly dissatisfied with existing solutions.

How much illicit trafficking in nuclear and radiological materials is there?

The International Atomic Energy Agency stated that, between 1993 and 2004, there were 650 confirmed cases of illicit trafficking in nuclear and radiological materials worldwide. According to another IAEA report, from January 1993 to December 2006, a total of 275 incidents involving unauthorized possession and related criminal activities were confirmed to the Agency's Illicit Trafficking Database, according to information released by the Office of Nuclear Security. Fourteen such incidents occurred in 2006. A breakdown of the 275 incidents shows 55% of cases involved nuclear materials and 45% involved radioactive sources. Information reported to the ITDB shows a persistent problem with illicit trafficking in nuclear and other radiological materials – thefts, losses or other unauthorized activities. An adequate system of licensing and control of radioactive sources designed to combat deliberate misuse or misappropriation of radioactive material has not been put into place.

What are the sensitivity levels of Gammatect™ & Gammatect Plus™?

Using a Cesium-137 beam irradiator, testing indicated that Defentect's Gammatect™ sensors detect gamma radiation above 20 mR/hr in less than one second and will detect a dirty bomb made with 60 curies of Cesium-137 at a distance of 29.5 meters, or about 100 feet. Gammatect Plus™ can detect 150 µCi (microcuries) at 50 feet. A threat level source of 60 Ci could be identified approximately 1,250 feet away. High radiation areas may be monitored since the system automatically subtracts predictive background radiation. Set in 'patient mode,' individuals undergoing medical treatments pass without triggering innocent alarms.

How does Defentect eliminate innocent positives?

Gammatect Plus™ set in 'patient mode' won't alarm for isotopes below 500 keV – the measure of energy within an isotope. (Kiloelectron volts are a unit of energy in diagnostic radiography and

nuclear medicine, equivalent to the kinetic energy gained by an electron falling through a potential of 1 volt.) It is programmed to ignore levels triggered by kitty litter, bananas or recently treated thyroid patients. The number of innocent positives plagued by current systems increases public inconvenience and reduces confidence in security systems. Innocent positives can trigger legacy radiation detection networks. Innocent positives are initiated when legitimate sources of radiation, such as a thyroid patients or kitty litter, come within range of sensors. By using sophisticated algorithms, Defentect's DM3™ can be fine tuned to avoid innocent positive alarms caused by low-level radiation emitted from medical treatments inherent in hospital settings or naturally occurring background radiation.

Are false or innocent positives costly?

The consequences and costs of false positives and false negatives occurring at border crossings and other traffic pinch points has been well documented. For example, shutting down the port of New York for one hour because of one false alarm has been estimated to potentially cost $500 million. Source: Oak Ridge National Labs.

Are dirty bombs really a threat?

The Federal government believes key facilities will be the likely targets of terrorist attacks and is investing in detection technologies. Radiological materials turned into terrorist weapons will kill and cause drastic psychological, sociological and economic devastation. Depending on the location of dispersion, these costs could range from millions of dollars to a trillion dollars to clean radiation from a site. To date, a dirty bomb has never been detonated, however the threat is real. It is not a question of if, but rather when there will be a dirty bomb attack in the United States. Currently, it is impractical and labor intensive to detect radiation in large public facilities and facilities housing radioactive material. "Radiological dispersal devices (RDDs) present more of an opportunity for attackers than either nuclear weapons or INDs (Improvised Nuclear Devices), since they can use a much larger range of radioactive materials that are far more common... The U.S. now regards the prospect of a radiological or nuclear terrorist attack to be one of the most serious challenges to its security." -July 2007 -Civitas Group -Homeland and national security advisory firm

What are the consequences if a dirty bomb is dispersed?

The bomb site would be uninhabitable for months to years after detonation. For those exposed, deleterious human health effects could take years to become evident. Radiological attacks could kill tens or hundreds of people and sicken hundreds or thousands. Psychosocial havoc and panic would ensue nationwide with certain enormous economic loss.

What doses cause radiation sickness?

Doses coming directly from external radioactive material -above 25 rem -are unlikely for most RDD scenarios unless hit with contaminated shrapnel from an RDD, or a large gamma source is secretly placed to irradiate unwitting victims, or if inhalation or ingestion of significant amounts of radioactive material occurs. However, the U.S. should be prepared to cope with tens, hundreds, or thousands of victims of radiation sickness, based on historical events. In 1987 in Brazil, 1375 Ci of scavenged C-137, the amount of powder that would fill a soda bottle, quickly spread into a deadly chain of contamination, illness, death, uninhabitable buildings, contaminated medical staff, ambulances and farmland. One person died from the consumption of only 27 mCi of C-137, a miniscule quantity, transferred from radioactive dust on their hands to their mouth. Feral cats with radioactive material stuck to their fur spread contamination further still. The incident

provides insight into the possible progress of radiological terrorism. A dose of between 400 – 500 rem (roentgen equivalent man) absorbed dose in human tissue is lethal to half the exposed population. Loss of white blood cells is detectable at a whole body dose of 25 rem – 50 rem. Classic radiation sickness includes hematological effects, loss of appetite, vomiting, gastrointestinal damage, hair loss, radiation burns, death. Patients with internal contamination pose a hazard to attending medical staff.

How much radioactive material is needed to make a dirty bomb and where does it come from?

A dispersion of 60 curies of Cesium-137 in New York's Grand Central Station would take years of radiation cleanup before the landmark transportation hub could be safely used again, if ever. Cesium-137 is widely used in hospitals in cancer therapy machines, hospital blood sterilizers and elsewhere as a water-soluble powder. Among the 6,000 hospitals in the US, thousands of curies of Cesium-137 are stored to treat patients. 1,000 curies of C-137 would fit in a soda can. Significant commercial applications are widely available, used in medical, academic, agricultural and industrial settings. Cesium-137 combined with a small amount of a conventional explosive like Semtex is enough to create and deploy a radiological dispersion device or RDD. Between 50 and 100 curies of Cesium-137 is enough to make a dirty bomb. Additionally, Cobalt 60, which can also be used in dirty bombs, is widely used in industry to irradiate food. On 2/21/08, the NRC issued a report stating, "The presence of these sizable sources in areas (hospitals) that are potentially attractive targets (for attack) is a major factor making radioactive cesium chloride such a concern to the committee."

How easy is it to get these radiological materials?

Currently, there is relatively little security surrounding these materials making the likelihood of pilferage and conversion into a dirty bomb ever more likely. The U.S. Nuclear Regulatory Commission estimates that in the United States, commercial users lose about one radioactive source (many large enough for an attack) a day, through theft, negligence, accidents or poor paperwork. One of these is recovered perhaps every two days either because the radioactive materials are voluntarily returned or because of good detective work. The threat of a radiological attack on the U.S. is real, and terrorists have a broad palette of isotopes to choose from. It's difficult to regulate and secure radiological material used in thousands of widely available commercial applications. Internationally, for example, 27 C-137 sources were lost during the war with Croatia, according to the IAEA. 170 pounds of C-137 and Strontium-90 was discovered in a taxi in the Georgian capital of Tbilisi, bound for Turkey, on 5/31/03. Relatively lax domestic and international regulations, unsecured access to legitimate sources and large vulnerable supplies in the former Soviet Union threaten American security. Per Civitas Group, Russia is the largest source of radioactive material, offering little or no security after the fall of the Soviet Union. Chernobyl has areas that are not fenced off and anyone can come in and take material.

Where is radiological material stored? -International Atomic Energy Agency calculation of significant radiological material worldwide, 2002.

Worldwide there are more than 20,000 operators of significant radioactive sources. Over 10,000 radiotherapy units for medical care are in use. 12,000+ industrial sources for radiography are supplied annually. 300 irradiator facilities containing radioactive sources for industrial applications are in operation. About 5,000 devices in the U.S. are used as radiation sources and 1,300 machines at U.S. hospitals and universities contain Cesium-137 in the form of cesium chloride stored in stainless steel capsules – NRC. The IAEA categorizes its count by threat level radiation sources and non-threat level. They estimate there are millions of sources

worldwide, with hundreds of thousands of sources currently used, stored and produced. Radioactive sources are stored in hospitals, university medical schools, research centers, food irradiation plants, construction sites, etc., with minimum security.

What's wrong with legacy radiological detection systems?

Present systems rely heavily on individuals physically holding many discrete devices such as detectors, radios and maps, severely limiting timeliness and effectiveness of response, compromising human safety. The average security guard can monitor 6 – 10 screens for only 30 minutes before surveillance effectiveness drops dramatically. The security of legal radioactive materials is inadequate due to previous technology shortcomings, high implementation costs and minimum security standards. Legacy technologies currently cannot scan wide areas and were not developed to meet the security requirements of today's environment. They have a lag time for authorities to be notified and a high incidence of false positives which raises costs, reduces confidence in security and disrupts normal business operations.

Where are radiation sensors needed to detect dirty bombs?

Detection networks are needed at hospital storage sites and entry points, at domestic and foreign seaports, airports, border crossings, government buildings, military installations, transit hubs, commercial buildings, financial hubs, chemical and power plants, universities, casinos, water plants, stadiums, theme parks, etc. The Federal Government (DHS) has classified approximately 100,000 locations as critical infrastructure in the United States alone. These include: Transportation Infrastructure (train stations, airports, ports, distribution centers); Public Facilities (government/military, courts, hospitals, etc); High Value/Landmark Buildings (Empire State Building, Grand Central Station, etc); Entertainment and Shopping Venues (stadiums, theme parks, malls, casinos); Industrial Facilities (petroleum refineries, chemical plants, power plants, factories, universities, places that store radioactive material, etc.)

What is the cost of Defentect systems?

Pricing for DM3™ management software, Gammatect™ sensors, server, installation and deployment is available upon request based on customized solutions. Calculations show Defentect costs are significantly lower than existing systems on the market. Defentect's systems don't depend on training high cost monitoring personnel. Hardware expenditures are limited to sensors and a single server.

Who are your alliance partners?

On-Net Surveillance Systems, Inc., RMS Technology Solutions, Inc., Convergint Technologies, S2 Asset Protection, Guardian Technologies International, Inc.

What is the ROI if I invest in Defentect solutions?

Even a small RDD is likely to do a great deal of economic damage because of two principle effects – suspension of economic activity and long-term contamination of property, possibly resulting in its permanent loss. The consequences are certain to be serious, expensive and long lasting. There are no proven methods to decontaminate a site other than to remove buildings and soil to a waste storage area which could pose an even greater hazard than leaving it in place. Any RDD of more than a few curies can contaminate some areas so heavily that decontamination will not be attempted. Affected areas could be abandoned, or, they could be razed, with the soil scraped to a depth of a meter and taken to a waste depository. Cleanup costs won't be able to

be borne by the owners. There will be decreased property value, tourist traffic will likely never resume, commerce will be handicapped, farmers won't be able to market their produce. All economic activity would cease for weeks or months. Businesses would be unable to pay their suppliers and unable to pay their mortgage. Even with business interruption insurance a wave of bankruptcies is likely to follow. Radiation is a specifically excluded risk in virtually all U.S. insurance policies. There would be a cost to shelter evacuees. It would be an economic catastrophe for victims. Nearby residents couldn't return to their homes for months, if at all. Streets, air ducts, sewer pipes, walls, sub-flooring all would need to be decontaminated. There would be total cessation of economic intercourse, physical and psychological isolation and years of remaining prejudice regarding the area after the event.

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