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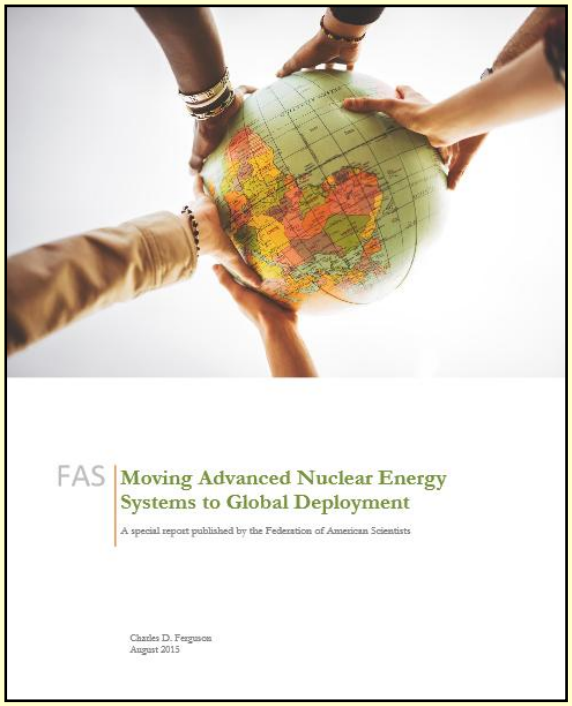
Moving Advanced Nuclear Energy Systems to Global Deployment

Source: http://fas.org/pub-reports/six-achievable-steps-for-implementing-an-effective-verification-regime-for-a-nuclear-agreement-with-iran-1/

In the FAS Special Report entitled, *Moving Advanced Nuclear Energy Systems to Global Deployment*, Charles D. Ferguson, FAS President, identifies the major factors that will affect deployment of advanced reactors (often referred to as *Generation IV* reactors) in the coming years to decades and analyzes what industry and governments need to do to move forward toward the ultimate goal of widespread deployment of potentially hundreds of highly energy-efficient, much safer, more proliferation-resistant, and economically-competitive nuclear power systems. Moreover, the report looks at lessons learned from the history of development and deployment of *Generation II* and *III* reactors and seeks to learn explicitly about the reasons for the predominant use of light water reactors. It then seeks to apply these lessons to current efforts to develop advanced nuclear energy systems. In the process of that assessment, the report reviews the status of the global cooperative and national efforts to develop and eventually deploy advanced nuclear energy systems. The main intentions of the report are to provide a guide to policymakers in the form of findings that lay out potential pathways to forward deployment of one or more advanced nuclear power systems within the next ten to twenty years.



▶ **Read the full report at:** https://fas.org/wp-content/uploads/2015/08/Advanced-nuclear-energy-technologies-report-August-2015_final_version.pdf

N.Y. Man First Ever to Be Convicted of Trying to Acquire a Radiation Weapon

Source: http://www.nbcnews.com/news/us-news/n-y-man-first-ever-be-convicted-trying-acquire-radiation-n414546

An upstate New York man faces life in prison after he became the first person ever convicted in the U.S. of trying to acquire a radiation weapon for mass destruction, the Justice Department said.

Glendon Scott Crawford, 51, a professed member of the Ku Klux Klan, and an accomplice acquired an X-ray device that they planned to modify into a "death X-ray," prosecutors said — and they successfully built and tested a trigger device that could have activated it.

The goal: to kill "enemies of Israel," according to the indictment.

Crawford, of Galway, New York, in Saratoga County, east of Utica, was convicted Friday in U.S. District Court in Albany of attempting to acquire and use a radiological dispersal device, conspiring to use a weapon of mass destruction and

distributing information relating to weapons of mass destruction. In addition to life in prison, he could face more than $2 million in fines when he's sentenced in December.

Prosecutors said the threat Crawford and his accomplice, Eric J. Feight, 56 — who pleaded guilty last year to lesser charges of providing material support to terrorists — was extremely serious.

While the plot was only in its early stages when it was uncovered, "experts have advised the investigation that the remote initiation device and X-ray systems Crawford plans to weaponize would produce a lethal, and functioning, remotely controlled radiation emitting device," the FBI said in the initial criminal complaint in June 2013.

The remote trigger was successfully tested on May 20, 2013, the FBI said.

Much of the court record remains sealed — a request Chief U.S. District Judge Gary Sharpe approved to prevent schematics of the device from becoming public. In a 2013 report to the U.N., the State Department described the two men as confirmed "major proliferators."

According to the indictment, Crawford approached the Jewish Federation of Northeastern New York, Congregation Gates of Heaven in Schenectady and the Israeli Embassy in Washington to ask whether they would help him acquire a commercially available industrial-grade X-ray device to kill "enemies of Israel."

They declined and reported him to the FBI, which sent in undercover agents in April 2012.

The undercover agents provided the device, which they'd rendered inoperable, the FBI said.

Crawford and Feight both worked for General Electric, and they managed to design, acquire parts for, build and test a remote trigger "that could have activated the radiation machine," prosecutors said.

Crawford had gotten as far as scouting specific mosques and Muslim community centers in Albany and Schenectady as targets, prosecutors sad. Crawford also suggested the Governor's Mansion as a potential target, according to the indictment.

Crawford's plans were "very real, very viable and very deadly."

The device was to have been parked outside the targets in a van or a truck and triggered remotely, prosecutors said. It would have exposed the targets — which prosecutors said also were to have included the Governor's Mansion in Albany — to lethal doses of radiation. The victims wouldn't even have been aware of the exposure until it was too late, prosecutors said.

In closing arguments Friday, U.S. Attorney Rick Bellis told jurors that Crawford strategically associated himself with the Ku Klux Klan because he thought the group would give him money and manpower to carry out his attacks. He said Crawford's plans were "very real, very viable and very deadly."

Crawford's sentencing hearing was set for Dec. 5. Feight is to be sentenced next month.

New drug protects against nuclear radiation's deadly effects 24 hours after exposure

Source: http://www.homelandsecuritynewswire.com/dr20150824-new-drug-protects-against-nuclear-radiation-s-deadly-effects-24-hours-after-exposure

Aug 24 – An interdisciplinary research team led by the University of Texas Medical Branch at Galveston (UTMB) reports a breakthrough in countering the deadly effects of radiation exposure. A single injection of a regenerative peptide was shown significantly to increase survival in mice when given twenty-four hours after nuclear radiation exposure. The study currently appears in *Laboratory Investigation*, a journal in the Nature Publishing group.

UTMB lead author Carla Kantara, postdoctoral fellow in biochemistry and molecular biology, said that a single injection of the **investigative peptide drug TP508 given twenty-four hours after a potentially lethal exposure to radiation appears to significantly increase survival and delay mortality in mice by counteracting damage to the gastrointestinal system.**

UTMB notes that the threat of a nuclear incident, with the potential to kill or injure thousands of people, has raised global awareness about the need for medical countermeasures that can prevent radiation-induced bodily damage and keep people alive, even if given a day

or more after contact with nuclear radiation.
Exposure to high doses of radiation triggers a number of potentially lethal effects. Among the most severe of these effects is the gastrointestinal, or GI, toxicity syndrome that is caused by radiation-induced destruction of the intestinal lining. This type of GI damage decreases the ability of the body to absorb water and causes electrolyte imbalances, bacterial infection, intestinal leakage, sepsis, and death.
The GI toxicity syndrome is triggered by radiation-induced damage to crypt cells in the small intestines and colon that must continuously replenish in order for the GI tract to work properly. Crypt cells are especially susceptible to radiation damage and serve as an indicator of whether someone will survive after total body radiation exposure.
"The lack of available treatments that can effectively protect against radiation-induced damage has prompted a search for countermeasures that can minimize the effects of radiation after exposure, accelerate tissue repair in radiation-exposed individuals and increase the chances for survival following a nuclear event," said Darrell Carney, UTMB adjunct professor in biochemistry and molecular biology and CEO of Chrysalis BioTherapeutics, Inc. "Because radiation-induced damage to the intestines plays such a key role in how well a person recovers from radiation exposure, it's crucial to develop novel medications capable of preventing GI damage."
UTMB says that the peptide drug TP508 was developed for use in stimulating repair of skin, bone, and muscle tissues. It has previously been shown to begin tissue repair by stimulating proper blood flow, reducing inflammation and reducing cell death. In human clinical trials, the drug has been reported to increase healing of diabetic foot ulcers and wrist fractures with no drug-related adverse events.
"The current results suggest that the peptide may be an effective emergency nuclear countermeasure that could be delivered within twenty-four hours after exposure to increase survival and delay mortality, giving victims time to reach facilities for advanced medical treatment," Kantara said.
Chrysalis BioTherapeutics has licensed worldwide exclusive rights to TP508 from UTMB for treatment directed toward radiation induced damage.

— Read more in Carla Kantara et al., "Novel regenerative peptide TP508 mitigates radiation-induced gastrointestinal damage by activating stem cells and preserving crypt integrity," Laboratory Investigation *(17 August 2015)*

Electromagnetic Pulses Could Leave A Country Without Power For Months

Source: http://i-hls.com/2015/08/electromagnetic-pulses-could-leave-a-country-without-power-for-months

Electromagnetic threats such as strong solar flares or intentional nuclear blasts by terrorists could paralyze the entire power grid of a country for several months and possibly over a year, but the United States is not prepared for these types of dangers and the American government is not doing enough to cope with these threats. That is the main conclusion of several experts who testified before a Senate committee hearing entitled "Protecting the Electric Grid from the Potential Threats of Solar Storms and Electromagnetic Pulse (EMP)".
The high electromagnetic radiation released by a solar flare or a nuclear explosion could weaken the country's critical electrical infrastructure or even paralyze it alltogether. In order to deal with these risks, cooperation should be established between government and industry, such as between the Department of Homeland Security and the Energy Department. But it seems that Washington has failed to act against the threat of EMP. A large part of this is due to policymakers as well as citizens not realising the extent of this danger and the catastrophical consequences likely to arise from an event of this magnitude. They cannot comprehend that the threat is just as real as the nuclear threat from Russia, China, North Korea and Iran.
Nuclear EMP attacks are aleady a part of the military doctrines, plans and exercizes of all these countries' new and innovative warfare which focuses on attacking power grids and important

civilian infrastructure. These wars are called Total Information Warfare, Cybergeddon or Blackout Wars. **We all think that events such as these, which are "one in a century" can't possibly occur on our watch, but they can, technically, happen next week.** Therefore, it's important to act right now in order to reduce minimize the possible consequences from such an event and start finding ways of defending the electric grid as soon as possible.

Sure, it's expensive and could cost several billion dollars, but it is sure cheaper compared to the economical impact expected in such an event. "The purpose of this hearing is basically to pull our heads out of the sand," said Senate Homeland Security and Governmental Affairs Committee hearing Chairman Ron Johnson. It is important to understand that this isn't science fiction.

identiFINDER R300 (Formerly nanoRAIDER)

Source: http://www.flir.com/threatdetection/display/?id=63325

When radiation detection capabilities are necessary, first responders and security personnel must rely on the accuracy and dependability of their instruments. With the highest detector resolution available in a pager-sized device, the R300 virtually eliminates the false alarms and false positives that are so common to personal radiation detectors. With both detection and identification capabilities available in a single, rugged device, those on the front lines of homeland security can trust the R300 to make their job easier.

Features

- Transflective color display
- 24 hour battery life
- IP63 compliant enclosure protection
- Data storage for up to 600,000 identifications and spectra and over 1 million alarms
- Designed to meet ANSI N42.48
- Standard ANSI N42.42 data output format as preferred by triage teams as well as the government and scientific communities
- Designed and built to meet the most rugged field environments
- Easy to read display, even in bright sunlight
- High resolution in a small device
- Ease of use in high background environments
- Highly reliable, accurate results
- Small enough to be carried on a belt or in a pocket
- Almost identical user interface with other FLIR radiation detectors
- Virtually eliminates the false alarms and false positives inherent in other personal radiation detectors
- No consumables and maintenance intervals of 5 years
- Configuration and data download through a standard web browser. No need for a dedicated PC software.

About the same size as a cellphone, the belt wearable R300 provides continuous detection capability with visible, audible and tactile alerts. Once radiation has been detected, the fast identification capability of the instrument provides essential information to the user in the field, enabling them to make a next step determination. The One Touch Reachback™ feature integrated into the R300 allows the user to immediately send a notification to team members, superior officers, situation management personnel, and expert analysts – all with a single push of a button.

The R300 uses uniquely constructed Cadmium Zinc Telluride (CZT) detectors that enable exceptional sensitivity and identification capabilities never before seen in a spectroscopic personal radiation detector (SPRD). The characteristic design of FLIR CZT detectors is more rugged than scintillation-based detectors and does not require temperature stabilization. The R300 is also available with an optional neutron detector as well as a full range of accessories.

To reduce the training burden on first responders and security personnel, the R300 uses the same easy to understand and navigate user interface common to the entire family of FLIR radiation detectors. With two-button controls, operators can pick up a R300 and begin using it simply and quickly.

With the R300, FLIR continues to provide the most technologically advanced radio isotope identification devices in the industry.

Fukushima today: A first-person account from the field and the conference table

By Subrata Ghoshroy

Source: http://thebulletin.org/fukushima-today-first-person-account-field-and-conference-table8683

It has been more than four years since the east coast of Japan was hit with a trifecta: an earthquake of Magnitude 9 on the Richter scale, followed by a massive tsunami triggered by the quake's tremors, and then the meltdown of three nuclear reactors in the Fukushima Daiichi nuclear generating complex. Design mistakes, a poor safety culture, and human error exacerbated the situation. And it all happened within the span of an hour, searing the name "Fukushima" into the collective memory of all. Like Hiroshima a few hundred kilometers to the south, the name Fukushima became synonymous with the horrors that can befall a nation from uncontrolled atomic chain reactions.

I had traveled to Japan to attend a meeting of the Japan Scientists' Association in Yokohama, near Tokyo, which was expected to announce a major change in its pro-nuclear energy position.

While there, several other conference attendees and I received permission to go on a guided tour to the restricted areas surrounding the Fukushima Daiichi plant to see for ourselves, first-hand, the things that we had all been discussing in conference rooms and lecture halls for the past three days. One of the conference organizers—Yoshimi Miyake, a professor at Akita University—accompanied us on our trip to Fukushima. (To be precise, Fukushima is a prefecture with the namesake city its capital. The plant itself is called Fukushima Daiichi.) Another participant, Lucas Wirl from Germany, volunteered to act as our photographer.

What follows are my personal impressions from the tour that occurred immediately after the meeting, and a few of the relevant highlights from the meeting itself—which called for the elimination of nuclear power from Japan as soon as possible. A total of seven of us traveled about 50 miles, starting from a point some 40 miles south of the power plant, then heading along a series of coastal highways until the road took us to within just a little over a mile and a half from the plant, within the town limits of Futaba—which was about as close as anyone could get to the site without special protective gear. We then continued northeast to the village of Namie, one of the nearest villages to the plant, and a place where the government was aggressively pushing for former inhabitants to return to live year-round.

Along the way, we passed through many towns and little villages that had been hit hard. As for the plant itself, the radiation levels are so high that it is difficult to even operate robots. And in places like Namie—whose closest boundary lay less than five miles away from the plant—the

radiation levels posed significant risks, because they are so much higher than normal natural background radiation. Also accompanying us were Itoh Tatsuya of the Iwaki City chamber of commerce and Baba Isao, an assemblyman from the town of Namie—both locales hurt substantially by the multiple disasters.

Getting there

We traveled by *Shinkansen*—bullet train—from Tokyo to Iwaki City in Fukushima prefecture, where we stayed overnight before beginning our journey the next day. As we left our hotel after breakfast, one of our guides—Tatsuya—readied his Geiger counter. Before leaving, he took a measurement of the background radiation level and announced that it was higher than normal today, even though Iwaki is more than 40 miles from the ill-fated power plant. It sounded like he was a weather forecaster talking about humidity levels. He did not give a figure as to how much higher the background radiation was.

As we started heading north, we saw homes destroyed by the tsunami. Iwaki lost 200 people, Tatsuya said. As we began to reach the outskirts of Iwaki City, the radiation level rose consistently, if in very small amounts. Here at about 20 miles from the plant it was about 0.1 microSieverts per hour—objectively not really high at all, but above where we started, and marginally higher than the normal natural background radiation. The Geiger counter's needle flickered, occasionally registering higher levels, especially when we passed through some tunnels.

As I looked out the window, I thought of what one of the conference presenters, Mitsugu Yoneda of Chuo University in Tokyo, had said: There were 120,000 evacuees across the Fukushima prefecture, and it was unlikely that they would be able to return to their homes in 2016 in the so-called "difficult-to-return" zones, where the cumulative annual exposure is expected to be 20 milliSieverts or more. In recognition of this fact, the government had come up with a new category called "release preparation zones," where the cumulative annual exposure is estimated to be well above "normal" but less than 20 milliSieverts. **The government's plan to promote an early return to these areas was called a politically motivated whitewash by Yoneda, because anything close to 20 milliSieverts is far higher than the normally accepted safe annual limit.** (One milliSievert is about equal to about 100 millirems—the units most commonly used in the United States. Thus, 20 milliSieverts would be 2,000 millirems.)

Different countries have different standards, but in the United States, the Nuclear Regulatory Commission requires that its licensees limit annual radiation exposure to individual members of the public to 1 milliSievert (100 millirems) above the average annual background radiation. Because the natural background radiation usually averages in the range of about 3.1

milliSieverts (310 millirems), that figure plus the allowed exposure from the nuclear power plants makes for a total of about 4.1 milliSieverts (410 millirems) annually—a far cry from the 20 milliSieverts (2,000 millirems) that could be encountered by a member of the public in any putative "release preparation zone" near Fukushima Daiichi.

To give a sense of scale, the average person gets 0.16 milliSieverts (about 4 millirems) from a single chest X-ray, and about 0.96 milliSieverts (24 millirems) in cosmic radiation annually if that person is living at sea level. Cumulative dosages of 500 milliSieverts (50,000 millirems) or above are considered "high," and cause acute radiation sickness, many different forms of cancer, and death. But because radiation affects different people in different ways—depending upon one's age, general health, and genetic predisposition—it is not possible to indicate precisely what dose is needed to be fatal to a given individual. **All that researchers can do is give statistical averages, such as "50 percent of a population would die within 30 days of receiving a dose of between 350,000 to 500,000 millirems (3,500 to 5,000 milliSieverts)."**

Some of the other background information that Yoneda provided was similarly dismal. For one thing, the building containing the failed reactors has radiation levels as high as 4,000 to 5,000 milliSieverts per hour (400,000 to 500,000 millirems per hour), making even the operation of robots difficult. In fact, two power company robots had to be abandoned while inside the depths of the plant. And some spots, such as inside the primary containment vessel, went as high as 9.7 Sieverts per hour (970,000 millirems per hour). In addition, it has not been possible to precisely locate the melted core. (Another conference speaker, Jun Tateno, who was a former research scientist with the Japanese Atomic Energy Research Institute, accused the government of suppressing voices from the scientific community that were critical of the safety of power plants. He said that we have reached a situation in which we do not even know how much plutonium is in the core.) In the meantime, huge amounts of water must be pumped in to keep the reactors cool; this liquid then mixes with ground water, contaminating it as a result.

The picture is not much better when it comes to the land. In an effort to decontaminate residential areas, radioactive soil is being dug up from approximately 1,000 sites. The government wants to consolidate this contaminated material in semi-permanent storage sites in the "difficult-to-return zones" in Futaba and Okuma towns. Local residents, meanwhile, fear that these could turn into permanent repositories of radioactive material.

I was jolted out of my reverie by the comments of Tatsuya, who pointed out a large apartment building that looked empty. He said that in days past there would have been many children's clothes hanging from the balconies. The only people who are living there now are some of the laborers who are working to decontaminate the town.

Our first stop was J-Village, about 18 miles from the plant. It housed a huge sports facility, including what was once Japan's largest soccer-training complex. Because of its stadium, many of Japan's top players once trained there. Now abandoned, the stadium was overgrown with weeds, and the scoreboard still carried the results of the last game. The parking lot was full, but not with the cars of soccer fans. The vehicles belonged to the decontamination workers who were taken by buses from there to the restricted sites.

Tatsuya noted that the Geiger counter was reading about 1 microSievert per hour as he moved the counter around the parking lot. That was bad enough; it translated to 8.76 milliSieverts per year.

He then bent down to take a reading from a grassy spot. The counter needle pinned to the right. "Off the scale!" he exclaimed. It was higher than 5 microSieverts per hour, which is more than 50 times higher than normal natural background radiation per hour in Tokyo. It translated into a cumulative annual dose of 43 milliSieverts—many times above the 6.2 milliSieverts (620 millirems) average annual exposure for members of the general public, according to the US Nuclear Regulatory Commission. (In addition to the natural background radiation level of about 3.1 milliSieverts [310 millirems], the average person is also likely to fly in an airplane, watch television, or undergo medical procedures, and all these manmade sources together add another 3.1 milliSieverts [310 millirems] per year to one's exposure, making for a total radiation dose of 6.2 milliSieverts, or 620 millirems. This figure could colloquially be considered the "normal" amount of radiation exposure for a member of the general public, as a very rough rule of thumb.)

We left soon thereafter. **We were told that most workers did not wear dosimeters to record their cumulative radiation dose.** There was good money to be made in decontamination work. They did not want to know.

But if one does the math, what the workers and their supervisors were ignoring—or were being told to ignore—could be significant. If a person spent one week working at this part of a supposedly safe parking area for 8 hours per day, then he or she would have been exposed to 40 microSieverts per day. And if that person was there for a 5-day workweek, then over the course of a single week that person would have been exposed to 200 microSieverts. In a year, that person could receive 10 milliSieverts, a significant dose. Of course, scientists are rightly cautious of such "anecdotal" evidence; our Geiger counter readings could have been off, or the machine calibrated incorrectly, or some other source of error introduced—though I doubt it because it had earlier read the background correctly. But the result of such quick and dirty, back-of-the-envelope calculations for what is supposedly a low-risk parking area, well away from the restricted hot zones, do give one pause—especially as the ongoing lack of dosimeters means that no one really knows a given individual's cumulative dose. The amount of exposure to a thing that you cannot see, hear, smell, taste, or feel sneaks up on you. Even when you think you are safe, you are not.

If nothing else, the fact that a simple, random spot-check registered so highly is an eye-opener, and counter to what has been officially portrayed. An April 16, 2015 story in the *Asahi Shimbun*—one of the major, reputable, national newspapers in Japan, of a stature comparable to the *New York Times*—quoted a government agency as saying: "Cleanup crews around the crippled Fukushima No. 1 nuclear power plant were exposed to an average dose of 0.5 millisievert of radiation per year, well below the government safety standard, a report shows."

An important item seemed to lie further down in the article, which noted: "However, the health ministry said the number of workers surveyed is different from the total number of cleanup personnel reported by the Environment Ministry, which could mean the association failed to record radiation doses of all individuals working around the Fukushima plant."

No wonder there has been public distrust and charges of a lack of clarity about the radiation clean-up operation, as can be seen in the title of a 2013 *Guardian* newspaper article: "Life as a Fukushima clean-up worker—radiation, exhaustion, public criticism." Even when the approximately 7,000 workers involved in the clean-up do wear dosimeters, that is no guarantee of accuracy; there have been reports of a Tokyo Electric Power Company executive who tried to force clean-up workers to manipulate dosimeter readings to artificially low levels by covering their devices with lead shields.

The voice of science

Because of such activities, it is hard to pin down basic data. Accordingly, the conference had been a key opportunity for researchers from different countries and different fields—including physicists, of course, but also economists and climate scientists, among others—to get together and compare notes.

Nearly 80 scientists, engineers, and academics from all over Japan attended. Many of the Japanese attendees were renowned academics in nuclear physics and engineering. Several had held high-level positions in the nuclear research establishment. Among international participants were delegates from the United States, Germany, and South Korea, among other places.

While there were no representatives from China at the meeting, Jusen Asuka, an environmental policy professor from Tohoku University, gave his analysis of the impact of Fukushima on the Chinese nuclear program. He said that the accident in Fukushima created a figurative, as well as literal, shock wave throughout China: **People started stocking up on iodized salt, and stores ran out of the substance within 30 minutes of opening.** The Chinese government suspended all license applications for new reactors, temporarily halted all nuclear plant construction, and established a nuclear safety law. China also began investing heavily in non-hydro renewables.

The meeting's goals

The importance of the meeting could hardly be underestimated, given that Japan is at a critical juncture in its debate about what path to follow in its energy future. On the one hand, a conservative government led by Prime Minister Shinzo Abe and backed by powerful forces in business and the nuclear industry, was pushing hard to bring back the nuclear plants—and even build new ones. Simply put, the Abe administration's objective is to make the Fukushima Daiichi tragedy a thing of the past; therefore, it promotes the idea that things are getting back to normal. After all, Abe won an election victory in December 2014, with one plank being that the nuclear plants would be restarted. Abe is counting on the fact that with 54 nuclear reactors in a small country, many people's livelihoods

depended on the reactors' continued operation.
It is hard to tell if the government's promotional campaign is succeeding. The Abe government is continuing to push for the revival of nuclear power in Japan, as exemplified by the recent restart of the Sendai plant.
By doing so, it clearly sought to lay down a marker—and also perhaps to gauge public opinion before proceeding to restart other plants.
On the other hand, public opinion has been growing stronger in opposition—although the opinion polls have not been overwhelming. One of the significant aspects of the conference was the vigorous participation of women scientists like Miyake, who spoke out strongly against nuclear power and also challenged the male domination in the scientific community. Young mothers were participating in increasing numbers in anti-nuclear protests in Japan and also in Korea, we were told by Hye-Jeong Kim, a leader of the anti-nuclear movement in South Korea, who is also a member of the country's Nuclear Safety and Security Commission, an equivalent of the NRC in the United States.
With these developments in mind, a scientific community that can speak with one voice and make a credible case against the government-industry publicity campaign is crucial. The Japanese Scientists' Association envisioned its role as accurately communicating to people around the world the dangers of nuclear power and the seriousness of the damage suffered by the Japanese people. And the group hoped to use science to counter the forces that promote nuclear power in Japan, and demand that Japan give top priority to renewables.

A welcoming banner
Heading north towards Tomioka, we found large tracts of land piled high with green trash bags. From a distance, the piles looked like vegetation; **it was only as we got closer that we saw that they were full of the radioactive dirt that had been excavated from the topsoil as part of the government's efforts to decontaminate the soil. It appeared to be a hopeless task.**
In reaching Tomioka—badly hit by the tsunami—we found a nearly destroyed town invoking an image of the Apocalypse. All we saw were homes, businesses, and shops as they stood or fell after the tsunami hit and then the radiation struck. There was no sign of life other than decontamination workers going about their grim task.
Continuing our journey toward Namie—one of the worst-hit towns, whose boundaries lie about six miles northeast of Fukushima Daiichi at the closest point—we passed through the small villages of Okuma and then Futaba. We continued onward, and edged as close as 1.5 miles from the plant at one spot, but no closer. All roads to the plant from here on were barricaded. Ironically,

one banner welcoming visitors to the town read: "Nuclear Power is Our Future."

Can Japan make the switch to renewables?

A key goal of the conference was the public announcement that the Japan Scientists' Association formally opposed nuclear power in Japan, and that its opposition was based upon scientific analysis of the accident in Fukushima and its impact. This about-face was a major step; it meant that some of the same Japanese scientists who had been the most forceful and outspoken proponents of nuclear energy now opposed it. To bolster the impact of this statement, the association had to show both the economic and technical feasibility of alternative sources of energy. Consequently, much of the meeting focused on the lessons learned from the experiences of other countries, and the keynote speaker of the conference, Professor Juergen Scheffran of Hamburg University, Germany, gave the European perspective on the implications of the transition from fossil and nuclear to renewable energy. The focus was especially on Germany, which is in the middle of its own planned transition to a non-nuclear future.

With that in mind, Reiner Braun, co-president of the International Peace Bureau in Geneva, Switzerland, spoke about the status of the German exit from nuclear power and entrance into renewables. Known as *Energiewende* in German (literally "energy turn"), it would entail shutting down all nuclear plants by 2022, with seven plants shut down immediately. The renewable energy sector would be expanded at the same time that there was a step-by-step reduction in fossil fuel use; modern natural gas plants are to be used as a transition technology. Structural changes would also be made to the distribution network to account for the decentralized nature of the new energy supply.

Braun, a veteran of the protest movements against nuclear weapons and nuclear power, said it was important to understand why a politically conservative government had made this U-turn. A vast majority of the German people had rejected nuclear energy and there were decades of organized resistance, starting with massive protests against the stationing of NATO's tactical weapons on German soil. While progress was promising so far, Braun reminded his audience that *Energiewende* was the "largest technological challenge" faced by the country since the post-WW II reconstruction efforts. The political challenges, meanwhile, were comparable to those encountered after the reunification of the two Germanys after the end of the Cold War.

But there was no doubt it had to be done, or that Japan could learn from observing the German experience. The feeling from the meeting was best summed up by the conference chair, Tsuyoshi Kawasaki, an expert on climate science and an emeritus professor at Tohoku University. Kawasaki ended his brief remarks with the words: **"The Japanese Scientists' Association believes that human beings and nuclear power cannot coexist."**

I was reminded of these words many times as we toured the forbidden land of once-lively towns of Fukushima prefecture.

It might have been worse

Finally we arrived at Namie, our destination, and as close as we could get to the actual plant itself. Another of our guides, Baba Isao, an Assemblyman from the town, had secured special permission for us to enter. We first went to the town hall for a quick lunch; the building had undergone a decontamination operation and there were a few town employees at work. A radiation level monitor with a large digital readout was in front of the building.

Namie had a population of 21,000 before it was evacuated. About 14,000 were relocated within Fukushima prefecture (his family being one) and 6,000 outside. Two hundred people were known to have perished in the tsunami. Isao told us that his wife had gone back to their house a few weeks ago and found the radiation level to be 34 microSieverts per hour, which is nearly 7 times higher than the "hotspot" we had encountered in J-Village. It would be considered an absolute no-go. Newspaper reports have cited other such hotspots in Namie.

Isao said that some people wanted to return, but he had advised them against it, although we found a convenience store to be open. Meanwhile, the government was making Namie's clean-up a priority, undertaking infrastructure improvement and house-to-house decontamination. **The town was considering a proposal that would allow people to return in 2017**, but Isao was doubtful.

In addition to the presence of radiation, there was another reason not to return: There were no longer any jobs in these communities, where the nuclear power plant was the *raison d'etre* for the town. In fact, before the accident, in a bid to boost the economy, the town had been negotiating with the Tohoku Electric Power Company to set up another nuclear plant in Namie.

We found a perfect ghost town where life ceased to exist, as if a light switch had been turned off. Abandoned homes were now inhabited by cats. In the downtown area there were closed stores, including a barbershop and a bakery. All looked as if the employees were on a break. There were tens of bikes left at the train station; a few buses were parked in their designated spots as if waiting for commuters to disembark from a train.

We drove through more silent streets before arriving at an elementary school, which had been in the tsunami's path. The school building was destroyed, but the children miraculously survived by running to a hill nearby. Inside the building, there were children's lockers with small boxes for crayons. A memorial *stupa*—a mound-like, Buddhist shrine—stood on the roadside, with flowers and candles.

From the elementary school, we could just barely see what appeared to be the top of the turbine buildings of the Fukushima Daiichi plant. Red and white construction cranes hovered over them. Namie escaped more damage thanks to the prevailing winds, which dispersed much of the fallout toward the ocean. And what if that second nuclear plant had already been up and running when disaster struck? Ironically, Namie had been lucky. Things could have been much worse.

Subrata Ghoshroy *is a research associate at the Massachusetts Institute of Technology's Program in Science, Technology, and Society. Before this, he was for many years a senior engineer in the field of high-energy lasers. He was also a professional staff member of the House National Security Committee and later a senior analyst with the Government Accountability Office. He is a frequent contributor to the* Bulletin.

How plutonium undermines the Hibakusha

By Mustafa Kibaroglu

Source: http://thebulletin.org/hiroshima-and-nagasaki-lessons-learned/how-plutonium-undermines-hibakusha

Akira Kawasaki wrote In Round One that the noble disarmament efforts of the ***Hibakusha*—survivors of the atomic bombings of Hiroshima and Nagasaki**—"have often been ignored" outside Japan. Indeed, the *Hibakusha*'s message has "sometimes been misinterpreted so badly" that it has "been portrayed as an incentive for nations to develop nuclear weapons in the name of deterrence."

That is a shame. Still, I can't help wondering if the world's failure to heed the *Hibakusha*'s message may be attributable at least in part to Japan's vast, growing stockpile of plutonium. I wonder if possession of so much fissile material dilutes the disarmament message that Japan—as the only nation to have suffered wartime detonations of nuclear weapons—is uniquely qualified to deliver.

Over the years Japan has accumulated about 47 metric tons of plutonium (separated from spent reactor fuel). Of the 47 tons, 36 are stored in the United Kingdom and France; 11 reside in Japan. This quantity of plutonium—enough to build

thousands of nuclear weapons—considerably diminishes the international community's confidence that Japan will never attempt to develop nuclear weapons. And thus it undermines the sympathy that Japan deserves as the world's only direct victim of nuclear warfare.

Certain political tendencies in Japan exacerbate the problem. As Kawasaki wrote, "the doctrine of nuclear deterrence is challenged less and less" in Japan today, and "a handful of ideologues … advocate that Japan become nuclear-armed itself." Meanwhile, when disarmament advocates suggest that Japan follow Sweden's example by making non-nuclear status a permanent, unconditional feature of the country's foreign and security policy, Japanese officials reply that the country's Atomic Energy Basic Law already forbids military uses for nuclear technology. This does not inspire confidence within the international community that Japan will remain non-nuclear forever.

What to do

Japanese authorities should consider taking a series of tangible steps to provide the utmost assurances that under no circumstances will Japan ever go nuclear.

First and foremost, Japan's plutonium stocks must increase no further. This means scrapping plans for the **Rokkasho plutonium reprocessing facility**—which, after decades of delays and tens of billions of dollars in expenditures, is now scheduled to begin operating in 2016. Second, Japanese authorities should consider expanding their program for using plutonium-uranium mixed oxide fuel in power reactors. This could lead to reductions in plutonium stocks over time. If Japan separated no more plutonium and gradually used up the plutonium it already possesses, it would send a powerful nonproliferation message to the world—and perhaps strengthen international efforts to make the proposed Fissile Material Cutoff Treaty a reality.

I realize that taking Japan to task over its plutonium stocks could be perceived as an injustice when the Japanese government's nonproliferation record has been commendable over the decades. And I realize that Japan's leaders, understandably, worry about North Korea's nuclear arsenal. Thus it is only fair to suggest that, while Japan solves its plutonium problem, its friends and allies seek ways to strengthen solidarity with Tokyo and enhance the nation's security.

Mustafa Kibaroglu *is the chair of the Department of Political Science and International Relations and director of the Center for International Security Studies and Strategic Research at MEF University in Istanbul. Previously, he has held positions at Harvard's Belfer Center for Science and International Affairs, the Monterey Institute of International*

Studies, and Bilkent University in Ankara, Turkey. Since 2007 he has been a Council member of the Pugwash Conferences on Science and World Affairs.

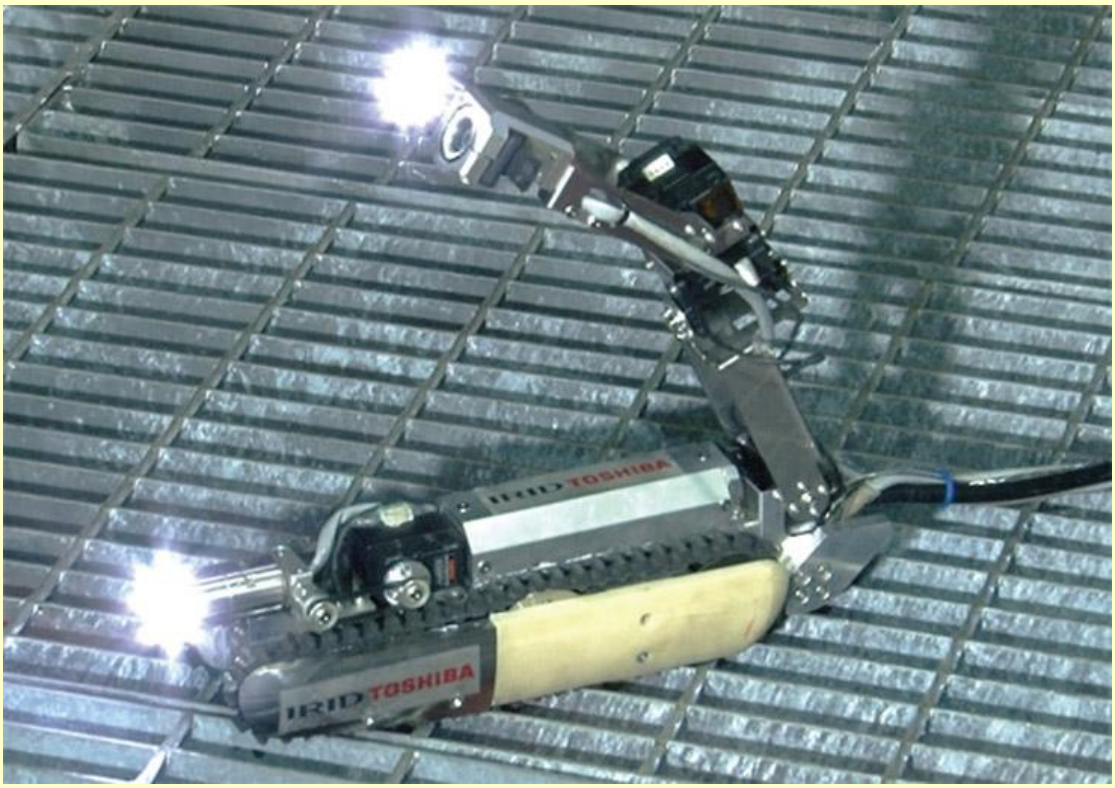
Scorpion robot prepares to roam through nuclear wastes

Source: https://www.crisis-response.com/comment/blogpost.php?post=152

It seems nature is truly king when it comes to inspiring today's robotics engineers. Following the development of disaster relief robots modelled on snakes and apes, Japanese manufacturer **Toshiba** has recently introduced a new robot resembling a scorpion that it hopes will finally allow engineers to assess the damage following the 2011 earthquake in Japan that devastated several nuclear reactors at the Fukushima power plant.

Two operators control the robot remotely, one controls movement with a video game-like controller, the other guiding the camera and video feed. Its 'tail' is fully manoeuvrable, with LED lights and cameras mounted on both the front and rear. Most impressively, it contains a flexible joint that allows the robot to right itself, should it tip over.

Toshiba designed the robot specifically for the purpose of investigating the nuclear plant, as it is built to withstand radiation levels far beyond the lethal dose to humans, and to squeeze through the narrow ducts designed originally for fuel rods.



Following one month of training exercises, the scorpion robot will embark on its one-day mission into the reactor to examine the melted nuclear fuel that remains, helping scientists to determine the extent of damage and evaluate options for the eventual clean-up and disposal of the fuel. Following its survey of the structure, Toshiba hopes to design a successor robot that can venture even further into the reactor. The mission won't be easy – two earlier 'snake' robots broke down shortly after entering the reactor, and **even the scorpion robot is only designed to last 10 hours in the radiation-heavy environment**.

While the scorpion robot is limited to this particular mission, similar designs could one day be used in the future to survey chemical or nuclear disaster zones and assess damage, search for survivors, and even contain further damage.

At the same time, such robots illustrate the work that remains to be done, as they are both slow and lack the dexterity needed for fine motor tasks. Ultimately, the goal of many governmental

agencies, such as DARPA, is to develop a more general, all-purpose robot useful for a variety of disaster scenarios.

You can buy a nuclear warhead on the black market

Source: http://www.businessinsider.com/you-can-buy-a-nuclear-warhead-on-the-black-market-2015-8

▶ **Watch the related video at source's URL.**

You can buy anything on the Bulgarian black market, including drugs, women, guns, and even fully functional nuclear warheads.
Fascinated by a French reporter's ability to purchase a nuclear warhead on the black market, American journalists from Vice traveled to Bulgaria to meet the man who sold it, according to the video below.
They met with Ivanoff, a former military-intelligence colonel turned entrepreneur, whose business led him into the Saudi Arabian building industry.
Through his business dealings, Ivanoff met with terror mastermind Osama Bin Laden, who was interested in making a "dirty bomb" out of radioactive waste. Ivanoff suggested why not get the real thing, a nuclear warhead.

Case closed: French judges end Yasser Arafat murder-by-radioactive-poisoning inquiry

Source: http://www.homelandsecuritynewswire.com/dr20150903-case-closed-french-judges-end-yasser-arafat-murderbyradioactivepoisoning-inquiry

Sept 03 – French judges who were investigating charges by the Palestinian Authority and the widow of Yasser Arafat that he was murdered by being poisoned with radioactive material, have closed the case without bringing any charges.
"At the end of the investigation … it has not been demonstrated that Mr. Yasser Arafat was murdered by polonium-210 poisoning," according to a statement from the prosecutor from the court in Nanterre, near Paris.
Al *Jazeera* reports that Arafat died in November 2004, aged 75, in Percy military hospital near Paris after developing stomach pains and exhibiting symptoms of a more general deterioration while living under Israeli siege at his partially destroyed headquarters in Ramallah.
His widow, Suha, charged he was poisoned (see more in "French experts rule out foul play in 2004 death of Yasser Arafat.. In 2012, Swiss scientists in a lab in the city of Lausanne examined some of his personal effects, including a hair brush, a tooth brush, and pieces of clothing, and also sixty tissue samples taken from his exhumed body, and found levels of radioactive polonium-210 isotope at least eighteen times higher than normal.

The tissue samples and personal effects were also examined by a team of French scientists and, at the insistence of the Palestinian Authority, by a team of Russian scientists.
The French and Russian teams found no abnormal radiation levels and dismissed the Swiss team's findings.
The investigating judges in France, relying on the findings of the French scientists' investigation, said on Wednesday that there was "not sufficient evidence of an intervention by a third party who could have attempted to take his life."
Al Jazeera notes that the French judges concluded their investigations in April and conveyed their findings to the Nanterre prosecutor, who recommended in July that the case be dropped.
The Swiss scientists, while saying they had found "abnormal levels of polonium" in Arafat's body tissues and personal belongings, stopped short of saying that he had been poisoned by the substance.
Toxicologists say that the isotopes polonium-210 and lead-210, found in Arafat's grave and in the samples, were of "an environmental nature," the Nanterre prosecutor, Catherine Denis, said in April.
Tawfiq Tirawi, the head of the Palestinian Authority's inquiry committee into Arafat' death, refused to accept the judges' conclusions, or the earlier findings by the French and Russian scientists. "We'll continue our investigation to reach the killer of Arafat until we know how Arafat was killed," he told AFP.
Lawyers representing Arafat's widow accused the judges of a rush to judgement, and called for more experts to be asked to look into the matter.

Nuclear War Theme Parks: Mass Destruction for the Whole Family

By John LaForge
Source: http://www.huntingtonnews.net/121623

Sept 07 – Plutonium was named after Pluto, "god of the underworld," Hades, or hell. It was created inside faulty reactors, concentrated, and machined by US scientists into the most devastating and horrifying of all weapons.
Photos of what the Manhattan Project's plutonium bomb did to human beings at Nagasaki prove the point. There is radioactive blowback in the fact that the thousands of tons of plutonium created since 1945 is so dangerously hot and long-lived that, like the underworld itself, nobody knows how to handle it at all -- except maybe to trivialize it.
Hoping perhaps to show that the bomb from hell can be transformed from a vengeful, self-destructive, nightmare demon, into a benign, peace-loving, fairy-tale prince, nuclear propagandists and their friends in Congress are establishing nuclear war theme parks -- without the taint of mass destruction -- at former bomb factories and nuclear weapons launch pads all across the country.
Tours are being **offered at the "B Reactor," on the Hanford Reservation in Washington State** which in 2008 was declared a National Historic Landmark. Plutonium production reactors for the nuclear arsenal were sloppily operated there for decades, releasing large amounts of radioactive fallout and causing permanent tainting of groundwater which now

threatens the Columbia River—cover it up, make it a destination.
A National Wildlife Refuge has been established at Rocky Flats, Colorado, outside Denver, where the machining of plutonium for nuclear bomb cores has poisoned dozens of square miles.
EDITOR'S NOTE: *Huntington's contribution to the era is a concrete pad which in the 1950s until its dismantling / demolition in 1979 housed the Huntington Pilot Plant. Elements such as nickel carbonyl, uranium and plutonium were either part of the*

manufacturing process or generated from recycling of materials used at gaseous diffusion plants in Portsmouth, Paducah, and Oak Ridge. The contaminated debris from HPP would be secretly buried in Piketon, Ohio. Workers there, at other diffusion plants, at Hanford, Rocky Flats, and other sites died a generation or two later from exposure to radioactivity.

Near Fargo, North Dakota, the State Historical Society has acquired a deactivated Minuteman missile launch control center, dubbed it "Ronald Reagan Minuteman Missile Site," and opened it to tourism.

Launch Facility Delta-09, Minuteman Missile National Historic Site
National Park Service Photo

In South Dakota, a retired launch control center is now the **Minuteman Missile National Historic Site** and is run by the National Park Service. With enough willful blindness -- that if looked at squarely, might be considered a kind of devil worship -- visitors may go underground and personally simulate a missile launch. "Satan laughing with delight."

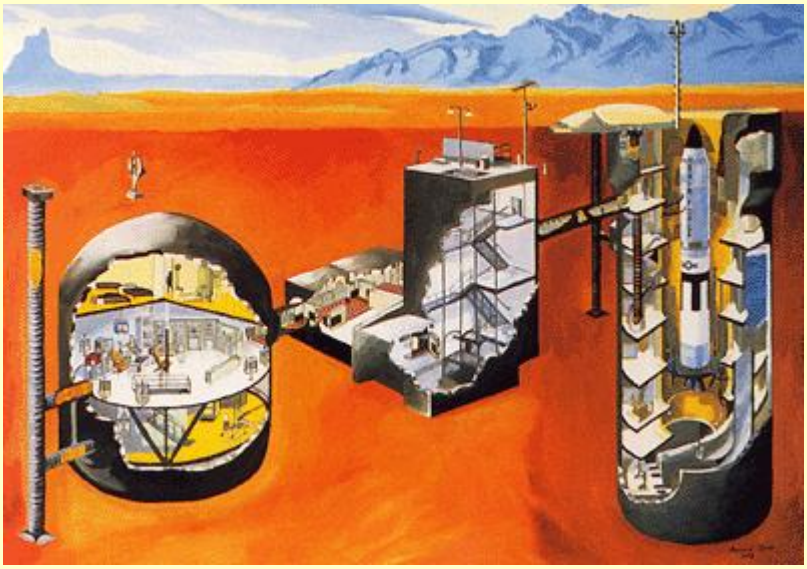
Outside Tucson, Arizona, you can tour the **Titan Missile Museum** which opened in 1986 and was designated a National Historic Landmark in 1994.

At White Sulphur Springs, West Virginia, six hours from Washington, DC, the Greenbrier hideaway was built by the Eisenhower Administration as a nuclear war fallout shelter for 1,000 people -- including members of Congress and their families. The bunker came with a generator, a 60-day supply of food, a hospital, kitchen, dining room, waste-disposal, and a dental operating room.

Of course, a nuclear attack on Washington would have rendered evacuation impossible, the airport a smoldering ruin, and the trains unworkable. Now deactivated and elegantly restored, the site is making money by charging visitors for tours.

In 2011, then-Interior Secretary Ken Salazar recommended to Congress that a national historic park be established to honor

the Manhattan Project -- the secret program whose atom bombs killed 140,000 people at Hiroshima and 70,000 at Nagasaki. National Park Service Director Jonathan Jarvis said then in a press release, "Once a tightly guarded secret, the story of the atomic bomb's creation needs to be shared with this and future generations."



Jarvis insults our intelligence by feigning ignorance of the vast literature concerning the development and use of nuclear weapons which is available

in any good library -- histories based on formerly classified documents that demolish the official government myth -- that the Bomb

"ended the war" and "saved lives."

These nuclear war theme parks are part of a deliberate attempt to trivialize nuclear weapons and to dumb down popular understanding of their environmental and human health legacy. After employing hellish mythology to manufacture real massacres so vast that governments might quake, it wasn't too big a leap for the same scientists to follow Hiroshima and Nagasaki with 16,000 human radiation experiments on US citizens, 100 atmospheric bomb tests, deliberate mass venting of radiation, intentional "test-to-failure" reactor meltdowns, and ocean sinkings of tons of rad' waste and entire navy propulsion reactors. All this coldblooded recklessness severely and permanently endangers human, animal and environmental health, because radiation in the body in cumulative doses attacks the gene pool in multi-generational perpetuity. Enormous radiation releases by commercial reactors and nuclear waste sites -- at Windscale, Chelyabinsk, Tomsk, Three Mile Island, Chernobyl and Fukushima, etc. -- have resulted directly from the nuclear weapons program first unveiled in a show of butchery, and later peddled like laundry soap to an uninformed public as a "peaceful atom" that would bring "electricity too cheap to meter." We now know the nuclear age will bring a never-ending due bill too gargantuan to quantify.

Last month, thanks largely to Senators from nuclear weapons states Tennessee and New Mexico, a Manhattan Project National Historical Park was officially authorized. Oddly, three proposed sites for this "park" are secret sections of the Oak Ridge National Lab in Tenn., off limits to the public.

In view of the fact that the Manhattan Project's atomic bombings of Japanese cities were not merely unnecessary but known in advance not to be necessary, the United States should be making formal apologies to the victims and their survivors in Japan, and offering reparations to them, not glorifying the planning, preparation and commission of mass destruction.

John LaForge *works for Nukewatch, a nuclear watchdog group in Wisconsin, edits its Quarterly newsletter, and is syndicated through PeaceVoice.*

You can print your own guns at home. Next it will be nuclear weapons. Really!

By Daniel C. Tirone and James Gilley

Source: http://www.washingtonpost.com/blogs/monkey-cage/wp/2015/09/07/you-can-print-your-own-guns-at-home-next-it-will-be-nuclear-weapons-really/

Sept 07 – An undated image released by Defense Distributed shows the parts of the "Liberator," which is being touted as the world's first 3-D printable handgun. (Defense Distributed via EPA)

Once again, with mass shootings in a church in Charleston, S.C., and a movie theater in Lafayette, La., Americans are discussing gun control — or discussing why we are not discussing it. With so many mass shootings and so little action, President Obama recently called gun-law reform the policy area in which he has "been the most frustrated and the most stymied."

But technology is a bigger obstacle to reducing future gun deaths than either the National Rifle Association or differing interpretations of the Second Amendment. Within a few years, the

greatest challenge to the government's ability to control firearms will be advances in additive manufacturing, popularly known as "3-D printing."
The ability to "print" or manufacture guns privately will allow individuals to bypass background checks, the primary way that guns are regulated today. And that challenge will expand exponentially as the technology advances, one day enabling individuals to print chemical, biological and nuclear weapons of mass destruction at home.

How do you run background checks on someone who can print a gun at home?
Today, licensed firearms dealers are responsible for conducting background checks and ensuring that they sell only to people legally eligible to purchase. That's part of the reason that Obama's 2013 gun-control proposals included not only more restrictions on who is permitted to buy and own guns, but also called for private sellers — who today don't have to run background checks — to sell instead through licensed dealers.

That's not possible when individuals can print their own weapons at home. With no seller, who runs background checks or denies purchase? The government's control mechanisms fall apart.
This is not a futuristic speculation; 3-D printed handguns are already on the street. The government is struggling to respond to these guns, which are hard to detect and deadly.
Oddly enough, the State Department has made one effort at regulating whether these weapons will be available within the United States. The State Department has asked a Texas-based organization called Defense Distributed to remove from public access the blueprints for its 3-D printed "Liberator" handgun and other related files, arguing that making these available outside of the country may violate International Traffic in Arms Regulations. Defense Distributed is challenging these proposed restrictions on the grounds that they violate the First and Second amendments.

Next up, weapons of mass destruction: How do you control their spread if they can be privately printed?
The threat of privately printed weapons will soon grow beyond the lethal handguns now in circulation. As we argue in research forthcoming in the October issue of the Journal of Policing, Intelligence and Counter Terrorism, considering expected advances in the technologies, terrorist groups will threaten nations with 3-D printed chemical, biological and nuclear weapons within a couple of decades.
Consider two facts. First, terrorists are now more willing to utilize WMD than before. Bruce Hoffman has argued that while at one point the conventional wisdom was that terrorist groups had no desire to inflict mass casualties, the 9/11 attacks and the rise in religiously motivated terrorism showed that this logic no longer holds.
Second, the opportunity to use WMD will expand as 3-D printing makes these weapons more available. In the past, only countries could reliably manufacture WMDs, given the formidable technical and economic investments involved. Accordingly, as Albert Mauroni has written, most major anti-proliferation measures and agreements have focused on preventing states from transferring WMD technology to non-state groups. The few instances in which non-state groups have successfully produced and used

WMDs, such as the 1994 and 1995 Aum Shinrikyo attacks, have shown that "the technical difficulties of achieving such an attack are considerable," as scholars such as Gavin Cameron argue.
That barrier will fall when 3-D printers can manufacture these weapons. Private groups will be able to bypass international controls on weapons production and proliferation — in much the same way that individuals producing handguns at home can bypass point-of-sale firearms controls.

When should we expect to see WMDs that can be printed at home?
When will 3-D printing become advanced enough to produce WMDs? Though it sounds like science fiction, the best projections suggest that it will happen within a few decades. The technology to print from standard metals such as steel and titanium already exists, allowing for firearms far stronger than the roughly made and fragile plastic handgun. Progress in mixed-materials printing, which can currently use 14 materials in the same printer, is being made both in the laboratory and among hobbyists. Work in biological materials is expanding at a rapid pace, with scientists printing human organs, medications and even hamburgers; bacteria and chemicals aren't far behind. Production is also moving beyond simple items, allowing for the fabrication of increasingly complex objects. As an example, SpaceX is utilizing innovative 3-D printing techniques to manufacture components for its spacecraft and rocket engines.
Most important, laboratories have already printed at the molecular level. Continuing progress in this area could allow for subatomic printing using the basic components of atoms – which can lead to printing nuclear materials. Such printing will probably migrate out of the lab within 20 to 30 years. These trends will accelerate with improved printer resolution and advances in the types of materials used. Within the past two decades, 3-D printers have gone from being formidably expensive laboratory instruments to desktop boxes that cost less than $1,500. Prices will keep dropping as the technology advances, so private users will one day be able to afford more complex printers that can produce chemical, biological and nuclear weapons.

What is to be done?
Governments should begin thinking now about how to expand 3-D printing's tremendously useful potential to improve lives — while simultaneously countering its potential for mass destruction.
Concerns include possible civil liberties infringements — such as those at the heart of Defense Distributed's lawsuit — and technological advances that outpace the government's ability to respond. 3-D printing promises to be the largest change in production methods since the Industrial Revolution. Let's be ready for the dangers.

Daniel C. Tirone *is an assistant professor of political science at Louisiana State University.*
James Gilley *is a PhD candidate in political science at Louisiana State University.*

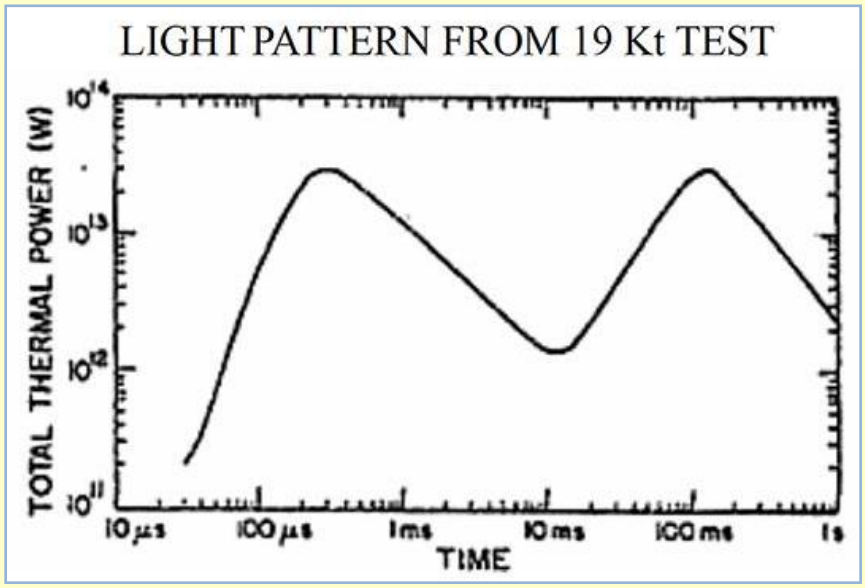
Flash from the past: Why an apparent Israeli nuclear test in 1979 matters today

By Leonard Weiss
Source: http://thebulletin.org/flash-past-why-apparent-israeli-nuclear-test-1979-matters-today8734

At a time when the Iran agreement is in the headlines and other Middle Eastern countries—notably Saudi Arabia—are making noises about establishing their own programs for nuclear energy and nuclear weapons, it is worth giving renewed scrutiny to **an event that occurred 36 years ago: a likely Israeli-South African nuclear test over the ocean between the southern part of Africa and the Antarctic.** Sometimes referred to in the popular press as the **"Vela Incident"** or the "Vela Event of 1979," the circumstantial and scientific evidence for a nuclear test is compelling but as long as many items related to the test are still classified, all the questions surrounding it cannot be resolved definitively. Those questions allow wiggle room for some observers (a shrinking number) to still doubt whether the event was of nuclear origin. But more and more information revealed in various publications over the years strongly supports the premise that a mysterious double flash detected by a US satellite in 1979 was indeed a nuclear test performed by Israel with South African cooperation, in violation

of the Limited Test Ban Treaty. The US government, however, found it expedient to brush important evidence under the carpet and pretend the test did not occur.

The technical evidence—evidence that has been reviewed in earlier publications—led scientists at US national laboratories to conclude that a test took place. But to this should be added more recent information of Israeli-South African nuclear cooperation in the 1970s, and at least two instances—so far unverified—of individuals claiming direct knowledge of, or participation in, the nuclear event, one from the Israeli side and one from the South African. And information provided by national laboratory scientists regarding the state of the satellite's detectors challenges the view given by a government panel that the flash was likely not that of a nuclear test.



The US government's use of classification and other means to suppress public information about the event, in the face of the totality of technical and non-technical evidence supporting a nuclear test, could be characterized as a cover-up to avoid the difficult international political problems that a recognized nuclear test was assumed to trigger.

This cover-up is all the more troubling because it runs contrary to President Obama's speech in Prague in 2009, in which he stated: "To achieve a global ban on nuclear testing, my administration will immediately and aggressively pursue US ratification of the Comprehensive Test Ban Treaty. After more than five decades of talks, it is time for the testing of nuclear weapons to finally be banned." Later, in the same speech, he said: "We go forward with no illusions. Some will break the rules, but that is we need a structure in place that ensures that when any nation does, they will face consequences."

Yet Israel and South Africa broke the rules, but they did not face consequences. All of this is more than "ancient history;" there is no statute of limitations on nuclear arms agreement violations.

▶ **Read the rest of the article at source's URL.**

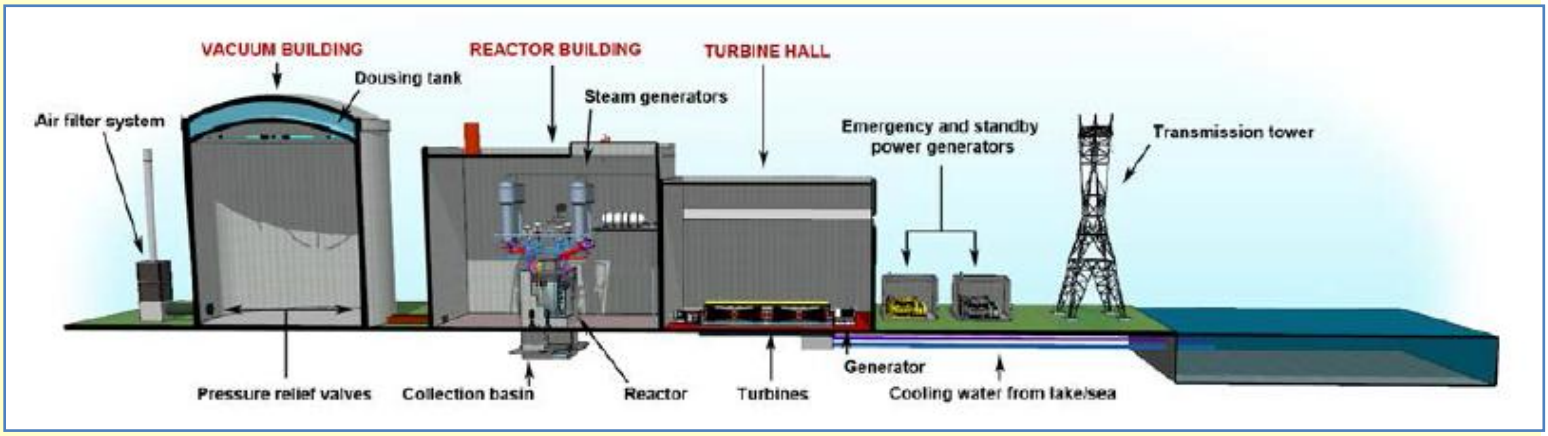
Leonard Weiss *is a visiting scholar at Stanford University's Center for International Security and Cooperation. For more than 20 years, he worked in the US Senate as Sen. John Glenn's staff director on the Governmental Affairs Committee, writing legislation and leading investigations in the areas of nuclear proliferation and nuclear safety. He was the lead Senate staffer on the Nuclear Nonproliferation Act of 1978 and the Glenn Amendment to the Foreign Assistance Act of 1961. He is a former tenured professor of applied mathematics and engineering at Brown University and the University of Maryland.*

Study of Consequences of a Hypothetical Severe Nuclear Accident and Effectiveness of Mitigation Measures

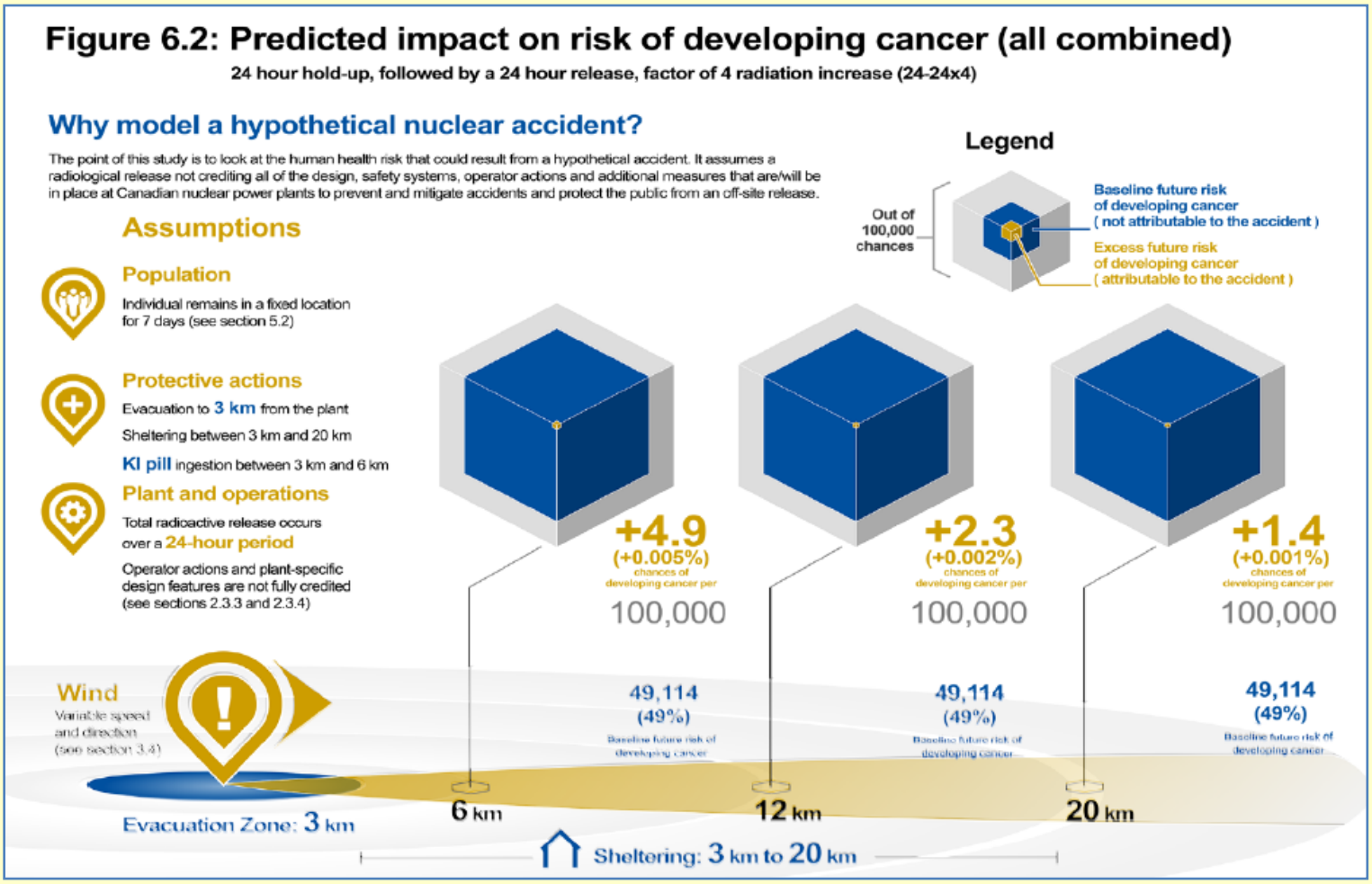
Source: http://www.nuclearsafety.gc.ca/eng/resources/health/hypothetical-severe-nuclear-accident-study.cfm

Sept 2015 – The *Study of Consequences of a Hypothetical Severe Nuclear Accident and Effectiveness of Mitigation Measures* was done to assess the consequences and possible preventative mitigation of a hypothetical severe nuclear accident in Canada. It addresses concerns raised during public hearings in December 2012 on the environmental assessment for the Darlington Nuclear Generating Station refurbishment project.

In June 2014, the draft study was released for public consultation and presented to the Commission.



Following the consultation period, the CNSC addressed and incorporated Commission feedback and comments from over 500 submissions from the public, government and other organizations. Certain study assumptions and language were clarified, and information was added on a number of topics such as reactor behaviour, emergency response decisions, risk acceptability, and comparisons to effects from the Fukushima accident. In some cases, dose and risk results were updated, using a statistical approach more consistent with how dose modelling would be done in an actual emergency. These



changes did not alter the conclusions of the report.

A subsequent update was presented to the Commission in March 2015. The study was published on CNSC's website in both languages in September 2015, in advance of Part 2 of the Darlington relicensing hearing being held in November 2015.

Some of the severe accident scenarios predicted doses that are comparable to the actual doses measured at Fukushima. The study concludes that, in the unlikely event of a radioactive release, there would be no detectable increased risk of cancer for most of the population, with the exception of an increase in childhood thyroid cancer risk. The result is not unexpected given the sensitivity of a child's thyroid gland to radiation. The findings emphasize the continued importance of considering sensitive receptors (i.e., children) in emergency planning, such as KI pill administration.

▶ **Read the study:** Study of Consequences of a Hypothetical Severe Nuclear Accident and Effectiveness of Mitigation Measures

Testing radiation detection systems in harsh conditions

Source: http://www.homelandsecuritynewswire.com/dr20150922-testing-radiation-detection-systems-in-harsh-conditions

Sept 22 – Researchers from five laboratories and a private company recently spent two days in blistering 100 degree heat testing radiation detection technologies amidst cargo containers. The fifteen researchers demonstrated the feasibility of using gamma-ray and neutron imaging detectors to identify radioactive materials using the Lawrence Livermore National Laboratory's (LLNL) cargo container stack testbed.

"The purpose of our test was to develop the concept of operations for deploying to a real-world port or on a cargo ship," said LLNL physicist Morgan Burks, the host for the exercise. "Each imaging system explored different search methods in order to optimize the detector's speed and sensitivity.

"The ultimate goal is to develop technology suitable for searching a large shipping vessel for radioactive material. This particular test is a way for the participating labs to characterize their equipment before taking it onboard a ship," Burks said.

LLNL says that three national laboratories — LLNL, with its GeGi germanium gamma-ray imager developed over the past decade; Lawrence Berkeley, and Oak Ridge — tested gamma-ray detectors, as did a commercial firm, H3D.

Sandia National Laboratory-Livermore, participated in the tests with a neutron imaging technology. And the Remote Sensing Laboratory from Andrews Air Force Base used hand-held scanners (non-imaging) as a benchmark with the other imaging technologies.

One of the detectors used during a radiation detection exercise last week was Lawrence Livermore's GeGi germanium gamma-ray imager that has been developed over the past decade. Shown from left are former LLNL employee and current Oak Ridge National Laboratory employee Klaus Ziock, LLNL post-doc Jonathan Dreyer and LLNL graduate student Lena Heffern.

LLNL riggers scaled the 32-foot-high testbed — outfitted with fifteen shipping containers that are 8 feet tall by 8 feet wide by 20 feet long — to place the radioactive sources. Riggers from the Remote Sensing Laboratory also climbed the containers to use their

hand-held scanners to check the sources.

One search method involved performing a quick scan around the testbed's entire perimeter, before returning to focus on the hot spots.

Another method took detailed images from various locations, then triangulated the precise location of the sources.

"Most of the radiation detection systems were able to not only locate which container held various sources, but to indicate in what part of the container the source was placed — front, back, near the floor, ceiling, etc.," Burks said.

Some of the challenges for the testing included hidden radioactive sources very high up in a stack, or there may be several intervening stacks, which can attenuate the signal.

Burks termed the two days of testing as "a very valuable experience for all of the teams."

"It will help us for real-world deployments next fall. We gained experience working in harsh conditions (101 and 104 degree Fahrenheit temperatures) and learned from each other about various search methods and the unique capabilities of gamma-ray and neutron imaging systems," he said.

LLNL notes that during the 2016 fiscal year, the teams will perform dockside radiation tests in the Savannah, Georgia area, checking shipping containers for radioactive materials. They also will conduct measurements on ocean-going ships while they are at sea.

The radiation detection test work is sponsored by the Department of Energy's NA-22 Office of Nonproliferation Research and Development. The collaboration is headed by Michael Hornish of the Remote Sensing Laboratory at Andrews Air Force Base.

Rats To Detect Mines

Source: http://i-hls.com/2015/08/rats-to-detect-mines/

For thousands of years man has been using animals for various needs – for food, for fighting, for company or more. Although a lot of us may be scared of them, it seems rats have come in particularly handy lately. Turns out rats are the most suitable animal for tracking mines. They have a highly developed sense of smell and can scan large areas, and most of all, rats are too small and light to trigger the mines.

These advantages led to Cambodia's decision to use rats in missions to detect mines and unexploded ordnance buried in the ground after many years of war.

Apopo, a non-profit organization that works in Asia and Africa training rats, claims that rats can detect mines much better than detectors and other means. James Pursey, communications manager for Apopo, explains that the reason for this lies in the fact that rats ignore metal scraps such as old coins and bolts and sniff out only the main ingredients of the mines.

And what do the rats get out of the deal? They are trained using the click-and-reward technique. A clicking created by the rat offers them a reward- a banana or peanuts usually, which are their favorite treats. Very soon the rats come to realize that the clicking sound is associated with food and start looking for the required smell, in this case TNT, to receive a reward.

Later the rats are trained to receive rewards for more specific tasks, such as sniffing out holes, distinguishing TNT from C4 from other explosives and more. In order to signal their trainer that the task was accomplished, the rats are trained to scratch the ground's surface.

No doubt that the nickname these rats received in Cambodia, HeroRat, is very suitable for the important job they do – saving people's lives.

Cleaning explosives pollution with plants

Source: http://www.homelandsecuritynewswire.com/dr20150904-cleaning-explosives-pollution-with-plants

Sept 04 – Biologists at the University of York have taken an important step in making it possible to clean millions of hectares of land contaminated by explosives.

A team from the Center for Novel Agricultural Products (CNAP) in the University's Department of Biology has unraveled the mechanism of TNT toxicity in plants, raising the possibility of a new approach to explosives remediation technology. TNT has become an extensive global pollutant over the last 100 years and there are mounting concerns over its toxicity to biological systems.

York University reports that the study, which is published in *Science*, also points to the potential of a new type of herbicide which could be used sustainably in rotation with other herbicide types, to limit the emergence of herbicide resistance.

TNT has a significant impact on the diversity of soil microbial communities and the

establishment of vegetation. The majority of TNT remains in the roots of plants, where it inhibits growth and development. In the U.S. alone it is estimated that some 10 million hectares of military land is contaminated with munitions constituents.

Whereas it is possible to ban toxic and polluting chemicals, the huge demand for military explosives means that TNT will continue to be used globally on a massive scale.

The researchers discovered that a key plant enzyme — MDHAR6 — reacts with TNT, generating reactive superoxide, which is highly damaging to cells. They found that mutant plants lacking the enzyme, previously implicated in protecting plants from stress, in fact have an enhanced TNT tolerance. By targeting this enzyme in relevant plant species, it may be possible to produce TNT resistant plants to revegetate and remediate explosives at contaminated sites such as military ranges and manufacturing waste sites.

Professor Neil Bruce, who led the research, said: "There is a lot of interest in natural mechanisms for the removal of recalcitrant toxic chemicals from the biosphere and because of the scale of explosives pollution, particularly on military training ranges, the remediation of polluted land and water as a result of military activity is a pressing global issue."

Dr. Liz Rylott, who co-led the research, said: "Only by eliminating the acute phytotoxicity of TNT can plant-based systems be successfully used to clean-up contaminated sites. Our work is an important step on that journey."

Since MDHAR6 is plant specific, compounds that react with the enzyme in the same way as TNT, yet are readily degraded in the environment, could also be screened for herbicide potential.

Professor Bruce added: "This is an important additional finding as it is an increasing concern that although herbicide resistance has been increasing steadily since the 1970s, no new herbicide mode of action has been commercialized since the 1980s."

— Read more in Emily J. Johnston et al, "Monodehydroascorbate reductase mediates TNT toxicity in plants," Science 349, no. 6252 (4 September 2015): 1072-75.

IONSCAN 600 - Explosives trace detector

Source: http://www.smithsdetection.com/index.php/products-solutions/explosives-narcotics-detection/61-explosives-narcotics-detection/ionscan-600.html?lang=en#.VfG89Jc42z8

Feature highlights:

- Non-radioactive IMS source
- Easy to use interface requires minimal training
- Small, lightweight and portable
- Fully operational, hot-swappable batteries
- Cost effective swabs
- Meets ECAC/EU standard for cargo and passenger screening

The IONSCAN 600 is a next-generation, portable desktop system used to detect and identify trace amounts of explosives. It features a proprietary non-radioactive ion mobility

spectrometry (IMS) source, which means licensing from national nuclear regulatory agencies is not required.

Universal software icon commands make training and operation of the IONSCAN 600 fast and easy. Onboard diagnostics also assist operators with maintenance and offer troubleshooting for error resolution.
Sampling is vastly improved and done manually with cost-effective, single-use swabs, or with an optional low-cost, redesigned wand.
The IONSCAN 600 is optimized for minimal maintenance and features a robust design to help enhance productivity.
Weighing just 23 pounds (10.4 kilograms), the IONSCAN 600 features a built-in handle that provides easy portability. Hot-swappable batteries provide sampling and analysis capability while still in use. The system also offers unmatched performance throughout extreme temperatures.
IONSCAN 600 provides accurate trace explosives detection for global aviation and critical infrastructure markets.

Specifications

Detector type	Non-radioactive IMS source
Sample collection	Trace particle
Calibration	Automatic internal self-calibration
Alarm method	Substance identification with configurable audio alarm
Consumables	Low cost single-use swab, verification pen
Expandability	4 USB 2.0 (2 front/2 back)
Connectivity	Ethernet, Wi-Fi option, 4 USB 2.0 (standard, 2 front/2 back)
Weight	23lbs (10.43kg)
Battery	1 hour full operation, hot-swappable
Analysis time	8 seconds or less

Warm-up time	Less than 10 minutes
Data display	9” high resolution, anti-reflective, color touch screen
Dimensions	14.6 x 11.4 x 12.8in (37.1 x 29.0 x 32.5cm)
Operating temperature	14 to 122°F (-10 to +50°C)
Operating altitude	13,780ft (4,200m)
Operating humidity	0 to 95% non-condensing
Explosives detection	Military, commercial and HMEs (RDX, TNT, PETN, NG, AN, UN, HMTD, TATP, EGDN, Tetryl, HMX, Sulfur, TNB, DNT and others).
Narcotics detection	Available 2015
Storage Capacity	50,000 samples
Printer	External
Power	100-240V AC, 50-60Hz
Other	Optional sampling wand, no hazardous parts, tamper proof

A new weapon in the fight against RCIEDs

Source: http://www.army-technology.com/features/featurea-new-weapon-in-the-fight-against-rcieds-4647155/?WT.mc_id=WN_Feat

To date the best method for de-mobilising IEDs has been to jam the signals used to set them off – isolating that signal has, however, proved to be a needle in a haystack kind of challenge. A new multirole jammer built by Airbus could change all that, as Dr Gareth Evans reports.

There is nothing new about improvised explosive devices (IEDs); despite their very modern connotations, they have a surprisingly long history stretching back at least as far as the American Civil War, and arguably much further. What is new, however, is the elevation of the IED to the weapon of choice for insurgents, their huge proliferation around the world and the mounting tally of deaths and appalling injuries to conventional forces and civilian populations alike wrought by today's radio-controlled versions (RCIEDs) in particular.

Easily and cheaply built using commercially available products such as mobile phones or garage door openers, RCIEDs can be triggered from a long distance, allowing users to remain safely hidden from the danger of both the explosion itself and any chance of being traced and engaged by those under attack.

Jamming the trigger

One obvious solution to the threat is to prevent the firing signal from actually reaching the device, either by blocking the specific trigger frequency being used - if you know it - or by jamming the whole radio spectrum if you don't. There are, however, problems with both approaches.

For a while, information gleaned from recent attacks can allow the triggers being used to be predicted and then blocked, but that intelligence may often be highly specific to a given area or a particular bomb maker - and in any case, the RCIED landscape is an ever-changing one as new tricks are developed. At best, such approaches are distinctly time-limited. While that is not an issue for blanket jamming, that approach suffers from practical constraints; it may often be impossible to block the entire frequency range, either because jammers have limited power, or simply because some bands are needed for 'friendly' uses such as communications.

As Kyle Lin explained in his paper 'Game-theoretic models for jamming radio-controlled improvised explosive devices' for the (US) Naval Postgraduate School, "the effectiveness of jamming is highly dependent on how the jamming power is allocated among frequency bands."
It calls for what is, in effect, finding the electronic warfare equivalent of the proverbial needle in a haystack, but now reactive jamming, a responsive technology using continuous wideband scans that detect and react to suspect signals as they appear, is helping to make that possible. New state-of-the-art systems such as the recently developed Multirole Jammer from Airbus Defence and Space, for example, allow all of the jamming effort and energy to be focussed on the immediately relevant frequency range - and that translates into greater safety for people on the ground.

Millisecond response
According to Lothar Belz, head of media relations for CIS/electronics at Airbus Defence and Space, the system can detect an intended trigger signal and jam that part of the spectrum to prevent detonation in under one millisecond - at least 100 times faster than the fastest blink of a human eye. It is also designed to keep its technical edge and so stay ahead of the ongoing RCIED/anti-RCIED arms race.
"Our products are fully software-defined jammers, allowing us to quickly react on new threats. This also ensures long-term use for our customers since they can upgrade to the latest set of capabilities by a simple software upgrade," says Belz. "The hardware is designed in a modular and very scalable fashion, so we can proactively work on future threats that we anticipate, even before they materialise in the theatre."

SMART jamming
At the heart of the system lies Airbus' own ultra-fast SMART technology - responsive jamming based on innovative digital receiver and signal processing technologies - which enables the system to hone in on the specific frequency being used to send a detonation signal. It means that in its counter-RCIED role, the jammer is constantly analysing the radio spectrum around a vehicle, and can act almost instantly to block transmission intended to trigger a bomb in a highly efficient and targeted way, but as the term 'multirole' suggests, the device has other capabilities too.
The system can be extended to enable a comprehensive picture of the wider radio environment to be built up, providing valuable operational communications intelligence (COMINT) which ordinarily requires separate - and less available and less easily deployed - equipment to amass. In addition, the company says, it can also take on a conventional tactical communications jamming (TCJ) role, providing a versatile, single-package system that offers optimal use of power, weight and payload space.
Belz says that although operationally TCJ and anti-RCIED tasks are separate jobs that are usually not performed simultaneously, technically it would be possible to do both at the same time. Having already successfully integrated counter-RCIED jamming with COMINT functionality and TCJ in the Multirole Jammer, he feels that the trend will continue.
"We expect to see further development and further convergence with other fields - more integrated multifunction applications," he adds.

Platform adaptability
According to Airbus Defence and Space, SMART responsive jamming is already operational in its Vehicle Protection Jammer, and although the company is understandably reticent about disclosing their international customer list, Belz confirms that the technology is in use in multiple nations as of today. Part of the reason for this

success can be found in the system's adaptability - particularly in terms of its antenna requirements, which is widely recognised as one of the most critical parts of any anti-RCIED package, almost as important as the radio hardware itself.

"The antenna systems are adapted to the individual platform on which the jammers are installed to achieve the best performance and satisfy each customer's requirements," Belz says. "Thus the antennas used vary widely."

Flexible future

Flexibility is likely to be an increasingly important feature in the fight against RCIEDs, not least because the threat they pose changes so quickly, with bomb makers developing new techniques as fast as their old ones are countered. The pace of their technological and tactical innovation creates challenges that need to be addressed in days or weeks, not months or years. Defence blogger Newton Hunter believes the problem is almost certainly only going to get worse.

"We tend to think about IEDs as something from Afghanistan and Iraq, but they've actually now been used in more than 100 countries around the world - and the numbers of attacks are rising monthly," he says. "The bad guys are adopting different technologies too, like drones. We've taught them how effective drones can be, and now they've started using them against us."

Hunter says that over the last ten years, the US alone has spent around $17bn on various kinds of counter-IED systems, on top of roughly $45bn spent on mine-resistant vehicles.

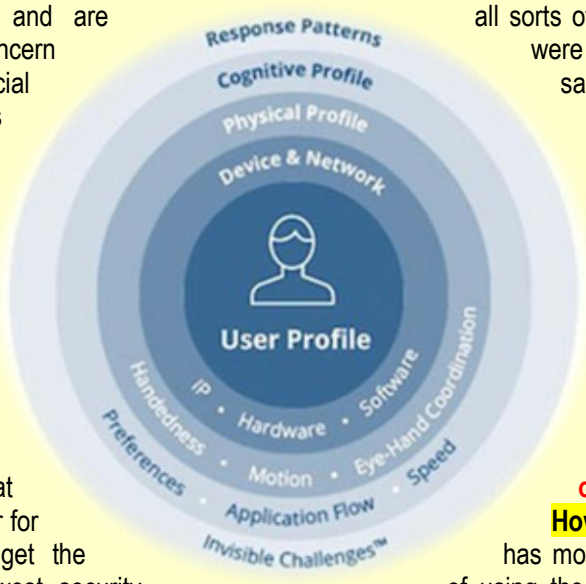
"The problem with that is, we've been spending billions of dollars to deal with weapons that cost just tens of dollars to make. It's the ultimate asymmetry," he adds.

If Belz is right, however, and anti-RCIED development does see ever greater convergence between individual technologies, and the growth of integrated multi-functionality within single devices, then the Multirole Jammer and its descendants could be the start of redressing that cost imbalance. More importantly, it might finally give us the edge in the battle against the bombers, and on a human scale, mean fewer lives being taken by roadside bombs.

Next Generation of Cyber Security: Behavior Based Security System

Source: http://i-hls.com/2015/08/next-generation-of-cyber-security-behavior-based-security-system/

Security leaks have reached an all-time high these days, and are causing great concern among financial advisors, business owners and consumers. Nowadays there are ways to deal with this problem and prevent cyber criminals from getting the information they're looking for, or at least make it harder for them. You could get the very best and newest security software or teach consumers and employers to keep better security on their login details to computers and internet sites.



These methods do make sense but are inherently flawed. There's always the difficulty or making sure that all employees in a certain company will follow strict security instructions. Even if you give a fiery speech on the importance of "strong" passwords, there will always be at least one person in the room that would still be using "password123", which is just the type of weak link a hacker is looking for in order to access the system.

Another problem is the constant progress in security and encryption systems. There is a behavioural pattern in the cyber security field, characterized in recurring attempts to outdo the opponent and to always stay one step ahead. In other words, computer security personnel will always come up with new protections and cyber criminals will always find breaches in the new defense softwares. So all the progress in cyber security field could serve us, but only for a limited time, and therefore, improving the cyberspace firewalls could never lead to a complete victory that crushes all cyber attacks once and for all.

Despite of this pessimistic note, it seems feverish minds have come up with an alternative method. Instead of continuing to focus on stopping cyber criminals by putting up all sorts of firewalls, new technologies were developed in order to detect said criminals red handed – Which is exactly what **BioCatch** company was able to do. **The company developed a technology that recognizes users' behavior patterns on certain computer applications and, according to that data, creates a usage profile on that computer.**

How does it work? Each user has more or less recurring patterns of using the computer. You must move the marker in a certain way, type at a more or less fixed speed or hit the keys with a specific force. According to those characteristics and more, BioCatch can decide whether the person using your identification details really is you. It's rather similar to the security service offered to us by banks, when each time we use our credit card from an unusual location, say from out of the state, someone from the bank will call or send a message to make that it really is us who used it.

Should the software detect a different pattern of typing or browsing, for example, the system makes the user provide extra verification in order to keep surfing. The main weakness of this software is that fact that human behavior isn't always consistent. After a long day of work you probably type a little slower and that means the system could get the pattern wrong and lock your account. It's also needless to say that following users' behaior online must be more coomplicated than building another new security program. In spite of the faults, however, we're probably expected to see many more services and products of this kind in the coming years.

DHS S&T Announces Licensing of Cyber Security Network Anomaly-Detection Technology

Source: http://www.dhs.gov/science-and-technology/news/2015/08/31/st-announces-network-anomaly-detection-tech-licensing

Aug 31 – The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) today announced that another cybersecurity technology has been licensed for commercialization. This is S&T's fourth technology that has successfully advanced through the Transition to Practice (TTP) program to the commercial market. The PathScan® technology, developed by Los Alamos National Laboratory is a network anomaly-detection tool that is being licensed to Ernst & Young LLP (EY). With this license, EY will bring PathScan to the private sector for the very first time.

"Innovative technology solutions are key to keeping pace with today's cyber threats," said DHS Under Secretary for Science and Technology Dr. Reginald Brothers. "Our TTP program is bridging the gap between the private sector and national labs to help transition lab technology to the commercial market."

In 2012, the TTP program identified PathScan as a promising candidate for transition to the commercial marketplace. By utilizing statistical models to identity network behavior, this technology quickly detects the movement of hackers once they breach the network and allows operational teams to quickly defend important network information.

"Public and private sector enterprise organizations need technologies that bring innovative approaches to bear so they are able to detect and defend against sophisticated cyberattacks," said TTP Program Manager Mike Pozmantier. "The PathScan technology is an example of a tool that does this, and if the cybersecurity industry can bring these types of services and tools to market, the playing field will start to level between the offense and defense."

Established in 2012 as part of S&T's Cybersecurity Division, the TTP program looks to transition federally funded cybersecurity technologies from the laboratory to enterprise consumers. The program, led by S&T's Michael Pozmantier, also seeks to create institutional relationships between the cyber research community, investors, end users, and information technology companies by showcasing the technologies across the country to develop pilot and collaborative opportunities.

"Besides identifying mature government-funded cybersecurity technologies for potential transition, TTP's priority is to connect the federal research community and private industry," said Pozmantier. "Historically these groups have had infrequent interactions. If we can help develop these relationships it will reduce the time it takes to transition necessary technology into practice."

Each year the TTP program selects eight promising cyber technologies to incorporate into its 36-month program. S&T introduces these technologies to end users around the country with the goal of transitioning them to investors, developers or manufacturers that can advance them and turn them into commercially viable products.

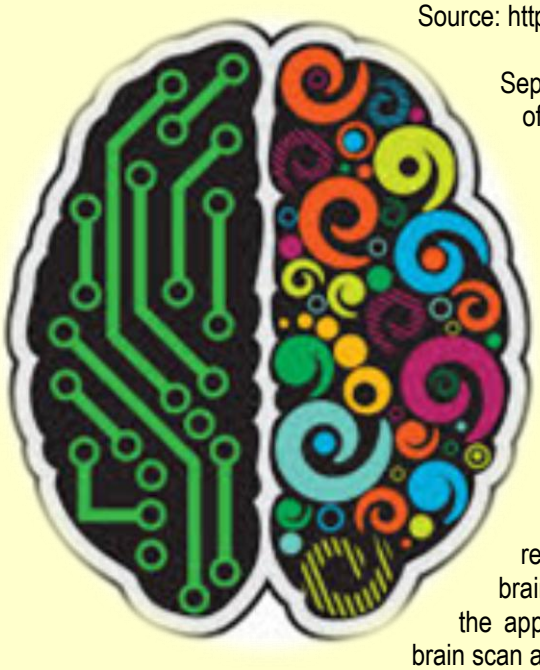
Now in its third year, TTP has 24 technologies (eight from fiscal year 2013, nine from 2014 and seven from 2015) that are ready for transition to the marketplace. Four of those technologies—Quantum Secured Communication , Hyperion, NeMS, and now Pathscan—have successfully transitioned to the marketplace through commercial licenses. During the next few months, S&T will introduce eight new technologies to TTP's FY16 class and will start to showcase these technologies within critical infrastructure sectors and to potential investors.

S&T anticipates that the successful transition of PathScan to the commercial marketplace will open the door to new technology partners and raise the visibility of other worthy technologies developed by the national labs as solutions to complex cybersecurity challenges.

For more information, visit scitech.dhs.gov/cyber-research, or view the TTP project video.

Could Your Brain Waves Be Hacked?

Source: http://i-hls.com/2015/09/could-your-brain-waves-be-hacked/



Sept 11 – In light of numerous cyber attacks and security breaches, of which the attack on the American Office of Personnel Management (OPM) was perhaps the most prominent, computer engineers have been hard at work developing new ways to keep businesses and identities protected online. **One of the latest innovations is a biometric brainprint, which engineers claim will provide unprecedented levels of data security.** In a June 2015 study called **"Brainprint"** out of Binghamton University in New York, researchers demonstrated the viability of the brain to respond to certain words in place of traditional passwords.

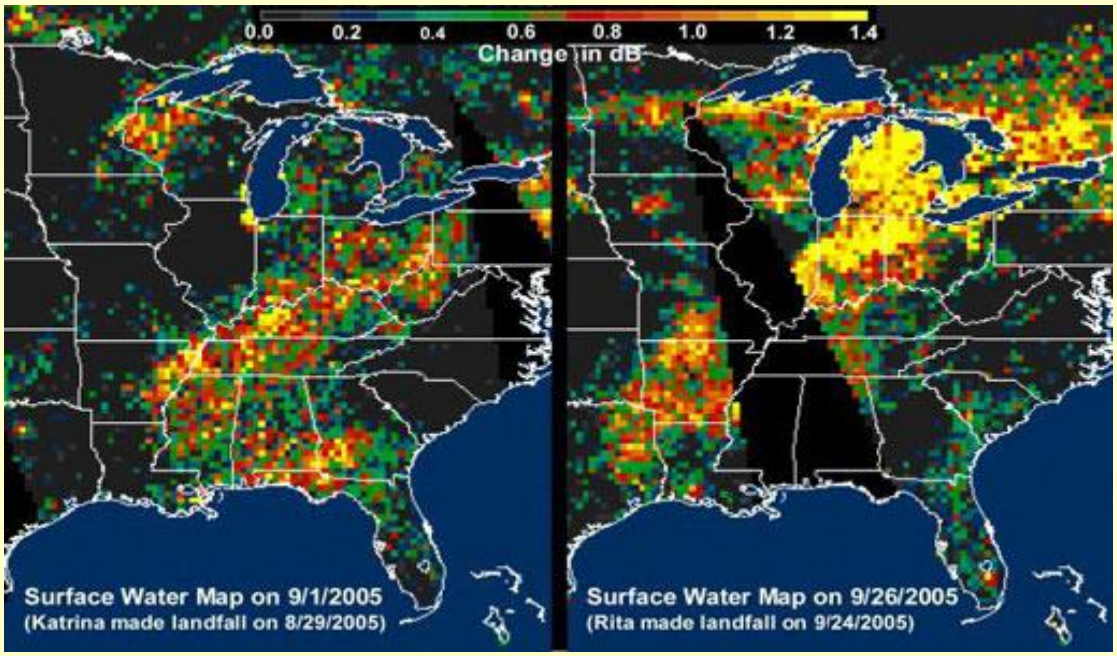
For the study, 45 volunteers read a list of 75 acronyms and researchers recorded the brain's reaction to each word. Within 94 percent accuracy, researchers found each person's brain responds differently to such acronyms, making the case for brainwaves to be used as identity verification. According to the study, the appeal of brain biometrics is cybercriminals cannot simply steal a brain scan as they can a password or fingerprint.

The "Brainprint" study was performed by attaching three electrodes to each volunteer's scalp – the minimum requirement to measure brain waves. This worked well for a focused study but the mainstream population can't be expected to attach electrodes to their brains every time they want to shop online or access their bank accounts. Until engineers develop a more comfortable and convenient way to measure brain waves, consumers aren't likely to make the switch from traditional passwords. To overcome this challenge, engineers need to start small and start in the enterprise. If, for example, they can protect sensitive government data, brainprints may eventually make their way to consumers as well. **Brainprints, unlike other biometric prints, are potentially "cancellable."** They can be reset by showing individuals a different set of acronyms or images to create a new, unique print and that cannot be stolen as easily as a fingerprint.

However, no security system is bulletproof and identifying new ways of protecting information may in fact create an equal but opposite reaction, meaning hackers could presumably take on any security system and find breaches in it. Therefore, **engineers must think like a hacker when developing new security strategies to stay one step ahead of cybercriminals and prevent future data breaches.**

The lessons of Hurricanes Katrina and Rita

Source: http://www.homelandsecuritynewswire.com/dr20150825-the-lessons-of-hurricanes-katrina-and-rita



Aug 25 – As the tenth anniversary of hurricanes **Katrina (29 August) and Rita (23 September)** approaches, memories of the storms vividly remain for Texans. Katrina killed more than 1,800 people and Rita forced the largest evacuation in Texas history, with more than three million people leaving the Houston-Galveston area. There are lessons to be learned from both, says a Texas A&M University severe storms expert.

R. Saravanan, professor of atmospheric sciences who specializes in studying climate variability, says the storms were historic not only for their intensity, but also as part of the most active hurricane season ever. In 2005, a record twenty-seven named storms occurred, and fifteen of them became hurricanes, seven of which became major hurricanes. Of those seven, an unprecedented 4 reached Category 5 status.

Texas A&M reports that Katrina was the costliest hurricane ever and one of the five most deadly storms ever to hit the United States.

Its high winds and storm surge engulfed New Orleans completely, so much so that fifty-three breeches occurred in the city's levee system, resulting in 80 percent of the city becoming flooded. **It damaged more than 800,000 housing units, causing $81 billion of damage in 2005 dollars, and killed more than 1,500 people in Louisiana and at least 230 in Mississippi.**

"The lessons learned from the Katrina disaster were immediately visible during the response to Rita a month later," Saravanan explains.

"People took the evacuation warnings seriously. However, hurricane activity has been relatively weak since then, with very few hurricanes making landfall. People may be a bit more complacent now, but I think Katrina is still fairly fresh in their memories.

"Both Katrina and Rita also exposed some of the flawed assumptions in risk management and insurance coverage that hopefully have been fixed to some extent."

Although Houston dodged much of the power of Rita, the storm caused millions to flee their homes. The storm killed at least 120 people, some of them as a result of evacuation efforts, such as twenty-three people who died in a bus accident near Dallas.

Gasoline shortages, inadequate **evacuation routes**, immense **traffic jams**, gridlocked roads, **power failures** and other miseries caused many persons who fled the storm to say they would never evacuate again.

"There were problems with **evacuation** procedures," Saravanan adds.

"It shows that we still need to educate the public about the nature of hurricane forecasts that can lead to evacuations. When looking at it from a risk management prospective, it (evacuating) is still worth it."

Texas has managed to dodge other storms in the ten years since Katrina and Rita, but it is only a matter of time before another major hurricane hits the Texas coast, Saravanan says.

"The hazards **of building homes too close to the water** have become very evident," he notes. "We have learned a lot from both storms. At the national level, Katrina and Rita led to major research initiatives to improve hurricane forecasts. Computer models have slowly but steadily been improving, and we have developed a better 'cone of uncertainty' about hurricane trajectories.

"Hopefully, these and other improvements have led to more precise storm warning and evacuation directives."

Screening Risk Analysis Tools for Resilience of Critical Infrastructure & Regions

By Jerry P. Brashear & Paula Scalingi

Resilience, a central element in any recovery, is established before potentially disastrous events. Twenty-one federally sponsored risk methods and tools were screened for possible use as the core of a defensible, repeatable risk/resilience management process that would capture the greatest benefits for available budgets. None was fully ready for this role, but several hold promise for further improvement.

Source: http://www.domesticpreparedness.com/pub/docs/DPJAugust15.pdf

Design Requirements / Methods, Tools & Processes	A. Key Decisions								B. Process Outputs					C. Costituent Terms						D. Scenarios		E. Focus of Application	F. Apparent Maturity Level
	1. Rank Assets by Criticality	2. Rank by Risk	3. Decide to Design Options	4. Value Options	5. Rationalize Budget	6. Evaluate Performance	7. Regional Interdependencies Anal.	8. Aggregate to Reg., St., US	1. Conditional Risk | Threat = 1.0	2. Full Owners' Risk	3. Full Regional Public's Risk	4. Resilience Metric (Expected Outage)	5. Option Value (Net Benefit)	1. Event Threat Likelihood/Frequency	2. Vulnerability, Given Event	3. Consequences, to Owner & to Public	4. Outages of Service	5. Dependencies & Interdependencies	6. Option Life-Cycle & Budget Costs	1. Non-Standardized	2. Standardized		
Ratio Scale Methods																							
CISR Risk Management Process Design Objectives																					A	Lifelines, Em. Mot., Gov. All	5
Common Risk Model – Dams (USACE)										2				1							M	Dams	4
Component Level Risk Mgt for Bridges (FHWA)										2										M		Bridges	3
Component Level Risk Mgt for Tunnels (TSA)										2										M		Tunnels	3
Costing Asset Protections for Transportation Agencies (CAPTA, DoT, TRB)										2										N		Various Transportation	3
J100-10 (EPA, IP with AWWA); Nashville regional field test (S&T)														3				4			A	Water, Sewer, Elect.,etc.	4.5
J100-15 (AWWA), *in progress*														3				4			A	Water, Sewer, Elect.,etc.	4.5
Threat & Hazard Identification & Risk Assessment (THIRA, FEMA)											2									A		Community, Core Capab.	3
Ordinal Scale Methods																							
Maritime Security Risk Analysis Method (USCG)																						Ports	3
State Energy Assessments (DOE)																						Electricity	3
Voluntary Chemical Assessment Tool (VCAT, IP)																						Chemical	3
Vulnerability Assessment Framework (FHWA)																						Highways	3
Vulnerability Assessment Scoring Tool (VAST, FHWA)																						Highways	3

Notes: Scenarios: A = all; M = malevolent only; N = natural only

1. CRM uses T = 1.0 for single-dam assessments, but uses an "adversary value model" T = F(V,C|dam attack) to establish a relative risk for a set of dams.
2. Risk is conditional risk, assuming threat likelihood = 1.0.
3. Threat likelihood is calculated by a "proxy" method based on RAND/RMS and threat-asset V and C to model adversary selection of asset and attack mode.
4. Dependencies are modeled as loss of supply of critical resources, including utilities, personnel, supplies, and proximity, but are not analyzed across infrastructures.

Legend: Degree Satisfied — Required, Fully, Partially, Not

FirstResponder.com articles of interest

Source:http://www.firstresponder.gov/SitePages/Technology/Documents.aspx?s=Technology%20Documents

A Research Study of Ambulance Operations and Best Practice Considerations for Emergency Medical Services Personnel
March 27, 2015

As part of an on-going effort sponsored by the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) to develop standards, guidelines and concepts for improving ambulance patient compartment design, BMT Designers and Planners (D&P) and Carlow International performed research into ambulance driver (operator) best practices to aid in the reduction and incidence of accidents due to operator error, inadequate skills and abilities, or poor practices.
View Document

A review of Satellite Communications to Support Distributed Disaster Response
January 15, 2014

This study covers: the elements of ICT, a survey of SatCom technology, hardware and software solutions for extending the ground range of SatCom connectivity to mitigate the effects of limited bandwidth, evaluations of SatCom performance using the U.S. Department of Homeland Security Science and Technology Directorate First Responders Group's Next-Generation Incident Command System in various configurations, emerging and experimental technologies to complement satellite connectivity, including small unmanned aircraft systems and the new, enhanced public safety frequency allocations, and more.
View Document

Ambulance Patient Compartment Human Factors Design Guidebook
April 14, 2015

This Ambulance Patient Compartment Human Factors Design Guidebook (the Guidebook) has been developed as a best practices guide to help augment that safer work and patient care environment. It is a result of more than four years of research and development, testing, modeling and simulation, human performance measurements, assessment and interaction with the EMS community, ambulance manufacturers and component providers.
View Document

Wearable device helps medics save lives in disasters, on the battlefield

Source: http://www.homelandsecuritynewswire.com/dr20150901-wearable-device-helps-medics-save-lives-in-disasters-on-the-battlefield

Sept 01 – Technology and design consultancy Cambridge Design Partnership the other day announced that it has developed the world's first wearable device designed to measure and monitor the vital signs of multiple trauma patients for emergency response in disasters and battlefield situations.
The First Response Monitor is designed to help medics monitor both heart rate and respiratory rate. Respiratory rate is often neglected by automated monitoring systems and has been described as the "forgotten bio-sign," as many existing wearable monitors focus on heart rate alone and those that do measure respiratory rate have low accuracy or are difficult to use in an emergency situation.

However, the benefits of accurately monitoring respiratory rate are clear, and when combined with other parameters — such as heart rate and body temperature — can indicate life-threatening conditions such as sepsis.

Cambridge Design Partnership says that when designing the new compact device, the company interviewed a range of army medics about their needs and challenges in multiple casualty emergency situations. An unmet need was identified for a low-cost device to bridge the gap between manual methods of vital signs measurement — which can be laborious and challenging amidst the noise and stress of a disaster or on the front line - and more expensive patient monitoring systems.

The wearable biometric device not only monitors patients but collects and transmits data in real-time, enabling the medic to care for a greater number of casualties, providing more effective casualty triage to deliver better patient care.

The small device clips onto a patient's nose and monitors breathing rate and heart rate, giving "at a glance" indication of both parameters, and this data is added to a trends graph showing how these measurements have changed over time. The company says that this enables the medic to focus their efforts on providing care rather than taking measurements, and also enables the care giver to understand how the patient's condition has changed over time. The data can then be transmitted using Bluetooth to a smartphone app or tablet, enabling other data analyses such as multiple patient triage or situational awareness across the group.

The device has been primarily designed with first response medics in mass casualty incidents in mind, but it has applications in many other fields — such as civilian medicine where additional monitoring of conditions has benefit in patient outcomes, wellness monitoring, and within sports for training and performance monitoring. The technology can also be developed to provide a low-cost solution for low resource healthcare settings.

James Baker, a partner at Cambridge Design Partnership, said: "At Cambridge Design Partnership we're always looking for ways to find a solution to a clear, unmet need. With the First Response Monitor we've combined our expertise in wearable connected devices with our extensive medical experience to develop a technology for effectively measuring breathing and heart rate. The monitor can help save lives in a variety of environments and we're really keen to speak to partners about developing the potential applications further."

App helps responders save precious time during missing person searches

Source: http://www.dhs.gov/science-and-technology/lost-person-behavior-app

When someone goes missing, the first few minutes and hours of the search are critical. A key to the success of search and rescue (SAR) teams is an aggressive, well-planned initial response. However, many times, first responders on scene in a missing person search don't have the extensive training and development of initial search plans that specialized SAR teams have.

The Department of Homeland Security Science and Technology Directorate (S&T) First Responders Group recently released a mobile app, developed with the support of SAR teams around the nation, that provides step-by-step instructions on search plans for first responders and response teams. It provides search guidance, protocols and strategies used by SAR teams around the nation.

The Lost Person Behavior mobile app was released this spring and is available to download (for a fee) from Apple iTunes, Google Play and Amazon.com. Since its release, the app has received two-five star reviews from the APCO International Application Community and has been used in actual SAR operations in Virginia.

Using data from over 150,000 missing person cases across the country, the app provides guidance, tactical briefings, investigative questions, and statistics for over 40 different scenarios. These include lost hikers, hunters, children, missing vehicles, despondent individuals, dementia patients, and climbers. It also provides guidance for snow and water incidents.

"The Lost Person Behavior app is designed to provide a step-by-step checklist for first responders as well as everyday citizens involved in search and rescue efforts," said program manager Christine Lee. "The app incorporated the feedback from SAR teams across the country for the development a comprehensive set of data, such as what questions to ask and what resources to use. It provides the knowledge obtained from experienced SAR teams into the hands of someone who may never have had any training at all."

The app identifies high probability areas where an individual goes missing so searchers can initiate rapid response. It also breaks down the categories of lost people with related behavior profiles and provides a checklist of questions to ask friends and family of missing individuals. Using this data, the app uses the data to provide initial search locations and has filters for ecoregion and terrain.

The Lost Person Behavior app was developed under SBIR initiatives by dbs Productions, Charlottesville, Virginia

IT-supported management of mass casualty incidents: the e-Triage project

By Anton Donner and Javier Mulero Chaves

Source: http://www.un-spider.org/es/book/5101/4c-challenge-communication-coordination-cooperation-capacity-development

The World Health Organization (WHO) gives the following definitions of disasters and emergencies:

"Disasters are events that occur when significant numbers of people are exposed to hazards to which they are vulnerable, with resulting injury and loss of life, often combined with damage to property and livelihoods."

and

"Emergencies are situations that arise out of disasters, in which the affected community's ability to cope has been overwhelmed, and where rapid and effective action is required to prevent further loss of life and livelih-ood." (1)

These definitions imply that emergencies are characterized by limited resources in terms of medical personnel and infrastructure, which underlines the importance of mobilizing regional, supra-regional and/or international help to the affected regions. Effective deployment of this help is crucial but only possible if a common operational picture between authorities, coordination centers, and staff working in the field is rapidly developed.

Upon arrival on site, the first task of a rescue team is to look for injured persons and to assess the situation. For scenarios with many (seriously) injured persons, many countries have foreseen a standard procedure for the initial scouting, known as "triage". According to it, teams consisting of medical doctors or paramedics classify victims according to different categories (e.g., immediate, delayed, minor, no chance of survival) and attach paper labels to the victims.

Paper-based triage and registration systems are still state-of-the-art, because they are robust and their usage is intuitive. Nevertheless, the main drawback is that information about affected persons remains among the persons themselves, making disaster management considerably more difficult. Data can be duplicated/ aggregated by manually copying triage tags only, which is a laborious and time-consuming process. Moreover, as soon as there is more than one rescue team (organization) involved maintaining different lists, or there is more than one access to the disaster area (which is the typical case for wide-area disaster events with large geographical extension, like earthquakes), registration of injured/affected persons turns out to be a logistic problem since it can only be performed at defined transfer points. Besides, experience has very often shown that injured persons 'bypass' the theoretical work flow of the rescue chain (see Figure 1), because passers-by or relatives take them to the nearest hospitals. This effect implies an additional problem, namely a saturation of the geographically nearest hospitals, which very often do not have a communication return channel to coordination centers.

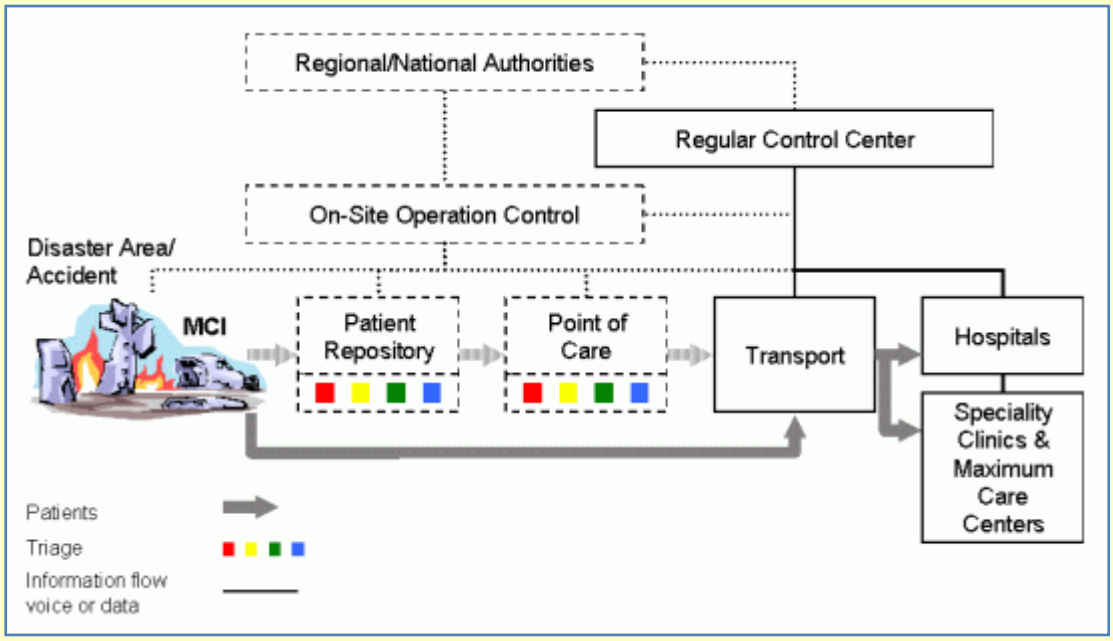


Figure 1: Present work flows and operation control for individual rescue (solid lines and blocks) and MCI (dashed lines and blocks).

Indeed, triage and registration performed at different places by different teams maintaining different lists are indubitably an error-prone approach. It can happen that all later attempts to track the way of single patients, their attendants and transport vehicles are not very successful, although this could be of key interest in scenarios with nuclear, biological or chemical hazards. Last but not least, relatives have a legitimate interest in the whereabouts of their family members.

Communication and dissemination of this information in order to provide coordination centers with an accurate situation overview (i.e. number of victims, injury categories and their location) becomes one of the main challenges to overcome, since the normal medium nowadays for exchanging information are voice-based radio systems.

Key concept

Earlier works have already described concepts for and advantages of IT-supported MCI management, which can be applied not only to operations in the field, but also to emergency rooms of hospitals. A comprehensive overview can be found in (2). Some of these system architectures include wearable sensors with wireless connectivity, e.g. (3), (4); others use radio-frequency identifications (RFIDs) in read/write mode, e.g. (2), (5), which means that data is stored both in the RFID chip and transmitted from a handheld device to a database. The main objective of this article is to describe the e Triage approach (6), which is a research project funded by the German Federal Ministry of Education and Research and which consists of four main elements: autonomous communication infrastructure, electronic data recording, a distributed database system (7), and psychological acceptance research. Outcome of the project will be a demonstrator system for registration of affected persons of an MCI. In more details, the e-Triage system comprises a satellite-based communication system with terrestrial radio cells that can be installed in the field, matching end devices with dedicated application software for the registration of victims, and a distributed, self-synchronizing database system guaranteeing maximal availability without a single point of failure. Main differences to approaches described in literature are:

- Sensors monitoring vital parameters of single patients might be a valuable tool in hospital environments, but for e-Triage the concept decision was to apply a simple classification scheme only.
- Triage tags (registration cards or colored wristbands) are not used as data storage media. Instead, a triage tag is labeled with a unique identifier (ID) in different formats only (RFID, optical matrix code, human readable text). With the ID the patient's data set can be obtained from the database.
- A distributed database system mapping IDs to persons is a key component of the approach. Not only hardware with optical/RFID scanners can be used to obtain the patient ID, but also notebook or desktop computers may be used for this purpose (with the database software running from external flash drives and the ID typed in with a normal keyboard).
- User terminals are designed primarily for regular rescue services, so that in case of a disaster they are instantly available.

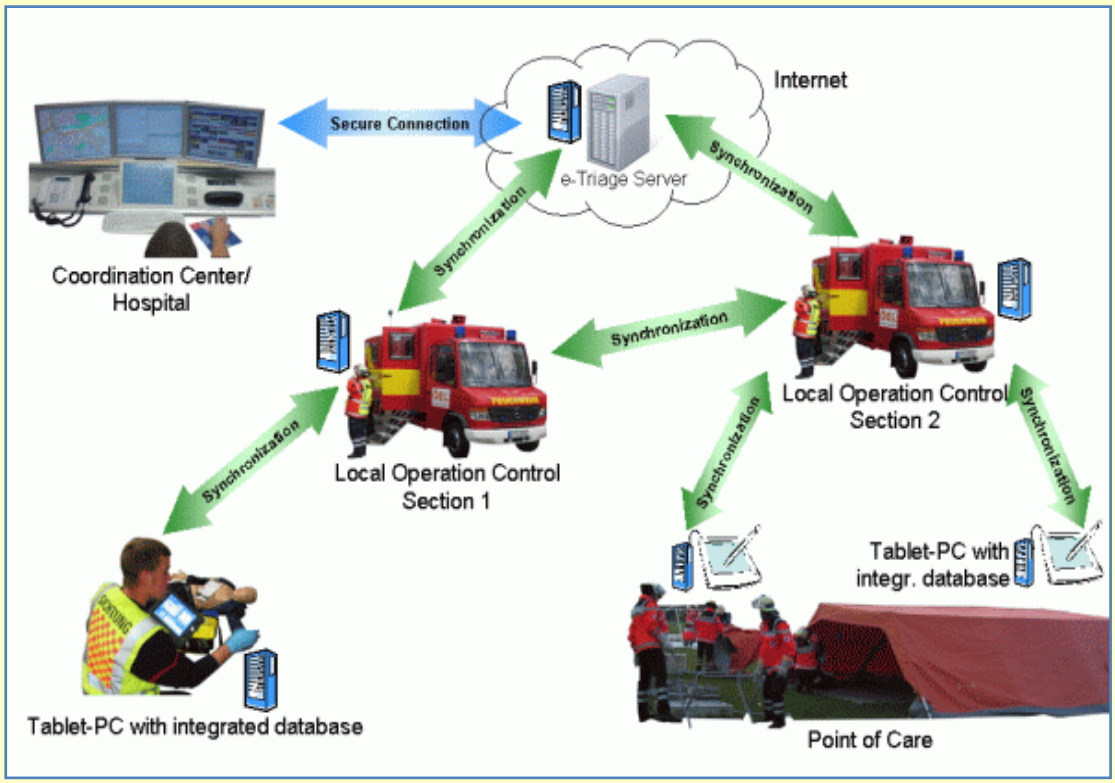


Figure 2: Distributed database system (DDBS) concept and synchronization of DDBS instances along the rescue chain.

Unique electronic labels remaining attached to victims show advantages for the subsequent rescue chain: due to the contact-free readability it is possible to equip ambulances and doorways of (field) hospitals with scanners which automatically transmit the new location (and/or the geographical position) of the respective person to the control center via various complementary wireless transmission links (see below). Additionally, patients could change their status (e.g., from category II "delayed" to category I "immediate") and this information is fed into the continuously updated distributed database allowing an operation control to trace how the situation evolves. On site forces can be redeployed and additional forces dispatched on the fields. (Field-) Hospitals can organize their care capacity, call for back-up personnel and send feedback reports to remote coordination centers. Last but not least, information regarding the whereabouts of the victims is easily obtainable and the entire information base is available for a later evaluation since MCIs are always subject to later police investigation.

Data management

Albeit the main challenge for the e-Triage system is aggregation of distributed data acquired from many terminals in the field, a fully centralized approach for data storage is not desirable. Rescue operations are temporally and spatially distributed events. Thus, a distributed data management approach has to be applied (see Figure 2). Arriving triage and medical rescue teams have to be able to start working immediately without having to wait for the communication infrastructure to be set up. Furthermore, all the collected data needs to be forwarded to local and remote decision makers automatically. As an integral part of this architecture, network outages or node failures have to be anticipated. Thus, the underlying storage technology will be a distributed database system (DDBS), which has to cope with a variety of different communication technologies, including terrestrial wireless and satellite links with different bandwidths. A basic assumption for the design is that, on the one hand, the network topology might change at any time. On the other hand, all involved communication links are not reliable so that intermittent network outages might occur (e.g., end devices leaving the coverage area of the locally installed radio cells). Nodes of this DDBS are installed in all mobile user terminals (tablet-PCs), at communication nodes (OSECEs), and in the remote area. The DDBS discovers joining and leaving nodes, and (re-)joining nodes have to be synchronized with the core DDBS. This design supports even scenarios with no network connectivity at all: it is possible to synchronize database nodes by exchanging flash memory cards.

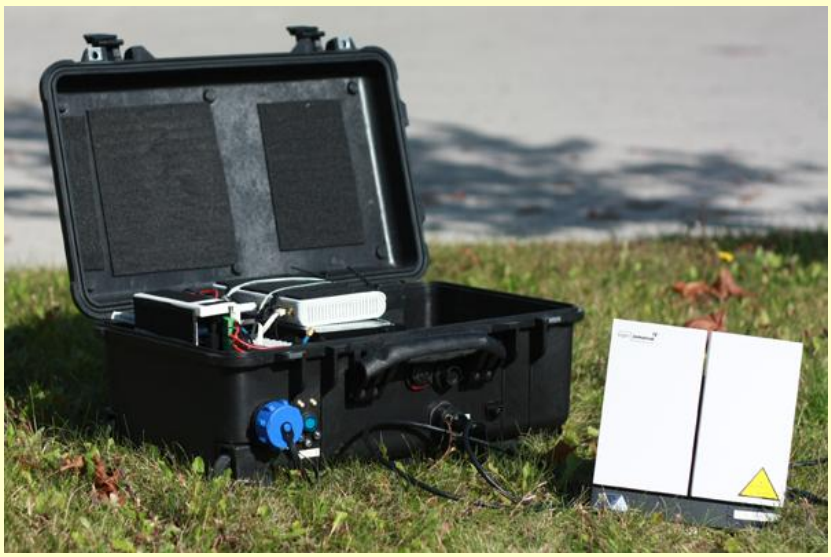


Figure 3: e-Triage communication suitcase (on-site emergency communications equipment, OSECE) consisting of an Inmarsat BGAN satellite terminal, a GSM pico cell, and a WLAN router (9).

Communication

An electronic registration system for MCIs requires wireless communication services, and since local infrastructures may not exist at all or can be destroyed, it is of paramount importance that at least a temporary communication system is set up. Even if functioning networks exist, it is most likely already saturated by the affected persons using their mobile phones. For rescue missions in less densely populated or less developed or seriously destroyed countries satellite phones (e.g., Globalstar or Iridium) are commonly used during the first hours/days. The idea of backhauling terrestrial cellular networks via a long-haul satellite link is not new and commercial products already exist. An example is Emergesat by Thales Alenia Space which has been designed to fit into a container for air freight. Disadvantage of this solution is that it is rather bulky and transport into an affected area can be rather challenging. The development of a more flexible and

faster deployable solution has been initiated in the WISECOM project (8) and is currently continued within e-Triage. The basic design goal is that the complete on-site emergency communications equipment (OSECE) fits into a hand-luggage size suitcase. The chosen satellite technology is Inmarsat BGAN, which is globally available but offers limited bandwidth only, and the resulting suitcase prototype is 56cm x 35cm x 23cm, including a battery pack for a few hours runtime (9). The BGAN terminal itself needs only to be taken out of the suitcase, and the antenna can be easily pointed to the satellite within a few minutes.

A second more powerful OSECE system is currently under development for use in mobile coordination centers, which is based on a commercial Very Small Aperture Terminal (VSAT) satellite system and which offers more capacity and wider terrestrial coverage. Manual alignment of the antenna reflector (diameter ca. 1 m) is not an option for this application, so the decision was to use a self-aligning antenna unit which can be mounted on a suitable vehicle.

The quasi-stationary OSECE nodes include several base-stations for different wireless technologies:

1. WLAN: Data communication as well as Voice over IP (VoIP) calls can be provided by WLAN access points. For the registration of affected persons WLAN is the preferred medium since it offers sufficient bandwidth for many terminals in parallel.
2. GSM/GPRS: These well-known standards allow voice and data communication. GSM cell phones are inexpensive and available all over the world, which in turn means that in most cases the access to the temporary GSM service has to be restricted to avoid network congestion. Then again, a GSM base-station can be configured so that unknown phones are booked into the network in a listen-mode only, which is an excellent possibility to distribute information or warning messages among the population in the area. A major disadvantage of GSM is the missing group call functionality. General packet radio service (GPRS) is the secondary medium for data exchange in the e-Triage concept.

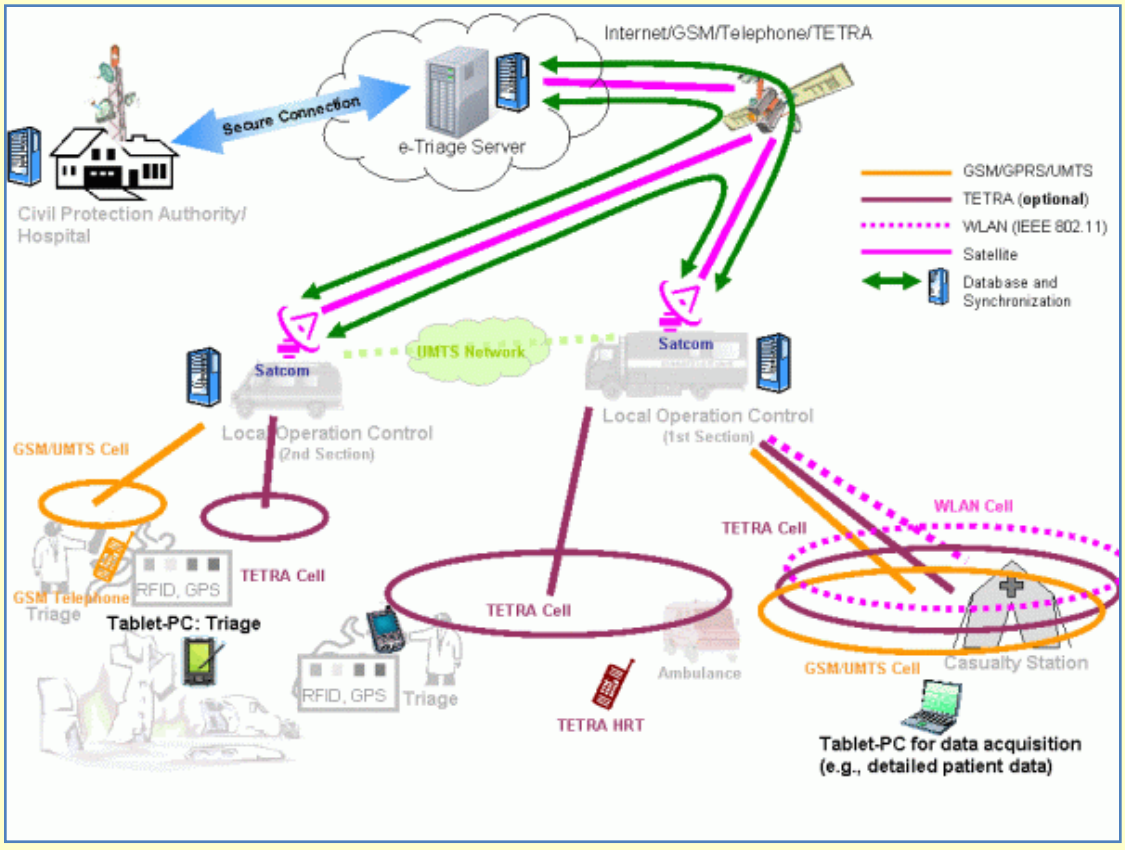


Figure 4: Fully deployed e-Triage communication infrastructure.

3. DECT: Digital Enhanced Cordless Telecommunications (DECT) is suitable for voice communication in vicinity of the local coordination center.

4. TETRA: The PMR standard TETRA will not be part of the final demonstrator system, but is currently under study within the project.

The different terrestrial wireless technologies supported by an OSECE are depicted in Figure 4. Note that two or more OSECEs connected via WLAN in bridged mode can be deployed in the field with only one having backhaul connectivity.

Conclusion

This paper has given a brief description of the architecture of the e-Triage system and the challenge to manage data in MCIs. Although earlier and other current works have studied single components of electronic MCI management, a unique feature of e-Triage is that for the first time a coherent overall concept consisting of mobile devices, communication infrastructure, and data management is under development. Another unique feature is that all developments, ranging from hardware selection to graphical user interface implementation, are accompanied by a team of psychologists, ensuring that all components are self-explanatory and can be used intuitively without causing additional stress. At the time of writing this article the system is under implementation and a series of real-live trials will start from January 2011.

Public safety communication means in most cases voice communication (group calls) using dedicated PMR networks, which are designed for closed user groups with partly specific confidentiality requirements. Introducing data communication to public safety requires appropriate preparation, which means that one may not rely on the availability of public (commercial) terrestrial networks only. With our satellite-based communication facilities flexible data services can be provided plus the possibility to quickly establish point-to-point telephone services in case of extreme disasters. It is important to remark that even without a backhaul link all the services provided in the disaster area are available, so that the rescue operation will not be affected.

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Public Health & Political Knowledge

By Raphael M. Barishansky

Source:http://www.domesticpreparedness.com/Medical_Response/Public_Health/Public_Health_%26_Political_Knowledge/

Public health professionals fill vital roles in homeland security preparedness. One of these roles is to ensure that government decision makers are well informed on issues that may affect the life and health of – perhaps not all, but at least most of – their community members.

When referring to public health preparedness efforts, the need for a deeper understanding of the political knowledge of efforts, successes, and future challenges is paramount. Webster's defines the word "politics" as "any activities that relate to influencing the actions and policies of a government or getting and keeping power in a government." A working definition of this word should encompass a range of situations. In other words, the meaning of politics should reflect what it is for each person, in terms of his or her own agenda, and the agenda he or she purports to pursue. Thus, politics – and the elected officials involved in the political world – are fundamentally variable as opposed to constant.

Public health, on the other hand, is based on the concept of doing the greatest good for the greatest number of people. This means that, on occasion, elected officials and decision makers need to be informed about initiatives and programs that may not benefit all, but rather most, of their constituents. **A panel of experts in 2007 defined public health emergency preparedness (PHEP) – a subset of public health – as:**

> *The capability of the public health and health care systems, communities, and individuals, to prevent, protect against, quickly respond to, and recover from health*

emergencies, particularly those whose scale, timing, or unpredictability threatens to overwhelm routine capabilities. Preparedness involves a coordinated and continuous process of planning and implementation that relies on measuring performance and taking corrective action.

Any preparedness program that readies a community could potentially have a positive effect, even if the program has yet to be tested in a true emergency. However, the inherent difficulty working in a field such as public health preparedness is that, although there are dedicated professionals with significant awareness and even operational experience, there are other elected or appointed officials without the same subject matter expertise, who must be rapidly educated. Additionally, policy goals have been overshadowed by politics in public health preparedness on numerous occasions.

The State of Readiness & Other Successes

There have been multiple successes in public health preparedness efforts, least of which is the overall state of readiness achieved since the post-9/11 Anthrax attacks. In the time period prior to these events, the United States experienced a degradation of public health preparedness infrastructure and capacity including a lack of laboratory readiness and appropriately trained personnel.

Since then, with the assistance of multiple federal funding streams – including the PHEP, Cities Readiness Initiative, and Hospital Preparedness Program grants – the strengthening of the public health infrastructure includes qualified professionals performing the following tasks:

- Conducting surveillance for pathogens;
- Practicing mass prophylaxis distribution;
- Safe-guarding the food supply;
- Engaging in cross-jurisdictional training and communication efforts;
- Participating in media training;
- Keeping first responders healthy;
- Creating volunteer opportunities and community outreach; and
- Consistently training in incident management.

On a daily basis, these improvements in the public health infrastructure have assisted during everyday occurrences – including environmental, food-based, and terrorism-related incidents – and have also been augmented to handle large-scale bioterrorism attacks or other emergencies affecting the public's health. The knowledge of these successes was solidified during the 2009-2010 H1N1 pandemic and the recent Ebola situation when, moving rapidly, the federal government released funds to state and local partners to strengthen response efforts for the specific situations.

The conundrum of public health preparedness efforts is that many community members and elected officials understand response efforts, but not readiness efforts. They fail to understand that well-trained responders responding to an emergency situation are an element of overall preparedness. The fact that experts have been trained and educated about myriad public health emergencies, conducted various drills and exercises based on relevant scenarios, and stand at the ready is not easily understood. Therefore, without seeing an incident occur, the need to have grant funding for readiness efforts may not be apparent.

Another area of success is the establishment of well-developed, operationally sound emergency plans for the wide variety of public health-specific emergencies that call for health departments to respond. Although these plans are primarily related to health emergencies, they can also include other incidents, such as weather emergencies, where the health department plays a tangential role. The National Response Framework, the National Disaster Recovery Framework, and the National Preparedness Goal all highlight the key roles that the field of public health plays in community preparedness and resilience, specifically in the planning process.

At best, it can be difficult to get elected officials to attend necessary drills and exercises in order to understand their distinct roles in an emergency. At worst, they may be so removed from the incident that they actually hamper agencies' efforts in an emergency and provide news media with inaccurate information.

Budgets, Planning & Other Challenges

Politics, budgets, and long-term planning are dynamically intertwined in the public health preparedness context. The electoral process may impact preparedness in significant ways. Representatives'

thinking about preparedness leads to adjustments in budgets and policies. Elected officials who are aware of preparedness efforts may choose to funnel resources to this area, whereas others might elect to trim budgets and focus more narrowly on specific strategic priorities. These shifts may alter, or even undermine, long-term efforts. Below are some points to keep in mind:

- At times, public health representatives must be proactive in making elected officials aware of specific community successes at the city, regional, and state levels.
- Forward-leaning politicians – local, state, or even national representatives –understand the "lay of the land" when it comes to preparedness efforts. However, for those who do not understand, local, regional, or state-based agencies must relay to elected officials that public health preparedness is a long-term issue that is affected by the term-to-term fluidity of politics.
- Subject matter experts must be able to clearly explain complex public health-specific terms such as quarantine, isolation, and patient screening realities to elected officials of all levels. This optimally should be done in a proactive manner, but may be required during an emergency.
- State and local health officials traditionally receive guidance, as well as incident-specific resources such as vaccines, from the federal government. Ensuring that elected officials understand dispensing practices and priorities before distributing antivirals or antibiotics could prevent a public relations debacle.

Public health preparedness programs need buy-in from all levels of government in order to build upon current successes. A strong commitment must be made at the federal, state, and local levels to maintain and improve local public health preparedness capacities and to make this effort a national priority. Without such a commitment, public health will continue to fail in its primary functions and lack the capacity to meet homeland security preparedness goals.

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Political Realities of Legislation for Extreme Events

By Andrea Boland

Source:http://www.domesticpreparedness.com/Commentary/Viewpoint/Political_Realities_of_Legislation_for_Extreme_Events/

The single extreme solar storm (GMD/geomagnetic disturbance) or electromagnetic pulse (EMP) attack (manmade weapon) – together often known as natural and manmade EMP, or simply EMP – could cause a blackout lasting months or years. Even for government officials who have the authority to do something about it, legislation may be required to make new demands on a resistant, powerful industry.

For unfamiliar and intellectually intimidating topics, it may be necessary to educate legislators. The effort it takes to pass legislation to solve even relatively simple problems, however, may be enough to discourage legislators from voluntarily taking on this kind of new, unfamiliar challenge. Therefore, when facing the specter of a massive infrastructure problem and a powerful industry lobby, many default to a wait-and-see position.

Educating Legislators

Key sources of information for legislators are typically the legislation sponsor and supporters, the industry and its lobbyists, content experts, and outside interests, including the general public and the legislators' own supporters. The primary forum for educating legislators comes from a public hearing presented before the legislative committee that has jurisdiction over that policy area. Thus, to seek protections of the Maine electricity transmission system (the grid) from long-term blackouts due to GMD and EMP requires the public hearing to take place before the Energy, Utilities, and Technology (EUT) Committee.

As a state representative, it took a significant amount of time to learn about the threats of GMD and EMP, and to develop a substantial network of national experts on policy, science and technology, manufacturing, space weather, weapons, intelligence, and national defense. Dr. Peter Vincent Pry and the office of (now former) Congressman Roscoe Bartlett, both long-time national leaders on EMP, were significant in introducing politicians to experts who had been working on these issues at the federal level. Many of them came to Maine to testify at the hearing. These experts informed the EUT about threats to the electric grid that they had never heard about before from the power companies. They challenged the legislators to do the following:

- Acknowledge that the State has a problem (as do all the states);
- Recognize that the State has regulatory authority to fix the problem;
- Identify available solutions and their costs (GMD protections exist that are low cost);
- Provide effective leadership to protect Maine's electrical grid from long-term blackout; and
- Serve as a model for other states.

The experts were articulate, convincing, and impressive when describing a compelling but scary message, so committee members were able to understand the issue.

On the other hand, the electric power industry "representatives" (lobbyists) who had spent careers lobbying for the industry before the EUT Committee (and other legislators) were not content experts, but rather public relations experts highly paid to deliver a message. They spoke positively about the electric companies' management of the threat, with statements including the following: "We are talking about a low-probability event; we have competing priorities; we've been protecting the grid for years; we are following all the NERC (North American Electric Reliability Corporation) reliability standards." Despite sounding impressive when delivering a reassuring message, they failed to answer key questions and to win over the committee. The threat they posed to passage of the bill was that they were familiar faces to the committee members – and their ingratiating smiles can tip the balance for lazy, confused, or just undecided legislators.

The Process Behind a Maine Bill

Facing news it could not ignore, the EUT lacked the confidence to act on or confront the industry's resistance, and amended the bill (LD 131, introduced by Andrea Boland) to a study, with the provision that the EUT could use its findings to draft permanent protective legislation the following year. The Maine Public Utilities Commission (PUC) was to conduct the study, and assured the EUT they could deliver it on schedule in January 2014. The industry agreed to the plan. LD 131 passed unanimously in committee as emergency legislation and in the House of Representatives, and passed by a vote of 32-3 in the Senate, to become law on 11 June 2013.

It was a deftly designed study and internationally acclaimed as model legislation. It also was the first ever EMP/GMD legislation passed in the nation. The Federal Energy Regulatory Commission (FERC) has an Office of Energy Infrastructure Security, which has a mission to assist states; its director, Joe McClelland, offered help with the study.

Two reports finally emerged – one influenced heavily by the electric power companies, and one supported by the independent experts – but not until 2015, and new elections had resulted in a newly configured legislature. Senator David Miramant introduced a new bill (LD 1363) to require installation of known, available protections supported in the studies. This time, the EUT split its vote, and the bill failed in the legislature – by one vote in the Maine Senate, along party lines. Low-cost solutions existed, and the prior legislature's nearly unanimous vote had supported emergency action to protect the grid, but the industry had succeeded in defeating it.

The difference in the results of the two legislative efforts may be explained by different factors at work. In 2013, the legislation, sponsor, and experts surprised the industry, which was unable to recover from the unexpected exposure of the threat and the apparent disinterest and/or incompetence of the power companies regarding GMD and EMP. In January 2014, the EUT chair, without a vote of the committee, had granted the PUC an extension to January 2015 to finish the study – under the direction of the biggest electric utility in Maine, Central Maine Power (CMP). By 2015, when LD 1363 was introduced, the industry had regained its political control, as the 2014

election had populated the EUT and one-third of the full legislature with new faces. Various systemic political realities also may have contributed to the industry defeat of protections:

- Uneasiness about supporting a big, new, unfamiliar issue – It may not seem advantageous to some legislators to invest the time and effort to support a bill that might not pass, or to take a politically risky position opposing a political power industry. Legislative leaders remained quiet, not signaling support, maybe for similar reasons.
- Legislators' fears and lobbyist arguments, valid or not, to oppose the bill – lobbyists make it easy for reluctant legislators to adopt their positions when they do not conduct their own research.
- Hesitation to cause trouble with big campaign donors – Legislative leaders are expected to raise money to get themselves and their members elected, and to fulfill an agenda.
- Committee chairs in Maine are appointed by legislative leadership (Speaker of the House and President of the Senate) – These leaders typically support the agenda of those who appointed them and often of the special interests under the committee's jurisdictions, and they are in a position to influence outcomes. The chairs never took up the PUC study reports for review, causing committee members to not be informed on their contents. Thus, they influenced the committee vote, which in turn, influenced the full legislature's vote.
- Appointment of committee members by leadership – Only three of the 2013 members of the EUT Committee were reappointed to the 2015 committee; 10 were new, including the chairs. Therefore, the committee did not benefit from a lot of experience with the subject.
- Influence of committee chairs – In 2013, the chairs did not limit the time visiting experts had to testify. In 2015, chairs limited them to three minutes each (meanwhile, the lobbyists were working every day in committee and in the halls of the State House). With so little input from the independent, national experts, and deliberately confused by lobbyists protecting electric companies from higher standards, new members were frustrated, unable to master critical new information, and split the committee vote. They thereby weakened the message to the rest of the legislature.
- The Senate chair of the EUT, Senator David Woodsome, who had been supporting the bill all along, changed his vote in the end, probably, as a new legislator, succumbing to party pressure, and spoke against it on the floor of the Senate. This was enough to defeat the bill by one vote, even though Senator Miramant spoke strongly for it. The House of Representatives had passed it decisively, where the three veteran EUT committee members spoke in favor of it.

Future Legislative Concerns

Many legislators who are motivated to follow and be politically safe, rather than lead on tough issues, often go along with party leadership or powerful interests. The legislative hierarchy structure, campaign funding laws, and committee system can work symbiotically to marshal votes for a separate agenda. Legislators who take on serious problems may find themselves opposing powerful interests and getting little or no help from their leadership because high political costs could reflect on them personally. Their constituents and the public in general may be strongly supportive, but not enough of them raise their voices.

Not unlike other powerful industries, the electric power industry uses media and lobbyists to telegraph an image of integrity and professional authority, but then uses inaccurate data in their studies to try to prove invalid arguments that work for them. To inexperienced, often stressed legislators, it may be persuasive. NERC, the electric power industry's association and lobbying arm, has sole authority to write its own "reliability standards" that determine their level of public responsibility. The Federal Energy Regulatory Commission (FERC) is charged with regulating NERC, but often turns to NERC for answers. In the same way, the Maine PUC turned to Central Maine Power Company for the LD131 study. CMP then turned to NERC, which provided data from another country, rather than using the Maine data it had, to support the outcome it wanted: the argument against GMD/EMP protections.

First-Hand Experience in the Maine Legislature

Big money and special interests have outside influence on the legislative process. It can often compromise leaders, defeat good legislation, endanger the public, and promote regulatory capture. It is difficult to display political courage when lobbyists of powerful interests smile and create confusion about the facts. For these reasons, testimony from subject matter experts needs to be treated with great respect. In this case, the testimony of first responders was very important. The public is critically important, too. Without public support, the nation cannot expect to maintain a self-governance.

The United States is the most vulnerable country in the world to natural and manmade solar storms and EMP because of its huge, interconnected grid and its dependence on electric power and electronics. State Senator and Navy veteran Robert "Bob" Hall of Texas refers to obstruction of protections of the grid as "treason" because it is also a national defense threat. Imagine what the fifth week of a blackout would be like following an EMP or solar storm: no heating, cooling, communications, water and waste systems, banking, hospitals, transportation, food delivery, etc.

Governing bodies must take charge of protecting the nation. If Congress is too conflicted to act, the states must. Many states are initiating action, but it is a struggle. In all states, the electric companies have blanket liability protection against the costs of catastrophe from these threats, so they have no incentive to act on their own to raise standards. The public must engage more and insist on more courage and dedication by their elected representatives, and more accountability from the electric power companies. They must be made to quickly repair the electric grid to a level of realistic protection against such horrific threats, and be held legally responsible to share in the consequences and real costs of catastrophes that result from their inaction.

Right now, the nation is in another pre-Katrina or pre-9-11 moment. A small army of people is working very hard to save the electric grid, and protect the nation, but it will take many more recruits, and bigger armies, moving governments, media, and industry in more states and in Washington, D.C., to win the war and save the country from the societal collapse that a severe GMD or EMP would threaten.

*State Representative **Andrea Boland** is completing her eighth year in the Maine legislature. She is considered a leader in safety issues of electromagnetic radiation, especially from cellphones and smart meters. She became involved in electric grid protection against electromagnetic pulse and geomagnetic solar storms (GMD) at the suggestion of her regular scientific advisor. Her work is supported by several national experts. She has a B.A. degree from Elmira College and an MBA from Northeastern University, and studied at the Sorbonne and Institute of Political Studies in Paris. She was awarded the 2011 Health Freedom Hero Award by the National Health Federation for her work on health freedom and safety. Her legislative work has led to confronting major corporate interests on matters of transparency and regulatory capture, and public protections.*

Seeing through the dark clearly

Source: http://www.homelandsecuritynewswire.com/dr20150921-seeing-through-the-dark-clearly

Sept 21 – For firefighters, a day's work consists of answering one or more calls for aid, and they must respond under what are arguably the most dangerous conditions of any profession.

Civilians, while understanding that firefighting is hazardous, are not aware of how dangerous it is. Clouds of thick, black smoke, building collapse, unfamiliarity with the building, and even flames, cannot be seen. There may be unconscious or disabled victims lying a few feet from them, but because the ambient environment, a firefighter is blinded by the smoke and flames, and the victim remains undetected.

After a long stretch of no real advances in the equipment firefighters use, new technology has accelerated efforts to bring advances in safety equipment. These improvements have

brought substantial improvement in the tools used, beneficial to both to responders and victims alike.
First was the self-contained breathing apparatus (SCBA.) Originally designed for military and industrial use, the SCBA was welcomed. However, there are drawbacks to the masks, in that it does not yield the desired results, since external gases could leak into the mask through openings as those caused by wrinkles in the skin.

The problems were solved with the arrival of the "positive-pressure" system.
A positive-pressure SCBA entails an improved valve design that ensured the pressure inside the mask was higher than the ambient air pressure. This ensured that the external air, which possibly contained hazardous gases, would not leak into the mask.
More recently, technology has brought tools to the firefighter that are literally life savers.
The Lowell Sun reports that an improved design has yielded substantive improvement in function.
In 2012, a new mask was introduced that when used, the device presented to its wearer crucial information about the environment in which the firefighter was operating. Data such as ambient temperature, rate of temperature change, and time remaining on oxygen supply, presented on a heads-up display gave the responders data leading to improved decision-making.
But there was one significant flaw. The firefighter still could not see any details in the space he or she was operating.
Hand-held thermal imaging devices allowed the responder to see the environment, but also tied up one hand, and had to be put aside when both hands were needed, as when carrying a victim out of the area. Now, that has changed.
BAE Systems has developed a device that solves the problem. Dubbed Thermal on Demand (TOD), firefighters can now see everything in a heavily smoke-filled room, where the unassisted eye sees nothing but a pitch-black environment.

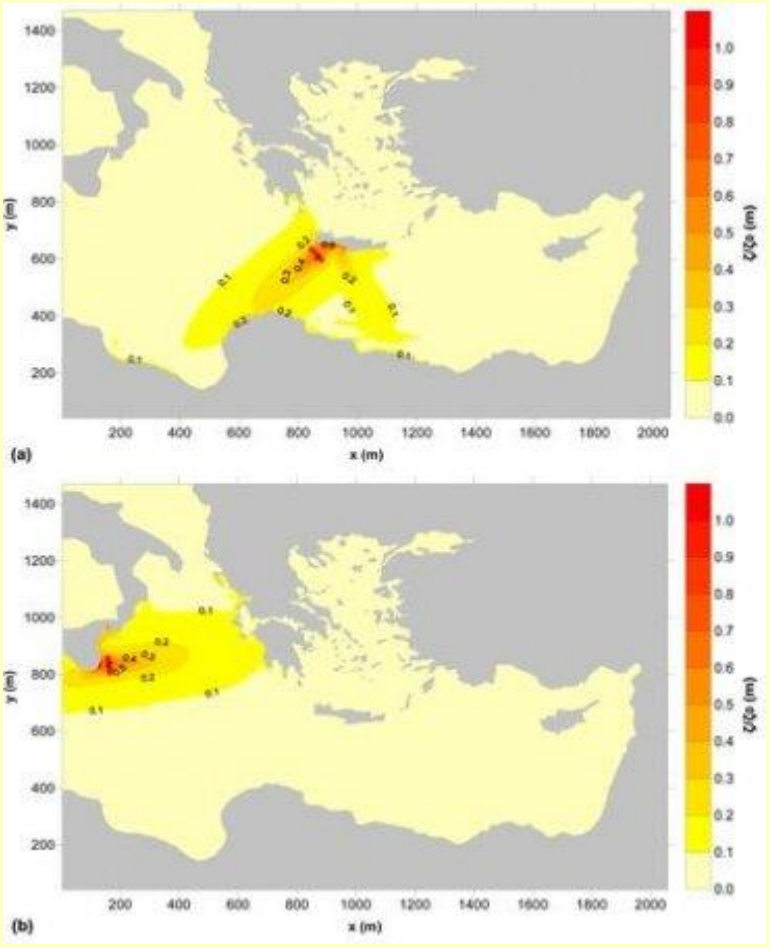
TOD allows responders to see doors, furniture, light switches, debris on the floor, and victims lying on the floor. Looking through a periscopic lens, in front of a thermal camera, the wearer sees a detailed image of everything in the immediate vicinity.

TOD is not yet available on the market. BAE Systems, holder of the TOD patent, and through spokesman, has not completed development.
The BAE Systems spokesman refused to answer questions about the company's development process. He did confirm that the company is working on TOD

Tsunami in Mediterranean would turn parts of Crete into an Atlantis

Source: http://www.ibtimes.co.uk/tsunami-mediterranean-would-turn-parts-crete-into-atlantis-1517352

Aug 27 – A **large tsunami in the Mediterranean has the potential to turn a large part of Crete into an Atlantis with 3.5sq km of land submerged beneath the sea, scientists have found. Researchers said their model showed that a tsunami could also pose a risk to 130 million people living along the coast and, with little advance warning, would only have to travel a short distance before hitting land.**

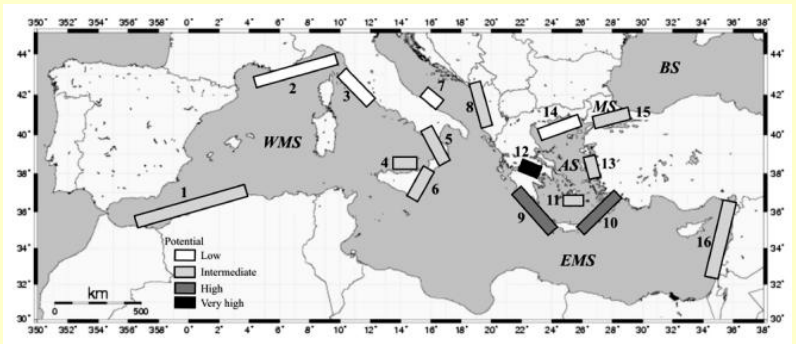


Publishing their findings in the journal Ocean Science, the team from the University of Bologna, in Italy, created two simulations showing tsunamis generated by earthquakes with a magnitude of seven on the Richter scale. The simulations were located off the coasts of eastern Sicily and southern Crete, areas chosen because they were the most tectonically active.

Simulated water elevation (compared with wave elevation at the source) for the earthquake-induced tsunamis to the south-west of Crete (top) and the east of Sicily (bottom). Water is shown in yellow to red and land is in grey.(Samaras et al, Ocean Science, 2015)

Their findings showed that Crete would not fare well, with a tsunami causing 3.5sq km of land being plunged under water. They found in both cases that tsunamis would inundate low-lying coastal areas up to around five metres above sea level.

Although the Mediterranean is not well known for its tsunamis, around 10% of all tsunamis in the world take place there, with around one large one happening every 100 years. In 1908, an earthquake of a magnitude of seven on the Richter scale hit the Messina region causing a tsunami that reached 10m in height and killed thousands.

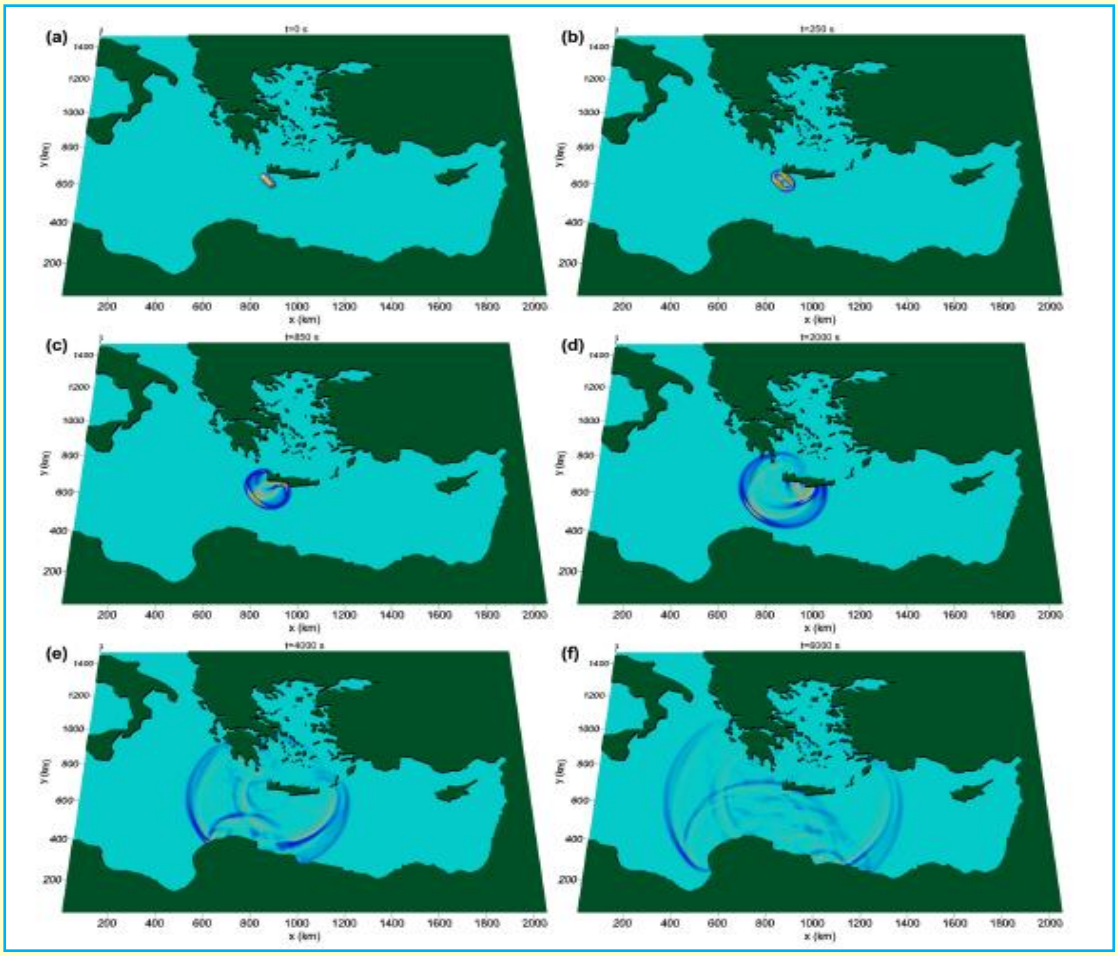


A cluster of earthquakes between eight and 8.5 magnitude occurred off the coast of Crete in 365AD. They created a tsunami that destroyed ancient cities in Egypt, Greece and Italy, and killing at least 5,000 people in the ancient city of Alexandria.

The tsunamigenic zones of the Mediterranean Sea and their respective tsunami potential

Achilleas Samaras, the lead author of the study, said: "The main gap in relevant knowledge in tsunami modelling is what happens when tsunami waves approach the nearshore and run inland. We wanted to find out how coastal areas would be affected by tsunamis in a region that is not only the most active in the Mediterranean in terms of

seismicity and tectonic movements, but has also experienced numerous tsunami events in the past.
"We simulate tsunami generation by introducing earthquake-generated displacements at either the sea bed or the surface. The model then simulates how these disturbances – the tsunami waves – propagate and are transformed as they reach the nearshore and inundate coastal areas."



Sequences of snapshots of water elevation for the earthquake-induced tsunami scenario at the Southwest of Crete at: **(a)** t = 0 s (generation), **(b)** t = 250 s, **(c)** t = 850 s, **(d)** t = 2000 s, **(e)** t = 4000 s, and **(f)** t = 6000 s.

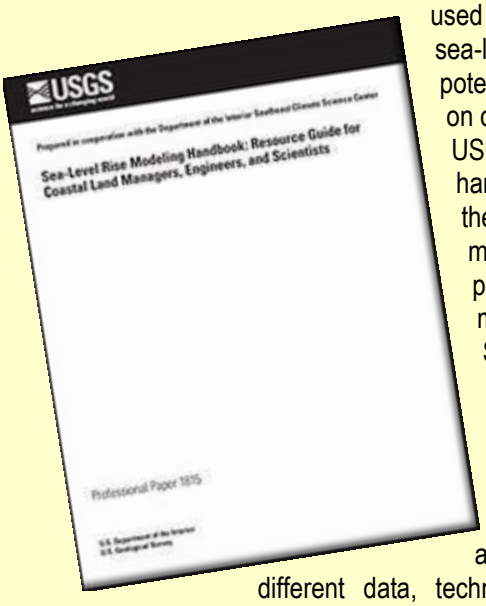
Speaking to IBTimes UK, Samaras said the scenarios they simulated were realistic and that real-life events could be even worse: "The scenario we simulated, it's not really small, but it's not big. Some in the area have experienced bigger tsunamis and earthquakes in recent times. It's not the biggest we can expect."
He said the problem with tsunamis is the huge amount of energy they contain and while there would not be a huge wall of water propagating towards them, the inundation to coastal areas would be devastating. They now plan to study the damage tsunamis could cause.
"The results we presented were based on the morphology and the extent of inundation," Samaras said. "At this stage we did not take into account loss of life, loss of property or damages, but this is something to work on next.
"The basis was to have a reliable model to simulate the process. Now we have done that we can see what implications this will have on loss of life and properties."
This, he said, will help authorities better prepare and plan for tsunamis. By establishing which areas are most vulnerable, local officials could establish defence structures and tsunami warning systems that would allow for evacuation plans if necessary.

▶ **Read the full study at:** http://www.ocean-sci-discuss.net/12/673/2015/osd-12-673-2015.pdf

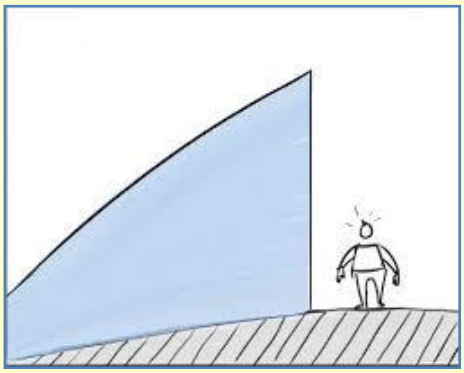
Sea-level rise handbook to help land managers, coastal planners, and policy makers

Source: http://www.homelandsecuritynewswire.com/dr20150831-sealevel-rise-handbook-to-help-land-managers-coastal-planners-and-policy-makers

Aug 31 – Coastal managers and planners now have access to a new U.S. Geological Survey (USGS) handbook which, for the first time, comprehensively describes the various models used to study and predict sea-level rise and its potential impacts on coasts.



USGS says that the handbook, designed for the benefit of land managers, coastal planners, and policy makers in the United States and around the world, explains many of the contributing factors that account for sea-level change. It also highlights the different data, techniques, and models used by scientists and engineers to document historical trends of sea level and to forecast future rates and the impact to coastal systems and communities.



"Our goal was to introduce the non-expert to the broad spectrum of models and applications that have been used to predict environmental change for sea-level rise assessments," said Thomas Doyle, deputy director of the National Wetlands Research Center in Lafayette, Louisiana, and the lead author of the guide. "We provide a simple explanation of the complex science and simulation models from published sources to help inform land management and adaptation decisions for areas under risk of rising sea levels."

The scope and content of the handbook was developed from feedback received at dozens of training sessions held with coastal managers and planners of federal, state, and private agencies across the northern Gulf of Mexico. The sessions aimed to determine what tools and resources were currently in use and to explain the broad spectrum of data and models used in sea-level rise assessments from multiple disciplines, including geology, hydrology and ecology. Criteria were established to distinguish various characteristics of each model, including the source, scale and quality of information input and geographic databases, as well as the ease or difficulty of storing, displaying, or interpreting the model output.

"A handbook of this nature was identified as a high priority need by resource managers," said Virginia Burkett, USGS chief scientist for Climate and Land Use Change. "[The handbook] will serve as a practical guide to the tools and predictive models that they can use to assess sea-level change impacts on coastal landscapes."

— Read more in Thomas W. Doyle et al., Sea-level rise modeling handbook: Resource guide for coastal land managers, engineers, and scientists, Professional Paper 1815 (USGS, 2015) http://pubs.usgs.gov/pp/1815/pp1815.pdf

Protecting Earth from asteroid impact

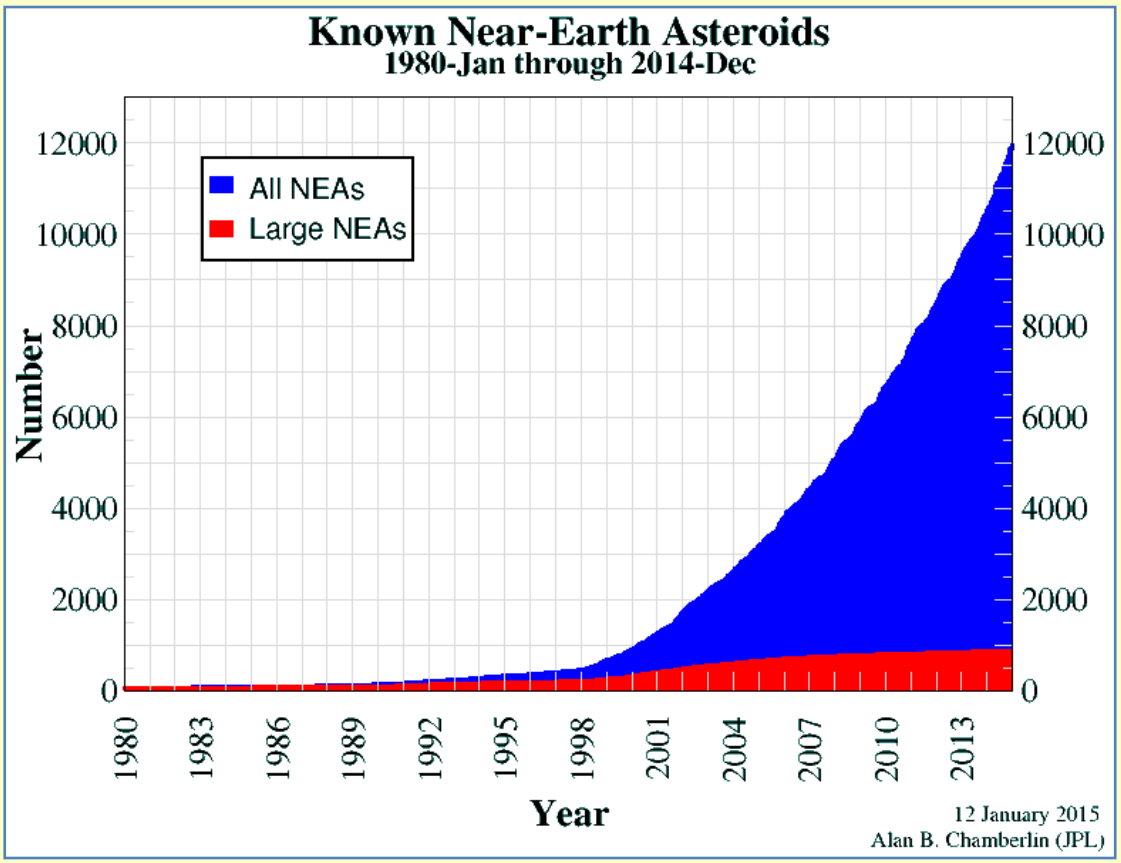
Source: http://www.homelandsecuritynewswire.com/dr20150903-protecting-earth-from-asteroid-impact

Sept 03 – Scientists cannot say when the next major asteroid will hit Earth, but it is certain that it will happen sometime in the future. An international collaboration of thirteen researchers is hoping to head the next one off.

The project is appropriately called "A global approach to **near-Earth object (NEO) impact threat mitigation" (NEOSHIELD).** CORDIS notes that it is a major EU-funded initiative that pulls together all the latest science and combines laboratory experiments with computer modelling work. The ultimate aim of this effort is to develop some definitive plan to knock massive asteroids out of their Earth-bound orbit.

Asteroids approaching our planet travel at up to thirty kilometers per second. At that speed, a body with a diameter of only 100 meters could have major consequences for our civilization. The much smaller asteroid that exploded in 2013 at a height of about twenty-four kilometers near the city of Chelyabinsk, Russia, with a force nearly thirty times more powerful than the Hiroshima atomic bomb, damaged buildings and injured over 1 000 people.

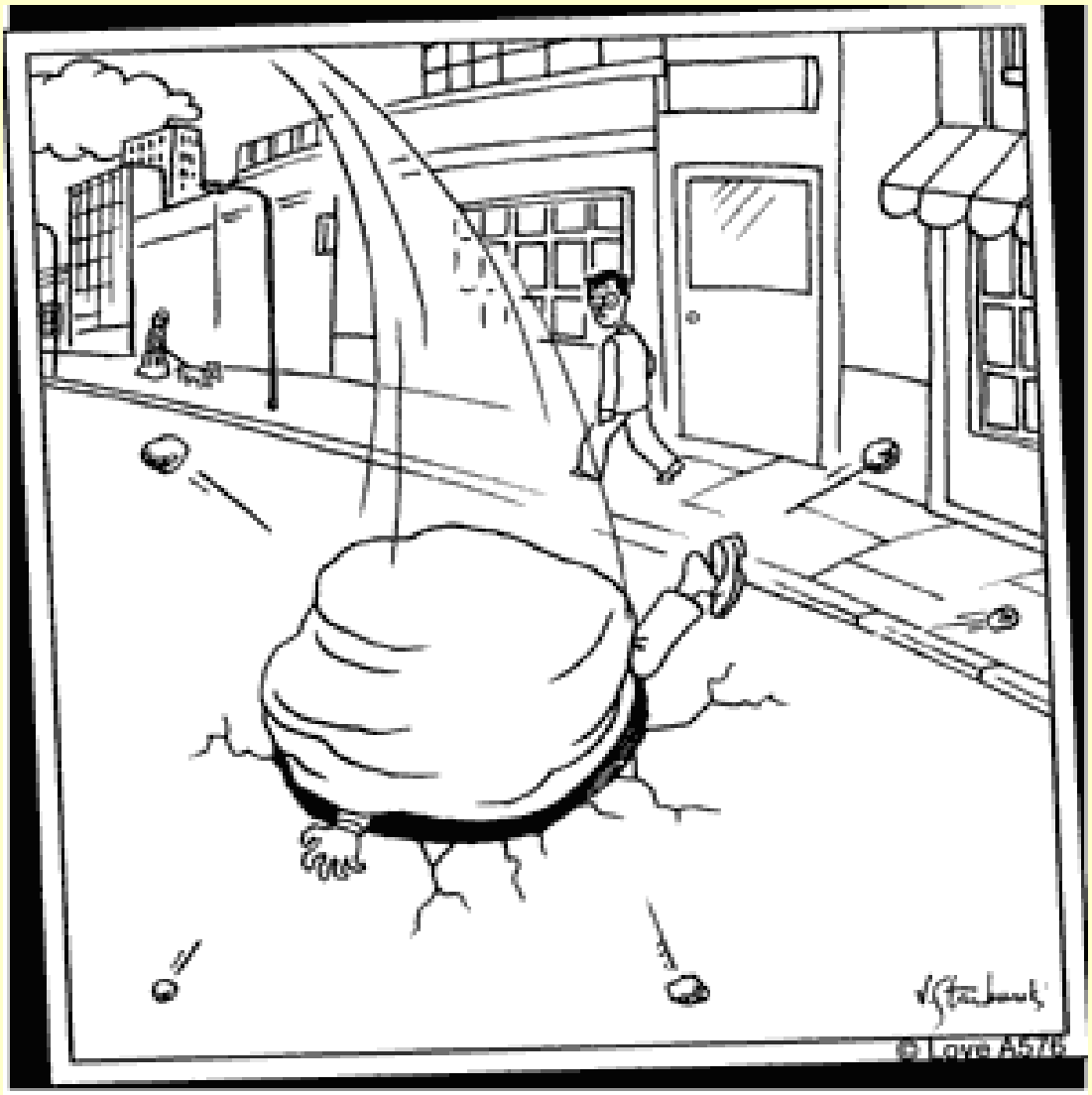
There are thousands of known NEOs just like that one, leading researchers to posit that a dangerous collision could occur as often as every few hundred years. However, it is possible to stop an asteroid from hitting Earth. The NEOSHIELD scientists and engineers are evaluating promising methods for asteroid deflection, which may simply mean providing a nudge in the right place at the right time.



One way to do this is to have a spacecraft impact the asteroid and impart enough force to change its orbit. NEOSHIELD researchers are working on finding ways to guide the spacecraft to the moving target at the right angle with the right velocity. Another way is to use the spacecraft's gravitational pull to tow the asteroid into a different orbit. If the asteroid is far away, a tiny tug could be sufficient to cause the asteroid to miss the Earth.

The most powerful but least appealing technique explored during the NEOSHIELD project relies on explosive power to divert or break up the Earth-bound asteroid. However,

breaking up a large asteroid could be disastrous if it were to result in the Earth being showered by many large fragments, instead of impacted by one solid piece. NEOSHIELD scientists use data from asteroid observations, lab experiments, and computer simulations, to find ways to best protect Earth from future devastating impacts.
At the end of the project, the NEOSHIELD researchers will provide detailed space-mission plans, which could form the basis of a proposal to national and international space agencies for a mission to demonstrate the necessary technology.



Sometimes it's not enough to look both ways.