



WHEN SECONDS COUNT

A LOOK AT HOW AN EARTHQUAKE EARLY WARNING SYSTEM AND A SECURITY PARTNERSHIP IS 'SHAKING' UP THE WORLD OF DISASTER MITIGATION

Last Summer, in CPS International's June/July edition we ran a special feature on the Sendai Earthquake in Japan and its effects on the security supply chain. We also looked into the technological strengths and shortcomings in warning systems and the rarely touched on notion of security equipment aiding in disaster management operations. It is unfortunate at that time I had yet to meet the innovative and energetic team at Seismic Warning Systems and their strategic partner Honeywell Security Group.

On the afternoon of October 30th a slow, ominous rumbling that soon turned into a terrifying explosion emitted from the center of the main hall. I looked out from the media room to see a large digital map appearing on a massive video wall showing a real time warning of an earthquake's progress. The exhibit was so real that some older visitors of CPSE even took cover and an earthquake survivor even broke into tears of fear at the sudden onslaught of memories (an occurrence the team admittedly felt apologetic for). I was intrigued and went over to see what all the to-do was about.

From there, I had the pleasure to meet some of the key members of this partnership who were kind enough to grant me their time to sit down and have a candid discussion on just who they are, what their technology is all about, what solutions they provide and why it is so important for China, Asia Pacific and the world. The following is a summary of our discussion.

THE INTERVIEW

Featuring:

- **George Dickson**
CEO and Chairman, Seismic Warning Systems
- **Scott Nebenzahl**
VP Sales and Director of Government Affairs,
Seismic Warning Systems
- **Paul Crombie**
Solutions Development Leader, Critical Infrastructure
Protection, Honeywell

Earthquakes are not rare events. On a yearly basis, 70 to 75 damaging earthquakes occur throughout the world. In the

United States, the Federal Emergency Management Agency (FEMA) estimates that losses from a future earthquake in the US would approach \$200 billion. The recent Tohoku Earthquake and ensuing tsunami in Japan presented a similar figure, left half a million homeless, and resulted in a worldwide radiation scare that has fundamentally changed the attitudes of many civilians and governments alike towards nuclear energy. The gravity of this figure is all the more intense when one considers the US, and especially Japan, are earthquake prepared nations with advanced building codes. When looking at developing nations, potential destruction can become even more staggering. In 2010, the 7.0 earthquake in Haiti, considerably less powerful than what was seen off the coast

of Japan, left a disputed 90,000 to over 200,000 dead and cost 15% of the nation's GDP. In 2008, the 8.0 magnitude Sichuan Earthquake in West China completely decimated multiple towns and left a death toll ranging from 70,000 to 200,000.

The recent Japan quake could have been much worse if it weren't for the fact that Japan is considered the most earthquake prepared nation in the world. They implemented an early alert system right before the quake hit to help mitigate destruction. And for good reason, as they lie in the middle of the most seismically active region in the world. Known as the "Rim of Fire" or "Ring of Fire", this zone spans from New Zealand up the eastern coast of Asia over to Alaska and down across the western coast of the Americas. The Asia Pacific region is clearly in a hotbed for earthquakes. So what measures can be taken to prevent the next big quake from reaking havoc on the population, infrastructure, and economy? As a globalized world binds us all together like never before and with Asia Pacific serving as major driver of growth worldwide, economic woes go far beyond the immediate disaster zone; disasters in this region will have serious repercussions around the world.

HONEYWELL SECURITY GROUP AND SEISMIC WARNING SYSTEMS WILL HELP US BREAK DOWN THEIR SOLUTION.

As a precursor to the seismic warning technology, Honeywell's Critical Infrastructure Solutions Development Leader Paul Crombie introduced the Radar Video Surveillance security solutions they were marketing at CPSE 2011 and indicated how they can fit with Seismic's early warning technology.

CPS: Mr. Crombie, please brief us in on the Radar Video Surveillance technology you are featuring here at CPSE.

Paul Crombie: The technology is known as RVS. RVS stands for Radar Video Surveillance. It is Honeywell technology, and the only patent for it is held by Honeywell. This technology originated in our Aerospace Division as a technology to track missiles that may have gone astray upon launch and used to help to destroy those missiles. It has been around for 10+ years and been operational as an advanced security solution for most of that time.

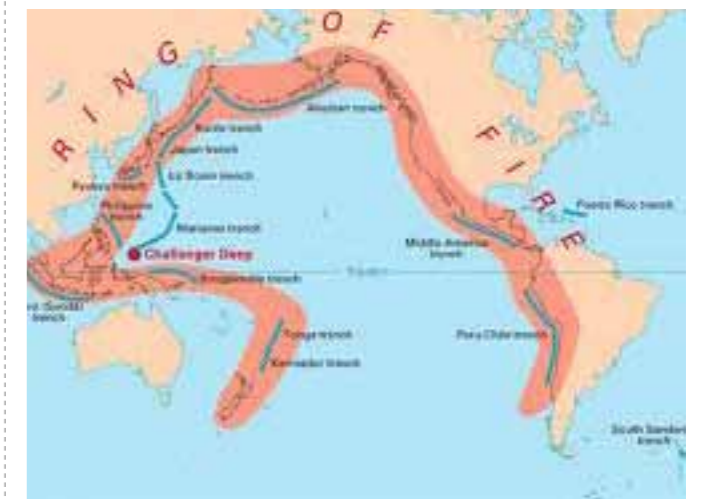
RVS strength lays in its synthesis of radar and video, to provide true day/night/all weather detection and tracking. Radar is used to guide a PTZ camera's movements in order to detect an intrusion, validate it and create an alarm to activate the required response actions. This means that intruders can be detected at the perimeter (or beyond) and tracked within the secure area, with the ability to accurately guide the response force to the intruder's current location(s).

RVS has come a long way since its inception and has been developed to provide client required functionality. It can track multiple targets; and client defined rules can be set to determine the priority targets; (which may not necessarily be the ones detected closest to the protected area). This allows the system to assess which target, such as a very fast moving one in the distance as opposed to a slow moving but close one, poses the greatest threat to the protected area. The RVS can prioritize and display multiple targets, track them, record and play them back, all to help security operators optimize their responses in real time, and to review events for training and analysis.

The demo system you saw downstairs is of an airport in the US where we have deployed 7 radars combined with multiple cameras. The RVS can guide all of those cameras to look at the alarm source. Or, if there are existing cameras installed, by mouse to click where the intruder is on the RVS Global Information System screen display, cameras in that area can be guided to 'look here' which is a simple way for operators to gain much valued current intelligence on the intruder's activity. This gives the operator great power and flexibility to understand the nature of, and to respond to, a threat.

It also allows for the threat to be tracked across the surface area covered by Radar sensors. So, in the airport world where I live and work, if there is an intruder, the response force can be guided to where the threat is currently and to where the threat has been in order to take search measures there. This means airport operators do not need to check and search the entire airport or shut down operations for a longer period of time than absolutely necessary.

In terms of verticals: RVS is especially suited for port deployments, whether they be land, air, or sea. This is because of the long perimeter distances involved, the usually flat terrain and minimal expected human and vehicular traffic. RVS is capable of being



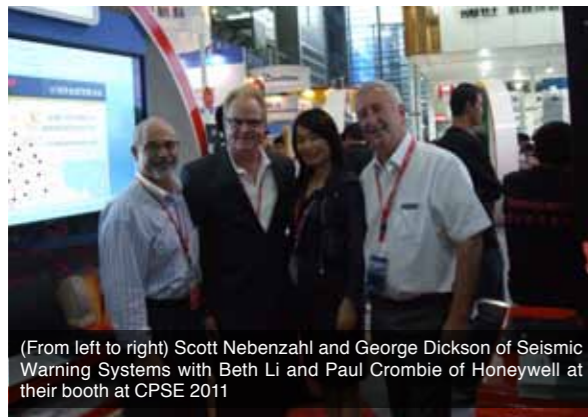
configured by the operator to ignore movement in defined areas; often on a time or activity basis; or to escalate the response if the perceived threat level increases.

Other important verticals where RVS is deployed are Industrial premises; nuclear facilities; rail and government facilities, and sporting venues.

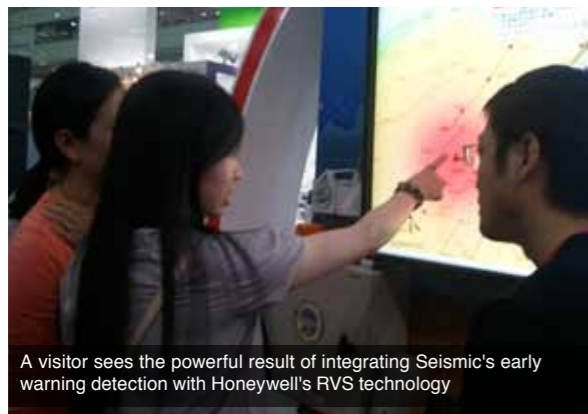
It is important to remember, in terms of RVS technology that radar is a line of sight sensor, where if you can't see an intruder in daylight, the radar cannot see it either, but don't forget that in terms of poor visibility (night, weather, dust etc.) RVS can still detect and track intruders invisible to the human eye. So you need to be selective in your deployment of Radar sensors. You can understand from this that flat areas like Air and Sea ports are perfect applications for RVS. Radar Video Surveillance can integrate other Perimeter Intrusion Detection sensors to provide a holistic security solution providing validated alarms by using another detection source, and provide coverage of perimeter or other areas that may not be covered by radar.

The benefits to clients are that RVS is very quick to deploy and is significantly cheaper than other technologies. The whole life cost (maintenance and replacements) is also significantly cheaper than conventional technologies.

Low false alarm rates are crucial for a Perimeter Intrusion



(From left to right) Scott Nebenzahl and George Dickson of Seismic Warning Systems with Beth Li and Paul Crombie of Honeywell at their booth at CPSE 2011



A visitor sees the powerful result of integrating Seismic's early warning detection with Honeywell's RVS technology

Detection System, so with RVS's ability to validate alarms, false or nuisance alarms are minimized. PIDS are intended to be operational 24/7/365, and in critical infrastructures it is unacceptable to frequently interrupt intended operations due to nuisance alarms. Talking with Chinese airport officials it is understood that they prefer PIDS with lower detection capabilities so if someone approaches an airport fence to observe aircraft movements, an alarm will not be generated.

INTEGRATION

When asked about the video wall on display at their booth Paul said that the solutions were screen shots from the EBI integration.

Paul: EBI, Enterprise Building Integrator, is a piece of software that brings together all of the different Honeywell systems used for monitoring and managing a building or estate of buildings. The Honeywell Security Group offering is the ProWatch System, an equivalent integration-capable system that can take many other systems like Fire, Building Management and Video Surveillance and Access Control Systems and manage and display them together, to allow for more effective operations. The ProWatch system is one of our primary means of collaboration with Seismic Warning Systems.

CPS: Could this technology be directly integrated with access control systems as well, so responses like shutting or opening a door could take place automatically?

Paul: The flexibility and configurability of these systems allow clients to define their intended system actions in the event of many sensed events and alarms. For example, Honeywell's holistic approach would suggest that in the event of a fire at an Airport:

- An alarm would be generated
- There would be a voice alert in the related zone
- CCTV cameras would pan/tilt/zoom to view the source of the alarm
- Appropriate access controlled doors would be unlocked to provide escape routes to safe and secure areas
- The gate allocation system would be notified
- The people tracking system could notify the control room of the location of key people on site
- The HVAC system would be driven into a 'fire' mode
- Lights would be turned on to assist with the evacuation
- Events would be electronically recorded for review and training, and operators prompted for correct responses
- An earthquake-related event could trigger similar or modified responses, depending upon the client's requirements.

The most common security concern in a location like an airport is of an act of terrorism. While certainly a serious concern, a terrorist act has never produced the kind of casualties or destruction that a serious natural disaster, such as an earthquake, has. But an earthquake, unlike a tornado or hurricane, is inherently elusive to predict due to its abruptness. This is where Seismic Warning Systems comes in.

CPS: I have to admit, I just learned of your company today. Can you provide an introduction to who you are and what solutions you provide?

George Dickson: Our technology is earthquake early warning and is the world's first and leading commercial system designed for this purpose. We are in a collaboration with Honeywell to promote this technology in Asia Pacific and under their good graces at this show. My company is Seismic Warning Systems Inc., and we developed and own the core technology.

This technology is designed to go beyond just giving an alert, like what you've heard of in Japan. My hat is off to Japan. They've literally saved countless lives with their technology. However, from the very beginning we've developed our technology to go from the concept of alerts and take it another step forward. Our concept was we need to take a commercial product and make it actionable. That is, that it can integrate with any machine language in the world such as SCADA, to be able to turn things off or on and to make it very simple to protect people, protect systems, infrastructure, and business continuity.

WE DID THIS BASED ON 3 MAJOR POINTS OF FOCUS:

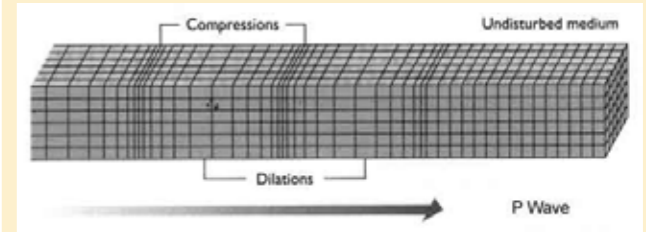
1. Reliability: a system you can count on that doesn't have false positives
2. Global Scope: this technology is needed throughout the world
3. Speed – how fast can you warn the intended population?

In regards to reliability, this system, called QuakeGuard™, is the world leader. In the last 10 years it has been deployed throughout California. Our clients include schools, hospitals, corporations, Lawrence Berkeley National Labs, Cisco and more. We have just partnered up with NASA, the Department of Energy, and as of a few days ago Chevron-Oil is onboard as well to take this to the next level.

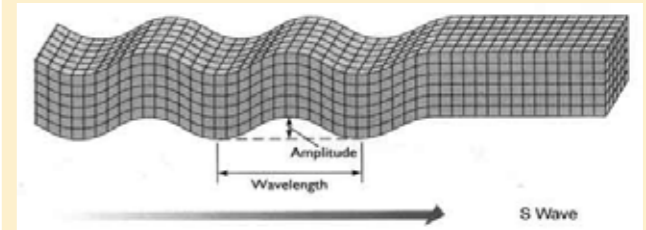
HOW IT WORKS

WHAT'S IMPORTANT TO UNDERSTAND IS THAT WE DON'T 'PREDICT' ANYTHING. We measure the P-wave, or primary wave, which is the fastest wave traveling at about the

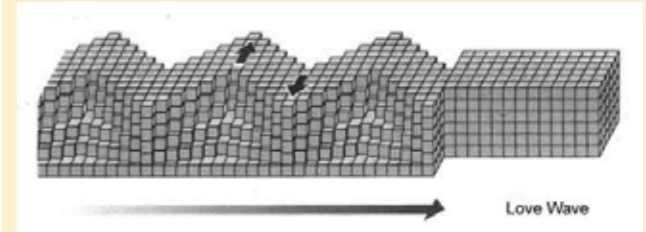
Four distinct waveforms



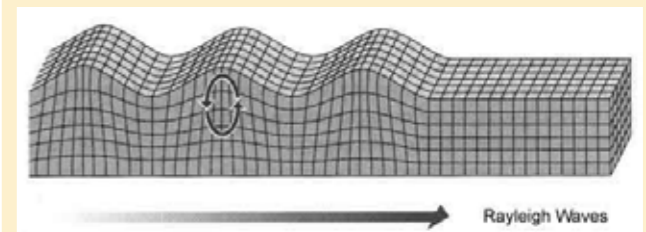
P-Waves are compressional waves that travel at 5 to 7km/s



S-Waves are transverse body waves that travel at 3 to 4km/s



L-Waves are transverse surface waves (primarily horizontal) that travel at 2 to 4km/s



R-Waves travel horizontally and vertically in a rolling motion, similar to ocean waves, at 2 to 4km/s and are typically the most destructive wave type.

FIGURE 1 EARTHQUAKES ARE CHARACTERIZED BY FOUR DISTINCT WAVEFORMS THAT EMANATE FROM THE QUAKE'S EPICENTER (GRAPHICS: PRINCETON UNIVERSITY)

speed of sound. In an earthquake this wave comes first. The next wave is the S-wave, or shear wave, followed by the Love-Rayleigh wave. Our system picks up the P-wave and within a half second processes the ground acceleration that is taking place from wherever the system is deployed. We convert that signal into a Mercalli (intensity) scale, somewhat like the Richter scale, and then through triangulation we determine the point of location.

CPS: Very interesting. And through networked systems you can dispatch a warning as well as using integrated networks and automation technologies to take preventative measures, correct?

George: Exactly. What we've designed it to do at this point is trigger anything at 5.0 or above, where it starts to become a more serious earthquake in most areas of the world.

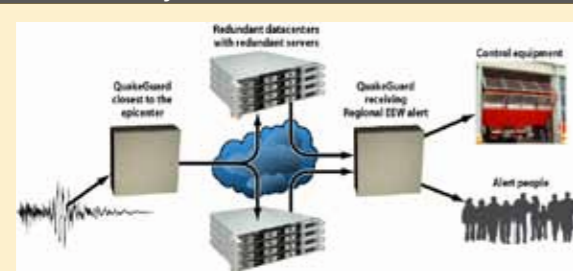
Within that half second we process it and then work with solutions like Honeywell's automation control and integrated security solutions unified solutions. It is so important for us to have a big brother like Honeywell who can help us to interface with a myriad of products and services and integrate with countries all over the world. Because when you think about it, when you're in a new market like China, India, Korea, Turkey or any of these areas that are in desperate need of these technologies, it is difficult to think of where to start and these solution providers can provide us with the most effective channels.

THE NEED FOR RELIABLE SPEED

George: The fact that in an earthquake you may only have a few seconds, it is critically important to have speed and reliability to deliver.

What we have also done in these deployments is gone a step further to develop regional networks. We're taking the systems that we've designed and are now networking the systems together. That's what we're doing here in China. We're starting

CREWS System



to look at the Asian markets. We're working with Honeywell, to understand the best way to deploy into the infrastructure of China and Asia Pacific.

The system we are building is one in which for every 8 kilometers from the epicenter you get an additional second of early warning. That is how much time you get in nature based off the speed that the P-wave travels. But over the past 10 years, through employing the internet, we have designed a system to actually jump *ahead* of the P-wave.

Scott Nebenzahl: What we have done is perfected this QuakeGuard technology domestically in the United States and then enhanced it through embarking upon regional early warning networks. This makes us the only provider of early warning network services which can integrate into any kind of end user's needs. It is vertical specific, schools may instigate drop, cover, and hold while industries may stop certain industrial processes through automation, to mitigate hazardous materials from being dispersed for example.

Part of the purpose we are here in Shenzhen is the demand; a demand that is changing from what it used to be. Originally the governmental approach was simply detection. They were not trying to take the signal and do anything with it beyond mass notification.

CPS: That was the case in Japan, no?

Scott: Exactly. We were discussing this with the transportation sector here, how in Japan it was the transportation sector, the high speed rail, or Shinkansen, that adopted early warning first, prior to any governmental system being put into place in the country.

When we talk to a client, whether it's the emergency management sector, a government client or industrial client, we say "Wow, we now have a tool for you that you were not able to previously exploit, that is time. We can afford you an early warning signal and thus your response protocols can now benefit from this new tool of early warning and the added time it affords.

IN THE AGE OF THE QUAKE VALIDATION IS KEY

Scott: We are seeing earthquake after earthquake taking place in significant locations all over the world. The impact of these events range tremendously. In Haiti, it was devastating because the infrastructure was built very poor. You see an earthquake of equal size in Chili and the human toll was much less because of the structural integrity of the environment. Nonetheless, in



all these areas there was still definite negative impact, especially economically. With an early warning system we can help mitigate some of those outcomes.

We are a small California company, while we enjoy a good reputation earned through George's 15 years of hard work and we have been engaged in some targeted international collaborations such as the city of Tijuana Water Authority in Baja, Mexico, previously there were still no aggressive international plans.

Fast forward to Japan. Japan becomes a game changer. The world watched early warning live on TV. People saw it pop up on their computer - 'countdown - 15, 14, 13'- and the earthquake hits. We saw the investment that Japan made in being a prepared society and the lives saved thereby. This caused the demand for what we built to explode.

Under these factors and with our collaboration with Honeywell already approaching a year, Honeywell's Asia Pacific region felt it very important that we introduce this technology to China at this point in time. The threats to China are not really any different than what the rest of Asia or Latin America faces, however shocks to China's economy will reverberate the world over.

Seismic is the world leader in validating this technology. This is really important because industry is not going to adopt this technology if it isn't deemed reliable. We come here with internationally renowned security integrators and providers. Now this can become a complete solution set.

Because of all these events worldwide there has been the development of a lot of inferior products; attempts to develop systems that are without validation. These are not industrial grade solutions. Our technology has earned a reputation of reliability.

Industry can count on it to do what it is supposed to do and not do anything when it is not supposed and that is what Seismic insists on.

A STRONG NETWORK MEANS ADDED SPEED

George: Ten years ago, when I was first looking at integration and how to guarantee the point-to-point quality of service would reach the level we desired, we were already thinking about who we would want to work with. Even back then, in a business plan I showed to Scott, I had said it was Honeywell. And I have to say through the leadership of Mrs. Mable Ng, the VP and GM of Honeywell Security Group Asia Pacific, we are on our way to delivering these solutions to the Asia Pacific market. They see the importance of this technology and they understand that we also need them to help integrate this properly in the Asian market.

THE KEY ELEMENT THAT WE ARE LEARNING NOW IS THAT THROUGH NETWORKING WE CAN DOUBLE THE WARNING TIME.

Unlike what anybody else has done in the world we can offer at least 2 seconds of warning time for every 8 kilometers. So if you are a nuclear power plant or a high speed rail, both two industries that Honeywell is working with, and you want to know how much time you have, what direction is this quake coming from and what can you do to best prepare your facility for safety and continuity of business, then you need to incorporate a system like ours. Our system provides a warning that is maximized - you can get any more time - and with the strength of a partnership like ours with Honeywell there is no beating the result we will create throughout Asia Pacific. So thanks again to the vision of Honeywell for opening a door for us into this region and we are now here to listen to the voice of the customers and understand what is needed to build this network. **CPS**