Solutions Brief

Innovative Homeland Security Solutions from Silicon Graphics

The recent terrorist attacks have challenged the high-tech industry to create innovative solutions to prevent future threats to homeland security. The potential threat requires a bold new class of solutions that provide a higher level of security and safety. The military has long understood how to leverage technology for effective preparation and real-time analysis, and now the civilian community is striving to understand technology's benefits. Proven SGI® solutions can be fielded today that will have an immediate impact on reducing our nation's vulnerability to threats.

SGI's core competencies in the areas of high-performance computing, visualization, and the management of complex data offer a unique set of capabilities suited to support an innovative class of homeland security solutions in the following key areas outlined in the National Homeland Security Strategy:

- Defending against catastrophic threats
- Domestic counterterrorism
- Intelligence and warning
- Protecting critical infrastructures and key assets
- Emergency training and preparedness for response

SGI focuses its core competencies on the entire life cycle of a crisis. We provide solutions that can be used in the simulation of a catastrophic event. Our solutions are modular so that they can also be used for mission rehearsal and training. Once trained, personnel can use our solutions within a command-and-control center in the event of a real-world disaster.

Defending Against Catastrophic Threats

Guarding our nation against a weapons of mass destruction attack is a critical part of the national strategy for homeland security. Dispersions of chemical and biological agents in the air or within buildings must be studied and better understood in an effort to forecast outcomes and contingencies should such an attack be launched.

SGI® computers are used throughout the world for weather forecasting and air-pollutant transport predictions on both a short- and a long-term basis, both locally and globally. Existing weather forecasting applications take environmental observation data and predict future patterns of front movement on a large scale. One such forecasting code, provided by SAIC, is able to scale on SGI platforms and support the fine-grain, micro-climate forecasting needed to predict the effects of contaminant releases in urban environments.

SGI Solution: The Chemical, Biological, Radiological, Nuclear, and Explosive Threat Operation and Training Center

SGI is working with its partners to develop a solution for decision support and communications called the Threat Operation and Training Center (OTC). The OTC is a decision-making tool that is a unique combination of computing, graphics, and display technology designed to provide faster time to insight. The OTC is being designed to provide a command center for a sustained response to a large-scale crisis, as well as to provide a training environment to assure preparedness. Based on SGI® Reality Center™ products and technology, the OTC will collect and fuse 2D and 3D data from multiple sources and enable decision makers to analyze, predict, and review actions for rehearsal and operations.

Domestic Counterterrorism

In a crisis, the quicker one can view the problem, the quicker one can react with a plan. SGI and its partners can create accurate, 3D, interactive worlds that not only make it possible to plan and react decisively to events such as terrorist attacks, plane crashes, and natural disasters, but that also allow emergency personnel to rehearse for a crisis before it occurs.

The 3D computer models of cities, regions, and ports can be developed through a variety of means and can then be applied to domestic counterterrorism applications. Once created, the analyst can view a city or port from any angle or distance in order to study possible scenarios. Accurate measurement can be made between various points within the model. Fusion of the 3D computer model with other information is also possible.

SGI Solution: Port Security Command Center (PSCC)

Protecting our nation's 95,000 miles of shoreline and navigable waterways is critical to our homeland security. Major seaports are vulnerable to terrorist attacks because of their large size, water and land accessibility, major metro locations, international border positions, various transportation types, and hazardous material transportation. To improve security, not only is more information needed, and needed faster, but information must also be presented in a manner that allows for rapid assessment and understanding.

Therefore, SGI and its partners are taking the next step in 3D modeling and scene visualization by developing a solution called the Port Security Command Center (PSCC). In the PSCC various sensor data, such as radar, sonar, HD video, GPS, traffic, and weather, are fused into a 3D model of the port and then displayed to support collaboration, decisions, and actions. Every ship, vehicle, and person entering the port can be observed and tracked. Using a Visual Area Network developed by SGI, any displayed information from the PSCC can be transmitted to a PC, laptop, or PDA to reach the first responders or tactical commanders at the site. End users now have a very powerful way to get the results of merging high-performance computing and advanced graphics from the PSCC into their hands.

Intelligence and Warning

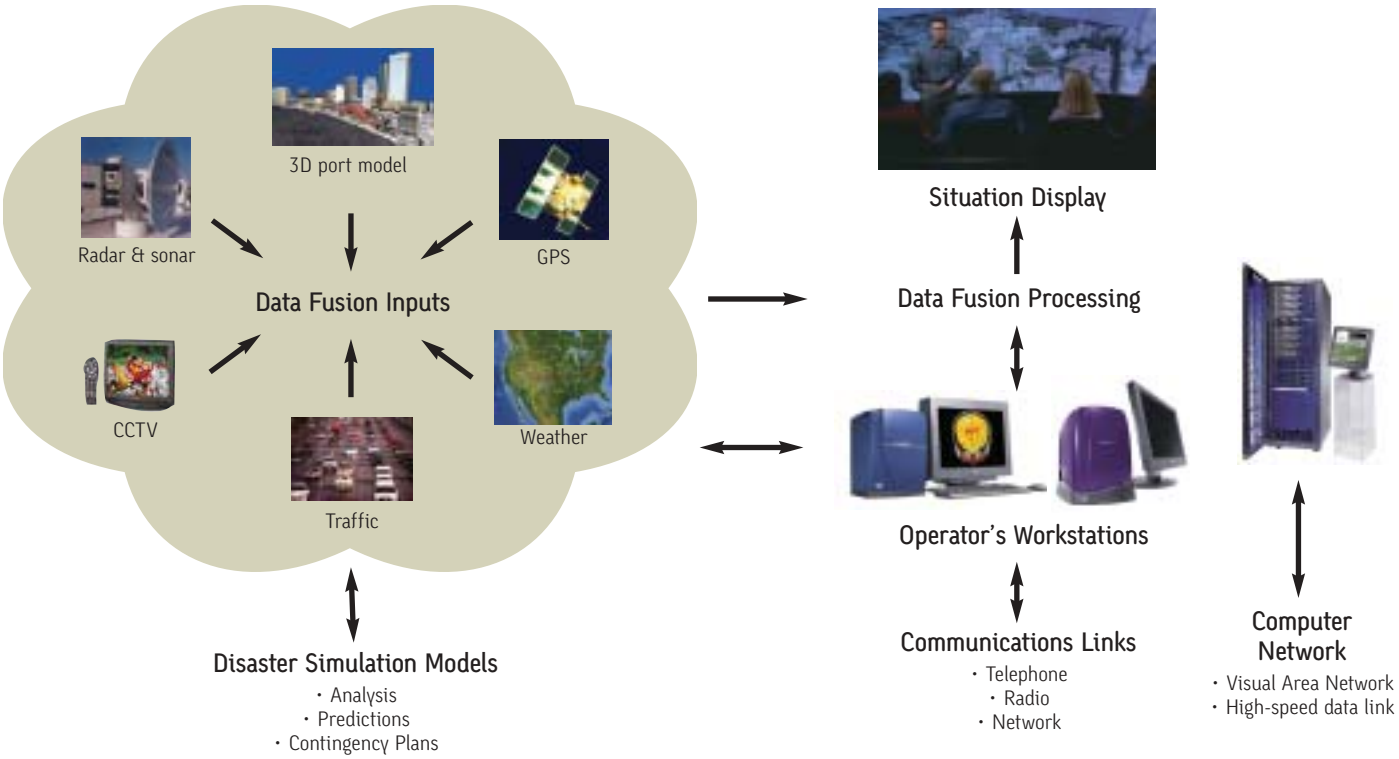
Law enforcement officials who are in charge of the safety of their citizens' public events need the tools that allow situational awareness and planning for safe and incident-free events.

SGI Solution: Urban Intelligence Tools

Recently the Royal Canadian Mounted Police and SGI's partner Harris Corporation created a 2 km^2 3D database of Quebec City for the Summit of the Americas. This 3D Quebec City database, which was used for Canada's largest national security operation for both planning and operations, was visualized using an SGI® Onyx® 3000 series computer and Harris RealSite™ software. Other 3D databases have been created, including Salt Lake City for the Olympics, as well as Denver, Atlanta, and Manhattan.

Protecting Critical Infrastructures and Key Assets

Buildings and municipal structures such as bridges, stadiums, and auditoriums were designed with codes and standards meant to help them withstand a variety of load conditions. Most of these loads are naturally occurring in the form of ground



Port Security Command Center

motion from earthquakes or atmospheric winds. However, following recent terrorist bombing around the world, there are reasons to consider additional evaluations and contingency planning for loads that include high-velocity impact and thermal effects. For most structures, such load conditions can be reasonably modeled with a combination of commercial off-the-shelf structural analysis software and high-performance computing technology and expertise from SGI. SGI continues to further enhance and invest in the company's strategic relationships with these solution providers. The result is a series of powerful solutions that help city planners and corporations manage the risk and liability introduced by the new threat.

SGI Solution: Blast Simulation and Analysis

SGI demonstrated its expertise in critical situations such as the September 11 attack on the Pentagon. Using an SGI® Origin® supercomputer, the Army Corps of Engineers had studied 3D simulations of the attacks on the Khobar Towers barracks in Saudi Arabia and the Murrah building in Oklahoma City. They then analyzed the effects of the attacks and recommended changes, such as blast-resistant windows. On September 11, part of the Pentagon that was hit had already been retrofitted based on these recommendations, and, as a result, lives were saved.

Emergency Training and Preparedness for Response

Traditional testing and training methods can be costly and, in some cases, limited if physical mock-ups present a real danger to trainees. Using visualization technology to simulate the whole environment, the cost and time required to train each staff person is drastically reduced, and scenarios considered too dangerous to reproduce in the real world are now possible through virtual re-creations of live situations.

SGI Solution: Hazard Perception and Situational Awareness Training (HAPSAT)

SGI and its partners have created a unique new concept for training purposes—an integrated Hazard Perception and Situational Awareness Training solution that uses a combination of powerful visualization technology and state-of-the-art simulation facilities and software. Situational awareness and response are vital to public safety. This technology provides organizations with a safe, controllable, repeatable, and measurable way of training and preparing staff for all manner of day-to-day situations, incidents, and potentially dangerous occurrences. These simulations are presented in a way that is as close to real life as possible.

HAPSAT can be used in the following arenas:

- **Transportation:** Transport organizations constantly come under scrutiny for efficiency and safety standards. This solution is able to help transportation departments to more effectively and cost-efficiently meet quality-control needs. Whether it's rail, road, or shipping transport

Australian Rail Training Facility
Image courtesy of New South Wales State Rail Authority

networks, the solution provides a completely realistic environment in which to rehearse all manner of day-to-day procedures.

- **Emergency service:** Although it's not always feasible for state authorities to physically re-create emergency incidents to train and assess response team capabilities, they can get closer to real-life testing using the HAPSAT technology concept. The solution supports the development of virtual, interactive scenarios designed to test the knowledge and decision-making skills of fire, police, and ambulance crews, offering emergency services a safe and cost-effective method of training response teams in unpredictable situations and environmental circumstances.

- **Airport operations:** Air safety probably causes more concern and has more visibility than any other transport industry. Whether dealing with emergency landings, runway clearances, the maintenance of flight safety in snow or ice, midair collisions, or general airport security, staff members need to be highly trained in operational procedures and proficient in dealing with any number of potential problems. SGI can help operators better meet these needs through realistic environment simulations and incident re-creation.

A recent example is Australia's New South Wales State Rail Authority, which is the first transport organization in the world to open a state-of-the-art virtual reality and simulation center that will enhance training and education levels for all State Rail employees. Using an SGI Reality Center facility, employees including train drivers, guards, and station managers will experience realistic scenarios covering all aspects of driver training, platform safety, emergency procedures training, customer service, and engineering maintenance.

SGI Crisis Management Centers

Urban disasters come in many forms—some predictable, others unpredictable. SGI and its partners are working on a crisis management center solution that would provide situational awareness and a common operating picture for the following natural and manmade disasters: earthquakes, hurricanes, storm surges, wildfire, oil/toxic spills, and debris removal.

An example is a recently opened advanced visualization center at the Scripps Institution of Oceanography at the University of California, San Diego (UCSD). Two universities, together with the California Institute for Telecommunications and Information Technology (Cal-(IT)^2), are creating a prototype for collaborative scientific analysis that could also be used as a command-and-control facility for crisis management. The Visualization Center at Scripps is built around an SGI® Onyx® 3400 system with InfiniteReality3™ graphics and 16 processors.

Summary

SGI is uniquely qualified to help coordinate the nation's vast resources and build an integrated homeland security infrastructure. With SGI's proven leadership in converting data into information through technical leadership in visualization and management of complex data, SGI is continually investing hundreds of millions of dollars in solving these most complex problems. SGI has over 1,000 engineers with over 400 patents engaged in research to make the industry's leading visualization solutions even better. Our products and solutions offer a distinctive set of capabilities suited to support an innovative class of homeland security solutions.

sgi®

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