Featured Articles

Citywide Safety and Security Solutions

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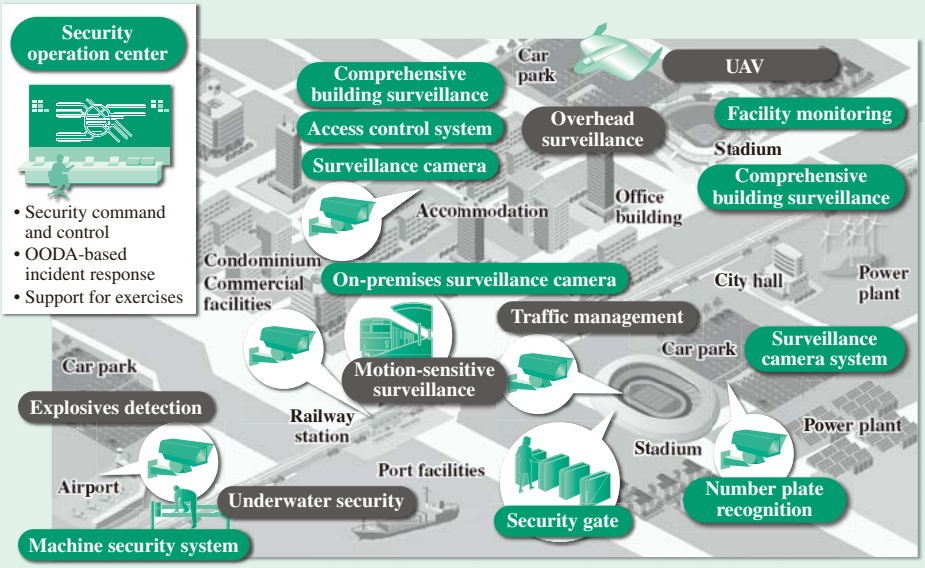
OVERVIEW: To provide people with a convenient and comfortable way of life, the social infrastructure systems that support the functions of a city have become increasingly advanced and complex, forming an enormous interdependent system. Meanwhile, threats such as natural disasters, epidemics, crime, and cyberterrorism that have the potential to impact on the reliable operation of these social infrastructure systems continue to grow, placing greater demands on social infrastructure security to protect people's safety and security. Hitachi has been drawing on its know-how in defense and social infrastructure security systems, and on its experience with their implementation, to consider what form the social infrastructure security systems of the future should take. From this base, Hitachi is contributing to the provision of social infrastructure that is even safer and more secure.

INTRODUCTION

CITIES provide an environment in which complex systems such as those used at energy facilities or by transportation agencies or financial institutions can work together in sophisticated ways to facilitate a comfortable and convenient way of life. Meanwhile, natural disasters like the Great East Japan Earthquake of 2011, the 9/11 terrorist attacks in the USA in 2001, the severe acute respiratory syndrome (SARS) outbreak in China in 2003, and the increased risk in recent years of cyber-attacks on important infrastructure have raised concerns about the potential for events like these to have a major impact[1].

Whereas facilities have in the past tended to implement their own independent security measures, it is now recognized that the future will require system concepts that take account of the entire system. The



OODA: observe, orient, decide, and act UAV: unmanned aerial vehicle

Fig. 1—Overview of Social Infrastructure Security.
Security measures are needed to protect people's safety and security from an increasing number of threats in a variety of forms in cities where complex systems work together in sophisticated ways.

fear of terrorist acts staged to draw international attention to the ideals of their perpetrators mean that large national events in particular require countermeasures against such threats[2].

This article provides an overview of how Hitachi's concept for social infrastructure security that focuses on security measures being adaptive, responsive, and cooperative works in practice, and describes security solutions that implement this concept (see Fig. 1).

HOW HITACHI'S SOCIAL INFRASTRUCTURE SECURITY CONCEPT WORKS IN PRACTICE

This section describes the new value added when the concept is applied to social infrastructure systems, giving an overview of how this works in practice.

Having identified the growing diversity of threats, the importance of incident response measures, and increasing interdependence as three trends influencing the field of social infrastructure security, Hitachi has adopted a concept for social infrastructure security that focuses on the need for future security measures to be adaptive, responsive, and cooperative.

By also incorporating the observe, orient, decide, and act (OODA) loop concept, this concept goes beyond the existing practice of business continuity planning (BCP) for maintaining operations during an emergency to establish business continuity management (BCM) in which the response to an incident can adapt to actual circumstances. Along with improving the efficiency of existing activities under non-emergency conditions, it also enables the provision of new services through the coordination of systems and organizations (see Fig. 2).

The following presents an overview of a system that incorporates this concept.

To ensure cooperation between organizations, the system acts as a common platform for security services such as operational management, identification (ID) management, and providing a common operational picture (COP) to allow greater coordination of social infrastructure system applications. Responsiveness is achieved by deciding on incident response measures that work through the OODA loop to minimize damage when an incident occurs in a social infrastructure system. These practices can also be used to decide whether an incident is limited to certain systems only, or whether it is interrelated.

By applying this structure to both physical security and cybersecurity, it is possible to build an integrated system that extends beyond the physical and virtual (cyberspace) realms (see Fig. 3).

SOLUTIONS BASED ON HITACHI CONCEPT

This section describes urban security solutions that implement the concepts described above. Other articles describe solutions for other forms of security, including cyber and control system security.

Cities have typically developed transportation systems that link them to the outside world, and it is more efficient for them to perform border security checks on the aircraft, ships, vehicles, and people that enter the city. The following sections describe solutions from this vantage point.

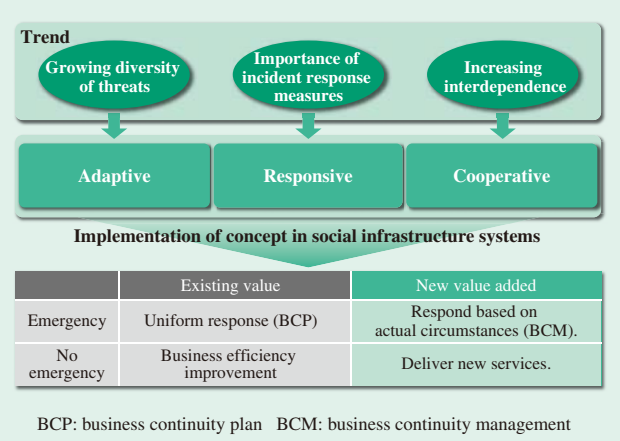


Fig. 2—New Value Added by Implementation of Hitachi's Concept.
Hitachi's concept for social infrastructure security that focuses on security measures being adaptive, responsive, and cooperative can add new value both during an emergency and at other times.

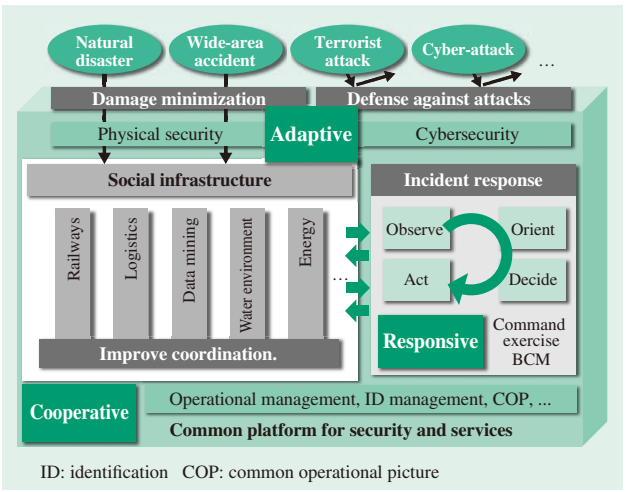


Fig. 3—System Outline.
The diagram shows an example system that implements Hitachi's social infrastructure security concept.

Total Security Solution for Airports

There has been a notable improvement in service at airports in recent years thanks to a reduction in the time required for passengers to check in and board.

Although airport security has been considerably strengthened since the 9/11 terrorist attacks in the USA in September 2001, terrorist attacks on transportation and other targets around the world continue unabated, with examples including the London bombings in July 2005, the attempted car bombings and terrorist attacks on airport facilities in the UK in June 2007, and the bombing at Domodedovo Airport in 2011.

Airports are divided into zones that include both public areas where large numbers of people congregate and restricted areas where only authorized personnel are permitted. Together with their operational collaboration with police, fire, and other agencies, airport companies also need to manage shopping and other areas inside terminal buildings where people congregate, ensure boarding procedures operate smoothly, and deal with more sophisticated and ferocious criminal activity. That is, an important requirement for airports is that they can quickly identify and track criminals or other suspicious individuals while also keeping nearby passengers and airport staff safe without imposing an overbearing security presence.

To maintain the safety and security of airports, Hitachi is progressively introducing services in the form of large-scale monitoring solutions for total security that combine imaging solutions for efficient image searching and tracking with other solutions such as those that predict the behavior patterns of criminals (see Fig. 4).

Marine Defense Solution

The importation of drugs, guns, and other contraband from overseas is believed to have played a part in violent crime in Japan over recent years. There are also fears that international terrorist organizations are engaged in activities such as using ships to launch attacks on land-based sites or other vessels, the illegal importation of arms or materials used for weapons of mass destruction, and the smuggling of terrorists across borders.

In the “1974 International Convention for the Safety of Life at Sea (SOLAS 74)” document that became effective in July 2002, Japan established a requirement that an automatic identification system (AIS) be fitted to, (1) All vessels of 300 t gross or more that ply international waters, (2) All passenger vessels that ply international waters, and (3) All vessels of 500 t gross or more, regardless of whether they ply international waters. Because AIS automatically sends and receives vessel information, including the vessel’s

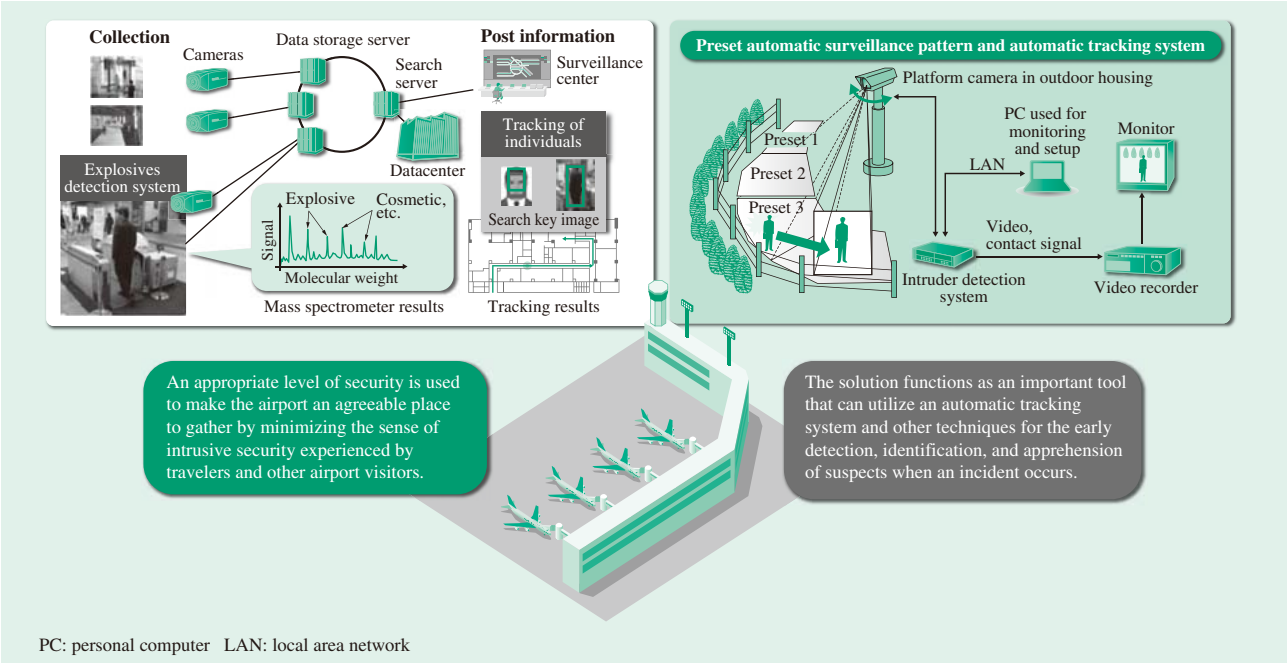


Fig. 4—Total Security Solution for Airports.
The solution is an important tool that can provide an appropriate level of security during normal times without imposing an overbearing security presence, while also being able to utilize an automatic tracking system and other techniques for the early detection, identification, and apprehension of suspects in the event of an emergency.

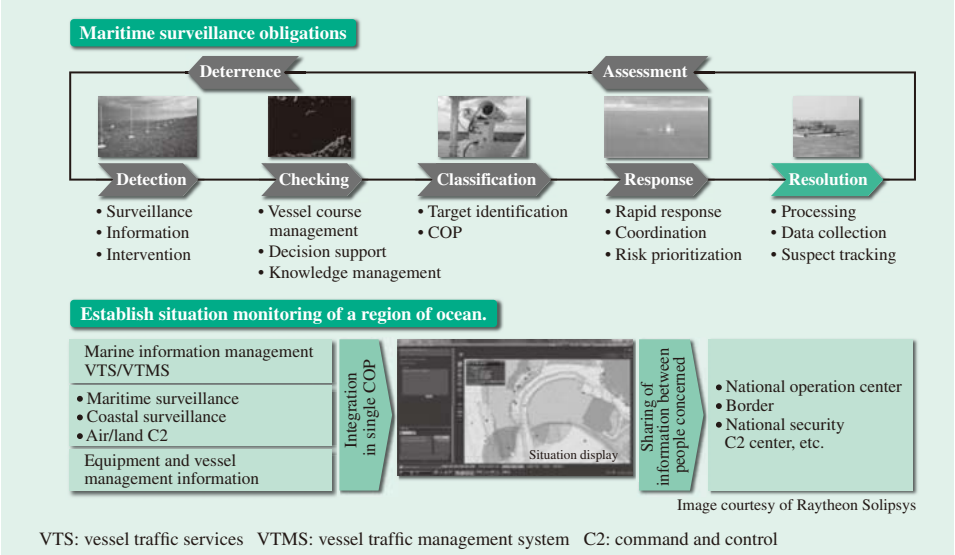


Fig. 5—Marine Defense Solution.
The solution supports marine defense by establishing situation monitoring of a region of ocean.

identification code, type, location, course, speed, progress, and other safety information, it allows shore-based agencies to keep track of vessel movements[5].

The issues with AIS, however, include the existence of small vessels that are not required to fit it and the fact that AIS information cannot be used to keep track of those vessels that are obliged to install it because sailors can disable it deliberately, this being permitted to allow large working fishing vessels to keep the location of fishing grounds secret[6].

Hitachi's marine defense solution is a total system that supports all aspects of marine surveillance from the detection of vessels through to identification, classification, response, and resolution. For the detection, identification, and classification phase, the solution can collect vessel traffic services (VTS) and AIS information and correlate it with other sensor data, including that from coastal radar and specific absorption rate (SAR) information from aircraft, to identify ships or other vessels and provide a highly accurate situation assessment. By installing radar and cameras on small boats, it can also track and monitor suspicious craft outside areas covered by radar. This information can then be shared by displaying it all together in a single COP. The solution also provides functions for using chat and whiteboards to prioritize risks or coordinate responses in the response and resolution phase (see Fig. 5).

Underwater Security Solution

Airports, power plants, oil storage facilities, and other important infrastructure are located along the coast of Japan, making it very important that these facilities have adequate security against underwater threats.

Because electromagnetic radiation, including both visible light and radio waves, attenuates rapidly in seawater, sonar security systems that work acoustically are the best way to detect underwater intrusions. Hitachi has reduced the installation cost by combining both passive sonar for long-range tracking and imaging sonar for short-range targeting, seeing this as also providing an effective system configuration in security terms.

Between FY2005 and FY2007, Hitachi participated in research into underwater security sonar systems by the Underwater Technology Research Center, Institute of Industrial Science at The University of Tokyo. The three-year research program demonstrated through sea trials that the system they had developed was suitable in practice for underwater intrusion monitoring (see Fig. 6).

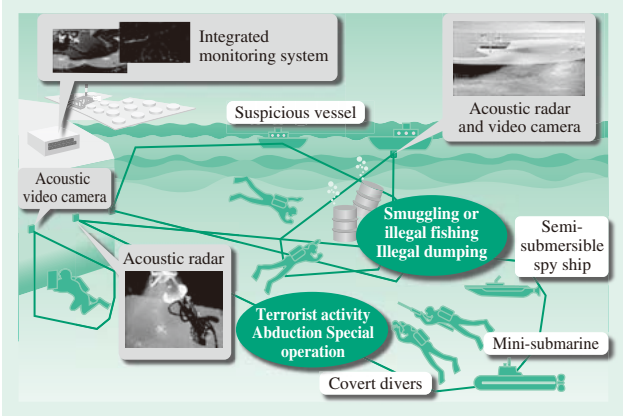


Fig. 6—Concept of Operation of Underwater Security Sonar System.
The diagram shows the concept of operation of the underwater security sonar system.

Railway Station Security Solution

An incident in May 2012 in which a man was seriously injured by a knife attack at Shibuya Station on the Fukutoshin Line of Tokyo Metro Co., Ltd. was resolved by the arrest of the assailant some days later by the Metropolitan Police Department, who had treated the case as one of attempted murder. Crucial to the arrest was video footage from the surveillance cameras installed at Tokyo Metro stations and security cameras installed in the streets around Shibuya Station.

While the installation of surveillance cameras at stations for crime prevention is ongoing, there is a need to take their deterrent effect a step further. That is, to integrate them into security systems. The use of high-speed image processing to keep nearby people safe by preemptively detecting and tracking suspicious individuals will be among the roles of future security systems. Given that large numbers of passengers packed onto the limited platform space is one of the features of railways in Japan, security systems that impede mass transit are impractical. What are feasible, however, are measures such as the use of surveillance video technology and sensing to provide warning of threats to passengers and station staff (see Fig. 7).

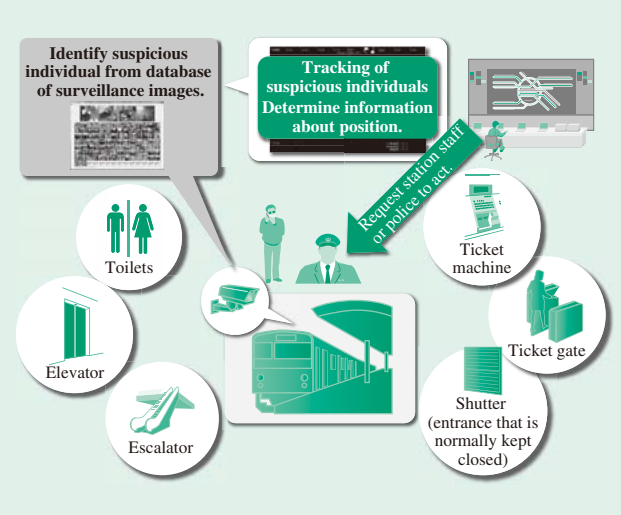


Fig. 7—Railway Station Security Solution.
Suspicious individuals can be detected and tracked using surveillance video technology and sensing.

Facility Security Solution

Facility security is used at facilities with a wide diversity of layouts and people present, including event halls, large retail premises, office buildings, factories, research institutions, datacenters, condominiums, and elderly care facilities. Likewise, the investigation and implementation of security depends on the type of facility, including both locations that are open to the public and locations used only by specific people.

The Great East Japan Earthquake reinforced to local government in Japan, businesses, and other organizations the importance of confirming people's safety when an emergency occurs.

Progress has been made on integration with security systems to make further advances in this field. This involves combining the confirmation of people's safety with access control systems to allow the rapid confirmation of who is present at a factory or other facility. This combination is recognized as being beneficial for confirming people's safety when a fire or other incident occurs at a factory, regardless of the scale.

Hitachi has experience in the building and installation of locally managed systems for large buildings, datacenters, and other facilities. Hitachi also supplies solutions through the public cloud for premises such as condominiums, small offices, or elderly care facilities that are operated by businesses that cannot afford a large investment. The benefits of using the public cloud can include minimizing the investment required by users of such facilities, cutting the cost of administration, and making operation more efficient. For example, the 24-hour, 365-day provision and management of common-use equipment or smartcard-based access to condominiums is difficult to achieve without relying on an administration office that operates both day and night. It can be provided at low cost, however, by utilizing Hitachi's public cloud and support infrastructure. The public cloud has also attracted attention from people with an interest in this area for its ability to perform low-cost operating system upgrades by treating the public cloud itself as a management service.

In a future initiative, Hitachi aims to achieve even greater efficiency than in the past while still maintaining a high level of security through the centralized management of areas of a certain scale, such as business districts or building complexes, rather than individual large buildings or condominiums, using the public or private cloud depending on the location. This is an even more advanced form of the "area management" being promoted by the Ministry of Land, Infrastructure, Transport and Tourism, and involves managing everything centrally through a private cloud or public cloud, including not only security management but also the efficient use of energy[7].

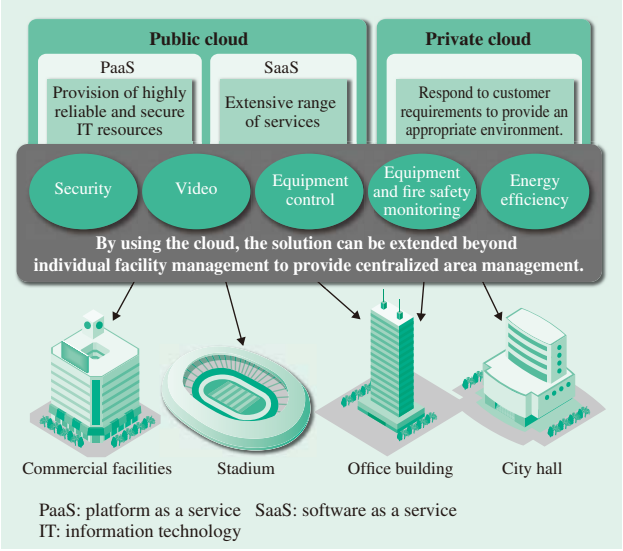


Fig. 8—Facility Security Solution.
By using the cloud, the scope of the solution can be extended beyond individual facilities to provide centralized area management.

Among the future possibilities for this initiative is the use of big data, something that is difficult to achieve under conventional configurations, by performing area management on a private cloud that allows centralized management of information. It is anticipated that this could be used for a new type of security measure that records people who are involved in incidents in the area so that, should these people enter the area again, administrators can be informed and a trace placed on the people concerned, and the implementation of management practices for identifying potential incidents before they occur and taking preventative steps (see Fig. 8).

CONCLUSIONS

This article has provided an overview of how Hitachi's concept for social infrastructure security works in practice, and described security solutions that implement this concept.

Hitachi believes that the solutions described here can contribute to making society safer and more secure.

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