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Interview	**Infrastructure & Cities Sector** **Building Technologies Division**

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"We need to make the overall system for cities more resistant"

Safety and security in the city of tomorrow

Modern cities are becoming increasingly more susceptible to natural disasters, attacks and infrastructure disturbances. Technology can prevent many of these dangerous situations from arising in the first place. Above all, however, it helps people escape danger quickly and safely. Peter Löffler, who researches safety and security innovations for Siemens Building Technologies, describes the solutions that are available today and explains what the security sector is working on for tomorrow.

Mr. Löffler, what threats are modern cities facing today?
In the Western world, fire was long the biggest threat to cities and their inhabitants. In recent years, however, the potential for danger has changed. New kinds of threats such as international terrorism and social violence are taking center stage.

Are there technological solutions to these problems?
Technology cannot prevent such dangers. At best, it can help create a sense of security through two measures: increased law enforcement presence and video surveillance. Yet we cannot install cameras everywhere, something no one would want anyway. In addition, there is a certain risk that existing surveillance cameras will only result in incidents being carried out elsewhere.

Are cities today more vulnerable than they used to be, generally speaking?
A few centuries ago, the flow of materials and people within cities was much more heavily regulated than it is today, for example through city gates. Today's cities are largely open. We can move from point A to point B without anyone taking much notice. This circumstance, and growing population density, make the system more complex.
Technical systems themselves have also become more complex, which means that they are more susceptible to disturbances. Power outages and interruptions to the supply of running water can quickly turn into a serious problem. These situations are not always resolved as easily as the three-hour power outage in Zurich at the end of January 2012. These potential weaknesses must be re-evaluated. We need to introduce measure that make the overall system more resistant to negative influences, from natural disasters to terrorist attacks.

What specific improvements can be made?

Several different approaches can be taken. We want to make technology itself less sensitive and optimize IT infrastructures. In today's networked systems, there is a risk of unauthorized persons gaining access to the system and manipulating it. The susceptibility of network infrastructures is extremely dangerous for our society.

Technology offers no preventive measures to counteract other influences, such as natural disasters. Therefore, we should be capable of responding to them efficiently and intelligently. We have coined the phrase "intelligent response" for this purpose.

What does intelligent response mean to Siemens?

We develop evacuation plans for typical emergency scenarios in large building complexes, such as airports, because every threat requires a different type of evacuation. Things get difficult when an unexpected scenario arises, such as a shooting rampage or a hostage situation.

Our general goal is to make building infrastructures more secure, thanks to correct emergency responses. Two points are decisive here: How do I reach the people I want to warn and how do I guide them out of the danger zone? In the past, air raid sirens would warn people in Germany, but today alarm sirens are often interpreted as false alarms and ignored. And while Europe has no standard regulations for voice announcements, in the United States emergency public address systems are mandatory in public buildings.

Can an intelligent system guide people out of a danger zone more quickly?

Emergency exit signs that are supposed to guide people to safety in an incident are static and cannot adapt to threatening situations. In the worst case, a fire is burning behind an emergency exit door and people are guided right into danger, into fire or smoke – which is what happened during the disastrous fire at Düsseldorf Airport in 1996. Such tragic events can be avoided with the aid of intelligent systems that show the control center where fires are burning. With today's technology, we can offer intelligent escape route control systems. The flight announcement boards at an airport can be used as navigation aids in an emergency. And only the corridors that are to be used as escape routes are illuminated.

Theoretically, it would also be conceivable to equip video cameras with so much intelligence that they can interpret images themselves. This would be beneficial since a single operator is incapable of monitoring all video images due to the enormous volume of data. Our idea, therefore, is to build a system that lets the operator know which camera may be displaying a dangerous situation at a given time.

How does this type of system identify potential dangers?

Experience has shown that crowds of people move according to certain patterns. Specific behaviors then stand out, for example one person running through a pedestrian zone while the rest of the crowd is moving along slowly and steadily. Such unusual movements do not necessarily signify a danger, but they can be an indication that the operator needs to check the situation. He or she can then decide whether an alarm should be triggered.

Another option is to evaluate crowd densities via video cameras. Several years ago, a risky situation occurred in the city of Zurich which could have ended badly. Crowds of people attending the city festival wanted to return home by rapid transit, and the escalators at the main train station kept transporting more and more people to the underground platforms even though these platforms had long since become overcrowded. This could have resulted in people falling onto the tracks.

Such situations could be avoided using intelligent response systems. Potential danger is detected in time and neutralized through prevention. If a serious hazard arises anyway, these systems can resolve the situation quickly and efficiently.

Does Siemens already have products that can accomplish this?
In the area of intelligent response, we are already able to calculate dynamic escape routes and we also have voice-controlled evacuation systems. We have launched a research project on people flow analysis in cooperation with a transportation firm based in the German-speaking countries. Using video cameras, this project aims to analyze crowd densities in order to prevent catastrophes. Some of these technologies are already available, others are still in the research stage.

What else are you working on?
We have developed Siveillance SiteIQ Wide Area to give control centers a better overview of emergency situations. This system projects data from different sensors, for example from GPS devices or video cameras, onto a screen which shows an aerial view of the monitored terrain. The view is superimposed with icons which represent objects moving across the terrain. The operator thus sees a vast area on his monitor and can recognize at a glance whether something unusual is happening. In addition, rules can be stored so that the system sounds an alarm when it detects unauthorized movements or objects in specific zones.
Another interesting development is system-based decision-making support and subsequent dispatching. Our objective is to have public buildings themselves report to the alarm center the location of fires and the approximate number of people affected. A system of this type would be technologically feasible – it is a matter of cost.

Are there cities where the implementation of such technologies is in a particularly advanced stage?
As far as I know, no city today is considered a forerunner in this area. The point, rather, is that implementing and developing these types of technologies depends a great deal on social and political discussions. Issues such as data protection and privacy must first be discussed on the national level, and society must reach a consensus. Enormous differences exist from one country to another. The United States, for example, is much more relaxed about privacy than people in Central Europe. As a manufacturer, we must be careful in the way we approach this issue.

Peter Löffler is the head of Innovation and Industry Affairs within the Fire Safety and Security business unit of Siemens Building Technologies.

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