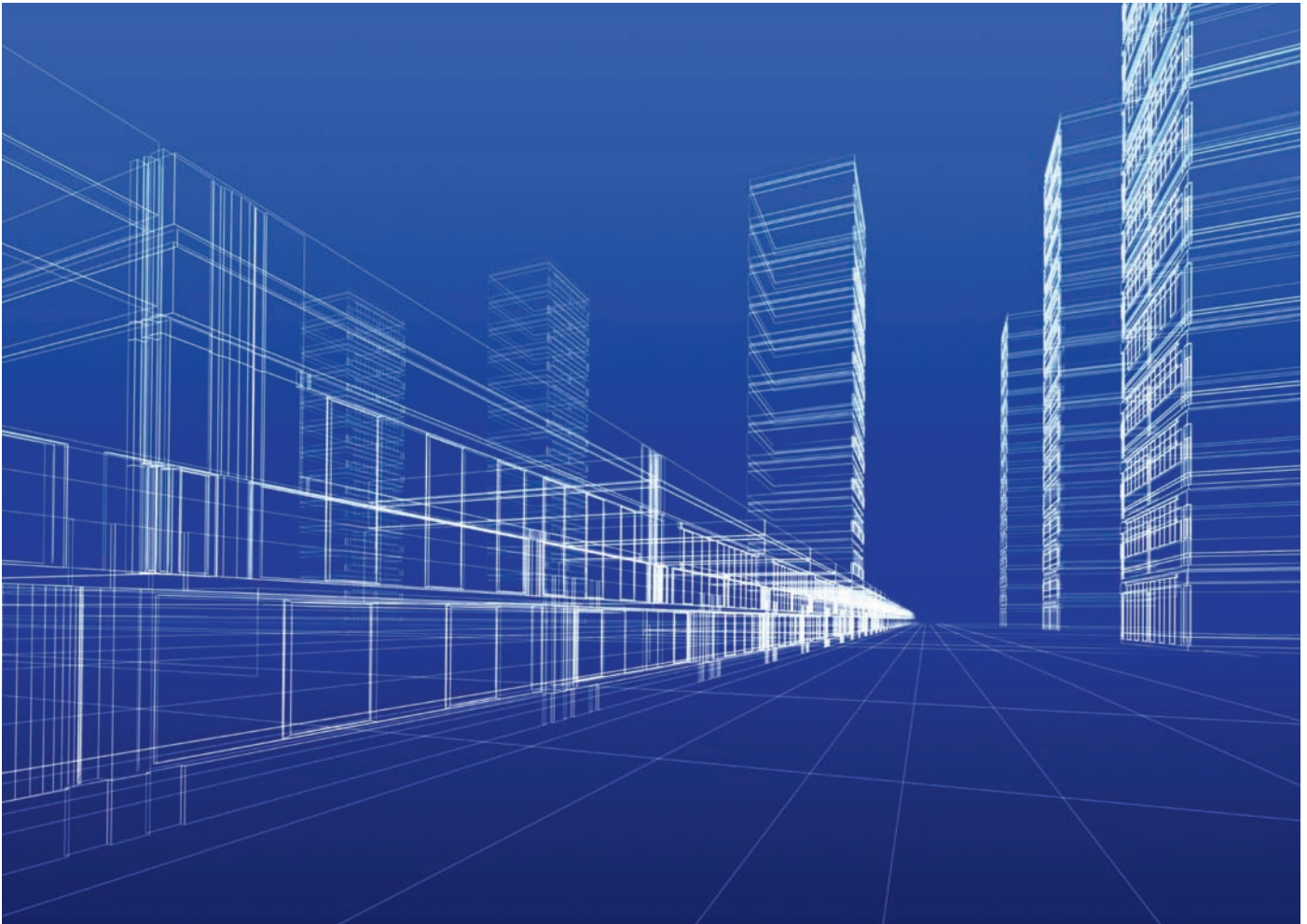


# DIGITAL FACILITY MAPPING IS CHANGING EMERGENCY EVACUATION AND MANAGEMENT

BY TOM CONDON



**Facility information is crucial to managing emergencies effectively and minimizing damage to the facility. An understanding of the layout of the facility can mean the difference between life and death.**

For example, occupants need to understand the facility's layout to find their way to emergency exits. And emergency responders need to understand the facility layout so they can navigate easily and direct fire suppression efforts more effectively. Mapping technology offers new opportunities for providing facility information to occupants and first responders.

Traditionally, the layout of the facility has been communicated through printed facility maps. These have been posted on signs in hallways to show emergency exit routes, and are usually also stored

in a book at the building's security desk or in the management office. Slightly different versions of this information are provided in paper formats to local fire departments so they can create 'battle plans' for fighting fires.

While this method has been used for decades, it is one of many aspects of facility emergency management that has been undergoing scrutiny after 9/11 and hurricane Katrina. Those events illustrated that many aspects of traditional emergency management are sorely lacking, and facility mapping is definitely one of them.

Printed facility maps have some inherent flaws that make them less than ideal for modern emergency management. The first is that it is difficult to effectively change the plans and ensure that all parties are using the same version. For example, when interior spaces are altered, those changes need to be added to hallway emergency exit signs, the lobby book needs to be updated, and the local fire departments need updated copies.

But what if facility maps are not scrupulously maintained by all parties? In a fire at a large manufacturing facility, firefighters found themselves trapped in a dead-end because they were using outdated facility maps. When the fire shifted suddenly, they followed the facility map to what they thought was a safe area. In fact, the area had been converted to a storage room for flammable chemicals. Fortunately they were able to escape by chopping a hole through a wall with an axe. A simple lack of communication had almost cost the firefighters their lives.

Another critical flaw of traditional printed facility maps is that they are difficult to distribute. Because they are paper, they must be copied or faxed in order to distribute them (which only aggravates the problem of maintaining a single version). For example, when police were called to a facility because an employee was seen with a gun, they discovered that the building did not have a book of facility maps on-site. The police had to call the fire department and have them fax copies of the floor plans so they could find a way to navigate behind the gunman and surprise him.

The third major flaw is the sheer bulk of paper facility maps. It is simply not feasible for emergency responders to carry copies around with them to ensure they always have the information they need. This has led to situations where firefighters arrive at a facility and find that there is no map book, or the map book has been destroyed, leaving them with no clear picture of the facility.

These are some of the reasons that facilities owners and municipalities are turning to information technology to modernize facility mapping. One of the leading cities in this movement is Chicago, which passed a watershed emergency

evacuation ordinance in 2001. The ordinance requires tall buildings to prepare emergency evacuation plans and submit them, along with floor plans, to the city in a digital format.

The city then uses these digital plans in new ways that paper could never be used. After being checked for conformity to city standards, the digital plans are archived in the city's OEMC (Office of Emergency Management and Communications). From there, the digital plans are accessible to city staff that need this information, including managers at OEMC who coordinate emergency efforts that sometimes involve large or multiple buildings. Since the plans are digital, they can also be easily distributed to other city offices if needed. Rather than sending a messenger with a set of paper plans, they can be emailed in a few seconds.

Because the facility floor plans are digital, computer technology offers incredible new capabilities. For example, OEMC has incorporated floor plans from some of the largest buildings into a 3-dimensional model of the city's downtown. Projected on a wall-size video screen, OEMC managers can fly through this 'virtual city', and zoom in and out at will, similar to the way Google Earth displays its 3D buildings. But this system is far more advanced, and allows you to see inside the buildings as well. By clicking on a building, you can choose a floor and instantly see the digital plan for that floor.

This kind of capability is valuable during events that involve very large or multiple buildings because it helps managers visualize a very complex environment. 3D visualizations allow someone to instantly grasp the spatial relationships between floors in a building or between multiple buildings. It is much more difficult to visualize a 3D building from 2D plans, especially in the stressful environment of an emergency.

The digital floor plans make it possible for first responders to have huge amounts of information available during an event. For example, when a fire truck is dispatched to a fire, the crew can access digital plans for the building on a laptop computer in the truck. While on the way to the fire, they become acquainted

with the layout of the facility and can see additional information like where hazardous materials are stored. This ready availability of information is transforming the way emergency responders manage events. They are more informed, and are better equipped to deal with the environment.

Cities are not the only ones benefiting from digital facility maps. Real estate developers are also finding that managing facility information in digital formats has significant advantages over paper. Many real estate owners and managers are choosing to use online, web-based portals that store their floor plans and related facility information.

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By storing floor plans online, all parties are able to access a single, accurate version of the plans. This is particularly important in real estate, where many different organizations and stakeholders can be involved. Brokers, building managers, architects, space planners, tenants, and building engineers all have a need for this information, and they can all access it from the same source in the web-based portal.

Digital formats also allow the building owner to decide who sees which parts of the building information. The broker may see the floor plan in the context of a simple line drawing suitable for marketing, while the engineer sees all the details of all the drawing layers, including HVAC and other systems. This is possible by using the layer functionality of digital plans. Different layers of information can be turned on or off to show or hide parts of the drawing as the building manager sees fit. That way people only see the information that is useful to them.

CONTINUED ON PAGE 26



Another advantage of using digital facility plans is that paper usage and floor plan reproduction costs are dramatically reduced by storing plans online. Instead of making copies of floor plans for all the different groups, they can access the information online, saving reams of paper and the significant costs of floor plan duplication.

In online portals, digital facility floor plans can be used as the basis for a wealth of information. For example, software can be used to automatically generate stacking plans or calculate square footage. This has proven to be a windfall for some real estate owners who were basing rents on inaccurate square footage measurements. In a recent sale of one large building in Chicago, for example, calculations on digital floor plans found that the building was 8% larger than previously thought. This increased the building's value by millions, and resulted in more rental income and a higher selling price.

The availability of facility information from a location outside the building can also be a key benefit. In one example, a fire in a commercial office building destroyed all the paper plans that

existed for the facility. Accurate plans were needed to get a permit to start repairs, and doing as-builts and drawing up new plans would have added weeks to the schedule. However, the facility manager had scanned the plans into digital formats and uploaded them to an online portal. The plans were emailed to the architect, who was able to get a permit and begin work on schedule. Organizations can improve their business continuity plan by using web-based systems that can continue to function even when the facility cannot.

These capabilities are all valuable, but there are some challenges to going completely digital. Some facilities do not have digital plans, and are discouraged by the cost of having digital plans created. This ordinarily requires on-site field verification and measuring as well as scanning paper blueprints and re-drawing them in digital formats. Much of the cost of digitizing the plans could be returned by the discovery of new square footage as mentioned before.

There are security implications to storing and distributing this facility information, and the city of Chicago takes this very seriously. Floor plans,

details of HVAC systems, and emergency evacuation plans could be very useful to malicious individuals planning an attack. Therefore, all information is guarded by a system of firewalls, encryption, and intrusion detection software. Files are transmitted in encrypted formats within the city's private network, and can be securely transmitted across the Internet using the latest encryption techniques.

Just as they have changed so many other aspects of our lives, computers are changing facility mapping, emergency evacuation, and disaster recovery. We're just at the beginning of this major shift, and we can expect to see more changes in the next few years. We can expect web-based digital facility information to become the norm, helping us to deal with emergencies and recover from them faster.

Tom Condon is a Senior Consultant for System Development Integration ([www.sdenterprises.com](http://www.sdenterprises.com)), a nationwide technology consulting firm involved with web-based facility portals and digital mapping. He can be reached at (312) 580-7531, or via email: [tcondon@sdenterprises.com](mailto:tcondon@sdenterprises.com).