EB11: Improved Emergency Response and Preparedness through Advanced Visualization

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Verbal Dispatch

• “Incident at Norcom High School. There’s a shooter reported to be hiding in the physical plant area. Secure the area and proceed with caution.”

• How much information does this provide?

• Do the responders have any idea what to expect?

• Have any of them ever been to this facility?
Visualization Will Improve Situational Awareness

- Verbal description provides limited information about the incident environment
- Enabling access to layered visual data of the facility will build a more complete picture of the environment
Visual Enhancement: Area Map

A map shows the facility in area context
Visual Enhancement: Site Plan

The site plan gives a sense of vehicle access and possible staging areas.
Visual Enhancement: 3D Model

A 3D model provides a sense of the facility mass and structure
Visual Enhancement: Floor Plan

The floor plans shows facility complexity
Visual Enhancement: Zoom Floor Plan

Zooming into the floor plan provides structural details
Visual Enhancement: Photograph

Photographs show an accurate view of the complexity of the physical plant
Knowledge is Key

- First responders who have access to facility visualization will be better prepared when they arrive on scene
- Knowledge of the environment will allow for better on-scene planning
- Better planning saves time
- Time is critical to successful incident resolution
Making the Data Available

• Requires an organized database of textual and visual facility information
• Provide ready access to visual data that is layered and linked with other critical facility information
• Needs to be Web enabled for distributed data access
Real Estate Walkthrough on Steroids

- Real estate virtual walkthroughs are familiar, but limited in capability
- Layered and linked visual database provides virtual walkthrough capabilities of facility
- Link floor plans with panorama photographic nodes and informational nodes
- Provide access to available live security cameras
Benefits of Panorama Photography

• One-shot panorama photography is a cost-effective technique to generate a facility visual database
• Complements use of live security camera feeds
• Provides better coverage and resolution of facility than live security cameras
Interactive Panorama Nodes

- User can pan view $360^\circ$ with limited tilt up and down, and zoom
- Interactive hotspots to navigate to adjacent panorama nodes or link to informational nodes
- Node position matched to real-world coordinates on floor plans
Linked Floor Plans

- Interactive enables the user to select a level, zoom, and pan
- Scale matched to real-world coordinates
- Contain selectable links to panorama and information nodes
- Show location marker with orientation arrow linked to panorama pan angle for spatial directional cue
Informational Nodes

• Provide detailed information as to the location of critical infrastructure elements:
  – Power panels, alarms, gas valves, HVAC, etc.
• Visualizations showing the location and how to operate the infrastructure element
  – Annotated still photos
  – Animated demonstration of operation
Visualization for Training

• With a distributed database training can be conducted 24/7 on any facility without impacting the facility
• Training participants need not visit the facility as the data is network enabled
• Running various training incidents helps develop recognition primed decision-making
Visualization for Planning

• Emergency planners and managers can visualize the facility to develop contingency plans for various incidents
• Emergency evacuation routes can be planned based on incident type and location
• See the best locations for command posts, evacuation, staging, etc.
Distributed Database

- Remote access to visual data is enabled via web services
- Wireless access to data by first responders provides facility information en-route
- Share data between first responders and emergency managers
Panorama Node Data Capture

- Key to cost-effective visual database collection is the data capture system
- Shoot, process, and upload to central database while on site to avoid post processing
- Build the database with automated capture tools
Interactive 3D Models

- Floor plans are modeled in real-world 3D coordinate space
- Facility site plan and exterior as 3D models enables responders to explore the structure
- Visualize key architectural components
- Model and animate infrastructure elements to instruct how to operate
Visualization as a Powerful Tool

• Bring together a variety of visualization tools and data into single distributed database
• Improved response and planning results when the facility can be visualized
• Train on existing facility to improve situational awareness and readiness
Summary

• Advanced visualization techniques and technologies will improve readiness and planning
• Distributed layered visual data provides ready access to critical data
• Cost-effective visual data capture techniques
• Improved knowledge through visualization will promote successful incident resolution
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