Building a Facilities Information Infrastructure to Support Public Safety

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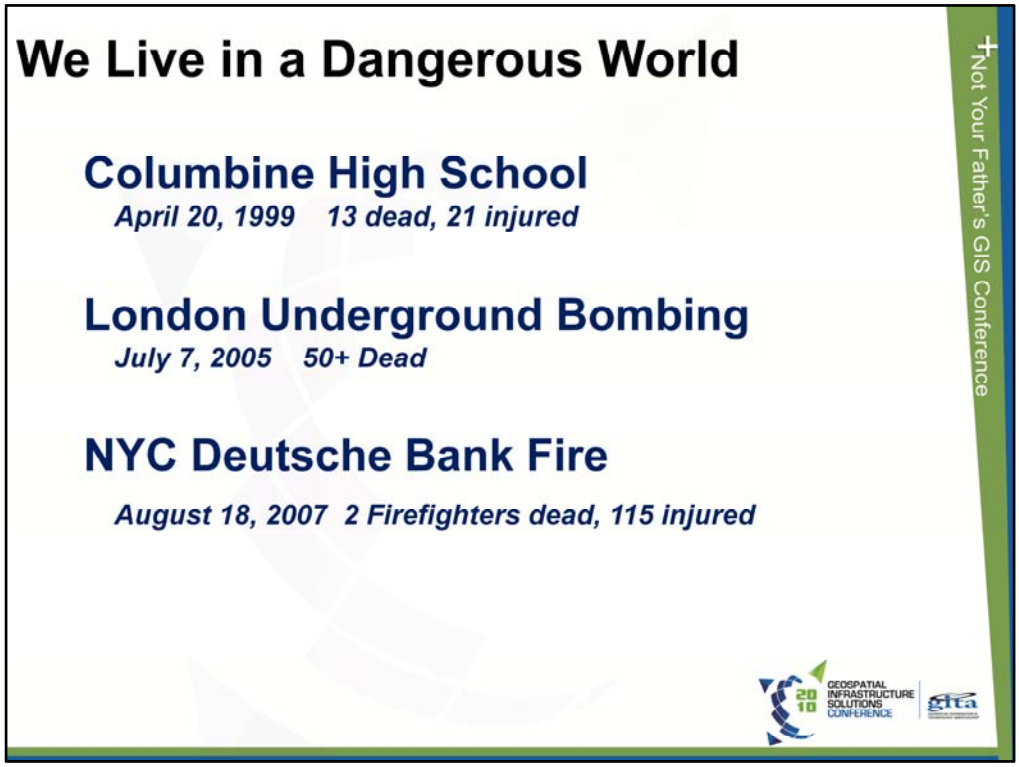
Not Your Father's GIS Conference



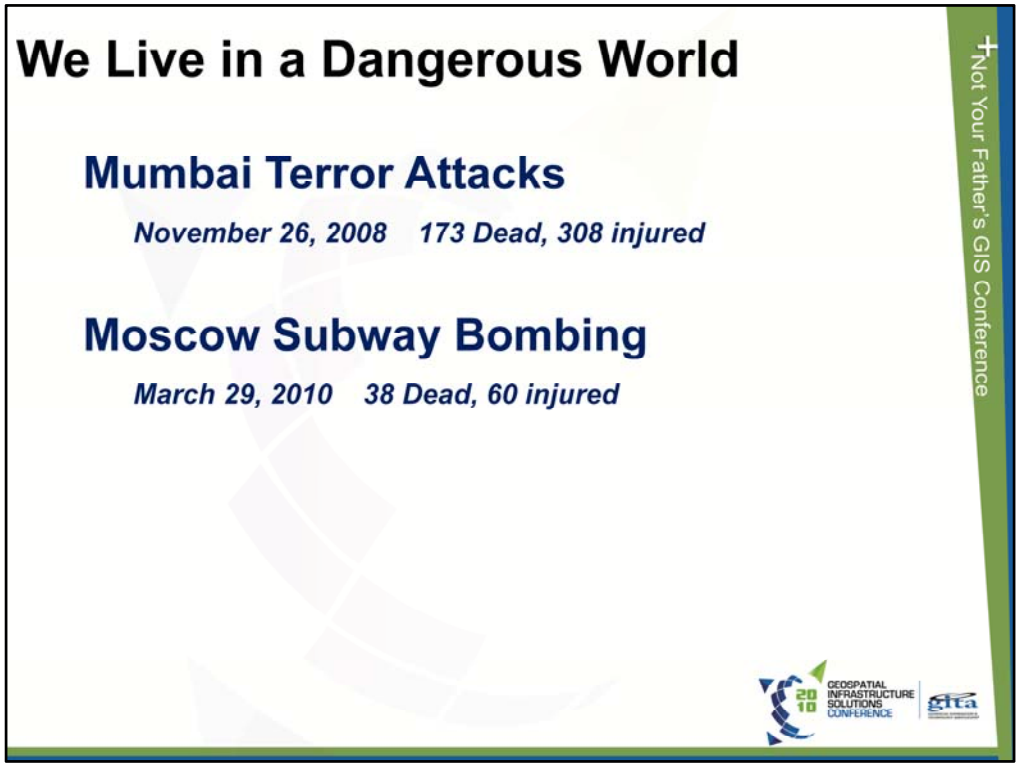
We live in a Dangerous World

The headlines are full of unfortunate stories every day about the challenges that our public safety personnel have to face in the course of their duties. All too often, they pay the ultimate price for protecting our safety. I have chosen a few of these many incidents that have particular relevance to issues of the availability of information about the insides of buildings. Most of these incidents you are already familiar with.

On April 20, 1999, two students in Columbine High School went on a shooting rampage killing twelve students and a teacher before committing suicide themselves. Officers responding to the incident had a very difficult time developing tactical response plans as they were not familiar with the internal layout of the school building.

On Muly 7, 2005, suicide bombers blew themselves up in the London Underground. Again, responders were hampered by their lack of good information about the layout of the environment that they were operating in.

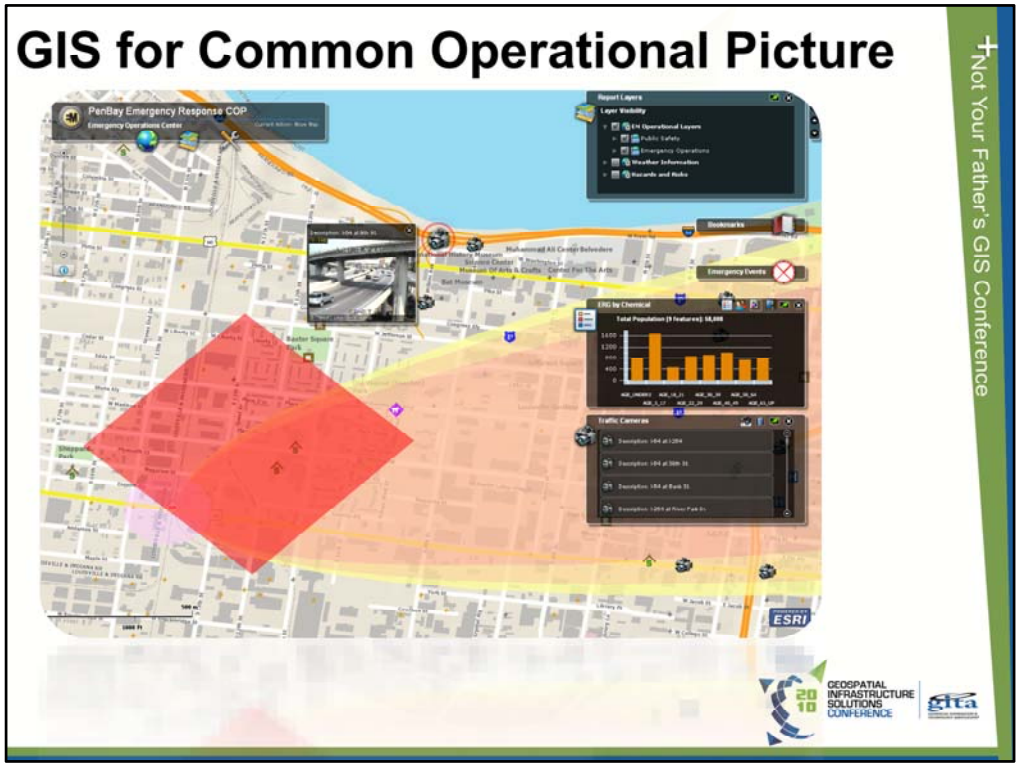
On August 18th, 2007, a fire broke out in the Deutsche Band where large scale renovations were taking place. Unbeknownst to the firefighters, one of the stand pipes designed to provide water to the upper floors of the building in case of fire had been disconnected in the construction process. Because of this lack of information, 2 firefighters lost their lives and many more were injured. In response to this disaster, NYC local law 86 was enacted which requires building owners to submit updated emergency action plans to FDNY every 6 months.



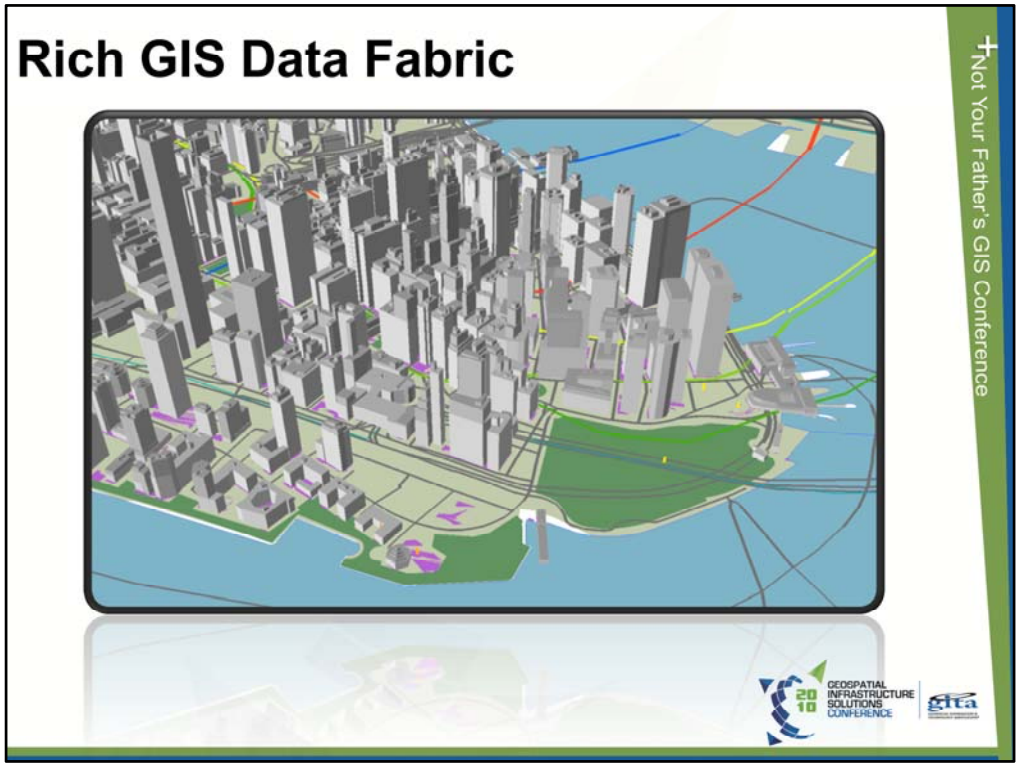
On November 26, 2008, terrorists in Mumbai, India instigated a 3-day assault on the city killing 173 and wounding an additional 308 people. Most of the casualties were inside buildings. The terrorists had planned their operations very thoroughly and had detailed maps of the insides of the buildings that they were attacking. Unfortunately, the responders did not have the same kind of information and were at a tremendous tactical disadvantage.

On March 29, 2010, a pair of female suicide bombers blew themselves up on a crowded subway car in Moscow. Again, terrorists have identified the inside of critical infrastructure buildings as an attractive target for their evil intent.

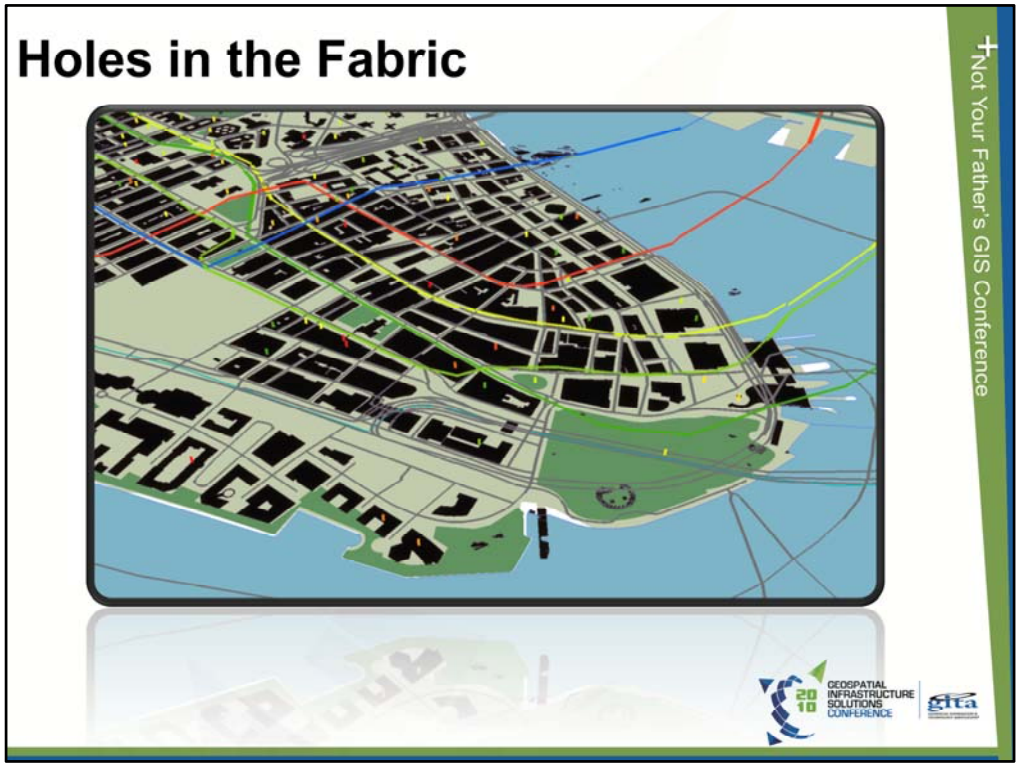
GIS has been used for many years of course to support public safety planning, analysis, operations and response. GIS is a particularly valuable tool to the public safety community as it provides a framework whereby geographic relationships can be understood in a multi-scale way. Over the decades a wide variety of remote sensing technologies have been used to map our world. Sensors from satellites to aircraft to hand-held GPS receivers have been used to all manner of infrastructure a many different scales from the globe to the neighborhood.



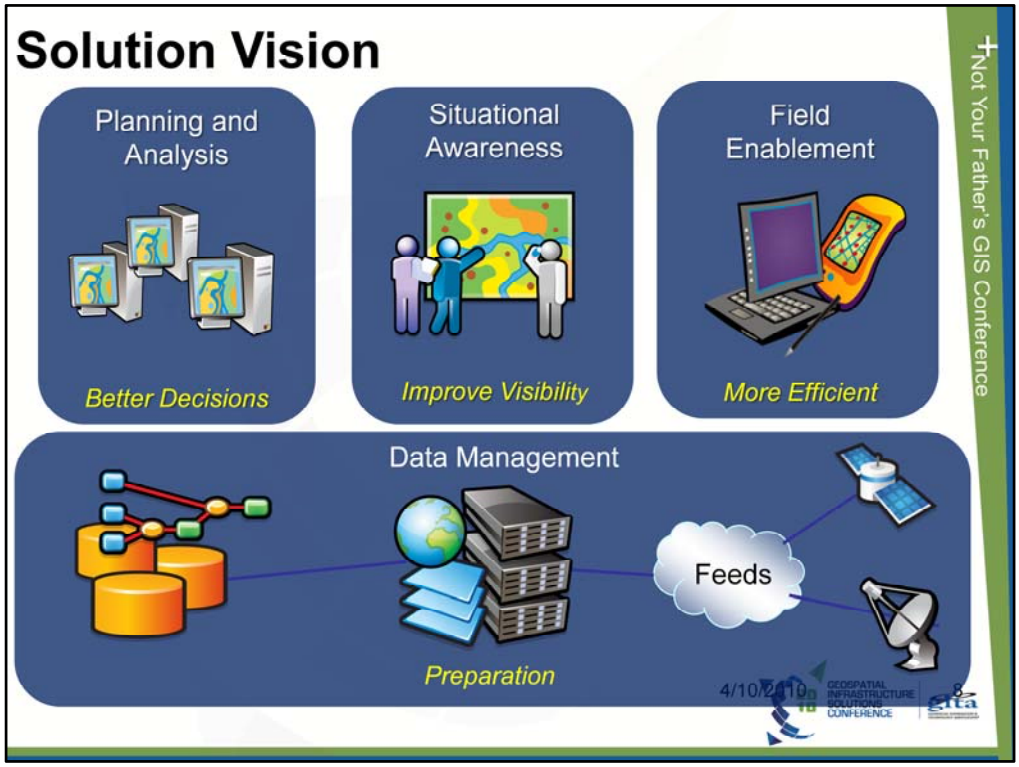
The classic success story in the public safety community is the deployment of a Common Operational Picture dashboard that combines a variety of data feeds into a single dashboard application giving public safety officials a single point of access to a wide array of different data sources.



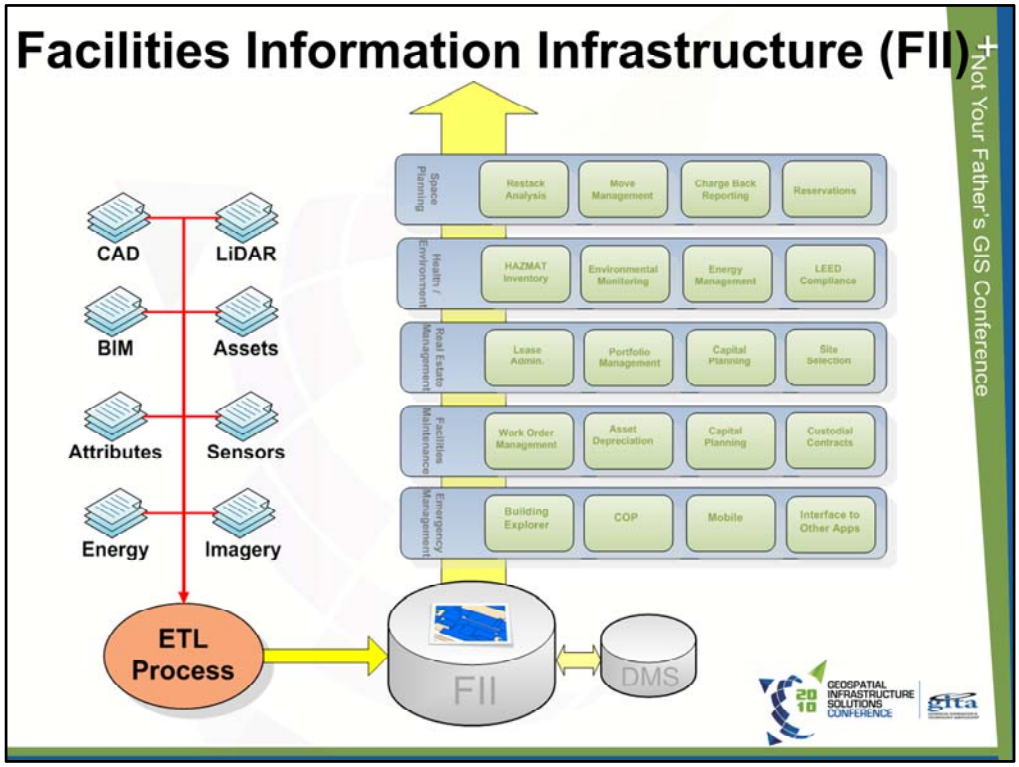
These dashboard applications typically pull from the incredibly rich fabric of GIS data that has been developed and is continually maintained by a wide variety of public agencies and private companies. This data fabric is usually maintained in some sort of Spatial Data Infrastructure (SDI) whereby the agency that is closest to a given data layer (Dept. of Environment for Hydrography for example) maintains that data layer and contributes the layer to the SDI periodically so that other agencies can use it for other uses.



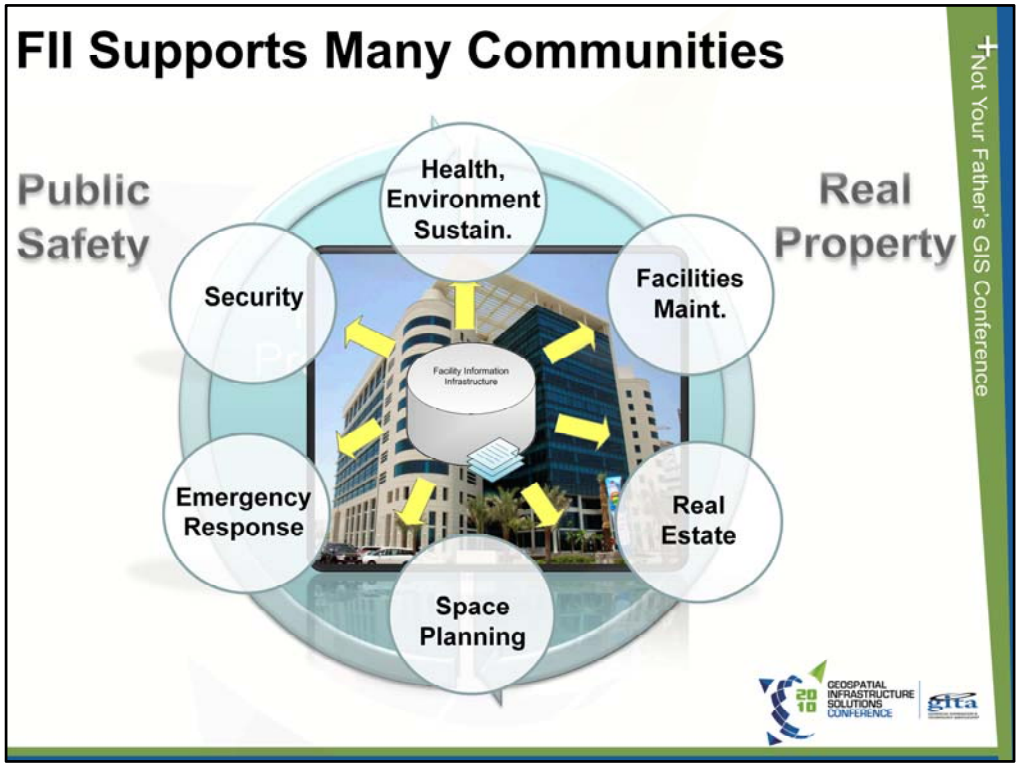
The problem with this wonderful data fabric is that it is full of holes. Those holes are a result of the technologies that we typically use for GIS data collection and maintenance. These tools are blind to the insides of buildings. As it happens, these holes correspond to the greatest concentration of financial and human capital on the planet and the structures that are the largest consumers of energy… our buildings. It is our contention that we should leverage same GIS technologies that have served us so well in the landscape to provide valuable information to the public safety inside buildings as well.



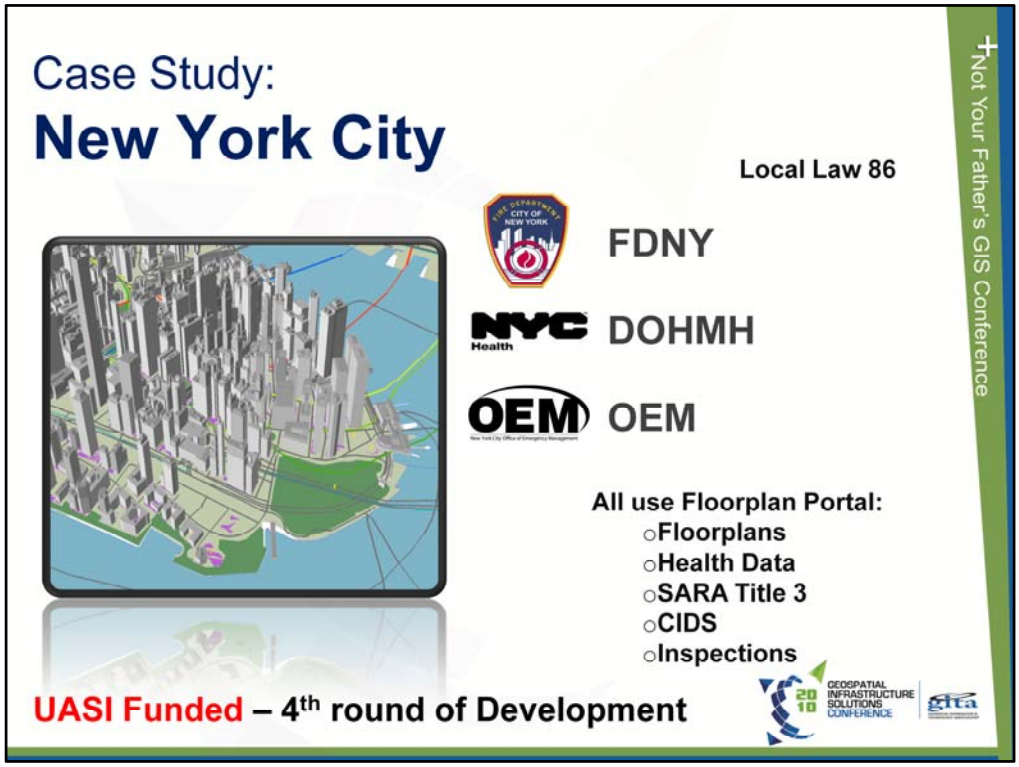
Our vision is that the same overall technology architecture that supports public safety GIS at landscape scales can be extended inside the built environment if we can create a Facilities Information Infrastructure (FII) that supply the necessary data.



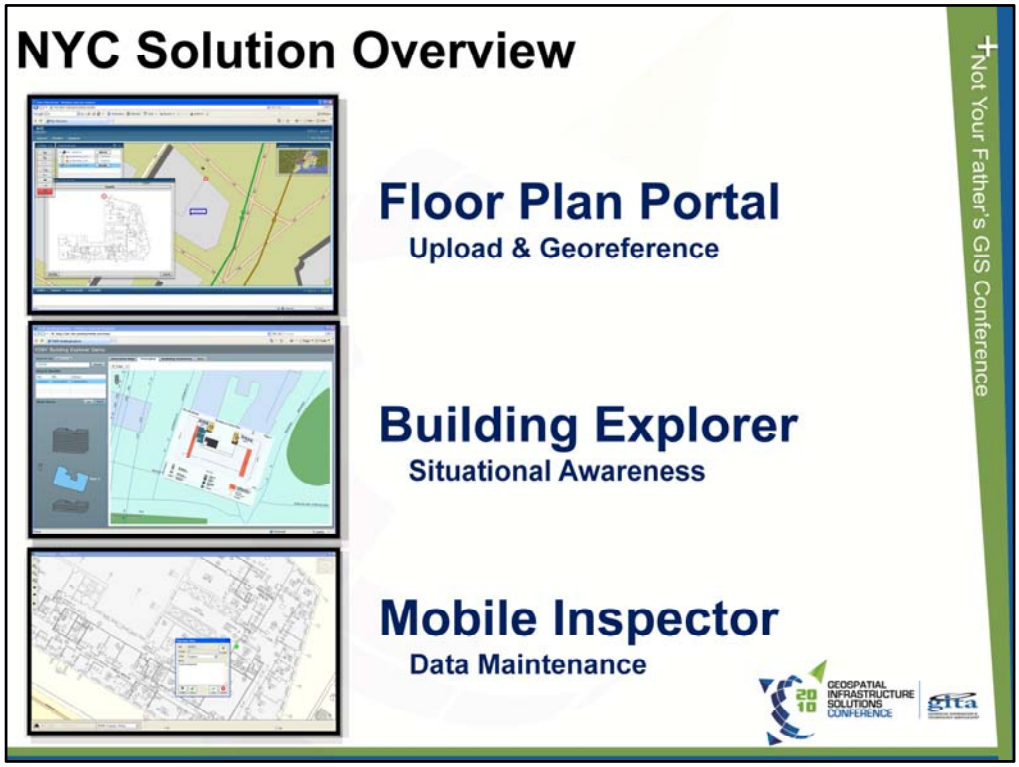
As it turns out, there are a myriad of data sources already available that are focused on the built environment. Many, if not most, of these data sets can be much more valuable if they are geospatially enabled. In the process of spatially enabling these data sets, we have the ability to provide tremendous value to a wide variety of business processes for both public safety and real property communities.



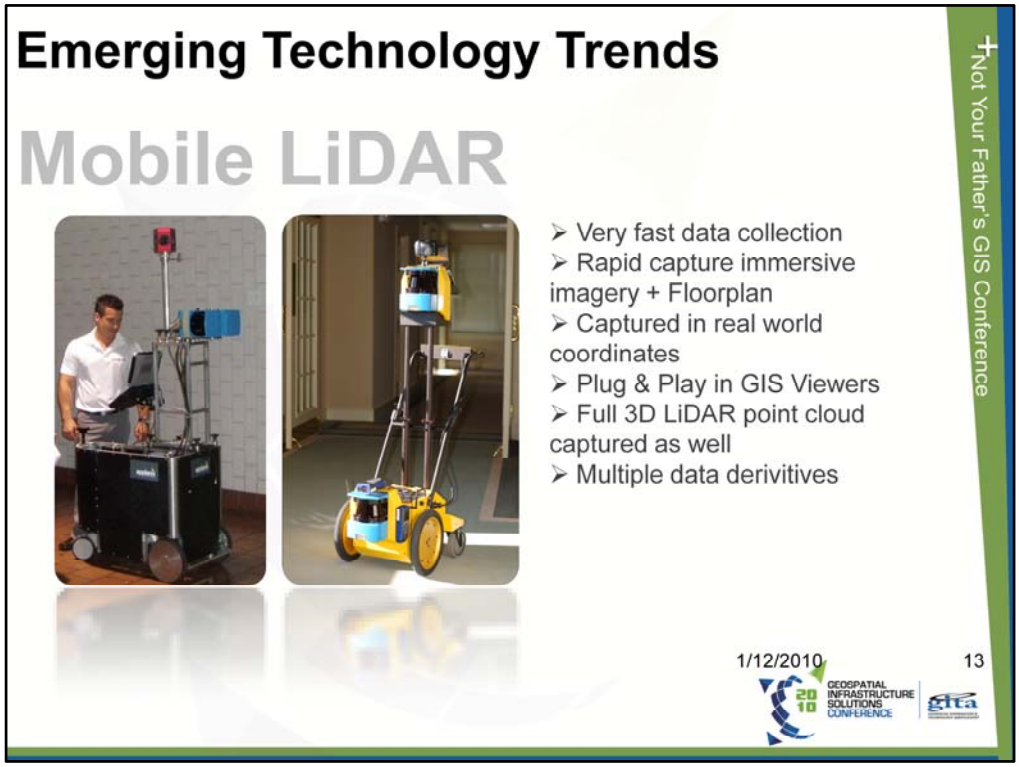
Many different business processes can be supported by a combined FII. The value propositions for FII usually fall into two general categories. Organizations that have a long-term financial interest in a property are usually interested in real property aspects of in-building information to support business problems like space and asset management. Public Safety agencies typically do not have a long-term financial interest in most properties, but need spatially enabled "building maps" to support their planning, inspection, and response activities.



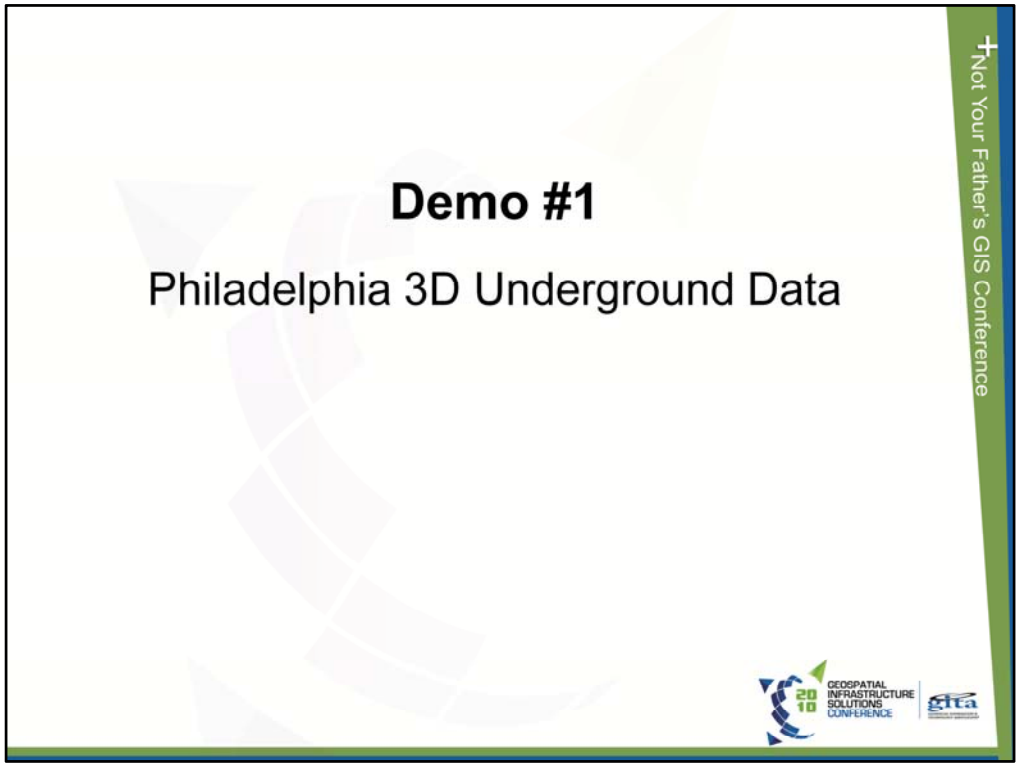
Review of a case study in New York City where several agencies maintain a shared repository of floor plans to enable health and safety planning, analysis, inspection, and response workflows.



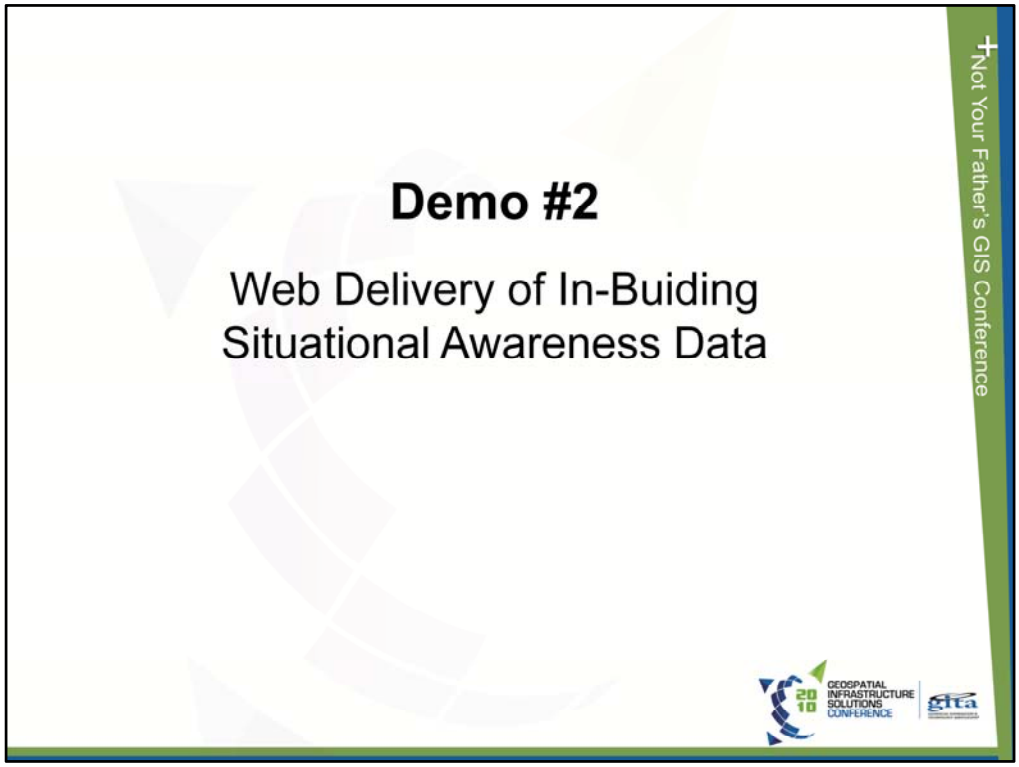
PenBay has developed several integrated solutions for these agencies that provide the ability for these agencies to author, publish, and maintain their shared floor plan repository. The system is built on ESRI ArcGIS Server and deployed across several different agencies in the city.



For those instances where CAD or BIM information for the inside of a building is not available or spherical imagery is necessary, new mobile data collection technologies are enabling the rapid collection and deployment of internal data sets. These data sets are fully 3D and delivered in real-world coordinates.



Demo of data collected in the Philadelphia subway system recently using a variety of ESRI 3D clients to visualize the data.



Demo of web delivery of the same data through an ESRI ArcGIS Server technology architecture.

Questions?

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