



# **Unified Victim Identification System (UVIS)**



**UVIS**

## **Introduction**

Disaster strikes. Family members and friends are calling police stations, hospitals, fire departments and other agencies searching for victims. Days pass—and you're still trying to determine how many people are involved in the incident and who they are.

Unthinkable? That's exactly what occurred in New York City following the terrorist attacks on September 11, 2001 when two commandeered jetliners struck the World Trade Center Towers. As officials in New York City learned that day as did others after the 2005 tsunami and again in the USA following Hurricane Katrina: when unprecedented actions occur—whether natural disaster, terrorist attack, or epidemic—there is no time to build systems to assist in the collection of missing person's information and the identification of victims.

A system for identifying victims in a catastrophe is already deployed in the City of New York. The Unified Victim Identification System (UVIS), developed by Connecticut-based Sapphire International, Inc, is a disaster management system that manages and coordinates all of the activities related to missing persons reporting and victim identification. In concert with the City's 311-call center, UVIS enables a centralized communications and data collection processes to support the family assistance center (FAC). This coordinated system is essential to developing an accurate manifest of potential victims – a critical step in victim identification. Most importantly, the coordinated UVIS-311 call center system keeps the lines of communication open to the families, friends and associates of possible victims. Such a resource is invaluable in the chaos that follows any tragic event.

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## **What is UVIS?**

The Unified Victim Identification System (UVIS) is a web browser-based application that can *greatly enhance the victim identification process*. UVIS was developed from knowledge gained during responses to major catastrophes, such as the September 11, 2001 attacks, the American Airlines Flight 587 crash in addition to lessons learned from national and international disasters. The City of New York Office of Chief Medical Examiner, the largest Medical Examiner operation in the nation, its Department of Forensic Biology, the New York Police Department (NYPD), the NYC Department of Information Technology and Telecommunications (DoITT), the NYC Office of Emergency Management (OEM), the NYC Mayor's Office and other agencies throughout the City provided direct input into its development.

Today, UVIS is ready to assist in the event of a terrorist attack, hurricane, earthquake, pandemic flu event or other mass fatality incident. UVIS can deal with both open and closed manifest incidents (i.e., when there are no decedent/missing person's lists, and when a decedent/missing persons list is available) and includes a built-in Dental Identification Module (UDIM).

UVIS is designed to handle multiple types of scenarios, and can manage up to 156 simultaneous events if needed. For example a terrorist operation may target different discrete areas of a large city (multiple incidents), as was the case on July 7<sup>th</sup> 2005 when a series of coordinated bomb blasts hit London's public transport system during the morning rush hour resulting in more than 121,000 call center reports.

Most importantly, UVIS enables the OCME to meet its primary objectives following a catastrophic incident. They include:

- Investigate, Recover & Process Decedents in a Dignified and Respectful Manner
- Accurately Determine Cause & Manner of Death
- Perform Accurate & Efficient Identification of Victims
- Provide Families with Factual & Timely Information in a Compassionate Manner
- Conduct Rapid Return of Victims to their Legal Next of Kin

### Lessons Learned:

- A centralized means for collecting missing person reports from the public is needed
- This centralized process needs to be accessible by a number of agencies for data comparison



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- A person potentially involved in an incident may be reported as many as 100 times by loved ones, friends, and family. Missing person reports of the same person may be collected multiple times due to the following:
  - The same person can be reported in different ways, leading to inflated numbers (e.g., Richard, Richie, Rich, Rick)
  - Names can be misspelled
  - Names can be duplicated
  - Often reporter contact information is not kept
  - Data can contain errors and omissions
- The government needs to have an established mechanism for communicating with citizens following a major incident
- The government needs a centralized system with significant missing person reporting capabilities to support and develop a valid manifest

UVIS was developed to incorporate solutions for each of these lessons learned.

In the event of a mass fatality incident in New York City:

UVIS is *immediately* activated. A message is broadcast directing the public to call 311 or 212-NEW YORK to report persons potentially involved in the incident.

Callers are asked to report the following categories of people as potential victims:

- Anyone known to be in the area at the time of the incident
- Anyone who may have been in the area at the time of the incident and has not been heard from since

After an established amount of time has passed, the public is asked to call about anyone missing who may have been in the general area.

If a manifest of victims exists, as in an airline incident, it is uploaded into the system as a starting point for an inclusive list of all victims. The call center in these types of incidents is typically not activated, to avoid confusion.

Call Center operators record information about possible victims in UVIS. A typical interview takes approximately three minutes. A call center can receive hundreds of thousands of calls in a very short time. In the London bombing attack, more than 4,000 calls were received in the first hour alone!

As the Call Center is building a manifest of possible victims, Forensic Investigators are in the field and on the scene, with tablet PCs and other handheld devices such as the Symbol MC75, gathering evidence and critical information... These data are recorded on wireless devices and transmitted back to the central database. At the same time, digital cameras are used that automatically tie in to the evidence case numbers and are time/date/place stamped. This process



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enables information such as age, gender, body description, personal property, and GPS coordinates of where remains or evidence are found to be quickly collected and entered into UVIS automatically.

Simultaneously, interview data, DNA and other ante-mortem information from the family of victims are aggregated at Family Assistance Centers (FAC) via the UVIS FAC module.

In the mortuary, post mortem information is collected electronically. All of the information is catalogued which allows for a robust comparison of ante-mortem and post-mortem data, a function that ultimately supports a more accurate and expedited victim identification process.

This system contributes to a more thorough, timely and precise notification process for family and friends, the most important service the ME can facilitate in times of great stress.

## **History of UVIS**

2001: Software is developed in response to Sept 11<sup>th</sup> and Flight 587 disasters, out of which UVIS evolves.

2004: The first version of UVIS is developed in anticipation of the NYC Republican National Convention in 2004. This version has only the Call Center and Missing Person's modules.

2005: The Family Assistance Center Module is added to UVIS. OCME and NYPD gain full Ante Mortem–Missing Persons interview capabilities.

2007: Documentation of the full cycle of victim identification is completed with the addition of the Post Mortem module. OCME now has the ability to track victims from “Cradle to Grave”. A forensic dental identification program was developed with new charting code and a smart search engine.

2008: In preparing for a possible Pandemic Influenza (PI) outbreak in the NYC area, the PI module is developed based upon the OCME's “PI Surge Plan to Manage Decedents”. All 63 health care facilities are connected to UVIS.

2009: UVIS continues to be developed and expanded in close collaboration with various Medical Examiners' and Coroners' Offices throughout the country. OCME and other Medical Examiners/Coroners offices provide important feedback for the future development of UVIS. UVIS is currently undergoing a major enhancement that will create a medicolegal case management system that will be fully integrated with all disaster components, laboratory systems and external information sources.



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## **UVIS Capabilities**

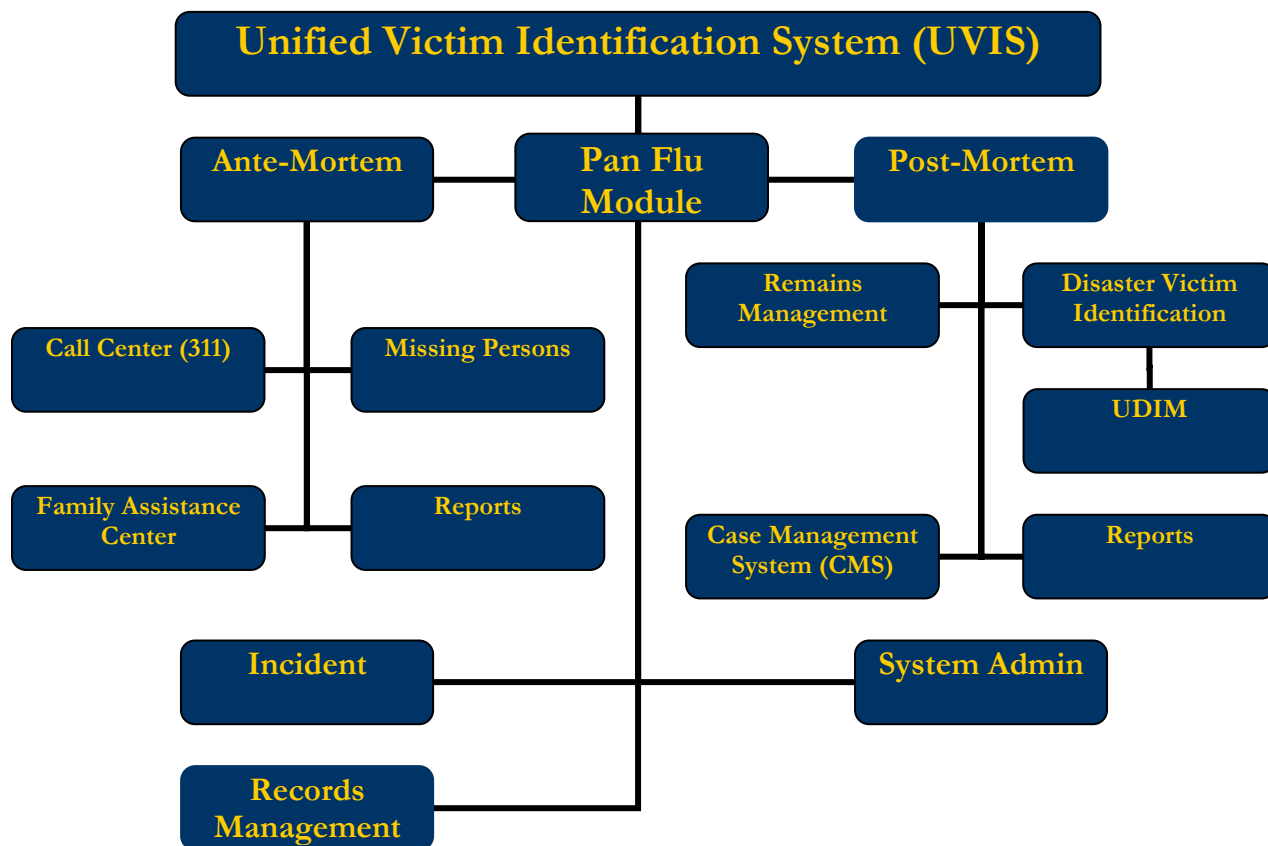
The Unified Victim Identification System (UVIS) is a disaster management application that:

- Tracks up to 156 Incidents at the same time
- Provides for electronic uploads of manifests (e.g. an airline manifest)
- Allows for tracking of open manifest with an undetermined number of victims
- Provides a full data audit trail (what data was entered, changed, by whom, when, where and how)
- Has been stress-tested to 750 concurrent users
- Offers a role-based architecture
- Provides deep security: Microsoft Active Directory, LDAP or UVIS-based



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**Components**





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## **Ante Mortem Section Capabilities**

### **Call Center (311) Module**

- Records information about reported missing persons. A report is created for each reported missing person.
- Ability to record reports for multiple incidents. If multiple incidents occur simultaneously, the Call Center Module allows for recording information for more than one incident.
- One caller can report multiple Missing Persons (MP) on the same call.
- Records multiple follow-up contact methods e.g. Cell, email, office contact. Up to 5000 contact methods are allowed per report.
- Records multiple addresses e.g. home, office, and hotel. Up to 5000 addresses are allowed per missing person reported.
- Relationship filtering is based upon callers' gender. If the caller is male, then relationship to the missing person is limited to masculine relationships, i.e. Father, Brother, Uncle, etc.
- Contains a 5000-word note area (free text searchable) per report.
- In order to establish a hierarchy of likely victims, missing person's reports are graded based on specific questions asked of callers. The established questions can be customized for the incident.

### **Missing Person Module**

- UVIS allows for multiple locations to be established e.g., police station, command center, etc.
- Tracks or works on multiple incidents. If multiple incidents occur simultaneously, this module allows for recording information for more than one incident.
- Searches for reported missing persons by any field e.g., last name, first name, date of birth, *etc.*
- Uploads electronic manifest e.g. hospital list, airline manifest.
- Activity log records all changes made by both system and user, *i.e.*, out-going and in-coming calls and family member interaction notes.
- Intelligent engine displays all "like" reports for consolidation into a confirmed missing person.
- Creates reports: statistics, confirmed MP list, *etc.*

### **Family Assistance Center Module**

- UVIS allows for multiple locations to be established, e.g., airport, hotels, etc.
- Facilitates DNA and personal effects collection by allowing each item to be bar-coded for tracking purposes.
- Ante-Mortem interview consists of 60+ questions.
- Automatically scans and uploads documents/photos.
- Creates and tracks appointments for follow-up family visits.
- Provides chain of custody for all collected items.



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- Automatically scans and uploads all documents/photos.
- Manages and tracks family member interview process.
- Provides the option to mail out DNA/personnel effects kits to family members.
- Creates reports: statistics, sample collection, daily appointments, etc.

### **Records Module**

- Provides chain of custody for all records.
- Assigns barcode labels to all files and folders for tracking purposes.
- Facilitates check-in and check-out via scanning folder barcode.
- Automatically scans and uploads documents.
- Records requests from:
  - Family Members
  - Lawyers
  - Public administrators

## **Post Mortem Section Capabilities**

### **Field Operation Module**

- Incident Management
  - Collects and manages scene documentation information
  - Stores photos
- Field Investigation
  - Facilitates remains documentation
  - Prints barcode labels for tracking purposes
  - Stores photos and video
- Collection of Remains
  - Manages body collection points, temporary morgues and staging areas
  - Stores photos
- Evidence Collection
  - Prints barcode labels for tracking purposes
  - Stores photos
  - Facilitates chain of custody
- Transportation
  - Records when and by whom remains are relocated
  - Tracks physical location of remains
  - Maintains documentation of evidence

### **Disaster Mortuary Management Module**

- Accessioning of Remains
  - Supports remains intake
  - Provides unique numbering for remains



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- Stores photos
- Tracks physical locations of DNA / Toxicology Samples
- Supports X-Ray (Body / Dental)
- Examination
  - Supports Medical Examiner examination documentation
  - Supports Anthropology examination documentation
  - Allows examiner the ability to 'split' cases when dealing with commingled remains
  - Records chain of custody
- Tracking
  - Records and stores all documentation associated with postmortem procedures; when conducted and by whom
  - Tracks physical location of remains whether in the OCME morgue, temporary short or long term storage
- Disposition
  - Records and stores all documentation associated with releasing remains to a funeral home

### **Disaster Victim Identification Module**

#### Bidirectional search capabilities

- UVIS has the ability to perform one-to-many search from ante to postmortem and vice versa based on multiple criteria

#### Ante and postmortem data accessible from single screens

#### Identification tracking

- DNA
- Dental (see UDIM below)
- Other (fingerprint, radiology, etc.)

#### Identification Review/Verification

- Anthropology reviews
- DNA Re-sampling
- Dental review

#### Consolidation of fragmented remains

- Upon analyses of forensic examinations UVIS has the capability to link/unlink multiple remains to/from a single victim

#### Notification tracking

- Documentation associated with notification of family members of a confirmed decedent and all documentation associated with press releases for Media regarding the decedent.

#### Death Certification

- Both remains and non remains based death certificates

#### Communication with families

- Maintains a log of all family communications
- Ability to schedule and track family visits



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### **Dental Identification Module (UDIM)**

- Forensic Odontology Add-On Module
- UDIM features a:
  - state-of-the art unified ranking algorithm
  - Detail “Self-Correcting” GUI-driven Coding system
  - Unique color-coding Odontogram for rapid comparison evaluation
  - Two-Monitor design for simultaneous Odontogram and image visualization
  - Full inclusionary and exclusionary search capability
  - Partial jaw fragment management
  - Linking and joining of specimens synchronized with UVIS
  - Unlimited searchable free-form explanation codes (75 Preloaded)
  - Unlimited image importation
  - Full reporting capability
  - Integration with Dexis software

### **Pandemic Influenza Section Capabilities**

#### **Health Care Facility (HCF)**

- During a pandemic influenza event, the HCF will be given the ability through UVIS to self report naturally occurring deaths.
- The HCF can ‘Check-In’ remains into a pre-established body collection point (BCP)
  - Print specimen inventory report
  - Print specimen barcode label
- The HCF can ‘Check-Out’ remains from a BCP when accessioning remains to the OCME
- Documentation associated with the release of remains to a Funeral Home
- Ability to search for remains via the unique ‘Specimen’ number
- Ability to manage requests for new, replacement or maintenance for a BCP

#### **Case Management**

- Manages and tracks all cases reported to OCME
- Ability to assign investigative and transport teams
- Perform a search for any case in UVIS (both HCF and OCME cases)
- UVIS will interface with and facilitate a search in Electronic Death Registration System (EDRS) (External software - Department of Health and Mental Hygiene)
- Facilitates the management of Borough / Precinct-based BCP and Borough-based Remains Storage Facilities (RSF)

#### **Field Operations**

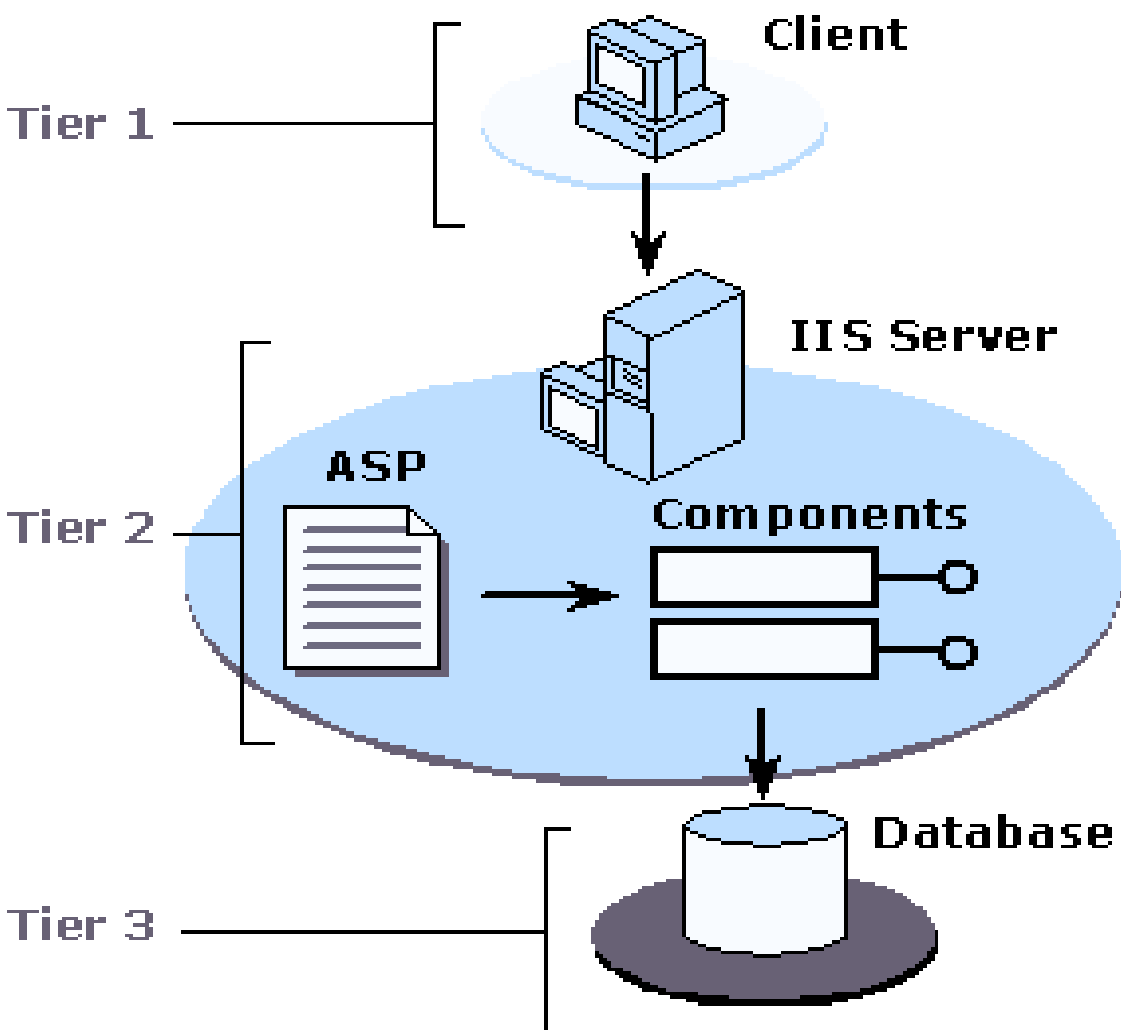
- Facilitates scene investigation by allowing the investigator to access forms and transmit case disposition and data digitally
- Allows remains transport teams the ability to accession remains from a HCF BCP via a browser or Win32 based version



## Technology

UVIS is a Multi-Tier, thin & thick clients, browser based and Windows-based technology; written in Microsoft Visual Studio 2008, C#, ASP.NET with Microsoft SQL 2005 as the database engine.

- **Client (tier 1)**
  - .Net Framework 2.0 or above
  - Compatible web browser (IE6 or above)
- **Business Logic (tier 2)**
  - IIS 5 or above
  - ASP.NET
  - Microsoft SQL Reporting Services 2005
- **Database (tier 3)**
  - Microsoft SQL 2005





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## **UVIS Technical Requirements**

### **Minimum requirements:**

UVIS is available in Microsoft SQL Server 2005 version.  
Microsoft Windows Server 2003 SP2 is recommended for all servers.

UVIS requires the following servers to operate:

Database Server  
Web Server  
Reporting Services Server  
Application Server

### **Database Server Requirements**

Microsoft SQL 2005 Enterprise Edition with SP4  
100 GB free disk space

### **Web Server Requirements**

Microsoft Internet Information Server 6.0  
Dot Net framework 2.0 or above  
100 MB free disk space

### **Reporting Services Server Requirements**

Microsoft Internet Information Server 6.0  
Microsoft SQL 2000 / 2005 Reporting Services with SP2  
.Net framework 1.1 (2000 version of Reporting Services)  
.Net framework 2.0 or above (2005 version of Reporting Services)  
100 MB free disk space

**Application Server Requirements** (applicable only if Symbol MC70 devices are used for Digital Photos)

.Net framework 2.0 or above  
100 MB free disk space

### **Workstation Requirements**

#### **PC**

Window XP Professional with SP2  
Internet Explorer 6 or above  
3 of 9 barcode font (included on CD)  
VintaSoftTwain ActiveX control (not included, must be purchased separately)  
50 MB free disk space



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### **Tablet PC**

Window XP Professional with SP2  
Internet Explorer 6 and above  
3 of 9 barcode font (included on CD)  
50 MB free disk space

Handheld PC (Symbol MC70)  
Windows Mobile 5.0  
4GB Memory Card  
USB cable to connect to Camera

### **Peripherals**

1D / 2D barcode readers  
Single label barcode printers  
Flat bed scanners  
Digital Dental Radiography  
Handheld Portable X-ray System  
Web cameras  
Professional grade cameras (Nikon D200 or Canon 30D)  
Laser mono chrome printers  
Laser color printers