

**Informedia Experience-in-Demand  
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**Objective**

The Informedia Experience-on-Demand (EoD) project is developing tools, techniques, and systems that allow users to capture complete records of personal experience and to share them in collaborative settings. The project is also developing techniques for managing vast quantities of multimedia data and for searching, summarizing, and visualizing content from multiple perspectives. Indexed and summarized experience will enable "remembering" analogous past events and "projecting" future, simulated ones. Potential users range from rescue workers carrying personal EoD systems in operational situations to crisis managers coordinating operations remotely. EoD capabilities will significantly improve situation awareness and analysis, both as events unfold and in retrospective review.

**Approach**

This work builds on the Informedia Digital Video Library (IDVL) project, which has successfully applied speech- and image-understanding and natural-language processing to create rich, indexed, searchable multimedia information resources automatically. EoD technology will extend the basic DVL concept, advancing into new information spaces by supporting collaboration and summarization of multiple, simultaneous information generators, integrated across people, time, and space.

Personal EoD units will record audio, video, GPS, and other sensor data, all of which can be augmented by manually added annotations. Each unit will operate as a portable, interoperable, Informedia system, allowing both its immediate operator and remote EoD systems to search for and retrieve information. Individual EoD units will capture and manage information from their unique points of view and make this information available to their peers throughout the EoD environment.

The EoD environment will synthesize data from contributing units into a "collective experience" -- a global perspective of ongoing and archived personal experiences. The environment can thus integrate multiple, local perspectives and provide additional details for larger-scale decisions and superior event coverage for realtime collaboration.

### **Recent Accomplishments**

Demonstrated EoD system with field captured video, audio and GPS data, and background (post processed) analysis, indexing and archiving for subsequent search and retrieval.

Implemented a "virtual-camera" method that integrates video sequences from separate cameras, merging them into a coherent, panoramic image. Users can specify virtual camera parameters arbitrarily. This technique offers the ability to use GPS data to guide the parameter-estimation process. Applying the method to three video sequences of downtown Pittsburgh, Experience-on-Demand generated a synthetic, panoramic view.

Synchronized map display with video data. Embedded GPS data allows indicating a dynamic track across the map, showing the current viewpoint-location and the video's spatial coverage. Maps can also be used to enter specifications for a spatial search. The interface supports typical GIS functionality, such as pan, zoom, and progressive disclosure of detail.

Developed a change-detection technique for images in video, based on comparison with a reference frame. The reference frame is constructed by extracting the background from a sequence of images, making it possible to then determine what has changed in that sequence. This provides one method for filtering redundant video from extended, EoD-captured content.

Implemented perceptual color-clustering image matching techniques that are faster and more robust than histogram matching methods. This image matching method compares location and shape of specific colors within an image. Perceptual color-clustering experiments have demonstrated significantly improved retrieval performance of similar images within a 20,000 image database, in 1/5 to 1/10 the time required for histogram matching.

### **Current Plan**

Field test multiple EoD data gathering units to simultaneously capture and transmit video data back to a command post, using existing wireless-network infrastructure. Develop techniques to analyze, index, incorporate and correlate the incoming video, sound and position data with that captured asynchronously by other individuals at other times.

Devise useful visualizations of multiple data streams to make shared experiences searchable and retrievable by the distributed individuals on their wireless laptop, enabling each individual to retrieve information from what others are seeing at the same time or at the same location previously.

Develop EoD-specific, Video OCR techniques to read incidental "scene text." Informedia's existing VOOCR recognizes persistent scene text that has certain positional properties, but misses text on moving vehicles, stylized text on signs, etc. EoD has begun training a neural network that has successfully detected text on signs, irregular text, vertically-oriented text, and text on "busy" backgrounds. Corresponding adaptive character-recognition systems to interpret the detected text will also be integrated.

Develop and demonstrate methods of segmenting recorded experience into coherent multimedia units by integrating analyses of audio, image/video, and GPS data to identify "episode" boundaries.

### **Technology Transition**

Validate EoD system capabilities within additional scenarios based on reconnaissance missions or disaster response in an urban setting.

Continue collaborating with system-integration contractor BBN (M. Sullivan) to obtain experiential data from Defense exercises.

### **Completed Travel**

None.

### **Equipment Purchases and Description**

None.