



Federal Emergency Management Agency

GIS Enables Flood Map Modernization

Challenge

Federal Emergency Management Agency needed to manage data updates to flood insurance maps for more than 20,000 communities.

Goals

- Track and develop flood hazard projects through best practices workflow steps.
- Manage attribution errors in a more timely and efficient manner.
- Allow for in-depth review of data attribution, spatial layers, and business tables.

Results

- Enabled FEMA mapping partners to work together by project reassignment
- Standardized flood hazard map symbology
- Allowed data rendering based on workflow phase
- Ensured FEMA-compliant data is created via a GIS software solution that mimics FEMA's independent QC review

The U.S. Federal Emergency Management Agency (FEMA) manages federal response and recovery efforts after any national incident. In 2003, FEMA became part of the U.S. Department of Homeland Security (DHS).

More than 2,600 full-time employees work at FEMA headquarters in Washington, D.C., and around the country. FEMA also has approximately 4,000 standby disaster assistance employees who are available for deployment after disasters.

Often, FEMA works in partnership with other organizations that are part of the nation's emergency management system. These partners include state and local emergency management agencies, federal agencies, and the American Red Cross.

FEMA initiates proactive mitigation activities, trains first responders, and manages the National Flood Insurance Program (NFIP). NFIP currently serves more than five million policyholders and provides coverage for nearly one trillion in insured assets to more than 20,100 communities.

The Challenge

FEMA developed a five-year plan, Flood Map Modernization (Map Mod), to update the NFIP's digital flood insurance rate maps (DFIRMs). The DFIRMs depict potential flood hazard risk for communities throughout the United States and its territories. FEMA uses DFIRMs to delineate a community's special flood hazard areas and risk premium.

Because flood hazard conditions are dynamic, DFIRM data needs to be continually updated. FEMA contracts with state, local, and regional mapping partners to keep flood hazard maps current and to produce maps. FEMA needed an integrated software solution that could manage these updates and changes.

The Solution

FEMA chose to manage data for the DFIRMs by integrating flood hazard maps with a geographic information system (GIS) database that makes data available over the Internet. The tools are based on the ESRI® Production Line Tool Set (PLTS™) for ArcGIS®. This software was specifically developed for high-volume database production, maintenance, quality control (QC), and cartographic production projects such as this.

The development of the DFIRMs begins with Job Tracking for ArcGIS (JTX™), a workflow management application designed to improve the efficiency of multiuser GIS projects. Through JTX, FEMA mapping partners create flood hazard products by progressing through a FEMA-defined set of best practices workflow steps. The ability of JTX to facilitate the assignment of work among users allows mapping partners to efficiently manage their DFIRM projects.

Many of the DFIRM workflow steps require the use of ArcMap™, an application within ArcGIS Desktop, for data development and review. Upon launching ArcMap via JTX, the user can get the toolbars and layers necessary to perform FEMA-specific tasks.



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ESRI Software Used

ArcGIS Desktop
PLTS for ArcGIS
GIS Data ReViewer
Job Tracking for ArcGIS (JTX)

FEMA manages symbology requirements with ESRI GIS Data ReViewer™ valid value tables (VVTs). These tables are accessed and synchronized via PLTS for ArcGIS tools and extend the core functionality of ArcGIS Desktop.

VVTs allow the features to be rendered by a symbology set designed to facilitate the QC process in data review. The final map is symbolized according to a set compliant with FEMA specifications. VVTs also highlight invalid attribute combinations in the flood hazard data.

Next, the GIS Data ReViewer condition table (CNT) allows users to employ a set of predefined complex attribute checks to review both spatial layers and business tables. These checks mimic FEMA's independent QC process because users can detect and correct errors early in the DFIRM production process. These checks also help ensure that FEMA-compliant data is created.

The GIS Data ReViewer Error Table tools allow different critics within the mapping partner group (including QC, engineering, and mapping) to review the spatial data. The engineers and QC analysts use notepad features and comments in the Error Table tools to indicate areas in need of revision, which the mapping analysts then correct. The GIS Data ReViewer Error Table tools also facilitate the spatial integration of engineering data.

Results

FEMA is now able to easily track the mapping process for its flood hazard mapping projects and create the final DFIRM database through best practices using PLTS for ArcGIS. PLTS for ArcGIS streamlines the product development process and allows FEMA mapping partners to work together by project reassignment using JTX within the DFIRM tools environment.

PLTS for ArcGIS also facilitates the spatial and attribute validation process. Using GIS Data ReViewer VVTs, FEMA can effectively highlight attribute errors. The GIS Data ReViewer Error Table tools allow QC analysts to locate areas in need of revision in the flood hazard database, track the mapping process of projects, and revise the database.

Once updated, the DFIRMs are stored digitally on FEMA's Mapping Information Platform (MIP), which can be viewed on the agency's Web site at <https://hazards.fema.gov>.

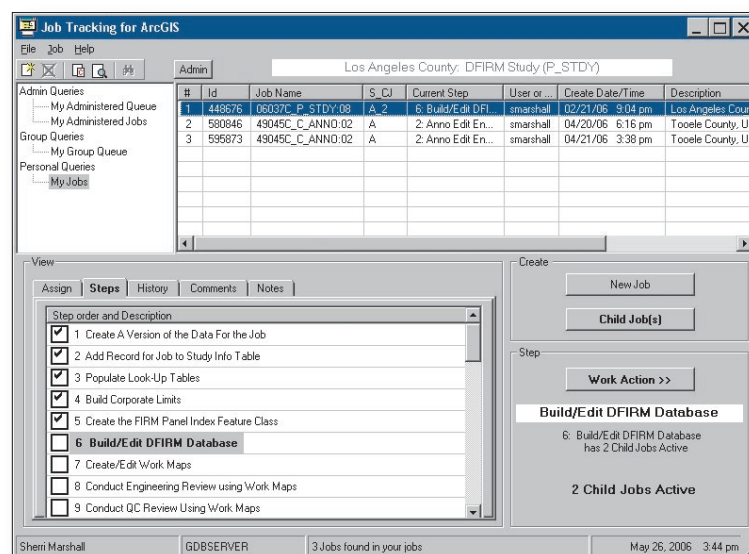
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FEMA can easily manage workflow of its digital flood insurance rate maps (DFIRM) with Job Tracking for ArcGIS (JTX).

Learn more about ArcGIS software at www.esri.com/arcgis.