Spatial & Attribute Data Collection for Infrastructure Reliability Analysis

Location: Washington, D.C.

Client: Department of Defense

PROJECT SUMMARY

The Department of Defense (DoD) relies heavily on commercial and defense infrastructure to support its missions and operations. Decision makers and mission commanders need specific information in order to identify and mitigate critical infrastructure susceptibilities and operational dependencies that could adversely impact mission accomplishments vital to national security. Burns & McDonnell is collecting spatial and attribute data regarding electric power assets for the purpose of performing these infrastructure reliability analyses. Results of the analyses are provided to the Infrastructure Assurance Program (IAP) of the Joint Program Office for Special Technology Countermeasures (JPO STC), administered by the U.S. Navy.

A vast amount of information is required to model electric power transmission systems worldwide, and the program administrators recognize that a collection of valuable data such as this should be warehoused in an enterprise data management system. Burns & McDonnell was tasked with developing the electric power data management system (DMS) and integrating it with the existing IAP database.

An Oracle9i/ArcSDE database was already implemented at the IAP headquarters, so the next major task was to devise a database schema that captured the useful information from the inventory effort and data obtained through research and incorporate it with the existing infrastructure database. The Spatial Data Standard for Facilities, Infrastructure and Environment (SDSFIE) was selected as an ideal starting place for building the database schema, since it is a standard employed by the DoD and other branches of the federal government. Several modifications to the database structure were made in order to streamline the data storage and improve performance by applications accessing the database.

To add functionality to the DMS, Burns & McDonnell developed a custom ArcMap extension which will help analysts retrieve information and work with it geographically using ArcMap. The application extended the functionality of ESRI ArcGIS to geographically view and analyze propriety modeling data using the two database architectures Microsoft Access and Oracle 9i. Burns & McDonnell organized the raw modeling data into datasets based on a database schema that promoted intuitive and efficient viewing, querying, and management of data in ArcMap. The application succeeded in bridging the abstract nature of the modeled data and statistics with known real-world features and elements. The application was designed to be a transparent layer of functionality for existing ArcMap users and modelers, which reduced learning-curves and training costs.

SERVICES PROVIDED

- Spatial database management
- Data conversion and development
- Field data collection
- Application development

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