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Florida’s Environmental Screening Tool: Laying the Technology
Foundation for Efficient Transportation Decision Making

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Abstract
Florida has recently developed a new, more efficient process for conducting environmental reviews of transportation projects. The Environmental Screening Tool, an interactive database and mapping application available on the Internet, is fundamental to the success of the new process. The Environmental Screening Tool integrates resource and project data from multiple sources into one standard format, provides quick and standardized analysis of the effects of the proposed projects on the human and natural environment, and supports effective communication of results among all stakeholders, including the public.

Because an innovative technology solution was fundamental to the success of the new process, application development occurred in conjunction with process refinements. This created a very flexible environment in which the process could be refined to take advantage of technology, and the technology could be easily adjusted, as process details were defined. As the ETDM process was refined, the Environmental Screening Tool was developed using the following general steps:

1. Determine general system requirements for the conceptual process
2. Lay the database foundation
3. Design and develop the user interface in modules
4. Update and add tools within the modules as the process details are refined

Version 1.0 of the Environmental Screening Tool has been tested and statewide training completed in the summer of 2003. Participant feedback on the utility of the application has been very positive. Additional enhancements will most likely continue throughout the first year of implementation, as the new process is refined. Requests for enhancements have been compiled and will be incorporated into version 2 of the Environmental Screening Tool in the fall of 2003.

The tool integrates Internet mapping technology, relational database management system and GIS. This integration was implemented using industry-standard platform-independent development tools such as Hyper Text Markup Language (HTML), Java Script, Java Server Pages (JSP) and Extensible Markup Language (XML). The Environmental Screening Tool was deployed at the University of Florida in conjunction with the Florida Geographic Data Library (FGDL), a repository of Geographic Information System data gathered from federal, state, and local governments. Users access the application from their desktop computer by connecting to a secure website using Internet Explorer. The application was jointly developed by URS and the University of Florida under contract with the Florida Department of Transportation, Environmental Management Office, with funding from the State of Florida and the Federal Highway Administration. The cost of developing the Environmental Screening Tool, Version 1, was approximately $1,255,000.

This paper describes the Environmental Screening Tool with an emphasis on the functionality, development methodology, and implementation strategy.

Overview
In response to the “Environmental Streamlining” legislation passed by Congress as part of the Transportation Equity Act for the 21st Century, Florida has developed a new environmental review process. This new process, called the Efficient Transportation Decision Making (ETDM) process, redefines how the State of Florida accomplishes transportation planning and project development. The overall intent of the ETDM process is to improve transportation decision-making in a way that protects the human and the natural environments. The approach includes active participation of federal, state, and local agencies, and the public. Early in the transportation planning process, resource agencies and the public interact with transportation planners to identify potential effects that the project may have on the community and the natural resources. Agencies also identify avoidance and mitigation opportunities and prescribe technical studies to be accomplished by the Florida Department of Transportation (FDOT) when the project proceeds. This early involvement is supported by an innovative technology application, the Environmental Screening Tool (EST). The EST is an Internet-accessible application that provides tools to input and update information about transportation projects, perform standardized analyses, gather and report comments about potential project effects, and provide information to the public. The EST brings together information about a project and surrounding resources, providing reports and maps that help summarize and communicate that information. The user community includes staff from 7 FDOT district offices, 26 metropolitan planning organizations (MPOs), 24 resource agencies, and the general public. The application is used throughout the project life cycle to:

- Integrate data from multiple sources into an easy to use, standard format
- Analyze the effects of proposed projects on the human and natural environment
- Communicate information effectively among agency representatives and to the public
- Store and report results of the environmental review effectively and efficiently
- Maintain project records, including commitments and responses, throughout the project life cycle
**Technology Components**

The EST integrates ESRI's Internet mapping service (ArcIMS), Oracle relational database management system and traditional geographic information system (GIS) techniques. This integration was implemented using industry-standard platform-independent development tools such as Hyper Text Markup Language (HTML), Java Script, Java Server Pages (JSP), ArcObjects, and Extensible Markup Language (XML). The application is deployed at the University of Florida in conjunction with the Florida Geographic Data Library (FGDL), a repository of GIS data gathered from federal, state, and local governments.

The Environmental Screening Tool is used throughout the ETDM Process as illustrated in figure 1. MPO and FDOT planners use the application to record information about proposed transportation projects. These organizations may also provide community characteristic information for their areas of jurisdiction. Resource agencies provide information describing their priority resources to the FGDL. This information is loaded into the ETDM database and is accessed through Internet map services. After projects are loaded in the database, standard GIS analyses are automatically performed to identify potential environmental effects. These analyses were prescribed by the resource agencies during the needs assessment and include concerns such as, identifying National Register Sites within a mile of proposed projects, describing wetland characteristics within the potential right of way, or locating critical species habitat within a half mile of the project. The results are stored in the database along with the project information. Agency representatives and the public review project details, resource maps of the project location, and the results of the GIS analyses. They supplement their review with additional information and local knowledge of the area. Agency representatives coordinate internally to resolve agency positions. When the internal position is formulated, they enter the agency comments into the database. The public provides input directly to the MPOs and FDOT through existing public involvement techniques, such as workshops and surveys. After the review period, coordinators in the MPOs and FDOT summarize the information, and it becomes available for public review and comment. The recommendations and findings become the basis for project modifications and advancement.

![Fig. 1. Integration of technology in the ETDM process.](image)

**Database Foundation**

The foundation of the Environmental Screening Tool is its database. The database includes information about transportation projects currently undergoing the planning and review process, designated communities and community focal points, priority resources, and the results of all GIS analyses. Project information includes project locations, descriptions, purpose and need statements, project reviews and comments, summary reports, and project history records. Spatial and descriptive information about priority resources in the human and natural environment are provided through the Florida Geographic Data Library (FGDL). FGDL is a mechanism for distributing geographic information system (GIS) data throughout the state of Florida to the general public. FGDL is stored and maintained at the University of Florida’s GeoPlan Center. Data are collected from various sources, including state, federal and local agencies, nonprofit organizations, and private companies.
companies. All data are organized into a standard format and projection, with complete documentation (metadata) for each data layer. Hence, many FGDL users do not have to do any additional data processing in order to begin analyses. FGDL's standardized structure lends itself to be a symbiotic component of ETDM. The data merely need to be loaded into the ETDM architecture (ArcSDE), and analyses can be performed against the data without affording extra computer processing time for data standardization. Spatial data currently used in the EST contain over 200 statewide vector layers and 10,000 images. Examples of vector layers include: National Wetlands Inventory (line and polygon), USGS 1:24000 Hydrography (line and polygon), parcels, specific soils, landuse, future landuse, and various layers describing Florida's social, natural, and physical environment. Image layers include mosaics for 3,885 Digital Orthophoto Quarter Quads, over 7,000 black and white aerial photographs, and statewide LANDSAT imagery.

**Web-Based User Interface**
The Environmental Screening Tool is a secure web-site access through Microsoft Internet Explorer. The site includes customized tools, or modules, that support various tasks performed through the ETDM process. While each of these modules provides unique functionality to various users in the ETDM process, they all access a single integrated database. The application provides forms and maps that enable users to update the database, view and query the information through maps and reports, review results of the GIS Analysis, and enter comments about environmental effects. These are organized in modules that support specific tasks, including the following:

- **Project Data Entry** - Used by the FDOT and MPOs to add new transportation projects to the database and update the database as the project progresses through the ETDM process. The EST provides three ways for new projects to be entered into the system: transferring existing GIS files, extracting roadways from the State Highway System database, or entering the information on-line by drawing project lines on a map and completing on-line forms. After projects are added or modified, the application automatically analyzes the proposed projects using prescribed criteria developed by the ETAT: for example, calculating the acreage of wetlands within the impacted area, and counting the number of known historical and archaeological sites in proximity to the candidate project.

- **Project Management and Coordination** - Provide functions for ETDM coordinators and their project management teams to review project entries for completeness, notify ETAT representatives to review projects, and create summary reports.

- **Sociocultural Effects Evaluation** - Used by the FDOT and MPOs to enter community characteristics into the database and review the sociocultural effects of the projects.

- **Public Information Access** - Enables read-only access to the ETDM database. Currently in prototype, this module will be available through the Florida Department of Transportation website by January 2004.

- **Environmental Review** - Includes forms and maps for agency representatives on the Environmental Technical Advisory Teams (ETAT) to view and query the database, review results of the GIS analysis, and enter comments about the project into the database. A screen capture of the map viewer in this module is shown in figure 2.

![Fig. 2. ETAT review module.](image-url)
Development Methodology
Because an innovative technology solution was fundamental to the success of the new process, application
development occurred in conjunction with process refinements. This created a very flexible environment
in which the process could be refined to take advantage of technology, and the technology could be easily
adjusted, as process details were defined. The technology team leader regularly attended the steering
committee meetings and workgroup sessions to enable continual feedback about technology capabilities,
process refinements, and development activities. After the core components of the conceptual process were
identified, application development began in September 2000 using the following general methodology:

1. Determine general system requirements for the conceptual process
   • Establish technology goals consistent with the objectives of the ETDM process
   • Review existing information systems used in the agencies for environmental review
   • Identify existing computer resource capabilities within target user community
   • Evaluate technology options
2. Lay the database foundation
   • Conduct a statewide data needs assessment with the cooperating agencies
   • Identify and acquire existing sources of environmental resource data
   • Design the ETDM database
3. Design and develop the user interface in modules
   • Develop prototypes based on general system requirements
   • Present prototypes for feedback from the steering committee and potential users
   • Modify modules based on feedback
4. Update and add tools within the modules as the process details are refined
   • Continue to meet with steering committee, consultants, and users to help refine the process
   • Develop system specifications for modifications and enhancements
   • Implement modifications and enhancements after concurrence from the steering committee

In June 2002, eighteen representatives from cooperating agencies tested the application by simulating data
entry and environmental reviews for sample projects. Participant feedback resulted in some modifications to
the system, but no major problems were found. Most of the modifications were enhancements to make the
system easier for the user to navigate through the application, such as eliminating unnecessary mouse clicks,
and grouping data layers on the maps. Several additional tools were identified to further improve efficiencies of
the new process. These enhancements were developed in the fall of 2002. Additional enhancements will most
likely continue through the first year of implementation, as the new process is refined.

Implementation
The implementation strategy for the Environmental Screening Tool includes training, support, and maintenance.
Implementation coincides with the ETDM process implementation currently being phased into the operations
of the MPOs and FDOT. The Environmental Screening Tool, Version 1, production release occurred in March of
2003 with the beginning of statewide training on the ETDM process. Training and user support occurs for each
module of the application at the appropriate phase as the ETDM process is initiated. Currently, FDOT and MPO
staff are entering projects into the database. The first ETAT review will be conducted in January 2004.

Training
Statewide training for the ETDM process was conducted March 2003 - May 2003. This training included
demonstrations of the Environmental Screening Tool. These were followed in May 2003 - August 2003 by
computer lab workshops that provided hands-on instruction for project data entry and project management
tools. Training for the ETAT Review module will be conducted in the fall of 2003. Sociocultural Effects training
is scheduled to begin in January 2004. Web-based training opportunities for continuing education will be
developed throughout this coming year.

User Support
Support of the EST is available to the user community in several formats. The first is comprehensive online
self-help, providing access to the EST manuals and user guides, PowerPoint presentations describing the
ETDM process and EST modules, frequently asked questions, a how-to section, and a discussion forum where
the user can engage other users in conversations to work through any issues. It also offers access to short
movie clips demonstrating each module to reacquaint the user and reintroduce the modules navigation and
intended functions. Secondly, an email help line is also available for users to email requests for assistance
or enhancements. Third, at FDOT, a central office help desk has been established to field user support calls.
Using either eCONNEX or the Lotus Sametime software, the help desk can visibly demonstrate to the user how
a task is accomplished with the EST. A user can log onto a website and see the shared Help Desk support
desktop as the support specialist talks the user through the steps over the phone. If the problem requires local support on the user's computer, the help desk can use the remote access technologies within eCONNEX and Sametime to reach out and make any necessary local configuration changes.

**Maintenance**

The EST system maintenance is handled through formal version releases. Defect corrections are implemented immediately. Enhances that improve or build on the system are scheduled for periodic implementation. Version 1.1 is scheduled for early September 2003 to incorporate enhancements that will improve efficiencies in the project input process. Version 2 will be released in November 2003 to implement modifications requested in the statewide ETDM process training.

Formal agency operating agreements specify details for maintenance of resource data acquired for the Environmental Screening Tool. Through these agreements, participants agree to review and refresh the data at a defined interval. Depending on the data and the agency, this process can be weekly, annually, or longer. Other resource data sets that are housed at the FGDL and used by the EST but do not have an ETAT agency representative are reviewed and refreshed by the GeoPlan Center as they become available.

**Biographical Sketch:** Ruth Roaza is currently a senior project manager at URS Corporation, responsible for managing the Environmental Screening Tool application development. Prior to joining URS, Ms. Roaza was the GIS and database manager for the Florida Department of Environmental Protection. Ms. Roaza has a bachelor’s degree in computer science and religion/philosophy.

**References**

