



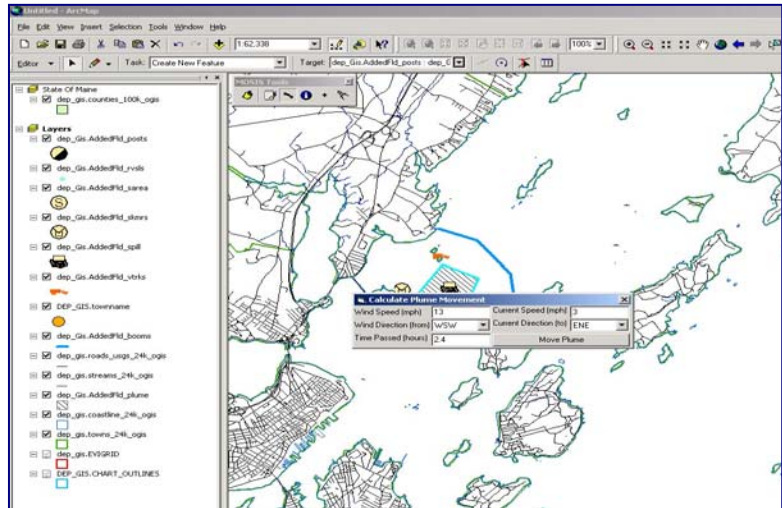
Capacity Title: Marine Oil Spill Information System (MOSIS)

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Key Features:

- Automated creation and symbolization of required Spill Response feature classes.
- Automated cartography tools.
- Import NOAA Trajectory model.
- Automated versioning of spill-related layers.

System Overview: The State of Maine has a famously long and rocky coastline. Maine is also host to the third largest oil-importing harbor on the east coast of the United States. This leaves Maine especially prey to oil spills and their aftermaths. Oil Spill Response personnel, working for the state's Department of Environmental Protection (MDEP), are first on the scene when a crisis occurs. The response logistics maps and data they create become the basis for spill containment and clean up.

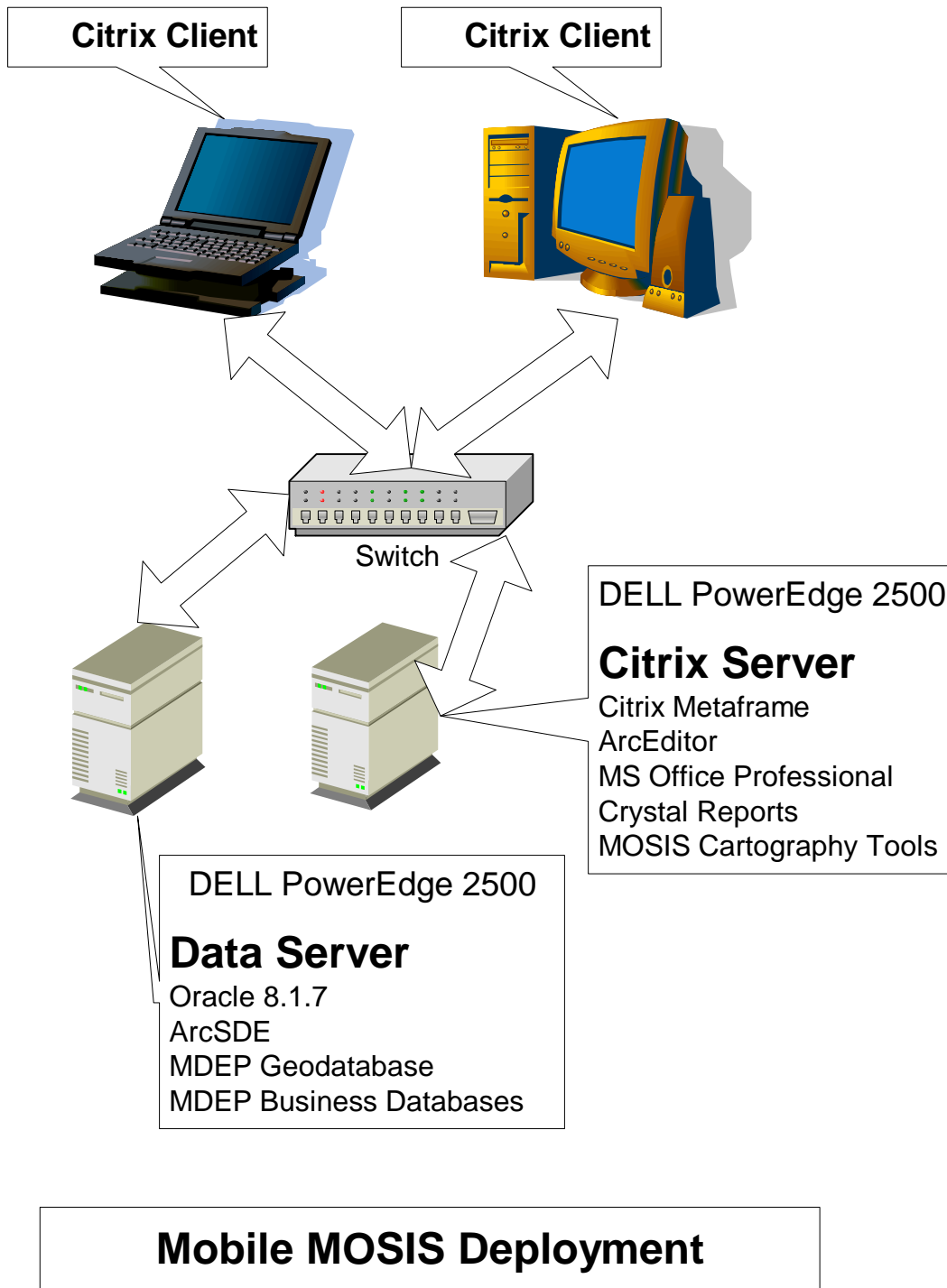


The effectiveness of the response team in the first 24 hours of a spill event is critical to reducing the environmental impact of that spill on sensitive areas near the oil plume. The MDEP required a software application that would help their response team be more effective: it had to increase the speed with which Oil Spill Response Teams could report the details of oil spills; it needed to reduce the number of reporting errors; and it had to be easy to use and understand. Because of the rural nature of Maine, there is no wireless or cellular coverage in much of rural Maine for which MDEP is responsible. Our solution had to be a self-contained deployment that allowed the responders to have a complete copy of the relevant MDEP databases and their Enterprise GIS that traveled with them to the mobile response center. Further, the infrastructure needed to be able to scale up quickly so that participants from other agencies and other MDEP responders could quickly be added as Response Cartographers to the system with a minimum of systems administration overhead and a maximum of hardware flexibility.

SGCi Penobscot Bay Media (SGCi), an ESRI Business Partner, developed this mobile GIS system consisting of a data server, a Citrix application server, and a suite of mapping applications and data collectively known as the Marine Oil Spill Information System or MOSIS. The data were collected from a number of different agencies from the US Coast Guard to the Department of Marine Resources to the Department of Inland Fisheries and Wildlife and several commercial organizations who might be likely participants in the cleanup of a Marine Oil Spill. Our custom application creates a fully independent mobile mapping platform that can be quickly mobilized to any location in the state that may be chosen as a local command center for spill response management.



Image of System Concept: MOSIS is a custom ArcGIS extension developed to operate in a mobile deployment environment during emergency response.





Operational Capability: Our Marine Oil Spill Information System (MOSIS) has vastly improved the effectiveness of Oil Response personnel. Extending ArcGIS, we built a series of cartographic automation tools that allow personnel to quickly zoom in on any section of Maine's coastline on pre-configured map templates. Using standardized, predefined symbols, personnel can immediately begin to diagram the spill and its plume. Pop-up windows give them the opportunity to add additional detail, such as plume movement, time and location of spill, personal descriptions and more. Temporal snapshots of all related spill data can be captured so that the evolution of the spill event can be analyzed at a later time. All spill-related features are stored as event-specific custom feature classes so that each spill event can be versioned, stored, and analyzed as its own separate event.

DEP management can now use MOSIS to quickly evaluate the environmental assets at risk in the event of a spill, even importing NOAA trajectory models when relevant. Now, more energy can be focused on containing and cleaning the spill, rather than on describing it. The following features represent leading edge technology for the MOSIS application:

Automatic creation of versioned custom feature classes: MOSIS starts out with a template of pre-symbolized base map layers. When a new spill event is created, the user is prompted for some limited metadata about the spill event. A number of new custom feature classes are then automatically created in the Enterprise Geodatabase and versioned for editing. All of these feature classes are specific to a particular spill event so that they can be analyzed separately. The analyst can then use ArcGIS and a few other custom tools to add new features to the map, import NOAA trajectory models, model plume movements, save historic versions and print map atlases.

Citrix deployment of the mobile application server for scalability: Because the system is deployed on the Citrix application server, additional analysts (up to 12 concurrent users) can be added to the system immediately without any software installation requirements other than the Citrix client. This capability allows the GIS response team to scale up very quickly with very little systems administration overhead.

Automation of ArcGIS versioning: By utilizing the versioning capabilities in the ArcGIS Geodatabase, the analysts are able to save historic versions of the spill event for review and operational analysis after the event is over.

Technical Approach: The Unified Software Development Process (USDP) will be used to manage all phases of the software development life cycle and the Unified Modeling Language (UML) will be used to document the system's deliverables (artifacts) through a series of UML diagrams. This methodology uses an iterative approach to systems design and implementation and includes a strong emphasis on stakeholder and end user requirements as well as delivery architecture. Each phase of the methodology includes a review of the system deliverables.

Project Phases and Deliverables:

The USDP phases and the deliverables that will be completed in each phase are as follows:

Phase 1: Inception

- Requirements identification and analysis (user interviews, group meetings, legacy system review)
- Functional design (documents the system requirements of users and other stakeholders)
- Architectural design (documents the system components to be developed and/or delivered)

Phase 2: Elaboration

- Design sessions (system design discussions between systems development staff and end users)
- Updated functional design (update functional design documents as per design sessions)
- Updated architectural design (update architectural design documents as per design sessions)
- Construction design (documents how the system will be built)
- Initial prototype and interface design evaluation (proof of concept prototype to validate the design)

Phase 3: Construction

- Implement and test the system components as per design (database, user interface, SDE, etc.)
- Install system components within the designated test environment



Phase 4: Transition

- User acceptance testing (based upon end-user interaction with the system in the test environment)
- Deploy system into the production environment
- Incorporate user feedback into planned maintenance updates

Estimated Schedule

- Project is expected to last between nine and twelve months depending on the needs and the complexity of the specific installation.
- Estimated time per project phase is as follows:
 - Inception: two to three months
 - Elaboration: two to three months
 - Construction: three to four months
 - Transition: one to two months

Hardware and Software Requirements

Servers

- Citrix Server (Dell PowerEdge 2500 with Citrix Server, ArcEditor and Crystal Reports 8.5)
- Spatial Data Server (DELL PowerEdge 2500 with ArcSDE 8.3, Oracle 8.1.7 and supporting software)

Clients

- Any PC, Macintosh or Unix computer capable of running the Citrix Client (Version 6.01 or higher) and with connectivity to the Citrix Server (Note: direct connections to the Business and Spatial Data Servers are not required as this is handled through the Citrix server)

Other Applications: MOSIS is a custom extension of ArcGIS (ArcEditor) built for mobile deployment with an Oracle RDBMS, but could also be used in stationary environments and/or adapted to other RDBMS such as DB2, SQL Server or Informix.

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