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The ARAC Client System: Network-Based Access to ARAC

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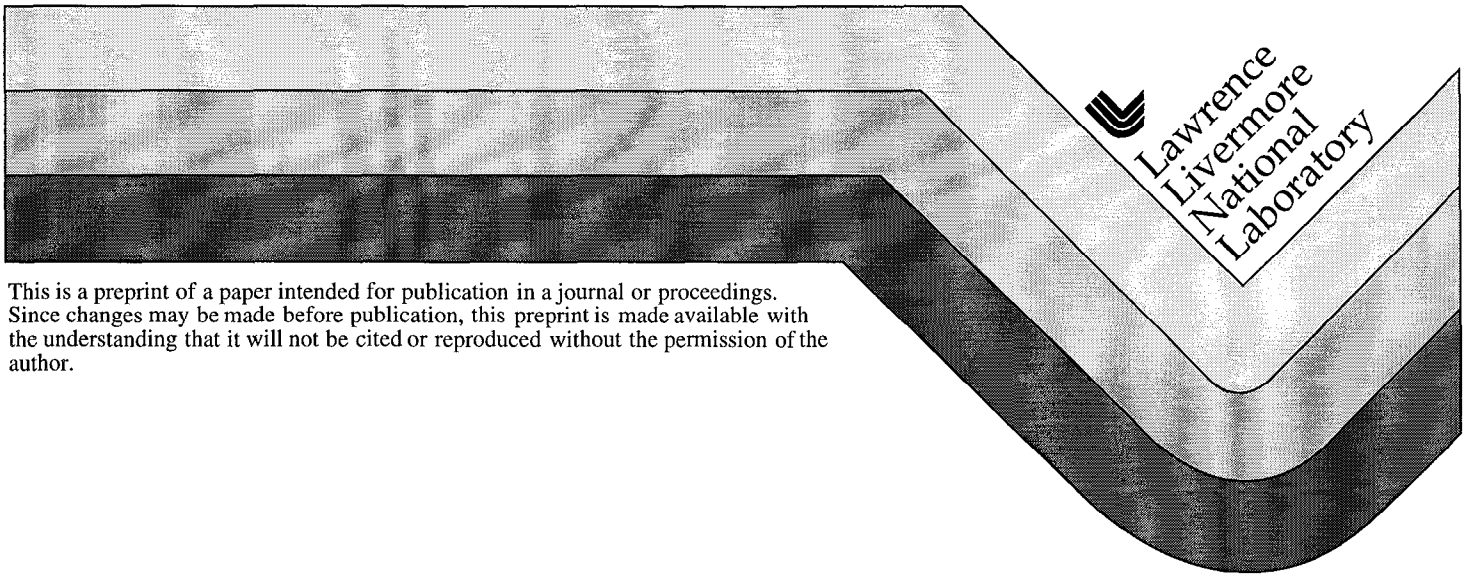

The ARAC Client System: network-based access to ARAC

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Objectives:
The ARAC Client System allows users (such as emergency managers and first responders) with commonly available desktop and laptop computers to utilize the central ARAC system over the Internet or any other communications link using Internet protocols. Providing cost-effective fast access to the central ARAC system greatly expands the availability of the ARAC capability. The ARAC Client system consists of (1) local client applications running on the remote user's computer, and (2) "site servers" that provide secure access to selected central ARAC system capabilities and run on a scalable number of dedicated workstations residing at the central facility. The remote client applications allow users to describe a real or potential chem-bio event, electronically sends this information to the central ARAC system which performs model calculations, and quickly receive and visualize the resulting graphical products. The site servers will support simultaneous access to ARAC capabilities by multiple users. The ARAC Client system is based on object-oriented client/server and distributed computing technologies using CORBA and Java, and consists of a large number of interacting components.

Recent Progress:
Development of a prototype ARAC Client system began in July 1998. This past year, the overall architectural framework and core capabilities of the ARAC Client system were designed and implemented. The first major milestone was the delivery of a demonstration version of the system by March 1999. The demonstration system includes a client application suite consisting of a basic event information entry application, a basic visualization tool (see Figure 1), and a communication monitor. The event entry application allows viewing, editing, archiving, and submission of simplified event/scenario information. The basic visualization tool allows viewing and archiving of model products along with geographic data. The communication monitor provides communication with the current operational ARAC system via the site server. The communication monitor provides status on the progress of the central system model calculation and product transmission. The ability to complete a "round-trip", from event/scenario input to model product delivery, was demonstrated. A site server application (a CORBA service) was developed that allows the client to communicate to the current operational central ARAC system. A framework was developed to map the data structure provided by the ARAC Client into an event information file that can be transmitted via the ARAC site workstation to the central system. The site server also provides a simple prioritization algorithm to sequence event submissions. A commercial installation technology (InstallAnywhere by ZeroG) was investigated and tested to aid in web-based deployment and installation of the client application suite.

Future Outlook:
The next year will focus on enhancing the existing site server and developing software components for use by collaborators. The core infrastructure of the ARAC Client system has been developed and used extensively in the demonstration system; therefore, the work will be focused on replacing or significantly enhancing specific components.

The site server currently communicates with the central ARAC-2 system through a UNIX-based ARAC Site Workstation. As the ARAC-3 system becomes operational, the ARAC Client system will submit events directly to the ARAC-3 system. This will provide better response time, augment the event reporting capability, and increase communication reliability. The architectures, and consequently the communications mechanisms, are very different between ARAC-2 and ARAC-3. An additional component on the site server must be added to support the new architecture employed in ARAC-3. This component must provide a persistent prioritized queuing infrastructure that allows requests for central system services to be scheduled appropriately and policy decisions on resource usage to be applied. The site server must provide encryption and authentication services for the remote clients. The security requirements will be

extended to the web server component, where access to the installation tool and web based documentation will be properly secured. Finally, the site server will provide an event database where information can be stored and retrieved by remote clients. This database will allow short-term storage of event information and provide the architecture for multiple agency event collaborations.

The ARAC Client architecture was developed using object-oriented design techniques. This architecture allowed the ARAC client to be constructed by connecting the components. The same methodology can be used by other organizations, such as the Virtual Planner team at LANL, to reuse the software components. Several components, such as the submission component, will be enhanced to facilitate distribution and reuse by other software collaborators.

Future work will include critical enhancements to the visualization tool, development of a web-based geographic data distribution system, developing multi-agency collaboration capability, enhancing the event reporting user interface, providing a local model capability, developing a regional meteorological observation extraction tool, and additional software application enhancements.

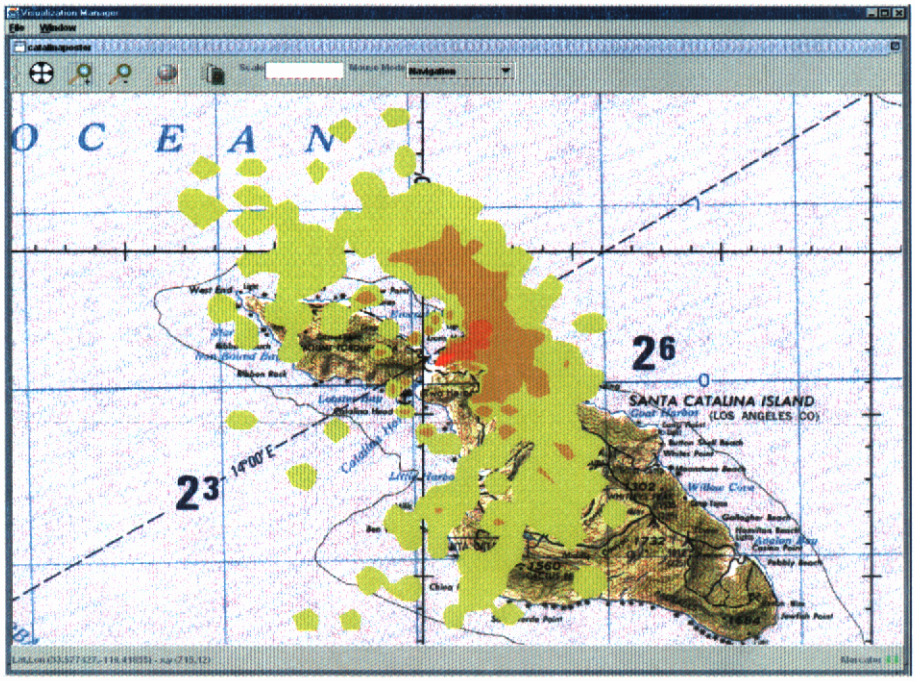

Figure 1. Example model product and geographic data layers in the prototype visualization component of the ARAC Client system. The visualization component allows a user to archive, retrieve, view and manipulate (i.e., pan, zoom, and change layer drawing order) a view composed of multiple geographic data types.

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