Easy Virtual Navigation Through a 3D Graphical User Interface

Navy Needs Fast, Easy, and Accurate Web-based Data Access

A major challenge for the U.S. Naval Sea Systems Command (NAVSEA) is making ship maintenance and logistics as easy, efficient, and cost-effective as possible. Both afloat and ashore, it is often difficult to visualize ship parts

and simplify access to all of the data repositories and systems related to a ship or class – engineering diagrams and documents, 3D CAD, smart product models, product data management, enterprise resource planning, integrated data environments (IDE), and even finance and accounting. NAVSEA needed a highly adaptable, intuitive, scalable, and portable means to view ship and ship class components and related data to support maintenance and logistics throughout a ship's life cycle.
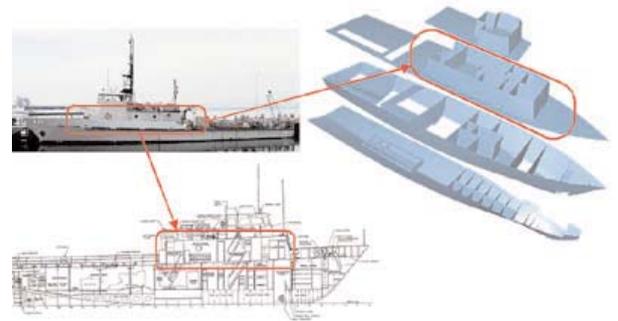
The Project Objectives:

- Improve ship data access, visualization, and performance
- Support maintenance and logistics throughout a ship's life cycle

The Solution:

NAVSEA partnered with Intergraph to develop a 3D graphical user interface (GUI) and interoperability engine to improve data access, visualization, and performance. Intergraph offers more than 30 years of marine program and ship experience. As the developer of the first production IDE for ship design, production, and life-cycle support, Intergraph offered the experience and technological expertise to build the solution. The result of their combined efforts was the 3D Viewer and Interoperability Framework™, a standards-based, scalable architecture that gives users an integrated, logical view of data retrieved from multiple software systems. The system builds on commercial off-the-shelf (COTS) technology to provide easy Web-based navigation, a geometrically accurate 3D virtual environment, and a single point of access to all available ship data. Interoperability is the key enabler for exposing configuration-managed data to numerous users, moving the focus from unique system interfaces to the data itself.

The 3D Viewer is built on a common 3D GUI that provides a lightened polygonal model representation of the ship that can be accessed through a Web-based interface on laptops or portable devices. Users can query and view 3D or 2D representations of ship structure, piping, cable, HVAC systems, compartments, and equipment as well as make the structures transparent. In addition, users can view and redline (non-destructive markup) associated drawings, documents, and technical manuals.

The Interoperability Framework is an XML-, Java 2 Enterprise Edition (J2EE)-compliant architecture providing Web-based access to multiple systems. Compatible with any Web server, the Interoperability Framework provides login access control to required data according to established privilege levels. The system automatically logs into the appropriate databases or systems, queries these systems based on the original request, and compiles, integrates, and presents data in a configurable style sheet. Although prototyped using ship data, the Interoperability Framework can support any large or complex set of data, such as weapon systems, vehicles, and facilities.

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Intergraph's Information Assurance group has and continues to perform Department of Defense IT Security Certification and Accreditation Process (DITSCAP) reviews on both the development process and resulting software products. Completion of this process will meet the Navy-Marine Corps Intranet (NMCI) certification prerequisites for the 3D GUI and Interoperability Framework.

Intergraph designed the system so that the representative sailor would find it easy and intuitive to use. Users can access the system using an ordinary Web browser and log in only once for controlled, secure access to all data repositories related to the ship. The primary GUI is a geometrically accurate model representation of the ship that allows users to conduct virtual walkthroughs and drill down to specific components or spatial areas of the ship. Users can "drive" through the structure using basic button selections. They need only touch a piece of equipment to retrieve related data, and they can toggle selected parts of the model to make them transparent or invisible and see behind the equipment, something possible only in a virtual environment. Users can perform graphical or text-based queries to find and retrieve any ship component information.

Easy Data Access and Visualization

The Interoperability Framework makes data access and visualization dramatically easier. Users no longer need to log into the multiple ship data repositories and spend huge amounts of time compiling data from individual logon sessions. With one point of access to all ship data and a geometrically accurate model to navigate, the system supports mission readiness and familiarity training while allowing users to interoperate with multiple ship repositories or data systems. Ultimately, this helps optimize processes, reduces total ownership costs, and improves readiness and quality of life. Initially developed for the U.S. Navy LPD 17 Amphibious Assault Program and Torpedo Weapon Retriever (TWR) ship, NAVSEA is currently planning extension of the system to additional platforms and programs.

Intergraph Security, Government & Infrastructure

Intergraph Security, Government & Infrastructure (SG&I), headquartered in Huntsville, Alabama, serves a broad range of clients, including local, regional, and national governments; businesses, both public and private; and security and public safety organizations. Intergraph SG&I focuses on providing software and services to enable our clients to make the right decisions at the right time using the right information.

NAVSEA

The Naval Sea Systems Command's (NAVSEA) world-class team of professionals provide virtual support anywhere and anytime to ensure the U.S. Navy Fleet remains ready and capable - operating around the globe. NAVSEA's chief objective is to successfully serve the American people and keep America's Navy #1 in the world.

For more information, visit our Web site at http://www.intergraph.com/sgi/.