

3D Visualization of the Galileo constellation applying IDL fed with GSSF data

GALILEO SIMULATION

THE GALILEO SYSTEM SIMULATION FACILITY (GSSF) PROVIDES A SIMULATION ENVIRONMENT THAT REPRODUCES THE FUNCTIONAL AND PERFORMANCE BEHAVIOR OF THE GALILEO SYSTEM TO DEVELOP SIMULATION APPLICATIONS TO ENSURE THE INTEGRITY OF PRODUCTS AND SERVICES BEING DEVELOPED USING GALILEO, GPS OR EGNOS SYSTEMS.

In 2000, the European Union (EU) and the European Space Agency (ESA) initiated Galileo, an international project to design and deploy global satellite navigation and positioning system specifically for the civilian applications of today and of the future. The Galileo project will include a combination of ground based systems, a constellation of 30 satellites, and a host of support services that will provide advanced technologies for transportation, energy, personal navigation, surveying, environmental and emergency management applications.

Advancing technology development using simulations

From the beginning of the project, ESA has focused its attention on developing advanced technologies to provide a broad spectrum of tools and capabilities to support present day and future civilian applications.

Along with a full array of payload systems and ground station services, ESA has commissioned a comprehensive simulation environment that will provide sophisticated models of Galileo's operations. These simulation models will be indispensable to companies and organizations that provide services to consumers that are dependant on accurately assessing the navigational accuracy and analyses of data integrity for the Galileo system.

This vision for a simulation environment is now being realized as the Galileo System Simulation Facility (GSSF). GSSF provides a simulation environment that reproduces the functional and performance behavior of the Galileo system and provides a robust

and easy to use platform for companies to develop simulation applications to ensure the integrity of products and services being developed using Galileo, GPS or EGNOS systems.

The GALILEO system simulation facility

GSSF is being developed for ESA/ESTEC by a multinational team lead by VEGA IT GmbH of Darmstadt in Germany, which is a 100% subsidiary of the British VEGA Group Plc. GSSF gives users the ability to create models that simulate Galileo functions such as navigational accuracy, data integrity, the effect of the environment on navigation performance, and ground segment performance for Galileo, GPS and EGNOS systems.

Developed in C++ and C# on the Windows XP platform, GSSF offers a single simulator environment that allows users to set up and configure a simulation scenario, run the simulation, analyze and visualize the data and import or export data and reports. VEGA has incorporated the advanced visualization capabilities of IDL into GSSF to provide users with additional simulation and 3D processing capabilities. IDL allows users to create powerful visualizations of the data including modeling, contour plots and map plots and many more.

The support of the team at CREASO GmbH, which is the German IDL vendor and engineering support provider, was essential. Frank Zimmermann, the GSSF Project Manager at VEGA, said: "The GSSF development did significantly benefit from the use of IDL. Due to the support provided by Bernhard Kortmann and his team, we achieved a seamless and smooth integration

of IDL into the GSSF infrastructure, greatly enhancing the visualization capabilities of GSSF."

Performance analysis and ground station validation - GSSF version 2.0

GSSF 2.0 has been formally accepted by ESA and is now available for free download from www.gssf.eu. Currently over 300 licenses have been downloaded and many core institutions are making use of the platform to model data from Galileo, GPS and EGNOS.

The current version of GSSF (2.0) includes the Service Volume Simulation (SVS) capability to analyze the navigational performance and integrity over long periods of time and over large geographic areas. It also includes the Raw Data Generation (RDG) capability allowing the production of simulated Galileo and GPS data for experimental purposes. The validation of the RDG capability as currently available was limited to the use of GPS measurement data, while ongoing activities target a calibration with data received from the first experimental Galileo satellite GIOVE-A in order to confirm that the raw data is indeed also representative for Galileo.

The latest version of GSSF (2.1) that was accepted by ESA recently in September 2006 includes integrity simulations based on the latest Galileo concept and further improvements to existing version 2.0 functionality.

The Real Power - Extending GSSF to support custom applications

The GSSF offers a variety of standard simulation models and analyses for many applications, however, the true advantage of the

GSSF comes from its ability to be customized and extended via the additional use of IDL as a development platform to meet a wide variety of custom application needs.

In addition to the flexibility of the Windows XP platform, the IDL engine generating the advanced visualizations in the system offers developers the ability to build additional functionality for application-specific purposes such as user-defined analyses. Equipment providers and service organizations can use this extensibility to develop customized models, post-processing routines and 3D visualizations to help gain a better understanding of the performance and accuracy of Galileo, GPS and EGNOS, and the relative performance of their particular commercial offering.

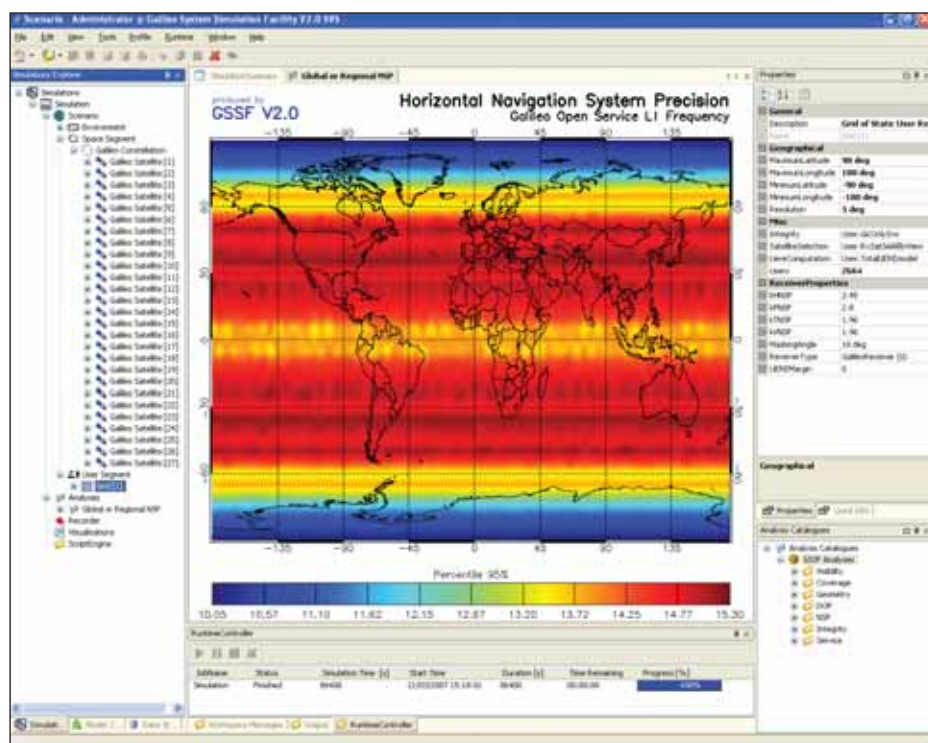
Application developers can also embrace the underlying IDL engine as a platform from which to develop third party, commercial software applications using the navigation system data.

Customizing the GSSF platform

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For more information:

VEGA IT GmbH - www.vega-group.com
 CREASO GmbH - www.CREASO.com



The GSSF Workspace