Software

Integrated Lunar Information Architecture for Decision Support Version 3.0 (ILIADS 3.0)

ILIADS 3.0 provides the data management capabilities to access CxP-vetted lunar data sets from the LMMP-provided Data Portal and the LMMP-provided On-Moon lunar data product server. (LMMP stands for Lunar Mapping and Modeling Project.) It also provides specific quantitative analysis functions to meet the stated LMMP Level 3 functional and performance requirements specifications that were approved by the CxP.

ILIADS 3.0 is a rich client (aka, thick client) lunar Geospatial Information System (GIS) software application. It is a redesigned software framework and architecture that leverages GSFCs experience developing the ILIADS 2.0 core software. Specifically, ILIADS 3.0 is built upon ILIADS 2.0.

The purpose of ILIADS 3.0 is to provide an integrated, rich client lunar GIS software application. Most significantly, the objective in designing and developing ILIADS 3.0 was to provide a flexible and expandable software framework that readily enabled new features and functions to be integrated into ILIADS driven by the science and engineering user community. To contribute to the decision support process, ILIADS 3.0 also provides interfaces to readily enable interoperability between ILIADS 3.0 and other NASA-developed lunar information systems whenever it may become required to interface ILIADS with such systems.

By building upon Goddard's IRC core framework, ILIADS is also well suited to being readily integrated with future lunar surface system assets (e.g., crewed rovers, spacesuits) as an embedded system application. ILIADS 3.0 provides cross-platform support and thus executes on a diverse suite of computing platforms that are used by NASA scientists and engineers. The application is designed to provide authorized/authenticated users with the ability to use the Internet to securely, yet easily, identify and locate geographically distributed sources of vetted lunar data products that have been derived from US and international lunar spacecraft missions. It can query the data catalogs of these sources to identify available lunar data products and the metadata associated with them. The software uses standard OGC (Open Geospatial Consortium) WMS, WCS, and WFS (Web Map Service, Web Coverage Service, and Web Feature Service) services to access mapped lunar delta products from these sources so that they may be processed by ILIADS 3.0 and rendered as multiple semi-transparent raster or vector visualizations, so that the lunar data product information is readily understood in the context of one another.

This work was done by Stephen Talabac, Troy Ames, Karin Blank, Carl Hostetter, and Matthew Brandt of Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-16210-1

Relay Forward-Link File Management Services (MaROS Phase 2)

This software provides the service-level functionality to manage the delivery of files from a lander mission repository to an orbiter mission repository for eventual spacelink relay by the orbiter asset on a specific communications pass. It provides further functions to deliver and track a set of mission-defined messages detailing lander authorization instructions and orbiter data delivery state. All of the information concerning these transactions is persisted in a database providing a high level of accountability of the forward-link relay process.

This is an improvement over legacy processes that required lander client users to log into orbiter mission workstations and run orbiter-specific applications. The legacy process provided only a simple e-mail indicating success of transaction, and no further accounting of the forward-link transaction.

The Phase 2 MaROS forward-file management functions represent a significant upgrade of this relay system. This version provides a lander team the capability of selecting a set of "forward-link" files to be radiated to an orbiter for relay during a chosen communications window. These forward-link files contain critical flight data such as spacecraft command sequences and flight software uploads; this new MaROS functionality is classified Class B software. This new software version also includes the capability for lander and orbiter team members to associate predefined messages to the chosen set of forward-link files. Lander teams can specify authorizations for the orbiter team such as "go for radiation," and orbiter team members may specify status messages such as "onboard spacecraft." All of the status data is tracked in a database and provided via a shared service interface. The system provides a high level of accountability into the forward-link process.

This work was done by Daniel A. Allard, Michael N. Wallick, Franklin H. Hy, and Roy E. Gladden of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

This software is available for commercial licensing. Please contact Dan Broderick at daniel.f.broderick@jpl.nasa.gov. Refer to NPO-47942.

Two Mechanisms to Avoid Control Conflicts Resulting from Uncoordinated Intent

This software implements a real-time access control protocol that is intended to make all connected users aware of the presence of other connected users, and which of them is currently in control of the system. Here, "in control" means that a single user is authorized and enabled to issue instructions to the system.

The software also implements a goal scheduling mechanism that can detect situations where plans for the operation of a target system proposed by different users overlap and interact in conflicting ways. In such situations, the system can either simply report the conflict (rejecting one goal or the entire plan), or reschedule the goals in a way that does not conflict.

The access control mechanism (and associated control protocol) is unique. Other access control mechanisms are generally intended to authenticate users, or exclude unauthorized access. This software does neither, and would likely depend on having some other mechanism to support those requirements.

This work was done by Andrew H. Mishkin, Daniel L. Dvorak, David A. Wagner, and Matthew B. Bennett of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

∑ XTCE GOVSAT Tool Suite 1.0

The XTCE GOVSAT software suite contains three tools: validation, search, and reporting. The Extensible Markup Language (XML) Telemetric and Command Exchange (XTCE) GOVSAT Tool Suite is written in Java for manipulating XTCE XML files. XTCE is a Consultative Committee for Space Data Systems (CCSDS) and Object Management Group (OMG) specification for describing the format and information in telemetry and command packet streams. These descriptions are files that are used to configure real-time telemetry and command systems for mission operations. XTCE's purpose is to exchange database information between different systems.

XTCE GOVSAT consists of rules for narrowing the use of XTCE for missions. The Validation Tool is used to syntax check GOVSAT XML files. The Search Tool is used to search (i.e. command and telemetry mnemonics) the GOVSAT XML files and view the results. Finally, the Reporting Tool is used to create command and telemetry reports. These reports can be displayed or printed for use by the operations team.