

Introduction

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LAT Science Tools Meeting
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Overview and Context

- **Purposes of Meeting:**
 - review proposed set of science analysis tools for adequacy to support standard analysis by user community
 - review & further define requirements documents for analysis tools
 - develop science tools implementation plan: e.g. personnel requirements, schedule, etc.
 - begin exploring collaborative arrangements for development between SSC and LAT team – will be reviewed by management and finalized by time of LAT Collaboration Meeting (October 2002)
- **The science tools requirements and the implementation plan will be reviewed jointly by LAT and GLAST management – Fall 2002**



Charge to SSC-IOC Software Working Group

- **February 14, 2002 - Charge formulated by LAT PI & GLAST Project Scientist**
 - co-leads from SSC (D. Band) and LAT IOC (S. Digel),
 - reports to LAT PI and GLAST Project Scientist

- **Software WG responsibilities:**
 - define the relevant level-2 science analysis software tools to support astrophysics data analysis,
 - develop the requirements and the standards to which this software will conform,
 - define the requirements of the Level-1 LAT database and develop the functional requirements for the Level-1 pipeline,
 - develop a delivery schedule, and review the software tools as they are developed

The SSC-IOC Software Working Group

Thursday, February 14, 2002

Purpose:

The working group (WG) is the SSC-IOC interface for the software and analysis tools that the instrument team is responsible for developing and that the SSC is responsible for delivering to the general scientific community. A WG will be established between the SSC and each IOC separately. This document is specific to the LAT.

Scope:

The WG is responsible for defining the relevant level-2 science analysis software tools to support astrophysics data analysis, developing the requirements and the standards to which this software will conform, defining the requirements of the Level-1 LAT database and developing the functional requirements for the Level-1 pipeline, developing a delivery schedule, and reviewing the software tools as they are developed.

In particular, the scope of work of the WG includes:

1. **Level-1 database** – the database containing the event summary information used for astronomical analysis that is generated by the Level-1 pipeline. It is desirable, though not mandatory, that the same database technology be used in the SSC and IOC. The WG shall develop the requirements for this database and identify implementation options.
2. **Level-1 Processing Pipeline** – this pipeline will be implemented, operated, and maintained by the LAT IOC at SLAC. The Level-1 pipeline processes LAT data from Level 0 through to reconstructed events. In this area, the WG shall:
 - A. develop the functional requirements for the Level-1 pipeline;
 - B. review the pipeline implementation plan and test plan developed by the LAT IOC. The pipeline will be implemented at SLAC with infrastructure support provided by the SLAC Computer Center. This implementation will leverage off of hardware systems supported by SLAC. Because it is intended that the SSC will develop the capability to run a backup level-1 pipeline with identical functional requirements as the IOC Level-1 pipeline, the WG should be cognizant of the LAT IOC implementation plans. The WG should identify modifications of the proposed LAT IOC implementation that

will make implementation of a backup pipeline at the SSC as cost effective as possible while not increasing the costs for implementation at SLAC.

3. **Level 2 Software tools**—This is software that scientists will use to derive astrophysical results from the Level 1 data (reconstructed photons for the LAT and calibrated counts for the GBM). In this area, the WG shall:
 - A. identify the suite of level-2 software analysis tools to be developed and supported, including requirements and a justification of the adequacy of the suite of tools for providing the core analysis tools that will be required by the user community. (e.g. this justification could be in the form of identifying a set of “use cases” that span the typical analyses performed on the data, and showing that the analysis tools identified support these use cases.)
 - B. develop functional requirements for each of the level-2 software tools. (The starting point of developing these requirements should be the justification developed for A above.)
 - C. define software standards. Review and evaluate the following:
 - i. use of proprietary software vs. free software.
 - ii. The supported platforms and operating systems.
 - iii. The user interface.
 - iv. Programming languages
 - D. define the software structure within which this software will be developed and maintained. Begin with the identification of functional requirements for this structure. Consider that once the software is delivered to the SSC, it will be maintained under configuration control.
 - E. define the data formats for the input and output of this software, specifically, FITS format conforming to HEASARC standards, which will allow multi-mission compatibility.
 - F. develop requirements for testing of the software.
 - G. develop requirements for documentation provided to the user.
4. **Response functions**—This is the model of the instrument necessary to convert the detected photons into astrophysical results. The WG shall develop the requirements for the the database within which the response functions are stored, taking account of the requirement that the response functions must be useable by the scientific user community. It is anticipated that the necessary calibration files will be stored within the CALDB system. The WG shall evaluate the adequacy of the CALDB system for meeting the proposed requirements. If not adequate, the WG shall identify alternatives to or modifications of the CALDB system.
5. **Data Access Tools**—This is the software that extracts the data necessary for a scientific analysis from the database of detected photons. The WG shall develop requirements for these tools.

Responsibilities:

Development of this software is the responsibility of the instrument team. Consequently, the WG (and the SSC) will not be responsible for organizing the development effort. The SSC is responsible for delivering this software and the necessary infrastructure to the general scientific community. Members of the SSC will participate in developing the software within the management structure established by the instrument team. The WG and the SSC will *not* supplant or control the right of instrument team members to develop software.

Structure and Reporting:

The WG will be a small group consisting of co-leads, appointed by and reporting to the Instrument Principal Investigator and the GLAST Project Scientist, and will have equal representation from the SSC and the IOC. The WG will draw on expertise at the SSC, the IOC and elsewhere as needed.