DESIGNING AND DEVELOPING A NASA RESEARCH PROJECTS KNOWLEDGE BASE AND IMPLEMENTING KNOWLEDGE MANAGEMENT AND DISCOVERY TECHNIQUES

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Introduction

The Research Projects Knowledge Base (RPKB) is being designed and will be implemented in a manner that is fully compatible and interoperable with NASA’s enterprise architecture tools developed to support NASA’s Application Science Programs. Through user needs assessment and collaboration with the NASA Space Flight Center, Goddard Space Flight Center, and NASA’s DEVELOP staff, personal insight to information needs for the RPKB were gathered from across NASA’s scientific community of practice. To enable efficient, consistent, standard, structured, and managed data entry and research results completion, a prototype RPKB has been designed and fully integrated with the existing NASA Earth System Science Components database (Mission-to-Model M2M database). The RPKB will compile research project and keyword information relevant to the six major Science Focus Areas, 12 National Applications, and the Global Change Master Directory (GCMD). The RPKB will be developed in a multi-tier architecture that will include a SQL Server relational database backend, middleware and front-end client interface for data entry. The application of data mining/knowledge discovery in RPKB will be useful for intelligent query answering and multiple-lookdown database construction. Using advanced enterprise architecture (EA) tools such as the Earth Science Architecture Tool (ESAT), RPKB will enable NASA and partner agencies to efficiently identify the significant results for new experiment directions and principal investigators to formulate experiment directions for new proposals.

Purpose

The purpose of RPKB is to meet the needs of NASA to systematically examine the portfolio of research results from six science focus areas of the Earth System Science Directors to identify candidate technologies and results that offer the best potential for transitioning from research to operations by mining the data from the RPKB.

Research Projects Knowledge Base (RPKB) Design

The RPKB is designed based on the questionnaire developed by the NASA Goddard Space Flight Center’s DEVELOP staff. The RPKB captures standardized information of NASA-funded Research Projects.

NASA SCIENCE FOCUS AREAS

The Earth Science Enterprise has defined its research strategy around a hierarchy of scientific questions. These science questions are addressed by the respective focus areas. The database will be populated with research results from all six major focus areas.

NASA APPLICATION AREAS

NASA has identified 12 application areas of national priority, each of which has a suite of support tools which are provided with environmental predictions from NASA models, which in turn receive raw and processed data from many sensors on space-based or ground-based platforms. NASA and partnering organizations focus on 12 applications of national priority.

RPKB Visualization - METIS Earth-Sun Architecture (ESAT) Tool

The Applied Sciences Program has developed Earth-Sun System Architecture (ESAT) Tool in model NASA enterprise architecture. The ESAT tool displays a Map of Questions on Research Project Results and the visual representation of the information will be displayed by the user by selecting data from RPKB Database.

RPKB Knowledge Discovery and Data Mining

The RPKB Data Mining is essential to improve the ability of users and operational organizations to identify, access, and harness NASA research results to enhance or improve their decision support tools. The RPKB will enable NASA and partner agencies to efficiently identify the significant results for new experiment directions and principal investigators to formulate experiment directions for new proposals. The harnessed data from RPKB tool will be useful in developing formation reports, which are the official records of the Candidate Solutions to be stored in part of the central solutions network inventory.

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