

# AN INTEGRATED AND COLLABORATIVE APPROACH FOR NASA EARTH SCIENCE DATA

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## 1. INTRODUCTION

Earth science research requires coordination and collaboration across multiple disparate science domains. Data systems that support this research are often as disparate as the disciplines that they support. These distinctions can create barriers limiting access to measurements, which could otherwise enable cross-discipline Earth science. NASA's Earth Observing System Data and Information System (EOSDIS) is continuing to bridge the gap between discipline-centric data systems with a coherent and transparent system of systems that offers up to date and engaging science related content, creates an active and immersive science user experience, and encourages the use of EOSDIS earth data and services. The new Earthdata Coherent Web (ECW) project encourages cohesiveness by combining existing websites, data and services into a unified website with a common look and feel, common tools and common processes. It includes cross-linking and cross-referencing across the Earthdata site and NASA's Distributed Active Archive Centers (DAAC), and by leveraging existing EOSDIS Cyber-infrastructure and Web Service technologies to foster re-use and to reduce barriers to discovering Earth science data (<http://earthdata.nasa.gov>).

## 2. BACKGROUND

EOSDIS pioneered the use of Internet technologies to link science users with science data and tools. Initial concepts for the system were conceived in the late 1980s and the system was developed during the infancy of the Internet in the 1990s [1]. As EOSDIS grew so to did technology advance, and websites and services multiplied to support such a large effort across multiple science domains and to connect specialized systems distributed across the United States. This widespread adoption of Internet technologies linked users to discipline specific data but also created a situation where all NASA data could not be found from a single location [2]. Until recently Earth science data users did not have a

single point of entry for all earth data related resources, rather they had to go to multiple EOSDIS websites and/or several DAACs to search for what they want or need. There was little to no common design, technologies, tools or functions as the users navigated through the plethora of Earth science data websites. Searches were localized and cross-linking and cross-referencing among the websites was sporadic. Users looking for Earth science data encountered stove piped DAACs and standalone websites with little to no integration, cohesiveness, common tools, or shared discovery interfaces. The development of a system capable of providing a single point of entry for all Earth science data related resources with a consistent look and feel, shared access controls, procedures and tools is essential. In order to better support integrated Earth science research activities (e.g. science, programmatic, mission, academia, etc.), NASA's Earth Science Data Systems need to be presented in a unified, seamless, integrative and cohesive manner. Leveraging new mature and emerging technologies [3] to achieve EOSDIS goals is another driver for change. Creating a coherent system of systems is imperative to support increasing demands and meet users' needs and NASA's goals (Figure 1).

### 3. APPROACH

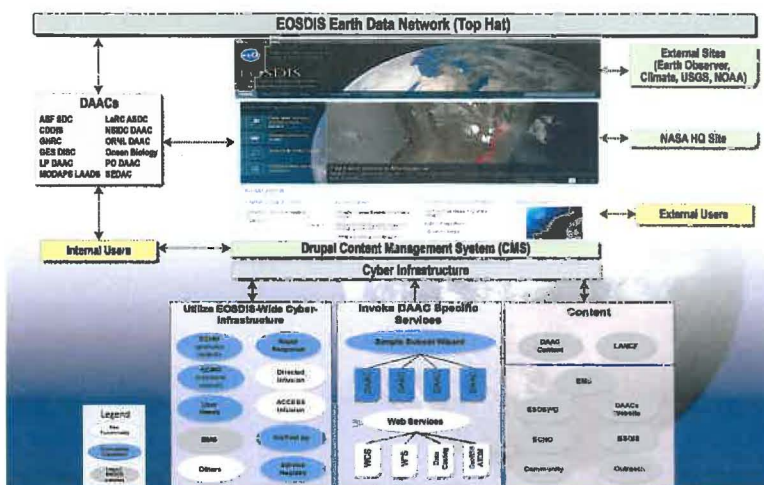
This paper describes the methodology for the evaluation and analysis of the Legacy EOSDIS Web services, presents results and describes proposed new system enhancements and architectures. Methods of analysis were: independent assessment of the existing web sites, technologies, capabilities and features; review of data artifacts and the current state; and formal and informal user feedback. As part of the formal user feedback, surveys were sent out to collect both visionary feedback and technical information.

Results from the analysis performed revealed the following key focus areas as high priority items that need to be addressed:

- *Discovery*: facilitate data and service discovery for end users.
- *Integration*: provide a true system of systems, where all the parts are unified and act and behave as one.
- *Usability*: provide an intuitive, successful, and memorable user experience.
- *Collaboration*: support internal and external users with common interests working together to achieve their goals.
- *Cohesiveness*: provide a unified systems that is logical, orderly and consistent throughout

- *Relationships*: build and maintain connections with Earth science data users; create relationships by adding value to users.
- *User Support*: address the needs of a broad set of users.
- *Tools*: provide adequate tools to support users' activities.
- *Performance/Metrics*: define, collect and analyze metrics to establish that the desired results are achieved.
- *EOSDIS Role*: provide leadership.
- *Reusability*: maximize re-use (of existing cyber infrastructure and/or new development) across the system to reduce costs.

The Earthdata Coherent Web (ECW) project approached each focus area by first defining goals. Second, identify system features that address the given focus area and satisfy the associated goals. Third, prepare high-level operations scenarios for some of the system features identified. In essence, the key focus areas are ECW high level requirements.



**Figure 1 Earthdata.nasa.gov model**

The new Earthdata website acts as a doorway into NASA's Earth science data resources, leveraging existing EOSDIS cyber-infrastructure, incorporating web services technologies and combining existing disparate websites through a unified Earthdata portal.

#### 4. REFERENCES

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