

Task 55 - CMR Governance and Operations Plan

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1. Introduction

1.1 Document Purpose and Scope

This Governance and Operations Plan describes the ongoing Governance and Operations Management of the NASA Common Metadata Repository (CMR). This Plan is a follow-on to the CMR Project Plan (Version 1.0; September 4, 2014), which defines the CMR project and describes its initial planning, development, and implementation. The CMR Project Plan calls for a CMR Operations Plan to be in place when the CMR is fully operational.

1.2 Approval and Revisions

Approval of this plan ratifies the ongoing Governance and Operations Management infrastructure of the CMR.

The ESDIS Project Manager will approve the CMR Operations and Governance Plan. The ESDIS CMR Dev/Ops Lead, with approval of the ESDIS Project Manager, will make revisions to the CMR Operations Plan as revisions are needed to improve the governance and operations of the CMR.

1.3 References

The following controlling documents may be used as additional references for CMR Operations:

- CMR Project Plan (Version 1.0, September 4, 2014)
- CMR Life-Cycle Document (Rev 1, 3 Feb 2015)
- Metadata Quality Review Life Cycle (Jan 2015)
- GCMD Keyword Governance and Community Guide Document (August 2016)
- Metadata Requirements - Base Reference for NASA Earth Science Data Products (423-RQMT-003)

1.4 Document Organization

Section 2 of this document provides an overview of the CMR, describing its mission, metadata standards and stakeholders. Section 3 describes CMR Governance decisions and decision-making authority. Section 4 provides descriptions of CMR Operations responsibilities, both in the ESDIS, in the contractor organizations and in provider and partner organizations. Section 5 describes key communication mechanisms used to support CMR Operations.

2. CMR Overview

2.1 CMR Description

The CMR is a high-performance, high-quality metadata repository for earth science metadata records. The CMR manages the evolution of NASA Earth Science metadata in a unified and consistent way by providing a central storage and access capability that streamlines current workflows while increasing overall metadata quality and anticipating future capabilities.

CMR is the authoritative source for NASA's EOSDIS metadata and provides a platform for other agencies and international users to submit their earth science metadata. CMR enforces consistency and quality of metadata through a structured quality assurance process. Metadata and associated services from the CMR are available and used by developers within and outside of EOSDIS to create tools and services for a variety of earth science data users.

The diagram below shows the CMR's architecture and external interfaces at a high level. As shown, the CMR is a system which has multiple ways for clients to access it ranging from legacy SOAP APIs to Standards based APIs to the most feature rich CMR REST APIs. The vast majority of CMR's search, ingest and curation clients utilize the CMR REST APIs. Inside, the CMR is comprised of micro-services, the GCMD Keyword Management System and various COTS products which work together to implement the full functionality of the CMR system.

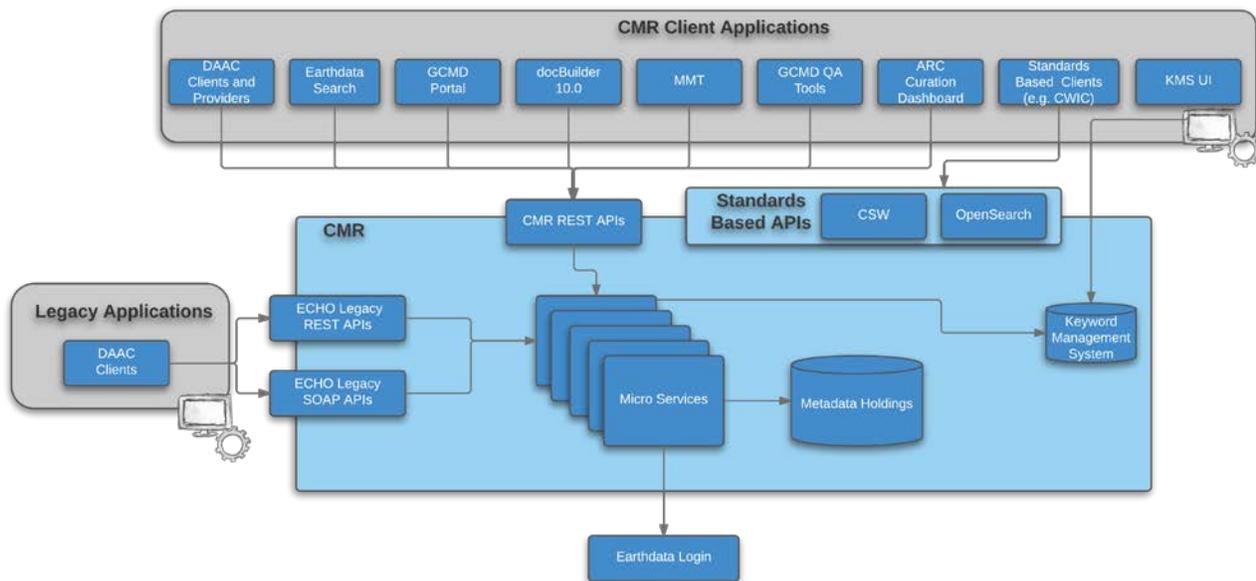


Figure 1 - CMR High Level Architecture

For the purposes of this plan, the Operations and Governance activities cover the backend CMR system, the Keyword Management System and associated UI, the Metadata Management Tool (MMT), the GCMD QA Tool suite and the underlying metadata standards and models which drive these applications.

2.2 CMR Metadata Standards

2.2.1 Supported Metadata Standards

CMR provides ingest, search and retrieval operations for Earth Science metadata records at the Concept level. Collections and granules are common metadata concepts in the Earth Observation (EO) world, but in CMR the number of concepts has been extended to include variables, services and eventually visualizations. The CMR metadata records are supplied by a diverse array of data providers, using a variety of supported metadata standards, including DIF 9, DIF 10, ECHO 10, UMM-S, UMM-C, UMM-Var, and ISO 19115-2 (SMAP/MENDS).

Initially, the designers of the CMR considered standardizing all CMR metadata to a single, interoperable metadata format - ISO 19115. However, NASA decided to continue supporting multiple metadata standards in the CMR to ensure the flexibility needed by the data provider community to convert legacy metadata systems so they could interoperate with ISO 19115. In order to continue supporting multiple metadata standards, NASA designed the Unified Metadata Model (UMM) to easily translate from one supported standard to another.

2.2.2 Unified Metadata Model (UMM)

The Unified Metadata Model has been developed by ESDIS to provide a cross-walk and mapping among CMR-supported metadata standards. Rather than create mappings from each CMR-supported metadata standard to each other, each standard is mapped centrally to the UMM model, thus reducing the number of translations required from $n \times (n-1)$ to $2n$.

A more complete discussion of UMM and its relationship to CMR can be found at [Unified Metadata Model](#). The Unified Metadata Model contains components for collections (UMM-C), granules (UMM-G), services (UMM-S) and Variables (UMM-Var)

2.3 CMR Organizational Structure, Roles, and Responsibilities

CMR Operations is governed and managed through the ESDIS and Contractor organizations and roles described in this section.

2.3.1 ESDIS

The ESDIS organization chart is shown below.

Earth Science Data and Information System (ESDIS) Project - Code 423

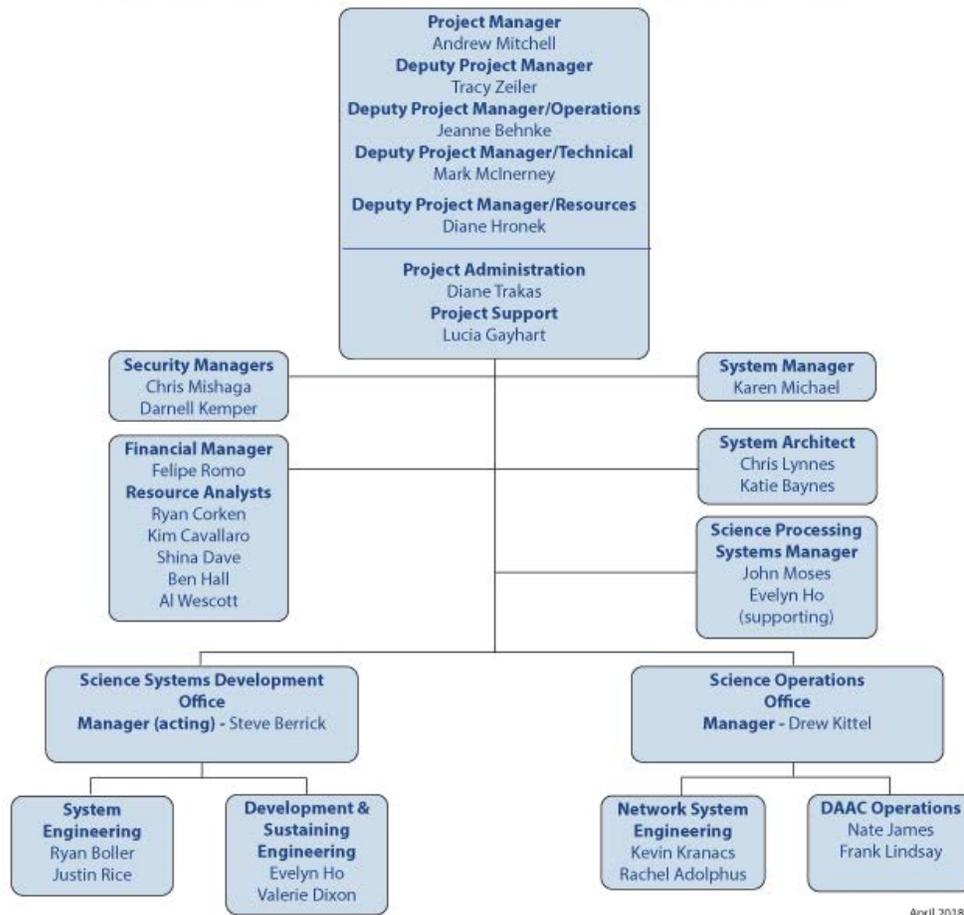


Figure 2 - ESDIS Project Organization Chart

The CMR Dev/Ops Lead is responsible for the overall development and operational activities related to the CMR. The System Architect and other members of the Science System Development Office organization assist the CMR Dev/Ops Lead in determining strategy and requirements for the system.

2.3.2 Contractor

NASA funds and manages contractor personnel who provide operational support to the CMR. Operational Roles and Responsibilities held by CMR contractor personnel are described below.

- **CMR Operations Lead** – Responsible for ensuring the CMR system meets its operational availability expectations, providing metrics to ESDIS regarding CMR availability and usage trends, and communicating outages to clients. Portions of

this role are delegated to various subsystems when appropriate, e.g. the Keyword Management System, MMT or QA Tool Suite.

- **CMR User Support Lead** – Responsible for responding to questions and problem reports entered by clients as well as collaborating with them to ensure they are able to quickly integrate with the CMR. Portions of this role are delegated to various subsystems when appropriate, e.g. the Keyword Management System, MMT or QA Tool Suite.
- **CMR Development Lead** – Responsible for implementing fixes to operational issues and implementing new features that are requested by providers and clients. Portions of this role are delegated to various subsystems when appropriate, e.g. the Keyword Management System, MMT or QA Tool Suite.
- **Metadata Curators** – These are science coordinators with subject-matter expertise who review CMR metadata records and recommend changes to the content of the records to improve the quality, consistency, and correctness of the metadata. The Analysis and Review of CMR (ARC) team and GCMD's Science Operations (SCIOPS) teams are the primary curators of CMR's metadata. The ARC team is primarily focused on curation of EOSDIS data providers while the SCIOPS team is primarily focused on the curation of the CEOS/IDN data providers.

2.4 Stakeholders

Stakeholders in CMR Operations are described below.

- **EOSDIS Data Providers and Affiliates** – The EOSDIS Data Providers (also known as Distributed Active Archive Centers (DAACs)) are custodians of EOSDIS mission data. They provide metadata descriptive of their data and services to the CMR. These providers supply collection, granule, variable and/or service metadata to the CMR. ESDIS funds and manages the operations of these data providers and affiliates.
- **Non-EOSDIS Data Providers (includes CEOS/IDN Data Providers)** – These are earth science data providers who are members of the CEOS International Directory Network (IDN) and who have contributed metadata to NASA's Global Change Master Directory (GCMD). They also include national and international data providers not associated with either EOSDIS or the IDN. They supply collection and service metadata to the CMR, but often do not supply granule metadata.
- **Client Partners** – Client Partners are those organizations who write and maintain clients which utilize the CMR APIs to search the CMR metadata holdings.

- **NASA IT Security (ESOIC)** – This is the NASA team responsible for overseeing security policies and procedures.
- **EOSDIS DAAC User Services** – This is the organization at each EOSDIS DAAC which is responsible for providing support to users of that DAAC’s earth science data.
- **NASA Earth Science Teams** – Earth Science Teams provide technical and scientific input to NASA and partner organizations to help ensure the success of missions, while providing science support on issues including data acquisition, product access and format, and science and applications opportunities.
- **EOSDIS System Components (e.g., GIBS, Earthdata Login, Worldview)** – These are separate EOSDIS systems which interact with the CMR and facilitate related functionality such as data visualizations (GIBS), communications (Worldview), and user authentication (Earthdata Login).
- **Metadata Standards Groups** – These are groups who advocate for standards support and adoption. They include ISO, the CEOS IDN Interoperability Forum, ESDSWG working groups and ESIP clusters.
- **End Users** – These are any user interacting directly with a CMR interface such as the Metadata Management Tool (MMT), GCMD Search and Discovery tools, GCMD portals, the Analysis and Review of CMR (ARC) Team, and docBuilder.

3. CMR Governance

Governance is the strategic task of setting the CMR goals, directions, limitations, and accountability frameworks. Governance decisions determine the nature of the CMR and what it should become.

3.1 CMR Governance Decisions

In order to guide the future direction of the CMR, the CMR Dev/Ops Lead is responsible for addressing the governance decisions below at a minimum annually. CMR Governance decisions include:

Which data providers will participate in the CMR?

This topic includes outreach, the application process, the approval process, the onboarding process, training, and operating agreements.

Which client partners will participate in the CMR?

This topic includes outreach, the application process, the approval process, the onboarding process, training, and operating agreements.

Which technologies will be incorporated into the CMR?

This topic includes technologies for data storage, search and retrieval. Technology refresh schedules and policies are also included in this topic.

Which metadata standards and models will be supported in the CMR?

See Section 2.2 for the current list of CMR metadata standards.

Which quality standards and rubrics will be used for CMR metadata, and how will metadata quality be enforced and measured?

See Section 4.2 for a description of CMR Metadata Curation

Which metrics will be reported against the CMR?

See Section 4.1.1 for the current list of CMR metrics.

How should the Earth Science Data community be engaged with CMR usage? (outreach)

This topic includes determining conference presence, outreach strategy and implementation, review of outreach materials, and outreach metrics.

What are the interoperability relationships/requirements with other U.S. government or international systems?

This topic includes requirements imposed by OMB, IDN, CEOS or other international organizations of which NASA is a member.

3.2 CMR Governance Decision Criteria

CMR Governance decisions are made based upon the following criteria:

- Alignment with NASA Strategic Goals
- Alignment with CMR Strategic Goals and Guiding Principles
- Benefit to Stakeholders
- Feasibility
- Affordability

3.3 CMR Governance Decision-Making Authority

The CMR Dev/Ops Lead is the **primary governance decision maker**, however, advice in the decision making process is sought from several different organizations.

3.3.1 ESDIS Organization

The CMR Dev/Ops Lead solicits advice on governance issues from the ESDIS Project Manager, the ESDIS Architects, contractors and from other members of the ESDIS CMR Project organization via meetings and other communications.

The ESDIS Standards Organization (ESO) provides advice to the CMR Dev/Ops Lead on standards-related topics. ESO also has approval authority for reviews of CMR standards including the UMM documents.

3.3.2 Partners

The CMR Dev/Ops Lead solicits advice on governance issues from CMR data providers and client partners via the technical communications channels discussed in Section 5.0.

3.3.3 Earth Science Organizations

The CMR Dev/Ops Lead may solicit advice on governance questions through ESDIS membership in Earthdata organizations and associated communications channels such as conference presentations. These Earthdata organizations include:

- Earth Science Data System Working Groups (ESDSWG). ESDSWG is a NASA organization comprised of working groups organized around key technology and information system issues. ESDSWG working groups are organized annually, and make recommendations to ESDIS for decision-making and prioritization purposes.
- Federation of Earth Science Information Partners (ESIP). ESIP is an external organization of earth science information organizations, of which NASA Goddard Space Flight Center is a member. ESIP provides recommendations, guidelines and best practices to NASA via semi-annual meetings, in which ESDIS and EOSDIS Data Providers participate.
- Committee on Earth Observation Satellites (CEOS) Working Group on Information Systems and Services (WGISS). WGISS promotes collaboration in the development of systems and services that manage and supply earth observatory data. NASA / ESDIS participates in semi-annual plenary meetings of WGISS.

3.3.4 Metadata Standards and Membership in Standards Organizations

The CMR Dev/Ops Lead may solicit advice on metadata standards-related questions through ESDIS membership in standards organizations and the associated communications channels.

CMR supported metadata standards are maintained by the following organizations:

- ESDIS maintains the DIF, SERF, ECHO 10, and UMM metadata standards.
- The International Standards Organization (ISO) maintains the ISO metadata standards, though ESDIS maintains the specific standards contained within 19115-x (SMAP/MENDS).

ESDIS is also a member of the Federal Geographic Data Committee (FGDC) and the Open Geospatial Consortium (OGC).

4. CMR Operations

CMR Operations is comprised of four distinct yet highly related functions. The first is the operational oversight of the day-to-day operations of the CMR. This function of operations is traditionally handled by the main CMR contractor. The second is the curation function which ensures the metadata in the CMR are complete and accurate. This function is provided by the CMR contractor and other curation groups. The third key function of operations is the operational activities of data providers. This function is performed in part by the main CMR contractor, but is more widely performed by multiple stakeholder groups. The final function is the operational activities of the client partners. These four functions are addressed in detail in the sections below.

4.1 CMR Operational Oversight Activities

Day-to-Day Operation of the CMR includes the following activities:

4.1.1 System Monitoring

The CMR operational systems are built to have full redundancy and are monitored 24/7 through Uptrends and Nagios monitoring. Alerts are responded to in accordance with the agreed upon level of operational support.

CMR availability and performance are monitored manually and through instrumented tools such as Splunk. Metrics are collected and reported to both ESDIS during status meetings and providers during Unified Technical Committee (UTC) meetings. Reported metrics include:

- System performance
 - Elapsed time from ingest submission until publicly available
 - Search response time (at API level) (average query performance)
- System availability
 - Uptime
- Provider Holdings
 - Number and list of data providers
 - Number of datasets, by data provider
 - Number of granules per provider
 - Total amount of data ingested per provider
 - Frequency of ingest requests by provider
- Service Levels
 - Average time to resolve a trouble ticket
- Interoperability
 - Number and list of registered clients
 - Number and list of APIs
- Usage
 - Total CMR queries
 - Ingest Volume
- Metadata Quality
 - Number of non-compliant records, by provider

- Relevancy Effectiveness

4.1.2 Operations Support

Requirements for hours and level of attended operations of CMR operational and partner test servers are defined in the Statement of Work (SOW) for the Common Metadata Repository tasks on the EED2 contract (Task 5, Task 25 and Task 35).

4.1.3 Trouble Reporting Tools

The following Trouble Reporting tools are maintained and available to support the CMR Trouble Reporting Process:

- **JIRA Service Desk** – Used for CMR Partner Trouble Reports. Issues entered here will be escalated to the development teams if the User Support representative is unable to address the issue.
- **Kayako** – Used for End User Trouble Reports. Issues entered here will be escalated to the appropriate development teams if the User Support representative is unable to address the issue.
- **JIRA** – Used for development teams to work tickets. Due to licensing constraints, the development team projects in JIRA are not open to all end-users, however providers who engage regularly with the CMR are able to receive access directly to the development team’s projects to ease communications between the teams.

CMR user interfaces are strongly encouraged to have Feedback buttons so that users may report problems and concerns to CMR User Support via the Kayako tool.

Tickets are evaluated by the Earthdata Review Board process. The ERB evaluates each ticket for technical feasibility, value added, cost to develop, and priority. Tickets are either rejected with explanation, held for additional research, or accepted into the product backlog.

4.1.4 CMR Operations Decisions

CMR Operations decisions include:

- Continuous
 - New requirements/user stories
 - Prioritization of trouble tickets
 - Sprint planning
 - PI planning
 - Hardware and COTS upgrades
- Discrete
 - Service level requirements
 - RMA requirements
 - How to communicate with stakeholders
 - Website structure and content
 - Wiki structure and content

The CMR Dev/Ops Lead is the **primary operations decision maker, with advice** from the main CMR contractor team, ESO, and the CMR SE group.

4.1.5 Testing and roll-out of upgrades to CMR software

As enhancements are made to the CMR system, part of Operations is to deploy and test the enhancement software. CMR deployments are controlled via Bamboo, which ensures that only personnel with appropriate permissions can deploy to any given environment. Bamboo also ensures that compliance checks, such as security scans and registrations, are completed prior to deployment. Upon deployment, CMR software is tested in the SIT, UAT, and finally the Operations environment to reduce the risk of bugs impacting end users.

4.2 CMR Metadata Curation and Evolution

Metadata inside of the CMR is rarely static as it continues to be updated over the life of the CMR. Two key factors drive the updates: metadata curation and standards evolution.

4.2.1 Metadata Curation

In order to ensure that the metadata in the CMR is complete, accurate and at the right level of detail, Metadata Curators periodically review metadata in the CMR. This review includes both automated compliance checks as well as manual human validation by earth scientists. After metadata has been reviewed, findings are reported to the provider and it is then part of the data provider's operational responsibilities to update their metadata to fix critical issues. Once metadata is fixed by the provider, the Metadata Curators re-validate the metadata to ensure critical issues have been resolved.

4.2.2 Metadata Standards Evolution

As new missions launch and Earth science needs grow, the metadata required to enable Earth science also evolves. Accordingly, the CMR supported standards and the UMM model itself continue to change. Since changes to metadata standards can cause cascading impacts on the metadata already inside of the CMR and on the data provider metadata generation systems, changes to the UMM and standards are controlled more tightly than other changes in the CMR. The steps below represent the high level change management cycle for the CMR metadata standards.

1. Solicit requests for changes from the data provider and client partner communities
2. Identify the highest priority requests and propose to the community a version of UMM and/or the standards in which the fixes will be released, along with a tentative release date

3. Update the UMM and/or standards and review the updates with the community. This step requires an ESDIS Standards Office (ESO) formal review if the changes could potentially break any provider or client. Since the ESO reviews include a large audience, these reviews take longer to complete and should be used for updates which could break providers or clients.
4. Implement the updated UMM and/or standards in the CMR, MMT, ARC Curation Dashboard and GCMD QA Tools
5. Generate reports on non-compliant metadata and send to providers
6. Providers work with ESDIS to identify completion data for required metadata changes

Additionally, new missions and science needs can drive evolution of the GCMD Keywords. These too can be breaking changes for providers, thus requiring a more formal control cycle. Details of the GCMD Keyword control cycle can be found here: [Keywords Governance and Community Guide](#)

4.3 CMR Data Provider Operational Activities

This section provides an overview of the interactions between Data Providers and the CMR system. The primary interactions described here include the initial on-boarding process and the subsequent curation operations for maintaining and updating the information provided to the CMR system.

A more detailed description of the information in this section can be found in the [Onboarding Process for a New Provider](#) and in the [CMR Data Partner User Guide](#).

4.3.1 On-Boarding

A high-level view of the Data Provider on-boarding process is shown in the Figure below. The onboarding process is organized into three phases: Discovery, Registration, and Generating Compliant Metadata.

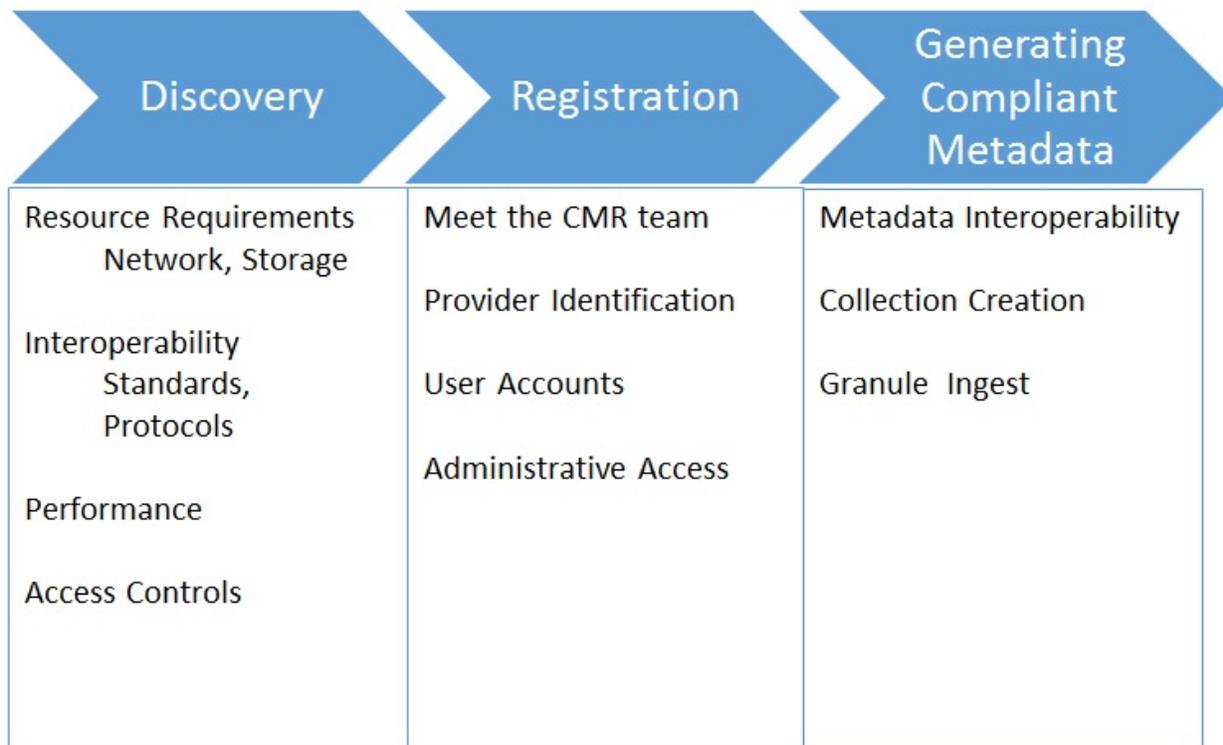


Figure 3 - Data Provider On-Boarding Steps

The Discovery phase is primarily conducted between the Data Provider and ESDIS engineering staff, with support from the CMR operations team as required. The discovery process gives the Data Provider a detailed understanding of their responsibilities and gives ESDIS and the CMR team an understanding of the resource and performance requirements expected of the CMR. The Discovery phase is focused on the following categories:

- **Resource Requirements** - Determines the initial metadata sizing, anticipated growth rates, processing requirements, as well as expected network throughput requirements.
- **Interoperability Standards & Protocols** - Data is represented in the CMR through implementation of the Unified Metadata Model (UMM) which is used by the CMR to drive search and retrieval of metadata. Data providers must ingest metadata into the CMR in one of the supported standards including UMM-JSON, DIF, ECHO-10, and several flavors of ISO 19115. During the Discovery Process data providers will learn how to format and ingest metadata into the CMR system.
- **Performance** - The expected performance impact on CMR will be estimated by combining expected ingest rates, metadata volumes, and anticipated user interest rates. This provides an understanding of any CMR modifications, cloud cost implications or extensions that will be needed to support the provider.
- **Security** - Any required constraints that will limit access to the data, ensure the accuracy of the data, or affect the reliable access to the data, must be discussed

with the CMR team to ensure that the CMR has sufficient controls to ensure the accurate delivery of the data to properly authorized people. While enhancements to the CMR are occasionally required to support specific needs of the data producer, most data products can easily be accommodated.

The Registration phase gives the CMR operations team a detailed understanding of the new provider's metadata requirements. The CMR operations team will also provide the credentials needed for the provider to access CMR systems. The Registration phase is focused on these activities:

- **Meet the CMR OPS Team** - The first step in becoming a Data Provider is to meet with the CMR Operations Team so they can understand the expected metadata volume, characteristics, delivery mechanism, frequency, and relationship to the study of Earth science; as well as contact information and availability of the new provider. This information permits the CMR team to properly prepare the CMR.
- **Provider Identification** -- Providers will need to choose a unique name to serve as your provider's identification throughout the CMR system. This name becomes the registered identifier for the provider to access the CMR API and metadata reports as well as accessing CMR related tools such as the Metadata Management Tool (MMT).
- **User Accounts and Administrative Access** -- The CMR Operations Team will request an initial list of individuals who are to be granted administrator access to the CMR data provider. Anyone granted administrative access must have an Earthdata Login account which can be obtained at <http://urs.earthdata.nasa.gov>. Please be prepared to supply the Earthdata Login user IDs for the people requiring access. In order to ingest new metadata or update existing metadata, users will need a valid Launchpad login.

The Generating Compliant Metadata phase allows the Data Provider to work with the CMR Team to ensure that their metadata is generated in a format that is compliant with a CMR supported specification (e.g. DIF-10) and then ingested into the CMR system. CMR provides a stable test environment to serve the needs of the provider in exercising the metadata ingest process. See Appendix A for a description of the test environments. The Generating phase is focused on these activities:

- **Metadata Interoperability** - The first step in generating compliant metadata is selecting the standard or specification that will be used to represent the data. The CMR supports several metadata formats that can be used to ingest metadata. New Data Providers should examine the list of supported formats and select the most appropriate format based upon their internal metadata representations. Some Data Providers will need to reformat their internal metadata into one of the CMR supported formats before the metadata can be ingested into the CMR.
- **Collection Creation** - Collection metadata can be entered in the Metadata Management Tool ([MMT](#)) or can be ingested via the [CMR API](#). Either mechanism provides validation of the Collection metadata, but the MMT provides

a user friendly interface to exploring, entering, and validating the collection metadata. The CMR API is a programmatic interface and is more suitable for automated ingest of metadata. The CMR ensures that metadata received from a provider is compliant with the standard which the provider is using. Metadata that does not comply with the standard will not be able to be ingested into the CMR.

- **Granule Ingest** - Metadata for test granules should be validated by ingesting the metadata using the CMR API. The API is constructed for high-volume and high-performance ingest.

4.3.2 On-Going Operations

Data Providers have multiple on-going responsibilities once they have completed onboarding as an operational provider:

Metadata Maintenance – This activity involves the continual maintenance of metadata including updating metadata in response to science team requests, Metadata Curator findings or evolving metadata standards. Data Providers will work with ESDIS to assess the required response time for implementing metadata changes to fulfill these requests. While the CMR system aims to make it as simple as possible for providers to update metadata, the responsibility to actually make the updates lies solely on the metadata providers since they are the owners of the metadata.

Testing of New Releases – The CMR delivers new software frequently so as to quickly respond to stakeholder needs. To enable Data Provider testing, the new software release is available in the User Acceptance Test (UAT) environment for 2 weeks prior to the release being deployed to the Operational system. Data Providers are expected to either manually validate the CMR build against their own needs or to run their own test systems connected to the CMR's UAT environment to flush out any potential problems with a build. Problems discovered in UAT should be reported via Kayako, Service Desk, JIRA or by directly reaching out to the CMR Operations team. Since each data provider uses the CMR slightly differently, working together with the CMR team in the UAT environment can help to ensure that no bugs are inadvertently introduced into the Operational environment.

Attendance at Unified Technical Committee (UTC) – The UTC is a bi-weekly telecon where the Data Providers are briefed regarding upcoming CMR changes and operational metrics in addition to changes to other ESDIS systems. The meeting also serves as an opportunity for Data Providers to ask questions of the CMR team.

Trouble Reporting – Data Providers are expected to raise problems to the CMR team via the methods identified in Section 4.1.3. In addition, should a problem be reported to the CMR which is actually a problem in the underlying metadata,

Data Providers are expected to correct the problem in a timely manner to ensure that a positive end-user experience on CMR's clients.

4.4 CMR Client Partner Operational Activities

This section provides an overview of the interactions between Client Partners and the CMR. The primary interactions described here include the initial on-boarding process, and the subsequent period of co-operations with CMR.

A more detailed description of the information in this section can be found in the [CMR Client Partner User Guide](#).

4.4.1 On-Boarding

A high-level view of the Client Partner on-boarding process is shown in the figure below. The onboarding process is organized into 3 phases: Registration, Searching for Metadata, and Accessing Data.

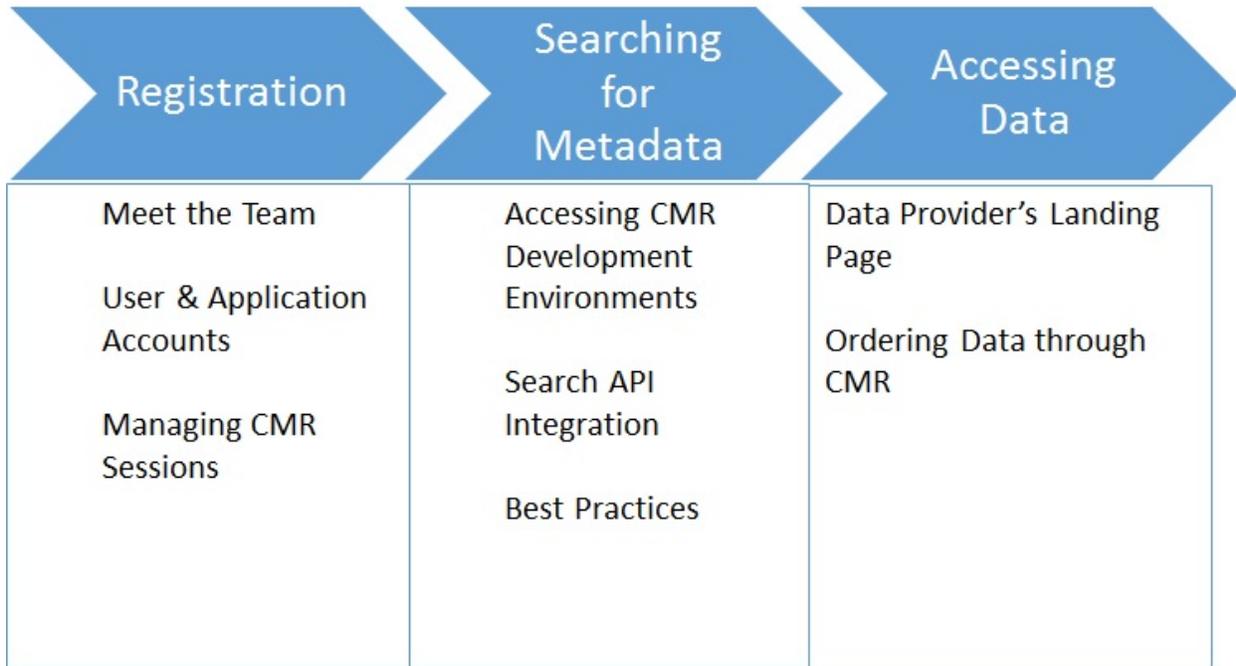


Figure 4 - Client Partner On-Boarding Steps

The Registration phase gives the CMR operations team an understanding of the new client's needs and will provide the Client Partner with access to CMR systems and information. The Registration phase is focused on these activities:

- **Meet the Team** - The first step in becoming a Client Partner is to meet with the CMR team so they can understand the Client's expected use of CMR capabilities and provide guidance for successfully integrating with the CMR.

- **User & Application Accounts** - User accounts are employed to enable access to restricted data, manage privileges, and/or to interact with other services and tools provided by the CMR. User accounts for the CMR system are created and managed by the Earthdata Login system. Clients that are part of a Data Provider group or other team should contact their team administrator to set up permissions to access their restricted data.
- **Managing CMR Sessions** - Tokens are used by the CMR to validate both the requester and their privileges for each request message submitted to CMR. For most searches, a token is not needed because the metadata records are unrestricted and accessible by anyone. However, when specific metadata records are restricted, privileged users require a token to see and access those records. See the [CMR Client Partner User Guide](#) for details on creating and using tokens.

The Searching for Metadata phase gives the Client Partner access to the CMR Search API to find and retrieve metadata for collections, granules and services. This phase is focused on the following activities:

- **Accessing CMR Development Environments** - CMR provides several test environments that are accessible by Client Partners. The list of environments and their uses is described in Appendix A - CMR Environments.
- **Search API Integration** - During the search API integration activity, the Client's application will be modified to use the [CMR Search API](#) to find and retrieve the specific metadata that is needed for the application.
- **Understanding Best Practices** - The CMR Team provides feedback on best practices for enhancing the speed and efficiency of the Client's queries through the CMR API. Client Partners should spend the time to understand how these practices can improve the performance of their applications.

The Accessing Data phase provides the ability for the Client's application to directly access the science data that was discovered by the search API. There are two mechanisms that may be used for accessing the science data. The Accessing Data phase is focused on these activities:

- **Accessing Data through the Data Provider's Landing Page** - Some Data Providers create a landing page that can be found in the collection or granule metadata that is retrieved from the Search API. Client applications that wish to use the landing pages must provide a mechanism for their users to reach the landing page so they can follow the provider's instructions for data retrieval.
- **Accessing Data through the CMR** - Some Data Providers allow client applications to order data through the CMR API. This allows the Client application to create a seamless search and order interaction with the CMR without directly exposing their user to the CMR or Data Provider user interfaces. Additionally, other Data Providers supply references to Data Services, such as OPeNDAP or WCS in their metadata which could be accessed directly by the Client application.

4.4.2 CMR Client Partner Operational Activities

Client Partners have several key on-going responsibilities once they have completed onboarding as an operational provider:

Testing of New Releases – The CMR delivers new software frequently so as to quickly respond to stakeholder needs. To enable Client Partner testing, the new software release is available in the User Acceptance Test (UAT) environment for 2 weeks prior to the release being deployed to the Operational system. Client Partners are expected to either manually validate the CMR build against their own needs or to run their own test systems connected to the CMR's UAT environment to flush out any potential problems with a build. Problems discovered in UAT should be reported via Kayako, Service Desk, JIRA or directly reaching out to the CMR Operations team. Since each client uses the CMR slightly differently, working together with the CMR team in the UAT environment can help to ensure that no bugs are inadvertently introduced into the Operational environment.

Notifications – The CMR uses the Earthdata Status App to post outage information. Clients who are integrating with the CMR should strongly consider subscribing to the CMR notifications in the Earthdata Status App and displaying them to the Client's end users. This will ensure that end users are aware of potential problems ahead of time.

Attendance at Unified Technical Committee (UTC) – The UTC is a bi-weekly telecon where the Client Partners are briefed regarding upcoming CMR changes and operational metrics in addition to changes to other ESDIS systems. The meeting also serves as an opportunity for Client Partners to ask questions of the CMR team. Attendance is not mandatory for Client Partners, but can reduce potential operational problems and allow Clients to make use of new features.

Trouble Reporting – Client Partners are expected to raise problems to the CMR team via the methods identified in Section 4.1.3.

5. CMR Technical Communications

5.1 General

General information for CMR stakeholders is posted on the CMR static websites, the Earthdata Development Portal and on the CMR wiki pages.

Outages, system maintenance, and operations schedule are posted in banners on CMR user interfaces such as the MMT as well as on any application which is registered to receive CMR notifications in the Earthdata Status App.

The CMR Operations team maintains a CMR status mailing list, to which any CMR stakeholder may subscribe. This email list is also used to announce outages or major CMR enhancements which may impact providers. Processes for notification of planned maintenance and unplanned outages are defined on the Earthdata Operations wiki.

5.2 With Providers

ESDIS and CMR contract personnel communicate with CMR metadata providers through a #Curation and #cmr Slack channel. Additionally, there is a [CMR Developer's Forum](#) and [Keywords Forum](#) where technical questions can be addressed.

CEOS / IDN metadata providers are kept informed of CMR status and updates through presentations at CEOS WGISS meetings and articles in CEOS IDN newsletters.

EOSDIS Data Providers and Affiliates participate in bi-weekly Unified Technical Committee telecons, where CMR status information is presented by the CMR team. Several EOSDIS Data Providers and Affiliates also participate in daily Problem Review Boards with the CMR team, where reported problems are reviewed and prioritized.

CMR Metadata Curators communicate directly with CMR metadata providers as needed to resolve metadata content and quality issues.

Any deprecation or breaking change of existing APIs must be accompanied by a light weight communication plan which is approved by the CMR Dev/Ops lead to ensure that all applicable parties are notified with sufficient time.

5.3 With EOSDIS System Components (e.g., GIBS, Worldview, Earthdata Login)

EOSDIS System Components that interface with the CMR participate in bi-weekly Unified Technical Committee telecons, where CMR status information is presented by the CMR team.

These systems are directly impacted by interface changes made to the CMR and must be included in reviews of any interface changes.

5.4 With End Users

End users are periodically surveyed in order to understand how CMR can better meet end user needs. This is aided by the DAAC User Services Working Groups which provide feedback to ESDIS. End users also have the opportunity to submit feedback on the CMR at any time using the Feedback tab in any CMR user interface.

5.5 With ESDIS

CMR contractors fulfilling Operations Support, Development Support, or Metadata Curation roles communicate status, schedule and issue resolution information to ESDIS at least monthly. The exact format of these communications is contract specific.

Appendix A - CMR Environments (OPS, UAT, SIT)

Three CMR systems are accessible by Client Partners: CMR Operations, CMR UAT and CMR SIT. Each of these systems is briefly described below. For additional information, click on the associated link.

- [CMR Operations](#) - The CMR Operations environment is a publicly accessible environment that houses the production data. The Data Holdings within this system include Earth Science data that has been made available to the Earth Science Community by the CMR Data Providers. This environment is monitored 24/7, updated with enhancements and fixes on a bi-weekly cycle, and experiences virtually no down time.
- [CMR UAT](#) (User Acceptance Test) - The UAT environment provides a stable test system to serve the needs of the CMR Data, Client, and Service Partners. The Data Holdings within this system consist of whatever the CMR's Data Providers have made available for their own testing purposes. Any enhancements and fixes that are planned for the Operations Environment are installed in this environment two weeks prior to operations delivery. CMR Partners are encouraged to verify the capabilities when a new release is installed.
- [CMR SIT](#) (System Integration Test) The SIT system was established in order to facilitate an exchange of ideas and provide an initial testing ground for upcoming capabilities. It is the key test environment for the CMR development team. There is often very little metadata available in this test environment, but it is fully functional. The next operational version is released into this system approximately 1 month before its schedule Operational release date.

Appendix B – CMR Life Cycle Process Overview

The CMR Life Cycle Process begins with proposed recommendations for changes, additions, deprecations, or deletions to any element of the CMR. Once submitted, change requests are entered into a tracking system where they are evaluated in terms of benefits and cost, and impact assessments are documented. The proposed changes that are determined to be beneficial to the user community or improve the CMR system are then implemented and the approval status of the request is communicated to the requestor and all stakeholders. In cases of significant, non-routine changes where an ESO review is required, request and approval status will be posted on the ESO-CMR Reviews webpage (<https://earthdata.nasa.gov/about/esdis-project/esdis-standards-office-eso/eso-cmr-reviews>) and is also likely to be documented on the Wiki.

B.1 Types of Change Requests

Submitted requests can be generally classified as:

- **New** - Requests for something new to be added in a CMR element
- **Modify** - Requests for modifying something existing in a CMR element
- **Deprecate** - Requests to have something existing in a CMR element deprecated
- **Delete** - Requests to have something existing or deprecated in a CMR element removed

B.2 Change Request Process Time Frame

While every effort will be made to acknowledge and evaluate all submitted change requests in a timely manner, it should be noted that evaluation and review of complex changes or those with significant impact (e.g. a new UMM concept) may require lengthier evaluations and reviews. Major changes will be implemented several times a year and minor ones within a shorter time frame; every change will be identified with a new major or minor release number along with release notes detailing the changes that have been made.

Requests for the addition of some GCMD Keywords (e.g. instrument, platform, organization) are considered routine and will undergo a streamlined process with quick turn-around and limited review (as documented in the Keyword Governance and Community Guide document, https://cdn.earthdata.nasa.gov/conduit/upload/5182/KeywordsCommunityGuide_Baseline_v1_SIGNED_FINAL.pdf). Urgency will be determined based on the impact assessment of the proposed change.

B.3 Levels of Control

Different types of CMR system documentation require different levels of configuration management. These documents can be categorized as follows:

- **HIGH** – Requirements or documents about stakeholders or interfaces (e.g. ADURD, OA) are controlled in the ESDIS COMET system and require the ESDIS Configuration Change Request (CCR) process to be followed, as per ESDIS CM Procedures (423-PG-1410.2.1)
- **MEDIUM** – Schemas, APIs, code, and other documentation that is not controlled in COMET but needs strict Configuration Management (CM) is handled by the CMR subcontractor (e.g. by utilizing a CM tool such as Jama). Current processes are governed by contractor configuration management.
- **LOW** – Best practices, guides, and descriptive documentation that drives no impacts to the system or stakeholders is kept in the Earthdata website, Wiki, or Developer Portal (as appropriate) and does not have any additional change management process governing updates

B.4 Applicability

The life-cycle defined in this document applies to all elements of the CMR. Below are some examples of major elements that undergo periodic review and revision and the levels of control at which they are managed:

<i>Expected Elements</i>	<i>Level of Control</i>
<i>Unified Metadata Models (for Collections, Granules, Common Parameters, Variables, Services)</i>	<i>High</i>
<i>Requirements and Interface documentation</i>	<i>High</i>
<i>Best Practices/Guidance (e.g. Metadata QA/Curation Guide, etc.)</i>	<i>Low</i>
GCMD Keywords	Medium
CMR system components/code (e.g. MMT, CMR API, IDN, etc.)	Medium

Acronyms

API	Application Programming Interface
ARC	Analysis and Review of CMR
CEOS	Committee on Earth Observation Satellites
CMR	Common Metadata Repository
DAAC	Distributed Active Archive Center
DIF	Directory Interchange Format
ECHO	Earth Observing System (EOS) Clearing House
EDSC	Earthdata Search Client
EED	EOSDIS Evolution and Development
EMFD	EOSDIS Metadata Format Depot
EMS	ESDIS Metrics System
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System
ESDSWG	Earth Science Data System Working Groups
ESIP	Earth Science Information Partners
ESO	ESDIS Standards Office
FGDC	Federal Geographic Data Committee
GCMD	Global Change Master Directory
IDN	International Directory Network
ISO	International Organization for Standardization
MMT	Metadata Management Tool
OGC	Open Geospatial Consortium
OPeNDAP	Open-source Project for a Network Data Access Protocol
SIT	Software Integration Test
UAT	User Acceptance Test
UMM	Unified Metadata Model
WCS	Web Coverage Service
WGISS	Working Group on Information Systems and Services