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*Consultative
Committee for
Space Data Systems*

REPORT CONCERNING SPACE
DATA SYSTEMS STANDARDS

**STANDARD FORMATTED
DATA UNITS —
CONTROL AUTHORITY
OPERATIONS**

CCSDS 630.02-G-1.4

PANEL 2

CHARTREUSE BOOK

ISSUE 1

REVISION 4

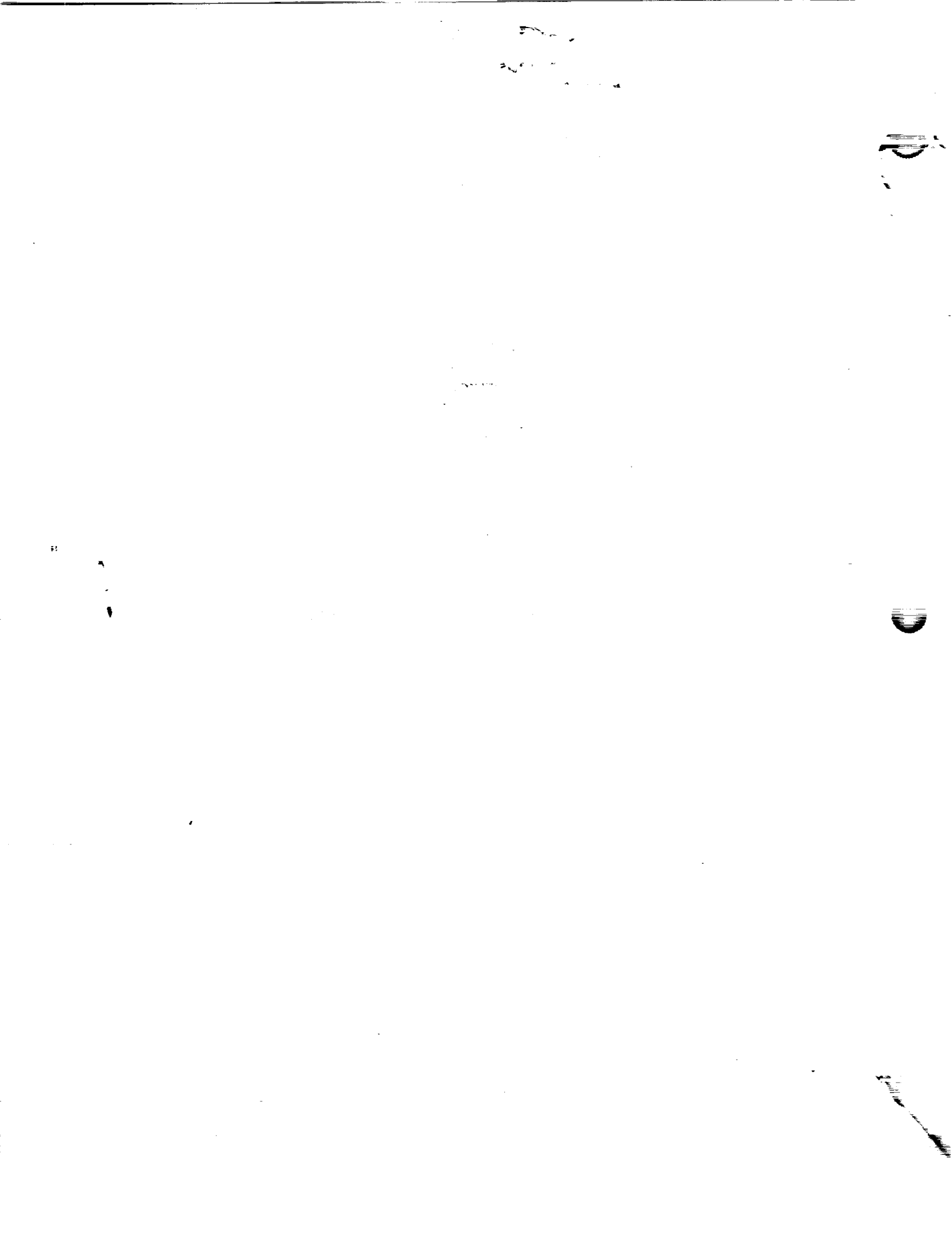
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FOREWORD

This Chartreuse Book is a companion book to reference [1] and contains rationale and explanatory material for the Recommendations therein. In the process of creating Member Agency standards, it should be used to justify and illustrate these concepts. Coordination among the Member Agencies is required to ensure that individual implementations conform to the SFDU structuring and data definition interchange standards specified in the applicable CCSDS Panel 2 approved Recommendation.

This document presents a description of possible Control Authority (CA) operations modeled on the CA Procedures Recommendation. CA operations are described in terms of the functions performed in the management and control of data descriptions (metadata). The document also illustrates a potential operational view of a CA through scenarios describing interaction between those organizations involved in collecting, controlling, and accessing registered metadata. The roles interacting with the CA are identified by their actions in requesting and in responding to requests for metadata, and with the information exchanged.

The scenarios and examples presented in this document are illustrative only. They could be supported by either a manual or automated system. These scenarios identify requirements for an automated system; these are expressed by identifying the information to be exchanged and the services that may be provided by a CA.

This Report serves a variety of readers. It is principally intended to aid in understanding the Control Authority Procedures Recommendation, CCSDS 630.00-R-1, now in Agency review as a Red Book. In addition, it will support two future Blue Books on Automated Registration and Dissemination Services.

This Chartreuse Book also serves as an example CA when establishing a MACAO, and will be used as the basis for a Control Authority Set Up Guide. Additionally, this Report can help users understand aspects of their interactions with a Control Authority. This information is expected to be the foundation for a future CA Services User's Guide.

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(When approved by the CCSDS, this document will carry a statement similar to the following:)

This Report reflects the consensus technical understanding of the Panel 2 members representing the following member Agencies of the Consultative Committee for Space Data Systems (CCSDS):

- British National Space Center (BNSC)/United Kingdom
- Canadian Space Agency/Canada
- Centre National D'Etudes Spatiales (CNES)/France
- Deutsche Forschungsanstalt fuer Luft und Raumfahrt e.V (DLR)/West Germany
- European Space Agency (ESA)/Europe
- ~~Indian Space Research Organization (ISRO)/India~~
- Instituto de Pesquisas Espaciais (INPE)/Brazil
- National Aeronautics and Space Administration (NASA)/USA
- National Space Development Agency of Japan (NASDA)/Japan

The following observer Agencies also concur with this Report:

- *Indian Space Research Organization (ISRO)/India*
- *Observers*
(WHEN THIS REPORT IS FINALIZED, THIS LIST WILL BE THE ACTUAL
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REFERENCES

- [1] "Standard Formatted Data Units - Control Authority Procedures", CCSDS 630.00-R-1, Red Book, September 1989, or later issue.
- [2] "Space Data Systems Operations with Standard Formatted Data Units: System and Implementation Aspects," CCSDS 610.0-G-5 Green Book, February 1987.
- [3] "*Standard Formatted Data Units - Structure and Construction Rules*", CCSDS 620.0-R-1.1 Red Book, September 1990, or later issue.

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1.0 DOCUMENT PURPOSE AND ORGANIZATION

1.1 PURPOSE

The purpose of this document is to illustrate a Control Authority's (CA) possible operation. The document is an interpretation and expansion of the concept found in the CA Procedures Recommendation. The CA is described in terms of the functions it performs for the management and control of data descriptions (metadata). Functions pertaining to the organization of Member Agency Control Authority Offices (MACAOs) (e.g., creating and disbanding) are not discussed. The document also provides an illustrative operational view of a CA through scenarios describing interaction between those roles involved in collecting, controlling, and accessing registered metadata. The roles interacting with the CA are identified by their actions in requesting and responding to requests for metadata, and *by the type of* with information exchanged.

The scenarios and examples presented in this document are illustrative only. They represent possible interactions supported by either a manual or automated system. These scenarios identify requirements for an automated system. These requirements are expressed by identifying the information to be exchanged and the services that may be provided by a CA *for that exchange*.

1.2 ORGANIZATION

Section 1 contains the purpose and organization of this document.

Section 2 presents descriptions of roles and the definitions of key terms. The roles *identify* define the types of organizational entities that interact with the CA. The definitions *identify* define the types of information exchanged between the CA and these other organizations.

Section 3 contains a discussion of Control Authority functions. These functions pertain *both* to the *mandatory* responsibilities the CA has *per reference [1]*, as well as *additional responsibilities deemed reasonable to operate a MACAO* and ~~the functions it can perform~~.

Section 4 contains scenarios of CA interaction with other organizational entities, ~~each~~. *The organizational entities are* defined by a role in Section 2.

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Annexes A and B respectively contain a list of acronyms and a glossary of key terms used in this document. Annex C contains a description of the capabilities needed by an organization to conduct Control Authority operations. Annex D contains an example of *the registration and dissemination process for a specific implementation of an automated control authority*. ~~Annex E defines the data entities stored and controlled at a MACAO.~~ Annex E F contains blanks of the forms presented in Section 4.0 of this document. ~~Annex F E defines the data entities stored and controlled at a MACAO.~~ Annex G contains descriptive scenarios of MDO ~~usage use~~ from a user (data producer) perspective.

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2.0 **DEFINITIONS**

This section provides descriptions of the roles involved in the control, registration, and access of data descriptions, as well as definitions of key terms. Figure 2.0-1 depicts the roles and the primary information they exchanged between them. Both *inter-MACAO administrative (required and local option)* and user interactions are portrayed. Section 2.1 *defines* ~~describes~~ the *relevant* roles and *their relevant* responsibilities, and Section 2.2 provides definitions of *the key terms representing the key information in the CA environment* ~~used in this document~~.

2.1 ROLES

This section defines the roles involved in the Control Authority operations including the CA itself. For the purposes of this document, the scope of the Control Authority is limited to Member Agency Control Authority Offices (i.e., exclusive of the CCSDS Secretariat and CA Agent).

2.1.1 *Member Agency Control Authority Office (MACAO)*

The organization responsible for the ~~The~~ functions of registering, archiving, and distributing data object descriptions upon request. ~~The organization responsible for these functions is a Member Agency Control Authority Office (MACAO).~~ A MACAO may be both a user of and supplier of CA functions. When an RP Originator or Requestor interacts with the MACAO, the MACAO is clearly a supplier. When two MACAOs are interacting, one is a user and the other a supplier. An example of a MACAO is the JPL Control Authority Office within NASA.

2.1.2 RP Originator

An individual or organization that prepares data object descriptions to be registered with a MACAO. The data object descriptions, or metadata, describe data being collected and used within the scientific community. An RP Originator may be a producer of the data objects, or acting to support producers of data objects. The distinction between the two roles is that the producer is responsible for the data, whereas the RP Originator is responsible for the metadata. An example of the producer/RP Originator distinction follows.

A Principal Investigator (PI) is responsible for a science instrument. The PI designs the instrument, collects scientific data, and archives the data. Therefore, the PI is the producer of the

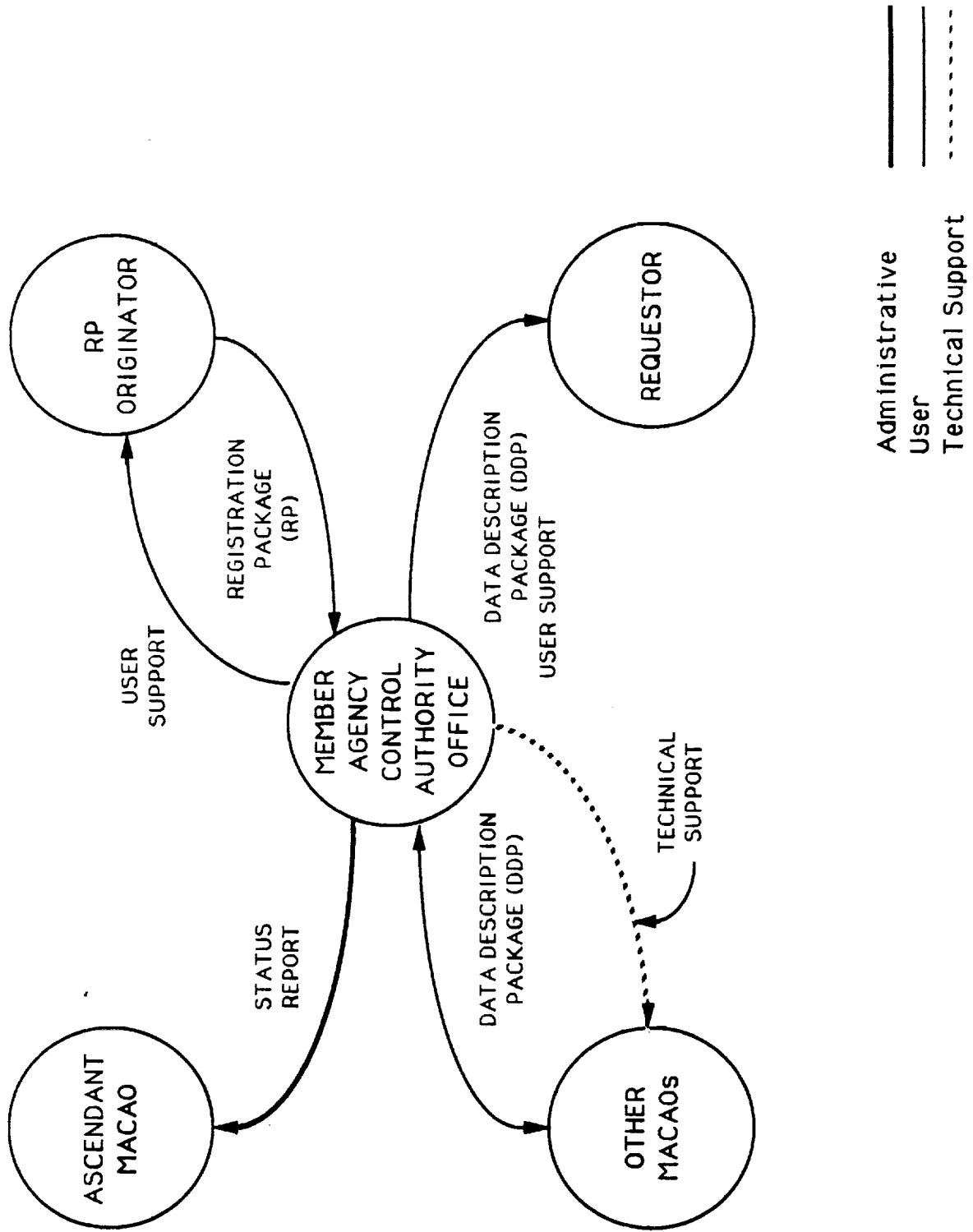


Figure 2.0-1. Control Authority Interaction

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data. The definition of how to interpret the data from the instrument is placed under the control of the MACAO, possibly by the PI or an associate acting as the RP Originator. The RP Originator is responsible for the definition of and registration of these metadata, and will be contacted by the MACAO should any issues arise.

Another example of the producer/RP Originator roles is: a researcher uses existing data objects initially collected (i.e., produced) by someone else to produce new data objects or information. The metadata objects describing this new data are then registered with a MACAO by this researcher acting as the RP Originator.

There are two variations on the RP Originator role that are derived from the nature of the metadata object (MDO) being registered. If the MDO is intended to describe a targeted set of data objects, the RP Originator has the responsibility of revising the MDO when the RP Originator determines that the MDO does not adequately describe the targeted set of data objects. The other variation occurs when the MDO being registered is intended for use by other data producers to create data objects that conform to that MDO. The RP Originator is providing metadata that may be referred to by many data objects unknown to the RP Originator; therefore he has responsibility for indicating that the metadata are not subject to changes.

Changes to the metadata may only be made by the RP Originator or other individual or organization that the RP Originator designates. This person or organization is called a Revising Authority, and is identified when the metadata are registered.

2.1.3 Requestor

An individual or organization that requests registered metadata from a MACAO. The Requestor may also be a consumer of data objects or acting in support of consumers of data objects. The distinction is that the consumer is concerned with the actual data whereas the Requestor is concerned with the metadata. An example of this distinction is a scientist (i.e., consumer) wanting to analyze a particular set or sets of data objects. The MACAO is contacted by the Requestor to acquire data descriptions (metadata objects) for the data objects of interest.

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2.1.4 Ascendant MACAO

The higher level organization to which a MACAO is responsible for its operation. The ascendant MACAO provides the authorization for the *descendant* MACAO, and defines the procedures the MACAO must follow. The ascendant MACAO also assumes the archiving and distribution responsibilities of any descendant MACAOs as necessary. An example of an ascendant MACAO is the primary MACAO for a *Member Agency member-agency*. For status reporting purposes, the CCSDS Secretariat and the CA Agent are also ascendant organizations, positioned at the top of the CA organization [Ref. 1]; however, they do not function as MACAOs as described in this Report.

2.2 KEY TERMS

This section provides a description of the primary information exchanged between the MACAO and its interfaces. Definitions (consistent with the P2 glossary) for ~~some of~~ these terms may be found in the glossary in Annex B. The descriptions in this section provide insight into the use and internal composition of the exchanged information.

2.2.1 Registration Package

A Registration Package (RP) is an instance of a data object description, that may refer to other registered data object descriptions, and that is intended to be registered with a MACAO. An RP Originator submits the RP to the MACAO as part of a registration request.

The RP is comprised of an Information Identification Metadata Object (II MDO) and one or more *descriptive* MDOs. *The II MDO provides high level information about the RP.* These ~~latter~~ *descriptive* MDOs will often be a data description record (DDR), a data entity dictionary (DED) or supplementary information. ~~However, some of the MDOs to be registered will be available for common use within other RPs. Therefore, any~~ Any given RP may *logically* incorporate previously registered MDOs by reference. A prominent example would be a widely used DED which is registered by itself, and is referenced by other RPs. When registered, the collection of MDOs contained in the RP are given *a single unique* an identifier called the Authority and Description Identifier (ADID).

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2.2.2 Data Description Package

A Data Description Package (DDP) is the assembled package of MDOs disseminated in response to a request for an MDO identified by a unique ADID. This may be structured in SFDU form. ~~single ADID~~. MDOs in the package may all have been registered together (i.e., included) and *only retrievable* ~~identified~~ by the single requested Authority and Description Identifier (ADID) of the *including MDO*, or they may be MDOs that are explicitly referenced by their ADIDs within the single (originally) requested MDO ~~ADID~~. Although an ADID is assigned to an RP when it is registered, a request, using that ADID as the key, is for an MDO. The reason for this is that some information in the RP will not be included in the DDP, since it has to do with the submission of the MDOs. It is the MDO (that is, the RP minus unnecessary administrative information) that is requested. Note that the entire package is itself called an MDO. ~~The DDP is an Standard Formatted Data Unit (SFDU) which contains one or more Description Data Units (DDUs).~~

In general, the MDOs of a DDP may be a DDR, a DED, or other related supplementary description information. The DDR is information which describes the producer's data object syntactically. The DED is information which provides the meaning (semantics) of data entities in the producer's data object. The related information may be other semantic information such as rules and constraints among data entities, aggregations of data entities, *test data metadata*, or external references such as contact information or publications. Construction of the DDP might require incorporation of MDOs which had been previously registered, and whose contents were not included in the RP having the ADID being requested. These Referenced MDOs may or may not be stored at the MACAO to whom the request was submitted. If the Referenced MDOs are not stored by the MACAO receiving the original request, communications between that MACAO and the one(s) at which the MDOs are stored will be necessary in order to completely fill the request. The information is exchanged as a DDP in SFDU form, composed of all the MDOs required. ~~Some of these MDOs will have been included (whether previously registered or not) in the original RP that forms the basis for this DDP, and others may only have been referenced from within this RP. (Note: Referenced MDOs are referenced by their ADIDs, and thus must have been previously registered.)~~ The MACAO provides the DDP to a Requestor to complete a successful request. The DDP contains all of the *relevant* information supplied by the RP Originator (i.e., the *description information and some of the identification information supplied by the RP Originator*) ~~when the metadata was registered, as well as plus~~ the MDOs which were referenced explicitly in the original RP and requested for inclusion by the Requestor. If any of the Referenced ~~referenced~~ MDOs

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themselves have *Referenced* ~~referenced~~ MDOs, the "references within references" will not be included in the DDP; those MDOs would have to be requested separately.

2.2.3 Status Reports

Status *reports* consists of ~~reports of the information registered~~ *registration* and ~~of~~ request activity *information* for each MACAO. Status *report* information is provided to an ascendant MACAO by each descendant MACAO according to procedures defined by the CCSDS *in reference [1]*. Reports ~~cover~~ topics *may include including*:

- a. Stored data
 - descriptive data for all registered MDOs*
- b. Registration activity
 - number of requests to register metadata
 - number of unfilled requests
 - number of RPs accepted (MACAO ADIDs assigned)*
 - number of MDO revisions made*
 - summary of MDOs registered**
- c. Requestor distribution activity
 - number of requests for registered metadata*
 - number of unfilled requests
 - number of DDPs generated (partial and complete)
 - number of DDPs distributed*
 - summary of widely-used MDOs**
- d. MACAO interchange
 - number of metadata requests from other MACAOs*
 - number of DDPs received per source MACAO
 - number of unfilled requests

* Required in the Annual Report by reference [1].

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~~2.2.4 MDO Exchanges~~

~~MDOs are exchanged between MACAOs in order that requests may be completely filled. A MACAO may receive a request for an MDO which references other registered MDOs which are not maintained by that MACAO, necessitating exchange of MDOs between MACAOs.~~

~~The information is exchanged as a DDP, composed of the MDO(s) needed.~~

2.2.4 Technical Support

With the exception of exchanges of MDOs (i.e., DDPs) described in Section 2.2.2, all interaction between MACAOs is a purely local option. The kinds of exchanges that may occur include: updates on changes in local procedures, lists of recently registered or revised MDOs, software to assist in daily MACAO operations or to support use of an MDO, assistance in resolving problems related to a DDP.

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3.0 CONTROL AUTHORITY FUNCTIONS

There are three functional interfaces in which the Control Authority functions are exercised. Figure 3.0-1 shows those functional interfaces from the perspective of one MACAO (the shaded box). They are:

- intra-MACAO
- inter-MACAO (i.e., MACAO to (external) MACAO)
- MACAO to (external) user

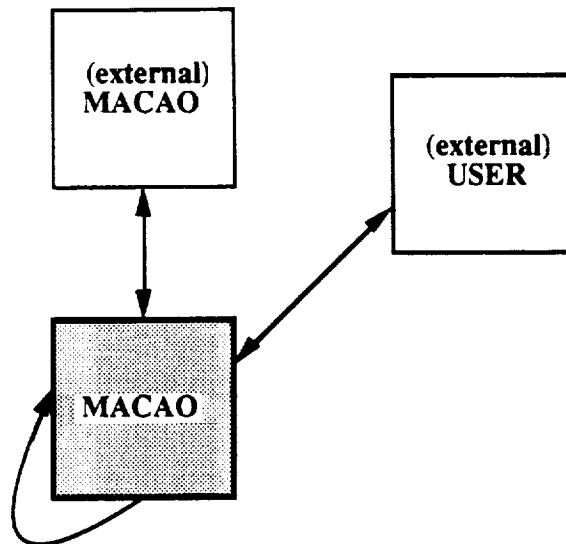


Figure 3.0-1. MACAO Functional Interfaces

Each of the functions described in the following sections *helps* defines one of the three functional interfaces. Each function is identified *in terms of the as-being* intra- or inter-MACAO, or MACAO-user *functional interfaces*.

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The MACAO has three major responsibilities: 1) to register data descriptions received from RP Originators; 2) to distribute data descriptions upon request; and 3) perform administrative functions to support responsibilities 1) and 2). All MACAO functions must be consistent with the CCSDS Recommendations *reference [1] [Ref. 1]*. Figures 3.0-2 and 3.0-3 provide a high level view of the CA functions.

The following sections do not assume any particular level of automation in the Control Authority operating environment; many of the functions could be performed in a ~~completely~~ manual as well as *an* automated environment. However, using automation may make the accomplishment of a given function more accurate, timely, and manageable. Annex C contains a list of capabilities that are underlying the functions in the following sections. These capabilities are mapped against general levels of automation of potential CA operating environments. *It becomes clear in this chart that some level of automation is necessary to support some of these capabilities.* Annex D contains a reference to an existing example of a Control Authority that processes and distributes data descriptions through an automated interface. *The specific implementation is not the focus; it is provided as an alternative using automation.* ~~Annex E contains an Entity Relationship diagram for the Control Authority operations and a detailed description of the data entities.~~

3.1 ADMINISTRATIVE FUNCTIONS

The administrative functions fall into the following categories:

- Activity Monitor
- File Management
- Procedures Definition and Change Control
- *MDO Change Control*
- User Support Services
- *Metadata Integrity & Access Control Data Security*

These functions are briefly described in Figure 3.0-2. The following subsections describe each function in more detail. Note: These are possible functions. Most are not required by CCSDS Recommendations. The functions that are ~~TBD [highlighted]~~ are required by CCSDS Recommendations *are marked with an asterisk.*

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ADMINISTRATIVE FUNCTIONS

Activity Monitor

- Provide status to ascendant MACAO*
- Maintain log of RP Originator/
Requestors

Procedures Definition and Change Control

- Define detailed procedures
- Update *local* procedures
- Define RP information content
- Define DDP request information content
- Maintain history of procedures changes
- Make knowledge of changes available

User Support Services

- Assist metadata registration process
- Assist registered metadata request
process
- Familiarize users with procedure
- *Maintain 'lessons learned'*
- *Assist user in interpreting DDPs*

File Management

- Maintain lists
- Maintain database of registered
*interaction MDOs**
- Maintain log of DDPs and RPs*
- Maintain database of tools

MDO Change Control

- Manage changes to registered
MDOs
- Inform RP Originators/
Requestors of changes

Metadata Integrity & Access Control

- Provide metadata *after to*
*authorized release date only**
users only
- Protect metadata from corruption
- Ensure backup and recovery

Figure 3.0-2. Control Authority Functions - Administrative

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REGISTRATION FUNCTIONS

- Provide procedures
- Evaluate RPs
- Register data
- Notify RP Originators

QUERY AND REPORT FUNCTIONS

- Obtain status of request
- Obtain list of newly registered metadata
- Obtain list of newly revised metadata
- Obtain new procedures
- Obtain list of ADIDs that have been referenced

DISTRIBUTION FUNCTIONS

- Provide request *requirements* form
- Process requests
- ~~Obtain referenced MDOs~~
- Prepare DDPs
- Send DDPs
- Provide additional information

Figure 3.0-3. Control Authority Functions - Registration, Distribution, Query and Reports

3.1.1 Activity Monitor

The MACAO logs information about its interactions in order to provide upward reporting. Activity monitoring functions are inter-MACAO; they are:

- provide status to ascendant MACAO or CCSDS Secretariat*
- maintain log of RP Originator/Requestor interaction

The CA procedures require an *Annual Report* ~~annual report~~ by the CA Agent detailing CA services and available products. Each MACAO will be responsible for providing that information to the next higher level, *or* ascendant, MACAO.

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By logging all request activity, a MACAO can generate counts of and statistics on its interactions with RP Originators and Requestors. Examples of information required are found in Section 2.2.3. The minimum set of information maintained must be consistent with *reference [1] CCSDS Recommendations [Ref. 1]*; however, a MACAO may keep additional records as *requested* required by its primary MACAO or local office.

3.1.2 File Management

A MACAO is responsible for archiving information both for eventual distribution to Requestors and to enhance its ability to locate information needed by Requestors *or other MACAOs*. To do this, it must have information on hand that allows it to locate MDOs *maintained controlled* by other MACAOs and to maintain the information for which it is responsible. File management *functions are all is an* intra-MACAO function.

The functions pertaining to file management are:

- maintain lists of RP Originators/Requestors/other MACAOs
- maintain a database of registered MDOs*
- maintain a log of DDPs and RPs*
- maintain a database of tools

Each MACAO will maintain a list of the RP Originators ~~that~~ *who* have requested registration *or revision of metadata*, and the addresses of other MACAOs. It will also keep a list of Requestors who have requested information from the MACAO. These lists will allow the MACAO to reach these organizations as necessary and also to provide their addresses to other organizations that may need them.

Each MACAO maintains a database of its registered MDOs, which comprise the key set of *Control Authority controlled* information. A registered MDO is identified by its Authority and Description Identifier (ADID). The database includes information describing each registered MDO, the creation date, and revision history. It also includes *a request history, indicating that it was how often an MDO was requested and included in a DDP.*

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The MACAO, as a local option, may also serve as a repository of tools (either actual software or references to software) *this may be software to facilitate building, parsing, and interpreting SFDUs or references to software* that may be useful or necessary for handling data (e.g., in the analysis of data referenced by an MDO or in transmitting large volumes of data). These tools will have been registered in accordance with the (TBD) procedures established for *CCSDS both regular and third party software formats*.

3.1.3 Procedures Definition and Change Control

The CCSDS defines standard procedures *in reference [1]* for the operation of the MACAO. These procedures allow leeway for the local MACAO to provide additional detailed procedures for its interactions. The first *five* functions of the CA in defining procedures below are intra-MACAO; the last is both inter-MACAO and MACAO-user:

- define detailed procedures for registering and requesting metadata
- update *local* procedures
- define the information needed for *Registration Packages registration packages*
- define the information needed to request *metadata* object descriptions
- maintain history of procedures changes
- make knowledge of changes in procedures available to other MACAOs and users

Specifics of interaction between a MACAO and its users are defined by the local MACAO. The local MACAO defines how required information is to be received from an RP Originator and Requestor. Such information consists of instructions on the minimum acceptable required *content* (per CA procedures) ~~content~~ to prepare, and *how and where* to send it. The local MACAO may request other information as well. Standard forms could be developed for RP registration requests and for DDP requests. These forms could be automated and distributed electronically as a CA service.

An *ascendant higher-level* MACAO will inform a local MACAO of changes to CCSDS standard procedures. The local MACAO then informs *its descendant lower-level* MACAOs of the changes. These changes will be incorporated into the detailed procedures defined for RP Originators and Requestors *in whatever way the MACAO sees appropriate, as long as it is conformant*. The lower level MACAOs provide feedback to the ascendant MACAO, acknowledging implementation of

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changes and assessing the impact of the changes. The history of the changes in procedures, *as well as the documentation of the way the changes were implemented* will be maintained at the MACAO originating the changes. Knowledge of all changes in procedures *and implementations of those changes* should be made available to other MACAOs and users. In this way, the effective date of a procedure change can *be used to help identify how an RP was constructed and where the metadata are if there is any problem with a DDP*. If a local MACAO makes any changes in procedures, they must not impact *conformance with the standard Control Authority Procedures*.

The scope of procedures includes the registration and change control of third party software which might be used for internal CA operations, or made available to users. *It also includes inter-MACAO exchange procedures.*

3.1.4 MDO Change Control

The MACAO is responsible for performing change control of registered MDOs and informing appropriate parties of the changes. Functions pertaining to change control are:

- manage changes to registered MDOs
- inform existing RP Originators/Requestors of changes

Managing the changes is an intra-MACAO function; informing users is a MACAO-user function. MDOs which have been registered are labelled as revisable or non-revisable. An MDO is marked non-revisable to ensure changes do not occur which would affect past and present users of the MDO in a data generation process. Similarly, consumers are assured that such MDOs are always applicable to the associated data objects. Producers whose data objects are subsequently found to be inadequately described by, or in conflict with, the MDO must address this through redistribution of the data in conformance with the MDO, or with a new associated MDO *that describes the data object correctly*. This new MDO must also be registered, and will receive a new ADID.

A registered MDO is marked revisable if modifications expanding or clarifying the use of the MDO are allowed. If the MDO is changed it would keep the same ADID, but receive a new revision number. It is the responsibility of the data object producer to ensure that revisions to the metadata improve the overall accuracy and completeness of description of the associated data object, without impacting the data generation process. Data object producers should be very cautious about

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adopting existing registered MDOs, ~~when that are~~ marked revisable, for their own use, since the ~~MDO~~ RP Originator may revise such MDOs. This may *not be as risky to be attempted*, however, if the new producer reaches an appropriate agreement with the RP Originator.

If a valid request to modify a revisable MDO is received, then the MACAO will register the new MDO as a revision. Both the original as well as *all previous* the revision(s) are maintained.

Notification of revisions to MDOs in the CA Annual Report and local reporting will be a mechanism to inform prior Requestors that an MDO has been modified. This is necessary to ensure that any erroneous interpretations of data can be corrected. Local MACAO tracking of Requestors will allow direct notification of specific Requestors,; it will be a local MACAO option whether to broadcast the notification or send it to each affected Requestor.

3.1.5 User Support

The MACAO provides support to assist user interaction ~~with the MACAO~~; they are all MACAO-user functions. User support functions of the MACAO are:

- assist RP Originators in preparing and submitting ~~RP's registration packages~~
- assist Requestors in preparing and executing requests *for DDPs*
- familiarize users with procedures
- *maintain 'lessons learned'*
- *assist users in interpreting DDPs*

The MACAO will provide support to RP Originators in all steps of registration — starting with identification of an appropriate MACAO with which to register the metadata. This support may be accomplished in a number of ways. The MACAO will make all necessary registration information available to the RP Originator in a timely fashion. Support will be provided in the way of guidance and feedback via phone, facsimile, or electronic media if appropriate, for each stage of the registration process. Forms may be provided (electronic or hardcopy) with supporting documentation *on how to use them*. Samples of correctly completed registration packages may be available to the RP Originator. A MACAO may maintain a 'lessons learned' log based on user problems. A user's guide may be available; it would include one or more detailed registration scenarios.

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Similarly, the MACAO will provide support to Requestors for submitting a request for registered information. Assistance will be available for filling out forms; feedback and guidance will be provided by phone, facsimile, or electronic media. The MACAO will help the Requestor identify and locate the appropriate MACAOs if additional querying is necessary. The MACAO will provide instructions on accessing packages of registered information that reside on multiple media. The MACAO may keep a list of ADIDs that Requestors have had problems with, and may also inform the Requestor if a requested ADID should not be used due to some previously reported problem. After the Requestor has received the DDP, the MACAO will assist, if needed, in interpreting the structure of the DDP. The MACAO will also serve as a liaison between RP Originator(s) and Requestor(s), if the RP Originators are still in existence.

The MACAO will provide support for users in learning and following procedures. There may be user's guides that clearly identify the sequence of actions and current contacts for the major functions involved in the registration and request for registered metadata. The MACAO will keep this documentation current. In addition, a hotline type of support may be provided to walk the user through more detailed questions.

The implementation of the user support will be dependent on the specific environment created by each MACAO. However, some of the specific user support *capabilities functions* that could be included in an automated environment are:

- online tutorial for using the automated registration function
- availability of languages/compiler received from producers for scientists/users to use
- display of field values for all previously entered metadata to minimize redundant metadata entry

3.1.6 Metadata Integrity and Access Control

The MACAO protects the integrity of the information controlled at its office. These are entirely intra-MACAO functions. Functions pertaining to metadata integrity and access control are:

- provide registered metadata *after release date only** ~~to authorized users only~~
- protect registered metadata from corruption by limiting access

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- ensure integrity through backup and recovery procedures

In general a MACAO provides registered MDOs to Requestors upon request. User security requirements, and their enforcement, are up to the *RP Originator user*. Under CCSDS procedures, *only an MDO will not be disseminated until the release data is exceeded; no other circumstances prevent its dissemination* ~~unexpired release date prevents the dissemination of an MDO~~. The procedures for enforcing physical security are outside the scope of CCSDS services; there is no CA liability.

Registered metadata is protected from corruption. Only the personnel designated by the local MACAO can directly access the registered metadata under the MACAO's control; these personnel are responsible for maintaining the integrity of the archived metadata content. Requestors of MDOs must interact with a combination of automated processes, and possibly personnel, to acquire registered metadata. The MACAO may invoke automated processes to change, update or create metadata sets for dissemination.

A MACAO is responsible for protecting its metadata from permanent loss or problems which may affect the quality of the metadata. Consequently the MACAO develops procedures and implements safeguards to protect the metadata. Backup procedures will be established and adhered to by the local MACAO. Recovery procedures will be invoked whenever necessary to return the MACAO to normal operations following data loss or interruption of service.

3.2 REGISTRATION FUNCTIONS

The MACAO has a major responsibility to register data descriptions as requested by RP Originators. The first and fourth functions are MACAO-user; the second is both intra-MACAO and MACAO-user, and the third is intra-MACAO. The functions involved in registration are:

- provide procedures and input requirements and/or forms to RP Originator
- evaluate Registration Packages received
- register the metadata
- notify the RP Originator

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A MACAO provides procedures to RP Originators to help them prepare Registration Packages. The MACAO may provide *the RP Originator with a means of submitting information that submission form to* ensures that registration requests are uniformly prepared. The MACAO may assess completeness and quality of RPs received. *This will include checking for the existence of Referenced MDOs, whether they are stored locally or not.* The MACAO checks whether all required identifying information is received. RPs which are accepted are assigned an ADID, and the MACAO's database is updated. RPs which are rejected are returned to the RP Originator; *the MACAO may also choose to maintain this information.* The MACAO informs the RP Originator of the disposition of the RP.

Test data may be included in the RP *as a descriptive MDO containing as* supplementary information. A consumer of this registered metadata could check out his implementation of the metadata against the sample test data before it is applied to the full set of scientific data.

The MACAO will not guarantee the correctness of a registered data description; however, the MACAO will help to resolve problems experienced with its registered metadata. If the Requestor of a DDP does not notify the MACAO of a problem with the registered metadata, then the MACAO takes no action. Upon notification by a Requestor that a DDP was unusable, the MACAO will first check if any problem exists with the DDP as generated and sent by the MACAO. If no problem is found with the DDP generation or transmission, the MACAO will contact the RP Originator of the original RP. The MACAO will work with the RP Originator to find and resolve the problem. If the RP Originator (or producer) is unavailable, the MACAO may be unable to help the Requestor. If the problem is corrected, the RP Originator or Revision Authority may submit a Revising Registration Package to replace, or correct, the revisable MDO. A new DDP is generated by the MACAO, sent to the Requestor, and the success/failure of this DDP is monitored. If necessary, the MACAO will repeat the steps required to correct the problem.

3.3 DISTRIBUTION FUNCTIONS

The MACAO has a major responsibility to provide MDOs as requested. The functions pertaining to distribution are:

- provide request requirements ~~and/or form to the Requestor~~
- process the request received

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- prepare the Data Description Package (DDP)
- send the DDP
- provide additional information as appropriate

The first function is *MACAO-user*; ~~and the fourth and last functions is are~~ *MACAO-user*, or *inter-MACAO* and the second is *intra-MACAO*, and third is ~~are~~ *inter-MACAO* and *intra-MACAO*, ~~and the last is an inter-MACAO function.~~ The MACAO works with the Requestor to complete his request. The MACAO may provide a request form or screen to help make the request consistent and complete. The MACAO evaluates the request and informs the Requestor of the request's status.

The MACAO acquires the requested MDOs from its own files, or *directs the request to another MACAO if necessary* ~~and from other MACAOs as necessary~~. A separate request is required for each registered MDO the Requestor wants — unless the *additional* registered MDO is referenced *within the requested MDO*. The MDOs are assembled as a DDP; the DDP is ~~prepared~~ *constructed* as an SFDU in accordance with the *structure and construction rules in reference [3]*. *If the DDP is to include Referenced MDOs from some other MACAO, the DDP(s) for that Referenced MDO would first be received by the MACAO receiving the original request. Then that/those DDPs would be incorporated into the DDP; the DDP, when fully constructed, will be sent to the Requestor. The only exception to this statement is if any of the MDOs have a release date that has not been exceeded. The DDP is sent to the Requestor.* If the Requestor has a problem with the information contained in the DDP, he contacts the MACAO to help resolve it (*as described above in Section 3.2*). Acquisition of any other information, such as the status of non-released MDOs, MACAO reports, or problem reporting is based on Requestor contact with the MACAO.

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3.4 QUERY AND REPORT FUNCTIONS

The MACAO has a major responsibility to make information about metadata available to users and other MACAOs. The kinds of query and report functions that the MACAO may provide are:

- obtain status of request
- obtain list of newly registered metadata
- obtain list of newly revised metadata
- obtain new procedures
- obtain list of ADIDs that have been referenced

The MACAO will, as a result of normal operation, have the above information available in its local database. The MACAO should provide some interface that allows users to easily provide parameters (e.g., date, keyword, ADID, submitter's name) for any of the above standard queries/reports. If there are repeated requests for another type of query/report, the MACAO may include new "canned" queries in its local software.

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4.0 SCENARIOS FOR CA OPERATION

The following sections provide illustrative scenarios of interaction between the *MACAO* and other organizations. These scenarios are:

- 1) MDO Registration
- 2) Obtaining Registered Information
- 3) *Status Reporting* ~~Reporting Status~~
- 4) DDP Exchange between MACAOs
- 5) Registered MDO Revision
- 6) Running Queries and Reports

These scenarios provide an overview of CA operations necessary for an understanding of the CA functions.

The format of each subsection is as follows:

- high level textual description
- participants (*roles*) in the scenario
- major steps in the process
- scenario ~~that describes the action/response taken by the CA and the other organization~~ in both graphic and textual formats

Each scenario represents a set of actions/responses between two *participants (roles)* organizations. ~~The scenarios are presented both graphically and in text. The graphical presentation is a one page flow of numbered boxes containing the major scenario actions, numbered in the sequence of occurrence, and without regard for which participant performs the action. The participants' views are accomplished by separating the sequences of actions that each performs. The text discussion of each numbered box is presented in two columns corresponding to each participant's "view" of the scenario. The two views of the scenario are accomplished in the graphical flow by separating the sequence of actions per participant, regardless of box numbering. These~~ Each participant's

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sequences of actions are connected by directional arrows between the boxes. The text discussion of each numbered box is presented in two columns corresponding to each participant's "view" of the scenario. Again, the sequence of the scenario is preserved using the same numbers as in the graphical flow.

The scenarios presented in this section are intended to capture the basic functions of the *MACAO* and the user. The method of presentation may give the impression of a lot of interaction. It is expected that many of these functions can, and will, be automated, thereby minimizing the amount of manual or verbal interaction.

Also, each step of a scenario is not necessarily required for each session between two *participants* entities. Some steps may not need to occur at all or may carry over from previous interaction. For example, it is not expected that instructions for submission will need to be repeated for the experienced user.

The figures in this section are used to display information content contained in requests and messages between a *MACAO* and its users. These figures are constructed to appear as "forms." However, this is not intended to imply or recommend the use of paper forms, or even a specific representation of the information, for interaction with a *MACAO*. The information could be represented on computer screens, using menu options, or on paper forms. Annex D, in fact, presents a *CA system that uses very different possible interface.*

The figures in Section 4.0 contain examples of data inputs (blank figures can be found in Appendix E F). The input is provided solely to demonstrate what (type of) information might go where; no attempt is made to explain the information or provide a context for it. ~~The source of information presented in the forms in this section is the Control Authority Scenarios: Registration and Dissemination Concept Paper (TOU/90/P2/N008), describing RPs and DDPs from the NASA/JPL Control Authority system. Specifically, the RP is presented in Section 7.1 of that document, and the DDP in Section 8.5. The specific meaning of each field on the form is defined in the Data Element Dictionary in Annex F. That annex also contains an Entity-Relationship diagram for Control Authority operations.~~

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4.1 MDO REGISTRATION

MDO Registration is the process by which an RP Originator registers the metadata with a MACAO. A possible scenario follows.

4.1.1 Description of MDO Registration

In order for organizations and individuals to use data produced by other organizations, a description of that data (along with other related information) must be made available. To facilitate the long term preservation and exchange of such descriptions, they may be registered with a Control Authority organization. To perform the registration, the MACAO requires, at a minimum, identification information and data description information such as a definition of the data format (the DDR) of the data of interest. From the perspective of the MACAO, the individual or organization that registers the description data, or metadata, is the RP Originator. The RP Originator may also be the producer of data, or a representative of the producer (e.g., a project office) or a representative of the broader science/user community.

The RP Originator may identify the appropriate MACAO by contacting the CCSDS CA Agent, contacting any MACAO or selecting the MACAO from a CA report. He requests instructions on how to submit his registration request and receives instructions on how to supply the presubmission information, and what that information is. Figure 4.1-1 is an example of the *information required for RP Presubmission Information*. The information in this figure may be supplied manually (i.e., verbal or written) or electronically, depending on the respective individual capabilities of the MACAO and RP Originator. After the RP Originator submits the Presubmission Information, there may be some discussion to clarify the way in which the RP Content can be extracted from the RP about to be submitted. It may be that for a given MACAO, there is always a predefined way information is to be supplied, or that for a given RP Originator the information is only supplied once. This prevents unnecessary submission of the Presubmission information. Determining the nature of this interaction is entirely up to the local MACAO.

Registration Package (RP) Presubmission Information

MACAO Name Lee M. Johnson	MACAO ID NJPL	ADID (if revision)																														
Date of Submission (yyyy-mm-dd) 1990-01:26T13:15:20.123	Registration Identifier LMPXYZDED0001																															
RP Originator's Name Lee M. Phelps	RP Originator's Affiliation Jet Propulsion Laboratory																															
RP Originator's Mailing Address MS-264-728; Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109																																
RP Originator's Electronic Mail Address TELEMAIL: LPHELPS																																
Brief Title for RP Content (≤ 40 characters) XYZDED																																
Proposed Media and Protocol for RP Content																																
<table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">A) <input type="checkbox"/> Electronic Transfer</td> <td style="width: 33%;">C) <input type="checkbox"/> 3.5" Diskette (IBM)</td> <td style="width: 33%;">E) <input type="checkbox"/> Bernoulli Cartridge</td> </tr> <tr> <td style="padding-left: 20px;"><input checked="" type="checkbox"/> Text</td> <td style="padding-left: 20px;"><input type="checkbox"/> 720 KB</td> <td style="padding-left: 20px;"><input type="checkbox"/> 5.25" <input type="checkbox"/> 10 MB</td> </tr> <tr> <td style="padding-left: 20px;"><input type="checkbox"/> Binary</td> <td style="padding-left: 20px;"><input type="checkbox"/> 1.44 MB</td> <td style="padding-left: 20px;"><input type="checkbox"/> 8.0" <input type="checkbox"/> 20 MB</td> </tr> <tr> <td style="padding-left: 20px;"><input type="checkbox"/> Telemail</td> <td></td> <td></td> </tr> <tr> <td colspan="3"> </td> </tr> <tr> <td>B) <input type="checkbox"/> 3.25" Diskette (MacIntosh)</td> <td>D) <input checked="" type="checkbox"/> 5.25" Diskette (IBM)</td> <td>F) <input type="checkbox"/> 0.5" Magnetic Tape (9 Track)</td> </tr> <tr> <td style="padding-left: 20px;"><input type="checkbox"/> 800 KB</td> <td style="padding-left: 20px;"><input checked="" type="checkbox"/> 360 KB</td> <td style="padding-left: 20px;"><input type="checkbox"/> 6250 BPI</td> </tr> <tr> <td style="padding-left: 20px;"><input type="checkbox"/> 1.4 MB</td> <td style="padding-left: 20px;"><input type="checkbox"/> 1.2 MB</td> <td style="padding-left: 20px;"><input type="checkbox"/> 1600 BPI</td> </tr> <tr> <td></td> <td></td> <td style="padding-left: 20px;"><input type="checkbox"/> 800 BPI</td> </tr> <tr> <td colspan="3">G) <input type="checkbox"/> Other _____</td> </tr> </table>			A) <input type="checkbox"/> Electronic Transfer	C) <input type="checkbox"/> 3.5" Diskette (IBM)	E) <input type="checkbox"/> Bernoulli Cartridge	<input checked="" type="checkbox"/> Text	<input type="checkbox"/> 720 KB	<input type="checkbox"/> 5.25" <input type="checkbox"/> 10 MB	<input type="checkbox"/> Binary	<input type="checkbox"/> 1.44 MB	<input type="checkbox"/> 8.0" <input type="checkbox"/> 20 MB	<input type="checkbox"/> Telemail						B) <input type="checkbox"/> 3.25" Diskette (MacIntosh)	D) <input checked="" type="checkbox"/> 5.25" Diskette (IBM)	F) <input type="checkbox"/> 0.5" Magnetic Tape (9 Track)	<input type="checkbox"/> 800 KB	<input checked="" type="checkbox"/> 360 KB	<input type="checkbox"/> 6250 BPI	<input type="checkbox"/> 1.4 MB	<input type="checkbox"/> 1.2 MB	<input type="checkbox"/> 1600 BPI			<input type="checkbox"/> 800 BPI	G) <input type="checkbox"/> Other _____		
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<input type="checkbox"/> 1.4 MB	<input type="checkbox"/> 1.2 MB	<input type="checkbox"/> 1600 BPI																														
		<input type="checkbox"/> 800 BPI																														
G) <input type="checkbox"/> Other _____																																
Location of RP Content on Proposed Media																																
A) <input type="checkbox"/> RP Content will be message content.																																
B) - E) <input checked="" type="checkbox"/> <u>XYZDED</u> (File Name)																																
F) <input type="checkbox"/> File Location on Magnetic Tape _____																																
G) <input type="checkbox"/> Other: _____																																
MACAO Acceptance: <input type="checkbox"/> Accepted <input type="checkbox"/> Accepted with Contingency <input type="checkbox"/> Not Accepted																																

Figure 4.1-1. Sample Registration Package (RP) Presubmission Information

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The MACAO tracks the various pieces of information related to the Registration process with a registration identifier. This identifier is provided by the RP Originator to allow the two parties a means of tracking a specific request for registration; the local MACAO may establish the nature of this identifier. As an example, this registration identifier may contain the submitter's initials name, brief title and/or a sequence number.

The RP submission information needed to register a data description is presented in Figure 4.1-2. The RP Originator prepares up to three sets of information, identified as Part 1, 2 and 3 in the figure. The Identification Information MDO (Part 1) contains the information related to the management of the RP, such as the *RP Originator's* ~~originator's~~ name and address, brief title, description of the RP, and the Revising Authority if different from the RP Originator. *The ADIDS of any Any Referenced referenced MDOs ADIDs appearing in the remainder of the RP Part 3* may be listed by the *RP Originator MACAO*, purely as a convenience, to facilitate creation of the ~~for~~ when the DDP for this RP will be created. Part 2 contains the information for each *description* MDO to be registered as part of (i.e., included in) this RP. Each of these MDOs is identified with respect to what interpretation language will be used to ~~as to how it is interpret it interpreted~~ (which corresponds primarily to CCSDS ADIDs) and the type of information it contains (which correspond to classes of metadata). The information in Part 2 is repeated for each MDO included in the RP. If ~~an the~~ MDO in Part 2 requires a previously registered non-CCSDS MDO for its interpretation, the ~~its~~ ADID of that MDO is supplied. Part 3 contains explicit references (using ADIDs) to previously registered MDOs which are necessary for this RP to be complete. This includes any non-CCSDS MDOs required by ~~ADID~~, ~~for~~ an MDOs included in Part 2. Only the ADIDs of the first level of Referenced ~~referenced~~ MDOs ADIDs (i.e., those MDOs to be ADIDs included in the DDP for this RP in Part 3) are to be included in the RP. Each successive level of RP will provide the ADIDs of the next lower level Referenced ~~referenced~~ MDOs ADIDs. There is no need to include the full description of the Referenced ~~referenced~~ MDOs ADIDs. The Referenced ~~referenced~~ MDOs ADIDs should be indicated using the syntax, e.g., "DDR = " or "DED = ". In all cases (whether Referenced ~~referenced~~ MDOs are maintained by local or other MACAOs), existence of the Referenced ~~referenced~~ MDO ADID will be checked for upon registration. The latest revision version of the Referenced ~~referenced~~ MDOs will be included in the DDP at time of dissemination.

"Registration Package" (RP) Submission Information

Part 1. Identification Information MDO

Page ___ of ___

MACAO Name Lee M. Johnsen	MACAO ID NJPL	ADID (if revision)
Date of Submission (yyyy-mm-dd) 1990-01:26T13:15:25.123	Registration Identifier LMPXYZDED0001	
Revision Number (Optional) 1	Revision Type (select one) Revisable <u>Non-Revisable</u>	Release Date (yyyy-mm-dd) 1991-01-01
Brief Title (≤ 40 characters): XYZDED		
Brief Description (100-200 characters) of RP Content or RP Content Revision This data dictionary contains the vocabulary used to describe the data sets for experiment XYZ of the Mars Observer Project		
Test Performed (Select one) Yes <u>No</u>	Test Data MDO Included (Select one) (Optional) Yes No	
RP Originator's Name Lee M. Phelps	RP Originator's Affiliation Jet Propulsion Laboratory	
RP Originator's Mailing Address MS-264-728, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109		
RP Originator's Electronic Mail Address TELEMAIL: LPHELPS	RP Originator's Telephone Number	
Revising Authority Name (if other than RP Originator's) (SAME)	Revising Authority's Affiliation	
Revising Authority's Address		
Revising Authority's Electronic Mail Address	Revising Authority's Telephone Number	
Referenced MDO MACAO ADIDs (list all): NJPLKL13, NJPLKL12, NJPLL014		
Referenced MDO CCSDS ADIDs (optional): CCSD0001, CCSD0000, CCSD0002, CCSD0004		

Figure 4.1-2. Sample Registration Package (RP) Submission Information

Part 2. Description MDOs (one block per MDO, repeat as necessary)

<p>Content Language Interpretation Language</p> <p><input type="checkbox"/> English (CCSD0002)</p> <p><input type="checkbox"/> PVL (CCSD0006)</p> <p><input type="checkbox"/> TSDN (CCSD0007)</p> <p><input type="checkbox"/> DED Structure (CCSD0008)</p> <p><input checked="" type="checkbox"/> Other (non-CCSDS) ADI = <u>NJPLL014</u></p>	<p>Type</p> <p><input type="checkbox"/> Catalog</p> <p><input type="checkbox"/> DED</p> <p><input type="checkbox"/> DDR</p> <p><input checked="" type="checkbox"/> Supplementary</p> <p><input type="checkbox"/> Test Data</p>
<p>Internal Tracking Number</p> <p>TAR001</p>	
<p>MDO Content</p> <p>This is where supplementary information would be found that would allow a user to interpret the Registration Package. This particular RP is a DED that will be referenced by other TLVO structures of the Mars Observer Project.</p> <p>Since the dictionary itself is to be found separately in a Class-E header, supplementary information that explains how to use what is in the Class-E header could be placed here.</p> <p>Sample topics:</p> <ol style="list-style-type: none"> 1) What the text format is for the dictionary - e.g. keywords names being in column 1 definitions begin in column 10 each line ends with an EOL delimiter 2) What tools are included for using the dictionary 3) How to use those tools 4) What other tools are available elsewhere 5) What other DEDs relate to this one 6) How often the dictionary is updated 	
<p>Relationships with other MDOs (if applicable)</p> <p>TAR001 precedes TAR002 TAR001 describes TAR002</p>	

Figure 4.1-2. Sample Registration Package (RP) Submission Information (Continued)

Part 2. Description MDOs (one block per MDO, repeat as necessary)

<p>Content Language Interpretation Language</p> <p><input checked="" type="checkbox"/> English (CCSD0002) <input type="checkbox"/> PVL (CCSD0006) <input type="checkbox"/> TSDN (CCSD0007) <input type="checkbox"/> DED Structure (CCSD0008) <input checked="" type="checkbox"/> Other (non-CCSDS) ADI = <u>NIPLL014</u></p>	<p>Type</p> <p><input type="checkbox"/> Catalog <input type="checkbox"/> DED <input type="checkbox"/> DDR <input checked="" type="checkbox"/> Supplementary <input type="checkbox"/> Test Data</p>
<p>Internal Tracking Number</p> <p>TAR002</p>	
<p>MDO Content</p> <p>albedo = "Reflectivity of a planetary surface or particle"</p> <p>eccentricity = "A measure of the extent to which the shape of an orbit deviates from circular"</p> <p>flattening = "A measure of the geometric oblateness of a solar system body, defined as the ratio of the difference between the body's equatorial and polar diameters to the equatorial diameter, or (a-c)/a"</p> <p>obliquity = "Angle between a body's equatorial plane and its orbital plane"</p> <p>radiance = "A measure of energy radiated by an object. EXAMPLE: 'spectrum_integrated_radiance'"</p>	
<p>Relationships with other MDOs (if applicable)</p> <p>TAR002 follows TAR001 TAR002 is_described_by TAR001</p>	

Figure 4.1-2. Sample Registration Package (RP) Submission Information (Continued)

Part 3. References to Previously Registered MDOs

<p>ADIDs of Referenced MDOs</p> <p>ADI = NJPLK013 ADI = NJPLK012 ADI = NJPLL014</p> <p>ADI = CCSD0001 ADI = CCSD0000 ADI = CCSD0002 ADI = CCSD0004</p>
<p>MDO Relationships (if applicable):</p> <p>NJPLL014 is_language_for NJPLK013 NJPLL014 is_language_for NJPLK012</p>

Figure 4.1-2. Sample Registration Package (RP) Submission Information (Concluded)

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The potential complexity of the RP lies within Parts 2 and 3. Since there can be multiple MDOs included in an RP, and conceivably each of these could have one or more *Referenced* ~~refereneed~~ *MDOs* ~~ADIDs~~, a means of correctly relating all the appropriate pieces of the RP is necessary. To support this, each *description* MDO included in an RP (whether it was previously registered or not) will have an internal tracking number. ~~In the case of a previously registered MDO, this identifier of that MDO would be the ADID; for non-previously registered MDOs~~ the local MACAO might develop a local standard for *creating* this identifier. Relationships among and between the MDOs, *included* in Part 2 of the RP could be captured as shown in the bottom of Figure 4.1-2 (Part 2). Relationships between MDOs *included* in Part 2 and *Referenced* ~~refereneed~~ *MDOs* ~~ADIDs~~ could also be captured in Figure 4.1-2 (Part 3). The full set of relationships is not defined in this document *nor at this time*; a very initial cut at some possibilities are included in the sample forms.

If an RP Originator wants to make *an* individual MDOs in Part 2 of the RP accessible independently from the RP in which it is included, he must submit *the each of these* MDOs as a separate RP with its own II MDO. It will then receive a unique ADID. *The ADID, which* will be recorded in Part 3 2 of the "main" RP as a *Referenced MDO if the MDO is not included.*

Sample test data may be included in the RP (as an MDO in Part 2) to become part of the registered MDO. These test data will be included to allow the Requestor/consumer to try out his implementation of the data description on actual data with known results. However, the MACAO is not responsible for the quality of the test data. The MACAO also does not verify that the test data works.

The RP is sent to the MACAO via the means of communication negotiated with the receiving MACAO. The MACAO records the receipt of request and then evaluates the RP for completeness and correctness with respect to its submission criteria. An RP acknowledgement/disposition, which includes the results and/or status of the RP evaluation, is sent to the RP Originator within five working days. The acknowledgement/disposition has the information as presented in Figure 4.1-3. The MACAO also attaches and returns a copy of the submission information when the disposition is other than "Under Review."

Acknowledgement/Disposition of Receipt of Registration Package (RP)

(Filled out by MACAO)

ADID (If assigned) NJPLKYZ1	Revision (Blank if not accepted) 1	MACAO Name Lee M. Johnson	MACAO ID NJPL
RP Originator's Name Lee M. Phelps		Date of Response (yyyy-mm-dd) 1990-01-30T	Registration Identifier LMPKYZDED0001
Brief Title (≤ 40 Characters) XYZDED			
<input checked="" type="checkbox"/> Accepted (ADID Assigned) <input type="checkbox"/> Under Review; Expected Date of Completion _____ <input type="checkbox"/> Rejected <input type="checkbox"/> Accepted with Contingencies described on revised RP Submission Form below in Explanation of Contingencies (Resubmit to register RP) 			
Reason for Rejection: (Select one or more) <input type="checkbox"/> Incomplete Registration Information <input type="checkbox"/> Information Incorrect <input type="checkbox"/> Information Unreadable <input type="checkbox"/> Submitted to Incorrect MACAO <input type="checkbox"/> Non-revisable ADID <input type="checkbox"/> Other			
Explanation of Rejection/Recommendation:			
Explanation of Contingencies:			
Comments:			

Figure 4.1-3. Sample Acknowledgement of Receipt of Registration Package (RP) Information

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If the review is incomplete, the MACAO provides an expected date of completion. If the RP would be accepted with some changes proposed by the MACAO, this information is described in the acknowledgement. The RP Originator can determine if he agrees with the proposed changes and resubmit the modified RP (or have the MACAO effect the modifications).

If the registration request is rejected, the RP Originator is informed of the reason; he may then correct the problem and resubmit the RP.

If the RP is accepted, the MACAO assigns it an overall ADID. The MACAO stores the registered information in its database. The local MACAO has the option whether to store the information in SFDU format or not. The MACAO informs the RP Originator when the RP was accepted, registered, and stored. Prior to the release date the RP Originator may submit changes to the registered MDOs, identifying them by the ADID. (See Section 4.5, Registered MDO Revision) The MACAO publishes availability notices of the registered MDO to other MACAOs after the release date had been reached.

4.1.2 Participants in MDO Registration

Participants in the registration of metadata are the MACAO and RP Originator. The RP Originator initiates the registration activity, defines the metadata, and generates the RP; the MACAO provides as much help as necessary to ensure the successful registration.

4.1.3 Major Steps in MDO Registration

The major steps in the scenario for registration are:

- Request/response for process information
- Preparation/submission of RP
- Evaluation of the RP
- Registration
- Notification

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4.1.4 MDO Registration Scenario

The flow for the MDO registration scenario is presented in Figure 4.1-4. The text associated with this graphic representation of the flow of the scenario follows immediately.

RP Originator	MACAO
1. Selects MACAO. Select appropriate MACAO by either: <ul style="list-style-type: none">- contacting the CA Agent- selecting from the CA Annual Report- contacting any MACAO	
2. Request RP Instructions and Form. Depending on the media used by the MACAO for the RP instructions and forms, and the ease of access the RP Originator has to one of these media, the RP Originator will either ask the MACAO to send the materials or be able to access them directly.	3. Provide RP Instructions. Instructions will include the specific requirements for filling out the various parts of the RP Presubmission and Submission Form.
4. Receive and Return Presubmission Information. Fills out Presubmission Information and makes it available in whatever manner agreed upon with the MACAO. (This may be done once per RP Originator, not per RP)	5. Signs off on Presubmission Info. Concurs with presubmission information. A copy of the Presubmission Information is returned <i>to the user</i> with the status. May require discussion with the RP Originator to clarify understanding of the input before the MACAO signs off.
6. Prepares RP Submission Information. Supplies the II MDO, and one or more MDOs comprising the balance of the RP content. Test <i>data results</i> may also be included.	
7. Sends RP to MACAO. The method for sending the RP will have been agreed upon previously.	8. Evaluates RP. The RP will be examined for completeness, clarity, and validity. The referenced MDOs are checked for their individual status.

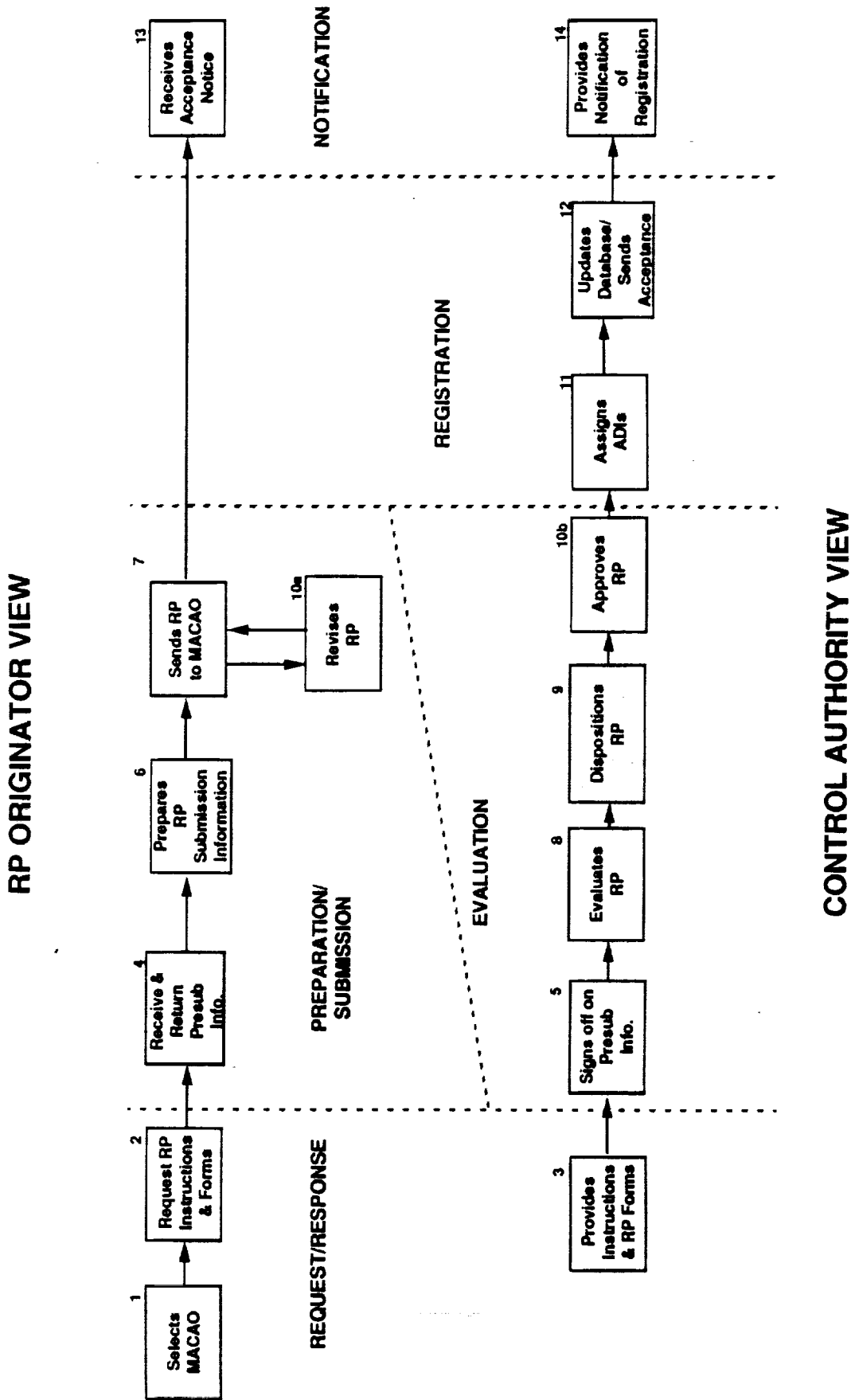


Figure 4.1-4. MDO Registration Scenario Flow

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RP Originator

MACAO

- | | |
|--|---|
| | <p>9. Dispositions RP. The MACAO provides status of the RP to the RP in Originator. The RP is either: 1) held up in review, 2) contingently accepted, 3) rejected due to problems or 4) accepted. If case 1), the expected date of completion is provided. If case 2) or 3), the RP Originator may revise the RP based on explanations of the problems provided by the MACAO in the Acknowledgement/Disposition notice. Step 10a follows at the discretion of the RP Originator. If case 4), the MACAO goes on to approval in Step 10b.</p> |
| <p>10a. Revises RP. The problems causing non-</p> | <p>10b. Approves RP. After one or more evaluation following will be repeated. Evaluation cycle, the RP is approved and Acknowledgement/Disposition notice is prepared.</p> |
| | <p>11. Assigns ADIDs. The RP is assigned an ADID and acknowledgement/disposition is completed.</p> |
| | <p>12. Updates Database/Sends Acceptance. All new information contained in the RP will be added to the MACAO's database.</p> |
| <p>13. Receives Acceptance Notice. Approval of the RP and assigned ADID will be acknowledged to the RP Originator.</p> | <p>14. Provides Notification of Registration. In a bulletin board manner, announcement of the RP approval and key identifying information will be made available in the medium of the MACAO's choice to all other MACAOs.</p> |

4.2 OBTAINING REGISTERED INFORMATION

This section describes a scenario for acquiring registered information where a Requestor needs the metadata to allow a consumer to interpret a dat set.

4.2.1 Description of Obtaining Registered Information

A science researcher typically correlates, analyzes, and processes existing data sets to produce new data sets that provide scientific revelations. In order to read data produced by another organization, the researcher (or consumer) must know how it is encoded. The MDOs containing the data description (i.e., the metadata) that permit this to be done are expected to be registered with a MACAO.

When SFDU labeling Recommendations are followed, the consumer should be able to identify the ADID for the metadata. The ADID provides the identity of the MACAO, as well as the local MDO identifier for *the* that metadata. The researcher contacts the MACAO, provides the ADID, and requests the associated information.

In the eyes of the MACAO, this consumer is a Requestor of previously registered information. The MACAO identifies the information needed to process the request (see Figure 4.2-1, Request for Registered Information).

The Requestor completes the request and submits the information to the MACAO. To request more than one registered data description, the Requestor must provide separate requests. In the case of RPs that have been revised, the latest revision will be the default for dissemination. The Requestor should provide the revision number with the ADID if other than the most recent revision is desired. To learn of new revisions, a Requestor can check periodic reports or ask the MACAO periodically. [NOTE: The current Structures and Construction Rules do not support revisions explicitly.] The MACAO evaluates the request. The Requestor is informed of the status of his request by receiving an acknowledgement (see example in Figure 4.2-2) from the MACAO. An individual acknowledgement is provided for each request.

The MACAO may reject the request if the MDO has not reached its release date or incomplete or incorrect request information is received. The Requestor is informed of the MACAO's inability to provide the requested information in the acknowledgement; the Requestor can then revise the request as appropriate.

Request for Registered Information

MACAO Name Lee M. Johnsen	MACAO ID NJPL	Date of Request (yyyy-mm-dd) 1990-05:18T15:32:16.572
Requestor's Name Larry Shotland		Requestor's Affiliation SAR/STX
Requestor's Mailing Address GSFC, Building 8, Room 234, Greenbelt, MD 20771		
Requestor's Electronic Mail Address NASAMAIL: LSHOTLAND		

Requested ADID NJPLXYZ1	Revision Number (Optional)	Exclude all Referenced MDOs MACAO ADIDs (select one) Yes <input type="radio"/> No <input checked="" type="radio"/>	Exclude all Referenced MDOs CCSDS ADIDS (select one) Yes <input checked="" type="radio"/> No <input type="radio"/>
----------------------------	----------------------------	---	---

Exclude the following Referenced MDOs for the requested ADID (list all ADIDs of MDOs to be excluded)

Preferred Media and Protocol for DDP

A) <input type="checkbox"/> Electronic Transfer <input type="checkbox"/> Text <input type="checkbox"/> Binary <input type="checkbox"/> Telemail	C) <input type="checkbox"/> 3.5" Diskette (IBM) <input type="checkbox"/> 720 KB <input type="checkbox"/> 1.44 MB	E) <input type="checkbox"/> Bernoulli Cartridge <input type="checkbox"/> 5.25" <input type="checkbox"/> 10 MB <input type="checkbox"/> 8.0" <input type="checkbox"/> 20 MB
B) <input type="checkbox"/> 3.25" Diskette (Macintosh) <input type="checkbox"/> 800 KB <input type="checkbox"/> 1.4 MB	D) <input checked="" type="checkbox"/> 5.25" Diskette (IBM) <input checked="" type="checkbox"/> 360 KB <input type="checkbox"/> 1.2 MB	F) <input type="checkbox"/> 0.5" Magnetic Tape (9 Track) <input type="checkbox"/> 6250 BPI <input type="checkbox"/> 1600 BPI <input type="checkbox"/> 800 BPI
G) <input type="checkbox"/> Other _____		

Comments

Figure 4.2-1. Sample Request for Registered Information

Acknowledgement of Request for Registered Information

(Filled out by MACAO)

Requested ADID NJPLXYZ1	Date of Response (yyyy-mm-dd) 1990-05:23T1b:40:10:83	MACAO Name Lee M. Johnson	MACAO ID NJPL
DDP Release (Select one) <input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Partial		MACAO ADID/Anticipated Release Date (if Partial) _____/_____/_____ _____/_____/_____	
Reason for Non-Release _____			
Transfer Media and Protocol for DDP A) <input type="checkbox"/> Electronic Transfer <input type="checkbox"/> Text <input type="checkbox"/> Binary <input type="checkbox"/> Telemail			
B) <input type="checkbox"/> 3.25" Diskette (Macintosh) <input type="checkbox"/> 800 KB <input type="checkbox"/> 1.4 MB		C) <input type="checkbox"/> 3.5" Diskette (IBM) <input type="checkbox"/> 720 KB <input type="checkbox"/> 1.44 MB	
D) <input checked="" type="checkbox"/> 5.25" Diskette (IBM) <input type="checkbox"/> 360 KB <input type="checkbox"/> 1.2 MB		E) <input type="checkbox"/> Bernoulli Cartridge <input type="checkbox"/> 5.25" <input type="checkbox"/> 10 MB <input type="checkbox"/> 8.0" <input type="checkbox"/> 20 MB	
G) <input type="checkbox"/> Other _____		F) <input type="checkbox"/> 0.5" Magnetic Tape (9 Track) <input type="checkbox"/> 6250 BPI <input type="checkbox"/> 1600 BPI <input type="checkbox"/> 800 BPI	
Location of MDO on Media A) <input type="checkbox"/> MDO will be message content B) - E) <input checked="" type="checkbox"/> XYZDED (File Name) F) <input type="checkbox"/> File Location on Magnetic Tape _____ G) <input type="checkbox"/> Other: _____			

Figure 4.2-2. Sample Acknowledgement of Request for Registered Information

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Generally, all MDOs referenced (by their ADIDs) within a requested ADID will be provided along with the requested ADID. For the *Referenced referenced MDOs ADIDs*, the MACAO will acquire the MDOs from each appropriate MACAO as necessary. If any of the *Referenced referenced MDOs ADIDs* have been revised, the latest revision will be the one sent to the Requestor as a default. Any revised MDOs will hopefully cause no problem; it is the Requestor's responsibility to track down any problems. The Requestor may indicate that he does not want to receive this additional information in the request information. The sample request in Figure 4.2-1 allows the user to exclude all or specific referenced ADIDs.

Once the request is accepted, the MACAO builds a Data Description Package (DDP) which includes all the metadata requested. This DDP will include the II MDO and *all the data* description MDOs. The most recent revision of each MDO, including the *Referenced referenced* MDOs, is included, unless specific previous revisions were requested. The revision number is part of the distribution.

The MACAO logs the distribution of the DDP with the Requestor's name attached.

The MACAO sends the DDP to the *Requestor requester*. The Requestor reads the DDP and determines if the package is sufficient *or if additional MDOs are needed*. If it is not sufficient, or if he needs help to overcome a problem, he requests additional information from the MACAO. A problem report, as shown in Figure 4.2-3, can be filed with the MACAO. Any additional request for registered information will follow this same scenario.

4.2.2 Participants in Obtaining Registered Information

Participants in obtaining registered MDOs are the MACAO and the Requestor. The Requestor initiates the activity by requesting the registered information; the MACAO provides as much help as necessary to ensure the request is met.

DDP Problem Report

Requested ADID	Date DDP Received (yyyy-mm-dd)	MACAO Name	MACAO ID
Date of Problem Report Submission (yyyy-mm-dd)		DDP Requestor's Name (Blank if same as Submitter)	
Problem Report Submitter's Name		Submitter's Affiliation	
Submitter's Mailing Address			
Submitter's Electronic Mail Address			
Description of Problem (including procedures used that led to identification of problem)			

Figure 4.2-3. DDP Problem Report

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4.2.3 Major Steps in Obtaining Registered Information

The major steps in this example scenario for obtaining registered information are:

- MACAO Identification
- Request/response for process information
- Preparation/submission of request
- Evaluation of the request
- Preparation/distribution of the Data Description Package
- DDP assessment

4.2.4 Obtaining Registered Information Scenario

The flow for the obtaining registered information scenario is presented in Figure 4.2-4. The text associated with this graphic representation of the flow of the scenario follows immediately.

Requestor	MACAO
1. Examine Data. A data set that is wanted is examined. Per CCSDS recommendations, the ADID for the metadata is in a fixed location in the SFDU label(s).	
2. Extract ADID. The ADID is read. It will identify the appropriate MACAO and provide the MDO identifier.	
3. Query MACAO. The Requestor will contact the MACAO for assistance in requesting the registered information.	4. Provide Data Request Instructions. The MACAO will assist the Requestor in the process for requesting registered information. The MACAO will identify the appropriate request information.
5. Receive Request. If there are any questions regarding the request information, the Requestor will contact the MACAO.	
6. Prepare Request. Using as much detail as possible, the Requestor will fill out the request. The Requestor may wish to indicate which referenced MDOs are not wanted.	

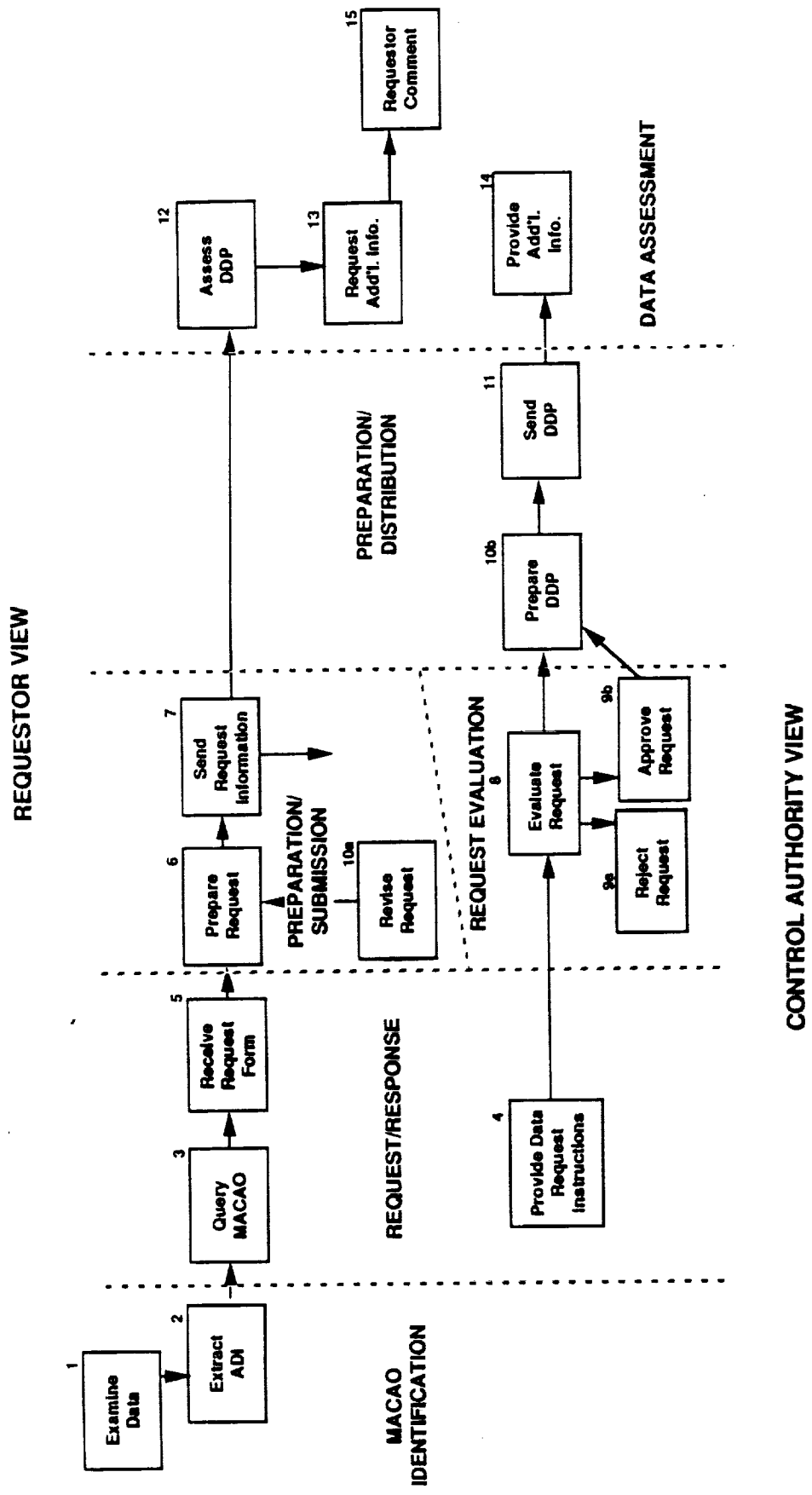


Figure 4.2-4. Obtaining Registered Information Scenario Flow

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Requestor

7. Send Request Information. The Requestor will send the completed request to the MACAO.

10a. Revise Request. The Requestor has the option of revising the request based on comments from the MACAO and re-submitting the revised DDP request. Step 6 and following will be repeated.

12. Assess DDP. The Requestor will evaluate whether the package contains what he requested and if anything else is needed or wanted.

MACAO

8. Evaluate Request. Each piece of referenced information in the request will be checked for release date and availability. This may require coordination with other MACAOs. One of three dispositions will be rendered: approved, rejected, or partial.

9a. Reject Request. The request cannot be accommodated; a reason for the non-approval will be provided to the Requestor and acknowledgement returned. If the request is rejected, step 10a follows.

OR

9b. Approve Request. The approval may be complete or partial. If it is partial, the MACAO will identify those MDOs in the request that cannot be forwarded until their designated release date. Acknowledgement is returned. If approved, step 10b follows.

10b. Prepare DDP. The MACAO assembles the DDP by accessing the requested MDO by *its* ~~it's~~ ADID plus all referenced and related MDOs. For MDOs to be acquired from other MACAOs, see Section 4.4 scenario "DDP Exchange Between MACAOs."

11. Send DDP. The complete DDP will be sent to the Requestor.

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Requestor

13. Request Additional Information. If the Requestor has problems with the registered *metadata*, he contacts the MACAO and may file a DDP Problem Report. Requests for additional information require submission of another request form.

15. Requestor Comment. The Requestor may choose to express concerns, problems, or praise to the MACAO about the process for obtaining registered information.

MACAO

14. Provide Additional Information. The MACAO helps resolve problems with the registered *metadata*, and contacts the RP Originator if necessary and possible.

The MACAO responds to requests for additional MDOs through the process described in this scenario. The MACAO also encourages feedback regarding the interaction process with the Requestor.

4.3 STATUS REPORTING ~~REPORTING STATUS~~

Status Reporting ~~Reporting status~~ is the process by which a lower level MACAO provides details of control activity to a higher level MACAO. A possible scenario follows.

4.3.1 Description of *Status Reporting* ~~Reporting Status~~

A MACAO provides service to RP Originators and *Requestors* ~~requestors~~ of data descriptions primarily as described in the scenarios in Sections 4.1 and 4.2. The CCSDS Secretariat requires reports of the level of activity of registration and distribution. Consequently, each descendant MACAO reports information to *its* ~~an~~ ascendant MACAO. The current minimum set of information to be reported is defined in *reference the Control Authority Procedures* ~~[Ref. [1]]~~. However, additional information may be required locally and requested by an ascendant MACAO. In order to support this reporting requirement, each MACAO will need to produce statistics as described below.

The local MACAO maintains counts of the requests to register *metadata*. Separate counts of rejections and acceptances are made. The number of revisions is counted. The local MACAO maintains counts of the requests for registered *metadata*. Likewise, separate counts of the approved and rejected requests are made. A MACAO may keep records on the reasons for

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rejection. Requests from MACAOs are distinguished from requests from other users. The MACAO assesses MDOs widely used and identifies which are candidates for becoming standard CCSDS objects.

Each year, according to the CA Procedures, this information is tallied and provided in a standard report that is summarized for each Member Agency. The MACAO also provides a list of all registered metadata stored in the local database. The list includes the ADID and title of the MDO.

Intermittent requests for current reports or updates to the *annual yearly* report may occur. A MACAO would respond with an ad hoc report. Each primary MACAO might define additional report formats and reporting schedules as *it they* deems necessary.

4.3.2 Participants in *Status Reporting Reporting-Status*

Participants in the reporting of status are the local MACAO and its next higher level CA organization.

4.3.3 Major Steps in *Status Reporting Reporting-Status*

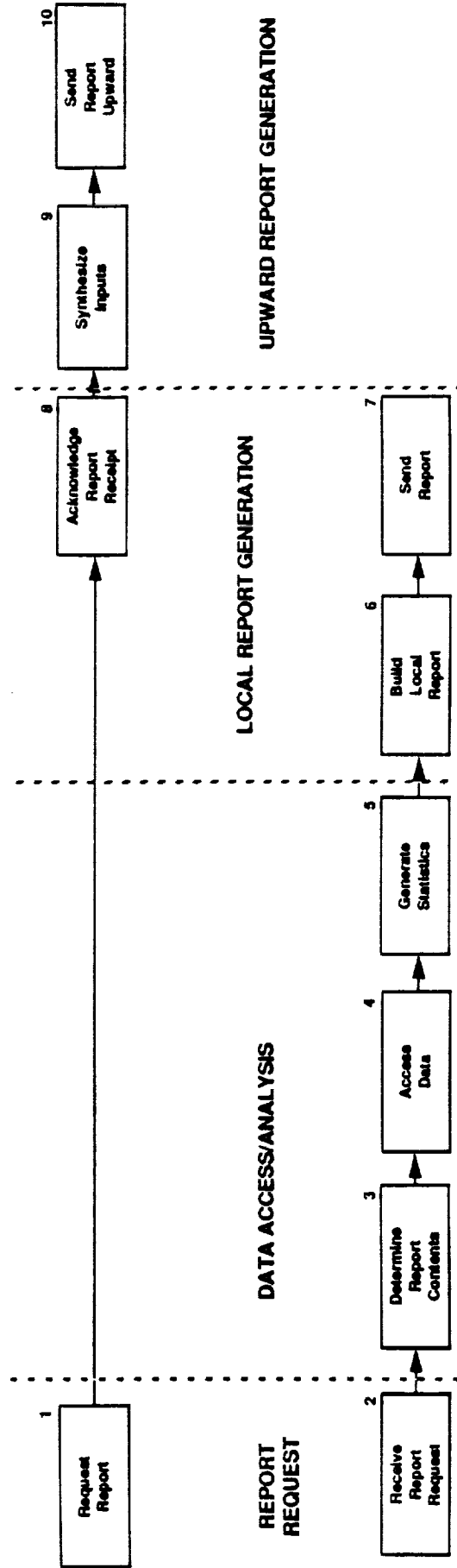
The major steps in the scenario for reporting status are:

- Report request
- Data access/analysis
- Local report generation
- Upward report generation

4.3.4 *Status Reporting Reporting-Status* Scenario

The flow for the Reporting Status scenario is presented in Figure 4.3-1. The text associated with this graphic representation of the flow of the scenario follows immediately.

ASCENDENT MACAO VIEW



LOCAL MACAO VIEW

Figure 4.3-1 Status Reporting Scenario Flow

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Ascendant MACAO

1. Request Report. Whether it is the annual report or an intermittent ad hoc report, the office issues its request.

Local MACAO

2. Receive Report Request. The request is received; the local MACAO acknowledges and determines the due date and format of the report.
3. Determine Report Contents. The 'specific report requirements', which may be the basic annual set or additional information, are determined. Any questions are brought to the ascendant MACAO's attention.
4. Access Data. The MACAO will query the database for both archived information (such as lists of holdings, organization structure) and request activity information (such as RPs received and registered, new ADIDs assigned, MDOs revised, DDPs created and distributed, information exchanged between MACAOs, and widely used MDOs.)
5. Generate Statistics. The various counts and/or lists will be produced. At minimum this includes the counts of request activity parameters to determine volumes of information and levels of activity. Analysis of frequent requests for certain MDOs is performed leading to recommendations for CCSDS standardization.
6. Build Local Report. The information compiled or calculated is put into the report format dictated by the ascendant MACAO.
7. Send Report. Using the medium of communication determined by the ascendant MACAO (but preferably electronic in predefined format), the local MACAO will forward the completed report.

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Ascendant MACAO

Local MACAO

8. Acknowledge Report Receipt. Upon receipt of each Descendant MACAO report, an acknowledgement will be provided. The ascendant MACAO will verify all information is included as requested.

9. Synthesize Inputs. The various local MACAO reports will need to be combined in a meaningful way for continued upward reporting. The MACAO will include its own archived and activity information.

10. Send Report Upward. The report is sent to the requesting MACAO. In this process the ascendant MACAO now functions as a *descendant* ~~Descendant~~ MACAO with respect to reporting.

4.4 DDP EXCHANGE BETWEEN MACAOs

Data exchange between MACAOs is the process by which a MACAO acquires the metadata it needs to respond to a request when some of that metadata is under the control of a different MACAO. A possible scenario follows.

4.4.1 Description of DDP Exchange Between MACAOs

A MACAO receives requests for registered metadata as described in the scenario in Section 4.2, Obtaining Registered Information. The request is for a given MDO; the ADID points to the responsible (primary) MACAO. However, there may be references to other MDOs whose ADIDs point to different, (secondary) MACAOs. The primary MACAO will have the responsibility of *obtaining* ~~tracking down~~ these additional MDOs by contacting the secondary MACAOs.

The primary MACAO issues a request for a given MDO or set of MDOs by providing the ADID to the appropriate secondary MACAO. The requested MDO is provided to the primary MACAO in the form of a DDP.

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If a Requestor's request includes information not under control of a CCSDS Member Agency, the local MACAO may provide the external authority's contact information, or attempt to track down the information. This decision is at the MACAO's discretion.

The primary MACAO is responsible for compiling all the requested information into a DDP — including any external authority contact information that may have been received. *The medium of exchange for the DDP is negotiated between the primary MACAO and the user, as well as between the primary and secondary MACAO(s).*

4.4.2 Participants in DDP Exchange Between MACAOs

The participants in the data exchange process are any two MACAOs.

4.4.3 Major Steps in DDP Exchange Between MACAOs

Major steps in the data exchange process are:

- Identification of MACAOs
- Contact MACAOs
- Response
- DDP Preparation

4.4.4 DDP Exchange Scenario

The flow for the data exchange scenario is presented in Figure 4.4-1. The text associated with this graphic representation of the flow of the scenario follows immediately.

Primary MACAO

Secondary MACAO

1. Read Referenced ADIDs. Embedded in a Requestor's request may be *references to MDOs* (identified by ADIDs) controlled by other MACAOs. Each unique other MACAO ID is extracted, and is associated with the ADID.

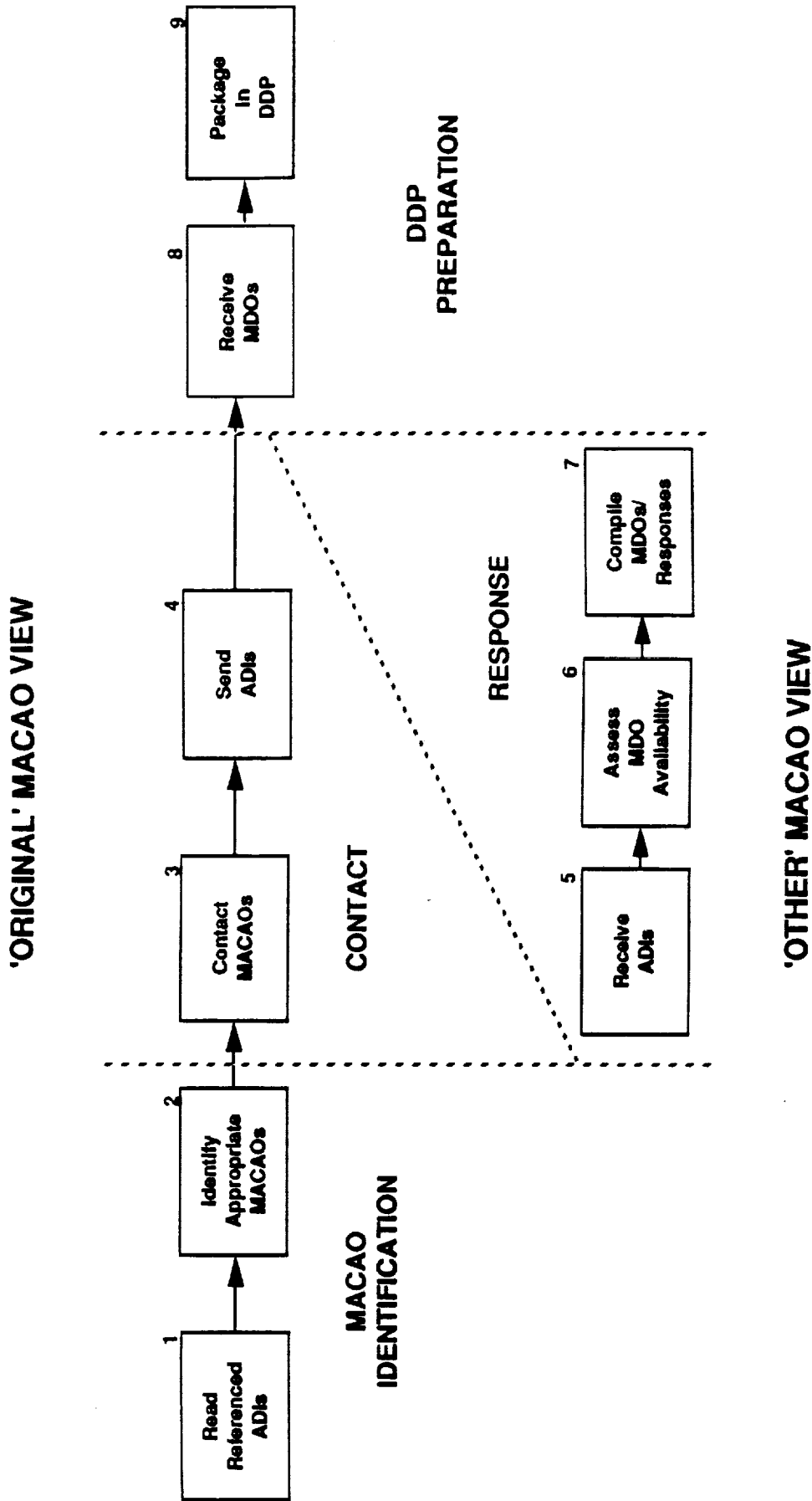


FIGURE 4.4-1. Data Exchange Between MACAOs Scenario Flow

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Primary MACAO

2. Identify Appropriate MACAOs. Using the latest annual report containing the complete CA organization, the MACAO identifies the other (secondary) MACAO's access mechanism.
3. Contact MACAOs. The primary MACAO will communicate with each secondary MACAO using the most expeditious medium common to both of them.
4. Send ADIDs. The primary MACAO will request one or more ADIDs identifying MDOs needed from the secondary MACAO by providing their ADIDs.
8. Receive DDPs. Within the 5 days of the original request, the MACAO should receive all MDOs from each of the secondary MACAOs. If not, the MACAO should determine what is delaying the response. The MACAO will verify the *that* appropriate MDOs have been received.
9. Prepare Composite DDP. When the requested MDOs are received, the MACAO packages them into a composite DDP together with its locally registered MDOs for the ADID requested. See scenario in Section 4.2 "Obtaining Registered Information", step 10b.

Secondary MACAO

5. Receive ADIDs. The secondary MACAO will accept the ADIDs for the MDOs that are under its control.
6. Assess MDO Availability. Just as with any other request for MDOs, the inter-MACAO request will be assessed for compliance with procedures for release.
7. Prepare and Send DDPs. The secondary MACAO will collect and compile all the MDOs that have been requested, or prepare an explanation of why an MDO cannot be supplied. The MDOs/ responses are packaged as a DDP for each ADID and sent to the primary MACAO.

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4.5 REGISTERED MDO REVISION

The process for revising MDOs that have already been registered is described in this section.

4.5.1 Description of Registered MDO Revision

The SFDU concept assumes that MDOs to be registered will not require frequent revisions. Information that has a known dynamic nature is assumed to be exchanged within the labeled data object itself, not through MDOs registered with MACAOs. However, the need to revise MDOs exists. Revision of registered MDOs parallels the basic registration process described in Section 4.1, MDO Registration.

The interaction occurs between the MACAO and another party (*either the RP Originator or Revising Authority*) attempting to register a data description. The MACAO evaluates the RP for inclusion as a registered MDO. However, in this case, the data description in the RP has been previously registered.

4.5.1.1 Types of MDOs

The revision process is governed by the type of MDO to be registered and the point in the life cycle of the MDO. The types of MDOs are: 1) an MDO that describes a specific set of data objects and 2) an MDO that will be used by other data producers to create objects that conform to that MDO.

The first type of MDO is created for a specific labeled data object. The producer of the labeled data object, or an RP Originator acting for the producer, prepares the description and submits the MDO as an RP to a MACAO. This MDO may be revised any time at the discretion of the RP Originator and/or Revising Authority. It would be marked "revisable" in the RP Submission information (see Figure 4.1-2). An example of this type of MDO would be a DDR geared for a specific instrument's data. If the data description needs to change due to improved understanding of the instrument's operation or to account for an error, a revision to the MDO would be beneficial to all users. At any time, the RP Originator may change the MDO from revisable to non-revisable. For a more detailed discussion of the application of this type of MDO see example User Scenario 1 in Annex G. A particular consideration that should be taken is using a status of revisable for MDOs

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that might be referenced from within another RP. If an MDO gets revised and the revision's implication is not known to a submitter referencing the MDO, there is some level of risk of incompatibility between the metadata and data.

The second type of MDO is a multi-use description to which many data producers may conform in the preparation of their labeled data objects. These MDOs should not change. They would be marked "non-revisable" in the RP Submission information (see Figure 4.1-2). An example of this type of MDO is a DED which may be incorporated by reference into descriptions of other data. An update to this DED, such as adding new terms, would be registered as a new DED with a new ADID. The original DED remains available from the MACAO. At no time can a non-revisable MDO be changed to revisable. For a more detailed discussion of the application of this type of MDO see example User Scenario 2 in Annex G.

All MDOs to be registered will have a "release date" specified by the RP Originator. This date may be any time from the time of registration to a future date. This information is noted in the RP Submission Information (see Figure 4.1-2). Until the release date is reached, a registered MDO would not be provided to Requestors. Any MDO may be revised before the release date; however, only an MDO registered as "revisable" may be revised after its release date has passed.

4.5.1.2 Life Cycle of MDOs

The two types of MDOs described above, specific and multi-use, undergo different life cycles. The respective life cycles for each of the types of MDOs appear in Figure 4.5-1 and 4.5-2.

For a specific MDO, the initial MDO may be defined before the labeled data objects it is to describe is defined. Therefore the correctness of the initial MDO may be very uncertain. This MDO will likely go through a testing phase which may lead to changes. At some future time, labeled data object production software or processing software may need to be generated and then a registered ADID for the MDO may be needed for incorporation into the software. Revision one of the MDO is generated. At this point the MDO is revisable, but not releasable. Additional testing may occur leading to other changes. *Those changes will not result in a revision number change, but will need to be tracked by the RP Originator.* (~~Revision J~~). At some point in time the MDO describing the labeled data objects has reached a stable state and can be released for access by the general community of potential labeled data object users (Revision I X). Although it is releasable, it still

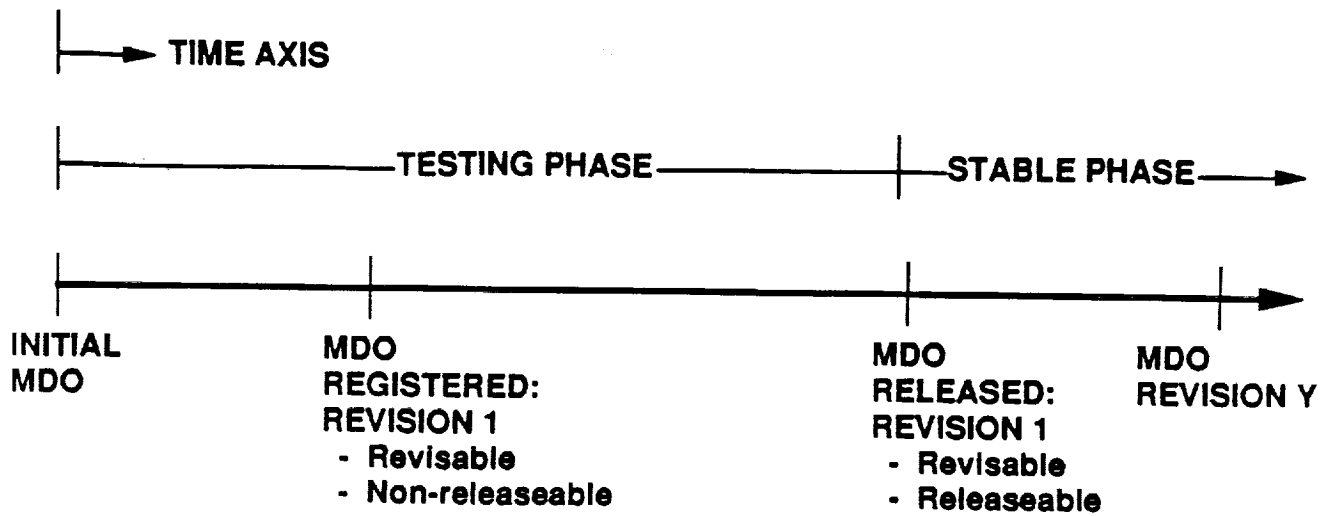


Figure 4.5-1. Life Cycle for "Specific" MDOs.

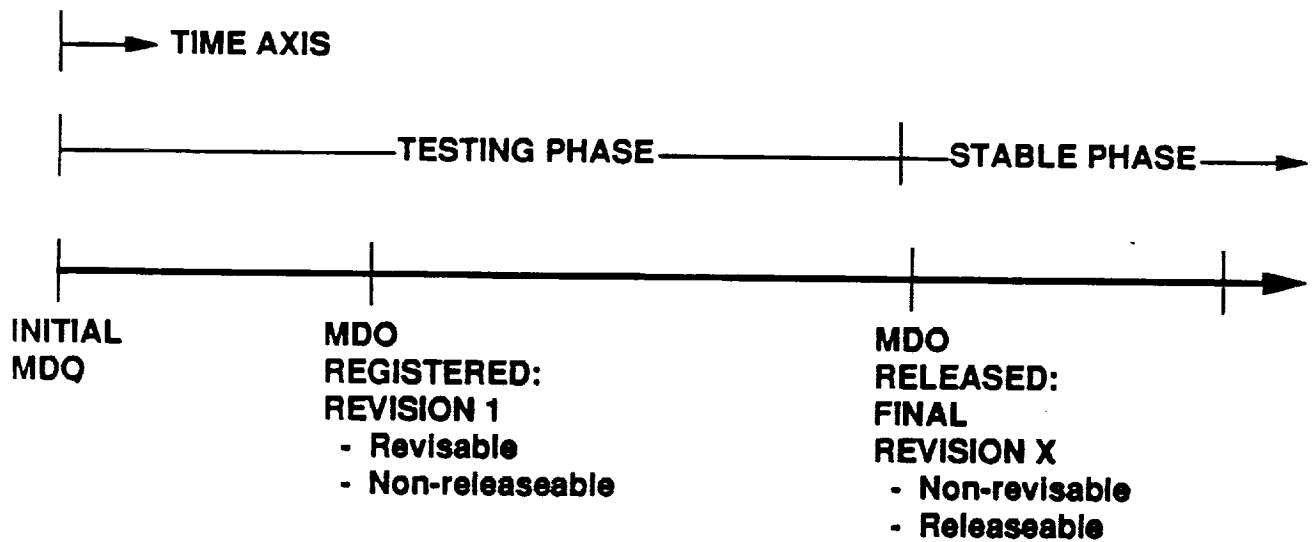


Figure 4.5-2. Life Cycle for "Multi-Use" MDOs.

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may be revised. Updates to the registered MDO may still be required to maintain the best MDO needed to describe all the labeled data objects produced in the past, as well as all those anticipated to be produced in the future (Revision Y).

For a generic MDO, the initial MDO will be generated with the intent that any number of data producers may produce labeled data objects that conform to this MDO. To ensure that this can be reasonably done, the MDO may undergo a testing phase that includes local production of labeled data objects in conformance with the initial MDO. Updates to the initial MDO may result from the testing experience. *Those changes resulting from the testing will be tracked by the RP Originator, but will not cause the revision number to be incremented.* The MDO is submitted for registration once it satisfactorily meets the objectives of the producer (becoming Revision 1). At this point the MDO is revisable, but not releasable. The release date may be delayed for programmatic reasons, but the MDO is unlikely to be revised (~~Revision J if it is~~) over this period since it passed the earlier testing. Once it reaches its release date and enters its stable phase, it is available to Requestors. At this point it can not be revised, even by the RP Originator, since unknown data producers may be relying on it and can not afford to have it changed. Any desired changes must be reflected in a new MDO which would receive a new ADID.

4.5.1.3 Revision Process

To revise a registered MDO, the Revising Authority (or the RP Originator) contacts the MACAO to indicate a revision is in the offing. The Revising Authority submits the Presubmission Information (see Figure 4.1-1) in the manner required by the MACAO. This information will include the ADID of the MDO to be revised; inclusion of the ADID identifies the RP as a request for a revision.

The MACAO receives the Presubmission Information. The MACAO assesses whether the revision can be allowed by checking the RP Originator name, the Revising Authority name, the release date, and the Revision Type of the original (previous) revision *and whatever other measures seem appropriate*. If the request is made by anyone other than the RP Originator or the designated Revising Authority, the request will be denied. Assuming the Revising Authority is correct, and the release date has not been reached, the revision will be allowed. If the release date has passed, the revision will be allowed only if the Revision Type is "Revisable".

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The MACAO provides the disposition of the revision request to the Revising Authority. Assuming the revision is allowed, the Revising Authority prepares a revised RP containing the changes. This RP will be substituted for the previous Revision of the MDO in its entirety, since the MACAO will be unable to make changes internal to the MDO. The revision RP contains the *same basic* information as presented in Figure 4.1-2, RP Submission Information, *but with the ADID filled in*. The revision RP is sent to the MACAO.

The evaluation and disposition of the revision RP follows the same process as the MDO Registration scenario in Section 4.1. The MACAO evaluates the revision RP for completeness and correctness with respect to its submission criteria. An RP Acknowledgement/Disposition, which includes the results and/or status of the RP evaluation, is sent to the Revising Authority within 5 working days. (See Figure 4.1-3). The RP may be accepted or rejected. If rejected, the reason for rejection is provided to the *RP Originator/Revising Authority* with the option of correcting the problem and resubmitting the revision RP.

Acceptance of the revision RP results in a new revision *number* (incremented by one) of the MDO with the same ADID. The previous revision of the MDO is also maintained by the MACAO.

The Revising Authority is notified of the acceptance. The MACAO publishes availability notices of the revised MDO after the release date has been reached.

4.5.2 Participants in Registered MDO Revision

Participants in the revision of registered MDOs are the MACAO (where the MDO is registered) and the Revising Authority. The Revising Authority initiates the revision activity; the MACAO ensures the revision is allowed before accepting the changes.

4.5.3 Major Steps in Registered MDO Revision

The major steps in the revision scenario are:

- Presubmission
- Preparation/Submission
- Evaluation

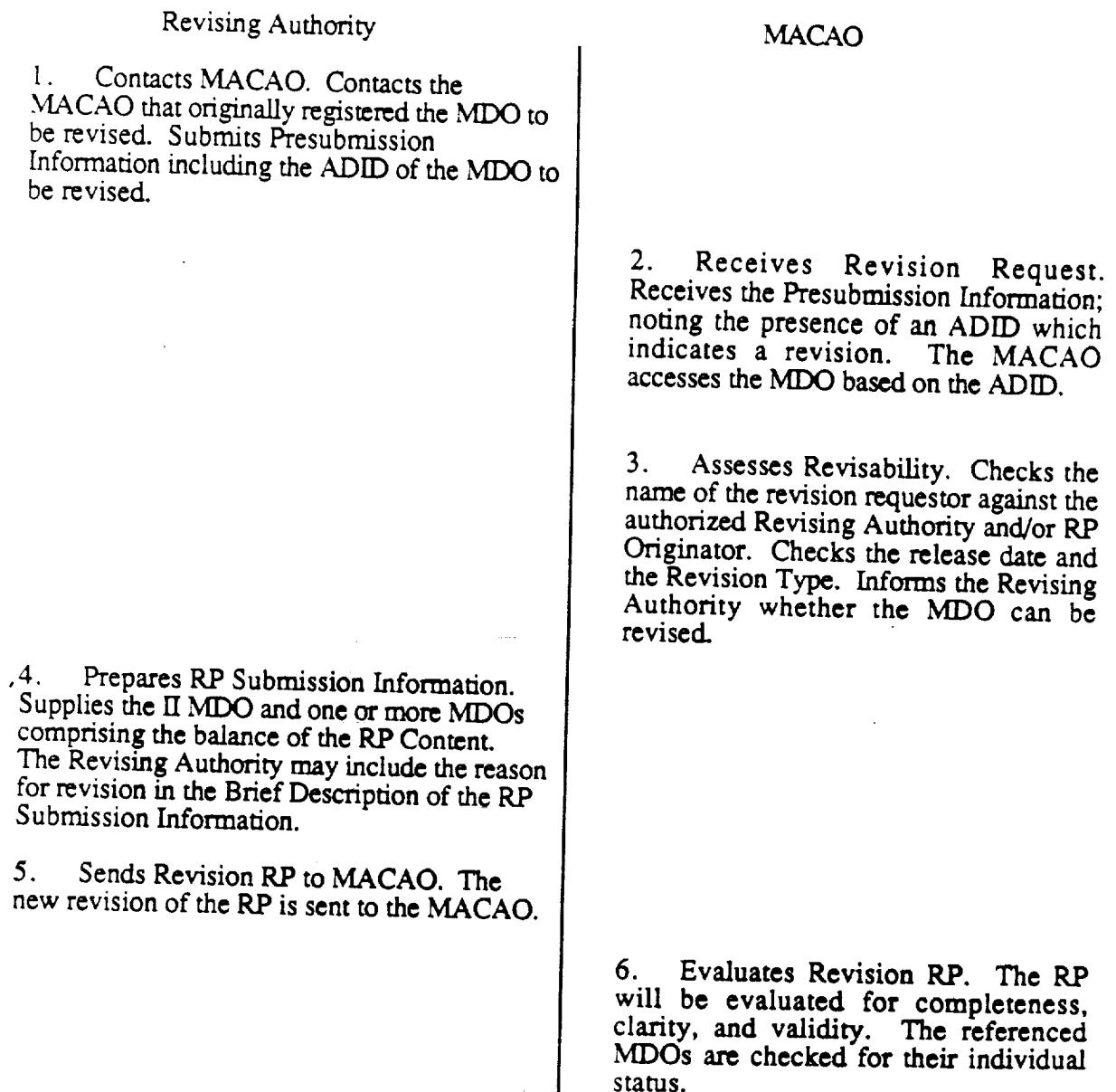
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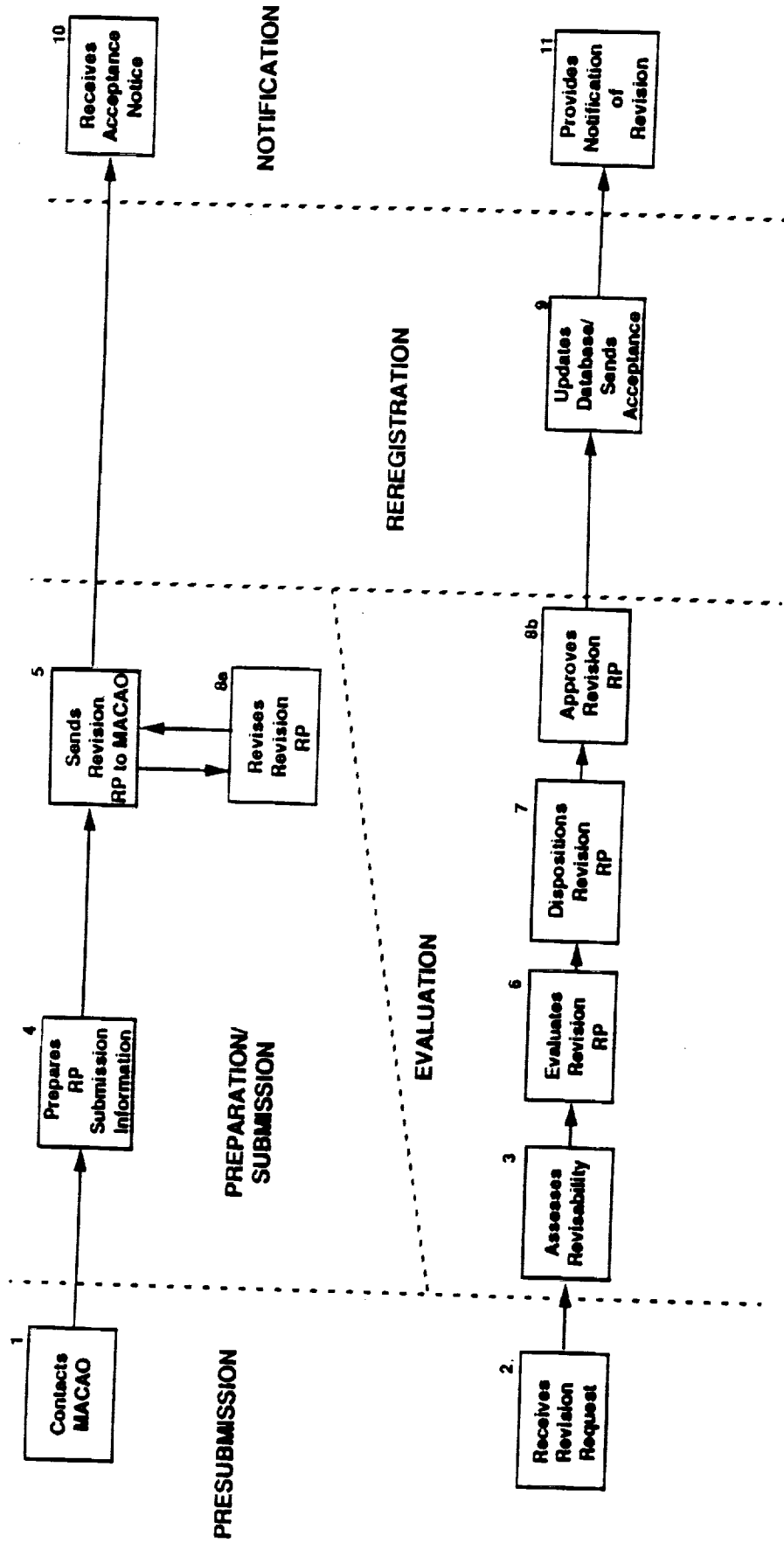
- Reregistration
- Notification

4.5.4 Revision of Registered MDO Scenario

The flow for the Revision of Registered MDOs scenario is presented in Figure 4.5-3. The text associated with the graphic follows immediately.



REVISING AUTHORITY VIEW



CONTROL AUTHORITY VIEW

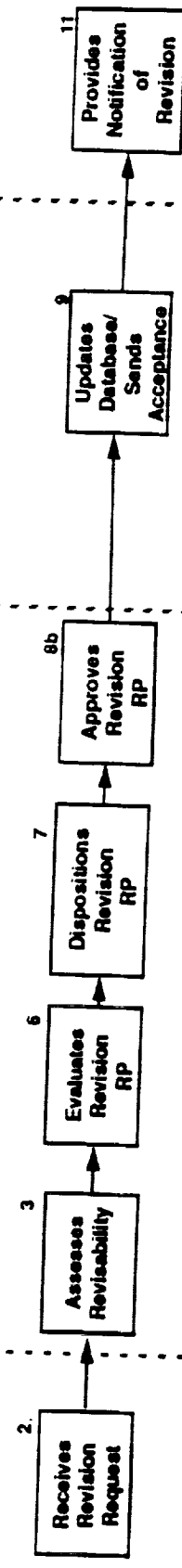


Figure 4.5-3. Registered MDO Revision Scenario Flow

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Revising Authority

MACAO

8a. Revises Revision RP. The problems causing non-acceptance will be rectified. Step 5 and following will be repeated.

10. Receives Acceptance Notice. Approval of the revision RP will be acknowledged to the Revising Authority.

7. Dispositions Revision RP. The MACAO provides status of the revision RP to the Revising Authority. The revision RP is either: 1) held up in review, 2) contingently accepted, 3) rejected due to problems or 4) accepted. If case 1), the expected date of completion is provided. If case 2) or 3), the Revising Authority may modify the RP based on explanations of the problems provided by the MACAO in the Acknowledgement/Disposition notice. Step 8a follows at the discretion of the Revising Authority. If case 4), the MACAO goes on to approval in Step

8b. Approves Revision RP. After one or more evaluation cycles, the revision RP is approved and Acknowledgment/Disposition notice is prepared.

9. Updates Database/Sends Acceptance. All new information contained in the revision RP will be added to the MACAO's database. The Revision number will be incremented by one.

11. Provides Notification of Revision. In a bulletin board manner, announcement of the revision and key identifying information will be made available in the medium *and to the extent* of the MACAO's choice to all other MACAOs.

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4.6 RUNNING QUERIES AND REPORTS

Running queries and reports is the process by which RP Originators, Requestors, and other MACAOs can obtain current knowledge of information maintained by a given MACAO.

4.6.1 Description of Running Queries and Reports

In order for the CA users to get maximum benefit from the system, they should be able to have access to current (relevant) information. Examples of things that would be considered relevant are: status of a request, lists of newly registered or revised metadata, changes in procedures. *Ideally, the users would* should be able to have direct access to the MACAO's database for this function.

4.6.2 Participants in Running Queries and Reports

The participants in this function are the user and the MACAO. The user may be an RP Originator, a Requestor, or other MACAO.

4.6.3 Major Steps in Running Queries and Reports

The major steps in the running queries and reports process are:

- Report request
- Data access
- Local report generation

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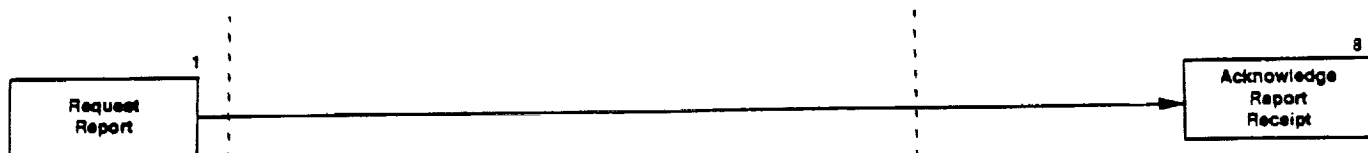
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4.6.4 Running Queries and Reports Scenario]

The flow for the Running Queries and Reports Scenario is presented in Figure 4.6-1. The text associated with this graphic representation of the flow of the scenario follows immediately.

User	Local MACAO
1. Request Report. Whether it is the annual report or an intermittent ad hoc report, the office issues its request.	2. Receive Report Request. The request is received; the local MACAO acknowledges and determines the due date and format of the report.
	3. Determine Report Contents. The 'specific requirements', which may be the status of a request or listing of new RPs, are determined.
	4. Access Data. The MACAO will query the database based on the user's request parameters.
	5. Generate Statistics. The various counts and/or lists (if applicable) will be produced. Analysis of frequent requests (or types of requests) performed leading to possible standardization of additional local reports.
	6. Build Local Report. The information compiled or calculated is put into the report format determined by the local MACAO.
	7. Make Report Available. Using the local MACAO system, the local MACAO will make the completed report available for the user requesting it.
8. Acknowledge Report Receipt. Upon receipt of the report, an acknowledgement will be provided.	

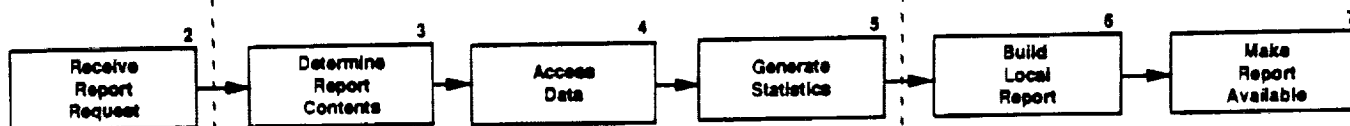
USER VIEW



REPORT REQUEST

DATA ACCESS

LOCAL REPORT GENERATION



LOCAL MACAO VIEW

Figure 4.6-1 Running Queries and Reports Scenario Flow

ANNEX A

LIST OF ACRONYMS

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ANNEX A

LIST OF ACRONYMS

ADI	Authority and Description Identifier
CA	Control Authority
CCSDS	Consultative Committee for Space Data Systems
DDP	Data Description Package
DDL	Data Description Language
DDR	Data Description Record
DDU	Description Data Unit
DED	Data Entity Dictionary
DIL	Data Interchange Language
II MDO	Identification Information Metadata Object
JPL	Jet Propulsion Laboratory
MACAO	Member Agency Control Authority Office
MDO	Metadata Object
PI	Principal Investigator
PR	Problem Report
P2	Panel 2
RP	Registration Package
SFDU	Standard Formatted Data Unit

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ANNEX B
GLOSSARY

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ANNEX B

GLOSSARY

- Ascendant MACAO:** The higher level organization to which a MACAO is responsible for its operation.
- CA Annual Report:** A report provided yearly to the CCSDS Secretariat, or the CA Agent, that contains status of MACAO holdings and statistics of registration and request activity.
- Consumer:** A user of data; a description of the data has been registered with a MACAO.
- Control Authority:** A collection of CCSDS Member Agency organizations (Control Authority Offices), under the auspices of the CCSDS Secretariat, responsible for registering, archiving, and distributing the data description, i.e., metadata, upon request.
- Control Authority Agent:** An organizational entity that has agreed to provide resources in supporting the discharging of the CA responsibilities of the CCSDS Secretariat. The WDC-A-R&S has been requested to act as this agent. Overall responsibility rests with the CCSDS Secretariat.
- Data Description Language (DDL):** A formal notation for specifying the conceptual structure of data objects.
- Data Description Package:** An MDO instance, to be disseminated by a MACAO and possibly comprised of other MDO instances, that carries its instance-identifier, which is called an ADI.
- Data Description Record:** A set of DDL or DIL statements that convey the information necessary to parse the values of a data object.
- Data Element:** The smallest named item or items of data for a given application.
- Data Entity Dictionary:** A database that contains the definitions and supplementary information which describes data entities.
- Data Interchange Language (DIL):** A notation for describing the physical representation of data.
- Data Object:** A collection of data elements that are aggregated for or by a specific application.
- Description Data Unit:** *A data unit containing information that describes other data and conforms to CCSDS specifications.*
- Identification Information Metadata Object:** The MDO of an RP that contains information about the RP as an entirety.
- Member Agency Control Authority Office:** An instance of the Control Authority, under the auspices of a CCSDS *Member Agency* ~~member-agency~~ organization.

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Metadata Object: An identified collection of metadata.

Non-revisable MDO: An MDO, registered with a MACAO, that may not be revised once its Release Data is exceeded.

Obtaining Registered Information: The act of requesting an instance of a data description identified by its ADI from a Control Authority Office.

Producer: A generator of data objects whose description is to be registered with a MACAO.

RP Content: The MDOs comprising an RP, i.e., an II-MDO and one or more other MDOs.

RP Originator: *That individual or organization that submits the Registration Package to a MACAO and accepts responsibility for the RP Content.*

Referenced MDO ADI: ~~The ADI of an MDO which a) has been~~ A previously registered MDO that, b) is not included in the RP being constructed, which c) is necessary for a complete and accurate data description. *Its ADID appears in the referencing MDO.*

Registrant: That individual or organization that submits the Registration Package to a MACAO and accepts responsibility for the RP content.

Registration: The act of submitting an instance of a data description to a Control Authority Office which is assigned a unique ADI.

Registration Package: An instance of a data description, that may refer to other registered data descriptions, and that is intended to be registered by a MACAO. Registration implies the assignment of a unique ADI. The instance is referred to as an MDO.

Requestor: That individual or organization that requests registered data descriptions from a MACAO.

Revisable MDO: An MDO, registered with a MACAO, that may be revised at the direction of the RP Originator or the RP Revising Authority.

Revising Authority: That individual or organization that has been designated, in the registration of an MDO with a MACAO, as having the authority to submit a revision to that MDO.

ANNEX C
CAPABILITIES IN VARIOUS
CONTROL AUTHORITY ENVIRONMENTS

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ANNEX C

CAPABILITIES IN VARIOUS

CONTROL AUTHORITY OPERATING ENVIRONMENTS

This annex provides a list of capabilities that a Control Authority might require to perform the various CA operations, and whether the capability could be supported in a given type of operating environment. The last three columns are identical; however they imply different levels of "power", and are therefore all included.

Capability	Operating Environment	Manual	Single User Micro	Single User Micro With Communications	Mini/Main With Comm	Network
Voice Communication		√	√	√	√	√
Mail Communication		√	√	√	√	√
Fax Communication		√	√	√	√	√
Electronic File Transfer				√	√	√
Online Registration/ Request				√	√	√
Online Tutorials				√	√	√
Testing			√	√	√	√
Problem Reporting		√	√	√	√	√
Data Manipulation			√	√	√	√
Data Analysis			√	√	√	√
Registration/Request Tracking		√	√	√	√	√
Elimination/Reduction of Redundant Data Entry				√	√	√
Automated Status Report Generation				√	√	√
Automatic Generation of Logs				√	√	√

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ANNEX D
AUTOMATED CONTROL AUTHORITY EXAMPLE

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ANNEX D

AUTOMATED CONTROL AUTHORITY EXAMPLE

(See "Automated Control Authority Registration Process", 9/07/89, Lee Johnsen, JPL, OTT/89/P2/N5 and "Control Authority Scenarios: Registration and Dissemination", 2/06/90, Lee Johnsen, JPL, CCSDS Panel 2 Action Item OT-M-08).

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ANNEX F E

DEFINITION OF MACAO DATA ENTITIES

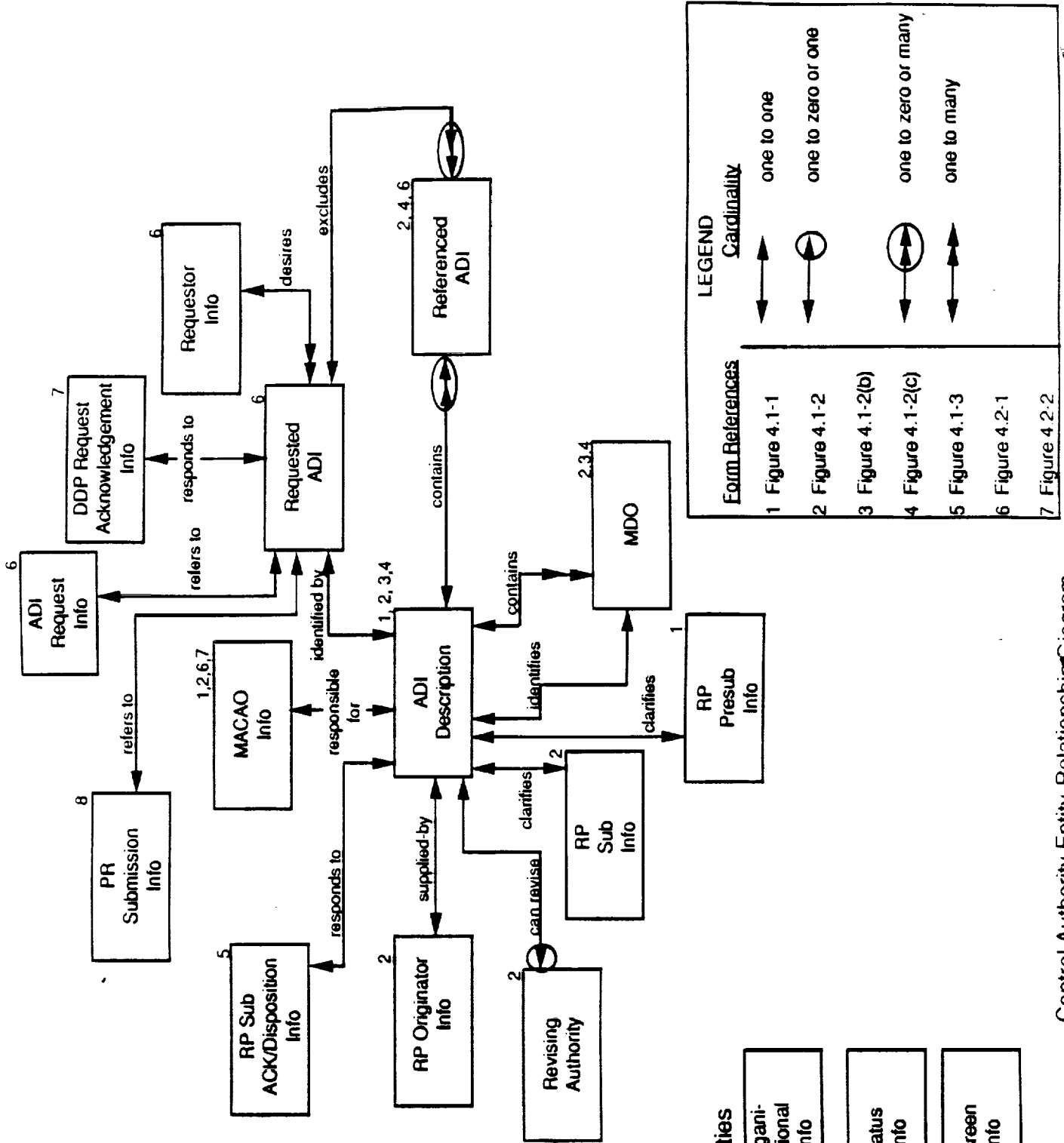
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ANNEX F E

DEFINITION OF MACAO DATA ENTITIES

An Entity-Relationship diagram is presented for a Control Authority. The tables following the diagram provide definitions of the data entities. Each data entity defined is an element that appears on the illustration forms for data registration and request included in this document. The table is organized alphabetically by data entity; in the case where there is a generic data entity underlying the specific usage, the generic entity is enclosed in brackets []. The form(s) on which a given data element appears are coded with a number. The translation for those codes is:

1. Registration Package (RP) Presubmission Information
2. Registration Package (RP) Submission Information (Part 1)
3. Registration Package (RP) Submission Information (Part 2)
4. Registration Package (RP) Submission Information (Part 3)
5. Acknowledgement/Disposition of Receipt of Registration Package (RP)
6. Request for Registered Information
7. Acknowledgement of Request for Registered Information
8. DDP Problem Report



Form References	Cardinality
1 Figure 4.1-1	one to one
2 Figure 4.1-2	one to zero or one
3 Figure 4.1-2(b)	one to zero or many
4 Figure 4.1-2(c)	one to zero or many
5 Figure 4.1-3	one to many
6 Figure 4.2-1	
7 Figure 4.2-2	

Control Authority Entity-Relationship Diagram

Data Entity Description	Form								Size	Type	Entity Type
	1	2	3	4	5	6	7	8			
ADI - The identifier assigned to registered metadata by a MACAO. It is constructed per the Procedures. A RP Originator will only supply an ADI if the metadata to be registered are a revision of previously registered metadata. A Requestor must always supply an ADI to obtain registered metadata.	x	x			x				8	x	ADI Description; MDO; submission Acknowledgement
ADI Relationships - A description of the relationship between a MDO and MDOs it references.				x					TBS	x	MDO
ADIs of Referenced MDOs ADIs - The identifiers for registered MDOs that are referenced within the requested MDO that the requestor does not want to include in this RP but are necessary for its interpretation [=ADI]				x		x			TBS	x	Referenced ADI
Brief Description - A description of a MDO.									TBS	x	ADI Description
Brief Title - A concise description of a MDO by which it might be referenced.	x	x			x				40	x	ADI Description
Comments - Additional information to clarify status of registration or transmission media.					x	x			TBS	x	RP Sub Ack/Disposition Info; ADI Rpt. Info
Content Language Interpretation Language - an indication of the language in which the MDO is presented.									TBS	x	MDO
Date DDP Received - The date that the DDP was received by the requestor. [=date]								x	10	x	PR Sub Info
Date of Release by MACAO - The date the MACAO makes the registered MDO available to the requestor. [=date]									10	x	RP Sub Info

Data Entity Description	Form								Size	Type	Entity Type
	1	2	3	4	5	6	7	8			
DDP Release - An indicator of whether the request is released as a DDP.						x			TBS	x	DDP Request Acknowledgement Info
Date of Response - The date that the MACAO responds to either the request to register or release the metadata. [=date]				x		x			10	x	RP Sub Ack/Disposition Info; DDP Request Acknowledgement
Date of Request - The date a consumer submits the request for registered information. [=date]				x					10	Info x	ADI Request Info
Date of Submission - The date, in yyyy-mm-dd format, on which information is submitted to the MACAO. [=date]	x	x						x	10	x	RP Presub Info; ADI Description; PR Sub Info
Description of Problems - description of problem.								x	TBS	x	PR Sub Info
Disposition - The decision the MACAO makes with respect to the request to register metadata.				x					TBS	x	RP Sub Ack/Disposition Info
Exclude all referenced CCSDS ADIs - An indicator of whether to exclude all CCSDS ADIs referenced in the requested MDO.					x				TBS	x	ADI Request Info
Exclude all referenced MACAO ADIs - An indicator of whether to exclude all MDOs referenced in the requested MDO from the DDP.						x			TBS	x	ADI Request Info
Explanation of Contingencies - A description of the contingencies being levied on the acceptance of the metadata to be registered.				x					TBS	x	RP Sub Ack/Disposition Info

Data Entity Description	Form								Size	Type	Entity Type
	1	2	3	4	5	6	7	8			
Explanation of Rejection /Recommendation - A description of why the request to register metadata was denied; related to the one or more categories of reasons for rejection.				x					TBS	x	RP Sub Ack/Disposition Info
Internal Tracking No. - An identifier to enable a given MDO to be associated with other and/or with Referenced MDO ADIs.			x						TBS	x	MDO
Location of RP Content on Proposed Media - description of the location of the MDOs on the media being employed.	x				x				TBS	x	RP Presub-Info; DDP Request Acknowledgement Info
MACAO Acceptance - RP Presubmission Information acceptance status	x								TBS	x	RP Presub Info
MACAO ADI/Anticipated Release Date - A list of the ADIs of the MDOs within a requested ADI that cannot be released at the time of response, along with the date that each un-released ADI might be available for release. [=ADI, =date]					x				TBS	x	DDP Request Acknowledgement Info
MACAO ID - The identifier of the local CA office.	x	x		x	x	x	x		4	x	MACAO Info
MACAO Name - The name of the local Control Authority office, including the Member Agency's name.	x	x		x	x	x			TBS	x	MACAO Info
Name of MACAO Agent - Name of person at the MACAO responsible for DDP delivery.						x	x		TBS	x	DDP Request Acknowledgement Info; PR Submission Info
Metadata Content - the data description.			x						TBS	x	MDO

Data Entity Description	Form								Size	Type	Entity Type
	1	2	3	4	5	6	7	8			
Problem Report Submitter's Name - The full name of the person submitting the problem report for the DDP.								x	TBS	x	PR Sub Info
Proposed Media and Protocol for RP Content Proposed/preferred transfer - A description of the physical medium on which this MDO is to reside.	x				x	x			TBS	x	RP Presub Info; ADI Request Info; DDP Request Acknowledgement Info
Reason for Non-Release - An explanation for why the MDO of the requested ADI is not being released.								x	TBS	x	DDP Request Acknowledgement Info
Reason for Rejection - A general category for why a request to register metadata was denied.							x		1	x	RP Sub Acknowledgement Info
Referenced MDO CCSDS ADIs - The CCSDS identifiers referenced within the RP to be registered.									TBS	x	Referenced ADI
Referenced MDO MACAO ADIs - The identifier (ADI) for each previously registered MDO referenced within the RP.									TBS	x	Referenced ADI
Registration Identifier/ADI of previously registered MDO - A unique alphanumeric designation assigned to a RP Submission.	x	x					x		TBS		RP Presub Info; RP Sub Info
Relationship with other MDOs - A description of the relationship of a given MDO included in an RP to any other MDOs in the RP.								x	TBS	x	MDO
Release Date - The date after which the producer permits the registered MDO to be available. [=date]									10	x	ADI Description

Data Entity Description	Form								Size	Type	Entity Type
	1	2	3	4	5	6	7	8			
Requested ADI - The identifier of the registered MDO that is being requested. [=ADI]						x	x	x	TBS	x	Requested ADI; PR Sub Info
Requestor's Mailing Address - The mailing address at which the requestor can be contacted. It should include building & room numbers, city, state, zip, country. [=address]						x			TBS	x	Requestor Info
Requestor's Affiliation - The full name of the organization with which the requestor is affiliated. It should include organization codes if they exist. [=affiliation]						x			TBS	x	Requestor Info
Requestor's Electronic Mail Address - The complete user name / system syntax. [=email address]						x			TBS	x	Requestor Info
Requestor's Name- The full name of the person who submitted the request for the registered MDO. [=name]						x		x	TBS	x	Requestor Info
Revising Authority's Address - The mailing address at which the revising authority can be contacted. It should include building & room numbers, city, state, zip, country. [=address]						x			TBS	x	Revising Authority
Revising Authority's Affiliation - The full name of the organization with which the revising authority is affiliated. It should include organization codes if they exist. [=affiliation]						x			TBS	x	Revising Authority
Revising Authority's Electronic Mail Address - The complete user name/system syntax. [=email address]						x			TBS	x	Revising Authority
Revising Authority Name - The full name of the person(s) who are authorized to revise the metadata being registered. [=name]						x			TBS	x	Revising Authority
Revision - A number assigned for a given ADI; it is '1' the first time an ADI is assigned to the MDO.						x		x	2	9	ADI Description; MDO

Data Entity Description	Form								Size	Type	Entity Type
	1	2	3	4	5	6	7	8			
Revision Type - an indicator of whether the MDO can be modified after the release date.	x	x							1	A	ADI Description; MDO
RP Originator's Mailing Address - The mailing address at which the RP Originator can be contacted. It should include building & room numbers, city, state, zip, country. [=address]	x	x							TBS	x	RP Originator Info
RP Originator's Affiliation - The full name of the organization with which the RP Originator is affiliated. It should include organization codes if they exist. [=affiliation]	x	x							TBS	x	RP Originator Info
RP Originator's Electronic Mail Address - The complete user name/system syntax. [=email address]	x	x							TBS	x	RP Originator Info
RP Originator's Name - The full name of the person who is registering the metadata [=name]	x	x		x					TBS	x	RP Originator Info
Submitter's Address - The mailing address at which the submitter of the problem report can be contacted. It should include building & room numbers, city, state, zip, country. [=address]								x	TBS	x	PR Sub Info
Submitter's Affiliation - The full name of the organization with which the submitter of this form is affiliated. It should include organization codes if they exist. [=affiliation]								x	TBS	x	PR Sub Info
Submitter's Electronic Mail Address - the complete user-name/system syntax. [=email address]								x	TBS	X	PR Sub Info
Test Data MDO Included - Indicator of whether one of the MDOs in the package is for the test data.									1	x	RP Presub Info

2

Data Entity Description	Form								Size	Type	Entity Type
	1	2	3	4	5	6	7	8			
Test Performed - Indicator of whether a test was performed for the data related to the registered metadata.	x								1	x	ADI Description
Type - An indication of the type of information in the MDO.			x						TBS	x	MDO

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ANNEX E F

SAMPLE FORMS FOR MACAO INTERACTION

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Registration Package (RP) Presubmission Information

MACAO Name	MACAO ID	ADID (if revision)
Date of Submission (yyyy-mm-dd)		Registration Identifier
RP Originator's Name		RP Originator's Affiliation
RP Originator's Mailing Address		
RP Originator's Electronic Mail Address		
Brief Title for RP Content (≤ 40 characters)		
Proposed Media and Protocol for RP Content A) <input type="checkbox"/> Electronic Transfer <input type="checkbox"/> Text <input type="checkbox"/> Binary <input type="checkbox"/> Telemail C) <input type="checkbox"/> 3.5" Diskette (IBM) <input type="checkbox"/> 720 KB <input type="checkbox"/> 1.44 MB E) <input type="checkbox"/> Bernoulli Cartridge <input type="checkbox"/> 5.25" <input type="checkbox"/> 10 MB <input type="checkbox"/> 8.0" <input type="checkbox"/> 20 MB B) <input type="checkbox"/> 3.25" Diskette (Macintosh) <input type="checkbox"/> 800 KB <input type="checkbox"/> 1.4 MB D) <input type="checkbox"/> 5.25" Diskette (IBM) <input type="checkbox"/> 360 KB <input type="checkbox"/> 1.2 MB F) <input type="checkbox"/> 0.5" Magnetic Tape (9 Track) <input type="checkbox"/> 6250 BPI <input type="checkbox"/> 1600 BPI <input type="checkbox"/> 800 BPI G) <input type="checkbox"/> Other _____		
Location of RP Content on Proposed Media A) <input type="checkbox"/> RP Content will be message content B) <input type="checkbox"/> _____ (File Name) F) <input type="checkbox"/> File Location on Magnetic Tape _____ G) <input type="checkbox"/> Other: _____ _____ _____		
MACAO Acceptance: <input type="checkbox"/> Accepted <input type="checkbox"/> Accepted with Contingency <input type="checkbox"/> Not Accepted		

"Registration Package" (RP) Submission Information

Part 1. Identification Information MDO

Page ___ of ___

MACAO Name		MACAO ID		ADID (if revision)	
Date of Submission (yyyy-mm-dd)			Registration Identifier		
Revision Number (Optional)		Revision Type (select one) Revisable Non-Revisable		Release Date (yyyy-mm-dd)	
Brief Title (≤ 40 characters):					
Brief Description (100-200 characters) of RP Content or RP Content Revision					
Test Performed (Select one) Yes No		Test Data MDO Included (Select one) (Optional) Yes No			
RP Originator's Name			RP Originator's Affiliation		
RP Originator's Mailing Address					
RP Originator's Electronic Mail Address			RP Originator's Telephone Number		
Revising Authority Name (if other than RP Originator's)			Revising Authority's Affiliation		
Revising Authority's Address					
Revising Authority's Electronic Mail Address			Revising Authority's Telephone Number		
Referenced MDO MACAO ADIDs (list all):					
Referenced MDO CCSDS ADIDs (Optional)					

Registration Package (RP) Submission

Part 2. Description MDOs (one block per MDO, repeat as necessary)

<p>Content Language Interpretation Language</p> <ul style="list-style-type: none"><input type="checkbox"/> English (CCSD0002)<input type="checkbox"/> PVL (CCSD0006)<input type="checkbox"/> TSDN (CCSD0007)<input type="checkbox"/> DED Structure (CCSD0008)<input type="checkbox"/> Other (non-CCSDS) ADI = _____	<p>Type</p> <ul style="list-style-type: none"><input type="checkbox"/> Catalog<input type="checkbox"/> DED<input type="checkbox"/> DDR<input type="checkbox"/> Supplementary<input type="checkbox"/> Test Data
<p>Internal Tracking Number</p>	
<p>MDO Content</p>	
<p>Relationships with other MDOs (if applicable)</p>	

Part 3. References to Previously Registered MDOs

ADIDs of Referenced MDOs.

MDO Relationships (if applicable):

Acknowledgement/Disposition of Receipt of Registration Package (RP)

(Filled out by MACAO)

ADID (If assigned):	Revision (Blank if not accepted):	MACAO Name:	MACAO ID:
RP Originator's Name:		Date of Response (yyyy-mm-dd):	Registration Identifier:
Brief Title (≤ 40 Characters):			
<input type="checkbox"/> Accepted (ADID Assigned) <input type="checkbox"/> Under Review; Expected Date of Completion _____ <input type="checkbox"/> Rejected:		<input type="checkbox"/> Accepted with Contingencies described on revised RP Submission Form below in Explanation of Contingencies (Resubmit to register RP)	
Reason for Rejection: (Select one or more) <ul style="list-style-type: none"> <input type="checkbox"/> Incomplete Registration information <input type="checkbox"/> Information incorrect <input type="checkbox"/> Information Unreadable <input type="checkbox"/> Submitted to incorrect MACAO <input type="checkbox"/> Non-revisable ADID <input type="checkbox"/> Other 			
Explanation of Rejection/Recommendation:			
Explanation of Contingencies:			
Comments:			

Request for Registered Information

MACAO Name	MACAO ID	Date of Request (yyyy-mm-dd)
Requestor's Name		Requestor's Affiliation
Requestor's Mailing Address		
Requestor's Electronic Mail Address		

Requested ADID	Revision Number (Optional)	Exclude all referenced MDO MACAO MDOs (select one)		Exclude all Referenced CCSDS MDOs (select one)	
		Yes	No	Yes	No

Exclude the following Referenced MDOs for the requested ADID (list all ADIDs of MDOs to be excluded)

Preferred Media and Protocol for DDP

A) <input type="checkbox"/> Electronic Transfer <input type="checkbox"/> Text <input type="checkbox"/> Binary <input type="checkbox"/> Telemail	C) <input type="checkbox"/> 3.5" Diskette (IBM) <input type="checkbox"/> 720 KB <input type="checkbox"/> 1.44 MB	E) <input type="checkbox"/> Bernoulli Cartridge <input type="checkbox"/> 5.25" <input type="checkbox"/> 10 MB <input type="checkbox"/> 8.0" <input type="checkbox"/> 20 MB
B) <input type="checkbox"/> 3.25" Diskette (Macintosh) <input type="checkbox"/> 800 KB <input type="checkbox"/> 1.4 MB	D) <input type="checkbox"/> 5.25" Diskette (IBM) <input type="checkbox"/> 360 KB <input type="checkbox"/> 1.2 MB	F) <input type="checkbox"/> 0.5" Magnetic Tape (9 Track) <input type="checkbox"/> 6250 BPI <input type="checkbox"/> 1600 BPI <input type="checkbox"/> 800 BPI
G) <input type="checkbox"/> Other _____		

Comments

Acknowledgement of Request for Registered Information

(Filled out by MACAO)

Requested ADID	Date of Response (yyyy-mm-dd)	MACAO Name	MACAO ID
DDP Release (Select one) Yes <input type="checkbox"/> No <input type="checkbox"/> Partial <input type="checkbox"/>		MACAO ADID/Anticipated Release Date (if Partial) _____/_____/_____ _____/_____/_____	
Reason for Non-Release			
Transfer Media and Protocol for DDP A) <input type="checkbox"/> Electronic Transfer <input type="checkbox"/> Text <input type="checkbox"/> Binary <input type="checkbox"/> Telemail B) <input type="checkbox"/> 3.25" Diskette (Macintosh) <input type="checkbox"/> 800 KB <input type="checkbox"/> 1.4 MB C) <input type="checkbox"/> 3.5" Diskette (IBM) <input type="checkbox"/> 720 KB <input type="checkbox"/> 1.44 MB D) <input type="checkbox"/> 5.25" Diskette (IBM) <input type="checkbox"/> 360 KB <input type="checkbox"/> 1.2 MB E) <input type="checkbox"/> Bernoulli Cartridge <input type="checkbox"/> 5.25" <input type="checkbox"/> 10 MB <input type="checkbox"/> 8.0" <input type="checkbox"/> 20 MB F) <input type="checkbox"/> 0.5" Magnetic Tape (9 Track) <input type="checkbox"/> 6250 BPI <input type="checkbox"/> 1600 BPI <input type="checkbox"/> 800 BPI G) <input type="checkbox"/> Other _____			
Location of MDO on Media A) <input type="checkbox"/> MDO will be message content B) - E) _____ (File Name) F) <input type="checkbox"/> File Location on Magnetic Tape _____ G) <input type="checkbox"/> Other: _____ _____ _____			

DDP Problem Report

Requested ADID	Date DDP Received (yyyy-mm-dd)	MACAO Name	MACAO ID
Date of Problem Report Submission (yyyy-mm-dd)		DDP Requestor's Name (Blank if same as Submitter)	
Problem Report Submitter's Name		Submitter's Affiliation	
Submitter's Mailing Address			
Submitter's Electronic Mail Address			
Description of Problem (including procedures used that led to identification of problem)			

ANNEX G

SCENARIOS INVOLVING MDO USE AND UPDATE

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CCSDS REPORT - CONTROL AUTHORITY OPERATIONS
ANNEX G

Scenarios Involving MDO Use and Update

Scenario 1: The UARS project has been delegated to be a CAO, and is supporting the UARS scientists in the registration of descriptions and dissemination of DDPs. Investigator A creates a format description to describe the data as it is expected to appear following launch. He generates some test data in this format, and packages it in SFDU labels. Since he has not registered the format description, he creates his own ADI by beginning the ADI with a "Z", and packages this description with the labeled data. He transfers this product to his colleagues overseas to test their preparation to receive the data, and to test his preparation of the product. His colleagues discover an error in the description of the format, and so he revises the description.

Prior to launch the ground handling system, which will actually create the labeled data objects he expects, requires the registered ADI for insertion into the labels they will add to the data. In addition, his local software contractor also wants this ADI to insert into a table that will be used to direct the local data handling and processing software. This software will not use the format description directly, but will incorporate this information into its processing algorithms for efficiency. Investigator A registers his format description with the CAO, and provides the ADI and description to both the ground handling system and the local software contractor. However he informs the CAO that his description is not to be released for 4 months, which he expects to be about 3 weeks after launch. This should give him time to look at the data and verify the correctness of the description before allowing general use. He also advises the CAO that the format description must be revisable following the release date.

The launch is slipped one month, so he requests the CAO to push back the release date of his description by one month.

Following launch, he begins to receive labeled data objects from the ground handling system and his local processing software begins to produce garbage. Investigation reveals that there was an error in understanding and documenting how the instrument packed information into a particular 8 bit word. Therefore he has his local software revised, and submits a revised description to the CAO which is labeled version 2 and is noted as an important update. The nature of this update is

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also described. This error is transparent to the ground handling system since it does not look at this information to do its processing.

Following the release date, he begins to send copies of the data to his colleagues and informs them that the CAO has a revised description. He has included this description in the initial data provided to them. They proceed to fix their software and to make the data available to others locally.

After about 6 months, Investigator A notices a mis-spelled name for a field in the format description. He wants this corrected at the CAO because he is in the process of preparing additional information that will refer to that name. This results in version 3 of the description, which is noted as having an editorial change. The nature of the editorial change is described. He does not bother to inform his colleagues.

After about 1 year, the instrument suffers a mode failure that results in the periodic occurrence of "all ones" in one of the fields of the format. Fortunately this is predictable and describable in the following way: For times greater than T0 in word 3, the value of word 5 is fill (all ones) when word 10 indicates mode=4. This information needs to be added to the format description to improve its correctness for all the labeled data objects carrying the ADI of the format description. He provides the new description to the CAO as version 4. At the same time he adds a text description of the instrument operation and the calibration coefficients to use in converting values to physical units. This version is noted to be an important revision from the previous version, and the nature of the revision is described. He notifies his colleagues of this new version. Other recipients of the data, who are unknown to him, should periodically check with the CAO or check the CA Agent Annual Report to see if new ~~revisions~~ ~~versions~~ of the description are available.

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Scenario 2: The Planetary Data System (PDS) has prepared a Data Element Dictionary (DED) that it would like adopted within the planetary community. It decides to register this DED with a CAO so it may be readily incorporated by reference into the descriptions of a wide range of data. It registers this with an immediate release date, and an update status of non-revisable. In this way future data producers can be sure that this DED will not change after they have generated labeled data objects and descriptions that may refer to this DED.

After about 12 months, the PDS has accumulated a set of additional terms to be added to the DED. A new DED is created and submitted to the CAO for registration. It receives a new ADI which is not necessarily related to the old ADI in any visible manner. PDS advertises the existence of this new DED and encourages its use, in place of the older DED, for all new data and descriptions. However from the point of view of the CAO, this is just another registered MDO with a registration date and brief description that will appear in the annual report. It is up to PDS to advertise it as a replacement for new work.

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Scenario 3: The colleagues of Investigator A from Scenario 1 have asked their local CAO to obtain the format description submitted by Investigator A to the UARS CAO. This will facilitate access to this metadata in their country.

The local CAO asks the UARS CAO to send the DDP corresponding to the given ADI. The UARS CAO agrees, and notes the request for future reference. When Investigator A submits a new version, the UARS CAO must forward the new version to the local CAO. In this way the local CAO can be current in supporting the latest version to its local users.

WACE
METEOROLOGICAL SERVICE

11/14/2024 10:10:10 AM

DDP Problem Report

Requested ADID	Date DDP Received (yyyy-mm-dd)	MACAO Name	MACAO ID
Date of Problem Report Submission (yyyy-mm-dd)		DDP Requestor's Name (Blank if same as Submitter)	
Problem Report Submitter's Name		Submitter's Affiliation	
Submitter's Mailing Address			
Submitter's Electronic Mail Address			
Description of Problem (including procedures used that led to identification of problem)			

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ANNEX G

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Report Documentation Page

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