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# Implementation Plan for the Release A Client

Technical Paper

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formal review or government approval.

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**SUBMITTED BY**

|                                                                   |                |
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# Abstract

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This document defines the implementation plan for the ECS Release A Client Subsystem. The Release A approach to the development of the Client Subsystem involves the integration of the System-Level IMS components of Version 0 (V0) with ECS supplied Version 1 components. This plan documents the rationale for this approach, specifies the technical activities to be performed, defines the responsibilities of the Version 0 and ECS teams, and describes the management procedures to be used to coordinate the development and integration activities.

**Keywords:** V0, Integration, Implementation, Client, Release A, Reuse

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# 1. Introduction

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## 1.1 Purpose

This document defines the implementation plan for the ECS Release A Client Subsystem. The Release A approach to the development of the Client Subsystem involves the integration of the System-Level IMS components of Version 0 (V0) with ECS supplied Version 1 components. This plan documents the rationale for this approach, specifies the technical activities to be performed, defines the responsibilities of the Version 0 and ECS teams, and describes the management procedures to be used to coordinate the development and integration activities.

## 1.2 Overview

For a variety of reasons the elapsed time available for the Release A development has been progressively shortened since the original ECS development schedule was set. This has resulted in the prototyping/incremental development schedule being tightened such that the feedback from tire kickers and the user community into succeeding prototypes and increments will be severely compressed and as a result potentially have less immediate impact on the development than is desirable.

In order to mitigate this situation, the system level IMS components from V0<sup>1</sup> will be used to substitute for the functionality that the Client and Data Management Subsystems would provide in V1, in the 9 month period until full V1 functionality is released for these subsystems at Release B. This approach will permit sufficient time for user feedback to be incorporated into the V1 Client and Data Management components before they are frozen for incorporation into Release B.

The System-V0 will be incrementally enhanced so that it can support access to the V1 components at Release A, always provided that these enhancements do not step outside of the overall V0 mission and that the implementation of these enhancements do not negatively impact the implementation of DAAC requested enhancements.

It is important to stress that there is no intention to incrementally develop the reused System-V0 components at each release beyond Release A. The reuse described here is only to address the early schedule and user migration issues at Release A; some important conceptual changes need to be introduced at Release B with full V1 functionality to make best use of the developing

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<sup>1</sup> The system level components are those parts of the V0 system which provide a unified view across all of the V0 DAACs. This includes the GUI/CHUI client applications, search agent (IMS client) and local server mapping components. Throughout this document this part of the V0 system is termed System-V0 or the V0 components. The remaining part of the system is called Local-V0.

technology and the underlying provider level capabilities that will be available across all DAACs at Release B<sup>2</sup>.

The remainder of this section discusses the current Version 0 concept and the proposed integrated approach to be used for Release A.

### 1.2.1 V0 System Concept

The basic System-V0 concept is shown in Figure 1-1. This figure attempts to illustrate the system as it is currently configured rather than the original architectural concept set out at the start of the prototype development. To aid clarity when relating this structure to the proposed integrated Release A structure different names have been used for components than they are commonly used within the V0 development. [Note: on the right of the diagram there is an indication of how the V0 components map into the three major ECS architectural layers].

The System-V0 interface provides the following functionality for users:

- o *Directory Search*

The system allows a user to retrieve high-level information about data sets held at the DAACs

- o *Access to the Global Change Master Directory (GCMD)*

The system also allows a user to retrieve high-level information on earth science datasets referenced in the GCMD which may or may not be held as V0 data sets at the DAACs

- o *Guide Search*

Provides the user with detailed descriptions about data sets, their acquisition, projects they are associated with and the data centers that hold them.

- o *Inventory Search*

The system allows a user to identify specific observations or collections of observations (granules) that are available for request from a data center

- o *Coverage Information*

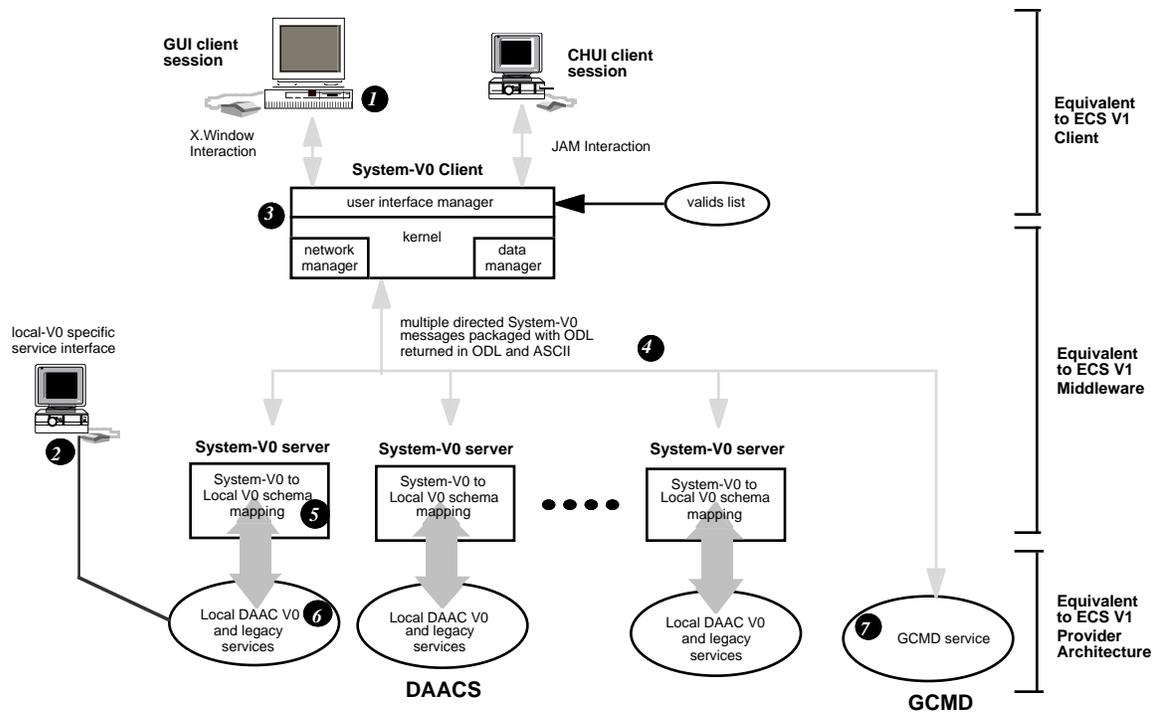
Provides the user with a representation of the geographic coverage of the granules resulting from an inventory search. Results from multiple data sets can be displayed simultaneously and therefore a simple visualization of spatial coincidence can be achieved.

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<sup>2</sup> For example,

- the underlying client-server interaction mechanisms
- the user session concept
- integrated schema management across all services

etc.



**Figure 1-1. System-V0 Concept**

- o *Browse Information*

Provides the user with a visualization of the granules resulting from an inventory search. [The availability of this function is not universal across all V0 datasets]

- o *Product Ordering*

The system allows a user to order data products based on the granule information obtained from an inventory search.

The functions offered by System-V0 are available in many other earth science data systems. The important distinguishing feature of the System-V0 approach is that it provides a single unified interface to many data sets and the services that are offered on each data set. This approach was taken following important lessons learned from previous NASA data system developments (e.g. PLDS). This is also a key feature of the EOSDIS V1 concept, though it is achieved in slightly different ways.<sup>3</sup>

<sup>3</sup> For V1 the architectural aim has been to try and combine the data set specific and cross system interfaces within the same framework without the clear separation that exists in V0. The architecture will provide the user with the capability to access individual services in their own unique way or a single unified interface across all data sets.

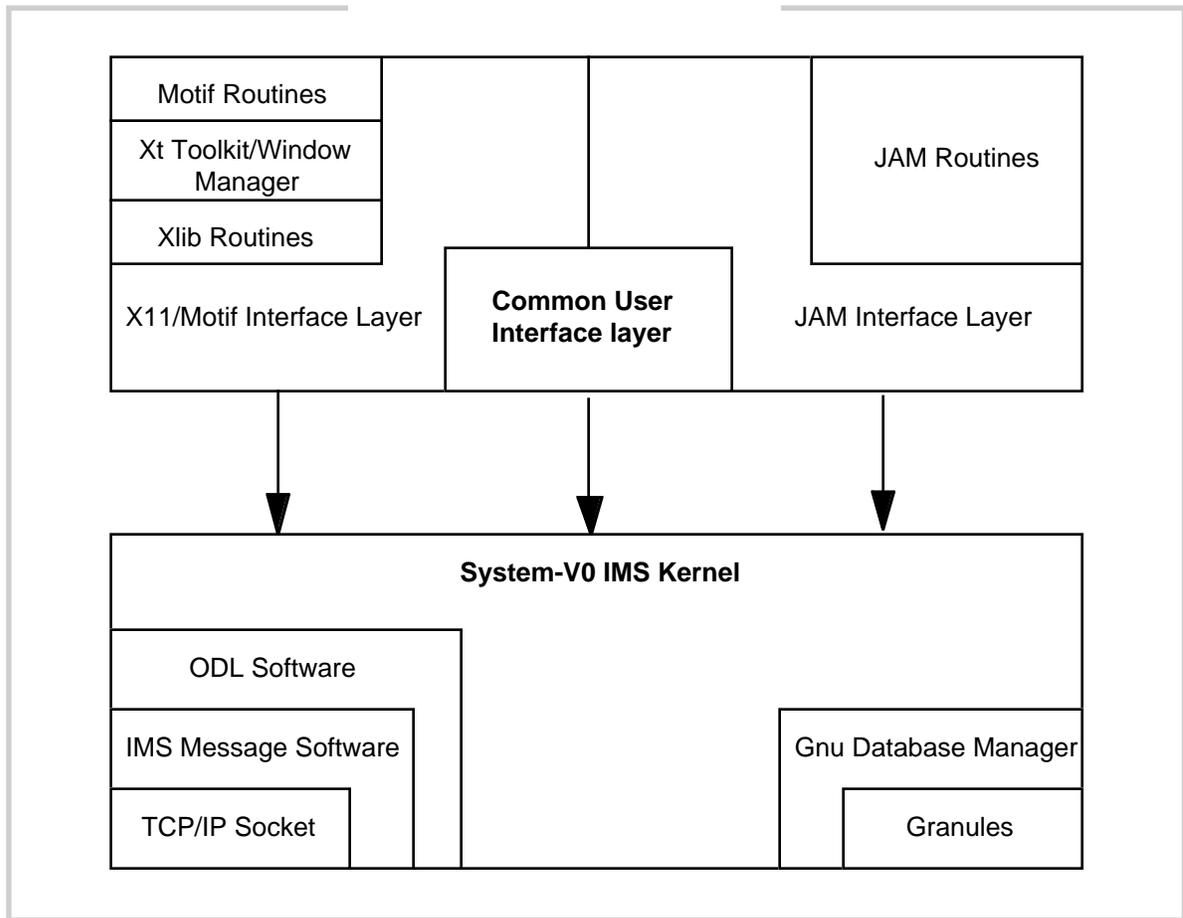
Technical details on how the System-V0 achieves these functions are described in various V0 documents and are outlined below. Essentially it uses a TCP/IP socket to pass specifically defined V0 messages (the 'V0 protocol') to servers who 'advertise' their data holdings through definition of domains of values ('valids') that apply to their sites. There are several message types and a flexible packaging mechanism (ODL) is used to handle the messages and the return messages from the servers. To enable system wide policies in applying queries to be resolved without the significant complications that would be associated with a distributed heterogeneous data system a limited schema has been identified that applies to all datasets within the V0 system. For those parts of the schema which do not apply to a specific data set a system wide policy is proposed for how to handle that situation. The DAACs then apply that policy in their System-V0-to-local server mapping software.

The key characteristics of the System-V0 configuration, shown in Figure 1-1, are:

- 1 - The System-V0 can be accessed using either a graphical or character based terminal. The former being an Motif interface employing X.Window interaction with the System-V0 client and the latter a JAM application interface. The client installation currently requires a 'valids' list to be configured each time the 'valids' list changes. It has been proposed as an interim measure that each site supporting a client should perform this re-configuration on a weekly basis (at least for DAAC-hosted clients users may actually do this at whatever interval they desire).
- 2 - The local-V0 services can also be accessed by native interfaces - usually GUIs. These interfaces only permit access to a service(s) at a single DAAC - they present no view of the entire EOSDIS V0 system. In general they provide some specific functionality relevant to the DAAC's discipline interests.
- 3 - The System-V0 IMS client combines a number of architectural concepts commonly found in distributed data management systems. It provides both the client management and search agent functions for the V0 system. It receives inputs from the user through either the System-V0 GUI or ChUI interface, validates the inputs and structures them into ODL, and then transmits them via System-V0 protocol messages to the relevant sites which are known (through the 'valids' list) to be able to respond to the user query.

The search agent (System-V0 client) also is responsible for receiving the results from the DAACs and reformatting/structuring them for display by either the GUI or ChUI interface.

A diagrammatic representation of the System-V0 client software layering is shown in Figure 1-2.



**Figure 1-2. System-V0 Client Structure**

An instantiation of the System-V0 client exists at each DAAC and at a number of other user sites. Further development of the client with respect to improving the configuration management is planned as a high priority item. Completion of this development would allow the client to be more widely distributed, though the distribution policy is still TBD. Currently the general policy is that users are registered at their preferred DAAC and always access the client at that DAAC. Each client can access all servers within the V0 system.

- 4 - The messages sent to and received by the System-V0 client are packaged in ODL; a flexible approach for passing parameter=value structures. The messages are transmitted using TCP/IP sockets - a socket connection normally being maintained for the length of the query session (a *session* is maintained from the sending of a query message until a response is returned from each DAAC). The development team found the ODL packaging to be inefficient in some circumstances (e.g. browse images and Guide results) and use alternative results messages (such as binary or ASCII results

messages) in these cases. Upon receipt, much of the data are converted from ODL to GDBM (Gnu Data Base Manager) data bases.

The System-V0 clients use a small restricted schema containing about 15 attributes for querying purposes. Approximately the same schema is used for finding datasets (directory); getting information about datasets (guide) and finding specific items within a dataset (inventory). Not all of the schema apply to all of the datasets but as the schema is relatively small it is possible to apply system wide policies for mapping non relevant criteria to data set queries (e.g. the cloud cover restriction is ignored for data sets that don't provide a cloud cover reference).

- 5 - At each DAAC the query expressed in terms of the System-V0 schema and packaged as an ODL message is received, parsed and mapped into local queries through the System-V0 server. This mapping may also include application of local site policies (e.g. a restriction on the number of results records to be returned from a single query). This server also receives results in the local protocol from the local services and maps them back into System-V0 protocol for delivery back to the System-V0 client.

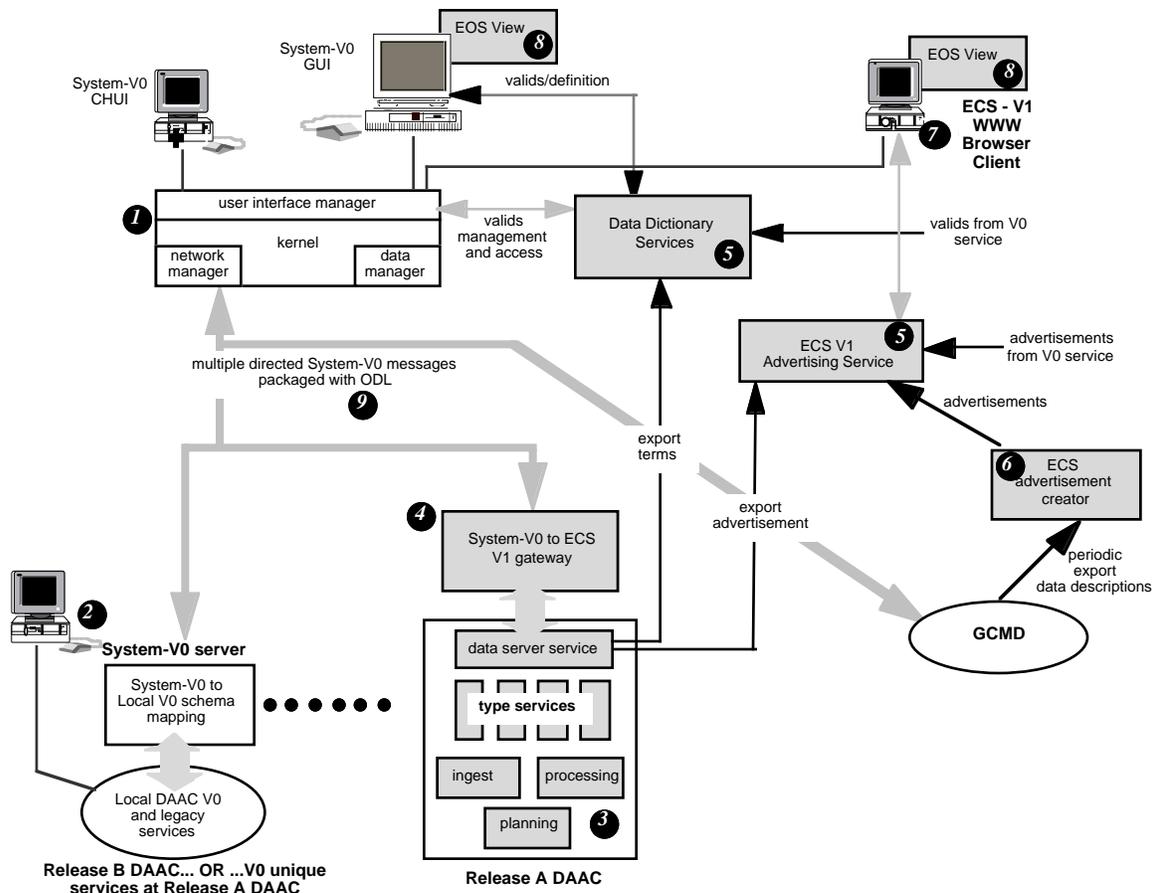
This component is developed independently at each site using template software for the common functions (e.g. socket management, ODL manipulation, etc.), which is provided by the EOSDIS V0 development team.

- 6 - The local services at each DAAC are heterogeneous with regard to the access protocol, schema, and functionality. As described above (2), these local services may have native interfaces specific to a service or a DAAC.
- 7 - A directory search from the user is dispatched by the System-V0 client to relevant DAACs who map the query to specific data sets. The System-V0 client then maps the data set identifier provided by the DAAC to data set information held in the GCMD which is then passed back to the client in DIF format for display at the client.

### 1.2.2 Integrated V0 and V1 System Concept

The proposed integration of System-V0 and ECS V1 components to form the Release A configuration is shown in Figure 1-3. The gray lines indicate interaction between components during a user session; black lines transfer of data from one component to another to allow them to work; dashed lines are connections which need further analysis. The key characteristics of this configuration are:

- 1 - The System-V0 client is retained for Release A as the primary user search agent, receiving inputs from users via the System-V0 ChUI and GUI interfaces. (*see point 5 below*)



**Figure 1-3. Integrated V0 and V1 Release A Concept**

- 2 - The majority of DAACs not involved in the Release A delivery will continue to operate with the System-V0 client in the same way as before. In addition DAAC specific functionality at the Release A DAACs which is not replaced by ECS V1 functionality will still be supported by DAAC specific interfaces. In a sense, *all* DAACs will operate *with V0* as before.
- 3 - At the Release A DAACs the provider level services, including science processing at LaRC and MSFC will be developed and installed as described in the ECS V1 design documentation and release plans. This will include all Release A functionality for the Data Server, Ingest, Planning, and Processing Subsystems.
- 4 - A gateway to provide translation between System-V0 protocol and the chosen ECS V1 protocol(s) will be developed to allow requests placed via the System-V0 client to be handled by the new Release A functionality. The primary interface from the gateway to ECS will be to the data server service CI, which is part of the Data Server subsystem. This gateway has always been in the Release A plan to allow a migration from V0 to V1 interoperability.

- 5 - Two components from the ECS architecture are added to the configuration to support the System-V0 client.

The Data Dictionary Service will provide terms and definitions which could be used to semi-automate the management of the list of permitted values ('valids'). The Release A Data Servers will be able to automatically export data dictionary updates to the service as part of the schema management approach in ECS V1. For the Release A DAACs, the manual export of 'valids' from V0 services will be to the Data Dictionary service. For the non-Release A DAACs, manual valids processing will remain unchanged.

Figure 1-3 also shows the use of the Advertising Service. This would be used as an operational prototype for providing users with one service from which to discover all of the services that are available in the Release A time frame.

The Advertising Service would receive advertisements from both the V1 and V0 services. The V1 functions will provide a managed solution to the formatting and export of advertisements. For V0 services the advertising process may be more manual.

- 6 - One strategy for populating the ECS Advertising Service with information on services held outside of ECS, is to utilize information held in the Global Change Master Directory (GCMD). This would allow a user to find earth science data services (and the data associated with a service) within ECS and elsewhere from a single service. It is proposed that for Release A the population is achieved through a periodic (quarterly) update from the GCMD by basic manipulation of an export of all of the data set entries in DIF format. Each data set not already advertised as part of the EOSDIS services would be advertised with either a telephone contact service or a URL to further information. The Advertising Service design is likely to support multiple views (layers) on advertisements so that an EOSDIS only view can be obtained. [Note: even within the EOSDIS services there are likely to be several views; e.g. V0, V1, mandated services, DAAC unique etc.].
- 7 - To ensure immediate widespread access to the Release A system it is imperative that a WWW browser interface is developed. With the startling rate of functionality advances within the WWW, it is clear that a reasonably capable interface could be developed<sup>4</sup>. This would ensure that there are no artificial barriers to widespread use of Release A as soon as it is released [Note: this is an important issue with less than a year scheduled between Release A and Release B there is a very real danger that the normal inertia involved in user access to a new system would mean that the system is essentially unused until Release B is made available].

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<sup>4</sup> There are already several effective interfaces to data services using relatively standard WWW functionality, and there are several R&D activities in the public and commercial domain looking at GIS interfaces within a WWW application.

The Advertising Service component will already be developed to work with WWW browsers via an HTTP interface. A gateway to System-V0 would need to be developed to support the HTTP protocol and provide HTML interface definitions.

- 8 - The EOSVIEW tool for local viewing of HDF formatted data will be made available for users of either the WWW browser or System-V0 GUI to unpack and view any data delivered in EOS-HDF format. The degree of integration of EOSVIEW with each interface needs further analysis; as a minimum it would be a standalone tool the user has access to. [Note: the tool will work with either general HDF files or the products using the HDF-EOS structures. More information will be available for the latter products]
- 9 - The System-V0 query/result messages and ODL packaging would be unchanged.

### **1.3 Organization**

This paper is organized as follows: Section 2 presents a high level description of all tasks involved in the implementation of the integration; Section 3 provides a high-level schedule and expected milestones for the integration effort; Section 4 details the overall management approach; and Section 5 presents the proposed integration and test approach.

### **1.4 Review and Approval**

This White Paper is an informal document approved at the Office Manager level. It does not require formal Government review or approval; however, it is submitted with the intent that review and comments will be forthcoming.

Questions regarding technical information contained within this Paper should be addressed to the following ECS and/or GSFC contacts:

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## 2. Implementation Task Descriptions

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This section describes the specific tasks required for the development of the Release A client. The tasks have been organized by responsibility areas. This section is organized as follows:

Section 4.1 describes several study efforts that must be performed jointly by the V0 development team, the ECS development team and ESDIS.

Section 4.2 describes the tasks to be performed by the V0 team in order to achieve the Release A client goals

Section 4.3 describes the tasks to be performed by the ECS team in order to achieve the Release A client goals.

### 2.1 Joint Studies

As of the time of this writing, there are several areas where the implementation requirements for the Release A client have yet to be finalized. In order to fully define the requirements for these areas, four joint study tasks have been defined. The study tasks that are described in this section will be undertaken as joint efforts between the V0 development team, the ECS development team and ESDIS. In Section 4.2 tasks are defined to implement the recommendations of the joint studies.

#### 2.1.1 Mapping V0-ECS Valid

This study will be focused upon identifying the proper mapping of the ECS schema, terms and domain values into their V0 equivalents. The mappings will be used by the V0 Gateway in translating the V0 language and protocols into ECS language and protocols. The Data Dictionary Service will also use these mappings in order to generate the V0 Valid descriptions for the Release A ECS data servers.

Inputs: V0 Valid Definitions

ECS Valid Definitions

Outputs: ECS-V0 Valid Term Mappings

#### 2.1.2 Security/Authentication

This study will be focused upon the following topics:

- o Determining the Security/Authentication requirements for the V0 Client and Server
- o Developing an Implementation plan for V0 Client and Server modifications if required by the Security/Authentication requirements

Inputs: N/A

Outputs: V0 System Security Requirements White-paper

V0 Security/Authentication Implementation White-paper (if required)

### **2.1.3 V0-ECS Guide Requirements**

This study will attempt to identify a common standard for V0 and ECS Guide documents and document accesses. Since the V0 community already has extensive expertise in this area, it is assumed that the current V0 standards will serve as a starting point. The V0 standards will be evaluated against the ECS requirements and system design to identify any required changes.

Inputs: V0 Guide Document Creation Manual

Outputs: ECS Guide Standards White-paper

### **2.1.4 User Administration**

This study area is to determine if the user administration functions of V0 and ECS can be combined, and to look at the impact on the V0 development. The goal is to find the optimal combination of V0 and ECS capabilities for the Release A system. The study will focus upon three areas:

- o User Registration - ECS is required to have an authenticated user registration mechanism. This portion of the study will concentrate on identifying a mechanism for providing a single registration mechanism for both V0 and ECS. Note that the results of this study are somewhat driven by the Security/Authentication Study.
- o User Profile Maintenance - This portion of the study will concentrate on identifying a mechanism for a "seamless" user profile maintenance for ECS and V0.
- o User Comments - ECS and V0 currently have different mechanisms for user comments and feedback on the tools. This portion of the study will determine if it is feasible to combine these mechanisms.

Inputs: N/A

Outputs: ECS-V0 Joint User Administration White paper

## **2.2 V0 Tasks**

The tasks assigned to the V0 team have been organized into the following categories

- o GUI Modifications
- o ChUI Modifications
- o Documentation
- o V0-ECS Integration Support

Each of these categories are discussed in the following sections.

### **2.2.1 Client Modifications**

This section describes the tasks required to modify the V0 Client software for the V0/ECS integration.

### **2.2.1.1 Security/Authentication Implementation**

The Security/Authentication Implementation task will implement the modifications required to the V0 client software as a result of the Security/Authentication Joint Study. Implementation plans for this task will be documented in the V0 Security/Authentication Implementation White-paper.

Inputs: V0 Security/Authentication Implementation White-paper

Outputs: TBD

### **2.2.1.2 Interface to EOSView**

Modify the V0 Client in order to interface with the EOSView software for the display of ECS browse images.

Inputs: EOSView Executable

EOSView Interface Document (TBD)

Outputs: TBD

### **2.2.1.3 ECS User Administration**

The ECS User Administration task will implement the modifications required to the V0 client software as a result of the User Administration Joint Study. Implementation plans for this task will be documented in the ECS-V0 Joint User Administration White paper.

Inputs: ECS-V0 Joint User Administration White paper

Outputs: TBD

### **2.2.1.4 Multi-Platform Support**

V0, in order to be compliant with ECS Release A requirements, will port the GUI client to the IBM AIX and the DEC ALPHA platforms in addition to the other platforms which it currently supports.

Inputs: TBD

Outputs: TBD

### **2.2.1.5 ECS DAAC Support**

The current V0 GUI client will be upgraded to handle the three additional ECS DAAC servers (gateways). This will include handling the dataset Valids definitions for the data at those three DAACs.

Inputs: Dataset Valids Definitions for the data from the three ECS DAACs

Outputs: TBD

## **2.2.2 ChUI Modifications**

This section describes the tasks required to modify the V0 ChUI software for the V0/ECS integration. Some of these may be simultaneously addressed in the performance of the counterpart tasks presented under GUI Modifications, although the extent of this has yet to be determined.

### **2.2.2.1 Security/Authentication Implementation**

The ChUI Security/Authentication Implementation task will implement the modifications required to the V0 client software as a result of the Security/Authentication Joint Study. Implementation plans for this task will be documented in the V0 Security/Authentication Implementation White paper.

Inputs: V0 Security/Authentication Implementation White-paper

Outputs: TBD

### **2.2.2.2 ECS User Registration**

The ECS User Administration task will implement the modifications required to the V0 client software as a result of the User Administration Joint Study. Implementation plans for this task will be documented in the ECS-V0 Joint User Administration White paper.

Inputs: ECS-V0 Joint User Administration White paper

Outputs: TBD

### **2.2.2.3 ECS DAAC Support**

The current V0 ChUI client will be upgraded to handle the three additional ECS DAAC servers (gateways). This will include handling the dataset Valids definitions for the data at those three DAACs.

Inputs: Dataset Valids Definitions for the data from the three ECS DAACs

Outputs: TBD

### **2.2.2.4 Multi-Platform Support**

V0, in order to be compliant with ECS Release A requirements, will port the ChUI client to the DEC ALPHA platforms in addition to the other platforms which it currently supports.

Inputs: TBD

Outputs: TBD

## **2.2.3 Documentation**

TBD - A complete list of V0 documents to be produced and the scope of their coverage is needed. The current list includes:

V0 Valid Definition and File Formats

V0 Message & Protocol Definitions

Programmers Guide to IK

## **2.2.4 V0-ECS Integration Support**

Level of effort support for Integration/Debugging/Installation etc.

### **2.2.4.1 Provide GCMD Export Files**

Provide three exports of all of the GCMD data prior to Rel. A. These export files will be used by the ECS GCMD Exporter to map the GCMD data into ECS advertisements.

### **2.2.4.2 Integration Testbed Support**

Provide integration support for building a V0 testbed for ECS. The testbed will be used primarily for testing and debugging the V0 Gateway component of ECS.

### **2.2.4.3 Discrepancy Repair**

Provide level of effort to repair discrepancies that are found in the V0 Client during ECS integration and testing.

## **2.3 ECS Tasks**

### **2.3.1 GCMD Exporter**

Develop a tool to support populating of the Advertising Server from GCMD data. The GCMD Exporter tool will provide a minimal functionality interface that controls a text manipulation script. The manipulation script will reformat exported GCMD data (in DIF format) into a format suitable for the creation of an ECS advertisement.

Inputs: GCMD Export File Data

Outputs: GCMD Exporter Tool

### **2.3.2 V0-ECS Gateway**

*This task is part of the normal Release A ECS system. It is included here in order to provide context to this implementation plan. No extra effort or documentation is required as a result of the V0 Integration.*

Develop a V0 to ECS Gateway that provides interoperability between the V0 client and the ECS data servers. An instance of the Gateway will operate at each of the ECS Release A DAACs, and will emulate a Version 0 IMS server. The gateway will translate an incoming request from V0 ODL into ECS query language and submit it to the local ECS data server. The results from the data server will be returned to the Gateway, which then will reformat it into V0 ODL structures and return it to V0 client.

Inputs: N/A

Outputs: N/A

### **2.3.3 Data Dictionary Service**

Develop a sub-set of the Release B planned Data Dictionary Service (DDS) component. The Release A DDS will provide a mechanism for delivery of ECS Valid and DataSet descriptions in V0 Valid format for each dataset in the Release A ECS system. The Release A DDS will provide mapping of ECS Valid terms into V0 Valid terms.

Inputs: V0 Valid Definition and Formats

ECS - V0 Valid Term Mappings

Outputs: Release A DDS

### **2.3.4 Desktop**

Provide V0 Client as a pre-installed desktop object for the Release A ECS system. Desktop shall provide framework for passing ECS registration and profile information to the V0 Client as defined in the User Administration Joint Study.

Inputs: ECS-V0 Joint User Administration White paper

Outputs: TBD

### 3. Implementation Schedule

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Figure 3-1 presents the implementation schedule for the tasks described in Section 2. As shown in the schedule, V0 Release 6.0 will provide the final set of components that will be integrated into Release A.



## 4. Management Approach

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This section describes the procedures to be used to manage the integration of Version 0 components into Release A. These procedures are designed to properly synchronize Version 0 and ECS development activities in order to ensure:

- o ECS requested enhancements to Version 0 components are prioritized and scheduled into the Version 0 development plan in a way that does not disrupt implementation of other user requested Version 0 enhancements;
- o timely delivery of Version 0 components into the ECS Release A integration and test process; and
- o maximum convergence of new Version 0 features with those features planned for implementation in Version 1.

### 4.1 Project Organization and Responsibilities

All Version 0 enhancements required to support integration with Release A that are not part of the current Version 0 development plan will be funded by ECS. The Version 0 Development Organization and ECS Release A Development Organization will jointly design and implement these enhancements in accordance with the task assignments and schedule specified in Section 2. Version 0 development personnel assigned to these tasks will be matrixed into the ECS Release A Development Organization as shown in Figure 4-1. NASA technical monitoring and coordination of these activities will be provided through a single organization (SISDO) on the ESDIS Project in order to ensure the objectives of both Version 0 and ECS are met. Table 4-1 lists the roles and responsibilities of the lead individuals.

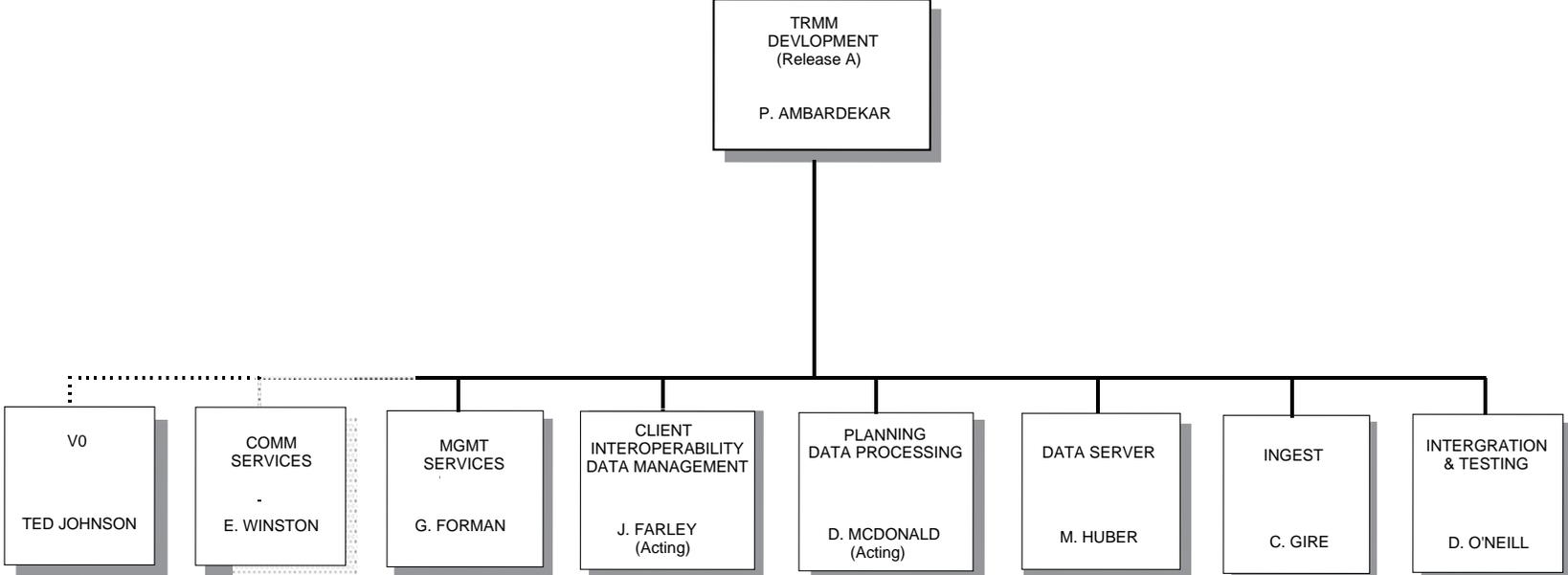


Figure 4-1. ECS Release A Development Organization

**Table 4-1. Roles and Responsibilities**

| <b>Name</b>      | <b>Org</b> | <b>Role</b>                                                      | <b>Responsibilities</b>                                                                      |
|------------------|------------|------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Parag Ambardekar | ECS        | Release A Dev Mgr                                                | Subcontract management, cost and schedule oversight                                          |
| John Farley      | ECS        | Tech lead for Client, Advertising Svc, Data Dict, V0 Gateway Dev | Technical oversight, technical lead for ECS activities                                       |
| Stuart Dogger    | ECS        | Software dev lead for V0 component integration                   | Day to day coordination with Version 0 development team                                      |
| Ron Campbell     | ECS        | I&T lead                                                         | Test plan, test procedures, test conduct                                                     |
| Ted Johnson      | V0         | V0 Development Mgr                                               | Technical oversight and subcontract lead for V0 activities                                   |
| Randy Barth      | V0         | Software dev lead for V0 component integration                   | Technical oversight, technical lead for V0 activities, day to day coordination with ECS team |
| Ken McDonald     | ESDIS      | V0 Manager, ECS Element Manager                                  | Technical monitoring and coordination                                                        |

## **4.2 Management and Technical Controls**

The following processes will be used to coordinate the Version 0 integration activities.

### **4.2.1 Technical Coordination and Review**

ECS funded Version 0 enhancements will be implemented by the Version 0 development team in accordance with a Statement of Work that will be mutually agreed upon by HAIS and HSTX. The ECS and Version 0 development teams will be colocated in the ECS Landover, Maryland facility and will work together on a daily basis. Primary technical coordination will occur through the software developments leads and through the technical leads and development managers as necessary. Development status and issues will be reviewed in biweekly meetings between HAIS and HSTX management.

In addition, the ESDIS technical monitor will hold biweekly status meetings to assess progress and facilitate resolution of issues that span both projects. Overall progress on the Version 0 integration activities will be reported by ECS via the standard project reporting mechanisms (Performance Measurement System, Monthly Reviews).

DAAC review and feedback will be obtained through the normal ECS review process (operations procedures review in June; Release A CDR in August), as well as through informal discussions and demonstrations as the integration proceeds.

### **4.2.2 Change Control**

Both Version 0 and ECS utilize configuration control boards (CCBs) to coordinate changes in requirements and schedules. A representative of the ECS project will sit on the Version 0 CCB. The ECS representative will evaluate all Version 0 configuration change requests (CCRs) and

provide the Version 0 CCB with an impact assessment should a pending change have an impact on the use of Version 0 software in Release A. This impact might relate to cost and schedule or the fact that a proposed Version 0 change is deviating from the current direction being taken by the Version 1 system. The ESDIS technical monitor has ultimate authority to approve/disapprove Version 0 changes and will evaluate them based on their impact on both Version 0 and Version 1.

A representative of the Version 0 development team will attend all ECS CCB meetings that relate to the integration of Version 0 software with Release A. The Version 0 representative will evaluate all relevant CCRs and provide the ECS CCB with an impact assessment should a pending change have an impact on Version 0 integration activities. The ECS CCB chairperson has ultimate authority to approve/disapprove ECS changes and will evaluate them based on their impact to both ECS and Version 0.

### **4.2.3 Software Configuration Management (CM)**

The Version 0 and ECS projects currently use different software CM tools and processes. It is anticipated that the Version 0 project will use its existing tools and processes for software CM prior to turning over components to ECS for integration and test. Once components are turned over, the software will be managed by the ECS CM tool using ECS defined CM processes.

### **4.2.4 Integration and Test**

The Workbench Configuration Item section of the SDPS Level 4 Requirements Specification (DID 304) defines a set of Level 4 requirements that are to be satisfied by the Version 0 software. It is assumed that these requirements are within scope of the current Version 0 development effort (not the ECS funded Version 0 enhancements) and that any deficiencies found will be corrected as part of the ongoing Version 0 maintenance activity.

The ECS Release A Integration and Test Organization will define a set of test procedures to determine whether or not the delivered Version 0 software satisfies these requirements. Any deficiencies found will be sent to the Version 0 development team for resolution. Software corrections will be made in accordance with ECS software configuration management procedures.

As with any OTS product, Version 0 capabilities that are not required to meet Release A requirements may undergo limited ECS testing or may only undergo the normal Version 0 test process.

## **4.3 Documentation**

The documentation to be produced for each task is specified in the task descriptions contained in Section 2. It is assumed that the user documentation and online help information being generated as part of the ongoing Version 0 effort is sufficient for Release A and that this documentation only need be updated to address the ECS funded Version 0 enhancements.

In addition, it is assumed that the design and maintenance documentation being generated as part of the ongoing Version 0 effort is sufficient for Release A sustaining engineering activities and that this documentation only need be updated to address the ECS funded Version 0 enhancements.

#### **4.4 Software Baseline for Release A**

The final Version 0 software components to be integrated into Release A will be turned over to ECS during the first quarter of 1996 in accordance with the schedule in Section 3. These components will form the software baseline for Release A and, other than updates to fix deficiencies, will not be further enhanced before Release A is delivered in December, 1996. These components will be supported by ECS until superseded by other ECS-provided components in later releases.

As part of the ongoing Version 0 Project, additional releases of the Version 0 client software may be made following turnover to ECS. While these Version 0 components will not be supported by ECS, they may be added to the ECS desktop as DAAC unique extensions providing they conform to the interfaces specified in the Version 0 / ECS Interface Control Document.

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## 5. Integration and Test Approach

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The Integration and Test team will use the Thread/Build approach for testing the V0/ECS Release A software. A thread is the set of components (software, hardware and data) and operational procedures that implement a function or set of functions. Threads are tested individually to facilitate Level 4 requirements verification and to isolate software problems. A build is an assemblage of threads to produce a gradual buildup of V0/ECS Interoperability capabilities. This orderly progression of combining lower level software and/or hardware items to form higher level items with broader capability is the basis of V0/ECS integration. Builds are combined with other builds and threads to produce higher level builds. Verification of threads and builds is accomplished at progressively higher and higher levels as the V0/ECS software is assembled.

Threads and builds are defined by examining ECS Computer Software Configuration Items (CSCIs), Level 4 requirements, and segment/element design specifications. The V0 client is one of the software components of the ECS Desktop CSCI. The Integration and Test (I&T) organization, with support from the V0 and ECS development community, has grouped the ECS and V0 software components into functional categories divided along noticeable boundaries. These categories are the basis for the V0/ECS threads. These threads are combined to define builds which include several V0/ECS functions. The relationship between each release thread and build is graphically illustrated on a Thread/Build diagram. Test cases are developed from each thread and build included in the release. These test cases provide the basis for development of step-by-step test instructions which will be documented as Release A test procedures.

The V0 client will also be tested to verify it properly performs searches and returns the correct results from the ECS DAACs. These tests include testing the V0 client, the processing of "dependent valids", the V0/ECS Gateway and the ECS Data Servers.

The Release A tests will demonstrate the ability of the Release A software to provide access to V0 and ECS DAACs. The test cases include verifying the user registration process, performing searches for V0 and ECS products, displaying advertisements, submitting advertisements, subscribing to advertisements, viewing browse images and ordering data products. Detailed test descriptions are documented in the Science Data Processing Segment Integration and Test Plan for the ECS Project Volume 2: Release A (319-CD-005-001).

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## Appendix A - Abbreviations and Acronyms

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|                 |                                                    |
|-----------------|----------------------------------------------------|
| CCB             | Configuration Control Board                        |
| CCR             | Configuration Change Request                       |
| ChUI            | Character User Interface                           |
| CDR             | Critical Design Review                             |
| CM              | Configuration Management                           |
| CSMS            | Communications and Systems Management Segment      |
| DAAC            | Distributed Active Archive Center                  |
| DDS             | Data Dictionary Service                            |
| DIM             | Distributed Information Manager                    |
| DSS             | Data Server Subsystem                              |
| ECS             | EOSDIS Core System                                 |
| EOS             | Earth Observing System                             |
| EOSDIS          | Earth Observing System Data and Information System |
| EP <sub>x</sub> | Evaluation Prototype x                             |
| ESDIS           | Earth Science Data and Information System          |
| GCMD            | Global Change Master Directory                     |
| GDBM            | Gnu Data Base Manager                              |
| GSFC            | Goddard Space Flight Center                        |
| GUI             | Graphical User Interface                           |
| HAIS            | Hughes Applied Information Systems                 |
| HSTX            | Hughes STX                                         |
| I/F             | Interface                                          |
| IMS             | Information Management Service                     |
| I&T             | Integration and Test                               |
| LIM             | Local Information Manager                          |
| MVP             | Manual Valids Processing                           |
| NASA            | National Aeronautics and Space Administration      |
| ODL             | Object Description Language                        |

|                 |                                   |
|-----------------|-----------------------------------|
| PDR             | Preliminary Design Review         |
| PW <sub>x</sub> | Prototype Workshop x              |
| SDPS            | Science Data Processing Segment   |
| TBD             | To Be Determined                  |
| TBS             | To Be Supplied                    |
| TRR             | Test Readiness Review             |
| UI              | User Interface                    |
| V0              | Version 0 (as produced by IMS)    |
| ECS             | Version 1 (to be produced by ECS) |