

## 4.2.8 Information Management Activities

The scenarios in the following paragraphs describe the Release B operations view of activities associated with the management of higher level metadata in the ECS. These scenarios focus on the activities associated with the generation, maintenance, and QA of data outside of the science data archival activities discussed in Section 4.2.2 of this document. The objective of the following paragraphs is to demonstrate that the management of this information is automated where possible to minimize requirements for operator intervention. However, DAAC operation's staff are required to support maintenance/update of data, resolve problems, and respond to error situations. The activities covered are often specific to the data or event being managed. The following scenarios define some of the major operational responsibilities for the management of this information:

- Schema update at DIMs and LIMs: This section describes the maintenance of schema as exported by Data Servers to the Data Management's replicated database.
- Periodic database maintenance: Maintenance activities typical for ECS databases are described in this section.
- Advertisement Review: This section describes the generation of advertisements by both ECS and non-ECS data providers, the acquisition of the advertisements by the system, the review and assessment of advertising "level", and the entry of advertisements into the advertising database.
- Valids: The section describes the import of valids and schema information by the dictionary data into the Data Management's replicated database. The QA process for dictionary data is described, with an example of operator intervention in response to an error in the import. Discussion of V0 valids import is also included.
- Subscriptions: Discussion of the Release B concept for responding to failure of a subscribed operation. Maintenance and monitoring of subscription lists and notification mechanisms are discussed, and a discussion of subscription mechanisms is provided.
- Server Saturation: This section is provided to describe operator actions in response to a flood of search requests.

All scenarios assume as a precondition that ECS servers are up and operating in normal mode, unless otherwise indicated.

### 4.2.8.1 LIM and DIM Schema Update

This scenario describes the operator activities associated with schema update at DIMs and LIMs for ECS core data model.

This scenario describes how DIM and LIM schema is updated when a new data type is added to the system. The scenario assumes as a precondition that the schema has been defined and generated at the data server level. The scenario also assumes as a precondition that the schema import and QA has been completed.

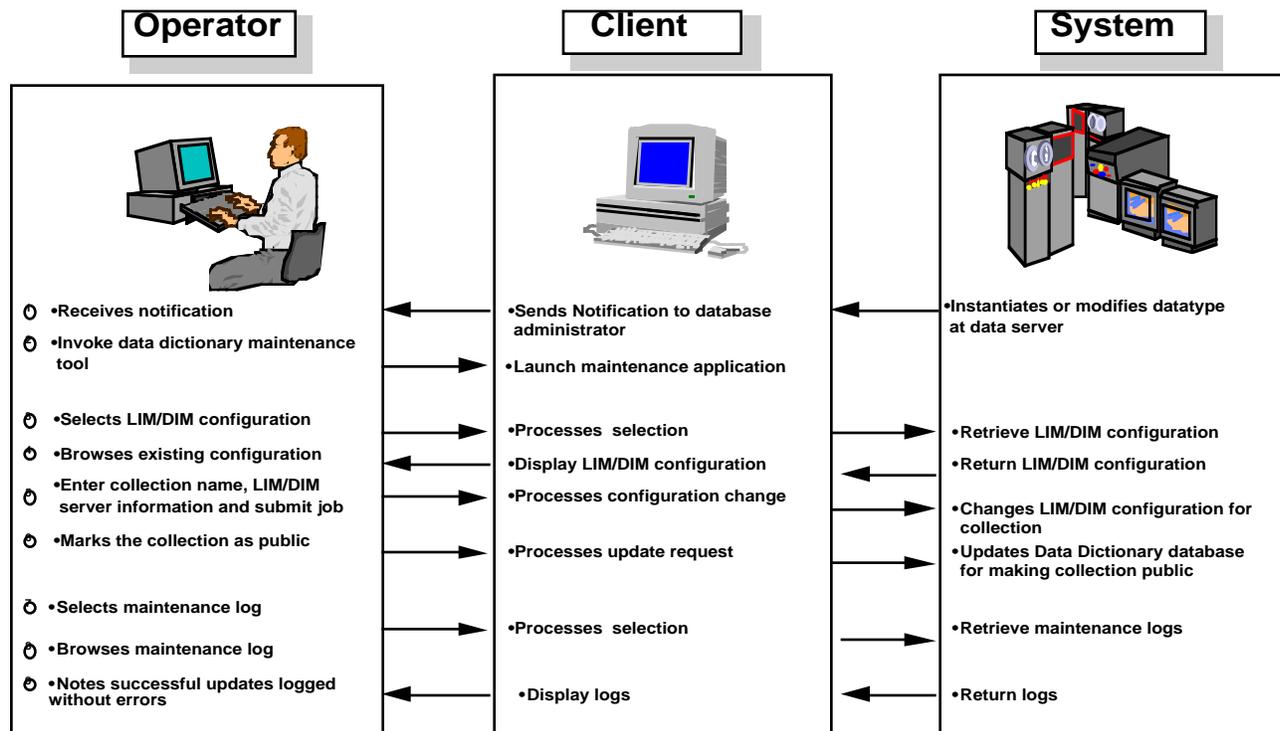
The LIM/DIM schema update can be automated as well as manual for DIM and LIM. The DAAC DBA has option to switch back and forth from manual to automated. In automated mode processing is largely transparent to operators unless errors are encountered. This scenario describes the operator activities for the manual mode of LIM/DIM schema updates.

In an error-free schema update scenario, the data server provides the data dictionary with the new valids and schema upon the instantiation or modification at the data server of the data type. In the manual mode the data dictionary updates the data dictionary and marks the collection as private. Then it sends notification to the operator for the LIM and DIM configuration change. In the automated mode the default LIM/DIM configuration is used.

Upon notification, the operator invokes the Data Dictionary maintenance tool and selects DIM/LIM configuration option. The operator can browse the existing LIM/DIM configuration and changes the LIM/DIM configuration for the collection. The operator then marks the collection as public.

The update event is noted in the system log. After the update, the data dictionary provides a notification to the data server that verifies completion of the update. The update verification ensures that the ESDT has been fully instantiated in the replicated database. Upon verification, the operator advertises the ESDT to the advertising server.

Refer to Figure 4.2.8.1-1 for a pictorial depiction of the LIM and DIM Schema Maintenance scenario. Refer to Table 4.2.8.1-1 for the steps of the scenario.



**Figure 4.2.8.1-1. LIM and DIM Schema Update Scenario**

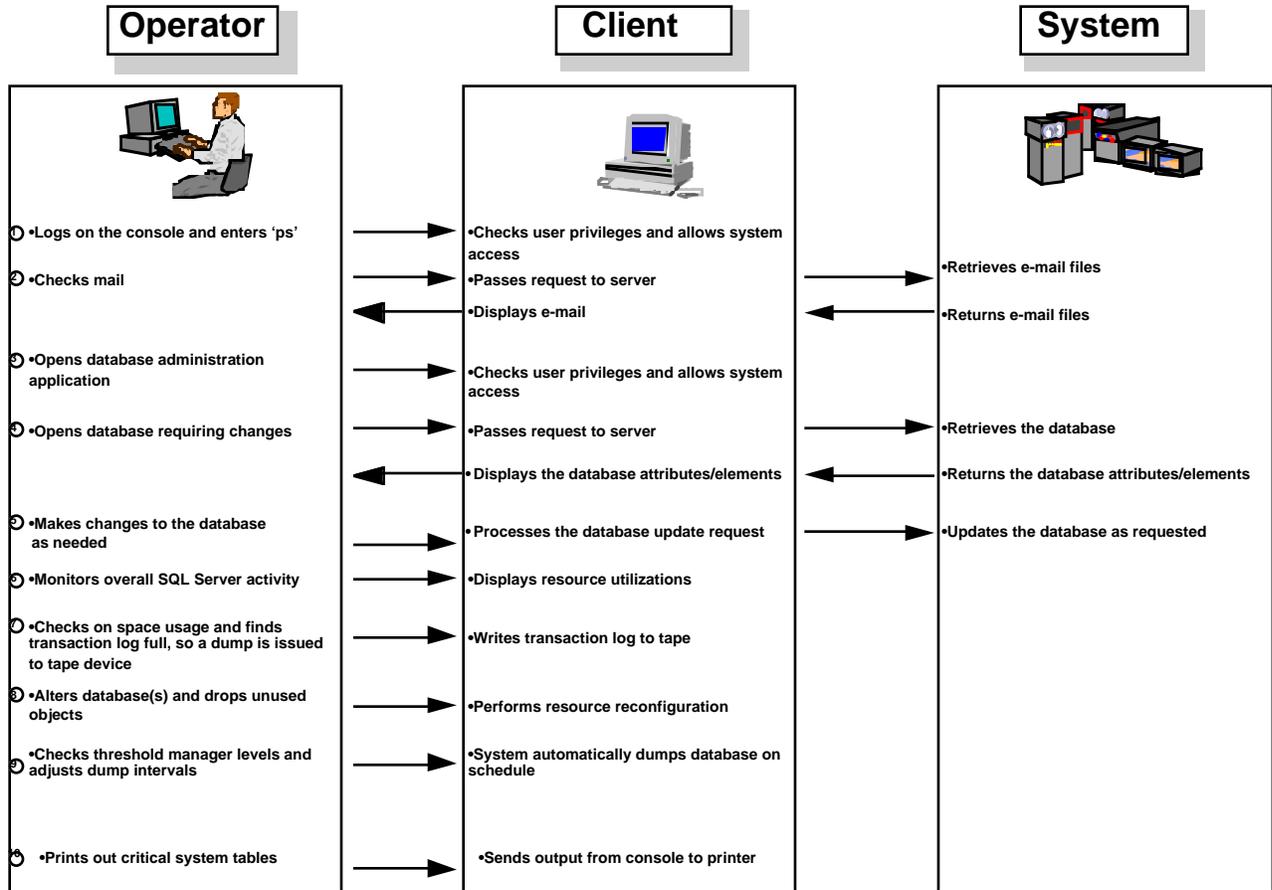
**Table 4.2.8.1-1. LIM and DIM Schema Update Scenario**

Step	Operator	System	Purpose
1	Receives notificaiton for data dictionary database update	Sends notification to operator upon instantiation or modification of datatype	Notify operator for data dictionary database update
2	Operator clicks on data dictionary maintenance icon	Launch maintenance application	Provide access to appropriate application
3	Operator selects LIM/DIM configuration change option	Launches application to change LIM/DIM configuration	Provides access to LIM/DIM configuration
4	Browses the existing configuration	Scrolls displays as directed by user	Enable operator to browse configuration
5	Enters the collection name, LIM/DIM server information, and submits the job	Processes the LIM/DIM configuration change for the collection	Enable operator to change configuration
6	Marks the schema as public in the data dictionary	Updates the data dictionary database for making the schema public	Perform updates to data dictionary database
7	Selects maintenance logs	Launches application to display maintenance logs	Enables operator to browse the logs
8	Operator browses maintenance log and notes successful updates	Scrolls displays as directed by user	Enables operator to verify the updates to the data dictionary database

#### **4.2.8.2 Database Periodic Administration Scenario**

This scenario covers typical database periodic administration activities. The database administrator activates the ECS client and invokes database administration application. The administrator checks the email for any database updates needed by the SMC that are approved by a quality control board. The administrator modifies the database and saves the changes. Then, s/he runs check on database resources and performs corrections where necessary. The administrator checks the overall server activity and resource allocation. The other tasks include database backup, storage space cleanup.

Refer to Figure 4.2.8.2-1 for a pictorial depiction of the Database Periodic Maintenance scenario. Refer to Table 4.2.8.2-1 for the steps of the scenario.



**Figure 4.2.8.2-1. Database Periodic Maintenance Scenario**

**Table 4.2.8.2-1. Database Periodic Maintenance Scenario (1 of 2)**

Step	Operator/User	System	Purpose
1	The System Administrator (SA) logs on the console	Checks user privileges and allows system access	To perform periodic Database Maintenance
2	SA checks email	Displays e-mail	To identify any updates needed in the database
3	SA opens database administration application	Checks user privileges and allows system access	To perform administrative tasks
4	S A opens database requiring updates	Displays the database attributes and elements	To access the specific database
5	S A makes changes to the database attributes and data elements	Updates the database	To change the database as required
6	SA monitors overall SQL Server activity	Displays resource utilizations	To check on server capacity and responsiveness

**Table 4.2.8.2-1. Database Periodic Maintenance Scenario (2 of 2)**

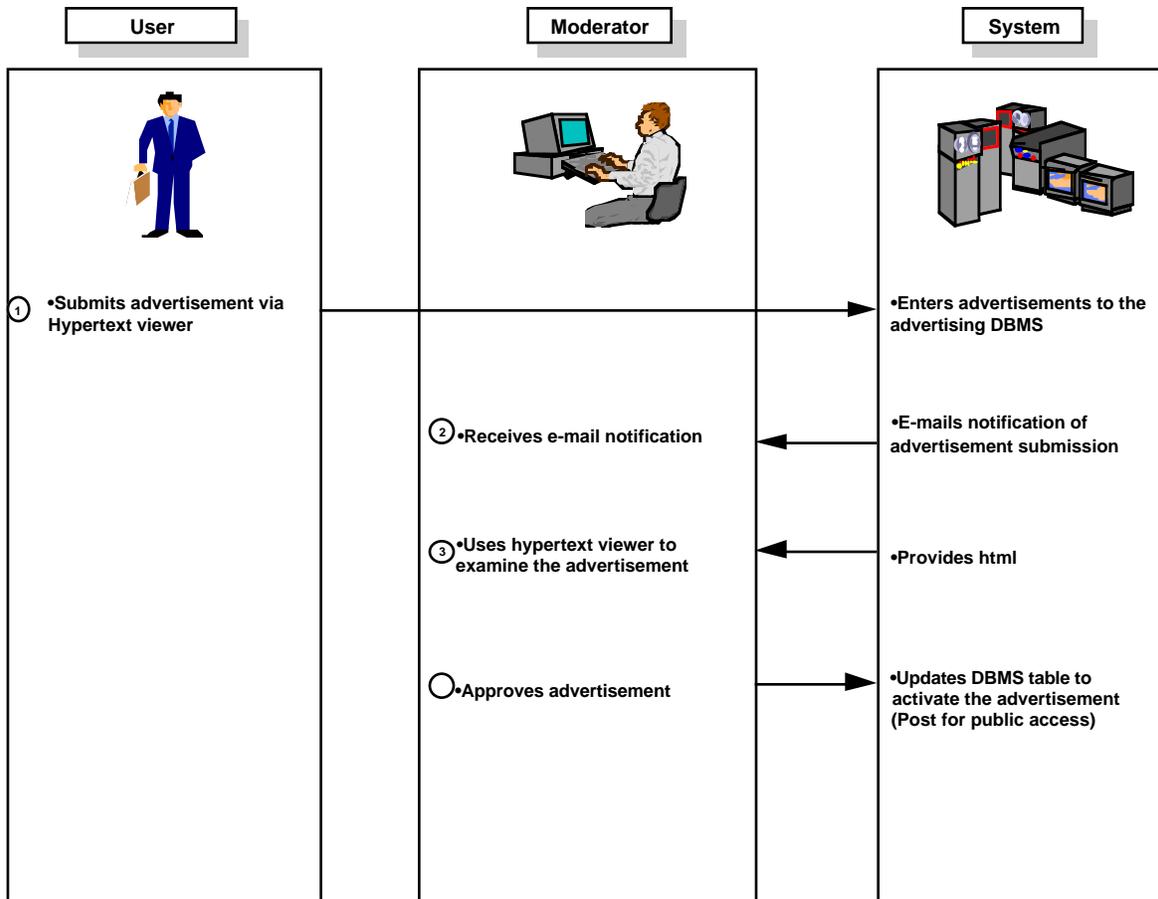
Step	Operator/User	System	Purpose
7	SA checks on space usage and finds transaction log full, so a dump is issued to tape device	Writes transaction log to tape	Clear the transaction log to free up space to allow writes/modifications
8	SA alters database(s) and drops unused objects	Performs resource reconfiguration	To free up space and enlarge altered database(s) workspace
9	SA checks threshold manager levels and adjusts back up intervals	system automatically backs up database on schedule	Adjust automatic space usage monitoring and trigger dumping
10	SA prints out critical system tables	Sends output from console to printer	Keep hard copy record of baseline configuration

### 4.2.8.3 Advertisement Review Scenario

The advertising server provides users and ECS system components the capability to post advertisements about their data and services for public view. Advertisements can be of one of two types, and the type of advertisement determines the way in which the advertising service handles it. An unmoderated advertisement is one which is not reviewed by a moderator. When the advertisement is submitted to the advertising server, after software checks it is posted directly for public access. A moderated advertisement is submitted but not posted by the Advertising Server for public view immediately upon receipt from the submitter. Rather, it is held in the advertising database, and an individual who has been designated as a moderator is informed of the advertisement's submission. The moderator is required to review the advertisement and approve it before it is posted by the advertising server for public access.

The submission of unmoderated advertisements is fully automated. This scenario describes the submission of an moderated advertisement.

Refer to Figure 4.2.8.3-1 for a pictorial depiction of the Advertisement Review Scenario. Refer to Table 4.2.8.3-1 for the steps of the scenario



**Figure 4.2.8.3-1. Advertisement Review Scenario**

**Table 4.2.8.3-1. Advertisement Review Scenario**

Step	Operator	System	Purpose
1	User submits advertisement via Hypertext viewer	Enters advertisements the advertising DBMS	User wants to advertise a data or service
2	Moderator receives e-mail notification	E-mails moderator notification of advertisement submission	Notify appropriate person to review the advertisement
3	Moderator uses hypertext viewer to examine the advertisement	Provides HTML to moderator	Moderator reviews advertisement for approval criteria
4	Moderator approves advertisement	DBMS table is updated to activate the advertisement	Advertisements is posted for public access

#### 4.2.8.4 Data Dictionary Validates Ingest (Error Condition) Scenario

The process for updating valids in the data dictionary can be automated or manual. This scenario describes valids update in automated mode and operator intervention is needed due to an error condition. In the error-free valids update scenario, the data server provides the data dictionary

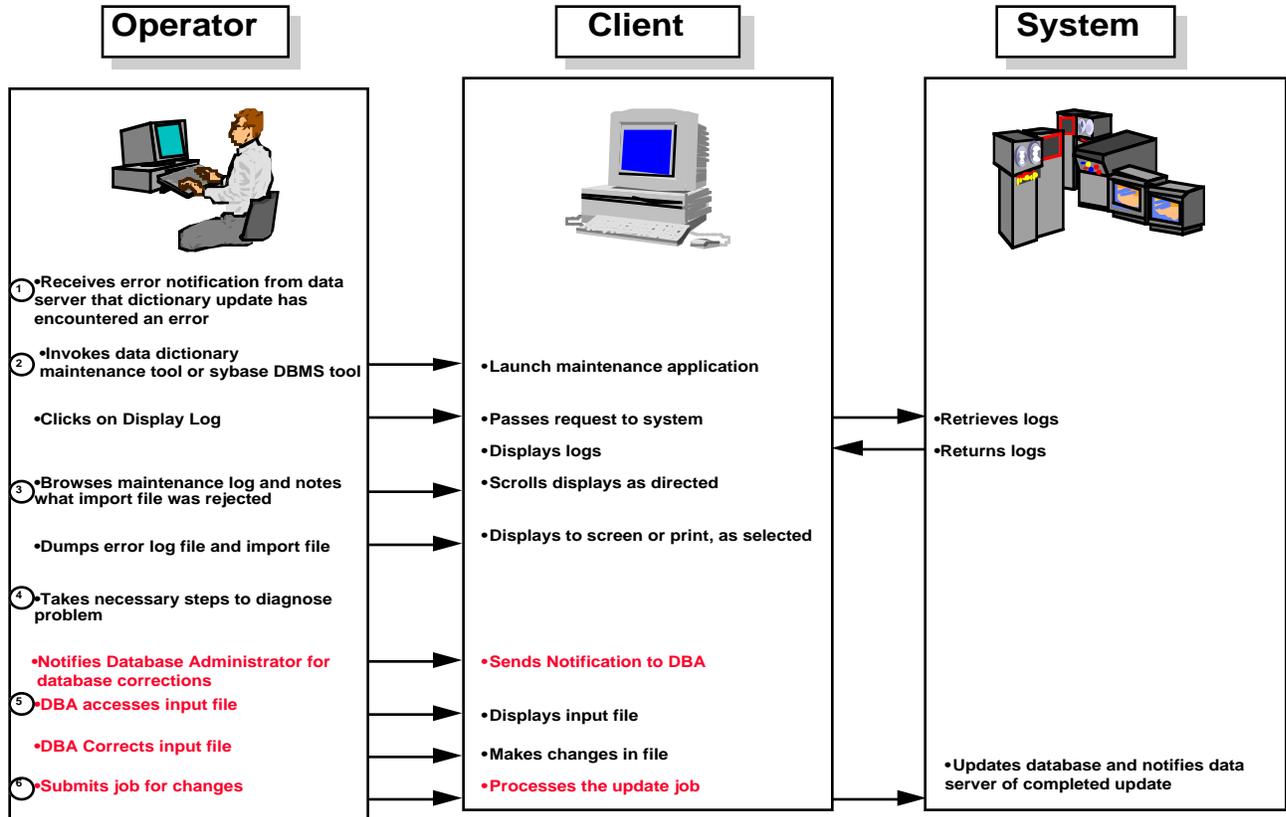
with new valids and schema when the data server instantiates or modifies a data type (described in paragraph 4.2.8.1). The update event is noted in the system log. After the update, the data dictionary provides a notification to the data server that verifies completion of the update. The update verification ensures that the ESDT has been fully instantiated in the data management database. Upon completion of all transactions associated with instantiating the data type in the system, the data server advertises the ESDT to the advertising server.

The valids update scenario for the data dictionary is the same for valids associated with data unique to ECS or data migrated from V0. The data dictionary is the single point of contact for valids by all ECS applications except the V0 gateway, which uses its own valids tables for translation of service requests between V0 and ECS. When valids are migrated from V0, the V0 gateway valids mapping tables are no longer needed, since the need for mapping is eliminated by the migration of the data to ECS. The provision of a single valids repository automatically provides an update mechanism to all users of the valids. This is true for whether the valids are from data migrated from V0, or result from the instantiation of a data type for non-migrated data.

An error condition in the above scenario will bring an operator into the loop. Error conditions can occur when problems are found by the data dictionary or the replicated database in the exported valids and schema. These problems are discovered during the automated QA of the exported information, and could be illegal values for the valids, or simply valids not matching the exported schema. Either way, a notification is sent to the operator of a failure in the QA of valids import. The operator accesses a dictionary maintenance application to obtain specifics about the error. The maintenance application provides a log of update activities and will provide filenames for the failed input file and the associated error log. The operator will normally view dumps of the error log and input file to determine what the problem is. The operator takes appropriate steps to resolve the problem, corrects the input file and resubmits it to the dictionary server. The dictionary application then completes the update to the data dictionary database, and notifies the data server. The data server advertises the ESDT to the advertising server when all operations associated with the installation of the data type have been completed.

The scenario has a single precondition, which is that the migrated V0 data has been converted to the ECS data model, has been QA'ed and ingested into the Data Server .

Refer to Figure 4.2.8.4-1 for a pictorial depiction of the Data Dictionary Valids Ingest scenario. Refer to Table 4.2.8.4-1 for the steps of the scenario.



**Figure 4.2.8.4-1. Data Dictionary Validates Ingest Scenario**

**Table 4.2.8.4-1. Data Dictionary Validates Ingest Scenario**

Step	Operator	System	Purpose
1	Operator receives error notification from data dictionary that dictionary update has encountered an error	Operator notified via e-mail	Provide operator with notification he must perform maintenance on dictionary
2	Operator invokes data dictionary maintenance tool or sybase DBMS tool	Launch maintenance application	Provide access to appropriate application
3	Operator browses maintenance log and notes what import file was rejected	Scrolls displays as directed by user	Isolate record required
3	Operator dumps error log file and import file	Display to screen or print, as selected	Provide information for diagnosing problem
4	Operator takes necessary steps to diagnose problem	N/A	Determine what needs to be corrected
5	Operator notifies the Database Administrator about the errors accesses editor and corrects input file	Sends notification to Database Administrator	Notify Administrator for corrections needed
6	Database Administrator submits the database changes	Updates database and notifies data server of completed update	Complete instantiation of ESDT

#### 4.2.8.5 Subscription Event Error Scenario

The subscription service provides automatic notification, and the initiation of associated processing, which are triggered by certain predefined events in the system. The Subscription Server provides the capability for ECS servers to register events against which subscriptions can be placed. The events for which subscription can be placed are initially determined when new data types are established in the system. The instantiation of the data type includes the automated export of the subscribable events to the subscription server. Subsequent modification/deletion of a registered event occurs only in concert with changes in the registering ESDT.

In addition to data basing the subscribable events, the subscription server process subscription requests from users. It maintains the subscription lists which describe which users are subscribing to which events, and the actions expected as responses to the subscribed events. Users may at any time add/modify/delete their subscriptions. These activities, like the registering of subscribable events, do not require operator intervention.

Problems can occur in situations where the subscription server cannot for some reason execute a subscription. This can occur, for example, if the subscription calls for the ftp push of data to a user's disk, and the user's disk is full, as is described in the scenario below. Operator intervention is required to address the problem and complete the normal processing.

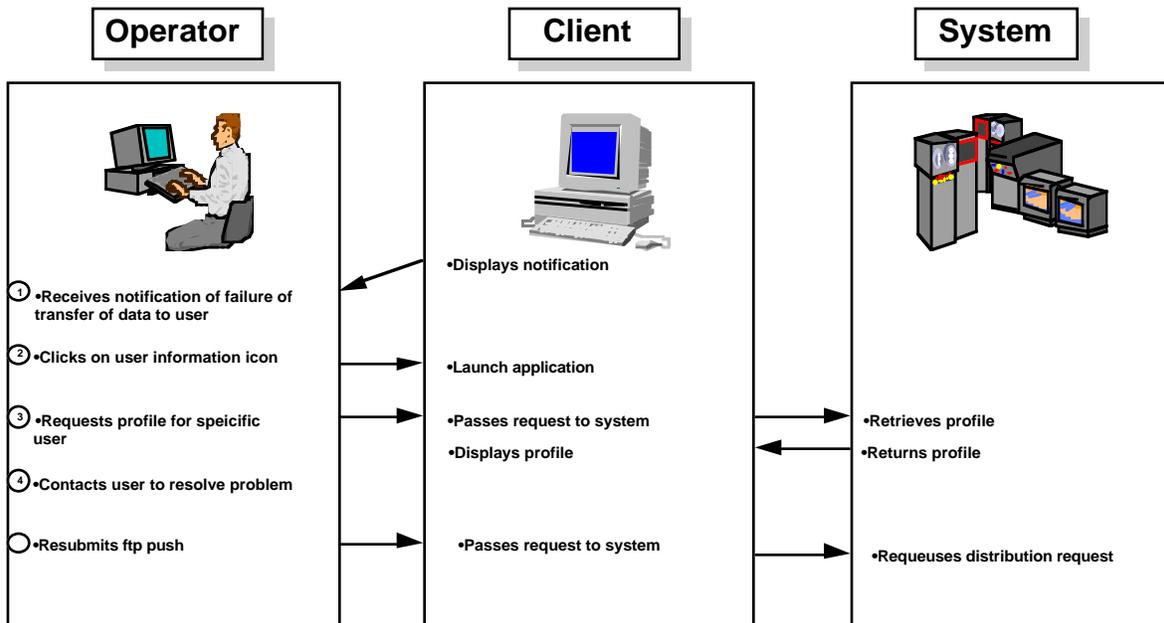
The following scenario assumes as a precondition the instantiation of the data type in a data server, and the successful import to the subscription server of the subscribable events. The subscription set up in this scenario acquire a data product via ftp push when it is inserted into the archive. A successful data insert occurs in the archive (Scenario 4.2.2.1), which is a ECS subscription event. Science Data Server to builds an ESDT data acquisition request. The requisite data is identified and an acquire via ftp push request is generated by the Data Server. Distribution Management logs the acquire via ftp push request. When the request thread is processed, distribution Management sends a Data Retrieval Request to Storage Management listing the granules of high interest to be retrieved. to request requisite data collection from the archive. Storage management logs and queues the Data Retrieval Request. When the request is reached in the request queue, Storage Management requests the appropriate granules be retrieved from the archive via the Archive Management OTS Product. The granules are placed on the Working Storage and a Data Retrieval Request completed message is logged and sent to Distribution Management. This is to retrieve the appropriate granules and place them on the user pull volume.

Distribution Management utilizing login, system and security information in the Data Distribution request, attempts to push the high interest granules to the user's system. When the transfer is interrupted, Distribution Management waits the prescribed interval and retries. The wait and retry sequence repeats until successful transmission or until the DAAC Policy specified number of retries is exceeded.

Distribution Management sends a Distribution Request Failure Message to the operator console and passes on a distribution failure notification to the client or e-mails the user if no client is

active. The scenario below describes recovery from the failure of the ftp push, which entails resolving the problem with the user and re-running the push.

Refer to Figure 4.2.8.5-1 for a pictorial depiction of the Subscription Event Error scenario. Refer to Table 4.2.8.5-1 for the steps of the scenario.



**Figure 4.2.8.5-1. Subscription Event Error Scenario**

**Table 4.2.8.5-1. Subscription Event Error Scenario**

Step	Operator	System	Purpose
1	The operator receives the transfer failure notification and an error code. (Destination disk full)	Provides notification to operator	Operator intervention required to resolve the transfer problem.
2	Operator clicks on user information icon	Starts application to access user profiles	Obtain contract information for user
3	Operator searches for user by name and obtains user contact information	Searches user profile database and returns profile	Obtain contract information for user
4	The operator resolves the problem with the user	N/A unless e-mail is used	
5	Operator resubmits via GUI the transfer request.	Re-queues the transfer request	Re-run the ftp push

#### 4.2.8.6 Server Saturation Scenario

Situations of unusually high ECS demand may occur, where the nominally available processing resources may be overloaded. This may be inspired by a catastrophic event, where a large

number of users might initiate broad-based queries across multiple sites to capture as much observed data as possible. The ECS must attempt to process this barrage of requests in addition to its normal workload.

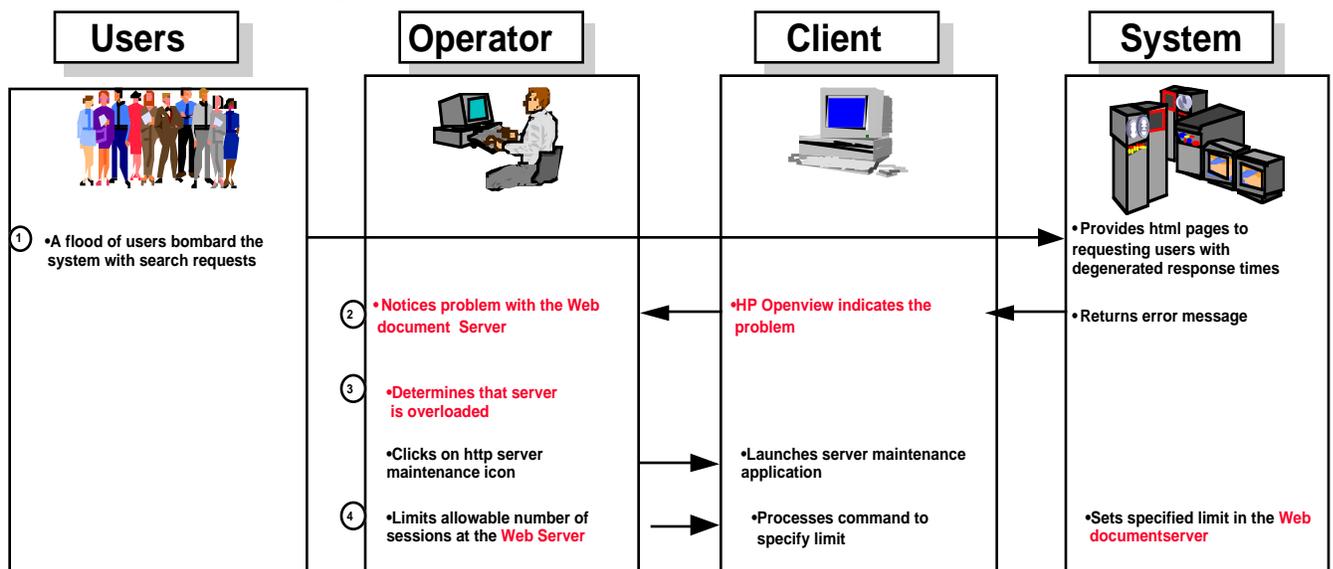
Aside from the load incurred by the query and subsequent data inventory list traffic within the system, the nature of the queries themselves may pose significant processing overhead. It can be expected that numbers wild card cross-DAAC searches will be requested. Additionally, *coincident searches* may be initiated, where qualifying data inventory lists consist of representative observations at the same time and date (e.g. search for all instrument data sets at 5/18/81 @ 3 PM EST of Mt. St. Helens).

ECS operators have an option for responding to the increased load. The strategy involves restricting number of concurrent sessions, which would limit the number of users accessing the systems

The scenario assumes a catastrophic event, with the subsequent dramatic increase in the number of users attempting to access the system and submit queries.

The scenario is not an attempt to describe a system-wide response to a flood of requests. It rather focuses on responses which can applied to Web servers. The scenario also assumes Web server capabilities which are common today. It does not assume the capabilities of any specific COTS Web server, nor does it attempt to predict Web server capabilities which may be available in the Release B time frame. Given the pace of technology change for Web servers, it is virtually certain that additional strategies and server features will be available to deal with Web server saturation in the future.

Refer to Figure 4.2.8.6-1 for a pictorial depiction of the Server Saturation scenario. Refer to Table 4.2.8.6-1 for the steps of the scenario.



**Figure 4.2.8.6-1. Server Saturation Scenario**

**Table 4.2.8.6-1. Server Saturation Scenario**

<b>Step</b>	<b>Operator/User</b>	<b>System</b>	<b>Purpose</b>
1	A flood of users access the Advertising Service	Provides HTML pages to requesting users with degenerated response times	To locate data sets relevant to the catastrophic event
2	Operator notices problem in with Web Document server	HP Openview indicates problem	Notify operator of problem
3	Operator clicks on http server maintenance icon	Launches server maintenance application	Provide operator access the maintenance application
4	Operator limits allowable number of sessions at the Web Server	Sets specified limit in http server	Limits load on the system from the front end

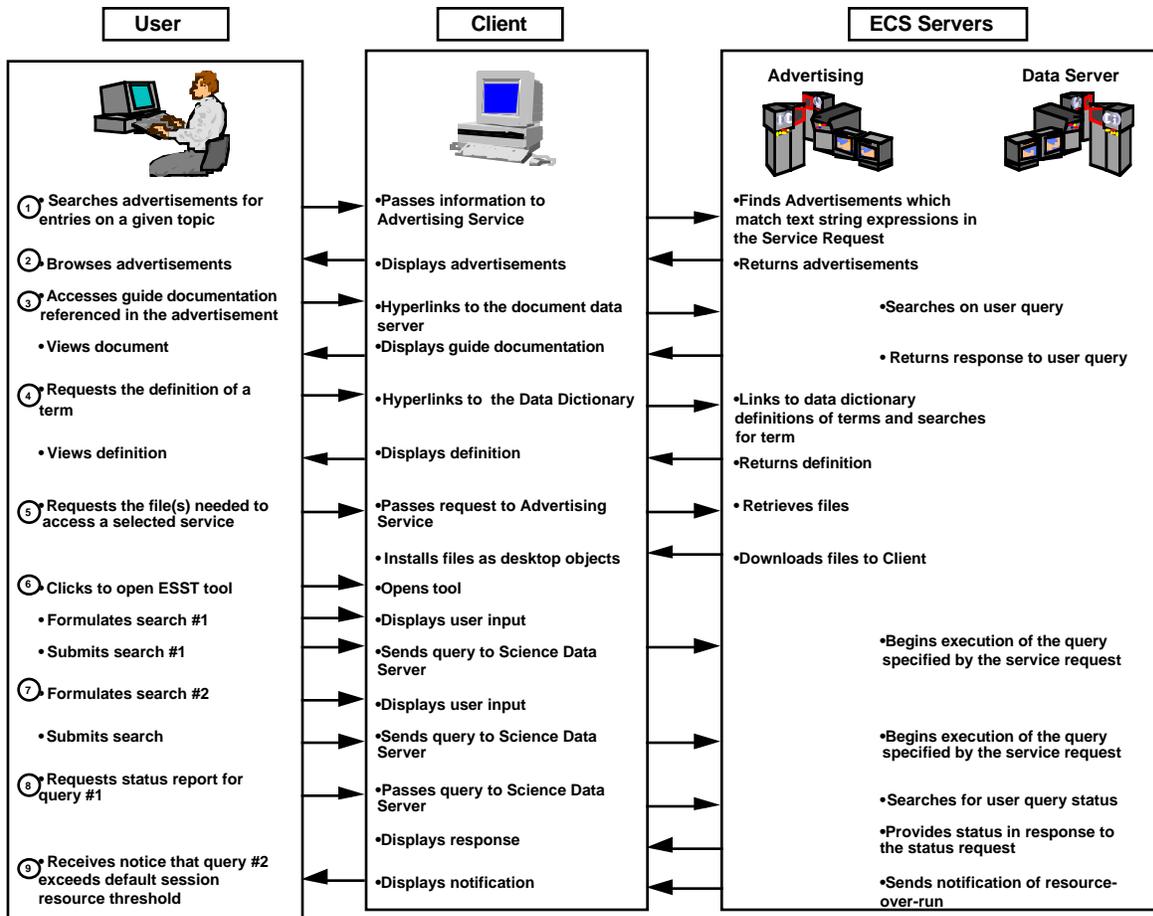
### **4.2.9 Science User**

This sections contains two scenarios which provide users' views of the ECS. The first scenario describes activities typically undertaken in a data search and ordering session. The second scenario describes only a coincident search, and focuses more on system activities than does the first scenario.

#### **4.2.9.1 Simple Search and Order Scenario**

The simple user search scenario covers activities typical undertaken in a data search for a single data server. The scenario starts with the user accessing advertisements in the advertising service. From the advertising service the user hyperlinks to the document data server to obtain guide documentation, and to the Data Dictionary for definition of terms. After review of the document, the user submits two queries to the system, one of which is stasured by the user. The user is then notified of a problem with a resource limit for one of his queries, for which the user requests and is granted a increased resource limit. The search are completed and obtained by the user, who then obtains browse images associated with the search results. An order is created by the user from the results sets, and subsetting options are requested for a part of the order. The scenario concludes with notification being sent to the user that the order has been filled.

Refer to Figure 4.2.9.1-1 for a pictorial depiction of the Simple Search Scenario. Refer to Table 4.2.9.1-1 for the steps of the Scenario.



**Figure 4.2.9.1-1. Simple Search and Order Scenario (1 of 3)**

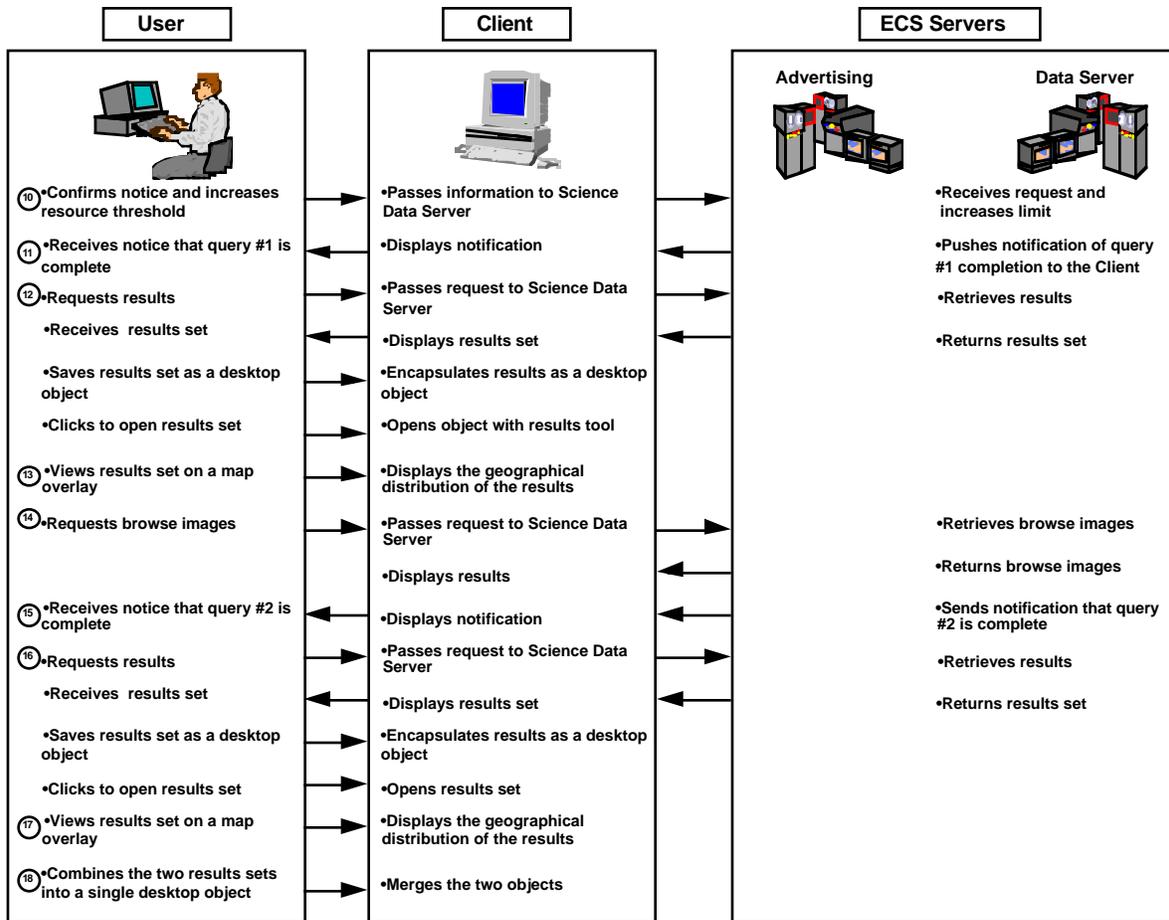
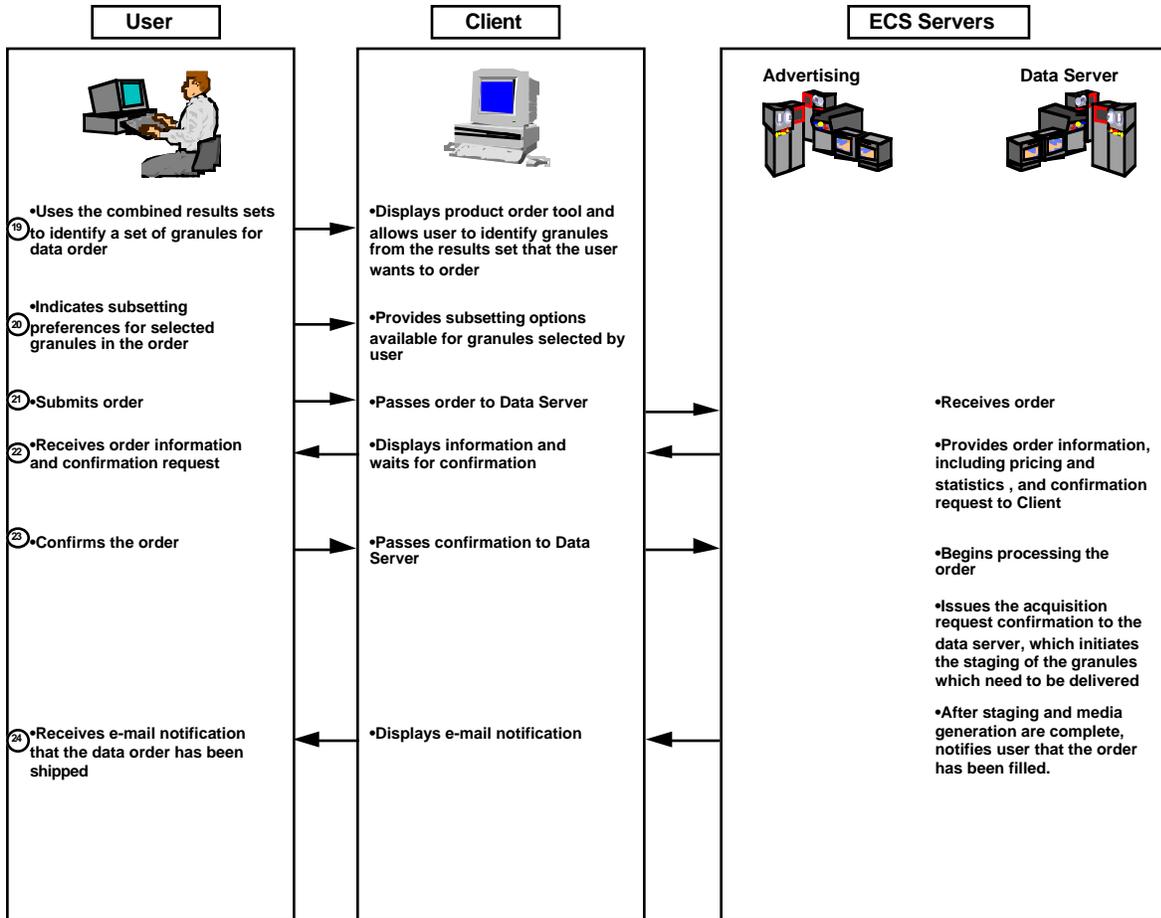


Figure 4.2.9.1-1. Simple Search and Order Scenario (2 of 3)



**Figure 4.2.9.1-1. Simple Search and Order Scenario (3 of 3)**

**Table 4.2.9.1-1. Simple Search and Order Scenario (1 of 2)**

Step	User	System	Purpose
1	User searches advertisements for entries on a given topic	Advertising service finds Advertisements which match text string expressions in the Service Request	User wants to locate data of interest
2	User browses the returned advertisements using an http browsing tool	The advertising service accesses Advertisements via hyperlink mechanism in support of browsing Advertisements and linking to data Dictionary definitions of terms	User obtaining additional information about the returned advertisements
3	User accesses guide documentation referenced in the advertisement	Client hyperlinks to the document data server, searches and returns response to user query	User requires documentation a
4	User obtains definition of terms	Client hyperlinks to the data dictionary , searches and returns response to user query	User requires additional information about specific terms
5	User installs the file(s) needed to access a selected service	Advertising Service downloads files to Client, where they are installed as desktop objects	Provide tools to user (Note: this scenario assumes that the files are available via the Advertising Service Storing the file(s) at the provider and accessing them there is being considered as an alternative)
6	User opens tool and formulates search # 1 and submits it	Client sends query to Science Data Server, which begins execution of the query specified by the service request	User query of system holding
7	User formulates search # 2 and submits it	Science Data Server begins execution of the query specified by the Service Requests	User query of system holding
8	User requests status report for query # 1	Science Data Server provides status to the Client in response to the status request	User wants to know how the search is progressing
9	User receives notice that query #2 exceeds default session resource threshold	Science Data Server sends the Client notification of resource over-run	Mechanism for responding to over-run of resources allocated to users
10	User confirms notice and increases resource threshold	Science Data Server provides receives request and increases limit	Mechanism for responding to over-run of resources allocated to users
11	User receives notice that query #1 is complete	Science Data Server pushes notification of query completion to the Client, which displays it.	Provide notice to user that result set is ready to be picked up.
12	User retrieves result set and save it as a desktop object.	Science Data Server provides the result object to the Client which encapsulates it as a desktop object.	Store results at user's workstation.

**Table 4.2.9.1-1. Simple Search and Order Scenario (2 of 2)**

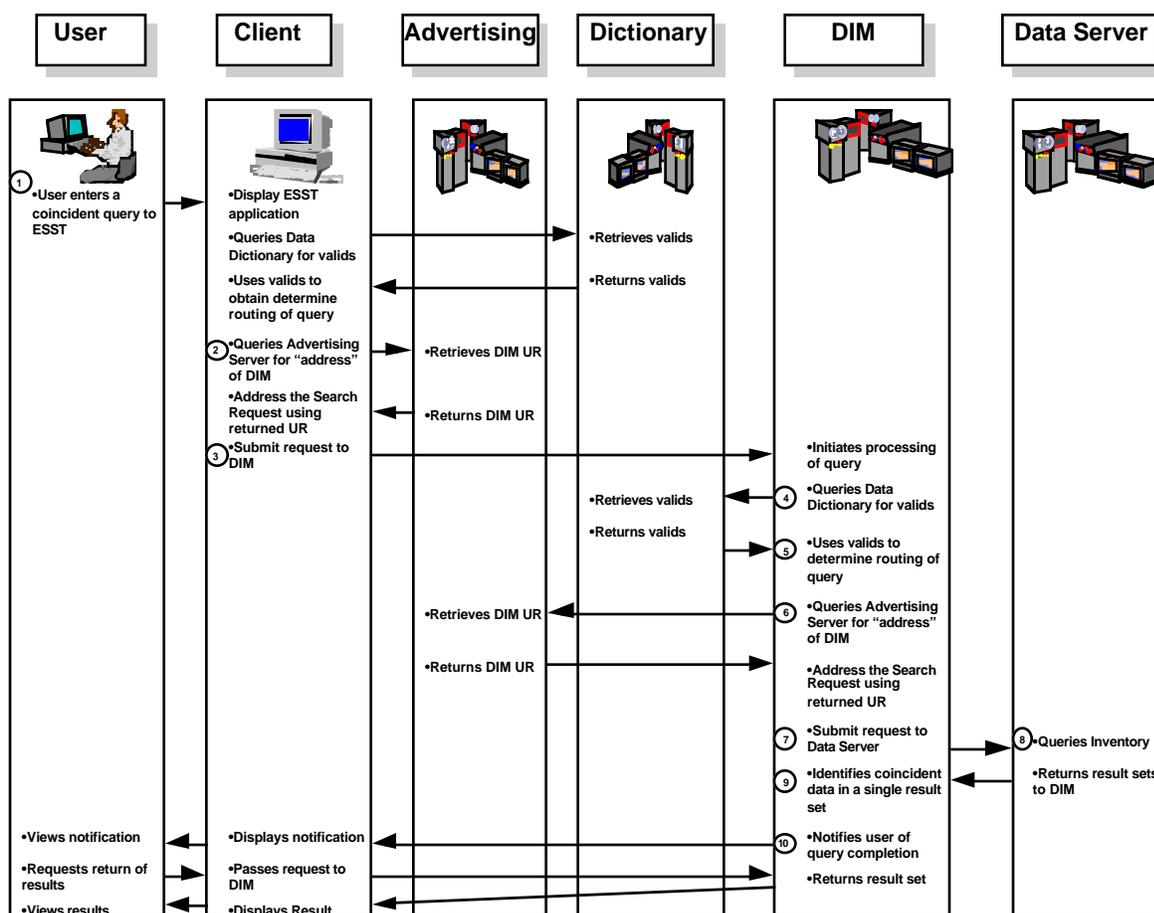
Step	User	System	Purpose
13	User reviews results of query #1 on a map overlay	Client displays the geographical distribution of the results	Provide user graphical representation of the results
14	User requests and displays browse images	Science Data Server provides browse images to Client in response to the service request. The Client visualization tool displays the results	Provide user with reduced resolution image of data
15	User receives notice that query # 2 is complete	Science Data Server provides pushes notification of query completion to the Client, which displays it.	Provide notice to user that result set is ready to be picked up.
16	User retrieves result set and save it as a desktop object	Science Data Server provides the result object to the Client which encapsulates it in a desktop object	Store results at user's workstation.
17	User reviews results of query #2 on a map overlay	Client displays the geographical distribution of the results	Provide user graphical representation of the results
18	The User combines the two results sets into a single desktop object	Client merges the two objects	Integrate the two results
19	User uses the combined results sets to identify a set of granules for a data order	Client displays product order tool and allows user to identify granules from the result set that the user wants to order	Create a data order
20	User indicated subsetting preferences for selected granules in the order	Provides subsetting options available for granules selected by user	Provide for processing options for a selected set of the granules
21	User sends the combined result set to the data server	Science Data Server receives the data order and acknowledges it	User wants to order the data
22	User receives order confirmation and order statistics, including pricing information	Science Data Server provides notification to Client, then begins processing the order	Provide feedback to user on the order
23	User confirms the order	Workbench issues the acquisition request confirmation to the data server, which initiates the staging of the granules which need to be delivered	Require user to confirm order after initial submission
24	The user is notified via e-mail that the data order has been shipped	Science Data Server, after staging and media generation is complete notifies user that the order has been filled.	Feedback to user

#### 4.2.9.2 Coincident Search Scenario

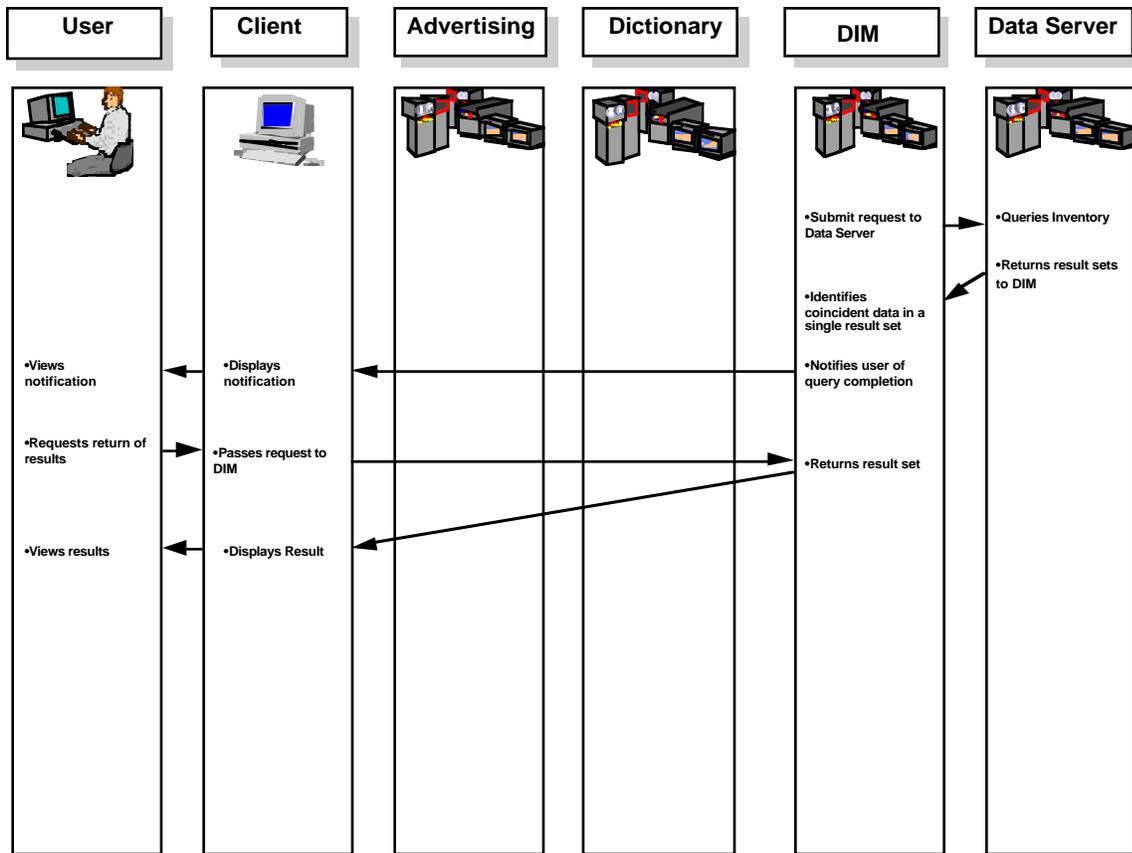
The purpose of this scenario is to demonstrate how ECS performs a coincident search across two different data sets at two different DAACs.

The scenario starts upon the client's submittal of a query using the Earth Science Search Tool (ESST). The ESST queries the data dictionary service to determine where the query should be sent (DIM, LIMs, Science Data Server, or Document Data Server). The ESST determines that the search must be sent to a DIM, established a session with the DIM, submits the search request to it. The DIM parses the query and determines that sub queries should be sent to two different Science Data Server. The DIM uses the Advertising Server service to get a UR for each Science Data Server instance. DIM creates a sessions to the Science Data Server using the URs provided by the Advertising Server, and submits the sub queries to the Science Data Servers. The Science Data Servers process the queries and return results set to the DIM. The DIM processes the two results set to determine coincidence, and returns a single results set with the coincident granules to the Client.

The scenario is terminated when the DIM combines sub query results from Science Data Servers. Refer to Figure 4.2.9.2-1 for a pictorial depiction of the Coincident Search scenario. Refer to Table 4.2.9.2-1 for the steps of the scenario.



**Figure 4.2.9.2-1. Coincident Search Scenario (1 of 2)**



**Figure 4.2.9.2-1. Coincident Search Scenario (2 of 2)**

**Table 4.2.9.2-1 Coincident Search Scenario**

<b>Step</b>	<b>Operator/User</b>	<b>System</b>	<b>Purpose</b>
1	User enters a coincident query to ESST.	Client queries Data Dictionary for valids	ESST determines server for servicing the service request
2		Client obtains URs for data servers from the Advertising Service	Obtain "address" of the appropriate server
3		Client establishes session with DIM and sends query	Route to appropriate server
4		DIM queries Data Dictionary for valids	DIM determines server for servicing the service request
5		DIM parses query and creates query plan	Decompose and process query
6		DIM obtains URs for data servers from the Advertising Service	Obtain "address" of the appropriate server
7		DIM establishes sessions with appropriate Data Server and submits sub-queries	Route to appropriate servers
8		Science Data Servers process queries and return results to DIM	Provide results from inventory searches
9		DIM processes results identifying coincident granules	Integrate results
10		DIM notifies Client that results set is complete	Provide notification to user
11	User requests result set	DIM pushed result set to Client	Provide results to user
12	User displays result	Client Results tool displays coincident sets	Display results to user