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Evaluation Package 6 (EP6) Results Report

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Abstract

This paper describes the results of the Evaluation Package 6 evaluation. Two methods were used to evaluate EP6: usability testing and an on-line user survey. Descriptions of the usability tests and on-line survey, known as the Comment Survey Tool, are provided. The analyses for these two data collection methods are detailed. A list of recommendations to the ECS developers is included in this report. In addition, some of the comments generated from the EP6 evaluation were input to the User Recommendations Database (URDB); those entries are provided.

Keywords: EP6, Evaluation Package 6, Usability Testing, Survey

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Contents

1. Introduction

1.1	Purpose.....	1-1
1.2	Organization.....	1-1

2. Background

2.1	What is an Evaluation Package?.....	2-1
2.2	Evaluation Package History	2-1
2.2.1	X/Motif-Based Tools	2-2
2.2.2	HTML-Based Tools	2-2
2.2	Evaluation Methods	2-3
2.3	Process for Incorporating Evaluation Results into ECS	2-4

3. Incorporation of Previous EP and Prototype Evaluation User Comments into EP6

3.1	EP4 Comments and EP6 Response.....	3-1
3.1.1	General Comments.....	3-1
3.1.2	Advertising Service.....	3-2
3.1.3	EOSView	3-3
3.1.4	Scientists' Workbench/Desktop.....	3-4
3.2	Prototype Workshop 1 (PW1) Comments and Response in EP6.....	3-4
3.3	Summary of URDB Entries from EP4 and PW1	3-5

4. Evaluation Methodology

4.1	Usability Test Design and Methodology	4-1
4.2	Comment Survey Tool Design.....	4-2

5. Evaluation Results

5.1	User Registration Tool.....	5-1
5.2	Desktop/Workbench.....	5-3
5.3	Earth Science Search Tool.....	5-4
5.3.1	Constructing a Query	5-4
5.3.2	Submitting a Search and Reviewing Results	5-7
5.3.3	Submitting an Order.....	5-9
5.4	Product Request Tool.....	5-10
5.5	EOSView	5-11
5.6	Advertising Service.....	5-13
5.7	Data Dictionary.....	5-17
5.8	User Profile Tool.....	5-19
5.9	User Preference Tool	5-20
5.10	Trouble Ticketing Tool.....	5-21
5.11	General.....	5-22

6. Lessons Learned

7. Conclusion

Figure

4-1.	Usability Test Environment	4-1
------	----------------------------------	-----

Tables

3-1.	Status of EP4 and PW1 related URDB Entries.....	3-5
5-1.	User Registration Survey Results	5-2
5-2.	Desktop/Workbench: Usability Test Survey Results.....	5-4
5-3.	Earth Science Search Tool Survey Results.....	5-5
5-4.	Product Request Tool Survey Results.....	5-11

5-5. EOSView Survey Results	5-12
5-6. Advertising Service Survey Results.....	5-16
5-7. Data Dictionary Survey Results.....	5-19
5-8. User Profile Tool Survey Results.....	5-20
5-9. User Preference Tool Survey Results	5-21
5-10. Trouble Ticket Tool Survey Results	5-22
5-11. General Survey Results.....	5-24

Appendix A. Usability Tasks

Appendix B. Survey Questions

Appendix C. EP6 URDB Entries

Appendix D. EP6 Comments

**Appendix E. List of EP6 Independent Evaluators and Usability
Participants**

Abbreviations and Acronyms

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1. Introduction

1.1 Purpose

The purpose of this paper is to present the results of the EP6 evaluation so that the information can be incorporated into the ECS design.

The author would like to thank all of the evaluators who participated in the usability testing or provided input through the Comment Survey Tool. EP6 could not have gotten off the ground without the diligent work of the EP6 developers, the dedication of the Integration and Test team, and engineering and science support from the DAAC liaisons; their work was invaluable and greatly appreciated.

1.2 Organization

This paper is organized as follows:

Chapter 2 provides some background on the history of the Evaluation Package, a discussion of the methods used for the evaluation of EP6 and the process for incorporating evaluation results into ECS design. The results of previous EP and Prototype Workshop evaluations are discussed in Chapter 3. A list of comments from previous evaluations is provided along with the ECS response for to each suggestion. A summary of the status of the URDB entries from EP4 and PW1 is provided. The Evaluation methodology of usability tests and the Comment Survey Tool are detailed in Chapter 4. Results from the EP6 evaluation are presented in Chapter 5 listed according to the appropriate EP6 application. Chapter 6 contains the EP6 Lessons Learned and the response from the EP7 development team. The paper concludes with Chapter 7. Survey questions, usability tasks, lessons learned and EP6 related URDB entries are listed in the Appendices.

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2. Background

2.1 What is an Evaluation Package?

A multi-track development process has been adopted by the ECS Team to build the EOSDIS Core System. This process includes the development of a portion of ECS on an incremental track and parallel development of the remainder of ECS on a formal track using the traditional waterfall development methodology. To accelerate and accommodate early user feedback, and integrate early prototypes and incremental prototypes, a delivery mechanism called an Evaluation Package (EP) was devised.

An Evaluation Package is a collection of prototypes that allow ECS developers to test concepts, implementation designs, and develop increasingly mature and robust software for the ECS user interface. Evaluation Packages also allow developers to evaluate the advertised capabilities of custom-off-the-shelf (COTS) software and hardware in the context of ECS. In addition to designing and constructing the user interface for the EP, the “back end” software and hardware that users do not see (e.g., security and communications software, database design, database population) is also developed. Once complete, the EP is delivered to the DAACs and a set of NASA sponsored evaluators, nick-named “Tirekickers” for evaluation. Each EP builds upon and expands the capabilities of the previous EPs, until the last EP in the series, supporting a formal release, is migrated to the formal track for integration, acceptance testing, and delivery.

Evaluation Packages focus on the ECS subsystems with heavy user interaction: Client, Interoperability, Data Management, and Data Server Subsystems. The EP as shipped to the DAACs and evaluators represents the prototype ECS Client. Using the Client applications users can search for data, view data, order data, manage their user environment, and access the data stored in the Data Server.

2.2 Evaluation Package History

Evaluation Package 4, the most recent EP (delivered in January 1995) focused, in part, on establishing an interconnected environment made up of ECS workstations at each DAAC and the ECS Development Facility in Upper Marlboro, Maryland. This testbed environment was built upon Open System Foundation’s (OSF) Distributed Communications Environment (DCE). Comments collected during EP4 allowed ECS to revise some of the EP4 applications based on user feedback, and have them re-evaluated at a Prototype Workshop.

Prototype Workshops consist of new design concepts and partial prototypes usually written using less robust software than is developed for an EP. While EPs are developed over a period of six to eight months, Prototype Workshop applications are developed within a two to three month period. Prototype Workshop 1 (held in May 1995) began to explore the potential of HTML-based applications for use within ECS. User feedback collected during PW1 was incorporated

into the development and revision of applications for EP6. Note: due to schedule constraints EP5 was not developed, it was to have contained communications and security software only. No user interface was to be developed.

Evaluation Package 6 focused on the development and incorporation of HTML applications and tools within the EP6 X/Motif environment. EP6 was supported on Sun and HP platforms and shipped to each of the ECS DAACs and the NASA Tirekickers with the appropriate hardware and software configuration. Each evaluator was assigned to a DAAC and provided with a UNIX account on the DAAC workstation running EP6. Because EP6 used DCE security software, each Evaluator was provided with an EP6 (DCE) account. The following tools provided in EP6 were evaluated by the EP6 Independent Evaluators and usability test Participants:

2.2.1 X/Motif-Based Tools:

- **Earth Science Search Tool (ESST):** this provides users with the capability to submit a query and to retrieve results from the data server. ESST also offers quick access to the Advertising Service and to the Data Dictionary.
- **Product Request Tool:** works in conjunction with the ESST and manages the submission and confirmation of data orders from the data server.
- **EOSView visualization tool:** is a Hierarchical Data Format (HDF) display tool that allows users to preview images, tables, and text before requesting data.
- **Desktop Manager:** allows the user to access EP6 applications, manage the files and folders stored in the user's EP6 account.

2.2.2 HTML-Based Tools:

- **Data Dictionary Tool:** provides access for users to conduct free-text or index-based searches of the ECS acronym list, glossary of terms, and metadata dictionary. It also provides information on valid ESST search parameters.
- **User Registration Tool:** allows unregistered users to request ECS accounts, make changes to their existing user profiles, and obtain ECS client software by filling out the appropriate information in the User Registration Tool registration form.
- **User Profile Tool:** allows each user to modify his or her user information. It also allows easy manipulation of the ECS application default preferences so that a user's preferences may be restored regardless of the client used to log in.
- **Advertising Service:** is a World Wide Web-based searchable index that enables users to submit and to search advertisements related to Earth science services, providers, and data. Advertisements provide relevant contact, copyright, and cost information, and direct links to advertised data, tools and services.

- **Comment Survey Tool:** provides the opportunity for evaluators to answer questions regarding EP6 capabilities, applications, interface design, and performance. A free-text comment field is provided for evaluators to enter any and all comments they have about EP6, the survey itself, and their evaluation experience.

For a description of EP6 functional content and physical configuration, consult the following:

- Evaluation Package 6 Deployment Description (222-TP-012-001)
 - <http://edhs1.gsfc.nasa.gov/waisdata/docsw/html/tp2221201.html>
- Evaluation Package-6 Advisory Document (430-TD-001-001)
 - <http://edhs1.gsfc.nasa.gov/waisdata/docsw/html/td4300101.html>

2.2 Evaluation Methods

Evaluation Package 6 underwent two periods of evaluation: the first Evaluation Period (December 15 - February 16) for usability testing, the second (March 11-31) for collecting additional user feedback using the on-line user survey in the Comment Survey Tool. Two Evaluation Periods were needed because of schedule conflicts caused by the two Federal Government furloughs, and some technical problems encountered during installation and use of the EP6 Client software at the DAAC sites and tirekicker workstations.

Usability tests are designed to capture very detailed data about a user's experience with the EP; they are very time and resource intensive. The usability tests were administered in a controlled environment that allowed for observed and measured user response for evaluation of EP6. The EP6 evaluators were selected by ESDIS, DAAC managers, and ECS DAAC Liaisons; this includes the group of evaluators known as NASA "Tirekickers." Evaluators were invited to travel to the ECS Development Facility in Upper Marlboro, Maryland to participate in usability testing. Of the approximately 100 potential EP6 evaluators, 16 came to Upper Marlboro to participate in usability tests. All of the evaluators have experience in various earth science disciplines both as users and producers of data. These EP6 evaluators will be referred to as usability Participants.

The on-line user survey allowed evaluators to input their user preferences and suggestions into the Comment Survey Tool at the user's convenience. These two methods were chosen because they complement one another and have been used successfully to evaluate previous EPs and PW software.

The on-line user survey provides the opportunity to measure important aspects of user needs, preferences, and comments with minimal investment in time and workspace. Collection of data via on-line survey allows users to access the EP6 at their own convenience and alleviates the requirements for a dedicated test environment, travel, etc. The prime disadvantage in using the on-line survey is that it is difficult to isolate some perceived and actual problems users may have encountered while using EP6 because each user evaluation session is uncontrolled (no record of system load, system configuration, etc. during user session). Users who evaluated the system remotely via the on-line user survey, will be referred to as Independent Evaluators.

2.3 Process for Incorporating Evaluation Results into ECS

All of the comments collected during the evaluation of EP6 were reviewed and sent to the appropriate developer and ECS Subsystem lead for incorporation into ECS design; some were appropriate for formal submission to ECS and were entered into the User Recommendations Database (URDB). These types of comments included potential new ECS requirements, implementation suggestions, recommendations for process improvement, and policy considerations. This database allows URDB Analysts to collect and track user recommendations made to the ECS. A team of Analysts researches each entry and ensures that they are forwarded to the correct person, be that a system designer, developer, policy maker, etc.

Information on all URDB entries related to EP6 are available through the URDB Home Page at: <http://epserver.gsfc.nasa.gov/urdb/urdb.html> (see Appendix C).

3. Incorporation of Previous EP and Prototype Evaluation User Comments into EP6

3.1 EP4 Comments and EP6 Response:

The prototype process takes advantage of lessons learned in earlier versions. To enhance system usability, EP6 incorporated a number of comments gathered during the evaluation of EP4. Over 1300 comments and suggestions from evaluators were recorded during EP4 usability testing and from the on-line survey. A set of high level suggestions was distilled from the 1300 comments. These high level EP4 comments and suggestions for improvement are listed in boldfaced text according to function. The response to each comment from the EP6 developers is provided in plain text:

3.1.1 General Comments:

- a. Consistency within EP4 is an issue - e.g., fonts, placement of buttons and double- vs. single- clicks for certain functions.

EP6 developers coordinated their efforts to ensure that the same fonts were used across HTML applications and, where possible, across X/motif-based applications. The single- vs. double- click issue was clarified by using double-clicks to activate applications from the desktop and using single-clicks to activate all actions/functions within applications.

- b. A style guide should be available to developers to improve look and feel consistencies among ECS and Advertised services and applications.

The ECS Style Guide was available for EP6 developers and consulted for issues such as button placement and naming conventions among other interface design issues.

- c. Participants liked the use of Mosaic interfaces to present Help information and as the Advertising Service interface, however, more Mosaic capabilities should be provided (hot list, search “escape/abort” button, etc.).

The Help information for EP6 was provided in HTML format for each EP6 application. Incorporation of Mosaic capabilities such as the “Escape/Abort” button within the Earth Science Search Tool was not possible due to schedule constraints.

- d. EP4 Help must contain better and more information on which EP4 services, applications, and objects are available, how they work, and why they should be used.

The Help information provided in EP6 was greater and more detailed than that in EP4, however, evaluators commented that even more improvements could be made to it.

- e. Feedback indicators (e.g., hourglass, stopwatch, etc.) must be consistently implemented in ECS. Indication of system activity must be improved (e.g., indication that command was accepted and is being processed).

Stopwatch style feedback indicators were provided at every appropriate point within EP6, however, due to some system bugs, they were not always displayed to the user. Dialog boxes with explanatory messages were displayed when users submitted searches to the Data Server using the Earth Science Search Tool.

- f. Users want more control over the ECS environment, for example, through user preferences and file management options. But user limits should be enforced by ECS, for example, when re-sizing windows (maximum and minimum sizes). Also, warnings should be given before deletion of applications. Users want more control over the EP/ECS environment - user preference file and capabilities should be prototyped.

A User Preferences Tool was prototyped for EP6, although the prototype was limited in terms of functionality. Evaluators were pleased with the direction the design was taking.

EP6 was designed so that users would not be able to delete applications from the Desktop, if they tried an explanatory dialog box would be displayed. Users could delete applications from the UNIX command line.

- g. Interactive Evaluation Tool could be improved through the use of scrolling windows and a “data saved” indicator.

The Interactive Evaluation Tool was renamed the Comment Survey Tool and implemented in HTML. After the evaluator filled out the survey and submitted their answers the system returned a confirmation message and a “thanks” to the user.

3.1.2 Advertising Service:

- a. More thought should be given to the look and structure of information provided in the Advertising Service, what the links are called and where they are located.

The Advertising Service has been completely redesigned since it was evaluated during EP4. Because of this, and similar comments, the Advertising Service was re-organized so that advertisements must contain a standard set of information. This has helped to improve the organization of the Service and promoted the incorporation of a logical set of links. Use of a standard web browser interface has been implemented for EP6.

- b. ECS should provide a “Road Map” of the Advertising Service so that users can see the overall structure of the Advertising Service; expert users could use this as a means of getting straight to the service or information they need.

Because users found the EP4 Advertising Service difficult to navigate the hierarchy of links and paths was re-organized and standardized for EP6. This has improved the ease with which users can search and find information. Links to previous levels of information have been standardized to improve Advertising Service usability.

- c. Link management and the quality of text and information provided in the Advertising Service must be improved.

The development of standard links has improved the link management of the EP6 Advertising Service. Standards for advertisement content has also improved the quality of information available through the Advertising Service.

- d. Improvements are needed in the Advertising Search Service forms in terms of content and should be incorporated into the next version.

The forms used within the Advertising Service have been reformulated using capabilities available in more mature versions of HTML. These new capabilities provide increased flexibility and powerful searches for the Service users.

3.1.3 EOSView:

- a. EOSView file structure window needs to be made easier to use - highlight image files, rename/re-word cryptic text.

The structure window has been redesigned so that the structure of each HDF file is more clearly displayed. The text used has been rewritten to make it understandable by a greater number of ECS users, especially those who are not familiar with HDF jargon.

- b. Zooming and panning features in EOSView are liked but some refinement is needed, i.e., ensure that the panning window stays “in synch” with the viewing window.

When the user tries to zoom in on an image and pan across it, it often takes some time for the zoom window to redraw and “catch up” with the panning cursor. A part of keeping the two windows “in synch” with one another is a function of the amount of RAM on the user’s platform. However, ECS should provide a system feedback indicator to alert the user that the system is trying to “catch up” with the panning cursor; schedule constraints prevented this from being implemented in EP6.

- c. Removing technical HDF text from the EOSView file structure window would make the viewer easier to use, especially by those users who are unfamiliar with HDF.

The structure window has been redesigned and HDF-specific (i.e., “cryptic text”) has been reworded to accommodate those users who are not familiar with HDF jargon.

- d. EOSView should include a means for users to view metadata; without this capability it will be very difficult for users to order data.

The version of EOSView incorporated into EP6 included the capability to allow users to view the HDF data. The ability to view metadata will be included in the next release of EOSView.

3.1.4 Scientists' Workbench/Desktop:

- a. Window management is improved since EP3, but Participants found it difficult to navigate through different levels of the Workbench (e.g., the "Go Back" button).

The "Go Back" icon has been labeled "Go Back" so that users will have an additional visual cue to use the button to return to the previous directory level within the Desktop.

- b. Scientists' Workbench shows real potential, but needs more work to make file management easier. Users want to move more than one file at a time and use of control keys.

Time constraints prevented the implementation of the suggested improvements such as control keys and "rubber band select."

- c. Placement of items in the Scientists' Workbench pull-down menus should be examined and improved. Some items are better placed in other menus. Do not use acronyms in menus.

The pull-down menus were re-evaluated based on comments from EP4. The pull-down menus were reorganized and all acronyms were expanded within the menus.

3.2 Prototype Workshop 1 (PW1) Comments and Response in EP6:

- a. In general, we need to focus on scalability, at least from a benchmarking point of view for the next iteration.

The issue of scalability was addressed in EP6 by attention to the design of scrollable/tear-off pulldown menus, the display of search results using widgets to "open" and "close" the data collection/granule information, and the use of movable panels within the ESST for greater user flexibility. In addition, the Advertising Service and the Data Dictionary displayed results using an expandable "Index" display.

- b. For many of the tools, aliasing came up as a key service to include. This would provide the users with a broader search capability. For instance, a user could search on NOAA 9; the system would use the aliases NOAA-9, noaa9, Noaa 9, etc. to perform the search.

Aliasing could not be implemented in EP6 due to time and resource constraints, however, it is a feature planned for the next Evaluation Package - EP7.

- c. Boolean operators need to be reworked in the Advertising and Data Dictionary.

Evaluators found the Boolean operators difficult to use so they were removed from the available user options in EP6 applications.

- d. It was suggested that the Advertising Service and the ESST be combined.

Links between the Advertising Service and ESST were partially implemented for EP6, a more complete linkage is planned for EP7. It was decided in discussion with ECS developers, ESDIS Tirekickers, and ESDIS personnel that the two applications should not be combined into one.

- e. There needs to be a "busy cursor," (e.g., stopwatch, hourglass) to indicate that the system is busy/processing a command. The tirekickers have mentioned this several times (including EP4) and it has not been incorporated.

Stopwatch style feedback indicators were provided at every appropriate point within EP6, however, due to some system bugs, they were not always displayed to the user. Dialog boxes with explanatory messages were displayed when users submitted searches to the Data Server using the Earth Science Search Tool.

3.3 Summary of URDB Entries from EP4 and PW1

The following table lists the comments from the evaluations of EP4 and PW1 that were entered into the URDB. To obtain the complete text information log on to the URDB web page at <http://epserver.gsfc.nasa.gov/urdb/urdb.html>

Table 3-1. Status of EP4 and PW1 related URDB Entries (1 of 2)

URDB Number	Summary	Notes	Current Status
743	"Abort" or "Escape" button is needed to cancel actions in EP	Planned EP7 feature	Design Consideration
744	EOSView panning cursor should show image values		Design Consideration
745	Mosaic interface for the Scientists' Workbench should be provided	Possible implementation for EP7	Design Consideration
746	Users should be able to set User Preferences	User Preferences Tool prototyped in EP6	Closed- Resolved
747	EOSView Overlay Feature		Design Consideration
748	EOSView Panning Feature: label the Panning Window and provide an indication of cursor location on view window within Panning Window.	The thumbnail image to the side of the viewing window has been labeled "Panning Window"	Design Consideration
749	EOSView Animation Feature: create movie loop of images by placing the files in one directory.		Design Consideration
750	ECS Visualization: make EOSView more user friendly = less jargon		Design Consideration
751	Importing user generated Data (GIF/HDF files) to EPs	No plans for this in EP7	Design Consideration

Table 3-1. Status of EP4 and PW1 related URDB Entries (2 of 2)

URDB Number	Summary	Notes	Current Status
752	ECS Style Guide must be distributed	Style Guide is available on EDHS and in Earth Pages	Closed-Resolved
753	Workbench: Pull-down menu	Pull-down menus have been re-organized and improved (non-valid choices greyed out) for EP6 and EP7	Closed-Resolved
754	Scientists' Workbench: File Management Improvements	Rubber-band select not implemented for EP6, "view by date/time/size/etc." not implemented for EP6	Design Consideration
755	Printing hard copy of search order		Design Consideration
756	"Application Working..." icon needed		Design Consideration
757	EOSView should allow users to view metadata	Requirement: CLS-10370	Closed: Existing Requirement
758	Workbench: New capability: user control of icon location on Desktop		Design Consideration
759	Workbench: Deleting Applications without warning	Users not allowed to delete applications in EP6 from Desktop, allowed from command line	Closed-Resolved
760	EP4 GUI needs more than mouse input	Requirement: IMS-0160	Closed: Existing Requirement
761	ECS should allow the ability to re-size windows in EPs	Requirement: CLS-01600	Closed: Existing Requirement
762	Workbench: Icon should highlight when selected		Design Consideration
763	EP4 Advertising Service issues	Various look and feel issues; request of a Search capability Requirement: CLS-10010	Closed: Existing Requirement
791	ECS User Registration should only contain mandatory fields		Design Consideration
792	ECS cannot assume in the Ops Concept-User Registration that all users have email addresses.	This may be changed for EP7	Design Consideration
793	ECS should prototype subsurface and altitude queries.		Design Consideration
794	ECS should research the combination of the Earth Science Search Tool with the Advertising Service.	Integration begun with EP6, will continue to more complete integration for EP7	Design Consideration

4. Evaluation Methodology

4.1 Usability Test Design and Methodology

Usability testing is a method of quantifying the ease with which a system can be used. It has been utilized to capture various measures such as user satisfaction, access time, and error rates. These metrics are all used to locate areas of the system in need of improvement. The methodology employed for usability testing of EP6 was adapted from a paper written by Martha Szczur, "Usability Testing on a Budget." Szczur describes an efficient and low cost method of testing and quantifying usability. This methodology was employed for the evaluation of EP3 and EP4.

Usability test Participants were selected from the list of EP6 Tirekickers, ESDIS personnel, and other scientists nominated for evaluation of EP6. In addition to the test Participants, other personnel were involved in each test session. Depending upon the number of Participants, one or two Observers were employed to take notes on Participant reactions, comments, and body language. Each test session was conducted by the Facilitator, who acted as the host to the Participant and kept time for the test session. The records kept by the Observers and the Facilitator were combined with comments and survey scores recorded by Participants in the Comment Survey Tool (CST) and used for analysis. Figure 4-1 shows the Usability Test Environment as employed for EP6.

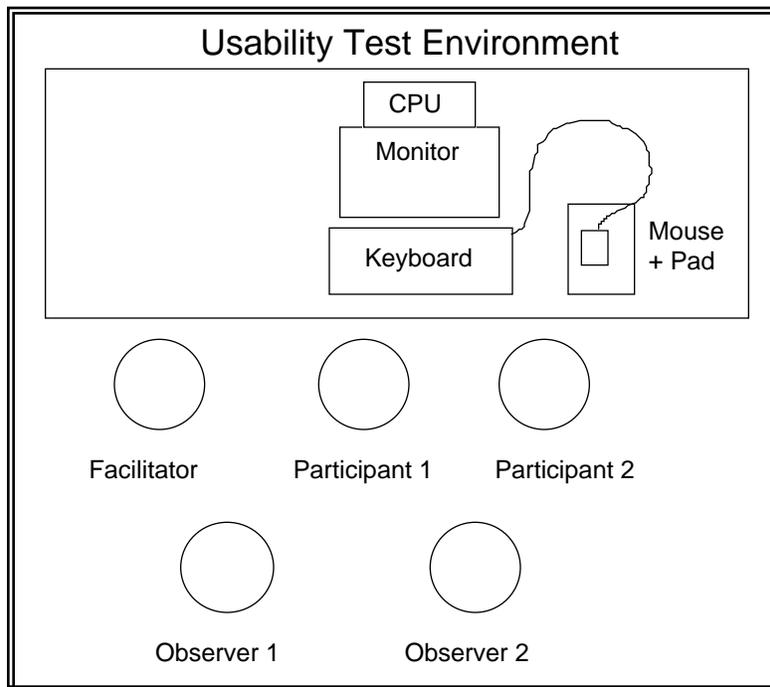


Figure 4-1. Usability Test Environment

Each test session was divided into three parts. The first portion of the session consisted of introductions between Participants and Observers followed by a brief demonstration of the EP6. In the second portion of the session Participants were given a packet of tasks to complete using EP6 (Appendix A). Part of each task was to fill out the corresponding portion of the user survey in the Comment Survey Tool. Last, Participants were asked to fill out the usability test “Exit Survey.” As a thank you for participating in the test session, each Participant was given the choice of a candy treat. After the Participants left the test area the Facilitator and Observers exchanged notes and discussed the test session.

4.2 Comment Survey Tool Design

The Comment Survey Tool (CST) is the on-line survey that both the usability test Participants and the Independent Evaluators used to record their comments about EP6. Evaluators could access the survey from the EP6 Desktop or EP6 Home Page. The survey was divided into ten sections, as well as a section of more general questions about EP6. At the bottom of the survey screen an entry field was available for Evaluators to record their comments in a free-text format. Evaluators used this field to expand on their answers to the survey questions and comment on the features and capabilities of EP6. The complete list of questions is provided in Appendix B.

The questions within the CST were developed by the Usability Test Facilitator, the EP6 developers, and other ECS team members. Re-use of questions used in the EP4 on-line survey was given high priority so that changes in user preferences could be measured. To protect the integrity of the evaluation, some rules were established (Poston, 1994):

- Each registered evaluator was given a unique name and password. Comments and survey information were linked to the user who logged in.
- Non-registered evaluators were able to log-in using the “guest” account. Guest user comments were included in the data analysis but could not attributed to a specific individual.
- To protect the integrity of the evaluation and anonymity of the evaluators, comments and survey results are reported without names.
- Upon request, a listing of comments made by an evaluator will be provided but only to that evaluator. The evaluator is free to publish his or her comments.

5. Evaluation Results

There were not enough responses to analyze the usability test session survey results separately from the Independent Evaluators' responses. All of the information presented in the following sections should be considered usability test session data unless noted.

Boldface text is used to emphasize the area of interest or importance recommended by evaluators for re-design.

5.1 User Registration Tool

The first task that the Usability Participants were asked to complete involved registering for an ECS account using the User Registration Tool. The registration form, written in HTML, was displayed using the Mosaic web browser. It should be noted that the Netscape browser was the recommended web browser for EP6 and was installed on all of the machines used for EP6 evaluation except those at Upper Marlboro. ECS was unable to secure licenses for Netscape in time for the evaluation, therefore Mosaic was used as the browser for usability testing. The most common complaint heard during this portion of the usability test was that users didn't like the Mosaic browser, especially because it wouldn't allow them to TAB or RETURN between fields within the Registration form. After users completed their registration they were asked to complete the portion of the on-line survey regarding the User Registration Tool.

According to the responses in the on-line survey (see Table 5-1), the majority of Participants agreed (score of 4 out of 5) or strongly agreed (score of 5 out of 5) with the statement, "I like the layout of the User Registration form." An even greater number agreed that it was easy to complete an application for an ECS account. All respondents agreed that they liked being able to register for an account via the World Wide Web.

All of the respondents agreed (13 out of 15) or strongly agreed (2 out of 15) that the amount of information they were asked to provide was appropriate. When asked if "The account application should request **ONLY mandatory information**, rather than a complete set of address and contact information." nine respondents disagreed and one strongly disagreed to the statement. This was surprising because many of the comments received during usability test sessions contradicted the responses to both survey questions. Most usability participants recognized which fields on the Registration form were mandatory and filled in only those fields. The few participants who filled out the complete form did not recognize the red check mark as the symbol designating which fields were mandatory. It was suggested by a number of participants that a key/legend be provided at the top of the form to indicate the meaning of the check mark. In regards to mandatory information, many evaluators commented that **email OR phone number should be mandatory** because not all users have an email address.

Table 5-1. User Registration Survey Results

Question	Number of Responses for the Following Scores				
	Strongly Disagree (score=1)	Disagree (score=2)	No Opinion/ Neutral (score=3)	Agree (score=4)	Strongly Agree (score=5)
1. I like the layout of the User Registration Form	0	1	4	9	2
2. It was easy to complete the application for an ECS account.	0	3	0	13	0
3. I like being able to register for an ECS account through the World Wide Web.	0	0	0	8	8
4. The information I was asked to provide in the application was appropriate.	0	0	0	13	2
5. I could easily identify which fields are mandatory.	1	2	1	7	5
6. The account application should request ONLY mandatory information, rather than a complete set of address and contact information.	1	9	3	2	0
7. I like the way the error messages are implemented.	0	2	11	1	0
8. Delivery of my account password via US Mail is acceptable.	1	4	3	8	0
9. The User Registration Help documentation was informative.	0	1	11	3	0

Many Participants commented that **definitions and examples for “Organization,” “Project,” “Affiliation,” etc. fields should be provided.** Without them, Participants were not sure what information to provide, furthermore, because it was not clear why the information was needed or how it would be used, some were reluctant to provide it. Some users questioned why they had to register at all. **ECS should clarify the option of remaining anonymous** and include any privileges or advantages a user would gain by registering within the Tool documentation.

Once users completed the Registration form and submitted it a confirmation page was displayed. Unfortunately, about half of the usability test Participants did not realize that they were supposed to hit the “submit” button again to confirm the registration information and send it to ECS. In some cases users closed the window at this point and went on to the next task; their information was not submitted to the system. Others were confused that the information was displayed a second time, **the confirmation window/page should be more clearly identified as such.** One evaluator suggested two buttons be displayed at the bottom of the registration form - a “verify” button and a “submit” button, which would bypass the verify/confirmation screen. At the least,

she suggested, the current “submit” button be renamed to “verify” to more accurately reflect its use. Similarly, the “reset” button should be renamed “clear all fields” because that is really what the button does.

The most controversial part of the User Registration Tool was the use of US Mail to deliver user passwords. This method of password delivery was acceptable to a slight majority of respondents, however, one third of the respondents disagreed or strongly disagreed, 3 respondents provided a score of 3, no opinion. Users commented that if ECS was going to use US Mail to deliver password information then Mailing Address should be mandatory. Others commented on the need to provide alternative methods for password delivery, suggestions included use of overnight delivery (e.g., Federal Express) and telegrams, both at the user’s expense. Others suggested encrypting the password and sending the user de-encryption software, providing one-time-only passwords that the user must change when logging in to the system for the first time, or providing 1-800/toll-free phone numbers for the user to call and receive the password information.

5.2 Desktop/Workbench

While there were no usability tasks specifically focused on evaluating the Desktop/Workbench, Participants used the Desktop frequently during the test session and filled out the survey questions using the on-line survey (Table 5-2).

Of the eight respondents to the question, seven agreed or strongly agreed with the statement that it is easy to access EP6 applications from the Desktop, one respondent recorded a score of no opinion. Because most usability Participants did not access the pull-down menus on the Desktop, it is not surprising that five of the seven responded that they had no opinion regarding whether the pull-down menus were logically organized, three of the seven agreed or strongly agreed that the menus were logically organized. Similarly, Participants did not create new directories within the desktop; four respondents provided scores of no opinion, three agreed or strongly agreed that it was easy to create new directories and move files, one of the eight disagreed with the statement.

When the Desktop appears after the user logs in to the system the window is not large enough to see all of the tools that are available to the user. It is recommended that the window open up to display the maximum number of icons available on the Desktop, yet not so large that it takes up the entire monitor display size. When the window is small it becomes hidden behind multiple windows as other applications and icons are opened. There may be better ways to organize or link windows together so that users do not become lost.

Comments made during usability tests indicated that users were not satisfied with the implementation of the system feedback in the Desktop. The Desktop was designed such that icons could be opened, or applications activated with a double click, or a single click and then selection of “Open” or “Activate” from a pull-down menu. With the first click the icon would be highlighted with a red box, with the second click the highlight would disappear and the application would activate or the icon would open. The problem was that the highlight box would disappear long before the application would fully activate and users were not sure if their mouse clicks were being processed by the system. To compensate users would double-click on the application icon a second time only to discover that two copies of an application would be accessed.

Table 5-2. Desktop/Workbench: Usability Test Survey Results

Question	Number of Responses for the Following Scores				
	Strongly Disagree (score=1)	Disagree (score=2)	No Opinion/ Neutral (score=3)	Agree (score=4)	Strongly Agree (score=5)
1. It was easy to invoke/access EP6 applications from the Desktop/Workbench.	0	0	1	3	4
2. The pull-down menus were logically organized.	0	0	5	2	1
3. It was easy to create new directories and move files around the Desktop to suit my needs.	0	1	4	2	1
4. The Desktop/Workbench layout is easy to understand.	0	0	1	5	2
5. The Desktop/Workbench Help documentation was informative.	0	1	6	0	0

Another comment received was that the **Desktop should be constructed as a Web page**, rather than in X/Motif. As a Web page it could contain a brief descriptive phrase next to each icon, especially in the case of Advertising Service or Data Dictionary. It was also suggested that a hierarchy or level of importance to the icons be provided, specifically that the Earth Science Search Tool be made the most prominent icon and re-labeled as “Search” or “Search for data” to make its function more obvious.

5.3 Earth Science Search Tool

The Earth Science Search Tool portion of the usability test and on-line survey generated a lot of comments from Evaluators. The majority of respondents liked the layout of the ESST (12 out of 16) (see Table 5-3). Specific recommendations and comments provided by Evaluators and Participants about the layout design details will be discussed further in this section.

5.3.1 Constructing a Query

Evaluators were mixed in their response to the question, “It was easy to construct a data query using the ESST.” Of the 16 who responded to the question, eight agreed or strongly agreed with the statement, five disagreed, and three respondents had no opinion. Comments recorded during usability testing and in the on-line survey reveal why the responses were mixed. The comments from one Evaluator can be used to summarize the positive comments about the ESST layout, “The graphical icons representing the search criteria is a good way to formulate the query. This compacts the screen real estate needed for the main search screen but all the information is there in graphical representations. Clever!!! Kudos to you!” Comments from another Evaluator illustrate the opposite viewpoint, “This interface needs to be redesigned -- the current version tries to put too much information on the screen.”

Table 5-3. Earth Science Search Tool Survey Results

Question	Number of Responses for the Following Scores				
	Strongly Disagree (score=1)	Disagree (score=2)	No Opinion/ Neutral (score=3)	Agree (score=4)	Strongly Agree (score=5)
1. I like the layout of the ESST	0	2	2	10	2
2. It was easy to construct a data query using the ESST.	0	5	3	5	3
3. It is easy to select geographic coordinates using the map tool.	3	7	0	3	3
4. I like the way the timeline is implemented.	2	1	8	5	0
5. The Results window was easy to understand.	1	6	2	6	0
6. I like the way the data were organized in the Results window.	1	7	2	3	2
7. It was easy to select data collections to order.	0	4	1	8	2
8. It was easy to modify the toolbar to customize the ESST.	1	2	7	4	1
9. It was easy to download a browse image.	4	3	2	3	3
10. I like the linkage between the ESST and EOSView for viewing browse images.	0	3	4	6	2
11. I like the linkage between the ESST and the Advertising Service for search for data and information.	0	1	8	6	0
12. The ESST Help documentation was informative.	0	6	7	2	0

During the usability test Participants were asked to construct a search for data related to changes in vegetation during the growing season within a particular study area, for which they were provided a set of coordinates. Participants were instructed to refer to the Data Dictionary to look up definitions of parameters and terms used within the ESST to aid in construction of their search.

After reviewing the usability task Participants explored the ESST main window. Many reviewed the contents of the attribute icon pull-down menus, a few Participants selected attributes and noted that as attributes were selected, the remaining invalid attributes were greyed-out, the valid attributes remained selectable. Participants seemed pleased that this implementation, known as “Valid Values,” ensured that they would construct a search guaranteed to return results. In general Participants were **pleased with the icons and colors** used in the ESST but requested that the text used on the icons and elsewhere in the ESST be written in a **larger font for improved legibility**.

A common suggestion heard during the course of usability testing and also recorded in the on-line survey was that there be a **tighter integration between the ESST and the Data Dictionary**. Users need a simple means of accessing Data Dictionary information about terms and parameters used in the ESST without leaving the ESST. This is especially necessary when acronyms are used within the attribute icon pull-down menus (e.g., AVHRR, NOAA, NDVI).

Participants also used the following tools to construct their search:

Attribute Selection Tool:

Some Evaluators and Participants investigated this tool within the ESST. Those who commented said they liked the ability to change the display of available attribute icons. The comment most often heard was that each **icon should be clearly titled** and a **description of its function should be provided** next to the icon. A couple of Participants used the tool to add icons to the displayed set of attribute icons but did not click on the “Apply” button to update the displayed set of icons. This may explain the wide variety of response to the question, “It was easy to modify the toolbar to customize the ESST.” Visual cues should be provided to ensure that the user completes the task they had begun.

Map Tool:

Evaluators and usability Participants found it **difficult to use the map tool** within the ESST. The comments received both in usability test sessions and in the on-line survey help to explain why there was such a strong negative reaction to the survey question, “It is easy to select geographic coordinates using the map tool.” The map tool allowed users to view a map of the world, zoom in and out on the map as necessary, and select a rectangular region on the map to bound a search area. Unfortunately there were technical problems with the implementation of the map tool which caused the zoom functions to work sporadically, and sometimes make the entire ESST crash; this caused quite a bit of frustration for the users.

Many Evaluators and Participants found the **implementation of the map tool disappointing**, primarily because the functionality was very limited. Users were forced to select a spatial search area using the mouse, it was not possible to **type in the exact coordinates to bound the search area**. One Evaluator commented that he re-sized the map tool window and was surprised that fields to type in coordinates did not appear. Users tried to zoom in on the map to improve the accuracy of the selected spatial coordinates, however, increasing the zoom magnification did not increase the detail in the map. Zooming within the map did not make the selection of the desired coordinates any easier because the tool zooms by default to the upper left-hand corner of the map, Evaluators wanted it to zoom to the area selected by the user. Some users tried to select a different map projection, one that would aid in selecting the desired coordinates, but the tool did not contain multiple map projections.

Once the user selected a spatial area the coordinates were displayed in the Attribute Summary portion of ESST main window. Users wanted to be able to edit the coordinates by typing in this summary window. They were also confused as to why the area selected did not appear in the Spatial Summary window on the ESST main window.

Timeline Tool:

Users were able to select the temporal search criteria using a Timeline tool. The tool displayed the available EP6 data collections and the time ranges for which the data are available. To select a time range the user clicked on the desired “start date/time” and dragged the mouse to the desired “stop date/time.” The times were displayed in the Attribute Summary area on the ESST main window. Because the usability task did not require the use of the timeline tool most of the Participants did not use it, thus, the majority of respondents to the survey question, “I like the way the timeline is implemented” had no opinion. Of those who did answer the question, five agreed that they liked the implementation, and three disagreed or strongly disagreed with the statement. The reason why some evaluators did not like the implementation of the Timeline tool can be partially explained by comments recorded in the on-line survey.

Evaluators commented that the **Timeline tool should be integrated into the Valid Values process** and display only those data collections which are valid based on any previous attribute selections. As with the Map tool, users requested the ability to type the start and stop dates/times in fields provided within the Timeline tool or on the Attribute Summary area itself. Similarly, the Timeline tool contains a pair of zoom in and zoom out buttons to allow users to examine the list of available data collections at a finer resolution, unfortunately the zoom function did not work.

5.3.2 Submitting a Search and Reviewing Results

Participants and Evaluators requested that the system provide an “**Estimated Number of Hits**” indicator that is updated as the search is constructed and displayed before the search is submitted to the system. Providing this information would give the user a chance to refine their search prior to submission and reduce network traffic.

After constructing the query the user submits the request to the system. Participants and Evaluators offered a number of suggestions to improve the way the system provides feedback to the user regarding the status of their search. Many Evaluators suggested that a dialog box or “**Percent Complete Bar**” be displayed while the system computes and retrieves the results of the search. This sort of “**estimated time to completion**” would accomplish a couple of important things. It would show that the system was actively processing the request and give the user an idea of how long it would take to complete the processing. The current implementation of the search submittal provides a dialog box which reads, “Please wait while the system processes your request...” but it does not indicate how long the processing will take.

Discussions with usability Participants as well as the comments from Evaluators indicate that in many cases users will want to iconify the ESST window while the system is busy processing the request. Once the system has completed the processing and returned the results it should provide some type of indication e.g., pop open a dialog box with a “**Search Completed**” message, chime, or flash.

During the evaluation of EP6 many users encountered delays in processing and slow system response times, when this happened some Participants commented that they would like to have a **Search Cancel/Abort** button. When system performance is poor or network load is high users want the option of canceling a search and saving it for submission at a later time when loads on the system and network are lower.

When the results are returned they are displayed in a new window. Responses to the survey question, “The Results window was easy to understand” were mixed with six of 16 agreeing that it was easy, seven of 16 disagreed or strongly disagreed, and two responded with no opinion. The responses were more strongly negative when asked, “I like the way the data was organized in the Results window.” Of the 15 respondents, five agreed or strongly agreed that they liked the way the data were organized, eight disagreed or strongly disagreed, two responded with a score of no opinion. Reasons for the negative reactions were revealed in the comments provided by Participants and Evaluators.

Many Participants were initially confused that their search returned only one or two items. They did not realize that the results were returned at the Data Collection level represented by a small blue folder icon. There is no visual cue that the information displayed is the Collection Level information and that clicking on the folder will display the Granule level information. Most had to be prompted to click on the folder icon to get their results listed at the Granule level. The Participants familiar with the Macintosh operating system **suggested that a triangle icon be used to represent the Collection level results** because the folder icon is so small.

System performance negatively impacted the Participants’ opinions of the Results window because it took so long for windows to redraw/refresh. In some cases users would select the collection folder icon to look at the Granule level information but there was no indication that the icon had been selected, a **“system working” icon** (e.g., stopwatch, hourglass) should be displayed. Because there was no system feedback the user would click on the icon multiple times causing the software to draw and redraw the Results window multiple times.

Participants found it difficult to evaluate the Results window because none of the scroll bars or slider bars were functional, therefore, users could only review the small portion of the Granule level metadata which was displayed in the window. Reviewing the metadata and available browse imagery was made more difficult by the fact that the granule metadata information was not aligned with the “browse available box.” This made it difficult to see which granules had browse products available for selection.

As part of the usability test, users were asked to select and order a browse product. To accomplish this task users had to open up the Collection level folder icon to display the Granule level information. The user then had to check the “browse available” box listed to the right of the Granule level metadata. After selecting the box the user must then move the cursor to the top of the column of browse available boxes and click on the “Browse” icon. Approximately half of the **Participants had to be prompted on how to select and order a browse product**, others found the select and order functionality completely intuitive.

Once the browse product had been selected and the Browse icon clicked, then a dialog box popped open. The user had to enter in login name, password, computer host name, and directory information so that the software could ftp the browse product directly to the user's computer. All usability Participants found this process confusing because no instructions as to how and what to enter in the dialog box were provided. Many felt that it was **inappropriate for the system to request login name and password** information from them and that ECS should find a different way of shipping browse products to a user. Others questioned why they had to enter this information in the first place and said that the system should know to look in the User Profile for this type of information. At a minimum, **clear instructions should be given to the user and an explanation of how the information will be used.** The other problem associated with this dialog box was that there was no way to re-set the information if, for example, the user mistyped some of the information. To re-enter the information the user would have to re-construct the search and submit it to the system.

More than one Evaluator commented, "Browse products have to be brought to the host workstation to view? [Users] should be warned of this if they need to make sure that space is available." One Evaluator wrote, "**Browse products MUST say size before starting ftp.** Think of the size of data, and the time to completion as the PRICE a user pays to get something . It is only fair that the price be known before saying 'I do'." Even more commented that, "**Rather than automatically save the browse image permanently, the user should be given the option of keeping it only temporarily** so it will automatically go away at the end of the session." Or as another Evaluator suggested, "...a screen allowing [the user] to delete or save the browse product when they're done viewing would be nice." These comments help to explain the wide range of positive and negative responses to the survey question, "It was easy to download a browse image."

Although the process of selecting and ordering a browse product was not always successful, the majority of respondents answered that they agreed or strongly agreed with the survey question, "I like the linkage between the ESST and EOSView for viewing browse images." Some Participants found the display of browse images in EOSView to be so fast that it was startling. It was suggested by one Participant that the system not open the images automatically but return a list of browse images in EOSView from which the user could select to view. Others mentioned that it may become difficult for a user to keep track of which browse image goes with which granule when more than two or three are opened in EOSView simultaneously.

5.3.3 Submitting an Order

During the usability test Participants were asked to select and order a few granules from their search results. To accomplish this task users reviewed the Collection and Granule information on the Results window and selected the granules of interest by clicking on the appropriate white Order box. After clicking on the desired granules the user selected the "Submit" button at the bottom of the Results window. A third window, the Preview Order window would appear showing the selected data at the Collection level. As with the Results window, in order to view the Granule level metadata the user had to click on the Collection folder icon.

After previewing the order the user could select the mode of data delivery, in the case of EP6 the choices were "ftp push" and "ftp pull." Many Evaluators and Participants commented that the

terms “push” and “pull” were not standard terms and may not be understood by a significant number of users. Furthermore, they questioned why, if a user selected ftp pull, the system prompted the user for their login name, password, hostname, and path/directory information. Once users were familiar with the actions for selecting and ordering a browse image, the actions for selecting and ordering data were relatively similar. Of the 15 respondents to the question, “It was easy to select data collections to order,” ten agreed or strongly agreed, four or the respondents disagreed, and one had no opinion.

Participants and Evaluators commented that there was information that they would like to see added to the Preview Order window. They expected to see information such as **file size, media type, media format, processing options**, etc.

After the user submitted the order to the system there was **no indication that the system was processing the order or that the order delivery had been completed**. The system must provide an estimated time to complete the order based on the size and media of the data. In EP6 the system sent an email to the user to notify them that the order had been completed, but no message was sent directly to the ESST or ECS Client software. The user would have to login in to their mail tool to receive the order notification.

After exploring the ESST, some users requested that ECS provide a quick means of ordering data for the user who knows the exact data collection that he needs. These users do not want to have to construct a detailed search, submit the search, wait for the results, preview the order, and then submit the order. Although it has not been advertised as such, the EP6 version of the ESST allows a user to search and order data by the exact name. The user could select the attribute icon “Collection Name” and add it to the default list of icons displayed in the ESST. This attribute icon lists the name of each data collection available through the ESST. The user could select the collection from the list and submit the search. The search would return the one collection which the user could then order. **ECS should improve and promote the direct order feature** so that it is more obvious to the user.

Although few usability Participants used the ESST on-line **help, those who did use it did not find it particularly helpful**. The help was implemented in HTML and was available from each window of the ESST. It contained a picture of each window of the ESST and corresponding information about how to use items on each window. However, it was not organized or written in such a manner as to provide appropriate help for users. Of the 15 respondents to the question, “The ESST Help documentation was informative,” six disagreed, two agreed, and seven recorded a score of no opinion.

5.4 Product Request Tool

The Product Request Tool is the order portion of the ESST and was designed to allow users to load previously saved search results so that users could go directly to viewing browse products and ordering data. Unfortunately, the ability to save searches was not implemented in EP6; the Product Request Tool icon on the Desktop was really a second copy of the Earth Science Search Tool. Evaluation of the Product Request Tool was not emphasized in the usability test sessions, but some of the Independent Evaluators took the time to review the tool and answer the survey questions.

Table 5-4. Product Request Tool Survey Results

Question	Number of Responses for the Following Scores				
	Strongly Disagree (score=1)	Disagree (score=2)	No Opinion/ Neutral (score=3)	Agree (score=4)	Strongly Agree (score=5)
1. The Product Request Tool window was easy to understand.	0	1	1	2	1
2. It was easy to request products using the tool.	0	2	0	2	1
3. I liked being able to access the Product Request Tool directly from the Desktop.	0	1	0	2	2
4. The Product Request Tool Help was informative.	0	0	5	0	0

5.5 EOSView

Users were able to access EOSView, the browse and display tool for viewing data in Hierarchical Data Format (HDF), directly from the Desktop or through the Earth Science Search Tool. One of the usability tasks was to select a browse product or two and view them, the ESST software automatically opened EOSView, loaded the browse products and displayed them on the screen.

Participants and Evaluators had mixed opinions about EOSView. Part of the problem may have been the technical difficulties that users encountered during their evaluation of the tool. In a significant number of cases users were unable to order browse products from the ESST and have them automatically loaded and displayed within EOSView. In these cases users got an error message, “File must be in HDF format.” This prompted comments such as, “If it has to be in HDF format why wasn’t I warned?” and a general feeling of frustration.

When the user was successful in displaying the imagery they immediately noted the problems with the system color mapping. When the cursor was moved from the EOSView application to another area of the screen the colors changed in both applications. The applications in EP6 were very color-resource intensive, therefore a limited number of colors were available at any one time. ECS should **provide a warning about the color mapping problem** and the steps users can take to minimize it.

Part of the usability task was to explore the various palette options, panning and zooming features within EOSView. Participants did not have trouble changing the default color palette. Of the 12 respondents, five agreed that the ability to change the color palette was useful, three users did not agree, and four responded with an answer of no opinion. Many Participants commented that the **numerical value of the colors must be displayed on the color bar**, without them, there is no way to interpret the colors within the browse images. Others asked if the color palettes and names were standard, users did not find them particularly useful.

Table 5-5. EOSView Survey Results

Question	Number of Responses for the Following Scores				
	Strongly Disagree (score=1)	Disagree (score=2)	No Opinion/ Neutral (score=3)	Agree (score=4)	Strongly Agree (score=5)
1. The EOSView HDF file window displays the file's structure clearly.	3	4	6	0	0
2. Panning and zooming on images in EOSView was easy.	4	3	1	2	2
3. The ability to select different color palettes for the image display was useful.	0	3	4	4	1
4. The EOSView animation capability was useful.	0	0	9	2	0
5. The speed of the EOSView animation was appropriate.	0	0	10	1	0
6. The EOSView window layouts are easy to understand.	0	6	2	5	0
7. The functionality (display of data values, animation, zooming, etc.) provided in EOSView is adequate for my needs/uses.	1	6	3	2	0
8. Help information/instructions provided for EOSView are understandable.	1	2	5	3	0
9. Overall, I found EOSView easy to use.	1	4	2	6	0

Opinions on the ease of panning and zooming within EOSView was mixed. Participants commented that it was easy to zoom in on a browse image but annoying that EOSView did not zoom into the area selected by the user, rather it zoomed in on the upper left-hand corner of the image. Users requested that the tool **zoom in to the area selected by the user** or, if that is too difficult to implement, the center of the image. EOSView does not allow infinite zooming in capability, the **zoom in button should grey out once the user has reached the maximum level of zoom.**

Panning within EOSView was difficult for many Participants. One of the primary complaints was that when a user zoomed in on the browse image, there was no indication of where the zoomed in area was in relation to the area displayed within the panning window. ECS should **provide a “zoomed in” box within the panning window to indicate the area covered by the browse image.** Another user commented that he found it difficult to pan because the cursor is very large relative to the size of the panning window, perhaps the panning window could be enlarged to improve the panning capability.

An animation capability is provided within EOSView, but most EP6 Evaluators and usability Participants did not evaluate this function because it was not part of the usability test and there were just a few animation browse images provided. Most of the respondents to the survey

question answered no opinion, “The EOSView animation was useful,” the two who did respond agreed that it was useful. A similar level of response was recorded for the question, “The speed of the EOSView animation capability was appropriate.”

When users were asked if they agreed with the statement, “The EOSView window layouts are easy to understand,” respondents were divided. Of the 13 respondents, six disagreed, five agreed, and two had no opinion. When asked if “the EOSView HDF file window displayed the file’s structure clearly” there was no doubt, seven of the 13 respondents disagreed or strongly disagreed with the statement, six of the respondents provided an answer of no opinion. Many Participants did not understand what the question was referring to, this may account for the high number of “no opinion” responses.

The majority of EOSView evaluators when asked if “The functionality (display of data values, animation, zooming, etc.) in EOSView is adequate for my needs/uses,” did not agree. Of the 12 respondents to the question, seven disagreed or strongly disagreed, three had no opinion, and only two respondents thought that the functionality of EOSView was adequate for their uses. One evaluator commented, **“I think this could be a useful tool with a little more work.”**

On the EOSView browse display window there was a button labeled “Order.” Participants commented that it was not clear what this button would allow users to order - the browse product currently being displayed, the granule associated with the displayed browse product, or the data collection within which the browse product was contained. **The purpose of this Order button should be clarified.**

Users reiterated **the need for ECS to provide a warning about browse product file size prior** to users selecting the products for display. A couple of Evaluators commented that they did not like the way ECS had implemented the linkage between the ESST and EOSView in regards to storing browse images in the user’s home directory. If the user does not have enough room in his directory then **an alternative, such as ftp pickup from an ECS site, should be provided.**

Users as a whole did not find EOSView easy to use. When asked, “Overall, I found EOSView easy to use,” of the 13 respondents, six agreed it was easy to use, five disagreed or strongly disagreed, two had no opinion.

5.6 Advertising Service

During the usability test Participants were asked to search the Advertising Service for data that met the test scenario criteria. The Advertising Service contains advertisements for both ECS-related data and non-ECS data collections. Advertised ECS-related data collections can be ordered using an “Order” link to the ESST. Advertised services can be installed on the ECS Desktop using the “Install” link from the advertisement.

Of the 12 respondents to the survey question, “The general organization of the Advertising Service was easy to understand and use” ten agreed or strongly agreed with this statement. There were only two respondents who disagreed. Comments recorded during usability test sessions confirm that users found the layout easy to read and navigate.

Although five of the 12 respondents agreed, or strongly agreed that other forms of browsing through advertisements, no new methods/forms were submitted to the survey. The remainder of the respondents had no opinion (five of 12) or disagreed with the statement (two of 12). All 12 respondents agreed or strongly agreed that “the ability to find and review advertisements on the World Wide Web is useful.”

To fulfill the usability task most Participants used the Advertising Service Attribute Search form. This form allowed users to search for data collections by entering a start and stop time, geographic coordinates, parameter name, sensor and platform names, and level of processing of the form and submitting it to the Service. The majority of users (nine of 11) found the Attribute Search method easy to understand and use, the remaining two respondents disagreed with the survey statement.

It was suggested that a **vertical dimension be added to the list of search parameter fields on the Attribute search**. This attribute would be good for those data collections involving atmospheric temperatures, pressures, and chemical content as well as those dealing with oceanographic data.

Some usability test Participants mentioned that it would be nice to be able to **select geographic coordinates off a map**, in addition to typing them in on the Attribute Search form. This would improve the ease of use of the form because some users found the terms “Upper Right” and “Lower Left” coordinates confusing, one Evaluator suggested they be renamed to “North/West” and “South/East.” This implementation is similar to that used by the Version 0 WWW IMS.

One of the main problems encountered by users of both the General and Attribute Search forms was the lack of robust keyword mapping within the system. Each advertisement was assigned a small set of keywords, however, there was no listing of available search keywords for users to use as search criteria. ECS should **improve the advertisement keyword mapping and make the keywords available to users**. It was also suggested that the search engine recognize both the English name (e.g., ozone), as well as the chemical equivalent for a substance (e.g., O³).

Because it was difficult to use the keyword search on the Attribute Search Form some Participants and Evaluators suggested that the **Attribute Search form search through the description of each advertisement**, or allow users to select it as a search option just as is implemented on the General Search Form.

The ECS-related data collection advertisements had “Install,” “Invoke,” and “Order” buttons at the bottom of the advertisements. The purpose of each button was not clear to the majority of usability Participants. **ECS should clarify the purpose and functionality of the “Install,” “Invoke,” and “Order” buttons**. Once the functionality was explained to the Participants they thought the linkage between the ESST (“Order” and “Invoke”) and the Desktop (“Install”) was a good idea. Users also suggested that **a link from each product advertisement should contain a link to the Data Dictionary**. This link would facilitate the gathering of information about the advertised data collection and related metadata. When asked if “Being able to place a browse or product request directly from the Advertising Service would be useful,” eight of the 11

respondents agreed or strongly disagreed with the statement, three respondents recorded a score of no opinion. It appears that **users would like to see stronger integration between the Advertising Service and EOSView, ESST, and Data Dictionary.**

When asked if users agreed that “It was easy to install advertised data products and services on the Desktop” seven of the 12 respondents agreed or disagreed. Three respondents disagreed with the statement, possibly because during EP6 usability testing and remote Evaluations there were a number of technical problems regarding the use of the “Install” button. Many Participants and Evaluators were confused by the dialog box that appeared on the screen prompting the user to select a directory within which to store the advertisement. To install the advertisement on the Desktop the user just had to click “OK” but there were no instructions; ECS should clarify the install dialog box, but ideally, the installation process should be automatic.

The use of the “Order” button was not included in the usability test tasks. This may account for the high number of scores recorded as no opinion (six of 12 respondents) when asked, “It took too much time to find a product in the Advertising Service and then have to enter it into the Search Tool.” Two respondents agreed it took too much time, two others disagreed.

Users were asked whether “additional search forms specific to products and services would be useful.” Of the 12 respondents, six agreed or strongly agreed with the statement, three disagreed, and three recorded a score of no opinion. This question might have been more effective if the users were provided a list of additional search forms from which to choose or rate according to their preference. Responses to the question, “The General Search form should allow specifying more flexible ‘and/or’ combinations of keywords,” appeared to be equally mixed. Of the 12 respondents, eight agreed or strongly agreed that ‘and/or’ options should be provided, three disagreed, and one respondent recorded a score of no opinion.

One of the survey questions was, “It will be difficult to handle a large number of search results with the current interface.” Respondents were mixed on this subject; six agreed or strongly agreed, two recorded a no opinion, and three disagreed with the statement. Some Participants and Evaluators suggested that ECS provide a “get Next” button at the bottom of the results list to accommodate the review of advertisements.

EP6 Evaluators and Participants were asked if “the advertisements available in the Advertising Service contained the appropriate types of information” and of the 11 who answered, six agreed or strongly agreed, and five had no opinion. These scores are similar to the comments recorded during usability testing. When asked during the test session, Participants answered that they thought the advertisements were pretty thorough. When asked if “additional types of information should be specified,” six users responded with a score of no opinion, two of the 11 disagreed, and three agreed, however, no additional types of information were suggested in the survey.

Some Evaluators explored the advertising submission functionality and questioned whether or not users would, or would be able to differentiate amongst the quality of different advertisements. It was not clear to the Evaluators how the quality of the advertisements would be controlled or if it would be monitored. One Evaluator was concerned that anyone could submit an advertisement to the system advertising minor modifications to an existing algorithm. He suggested that ECS provide different advertisement tools, one for EOS-standard products and related data collections, and one for non-EOS product advertisements.

Table 5-6. Advertising Service Survey Results

Question	Number of Responses for the Following Scores				
	Strongly Disagree (score=1)	Disagree (score=2)	No Opinion/ Neutral (score=3)	Agree (score=4)	Strongly Agree (score=5)
1. The general organization of the Advertising Service was easy to understand and use.	0	2	0	9	1
2. Other forms of browsing, in addition to the alphabetic index, are needed.	0	2	5	2	3
3. The ability to find and review advertisements on the World Wide Web is useful.	0	0	0	2	10
4. The General Search form should allow specifying more flexible "and/or" combinations of keywords.	0	3	1	6	2
5. Additional search forms specific to products and services would be useful.	0	3	3	5	1
6. The Attribute Search method was easy to understand and use.	0	2	0	9	0
7. It will be difficult to handle a large number of search results with the current interface.	0	3	2	4	2
8. The advertisements available in the Advertising Service contained the appropriate types of information.	0	0	5	5	1
9. Additional types of information should be specified in advertisements.	0	2	6	3	0
10. It was easy to install advertised data products and services on the Desktop.	0	3	2	6	1
11. It took too much time to find a product in the Advertising Service and then have to enter it into the Search Tool.	0	2	6	2	0
12. Being able to place a browse or product request directly from the Advertising Service would be useful.	0	0	3	4	4
13. It was easy to submit an advertisement to the Advertising Service.	0	0	4	7	1
14. The ability to link products and services that relate to one another would be useful.	0	0	2	5	5
15. The Advertising Service was easy to use.	0	1	0	9	2

Of the 12 respondents to the survey question, "It was easy to submit an advertisement to the Advertising Service" eight agreed, four recorded a score of no opinion. It was suggested that **ECS allow users to modify advertisements once they have been submitted**. ECS should provide this functionality for users. This would be especially important as a means to update

advertisements and link them to related advertisements as the system grows in size and matures. When asked if “The ability to link products and services that relate to one another would be useful,” 10 of 12 respondents agreed or strongly agreed, two respondents recorded a score of no opinion.

The majority (11 of 12) of respondents found the Advertising Service easy to use. Even so, it was recommended that the Help documentation on the Advertising Service be improved to include a definition and example for each field on the Search and submission forms.

5.7 Data Dictionary

Usability Participants were encouraged to use the Data Dictionary to look up the definitions and terms while searching for data in the Earth Science Search Tool. Many Participants used the Data Dictionary to get more information about the available search parameters and sensors. The Data Dictionary had two types of searches, an Index search and a Keyword search. The Index search allowed the user to view in alphabetical order a list of acronyms, instruments, platforms, and definitions, among other things. The Keyword search allowed the user to enter multiple keywords and target the search so that the system would look for that keyword with the acronym list, the definitions, etc., the default setting allowed the user to search for the keyword in all places within the Data Dictionary.

Of the nine respondents, seven agreed that “searching through the data was easy,” and two disagreed. All nine agreed or strongly agreed that “the ability to search through the Data Dictionary for information about data collections, instruments, parameters, and acronyms is important.”

When asked if, “it was easy to find items of interest using the Index” eight respondents agreed or strongly agreed, one disagreed. The response to the survey question, “I like the way the Index is organized” was not as positive, six agreed with the statement, one disagreed, and two listed a score of no opinion. Unfortunately the question may have been ambiguous and some users may have answered the question thinking it referred to the organization of the Index results display, rather than the division of the index by acronym, definition, instrument, etc.

Most Participants used the Keyword search form to look up information. When asked if “finding items of interest using the search form was easy” seven respondents agreed with the statement, one disagreed, and one had no opinion. There was a more detailed version of the Keyword search form called the Full Search form. It allowed users to change the default Index category and select a specific category within which to search for information. Of the nine respondents, five agreed that “defining queries using the search options on the Full Search form was easy” two disagreed, and two listed a score of no opinion.

When the search results were returned by the Dictionary they were displayed in alphabetical order using an index format. A set of letters “A B C D...” was shown across the top of the page along with an indication of the “number of hits,” the results were listed in alphabetical order running down the length of the page. The primary drawback to this display format was the significant amount of screen “real estate” used. In most cases the searches returned just three to five search hits but to find them the users had to scroll down the entire list of letters until the user came to the information listed in alphabetical order. Participants and **Evaluators strongly**

suggested displaying only the results received, not a list of letters with no information associated with them. Other Evaluators commented that they were confused when the list of letters (“A B C D...”) appeared and were not quite sure how to find the results of their search.

When users scrolled down the list of results it was often not clear why the search keyword(s) used had caused a result. Many users entered ‘vegetation’ as a keyword and were very surprised to see ‘NDVI: acronym’ and ‘NDVI:parameter topic’ listed in their results set. It was not clear to some Participants that they were to click on the link ‘acronym’ or ‘parameter topic’ to get more information about ‘NDVI.’ Evaluators and Participants suggested that **the keyword be highlighted as the link, not the category** (e.g., acronym, parameter topic, instrument) the information is stored within the index. The category names were not always clear, it was suggested that ‘reference category’ be changed to ‘more information.’

Exploring the results list gave rise to a wide range of comments from the Evaluators and Participants. Because many Participants were using the Data Dictionary as an aid to creating a search for data in the Earth Science Search Tool, some **expected that when they selected ‘NDVI’ from the Data Dictionary results list that it would be automatically inserted into the ESST** as a search criterion. Because the information within the Data Dictionary is linked together it **would be nice to continue to retrieve data directly using the Data Dictionary**, similar to the functionality available using the Advertising Service “Order” capability.

For the most part, when asked, “when I submitted my search queries I received the results I had expected,” the majority of respondents agreed (five of eight), two disagreed, and one listed a score of no opinion. Similarly, the majority of respondents (six of nine) agreed that the information contained in the Data Dictionary was the type of information they expected.” Comments recorded by the Evaluators suggest that users liked the information stored in the Data Dictionary but did not like the use of the Index display. Evaluators noticed that some information was more closely linked than others and specifically asked that term **acronym information be linked to term definitions**.

When the search submitted did not return a set of results the system displayed the results listing page with the “number of hits” equal to zero. Even though all nine respondents to the question agreed or strongly agreed that “the ‘Number of Hit(s)’ on the listing page is useful information.” it was not clear from a quick glance that the screen that no results were returned, this information should be emphasized. **The Data Dictionary should return a clear and informative error message when a submitted search returns no results**. In addition, the Data Dictionary **Keyword and Index search form should be available from every page**, this would save the user having to hit the web browser ‘Back’ button multiple times to return to construct a search.

In some cases the Data Dictionary returned results but not the results expected by the user. During usability testing a Participant entered the keyword ‘rain’ and expected to get results listing rain and precipitation information, instead the Dictionary returned information on training. **ECS should implement a thesaurus or alias feature with the Data Dictionary** to improve the type of hits returned to the user.

When asked if, “the Data Dictionary was easy to use” eight of nine respondents agreed or strongly agreed to the statement. Outside of the comments listed above, most Participants commented that they liked the implementation and content of the Data Dictionary.

Table 5-7. Data Dictionary Survey Results

Question	Number of Responses for the Following Scores				
	Strongly Disagree (score=1)	Disagree (score=2)	No Opinion/ Neutral (score=3)	Agree (score=4)	Strongly Agree (score=5)
1. Searching through the data was easy.	0	2	0	6	1
2. The ability to search through the Data Dictionary for information about data collections, instruments, parameters, and acronyms is important.	0	0	0	3	6
3. It was easy to find items of interest using the index.	0	1	0	6	2
4. I like the way the Index is organized.	0	1	2	6	0
5. Finding items of interest using the Search form was easy.	0	1	1	7	0
6. Defining queries using the Search Options on the Full Search Form was easy.	0	2	2	5	0
7. When I submitted my search queries I received the results I had expected.	0	2	1	5	0
8. The "ALL" category search/index is a useful feature.	0	0	4	4	1
9. The "Number of Hit(s)" on the Listing page is useful information.	0	0	0	7	2
10. The information contained in the Data Dictionary is the type of information I expected.	0	2	1	5	1
11. The layout of the Data Dictionary is easy to read.	0	3	0	5	1
12. The Data Dictionary Help documentation was informative.	0	1	5	3	0
13. The Data Dictionary was easy to use.	0	0	1	7	1

5.8 User Profile Tool

Usability Participants were asked to verify their user profile information during one of the usability tasks. This tool was not evaluated by all usability Participants because only those with EP6 accounts had user profiles established. Those Participants who evaluated EP6 using the ecsGuest account did not have user profiles to verify.

Evaluators found the tool easy to use (three out of four respondents agreed, one out of four strongly agreed). They were divided on the issue of whether it was easy to modify information stored in the User Profile Tool (two of four agreed it was easy, one of four strongly disagreed, one of four had no opinion).

During usability sessions participants commented that the User Profile Tool was too similar to the User Registration Tool to quickly differentiate between them. It might be worthwhile to make the differences between the tools more obvious. Other Participants thought that there should be a **quick way (e.g., check box) to indicate that the Mailing address is the same as the Shipping and Billing addresses**. Participants did not like having to fill out three separate addresses. It was also suggested that if the information was not provided by the user within the Profile Tool, the **user should be prompted at time of order for the address information**. Others were surprised that information such as “anonymous ftp address” and “preferred media” were not included in the Profile Tool.

Table 5-8. User Profile Tool Survey Results

Question	Number of Responses for the Following Scores				
	Strongly Disagree (score=1)	Disagree (score=2)	No Opinion/ Neutral (score=3)	Agree (score=4)	Strongly Agree (score=5)
1. It was easy to use the User Profile Tool.	0	0	0	3	2
2. It was easy to modify user information in the User Profile Tool.	1	0	1	2	1
3. Help provided for the User Profile Tool was informative.	0	0	3	2	0

5.9 User Preference Tool

Many Participants found it difficult to evaluate the User Preference Tool because so many of the preferences were not changeable, but were used as “place holders” within this prototype tool. Evaluators were able to change a few default values and preferences including the default web browser and the location of where windows would automatically pop-up on the screen. Unfortunately any changes made by the user were not saved by the tool unless the user typed a RETURN after entering the new information. This caused a good deal of frustration for evaluators.

Evaluators suggested that a **“return to default” button** be available to reload the defaults and ignore the user’s changes. It was also suggested that a **detailed Help document be available** to explain and give examples of how to change default settings, and why the default settings were chosen in the first place.

According to the responses in the on-line survey four out of five respondents liked the layout of the User Preferences Tool (one of the five had no opinion). As expected from user comments, the respondents were divided on their opinion on whether it was easy to modify the user preferences; two out of the five did not think it was easy, three of the five agreed that it was easy.

Table 5-9. User Preference Tool Survey Results

Question	Number of Responses for the Following Scores				
	Strongly Disagree (score=1)	Disagree (score=2)	No Opinion/ Neutral (score=3)	Agree (score=4)	Strongly Agree (score=5)
1. I like the layout of the User Preference Tool.	0	0	1	5	0
2. It was easy to modify user preferences.	1	2	0	3	0
3. The User Preference Tool Help documentation was informative.	2	0	3	0	0

5.10 Trouble Ticketing Tool

Towards the end of the usability tests Participants were asked to submit a Trouble Ticket to ECS using the Trouble Ticketing Tool. Only those users with EP6 accounts were able to submit a Trouble Ticket. This caused some problems for those who were evaluating EP6 using the ecsGuest account. Some evaluators questioned this policy and asked how Guest users submit Trouble Tickets. There were some technical problems caused by the tool’s error checking routine that denied access to the tool to some users even though they had active EP6 accounts.

Participants with EP6 accounts who could evaluate the tool, had mixed reactions. Of the four respondents to the survey, three agreed that the layout of the tool was easy to understand, one responded with no opinion. In terms of whether it was easy to submit a Trouble Ticket, two agreed that it was easy, one disagreed and one strongly disagreed with the statement. Users can use the Trouble Ticket tool to check the current status of any Tickets they’ve submitted. When asked if it was easy to request the current status two of the four respondents agreed that it was easy, the other two recorded a response of no opinion.

When asked if the information they were asked to provide was sufficient to accurately describe the problem two of four disagreed, one agreed, and one had no opinion. A usability Participant elaborated during the test session that for a general problem the Tool interface is sufficient, but not for more specific problems. He gave an example of wanting to point Help Desk personnel to a specific core dump or saved file which would provide more detail about the problem. The interface should prompt users to supply that type of information.

Participants during the usability session commented that they were surprised that there was **no access from the Trouble Ticketing Tool to other HTML portions of EP6**; this is inconsistent with the other HTML applications. One Participant commented a couple of weeks after her test session, that she had received an email saying her Trouble Ticket had been closed. She was confused and surprised that no explanation or solution to the problem was given and that no one had contacted her when trying to resolve the problem. **ECS should confirm with users when responding to and resolving Trouble Tickets.**

Table 5-10. Trouble Ticket Tool Survey Results

Question	Number of Responses for the Following Scores				
	Strongly Disagree (score=1)	Disagree (score=2)	No Opinion/ Neutral (score=3)	Agree (score=4)	Strongly Agree (score=5)
1. It was easy to submit a trouble ticket.	1	1	0	2	0
2. The layout of the Trouble Ticketing tool was easy to understand.	0	0	1	3	0
3. It was easy to obtain the current status of my trouble tickets.	0	0	2	2	0
4. The information requested when submitting a trouble ticket was sufficient to accurately describe the problem.	0	2	1	1	0
5. The Trouble Ticketing Help documentation was informative.	0	0	4	0	0

5.11 General

The vast majority of comments recorded in the General section of the on-line survey dealt with the technical problems encountered by many of the Evaluators who were exploring EP6 on their own, usually at a DAAC. They commented on the error messages they received from the software, the frequency of EP6 core dumps, and performance problems encountered during their evaluation of EP6 which were exacerbated because of LAN overloading at the Upper Marlboro facility. Nevertheless, the Evaluators provided valuable comments about their overall impression of EP6.

When asked in the survey if “navigation through EP6 was easy,” nine out of 13 respondents agreed or strongly agreed, one disagreed, and three responded with a score of no opinion. An Evaluator wrote in the survey, “navigation was easy except for when we core dumped.” Many users were startled by the error messages that scrolled across the EP6 terminal window during the course of evaluating EP6. The error messages were not informative to the user and should be hidden from view.

When trying to start up EP6 users were asked to type their EP6 login name and password into the EP6 login window. After users entered the information there was no system feedback indicator (e.g., stopwatch, hourglass) that the system was processing their access to EP6. If ECS continues using this login screen for EPs, ECS should provide a system feedback indicator.

Another annoyance to users was the problem of colors changing as the user moved the cursor from one EP6 application to another. The problem was most prevalent when moving from any page (e.g., Advertising Service, Data Dictionary) displayed in Netscape to the ESST, or from the ESST to EOSView. This is known as a color mapping problem; it occurs when two or more applications are “fighting” for use of a limited number of colors available on a workstation.

Netscape is a notorious “color hog” and when the application was being used it would block access to the colors needed by any other application within EP6. Usually the colors in the application the user was currently working with would be normal, but when a user moved the cursor to another application it often took some time for the colors in the new application to revert to a normal display. ECS should provide a warning about color mapping problems and how to minimize them.

The color mapping problem did not appear to significantly affect the survey scores recorded for the question, “The color scheme for the EP6 non-Web User interface is pleasant;” seven of the 12 respondents agreed or strongly agreed. Only one respondent disagreed, while four respondents had no opinion.

Managing the EP6 windows was a problem for many users especially when applications were activated from the Desktop. As they opened the new application windows would cover the Desktop. This made it difficult for users to find the Desktop once a couple of applications had been opened. It was suggested that there should be an option on the Desktop menubar to pop open a list of available tools to select from (similar to that of the Macintosh); this would make navigation and access much easier for users.

One problem with the Desktop that was corrected and incorporated into a second release of EP6 was the continual refreshing of the EP6 Desktop. Before the problem was fixed, each time the user would move the mouse cursor into the Desktop window it would refresh. The constant refreshing created a distracting flashing window on the monitor. When the system was busy refreshing the Desktop the user couldn’t access any other application, and this became very annoying.

Of the 13 respondents nine agreed that “the EP6 window layouts are easy to understand,” two disagreed with the statement, and four offered a score of no opinion. When asked if the “EP6 icons were easy to understand,” eight of the 11 respondents agreed or strongly agreed, one strongly disagreed, and three had no opinion. One usability Participant commented that he thought the icons were “very snazzy” and much improved from previous Evaluation Packages.

A significant portion of EP6 was built using HTML. Each of the HTML applications (Advertising Service, Data Dictionary, User Registration, User Profile Tool, and the Comment Survey Tool) were available from the Desktop as individual applications with unique icons, or from the EP6 Home Page. When asked if, “the EP6 home page provides the appropriate content” five of the 11 respondents agreed or strongly agreed, one disagreed, and five had no opinion. In regards to whether they “like the way the EP6 home page is organized” seven of 12 respondents agreed or strongly agreed, and five had no opinion. In addition, when asked if, “the color scheme for the EP6 Web User Interface is pleasant,” six of 12 respondents agreed or strongly agreed, two disagreed or strongly disagreed, and four offered no opinion. There were a number of scores of ‘no opinion’ for these survey questions. This may be due to the fact that the majority of usability Participants did not access the EP6 Home Page.

Most Participants did not access the EP6 Help documentation which was available from each application as a link to the HTML documents. This may account for the fact that the majority of responses (eight of 11) to the question, “I like the way the EP6 Help function is implemented” were no opinion. Of the 11 responses two agreed that they liked the implementation, and one disagreed. Of those who did access the information, two of 11 respondents agreed that “the Help

provided in EP6 was easy to understand,” one did not agree, and eight had no opinion. Usability Participants commented that more detailed help information provided in a more coherent manner would be an improvement. Another Evaluator suggested that the **Help documentation files should be installed locally in the Client software; this will help to speed performance.**

The Evaluators who accessed the user survey using Mosaic found it inconvenient that the survey questions did not ‘wrap’ around the page. To read the questions users had to scroll across the window. The ‘look and feel’ of the Comment Survey Tool in Mosaic was not as nice as it was using Netscape. Most users (10 of 12) agreed or strongly agreed that “the layout of the survey was clear and easy to use,” one did not agree and one had no opinion. When asked if, “it was easy to fill out the ECS user survey,” 11 of 12 respondents agreed or strongly agreed, one respondent disagreed. It was suggested by usability Participants that **the survey could be improved by shortening it.**

Of the 12 survey respondents, nine agreed or strongly agreed with the statement, “my experience using EP6 was positive,” one respondent disagreed, one strongly disagreed, and one had no opinion.

Table 5-11. General Survey Results

Question	Number of Responses for the Following Scores				
	Strongly Disagree (score=1)	Disagree (score=2)	No Opinion/ Neutral (score=3)	Agree (score=4)	Strongly Agree (score=5)
1. Navigation through EP6 was easy.	0	1	3	8	1
2. The EP6 window layouts are easy to understand.	0	2	4	6	1
3. The EP6 home page provides the appropriate content.	0	1	5	4	1
4. I like the way the EP6 home page is organized.	0	0	5	6	1
5. EP6 icons are easy to understand.	1	0	3	7	1
6. The color scheme for the EP6 Web User interface is pleasant.	1	1	4	5	1
7. The color scheme for the EP6 non-Web User interface is pleasant.	0	1	4	6	1
8. I like the way the EP6 Help function is implemented.	0	1	8	2	0
9. The Help provided in EP6 was adequate for my needs.	0	4	7	0	0
10. The Help provided in EP6 was easy to understand.	0	1	8	2	0
11. It was easy to fill out the ECS user survey.	0	1	0	6	5
12. The layout of the survey was clear and easy to use.	0	1	1	6	4
13. My experience using EP6 was positive.	1	1	1	6	3

6. Lessons Learned

The EP6 development, deployment, and evaluation team members provided a number of lessons, the majority of these being process-related. The ECS team has endeavored to improve the process by incorporation of lessons learned into subsequent activities.

In addition to the design comments discussed in Chapter 5, the EP7 lead and developers have incorporated the lessons learned about the process into the development, deployment, and evaluation plans for EP7. The lessons learned (boldface text) and plans for incorporating them were presented at the EP7 Design Objectives Review in February 1996.

- a. **The primary objective for EP7 developers is to deliver a robust, usable Evaluation Package** that can be evaluated. All of the parties in the EP7 development and deployment process are working together to ensure that this objective is met. The following lessons learned support this objective.
- b. Start the port to HP and SGI early. EP6 was developed on Sun platforms and then ported to HP platforms late in the development cycle. EP7 will be supported on Sun, HP, and SGI. Development of EP7 on Sun platforms will be paralleled by porting “early and often” to the HP and SGI platforms to ensure that technical problems and bugs caused by the porting process will be resolved prior to the delivery deadline.
- c. Continue to involve science users in the design process. EP7 developers have interacted significantly with science users, especially the NASA sponsored “Tirekickers” who attended the Prototype Workshop 2, held in January 1996. Developers were able to present ideas and concepts to attendees and obtain instant user feedback on their design and implementation concepts. To continue the user involvement throughout the EP7 development process, an EP7 web page has been established (<http://ecsinfo.gsfc.nasa.gov/ep7/ep7.html>).
- d. Science Office is an integral team member. The Science Office is the ECS ‘in house’ source of the science user view. The EP7 development team will have significant input from Science Office personnel in the areas of defining data collections for use in EP7 and populating the metadata in the EP7 Data Server. This will ensure that the data collected are representative examples of data collections that science users commonly use and ones that will allow users to truly evaluate EP7 functionality. The Science Office will also participate in the development of Test Cases. Test Cases will be written from the science user point of view and will ensure that the data is populated correctly and the system is scientifically “correct.” To increase the science usability before EP7 is delivered, the Science Office will be conducting usability tests as part of the EP7 Integration and Test effort.
- e. Involve DAAC sites in Integration and Test; conduct multiple user tests as part of Integration and Test. The EP7 Integration and Test team is coordinating their schedule and efforts with the ECS Liaisons at each of the DAACs to ensure a thorough testing of EP7 at remote sites. Multiple-user system-wide tests are being developed and scheduled to ensure that EP7 will be robust when operational.

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7. Conclusion

The comments and suggestions from the usability test Participants and Independent Evaluators have been submitted to the ECS developers for consideration in development of Evaluation Package 7. The suggestions entered into the User Recommendations Data base (Appendix C) will be formally reviewed and tracked. Lessons learned from the development, deployment, and evaluation of EP6 have been incorporated into EP7 to improve the development process and ensure that the experience gained will not be lost.

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Appendix A. Usability Tasks

1) Thank you for agreeing to participate in the usability evaluation of EP6.

For the purposes of evaluating EP6, imagine that you are a researcher who wants to determine correlation between land use patterns and water quality in a tributary of the Potomac River. You have spent time gathering data to create a database documenting changes within the watershed. This information includes digitized USGS maps, in situ data, weather data, and information on land uses from historical sources. Today you have logged on to EP6 to look for satellite data that would give you information about changes in vegetation over a growing season within your study area.

Please log on to EP6 using the ecsGuest account name. Fill in the requested User Registration information.

After you have submitted the information, access the Comment Survey Tool and fill in the survey questions related to User Registration.

2) You examine the EP6 Desktop/Workbench and access the Earth Science Search Tool.

Using the Earth Science Search Tool (ESST), submit a search to the data Inventory for data related to vegetation indices covering the watershed study site (upper left: 78 W, 40 N ; lower right: 77 W, 39 N)

To aid your choice of search parameters, use the Data Dictionary to look up the definition(s) of the terms used in the Earth Science Search Tool.

3) When the search results are returned, select at least one of the granules to view as a browse image. Enter the appropriate information in the User Profile window:

email address: ecsGuest@epserver.gsfc.nasa.gov

Destination Directory: /users/ep6/ecsGuest/.ecs/

Your Host Password: ecsGuest

Your Host Name: epserver.gsfc.nasa.gov

When the browse window is returned to you, examine the image using EOSView. Be sure to try zooming in and panning around the imagery. Use EOSView pull-down menus to read more information about the browse file.

When you are finished examining the browse image, access the Comment Survey tool and answer the questions related to EOSView.

4) Return to the Earth Science Search Tool to select and order the granule(s) you wish from the Search Results window. An email notification of your data order will be sent to you. A copy of the email notification should be sitting in your account along with a copy of the data granule(s) that you ordered.

Check to see if the data and the email notification have arrived in your account.

When you have finished, access the Comment Survey tool and answer the questions related to the Earth Science Search Tool, the Data Dictionary, and the Product Request Tool

5) There may be other data collections available through EP6 that would be useful additions to your database. These data collections might not be composed of EOS-data but they might be advertised and available for your use. Submit a search using the Advertising Service for data collections pertaining to vegetation changes that are available for your study site. The coordinates of your study site are - upper left: 78 W, 40 N; lower right: 77 W, 39 N.

When the results are returned select and examine a data Product advertisement.

- Is the information listed on the screen the type of information that you find useful in a data advertisement?
- What additional information would you like to see?
- What information do you think is not necessary?

6) Return to the list of results and select a data Product advertisement containing an “EOS-Related” icon. Examine the contents of the advertisement. Install this advertisement on your Desktop/Workbench.

After the item is installed on the Desktop/workbench, access the Comment Survey tool and answer the questions related to the Advertising Service.

7) Access the Comment Survey Tool and answer questions pertaining to the Desktop/Workbench and the General categories.

Appendix B. Survey Questions

General:

- 1 Navigation through EP6 was easy.
- 2 The EP6 window layouts are easy to understand.
- 3 The EP6 home page provides the appropriate content.
- 4 I like the way EP6 home page is organized.
- 5 EP6 icons are easy to understand.
- 6 The color scheme for the EP6 Web User Interface is pleasant.
- 7 The color scheme for the EP6 non-Web User Interface is pleasant.
- 8 I like the way the EP6 Help function is implemented.
- 9 The Help provided in EP6 was adequate for my needs.
- 10 Help provided in EP6 was easy to understand.
- 11 It was easy to fill out the ECS user survey.
- 12 The layout of the survey was clear and easy to use.
- 13 My experience using EP6 was positive.
- 14 The general organization of the Advertising Service was easy to understand and use.

Advertising Service:

- 1 Other forms of browsing, in addition to the alphabetic index, are needed.
- 2 The ability to find and review advertisements on the World Wide Web is useful.
- 3 The General Search Form should allow specifying more flexible "and/or" combinations of keywords.
- 4 Additional search forms specific to products and services would be useful.
- 5 The Attribute Search method was easy to understand and use.
- 6 It will be difficult to handle a large number of search results with the current interface.
- 7 The advertisements available in the Advertising Service contained the appropriate types of information.
- 8 Additional types of information should be specified in advertisements.
- 9 It was easy to install advertised data products and services on the Desktop.
- 10 It took too much time to find a product in the Advertising Service and then have to enter it into the Search Tool.
- 11 Being able to place a browse or product request directly from the Advertising Service would be useful.
- 12 It was easy to submit an advertisement to the Advertising Service.
- 13 The ability to link products and services that relate to one another would be useful.
- 14 The Advertising Service was easy to use.

Data Dictionary:

- 1 Searching through the Data Dictionary was easy.
- 2 The ability to search through the Data Dictionary for information about data collections, instruments, parameters, and acronyms is important.
- 3 It was easy to find items of interest using the Index.
- 4 I like the way the Index is organized.
- 5 Finding items of interest using the Search Form was easy.
- 6 Defining queries using the Search Options on the Full Search Form was easy.
- 7 When I submitted my search queries I received the results I had expected.
- 8 The "ALL" category search/index is a useful feature.
- 9 The "Number of Hit(s)" on the Listing page is useful information.
- 10 The information contained in the Data Dictionary is the type of information I expected.
- 11 The layout of the Data Dictionary is easy to read.
- 12 The Data Dictionary Help documentation was informative.
- 13 The Data Dictionary was easy to use.

Desktop/Workbench:

- 1 It was easy to invoke/access EP6 applications from the Desktop/Workbench.
- 2 The pull-down menus were logically organized.
- 3 It was easy to create new directories and move files around the Desktop to suit my needs.
- 4 The Desktop/Workbench layout is easy to understand.
- 5 The Desktop/Workbench Help documentation was informative.

Earth Science Search Tool:

- 1 I like the layout of the ESST.
- 2 It was easy to construct a data query using the ESST.
- 3 It is easy to select geographic coordinates using the map tool.
- 4 I like the way the timeline is implemented.
- 5 The Results window was easy to understand.
- 6 I like the way the data was organized in the Results window.
- 7 It was easy to select data collections to order.
- 8 It was easy to modify the toolbar to customize the ESST.
- 9 It was easy to download a browse image.
- 10 I like the linkage between the ESST and EOSView for viewing browse images.
- 11 I like the linkage between the ESST and the Advertising Service for searching for data and information.
- 12 The ESST Help documentation was informative.

EOSView:

- 1 The EOSView HDF file window displays the file's structure clearly.
- 2 Panning and zooming on images in EOSView was easy.
- 3 The ability to select different color palettes for the image display was useful.
- 4 The EOSView animation capability was useful.

- 5 The speed of the EOSView animation was appropriate.
- 6 The EOSView window layouts are easy to understand.
- 7 The functionality (display of data values, animation, zooming, etc.) provided in EOSView is adequate for my needs/uses.
- 8 Help information/instructions provided for EOSView are understandable.
- 9 Overall, I found EOSView easy to use.

Product Request Tool:

- 1 The Product Request Tool window was easy to understand.
- 2 It was easy to request products using the tool.
- 3 I liked being able to access the Product Request Tool directly from the Desktop.
- 4 The Product Request Tool Help was informative.
- 5 It was easy to submit a trouble ticket.
- 6 The layout of the Trouble Ticketing tool was easy to understand.
- 7 It was easy to obtain the current status of my trouble tickets.
- 8 The information requested when submitting a trouble ticket was sufficient to accurately describe the problem.
- 9 The Trouble Ticketing Help documentation was informative.

User Preference Tool:

- 1 I like the layout of the User Preference Tool.
- 2 It was easy to modify user preferences.
- 3 The User Preference Tool Help documentation was informative.

User Profile Tool:

- 1 It was easy to use the User Profile Tool.
- 2 It was easy to modify user information in the User Profile Tool.
- 3 Help provided for the User Profile Tool was informative.

User Registration Tool:

- 1 I like the layout of the User Registration form.
- 2 It was easy to complete the application for an ECS account.
- 3 I like being able to register for an ECS account through the World Wide Web.
- 4 The information I was asked to provide in the application was appropriate.
- 5 I could easily identify which fields are mandatory.
- 6 The account application should request ONLY mandatory information, rather than a complete set of address and contact information.
- 7 I like the way the error messages are implemented.
- 8 Delivery of my account password via US Mail is acceptable.
- 9 The User Registration Help documentation was informative.

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Appendix C. EP6 URDB Entries

The following is a list of the EP6 comments and suggestions which have been entered into the User Recommendations Database (URDB). These recommendations will be formally reviewed and tracked by the URDB Analysts to ensure that they are considered for ECS design. To review the complete text for each entry access the URDB Home Page (<http://epserver.gsfc.nasa.gov/urdb/urdb.html>), they are available using the keyword "EP6."

- #957. Provide alternative methods for initial password delivery
- #958. Provide feedback indicators on system status (working, busy, in progress, etc.)
- #959. Establish tighter integration between ESST, Advertising Service, Data Dictionary, and EOSView
- #960. Provide the ability to type in spatial search coordinates
- #961. Provide the ability to type in temporal search criteria
- #962. Improve zooming function on ESST Map Tool to zoom in on user selected area
- #963. Integrate ESST Timeline Tool with the Valid Values process
- #964. Provide an "Estimated Number of Hits" indication prior to search submission
- #965. Provide an "Estimate Time to Completion"/"Percent Complete Bar" after search submission
- #966. Provide a "Search Completed" indicator to alert the user, especially if the ESST was iconified during the search execution
- #967. Provide a Warning/Confirmation dialog box indicating the size and destination of browse images delivered to the user
- #968. Provide a Confirmation dialog box specifying the product request information prior to order submission
- #969. Provide a Confirmation dialog box indicating that a product request has been received by the Data Server
- #970. Provide a "Order Completed" indicator to alert the user that a product request has been completed
- #971. Add a legend to images displayed by EOSView to explicitly differentiate multiple windows
- #972. Improve zooming function on EOSView to zoom in on user selected area
- #973. Improve the attribute search in the Advertising Service
- #974. Improve the keyword mapping and search in the Advertising Service
- #975. Provide a list of active tools/services as a pull down menu on the Desktop

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Appendix D. EP6 Comments

The following are the list of comments recorded during usability test sessions or received by Independent Evaluators as recorded in the Comment Survey Tool or emailed directly to the Usability Test Lead. The comments are organized according to usability task.

Task 1

Thank you for agreeing to participate in the usability evaluation of EP6.

Please log on to EP6 using the ecsGuest account name. Fill in the requested User Registration information.

After you have submitted the information, access the Comment Survey Tool and fill in the survey questions related to User Registration.

Usability Notes:

- Had trouble logging in, typed in wrong login name, couldn't highlight field to delete all.
- User typed in just the required information
- The "return" key didn't work between fields on the User Registration Tool
- User said it was clear which fields are mandatory, and which are not.
- Found the submit portion of the URT confusing, thought that the system would return a confirmation/edit page but it looked just the same as before. Confirmation page should be labeled.
- Clicking on "applicant information" spawned a new window. Why? It should have just moved down the window to the applicant information portion of the current window.
- User only typed in the information that was required.
- User thought that he should be able to phone in and get his password, not have to wait a week for US mail.
- "oh, it is mosaic."
- Clicked "applicant information." Not sure what is meant by "title." Title field isn't long enough, tried to enter "Network Engineer."
- filled in all fields
- annoyed that user has to point and click to move from field to field. Tried to use "Return" and "Tab."
- Submitted the information but it didn't appear to have accepted it. Message to verify information was confusing, though they had typed something wrong.
- No notification that US Mail is going to be used so many users won't fill in US Mail address.
- If a user has an email address why not encrypt a file and send it to the user, 24 hours later send the de-encryption software. Give the user a 1-800 number to verify things to get an account.
- Users didn't notice the red check marks (mandatory marks).
- User dislikes the mosaic layout. Prefers Netscape.
- User Registration tool - user asks which fields are mandatory?
- User suggests a FedEx option (paid for by the user, of course) for those who need access to their ECS accounts immediately.
- User dislikes Mosaic windows that pop up if you click a "hot key" combination.
- Tabs don't work from field to field in Mosaic.
- Had to notify users that check boxes = mandatory information.

- Distinction between Organizations and Project is too obscure - need definitions.
- Confirmation page: what to do if you don't want to change anything? Need an "everything is correct/confirm" button.
- If I were international, I'd wonder about "US Mail" statement. I'd want to put in "postal" somewhere.
- For people with 4 names, they might need an extra field in the registration form, they may find the current layout problematic.
- Will international users know what "K-12" means? What about a button for a Non-Profit institute? (Re: "Affiliation.") User Services may have to agree to changes in these categories.
- Registration form should only generate errors on the fields you miss.
- Filled in the User information
- Check marks not obviously required, may want to add a key to the top of form.
- Definition of "Organization" needed.
- Use Organization information to create mailing lists for marketing?
- Need a confirm button near the top so that the user knows they don't have to change anything.
- Reword the "US Mail." part.
- Left Registration window open when went to CST.
- User shouldn't see an error when they register twice. 1) users should see something like, "we have received your registration, User services will contact you. or 2) Accept the new registration as an update to the previous information.
- Netscape/Java platform independent interface.
- title field not long enough for "Professor", should be extendible.
- Filled out all, "Project" should be removed.
- Didn't want to fill out mailing address
- Didn't like that the "Return" key didn't work between fields
- Thought that a user should be able to enter their ZIP code and the system could fill in city and state information
- Wrote in mandatory information and some extra.
- Wrote in mailing address
- annoyed that can't "TAB" between fields
- Went to CST through the User Registration Tool
- found non-tabbing to be cumbersome and inconsistent with other similar applications.
- I like things electronic, why can't ECS send password through email.
- Didn't read information
- Likes the red checkmarks
- likes the CST layout
- don't like US Mail option but would want something electronic, credit cards use US Mail and that is pretty standard. I'm sure they can come up with a clever way to send things electronically.
- do we need to do user registration?
- Submit and Reset buttons chosen on Registration Screen.
- Want password electronically, but user recognizes the security problems.
- Glad that the registration screen didn't show change made a second time.
- Filled in the information with check marks, also filled in the Mailing Address.
- Didn't recognize the confirmation information, went straight to survey.
- Liked the icons
- Wondered how else a user could get their password - Mail too slow, FedEx too expensive. Call up on phone? - alternative to FedEx password overnight and user pays, Telegram?

- No mixed uppercase account name (e.g., ecsGuest).
- Not clear what user is applying for with the User Registration Tool, text unclear.
- Annoyed that he can't Tab/Return between fields
- Big hassle with Affiliation, Project. Need clarification, need the data but hard to collect and keep people straight.
- We've always gotten into a hassle with Organization. There needs to be clarification of what Organization is, your employer? Where you work? If I am a contractor, am I affiliated with the Government or Commercial? It is important to spell out whether you want "contractor" or the contract (you) work on. GSFC DAAC uses valids list and then has a "new Organization."
- Affiliation is tough to define. Spell out the discrepancy between contractor and government contract.
- You don't require any of this? (phone number, etc.) How do you determine the uniqueness of a user?
- Filled out all fields and was surprised that they weren't mandatory.
- Do I have to fill out the User Registration? Can I remain anonymous? Might want to mention you can dismiss this screen but you won't be able to access all of ECS.
- When the survey ends "where am I?" I wouldn't expected to go back to the first ECS Comment Screen instead of staying on confirmation window. Want to go back to survey home page after doing survey.

Survey Comments:

- Need to allow the same address to be used for all three fields without making the user type them all in. This can be irritating.
- Need an immediate acknowledgment that the registration has been sent.
- The verify screen is VERY confusing. I didn't even know it was different the first couple of times I saw it. I saw it and just closed it. I'm not even sure this is necessary (people can scroll back and see what they filled in). I would suggest two buttons at the bottom - a verify and a submit (which bypasses verify). If you feel that we must verify the information on a new screen, then change the name of the button from submit to verify or something like that.
- 1. Filling out the fields was a royal pain in the ass, because you had to keep moving the mouse arrow to each field in which you wished to type. In 100% of the websites which I have visited I have never encountered such a situation. You ****always**** can navigate fields by using the TAB key. Scientists will NOT like this.
- 2. The text does not wrap around!!!! -- consequently I couldn't read some of your survey questions in their entirety!!!!!!
- Some alternative choices for delivery of password
- Clarify option of remaining anonymous.
- Password Delivery by FedEx or telegram or some other quick delivery mechanism at user's expense should be provided. quick means
- liked that the correction was accepted without further verification \
- The User registration layout, etc. was good. The only negative is that after the user hits "return" in an input panel, the cursor does not go to the next input panel in sequence. The user must manually move the cursor via the mouse and click on the next input panel to get access to that input panel.
- Some of the field entries need to be extensible.
- Address information should be linked to ZIP codes.
- Return button should take user to next input field
- Is the confirmation step really necessary?
- What privileges are available to a guest versus a registered user?
- I don't like the way this (the TEXT) DOES NOT WRAP.
- Suggestions: Fields should be tab delimited to allow users to more freely update fields. Show some kind of tick marks representing required fields.

- Also suggest some type of encryption be set up for requesting users to receive account name/passwd via email.
- Needs to be consistent with other windows on use of tabs to go between fields, etc.
- All of these comment forms have two buttons at the bottom, submit and reset. The submit does what I'd expect. The Reset does not. Users need to be able to retrieve their submitted comments (to see that they actually got in, to add things to them without leaving all of the multiple choice questions blank the second time round, etc.).
- If the reset button is really a clear screen button it should be labeled so and the description should be changed to reflect that....
- Two complaints:
 - 1. I didn't enter a title and the response page addressed me as ROSS. I thought that was rude. Since the title isn't (and shouldn't) be mandatory, the response page should address the user by first and last name, e.g. ROGARD ROSS.
 - 2. How can mailing address be voluntary if the password is sent by snail mail?
- Error: Warning: Could not open message catalog "oodce.cat"
- In registration it would be nice to be able to use the tab keys to jump from one field to the next After you register it would be nice to know if it worked and have a welcome message Error:Netscape: Ignoring invalid mailcap entry: text/ecs: \$ECS_HOME/bin/loAdInstall %s
- 1) For some reason the system did not have me as a user although I had given my name etc. to the EP6 team (as far as I know other members of our team were included in the system). As it was, I logged in as an ecsGuest. I attempted at least 3 times to enter my user attributes (including the registration confirmation) with no success. Had I been successful I wouldn't have to give the same user information every time I would attempt a new session. For example, on 3/30 it finally gave me a message "Error has occurred-EcAc error code=2". Ruixin Yang, a registered user, also got the same message. I was, nevertheless, able to continue with the EP6 window options.
- 13. In registration, the required items and optional items should be identified.
- 14. After "submit" the registration information, there should be a notice to tell the user if the registration is successful or not. The modification and re-submit should be optional, and the user entered information should be listed in a compact format so that the user can check it without using the scroll bar.

Task 2:

After you register for an EP6 account you have two options. You can continue using EP6 as an ecsGuest,.however, the ecsGuest account does not allow a user full access to all EP6 functionality. Your second option is to exit EP6 and re-log on using your official EP6 account. This is the path we will take for the usability session.

Exit out of EP6.

Re-log in to EP6 using your account name and password. Your account information will be provided by the Usability Test Facilitator.

Access the User Profile Tool. Verify your User Profile information.

When you have verified the information in your User Profile access the Comment Survey tool and fill in the survey questions related to the User Profile tool.

Usability Notes:

- Can make all address the same? Make the Mailing address the default.
- Need a busy signal
- FTP address is needed for ftp push, this is different than email.

- Not sure to double-click or not, shift shock between HTML and XMotif.
- Needs to have a “confirm” or “same” as mailing address for the User Profile.
- At first only provide minimal information, have the billing and shipping address come up at time of order. Prompt for additional information at time of order.
- Rather than “submit” change to “verify/confirm” for the UPT submit button. Submit implies first time tool is used, when in reality the UPT would never be empty for a registered first time user.
- “Press Reset to display previous information...” was confusing, the Reset clears all of the information but that is not implied in the text.
- User didn't realize that it took two clicks to open up the UPT from the desktop.
- ‘I would assume that billing and shipping address would be the same.’
- There needs to be a confirm button next to the billing/shipping fields.
- The survey input should be cleared after I log out and log back in with a new session.
- I didn't use this tool
- I wasn't able to view or modify my profile info since for some reason my user ID wasn't recognized
- I tried registering a couple of times and while after the first time, the process was obvious, the first time, I was confused by what appeared to be the same screen appearing twice. It took some looking before I realized that the small section of text at the top had changed. It might be worthwhile to make it more visually obvious that the two screens are not the same!
- Changes in User Profile did not retain. I changed information in the User Profile screen and pressed SUBMIT. It looks like it was accepted. But when I went back to click on User Profile on the Desktop, my changes did not appear.
- I have two complaints about the user profile tool:
 - 1. Since most users have the same mailing, shipping and billing addresses can't there be a way to copy the info into those fields either automatically or somehow so the user doesn't have to type that info all in again??
 - 2. It would be really nice if the user can hit 'return' to go to the next field. This will make completing the forms much quicker and less frustrating. This goes for the other places where the user is asked to complete similar info, i.e., EOSView.

Task 3:

For the purposes of evaluating EP6, imagine that you are a researcher who wants to determine correlations between land use patterns and water quality in a tributary of the Potomac River. You have spent time gathering data to create a database documenting changes within the watershed. This information includes digitized USGS maps, in situ data, weather data, and information on land uses from historical sources. Today you have logged on to EP6 to look for satellite data that would give you information about changes in vegetation over a growing season within your study area.

Using the Earth Science Search Tool (ESST), submit a search to the data Inventory for data related to vegetation covering the watershed study site (upper left: 78 W, 40 N ; lower right: 77 W, 39 N)

To aid your choice of search parameters, use the Data Dictionary to look up the definition(s) of the terms used in the Earth Science Search Tool.

Usability Notes:

- Went to the EP6 Home Page. No indication of what the Desktop is on the Home Page.
- Went to the Data Dictionary to do a keyword search on vegetation. Wanted to type, “vege”

- No hits, no error message - must have a message.
- Searched vegetation and got NDVI. Annoyed that it was under “N”, not “V”
- Clicked on NDVI and got definition - it was what they expected.
- Want the screens to open up at a larger size as default.
- Hard to read map of white text on grey background.
- Did zoom area and went too small. Zoomed twice and system crashed. Hard to select zoom area.
- “Update/Close” what does that do?, the user asked.
- Want to edit spatial area by typing on text in attribute summary area. Disappointed they couldn’t.
- Need a search Cancel button
- Tried to find the Desktop but it was hidden behind the Registration window.
- Send error messages to a file, rather than to the user’s terminal (the EP6 messages that appear in the terminal window.)
- Went to Data Dictionary and looked at Search hints.
- Got a DCE Exception, no indication that there was “no hit.”
- entered “Vegetation” and got error message.
- Must close map tool before you can do any other action.
- Tried to type in the attribute summary area.
- pressed “submit” and got error messages saying must submit one attribute then got “your requested is being processed.” even though no attribute was selected.
- Found map tool very annoying.
- The lettering is a bit small on the icons.
- How do I find out what NDVI means? (he tried double clicking on the term after he entered it into the Summary area.
- Data Dictionary: confusing. Just want to see the hits - not blank letters!
- It told me I have 3 hits, but it looks like 4 (he counted the number of links. There were 2 parameter topic links).
- Spatial tool: Resizing window looks odd. (Just blank space around the map) Expected the type in fields to be revealed when map was re-sized.
- Just want to type in coordinates (when the map is up user can’t do anything) “Is that necessary?” Didn’t like that the map tool locks the other ESST functions, can’t do anything with it without closing the map tool.
- Would like to have grid lines labeled.
- He hit the zoom arrow twice and the search tool crashed.
- It would be nice to zoom on the area you selected (as opposed to fixed zoom increments).
- Couldn’t get exact coordinates because there wasn’t an extra zoom.
- Want a cancel button so that if I didn’t want to change the summary I could close the window (even if I had selected an area).
- People expect to see lat/long instead of long/lat. Need a preference section for changing +/- to E/W or N/S, decimal degrees, etc.
- Need dialog popups should show full messages. Hard to re-size those windows.
- Like the EP6 Home Page
- Like the Data Dictionary WWW implementation.
- No type in coordinate features - very annoying.
- No help on map - it is needed.
- Update/Close - it is not clear what this button does.
- Activated 2 ESSTs, did it because user didn’t see anything happening.
- Opened temporal, no selection, no comments.

- Zoomed in and it crashed.
- Like the highlight color on the map tool
- No clock after the double-click, this should be fixed.
- Data Dictionary - searched on vegetation not sure what user supposed to do when index comes up.
- Not clear that Parameter topic link was the definition, the NDVI portion of the display text should have been highlighted, rather than Parameter Topic.
- Prefer that the blank letters in the index don't come up at all.
- entered "rain" in the search and got a hit on "training."
- Went to Data dictionary icon to search on vegetation indices.
- Why doesn't the Data Dictionary just give the result to me? Annoyed with the index feature of the Data Dictionary.
- found NDVI, linked to AVHRR collection. - Want to be able to order data from the Data Dictionary.
- What does "Update/Close" mean, as opposed to "finished?"
- Want to create a box and move the box around in the spatial tool. Hard to zoom and select an area. User noted that he liked the UMCP tool where you could select North America and didn't have to zoom in too much.
- Had to go to Data Dictionary to find link to "Vegetation."
- Why wouldn't Data Dictionary just give data rather than listing it out by letters?
- Want to be able to click on NDVI data from full description screen.
- No place to enter lat-long information directly to EP6.
- No clock when it took ESST window a while to come up.
- How will a person know what "Inventory" is? Can't find it in the Help. Not good, not easy to find.
- Tested the zoom and didn't like the zoom action in the spatial tool. Hard to be precise, no text entry.
- Want to be able to highlight NDVI from the attribute summary area and go straight to the Data Dictionary definition.
- Not clear about searching the data.
- Wants just the hits to come back, not the whole alphabet in the Data Dictionary display.
- Want to have the example given made more clear. Not clear about the grouping of data in the Data Dictionary.
- User says it feels like he is running two separate applications.
- User wants some kind of message to say when things are working, perhaps show it every 30 seconds or so.
- Searching for "vegetation" on Data Dictionary - number of hits = 1, so why doesn't the system just show the hits, rather than the entire alphabet?
- Map tool: user dislikes the tool, wants to be able to type in coordinates for location.
- Map tool: zoom buttons - since they only zoom in 4 times each way the buttons should be deactivated when you can go no further one way.
- Where is the "busy" clock? - this is very important as users will get impatient or confused and start clicking - which has resulting in the tool closing.
- Liked the answer in the Data Dictionary but didn't like the index display.
- Busy cursor was not on long enough.
- Wants to type in the geographic coordinates but can't. What do the arrows do? Font too small.
- the order of the attributes in the icon tool bar should have parameter first. Science type stuff first - Parameter, Topic/Parameter, Spatial, Temporal, Sensor, Platform, Processing level should be the default.
- Want to be able to get the definition of parameter NDVI without leaving the screen.
- Went to Help-Data Dictionary typed "vegetation." Don't like the list display, annoying to have to search the hits. Highlight the letter of the alphabet? so that the user can go right to it.
- Clicked on NDVI parameter Topic, not clear what "reference category" means, maybe it is better to call it "more information." This isn't the type of information I expected but I like it.

- User thought that clicking upon “parameter topic” would automatically insert NCDI into the search tool, but then I saw all of the information in the Data Dictionary and it would be nice to continue to retrieve the data directly using the Data Dictionary.
- Want to order the data from the Data Dictionary.
- Expected the zoom area/highlights area to be in the middle of a screen. The lat/long aren’t labeled
- difficult to drag the box and re-size it, may be make it more like a Mac application.
- Not clear how ECS defines spatial queries (- = south, + = west) this should be added to the spatial tool and data dictionary.
- No instructions on the spatial tool.
- Can’t delete attributes from the summary window using the “Delete” key on the keyboard. annoying.
- Spatial Search: not clear that lat/longs define corners of rectangle. On the spatial tool there are no instructions but it is intuitive to start clicking and pointing. It is hard to tell which coordinate corresponds to which corner, an illustration would be very handy here. or you could just label the cornerpoints “Upper Left: lat, long; Lower right: lat, long”
- Surprised by default zoom area being the corner of map, not area selected.
- Timeline tool hard to read
- didn’t understand how to open collection of data
- Can’t cancel searches, very annoying.

Survey Comments:

- The temporal selection should only list the selected data sets (after select sensor, should not show them all).
- Need a way to fine tune dates and lat/long.
- Search results screen - the scrollbars do not work. I was unable to see all of my matches after I opened a folder with a lot of values.
- Need to allow the user to expand/shrink the widths of each column. That way they can see more of the information in the columns which they think are most important.
- I do not like supplying a password. Could we allow an optional anonymous ftp area on our machines?
- With a ftp pull, where does the data reside so that we can go get it? It probably is not necessary to supply a password in this case.
- You cannot change the ftp pull/push value after you submit it once, until you come back in. The button should be dimmed or better yet, the user should be allowed to change this value.
- Clicking on the browse icon is not apparent. I only "discovered" this by reading the EP6 brochure after my first attempt at the system. It tends to look like a selection icon and does not stand out.
- Browse products have to be brought to the host workstation to view? People should be warned of this if they need to make sure that space is available. Also, a screen allowing them to delete or save the browse product when they are done viewing would be nice.
- I had a lot of problems with getting a ESST result screen. At times, I would submit my search and the button would dim, and nothing else would happen (I even left it for a hour or two). This would occur even with a search that I know should return results.
- With the Search Results screen, the boxes are larger than the text and by the time you get to the bottom of the page, the text is offset quite a ways from the appropriate box.
- 1. text on icons is too small - maybe bigger font underneath the icon will work better.
- 2. need to have all the geographic info type in options - point, rectangle, polygon, point and range, etc...
- 3. geographic area selection with map was difficult because it was hard to pinpoint exact locations with the cursor.

- 4. rather than automatically save the browse image permanently, user should be given the option of keeping it only temporarily so it will automatically go away at the end of the session - this is to prevent clutter on MY machine.
- no boxes appeared to select granules crash when try to zoom over 200%
- Additional collections with additional granules would have been very helpful in assessing how the ESST deals with results sets, etc. Being able to search on one collection limits the kind of assessment that one can do. This also applies to data dictionary terms.
- The graphical icons representing the search criteria is a good way to formulate the query. This compacts the real estate needed for the main search screen but all the information is there in graphical representations. Clever!!!! kudos to you!!! Of course, names of the criteria can be improved. (parameter group versus parameter topic) What acts as a filter to what? If the user only knows the end item parameter terminology, is there still a way for the user to find how to formulate the query??
- This interface needs to be redesigned -- the current version tries to put too much information on the screen. Also, functionality of the white tick-boxes is unclear.
- It would also be nice to be able to order without searching, i.e., just place an order for all the granules that match this search (useful for people who know exactly which datasets they want beforehand.)
- The window info did not adjust to window resizing. The data did not line up. Help instructions on the screen would have been useful in the Results window. too.
- May need an intermediate screen between the Collections view and the Granules view.
- Too much help text

Need more granule info on results screen data dictionary is a dead end for searching

- (1) It was veeery slow;
- (2) the display at panel of data selection needs more work (it doesn't show the whole information and has no way to scroll).
- (3) browse data has no label on the color bar.

Comments about the Earth Science Search Tool Survey

- 1) We submitted several searches and the response was adequate. Searches were submitted about noon EST.
- 2) A new attribute was selected and we added to the initial attribute set. However, the ESST did not remember it even though we remain in the same EP6 session.
- 3) Colors used here are good. Easy to read and it does not produce any eyestrain.
- 4) In the timeline window for specifying the time range, what are the arrow buttons good for?.
- 5) We specified some attribute parameters for the search and we could not find any data for it. It will be great if EP6 provides some feedback about which attribute selection are more important based on previous parameters defined in the search. For instance, after selecting AVHRR, some future parameter selections may not be applicable to this sensor. Make them unavailable to the user.
- 6) The ESST does not indicate if there is a min/max number of selection for each attribute. Is there a limit for the number of time ranges?, spatial regions?
- 7) The system takes sometimes more than 10 sec to reply to some command. It will be nice to have a time icon displayed whenever the user is waiting for some reply. So far, we don't know if the system is doing something when we push some buttons. Or, the system may grey the control button after it has been pushed.
- 8) We tried to bring the search window UP (the front window) and for no reason EP6 was killed.
- 9) The zooming in the spatial coverage is fixed. It does not let the user to enter a percentage value.
- 10) We could not download a browse image. It brings a window to order it whenever we want to browse a marked granule. The user might want to browse a sample of the granule before ordering it.
- 1. help through Mosaic is too slow (it should be local).
- 2. it will be nice to have an icon that shows that the system is working.

- 3. give an explanation for each acronym used.
- 4. give short description for each satellite sensor, i.e. have a data dictionary on line.
- 5. no guidance on how to choose the area of interest on the world map.
- 6. Give time coverage for each platform in advance, before the user choose the data.
- 7. For GOES platforms, show or highlight only the geographical region covered by them.
- 8. "update" means delete and replace, not add.
- 9. will be better to have access to a comment window as soon as you find a problem.
- 10. under ESST main window, Spatial summary and Temporal summary does show nothing.
- 11. When searching for data, it does not say " no data available ".
- 12. should tell you that a browse on line is not available.
- 13. Under ESST main window, the Search Type button does not give any information.
- 14. When exiting ESST main window, it doe not give the option to save the search.
- Scroll bar ESST, spatial and Temporal does not work the same when click arrow, sidebar empty space.
- Need to be able to specify Zoom factor on spatial. Spatial selection box does not slide when cursor goes outside of window. Need separate message pop up after search submit in progress to let user know search is complete. Users will iconify ESST while waiting.
- Delete attribute doesn't work for whole attribute forced to clear all.
- Must tell user how many granuals selected in collection. Query time gets longer as selection criteria are added -- expected it to get faster. Scroll bars don't work on results screen. What does ftp-push/pull mean ... with respect to who? didn't notice help documentation.
- It was easy to construct a search, but that was because I had instructions in front of me. If I did not have them, I don't think the Earth Sciences Search Tool would be very intuitive. A couple of problems I had were that the map did not zoom in very well. I did not get a very good resolution. Also, the map coordinates displayed were backwards (in my opinion). I think coordinates are, generally, given as (lat,long). My coordinates were displayed as (long,lat). Instructions for the Search Results window stated to enlarge my window to get the white browse and order buttons. While they appeared, the individual fields, i.e., spatial and source, did not resize so the information was cut off. Also, the white boxes should probably be the same size as the print font. I needed to count down the number of boxes to get the right granule. I couldn't just click on the box next to the granule. After I submitted my order, it took FOREVER to download. I downloaded two data files. The second file, for some reason, downloaded twice. I was watching it and when it completed it downloaded the same file a second time. Don't know why.
- 1. in the latest script you tell the user to zoom in on the US and then give coordinates that are somewhere in Russia.
- 2. small nit,--the ESST lists spatial data at (lon,lat) which is backwards from custom. That would not be a big deal if the numbers were accompanied by units, like North or South.
- 3..I did a data dictionary search and got this Requested document (URL [http://epserver.gsfc.nasa.gov:1500/cgi-ls/CIWbDdDisplayList?action=search&category=ALL&case=insensitive&nameField=name&keyword="NDVI"](http://epserver.gsfc.nasa.gov:1500/cgi-ls/CIWbDdDisplayList?action=search&category=ALL&case=insensitive&nameField=name&keyword=)) could not be accessed.
- The information server either is not accessible or is refusing to serve the document to you.
- 4. While putting together a search of my own, I got no hits. At least I think I did. I cannot be sure since what I got was a blank results window. When I did get hits, only partial words appeared making me unsure what it meant when no words appeared.
- 5. After I did the data dictionary search, the ESST disappeared. I had to fire it up again. Is that supposed to happen?

- 6. These comments are not robust. This is the third time I have entered comments and, if this makes it to you, the first time it makes it in.
- 7. When I ask for a browse, a dialog box comes up and asks for my host machine and password. even if I ask for a pull. is this secure? I am assuming that host means the user's workstation. Does that mean that the user has to give out her password in order to get data?! Why for a pull?
- 8. The little window wasn't big enough and it came up 'destination director'. I thought that was me. Maybe I should have been able to figure it out, but hey, I'm a user.
- 9. I couldn't get EOSview to work at all. I couldn't find any files that it could open.
- 10. okay, amend that. I did finally get one to work. not obvious how to use the EOSview, though. May be a useful tool as it matures, but right now it is not.
- 2. Zoom feature of the spatial selection in the ESST causes a memory error if I zoom beyond 400%. This error was a fatal error which caused the ESST session to end.
- 3. Spatial attribute should also allow users to specify coordinates of box by typing in the numbers. Same should be true for the temporal attribute.
- 4. Spatial attribute map should label grid lines with latitude and longitude coordinates.
- 5. In my command line window (where I started EP6), I kept getting a warning about my Scrollbar. It said that "my slider size is greater than the scrollbar maximum value minus the scrollbar minimum value".
- 6. There is no way to stop a search. I think this is very important. Also, it would be nice to have some window indicating how far along you are with the search. One search I made went on for over 30 minutes without success or any reply.
- 8. When selecting an available attribute, that attribute should be highlighted before you choose add so that you can visually see what you chose.
- 9. What are the purposes of the spatial and temporal summaries in the ESST? I saw no information or use for this area of the ESST window.
- 10. I thought the method of selection of different attributes was done very well. I like the way it shows only the mutually exclusive items after you selected an particular attribute.
- 12. I found the X windows to be rather slow. Whenever a search is being made or the system is "thinking", the windows do not refresh. Therefore information that you may want to refer to disappears from the screen for a while.
- It is extremely slow from when I click on the ESST and the window comes up... I didn't know if the system was doing anything it looked broken. perhaps the hour glass can remain until the window comes up.
- For the spatial map it would be nice to be able to just type in the numbers rather than using the rubberband on the map.
- Error:Warning:
 - Name: attributeDisplaySB
 - Class: XmScrollBar
 - The specified scrollbar value is greater than the maximum
 - scrollbar value minus the scrollbar slider size.
- X Error of failed request: BadAlloc (insufficient resources for operation)
- Major opcode of failed request: 53 (X_CreatePixmap)
- Serial number of failed request: 12200
- Current serial number in output stream: 12201
- Would be nice to know that you can only zoom to 400x
- Crashed system by double clicking on the data dictionary twice. Again, extremely slow, and can't tell if the system is doing anything.
- Brought up system again, asked for info on NVDI, window came up, saying no info, I clicked OK, crashed.

- For the timeline window, it would be nice to be able to select data by typing the dates... also the window doesn't scroll to the right, so you have to make two sets of times if you want to include data from both windows.
- After the search, first I got no data (can't you be told that no data will be available for parameters selected before searching). Second search on NDVI gave both ERBE and NDVI data, after clicking on NDVI folder, new page came up after 5 minutes showing granuals, I read mail, and all the text in the screen was gone, there should be a way to refresh the screen, tried to click window, system crashed.
- I miss typed my file directory I wanted the files to go too... it doesn't ask me again for the password/directory, so I have to start the search all over? Need away to reset these values.
- After restarting from scratch, the browser did ask again for the directory would be nice to have a browser to select the directory. After setup the following was written into the directory:
 - ORDER 5001 1KM NDVI
 - OPEN /users/bates/.ecs/data/NA-NDVI.1-10Apr92.browse
 - DISPLAY IMAGE 1
 - ORDER 5003 1KM NDVI
 - OPEN /users/bates/.ecs/data/NA-NDVI.21-30Apr92.browse
 - DISPLAY IMAGE 1
- However no hdf files, nor NA-NDVI.1-10Apr92.browse NA-NDVI.21-30Apr92.browse were written, the eosview was demanding an hdf file...
- EOSView main window would not go away... had to do a kill -9
- Also a process /opt/dcelocal/bin/cdsclerk -U bates -u 245 -m 4 wouldn't go away, and was owned by root, so I couldn't kill it
- 2- ESST attributes were checked. It is a very useful feature to have extensive customization of attributes and be able to save this configuration for future use. Many users will want to work in quick access mode using only specific attributes repeatedly.
- 9- Having push/pull options for ftp would be useful. (Option shown but not implemented)
- 10- Guide info would be useful to have from ESST directly. After a search on a parameter, multiple sources showed up (both ISCCP and S4G products). User should be able to get DD or guide info directly from ESST for the products that resulted from the search without going to another DD window. This would be necessary to decide on what to order quickly.
- 11- As many users indicated, having a clock on the screen while ESST is searching is necessary. The user is waiting for a long search and the only indication out there is the increasing size in granules in a specific directory (.ecs). Similarly, a notice from ESST when the search is completed is needed. Currently, you have to track the disappearance of a small window.
- Overall, EP6 session went reasonable well in what it demonstrates. There were no crashes once we logged on the EP6.
- 4) I mainly attempted to use the ESST window. I attempted a variety of attributes from the list, including NDVI and ERBE-type fluxes. The spatial window should also give the user the opportunity to directly enter numerical values of longitude/latitude ranges. The temporal scroll bar seemed not to exist for NDVI, I never figured out whether temporal information for NDVI was not accessible. My attempts to get to some data proved unsuccessful. I kept getting the message "Unable to connect to a server". Typical comment entries from the system were the following:
 - Warning: Cannot allocate colormap entry for "Grey56"
 - Warning: Cannot convert string "-*-menu-medium-r-*-*-*120-*-*-*-*iso8859-1" to type FontStruct
 - Warning: Cannot allocate colormap entry for "#e2ef74"
 - Warning: Cannot convert string "-*-lucida-medium-r-*-*-*100-*-*-*-*iso8859-1" to type FontStruct

- Warning: Could not open message catalog "oodce.cat"
- Warning: Cannot allocate colormap entry for "Grey65"
- Warning: Cannot allocate colormap entry for default background
- Warning: Cannot allocate colormap entry for "Gray65"
- Warning: Cannot allocate colormap entry for "Grey56"
- Warning: Cannot convert string "-*-menu-medium-r-*-*-*120-*-*-*iso8859-1" to type FontStruct
- Warning: Cannot allocate colormap entry for "#e2ef74"
- Warning: Could not open message catalog "oodce.cat"
- Warning: Cannot allocate colormap entry for "Grey65"
- Warning: Cannot allocate colormap entry for default background
- Warning: Cannot allocate colormap entry for "Gray65"
- Warning: Cannot allocate colormap entry for "Grey56"
- Warning: Cannot convert string "-*-menu-medium-r-*-*-*120-*-*-*iso8859-1" to type FontStruct
- Warning: Cannot allocate colormap entry for "#e2ef74"
- Warning: Cannot convert string "-*-lucida-medium-r-*-*-*100-*-*-*iso8859-1" to type FontStruct
- Warning:
 - Name: scrollbar
 - Class: XmScrollBar
 - Specified slider size is greater than the scrollbar maximum
 - value minus the scrollbar minimum value.
- Unable to connect to a server
- Warning: Cannot convert string "-*-lucida-medium-r-*-*-*100-*-*-*iso8859-1" to type FontStruct
- Unable to connect to a server
- Unable to connect to a server
- Warning: Could not open message catalog "oodce.cat"
- Warning: Cannot convert string "-*-menu-medium-r-*-*-*120-*-*-*iso8859-1" to type FontStruct
- Unable to connect to a server
- 5) I was able to successfully change the attribute widget choices (I added Proc Level--only Level 3 are available--and the DAAC/ADC widget, the latter did not contain any information on which DAAC had the data).
- 6) I tried the ECS Data Dictionary widget from the search tool. I am still waiting for a complete Mosaic download but at least it connected.
- 8) Due to the inordinate amount of time that I spent on the system (two hours on Sunday morning just to complete the above tasks) I gave up. If the system gave the option to save the specifics of an unsuccessful search (the Search option of "save" was not active, presumably it would only have been active if I had successfully completed it in the first place), I would have been able to close the login and try same search later.
- 2. The slow process may be always true at certain time to a particular user. For a time consuming processes, there should be some message to notice the user what the system is doing. I noticed that for Searching Process, another window tells the user the on-going process, that is a nice feature. The same feature should be included in the process of changing attributes. The black box showing that the process is selected may be not obvious enough. I waited a longer time to get a changing attribute page than a searching process.
- 3. In spatial area selection, giving both the starting coordinate and the end coordinates in numbers will be helpful. Right now, only the starting point is shown in number. The temporal selection displays both the starting and ending time.
- 4. For the spatial and temporal selections, there are some interference between the displaying messages and the buttons. This may be machine dependent. The machine I used is an SGI.

- 5. The attribute Topic Parameter corresponds to Parameter Group in the summary display. But the Parameter attribute button results in Parameter Topic in the summary. I understand the meaning, but it seems confusion for a beginner.
- 6. I do not know how to use the spatial summary and temporal summary areas on right side of the screen.
- 7. When viewing a browse data, is the HDF only data format? From my search, I found no HDF file but some *.bin files (binary files?).
- 9. User Preference Tool does not work at this moment. That is a good idea. It will be more helpful for a user to save a search and update the temporal range for later use.
- 10. It seems that when one application (e.g., Earth Science Search Tool) is open, one cannot open another application (e.g., User Profile or Product Request Tool). This may not be true, but just because the machine (or network) I was using was too slow.
- 11. The Product Request Tool gives the same interface as Earth Science Search Tool. If they are the same, it is better to have a more general name and put the two into one.
- When you type in a word to search for, the results window returns the entire alphabet even though you are just at one section. It would be nice to have the window come up at the first match so that you don't need to scroll down to find it.
- When I typed in something that had no matches, I should receive an error window immediately. Instead, I receive a window with the alphabet. When I click on a letter, nothing happens until I move my window a bit. Then I finally get an error window (which tends to be cryptic).
- it wasn't obvious when results were returned that we had to use the A-Z index to find hits
- thesaurus would be good - simple text matching that is currently there sometimes returns unexpected results. Searching for "rain" yielded 1 hit - "training" - did not reference "precipitation"
- acronyms should be linked to the definitions as well
- Currently, cannot access data collections from the definitions of the data collections. Is that feasible? Would users like that? (don't know In the results of the data dictionary search, if an - - - index has no entries, should not be shown.
- navigation buttons would be helpful so that the user doesn't have to press "back" many times to get to an another functionality. Should always be able to reach the search screen from anywhere
- the full search screen - can be integrated with the simple search screen with defaults set to do the simple search ??
- The only improvement I could suggest would be to allow the user to select a max number of hits per screen returned. This could be especially useful if the user selects all categories and wants to browse the index. At this moment with a mostly empty data dictionary, doing that brought back more than a quarter Megabyte of info. I can easily see this running to a few GB in the future...
- Need a better way to find entries in the index listing...rather than scrolling through the list.
- At first I confused a dictionary with a directory. Once I understood that, things went more smoothly.
- I did a search on the phrase 'sar' and got several hits. In the alphabetical printout, I don't think it should show those letters of the alphabet in which no matches were made - it's a waste of space.
- I was using the script provided to test EP6. I got an error after I submitted 'AVHRR' in the data dictionary so I did not receive any results. The error message that I received was 'Error: caught a DCE exception object not found (dce/rpc).
- 12. The Data Dictionary looks very helpful. But the processing is too slow considering we are processing text only in this part (search is exceptional). The same problem to the Advertising Service.

Task 4:

When the search results are returned, select at least one of the granules to view as a browse image. Enter the appropriate information in the User Profile window:

email address: jposton@epserver.gsfc.nasa.gov

Destination Directory: /users/jposton/.ecs/

Your Host Password: ecsGuest (the same password you used to log on to epserver)

Your Host Name: epserver.gsfc.nasa.gov

When the browse window is returned to you, examine the image using EOSView. Be sure to try zooming in and panning around the imagery. Use EOSView pull-down menus to read more information about the browse file.

When you are finished examining the browse image, access the Comment Survey tool and answer the questions related to EOSView.

Usability Notes:

- Results Window: The folder icon is a little small. A little triangle might be better.
- Browse checkboxes don't line up with granules
- How come I can't select individual granules to order? (There weren't any checkboxes)
- I do like the checkbox to let me order the whole collection
- Takes a while for the results window to re-draw.
- No indication that the collection was selected
- The Results window is singularly lacking any kind of instruction.
- Wanted to highlight a granule to select it.
- Not intuitive to select a browse box at the end of the row.
- The color changes really "got on my nerves." said the evaluator.
- The user went right to the folder icon and clicked on it. User suggests a Mac-like rotating triangle at this level of size, folder too small.
- User had trouble selecting browse, went to pulldown menu and selected viewing options then browse. Nothing happened. Went and then clicked the Browse button on the screen.
- Very impressed with the "snappy" icons.
- Fix the packing routines in the motif window (see O'Reily volume 7 Motif) - re-size window event handler
- When the dialog box is up it messes with the window repacking.
- User feedback to indicate that the granules are being drawn is needed.
- Clicked on the file icon to open the collection to see granules browse information.
- Want a "progress indicator" something like, "got 2% of 500K..."
- Only didn't know how to open a collection, not know if it is a collection or a granule. Need a better visual cue like an arrow, or the Mac triangles. Users are used to it.
- The font is too small to readily read.
- Would like to tab or return between fields on the User Profile ftp window.
- Hat to retype the field and it deleted everything and so had to retype it all.
- Would be nice to have something to show how far along an action you are (loading results, etc.)
- Wasn't obvious how to use arrow keys on keyboard to move through granule/collection information.

- Not clear whether it is a granule or collection before you open up the folder.
- Having to keep 1 vs 2 clicks straight is not good.
- Need more visual clues to instruct the user how to use the Results Screen.
- Text in blue pop-up box (User Profile window) too small. and hard to read.
- When tried to correct the text in the field it cleared the whole field.
- Want some of this data defaulted, shouldn't it know the information from the user profile?
- Unfriendly error messages.
- Not clear that the item(s) in the Results window is just the data collection level information.
- May be add a text field at the bottom of the window for "context based help"
- Wants some type of granule "detail service" that you can select to get more information about the granule level detail for that granule
- Surprised by the dialog box (User Profile window), this really needs some explanation. Why isn't this transparent?
- Time clock is needed to provide feedback to the user.
- Don't like the browse image to open immediately, it isn't clear which browse image goes with which granule. This will be hard to manage if there are more than 3-4 images. Perhaps the system should return a list that the user can select from to display the various browse images.
- Clicked on collection window.
- Surprised by browse images automatically opening.
- User wants the Comment Survey Tool directly accessible from the ESST.
- Likes that the background in the ESST is different than the Desktop.
- Don't know how to get granule information - click on icon?
- Still not clear what the data set is showing, not apparent that this is a granule list.
- Want to know whether it is an interactive or ftp browse.
- Instructions about what to do to browse and order data collection/granules are not available.
- The help doesn't go straight to the search results screen, it starts up with the search summary information. Help needs to be very short and concise.
- I don't have granules. How do I get granules? The only reason that user clicked on the folder
- What are these [names?]. They're just four digit numbers. Nothing differentiates these granules. User didn't realize that you have to re-size the screen since the scroll bars didn't work.]
- Got an error "File is not an HDF file."
- Clicking on Browse, I'd expect to see a browse image. I'm reluctant to enter my name and password in to a strange window. [A regular user is not going to know/expect an ftp browse.]
- Tried to select several browse images, but then gave up because of errors.
- The boxes don't line up on the left side.
- For selecting to order he thinks there should be a "select all" button. He didn't want to click each box, it wasn't clear that you could "select all" at the collection level [the blue folder].

- EOSVIEW: Got the impage, but also had an error message at an underlying system error.
- Tried to click on the image or highlight an area to zoom in on (he wanted to select/zoom feature or zoom to center of window)
- It's not clear how to pan the window (There wasn't a thumbnail image). It would be more intuitive to have scroll bars.
- Antarctic is spelled incorrectly. It's probably not a good name for a palette.
- When you bring the arrow into the field of view, the same palette doesn't always come back. If the arrow goes

from the background to the window, the palette doesn't refresh. It only refreshes if the arrow was in another window first.

- It is not well formatted (re: window that tells at the browse image) i.e., information was all in one line. Would like to be able to access that information from buttons at the picture. The focus should remain on the picture. Right now its not obvious where to find that information. The EOSView "Main Window" doesn't seem to serve much purpose.
- Would like to put overlays on top of the image.
- Would like a palette legend.
- The Pan window doesn't display.
- User would prefer a scroll bar.
- Not sure what "an object to display..." is?
- Thinks we're on the right track with EOSView.
- If most of the images are landscape then you could put the whole package into one window with a toolbar.
- What is the EOSView Main Window for?
- Tried to pan by dragging cursor on image.
- Want to select an area then zoom, if can't do that, then zoom area in the center.
- Colors change as the cursor is moved but the color doesn't consistently "come back." Very aggravating.
- Antarctica is spelled wrong.
- Need a warning message about the colormap problem.
- Data in file identifier not well formatted.
- Selected "close" and it closed all the EOSView windows.
- Want to access the additional file information from the picture, rather than from separate windows.
- EOSView font is too small.
- Liked the panning window, it is really nice.
- Need a busy signal in the zoom.
- Would like a user-customizable flashing arrow- red dot - reference box- thing to let the user know where within the panning window the zoomed area is.
- Tried to change palette by selecting color band.
- Selecting "close" on the "file identifier and description" quits the application. Bug or feature??
- Are the file palette names standard?
- EOSView error messages not friendly at all! The error should go to a log and provide a better error message, period.
- The palettes are not helpful.
- the Panning window did not redraw.
- Font too small to read.
- "Click on Object to Display" not obvious what an "object" is.
- Only those who know HDF may appreciate the file structure display.
- EOSView has the potential to be easy to use. EOSView is sort of easy to use.
- Need steady colors.
- How do I scroll around image?
- Use of term "object" is not intuitive.
- How do you get rid of "more info" box.
- Not obvious how to pan the view.
- Never got the panning window to display.
- Image did not center in on where the user specified. Side bars would be helpful for this image.
- User suggested the use of pulldown menu (Mac) for each window that would allow users to see everything.

- User found zooming to be easy, panning not so easy.
- Zoom button should grey out when the zoom is not valid.
- Want to see metadata associated with Browse.

Survey Comments:

- I wasn't even aware that there is an animation capability.
- I think this could be a useful tool with a little more work.
- Will each data producer of a browse product be able to specify which color palette should be the default with which to view their data?
- Need to have a description of what the frame is showing. Could the file description be displayed at the bottom of the graphics frame?
- Need coordinates on the axes and color bar.
- What does order do? Does it allow you to place an order for data or does it do some sort of ordering. Perhaps adding a second word to the button would help with this confusion.
- The pan window overlaps the color bar.
- I think the pan selector should be the center of the new view, not the edge which it appears to be.
- has the potential to be easy to use, but glitches still so question 9 should be answered with a 3.3 error message greek panning window did not appear color weirdness default user profile fillin would be time efficient editing of Destination Directory field erased all characters to right when changing a character in middle
- Color Palette names - are these standard? Didn't know what each choice would do until tried it.
- Better descriptive names for the different windows available, example: the "main window" seems to be the only way to input in local HDF-EOS files to EOSVIEW, e.g., call it EOSVIEW file manager or something like that
- Having a "frame" around the postage stamp for the pan would be helpful in defining that as an "input" from the user. Really liked the postage stamp method of panning. A reference point on the postage stamp, showing what area the zoomed display panel shows, would be extremely helpful.
- Having a map overlay over the browse image would also be helpful.
- It's easy to use, but I don't know what to do with it ?
- I only saw 2-d data files -- I would like to view three-dimensional data.
- Would really like to be able to put overlays on top of the image (political bounds, lat/long, rivers, etc.)
- Also, would like to see more info about what the values mean, i.e., a legend assoc. with the palette. See the V0 / Release A client for example of what I mean.
- Need to be able to overlay on the image: political boundaries, rivers, lat/long (especially!).
- Zoom should use the select-then-zoom-to-selected-area paradigm, or if impossible, then zoom to center.
- Also need to see a legend along with palette to know what the colors mean. See V0 Client for an example of what I mean.
- Also, it would appear that it could all fit in one window (at least for the example NDVI image), which would be much easier to use.
- The ZOOM capability is Klugie (needs help) A scroll bar would be useful or a bounding box of some sort.
- Would be good to have instruction/help on the window for the novice.
- This is an on/off capability or windows available set of instructions.
- 1. panning was difficult because the cursor is too big relative to the area I wanted to pan - especially in zoom mode.
- 2. zooming needs to zoom in on a centered target or on a target that is selectable with a cursor - e.g. if you click an area to pan in, that should be the point to zoom in on.

- 3. when the browse image came up, all the colors on the computer screen changed colors so I couldn't distinguish the title bar - so it was difficult to grab and move the window.
- 4. after I zoomed in all the way, the zoom in option was still active so I thought I could continue to zoom - so I kept clicking it. So, after I've zoomed in all the way, the zoom button should be deactivated so I won't waste my time clicking it.
- 5. I want to see the metadata (attributes and guide info) associated with the granule that I'm browsing.
- Displaying a browse image was sooo.... slow, I could never tell whether an action had been accepted or not (i.e., pan, zoom, etc.).
- When a new palette is used only the browse data color should be modified - NOT THE WHOLE SCREEN AND ALL THE WINDOWS ON IT!!!! Especially if the new palette makes the menu text INDISTINGUISHABLE FROM THE BACKGROUND COLOR!!!! Also, when a user selects the default palette again, IT SHOULD RETURN THEM BACK TO WHERE THEY STARTED COLORWISE!
- Since I only had a single image, left by someone on a previous test drive, I couldn't do any animation. The capabilities seemed minimal.
- I can't stand the EOSView GUI! Talk about user-unfriendly! The window that comes up is too small - you have to scroll just to read the basic entries.
- I tried to pick a data file to display and was told that the file I picked needed to be in .hdf format. If that's so, then why are non-hdf files even there? Why wasn't I warned ahead of time that it had to be hdf?
- In snooping around here, I couldn't find an hdf file. Are there any? Where are they? Why isn't the user directed to where they are instead of having to search in vain!
- I hate EOSView!!
- critical flaw is how hard it is to find files. turns the user off.
- 11. Browse did not work for me. It said I need an hdf file format.
- I received the following message by email after trying to browse. "Data requested for distribution by ftppush failed to be retrieved or distributed.
- Error in setting local path for ftp push."
- Consequently, I was not able to retrieve any data from my search. I did get the file "0Aeosview.script". Perhaps I am old-fashioned but I think it very easy to put requested data on an ftp site where users can anonymously ftp the data to their local machine. Large data orders should be restricted to tape. I don't think it is necessary to directly send the data to the users home directory.
- 1- We used EOSView to look at existing browse granules (NDVI). Features are useful, users will want to have a copy of EOSView in their personal directories for further data access.

Task 5:

Return to the Earth Science Search Tool to select and order the granule(s) you wish from the Search Results window. To check to see if the data file(s) have arrived in your account directory, open a new window (xterm), rlogin to epservers and change directory to your account (/users/jposton/.ecs/), and list the contents of the directory. A copy of the email notification should be sitting in your account along with a copy of the data granule(s) that you ordered.

When you have finished, access the Comment Survey tool and answer the questions related to the Earth Science Search Tool, the Data Dictionary, and the Product Request Tool

Usability Notes:

- Re-sizing the Results window brought back the check boxes.
- Why can I select attribute text in the columns and delete?
- I like the vertical pane adjusting.
- Total price field should be read only.
- Media format should be selectable from a list of granules.
- Email notification didn't arrive.
- Would like to turn just search results and order window into icons. Right now can only iconify windows as a group from ESST.
- Select the AVHRR and want a screen to come up with the information on just AVHRR, the ERVE and ISCCP should "go away" - intermediate screen.

- Had to re-size the Results window to get the granules order boxes
- User likes the "virtual panes" on the Results screen.
- Why are metadata information editable?
- Media format should be selectable from a list of values, not editable.
- No message in dialog box
- Want the search, results, and preview order button to be de-coupled.
- fix the scroll bars
- most people won't know frt push/pull. Will anyone know what FTP is?
- Why not say, "Send data to account..." try and hide the ftp detail from the users.
- The buttons in the change Attribute should have the button name outside the button.
- Why not use radio buttons on/off for attribute selection. The notion of "current" vs "available" attributes doesn't apply if they are all "on" or "off."
- The window realstate needs to be used more efficiently.
- feedback information needed, perhaps next to the "submit order" button.
- Search REsults window has problem with refresh of columns and text.
- It is not clear. Re-design the window so that the granules are listed but the Attribute information may be displayed in a separate window. Move the cursor and the window will update.
- The window has to be much smarter.
- Liked the "order" button on the browse imagery.
- Rename the EOSView windows so they are appropriate to the content "EOSView Image Window," "EOSView File Manager..."
- Looked for media options, surprised that it was type-in, not an option. Same with "total Price."
- How do you deal with V0 data that are only sold in "packages?"
- Maybe show the package orderable as a CD-ROM but the granules could be ordered individually.
- Rename parameter/parameter group/ parameter topic - check with Science office and Modeling group.
- There would be a link from the acronyms to the other information about that acronym.
- There should be a link from the Data Dictionary to the Advertising Service.
- Don't know why there are 2 Data Dictionary search screens a full search, and a plain one.
- Want navigation buttons from the pages.
- The order boxes didn't come up.
- Zooming twice in the spatial tool causes a crash.
- To close the ESST it is not clear that the "Search" pulldown menu is where the "Close/Quit" command is.

- What is “media format?” How do “type” and “format” relate?
- ECS should provide selectable options for format based on type.
- grey out mailing address if not ordering by mail
- Want an itemized list of cost vs order items.
- Can’t zoom more than 2 times
- Wouldn’t have thought the Search button would be where it is.
- Not always easy to go back and forth between windows.
- No hard media choices?
- Not familiar with FTP push or pull.
- Would like a price breakdown of the items I’ve ordered.
- What are the black marks in the Attribute Fields?
- Couldn’t select single granules of data - only the whole collection.
- The Product Order Preview is not needed. The attribute stuff is not needed at the order stage.
- Where do I go to find information on the formats? Is data format in the metadata model? This is critical.
- User prefers not to save everything that she has browsed - ECS should have some type of save option.
- Don’t want to save every browse, maybe want to put it in some type of temp file that is cleared when the session is over.
- The list returns the order at collection level but don’t need to browse information now, want file sizes, format information, order information, archive format, media format, etc...
- Redundant information.
- Not easy to figure out what to do, like the media type valids.
- Need smart valids at the order section.
- Mailing address should be retrieved from profile.
- Do data-oriented information first, then after submitting, confirm user profile addresses. Use same arrangement as User Profile format.
- No confirmation that the order was submitted.
- What about a summary of “things I did today...”
- Would like to be able to “add to my order.”
- expects the multiple orders to appear in one summary window, want to be able to do a search, mark the granules for order, then go do another search.
- ONE summary screen please.
- Not interested in the “how I got the search” not critical information (meaning - the search attributes listed on the Results screen, really want format and data information at this point.).
- Help comment: Most users don’t want this much text. Hlp needs to be SHORT.
- Is there something that says, “Your search yielded 500 granules...”
- Product Request Tool: So, I assume if there were more than one collection, there would be more than one folder?
- I don’t see a need to re-display the platform, sensor... browse information. Now I’m looking for file sizes.
- Media types with the valids is good. You need valids for media format.
- I’d put archive format and media type next to each granule. Need smart valids for media format (e.g., can’t get CD-ROM by ftp push.).
- The mailing address should be retrieved from my profile, you should be able to confirm you mailing address. Confirming addresses should be a separate screen. (after you submit the order). Confirmation screen should be the same format as the registration profile e.g., boxes.

- There should be a summary of what I've done. What if I want to go back and order more? What if I just went to add to my order? I've marked my granules for ordering. I want to do another search, and I want to add that to my order.... and I want to know their sizes, formats, and media types.
- I hit submit order... I think ... I don't know... I didn't get anything.
- If I'm trying to get out, sometimes (the menubar) says Quit, sometimes Close. Need consistency between screens.

Survey Comments:

- It was unclear to me about what the difference was between the Product Request tool and the ESST. Why do they both exist?
- again problem in that the order boxes for granules did not appear so could never place order
- From what I saw, the product request tool looks good but it seems to be in very preliminary stage. Because price, media option, media format, processing, etc. are NOT shown per orderable item (granule or collection), it's difficult to assess the usability of the tool. Maybe later...
- When this is selected, ESST comes up. This may be the case, but the user expects a different tool. Not clear on how this is different from ESST.
- 2) The Product Request Tool in the Desktop is identical to the Earth Science Search Tool. I presume there will be changes in EP7--this redundancy is unnecessary.

Task 6:

There may be other data collections available through EP6 that would be useful additions to your database. These data collections might not be composed of EOS-data but they might be advertised and available for your use. Submit a search using the Advertising Service for data collections pertaining to vegetation changes that are available for your study site. The coordinates of your study site are - upper left: 78 W, 40 N; lower right: 77 W, 39 N.

When the results are returned select and examine a data Product advertisement.

- Is the information listed on the screen the type of information that you find useful in a data advertisement?
- What additional information would you like to see?
- What information do you think is not necessary?

Usability Notes:

- A close button would be good on the results screen.”- The search tool closed when he closed the results screen.
- Locality type [icon] is not very intuitive
- Tear-off menus are neat.
- Advertising Service didn't work when parameter group was selected in ESST. The window popped up, but nothing was in it.
- Would like to see list of services available for the product in the Advertising Service results screen. Information about project should go at top of screen, contact information at the bottom.
- Show coverage as a map, not just numbers.
- Tried clicking on a close window button and it didn't work.
- Nice icons, look really sharp.
- Entered the lat and longs using “w” and “n”
- having to type in the +/- information is not too much to ask of a user, may want to give the user more information to do that.
- Need help on each field (sensor, parameter, etc.)
- Want to know date of last update for advertisement.

- Want to know the size of the advertised dataset.
- confused as to where the user is within the Advertising Service.
- Close button on ESST would be good.
- Selected Advertising Service from ESST to search for other data.
- Added new attributes to attribute toolbars
- locality type was 10 -day composite, not very intuitive.
- Like the tear-off menus.
- Wanted to find out the definition of “locality type” and “attribute”
- Entered a search “NDVI and Biogeochemical” error message said, did not say where to specify search, went to the ESST Options pull-down.
- Search of “NDVI” returned a list of data.
- Grammar in the Advertising Service not right, “No record__ found that satisfy the criteria...”
- Looking for a list list of services available for thisproduct within the Advertisement.
- The information about the product (attributes) should be at the top, data submitted and contact information at the bottom . Show the coverage of the data as a map, in addition to the lat and long numbers.
- Went to general and entered “data” “vegetation” and “potomac”
- Who will maintain the Advertising Service?
- Why not just use Lycos?
- It is a pipe dream that you’ll be able to keep the links up to date.
- Click to submit advertisement should say, “click to submit search.”
- Not clear how to sue +/- for spatial searches.
- The submit/reset buttons are not aligned.
- Problem with some keys.
- Examined the Index.
- Wants more detail but the contact information is key must have description and contact.
- Not clear which are mandatory on Attribute SSearch.
- Not sure what the valid parameters and sensors are.
- User would prefer not to have the ESST page locked, would prefer to go back and do another search.
- User is concerned about inconsistent results.
- User is concerned about keywords - how and who decide about keywords.
- Inconsistency within the interface terminology.
- Organization/Mission - vague and possibly misleading.
- Metadata needs to answer - who collected, what was collected, where it was collected, when, and why.
- Went to the ESST to access it there.
- Didn’t like the REsults screen tied to the search screen.
- Went to attribute search.
- Inconsistent results with the Advertising Service.
- Operational keyword definition issue.
- Needs to be some guidance for inputting adverts.
- Want platform, instrument and wavelength information.
- Sensor and Instrument mean two different things.
- Interface terminology among tools must be consistent.
- Organization/Mission - is this useful? Can be vague.
- Entered in too specific a search criteria.
- Needs spatial/temporal resolution (1 x 1 degree) (monthly/daily)

- Differentiation between archive contact and producer contact.
- Looks like the level of detail you'd want to see.
- He didn't get any results for his first search. Tried it again but just wanted to go back to his old search form. Couldn't find it, so started new search.
- The Product Advertisement needs spatial and temporal resolution information.
- Differentiate between producer contact and archive contact.
- It is pretty standard ... about the level of detail that I'd want to see.
- User Likes the ability to search for data.
- Want to do general and attribute to make the search smaller.
- Didn't know what a parameter was.
- Want the two searches combined. Want to look at the intersection of the two searches (ESST and ADvert Service).
- Want more informative error messages, " no products found please expand your search."
- Find match in description should be the default
- Had problems with lat/long entry very hard.

Task 7:

Return to the list of results and select a data Product advertisement containing an "EOS-Related" icon. Examine the contents of the advertisement. Install this advertisement on your Desktop/Workbench.

After the item is installed on the Desktop/workbench, access the Comment Survey tool and answer the questions related to the Advertising Service.

Usability Notes:

- Tried to click and drag advertising service icon to workbench to install advertisement.
- Had trouble installing the icon on the Desktop. (Didn't go all the way to the bottom of the windows to see the install button).
- "Help" doesn't tell how to install the icon
- The Advertising Installer window needs a help button.
- The "install" interface was not clear. User didn't know if they were supposed to "do anything,"
- Scale of 1-5 is not enough gradation for selecting answers.
- Other forms of browsing are needed, although the alphabetical index really didn't do the job.
- Would like to do a search and receive results, then submit a second search on just the results list.
- Not really clear on "install" should e "install on desktop."
- "I wouldn't read the manual, not if I can point and click."
- If the link to other services would be fine if it was a note of some kind.
- Maybe tie the definition of the fields to the data dictionary.
- Want the user manual to be available on-line, downloadable.
- The window manager got confused and wouldn't move or close any windows.
- Tried to drag and drop the advertising service icon from 1 km NDVI advert to the desktop.
- The install window needs a help button.
- Tried to find Advertising Service help, finally found it but it wasn't helpful.
- Installed the icon without hesitation.
- Have to clean up the invoke/install
- Maybe have a definition of invoke/install/order on the screen.
- Should have more parameters mapped to each advertisement.

- Hard to install the information is default but it is not clear that the user is supposed to just click "OK". Should be some "warning" that the default is coming up first.
- Information dealing with downloading directories is very detailed and cryptic.
- Not obvious that the default was the Desktop.
- Invoke? not sure
- Clarify the buttons! not sure about what invoke vs install do.
- Not clear what to do, the ECS should just put the icon on the desktop, bypass the whole dialog box thing.
- I have no idea what "invoke" and "Install" mean. Refine the buttons or provide more information.
- There needs to be some information, what is going on? The icon should be installed automatically on the Desktop without asking where ... unless you want to custom install.

Survey Comments:

- In Search Advertising Services, need a way to go onto the next instances. For instance, if you selected 25, there should be a button to retrieve the next 25 instances.
 - Iterative searches should be easy to do. For instance, say you specify too common a word and you realize you have too many matches, it should be easy to "build upon" your search. You should then be able to easily supply another word (it remembers your last search for you. You might then supply another word which supplies no matches and would like to take that one word back and try again. It would be very nice to have the search "remember" for you to minimize the typing that we need to do.
 - There needs to be a way to modify advertisements once you submit them. In attribute search: Dates and lat/long - If they are specified, then the data set must span them completely. I would suggest a subset/span button for each dimension. For instance, if I want data in a certain geographic region, but anytime in the last 5 years, I would want to specify that the data span the lat/long region, but they can be a subset of the time.
 - Need to be able to recognize chemical names (O3) as well as the spelled out version (ozone).
 - A vertical range would be useful too. (Atmospheric temperatures at the surface are of no use to you if you are studying the upper atmosphere).
 - keyword mapping was limited. We used "vegetation" and it didn't find NDVI data collection not obvious when adding to desktop that default file info was desktop
 - When application installed on the desktop, context need to be passed.
- When in the general search screen, and looking to enter spatial parameters, hit the "attributes " button at the bottom, thought this would enable me to enter in additional attributes, like spatial to the search but came up with an entirely new, search screen ability to enter in spatial parameters through the map would be helpful.
- invoke, install buttons need explanation.
 - ability to invoke, install, and order from the advertiser is great functionality.
 - As in the data dictionary which is also a www -based tool, some custom navigation buttons would be extremely helpful. Having the ability to get to the main page from any other page in the advertising service would be good. Now, must use the "back" button which gets tedious.
 - The purpose of the advertising service needs to be clarified w.r.t other Web services.
 - The purpose of the advertising service needs to be clarified w.r.t other Web services.
 - The install function is so unique that it needs to be easier to find and understand within the Advertising service. Perhaps put it near the top of the page, with a sentence explaining what it does.
 - Actually, the advertising service is one part of the ep6 that worked well, probably because it is web based. I couldn't actually answer questions 10-12 above, because I couldn't get the desktop to run long enough to try any of these things...

- Not clear what INSTALL, INVOKE buttons meant.
- Need HELP capability on each field (like Balloon Help).
- Missing Fields like SIZE ESTIMATE, UPDATE.
- Need to search description in attribute search
- Once I learned what an advertisement is, the whole thing turned out to be very useful.
- Of course, I'm biased -
- In the Adv, Service I did a search on the letter 'T'. One of the matches I got was "The 100-km SST Field and Accumulation Files from the NOAA TIROS/NSatellite Series". What word was I getting the match on - "The' or "TIROS"? I don't think I should get a match for "The".
- I did a search on SAR and got a match on "Bermuda Biological Station for Research, Inc.". Why? What does this have to do with SAR.
- Errors in search specification were returned one at a time vs. scanning for all errors.
- Upper left/Lower right not intuitive for Lat Long ... better use was coverage using north/west & south/ease. Lat/Long specification in search tool should match coverage information.
- 13. I think the advertising service is a good idea.
- 3- We inquired about the platform sources of NDVI. Advertisement on NDVI did not have it. We used Data Dictionary (DD) to retrieve that.
- Advertisement tool may be confusing to users in its contents. During most of our search, DD provided the information.
- 4- Concern on the advertisement tool: The users may not differentiate among the quality differences of various ads. Anybody can submit the advertisement with minor modifications to existing algorithms. Suggests different advertisement tools for EOS-standard and non-EOS product ads.
- 5- How to get specific attribute information was not clear to the user. DD was not the first place user would go to get the list of parameters for specific platforms, sensors, sources. As more ads and products are placed, advertisement tool may also be more useful and comprehensive.
- 6- User specified S4-G product for SW flux. To order, we have to access ESST from the main window. Consider creating a link from DD after locating the product. Six other links (other Web links - EP6, Comments, Help ...) were there. ESST and product ordering can be added there, too. (They are X utilities which may be a complication.)
- 3) I used the Advertising Service. When accessing the index, I wanted to search key word "oceans" or "oceanographic" and I pressed the letter "o" on the keyboard. It returned 50 entries. It would have been better if one could type in an entire key word, to cut down number of entries returned. I did go to a particular oceanographic entry and obtained the information. It would be important to have the URL connections, if available, active. I did not attempt more than one access and I am not sure if other entries would have URL connectivity to their home pages.

Task 8:

Access the Trouble Ticketing tool. Submit a description of the problem(s) you encountered during your evaluation of EP6.

After you have submitted your ticket(s) review a list of your ticket(s).

After you have completed the above tasks related to the Trouble Ticketing tool, access the Comment Survey tool and answer the questions related to the Trouble Ticketing tool.

Usability Notes:

- No access to rest of HTML EP6 from Trouble Ticket tool.
- Sufficient information to describe problem requested? Yes for general questions, not for more specific ones. Would like to point M&O to the core dump or saved file which would detail the problem.

Survey Comments:

- When I was filling out my trouble ticket, I hit return to advance to the next box and it submitted my trouble ticket before I was done.
- I found the limitation on how much information you can type in for the description to be insufficient.
- Need some way for submitter to communicate enough details so that a specific problem can be reproduced--i.e. reference some saved search screen, etc.
- I did not explore this feature
- I was unable to use the trouble ticketing system. Apparently the system does not believe I am a registered user (or at least that's the error message that popped up).
- I submitted a trouble ticket. I got a mail message from ARSystem@epserver.GSFC.NASA.GOV saying that my trouble ticket was close with no explanation or solution provided. I then went into EP6 trouble ticketing tool and view my trouble ticket. No explanation or solution was provided there either.
- How do one know why a trouble ticket is closed? There is no confirmation with the users at all.
- I tried to view my previously submitted trouble ticket and it came back with a blank list. I submitted one several weeks ago - what happened to it?
- there was no help in the Netscape display anyway did not bring up any of my trouble tickets, I have about 6 submitted does not let me view all outstanding tt by subject does not let me put in a tt number to look at a specific

Task 9:

Access the User Preferences tool and review the content and features that are customizable. Afterwards, access the Comment Survey tool and answer the questions related to the User Preferences tool.

Usability Notes:

- Not clear what "Default Search File Path"
- Identify which things are user customizable, rather than choices already provided by ECS.
- Customize the spatial entry (West/North vs -/+)

Survey Comments:

- I struggled for quite a while trying to change my browser. It was not apparent to me that you must hit return in order for the information to be changed.
- Need a "Back to default" feature to reload the defaults and ignore my changes. Also, changes in desktop preference would not be saved unless I pressed 'RETURN' after entering my preference.
- I didn't use this tool, but looking at the window, it appeared to be straightforward and easy to use.
- The help is useless as it doesn't tell you the impact of changing the values of particular preferences. For example, when I first brought up ep6, every time I started up the Earth Science Search tool it came up nearly completely off the right side of my screen, causing me to have to be very careful in trying to reposition it. The first thing I thought was, well lets try user preferences to see if I can change the default startup position. Well, user preferences did have

such an option; it did show that the current values were 222,222; but, it didn't give me any clues to the reasonable range of values for my screen, which direction the numbers increased, etc. Looking at help told me nothing further about this issue. I guessed that using 111,111 might be better; but, as far as I can tell this had no impact.

- There weren't too many preferences that I could set.
- The color shown is terrible. You can hardly read the text.

The desktop preference did not get saved unless I actually pressed 'RETURN' after entering the text.

- 8 jdaucs cant read. cant figure out how to make changes stick.
- 7. User preferences - I was not allowed to change much in here.

Task 10:

Access the Comment Survey Tool and answer questions pertaining to the Desktop/Workbench and the General categories.

Usability Notes:

- Not obvious how to return to Main Survey page.
- Weird control keys for mosaic.
- Buy Netscape.
- Iconify Desktop or make it long and skinny.
- "A lot better than EP4." "Two thumbs up." - Robin Pfister.

Survey Comments:

- Need to also put info about service installation in the desktop help, since that is where the service will show up.
- Need better feedback when double clicking button - I wasn't sure if I had activated button or not
- I did not use this
- The initial desktop window size is not big enough to see that there are other tools available. There is no working indication from the time I pressed "Begin" on the login screen to the time the desktop appears.
- 1. When you click on an icon in the Main Menu, you need to have the mouse change so that you know your selection is being processed. Perhaps it would be good to have the user select an icon with only one click of the mouse rather than two clicks.
- 7- Multiple windows began to be confusing. Main icon window was hidden after pulling up others. Many users prefer sequential access, going from one window to another and having the links for that. Try to better organize the windows by creating more links from each. (Others may differ on this topic, having a central menu to access all the windows.)
- 8- Bottom links in DD and other Web windows were too small to read. Include text outside the icon to read.
- 9- Some pages cannot be minimized to icons. For a user using a small screen, this may be inconvenient.
- Found it very difficult to keep EP6 up and running. It seems to fork a process and not close them up when the window closes. Eventually you run out of forks and it crashes. I had it crash many times on my HP with either a bus error or memory fault. I'm not sure if these are related to the forks or not. To experiment with this, I closed all of my windows except for my clock and the terminal session. I then called up EP6 and opened and closed the Advertising services repeatedly. This would crash the system after doing it as few as 4 times. It was not repeatable in that the number of times I needed to open and close the Advertising Services varied, but if I kept at it, I could always get it to crash. Need a busy signal in all places where the user is kept waiting. If it may be a long wait, maybe an

informational screen indicating at least that this could be a long wait. It would be even nicer to have a guess of how long the wait will be if possible. Need a screen that pops up the first time (and every time thereafter until the user indicates they no longer want it).

- This screen should contain a few general comments such as a sentence description for each of the desktop icons. Also, any general suggestions that all users should know should also appear on this page.
- I found the background on the Advertising service window (peach with white dots) made it very difficult to read the text. This MIGHT have been with mosaic. I switched around and I'm not sure when I encountered this.
- I have just entered 1,1,1,1, etc. into the system as a Test of the General function.
- 1. navigation was easy except for when we core dumped.
- 2. once you're in a tool like ESST, then access other tools is difficult - especially if you have several windows open and you cant find your desktop. having an option on the menubar to pop open a list of available tools to select would make for easier navigation and access. (like what's available on the Macintosh).
- 3. colors are okay EXCEPT for when the browse color palette overrides everything - then you cant distinguish items on the screen.
- was not obvious at first how to return to main survey page after iconifying survey buy a Netscape license, stop Mosaic
- EP6 does not work well enough to form an opinion about screens, buttons, color schemes, etc.
- Most of the questions above were answered with a no opinion because frankly, I wasn't able to get ep6 to do ANYTHING (and I mean ANYTHING) consistently. Quite frankly, I've given up trying to use it. This is too bad, because I have always been a strong proponent of ECS; and I feel that this prototype package has really let me down. It is certainly not something I care to have anyone I'm trying to convince that ECS is a worthwhile effort use!
- Having a view of EP6 at this early stage is very useful in bounding the expectations of the participants.
- EP6 is well worth the effort HAIS is putting into it via the incremental track.
- This was my initial access to EP6. I realized I had to read the "Science Scripts" document the next time. Also:
- I checked data dictionary, works fine. I checked for instruments, sensors and received info. Read the ECS newsletter, useful.
- ESST is confusing. After following the scripts, I ordered NDVI as suggested. The response is very slow. I was asked "ftp destination" asking for what directory to put in, was not clear for me. Selected "/users/haldun" on "ecs", after submitting the order, EOSView came up, but we could not trace the files that we ordered. It also asked about my password which made me uncomfortable, since I am in another GUI tool and have no idea where this password is going.
- After submitting from ESST, EOSView came up. The directories did not include any .hdf files.
- There is no indication while waiting for the search. The red outline for GUI is useful. Search needs something similar. But in general, due to slow response, I will try another time.
- Advertising service worked well. I looked at the ads, and the index, and the submission form.
- At this point, I think we have to check EP6 more before the general use. The response time may get better with other hosts in the future.
- My X-window display had dark blue lettering on medium-dark blue background and was difficult to read.
- General Comments:
 - 1) I started EP6 at 11:30 EST and I entered the user ID and password and nothing happened for 5 min. I kill EP6 again and this time it took about 15 sec to bring the EP6 main window.
 - 2) This EP6 main window refreshes itself when I make it the front window in the desktop.
 - 3) The message "Could not open message catalog oodce.cat" is displayed after I started EP6 and also, after I chose the Earth Search Tool.
 - 4) The Help files should be installed locally in the client. It will speed up the application.

- 5) Help does not exist for the Timeline Window. We wanted a description of "Dataset Names" but we could not find help regarding this term. EP6 could add an explanatory window whenever the user wants to know more about some terms in the current window.

- Hi Jan,

Finally got through the beast. I never did get Search Results.

- I accessed EP6 today for testing. I was able to submit a search and order NDVI products. Ordering was successful and I received 2 granules each around 15MB.

- Note: I read EP6 User Scripts, Item 1 says only 1 copy of EP6 can run. How will we be able to restrict the users and inform them of others in the EP6 environment?

- Remote use of this package is at best painful. Our network connection makes it take tens of seconds or more for anything to happen.

- The basic interface seems fine, but what we must have is a *non* interactive method to order and access data. I want my program to do the ordering (and waiting). Ideally, I want an asynchronous way to wait for the data.

Appendix E. List of EP6 Independent Evaluators and Usability Participants

The following people provided valuable suggestions and comments about the design, implementation, and deployment of Evaluation Package 6. In addition, there were 10 people who evaluated EP6 using the EP6 “Guest” account. It is not possible to know who they are, but their comments are appreciated.

Mark Austin	Zuotao Li
Dan Baldwin	Dawn Lowe
John Bates	Chris Lynnes
Bryan Baum	Bill Mankin
Jeanne Behnke	Lise D. Maring
Ellen Chilikas	Ken McDonald
Cheryl Craig	Vickie Ng
John Daucsavage	Daniel Packman
Sue Digby	Liwen Pan
Haldun Direskeneli	Morris Patterson
Ruth Duerr	Manuel Penaloza
Yonsook Enloe	Robin Pfister
Giulietta Fargion	Rogard Ross
Tom George	Sue Sorlie
Paul Hertz	Marti Szczur
Tonjua	Alison Walker
Ben Holt	Ron Welch
Darren	Hank Wolf
Menos Kafatos	Ruixin Yang
Siri Jodha Singh Khalsa	Victor Zlotnicki
Nettie Labelle-Hamer	

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Abbreviations and Acronyms

(Authors should use this as necessary)

ECS	EOSDIS Core System
EP	Evaluation Package
ESST	Earth Science Search Tool
PW	Prototype Workshop
URDB	User Recommendations Data Base

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