Prototype and Evaluation of AutoHelp:
A Case-based, Web-accessible Help Desk System for EOSDIS

FINAL REPORT

Technical Monitors:

Walt Truszkowski, Code 588
Advanced Architectures & Automation

and

Karen L. Moe, Code 505
M.S. 423

NASA Goddard Space Flight Center
Greenbelt, MD 20771

by

Christine M. Mitchell & David A. Thurman
Principal Investigators

Center for Human-Machine Systems Research
School of Industrial & Systems Engineering
Georgia Institute of Technology
Atlanta, Georgia 30332-0205

Contact Information

Mitchell
Phone: (404) 894-4321
Fax: (404) 894-2301
Email: chris.mitchell@isye.gatech.edu

Thurman
Phone: (404) 894-2318
Fax: (404) 894-2301
Email: dave.thurman@isye.gatech.edu
AutoHelp: Demonstration and Presentation

Christine M. Mitchell and David A. Thurman
Center for Human-Machine Systems Research
School of Industrial & Systems Engineering
Georgia Institute of Technology

AutoHelp is a case-based, Web-accessible help desk for users of the EOSDIS. It uses a combination of advanced computer and Web technologies, knowledge-based systems tools, and cognitive engineering to offload the current, person-intensive, help desk facilities at the DAACs.

As a case-based system, AutoHelp starts with an organized database of previous help requests (questions and answers) indexed by a hierarchical category structure that facilitates recognition by persons seeking assistance. As an initial proof-of-concept demonstration, a month of email help requests to the Goddard DAAC were analyzed and partially organized into help request cases. These cases were then categorized to create a preliminary case indexing system, or category structure. This category structure allows potential users to identify or recognize categories of questions, responses, and sample cases similar to their needs.

Year one of this research project focused on the development of a technology demonstration. User assistance ‘cases’ are stored in an Oracle database in a combination of tables linking prototypical questions with responses and detailed examples from the email help requests analyzed to date. When a potential user accesses the AutoHelp system, a Web server provides a Java applet that displays the category structure of the help case base organized by the needs of previous users. When the user identifies or requests a particular type of assistance, the applet uses Java database connectivity (JDBC) software to access the database and extract the relevant cases.

The demonstration will include an on-line presentation of how AutoHelp is currently structured. We will show how a user might request assistance via the Web interface and how the AutoHelp case base provides assistance.

The presentation will describe the DAAC data collection, case definition, and organization to date, as well as the AutoHelp architecture. It will conclude with the year 2 proposal to more fully develop the case base, the user interface (including the category structure), interface with the current DAAC Help System, the development of tools to add new cases, and user testing and evaluation at (perhaps) the Goddard DAAC.
A Web-Accessible "Intelligent" Help Desk

An ESDIS Prototype

Christine M. Mitchell
David A. Thurman
Center for Human-Machine Systems Research
School of Industrial and Systems Engineering
Georgia Institute of Technology

Walt Truszkowski, Code 522.2, Technical Monitor

http://eoshelp.isye.gatech.edu/autoHelp
Overview of Presentation

- Introduction to year 1 goals and outputs
- Demonstration of current AutoHelp prototype
- Description of current AutoHelp architecture
- Presentation of the cognitive model of user requests
- Overview of Case-Based Reasoning to structure AutoHelp knowledge
- Current case structure
- Future Activities
Goal: Use "technology" to meet exponential growth of EOSDIS science data users
AutoHelp

AutoHelp
Web-Accessible
"Intelligent" Help Desk

Technology

Cognitive
Engineering

- Review of COTS Help Desk Software
  - Specify end-to-end help desk system
    - platform-independence
    - COTS components
    - scalable architecture
    - maintainable/extensible case base and case retrieval structure

- Field Study of Current DAAC
- Model of User Help Requests
  - multiple dimensions
  - multiple levels of abstraction
- Case-Based Reasoning
  - cases organizes existing assistance requests
  - indices provide access to previous responses
AutoHelp Screen Layout

Navigator Applet
- Displays case base structure
- Shows links to category information

Web Browser
- Displays assistance information based on assistance category selections
Demo: Scenario 1

- What data is available from the Goddard DAAC?
  - By scientific discipline
  - By mission/spacecraft
  - By specific dataset
Demo: Scenario 2

- How do I order data from the Goddard DAAC?
  - What data is available on which media?
  - What's available on CD-ROM?
  - How do I order a CD-ROM?
Current AutoHelp Architecture
Navigator Applet Architecture

- Java (JDK 1.1.5) & Swing (JFC)
  - platform-independence
  - Swing provides improved performance and usability

- WebLogic Tengah/Kona software
  - database-independent JDBC protocol

- HotJava
  - Future work will include modifications to support use via Netscape and Internet Explorer

- CHMSR Packages
  - Homegrown software packages for easing file input/output, developing useful displays, etc.
AutoHelp

Web-Accessible "Intelligent" Help Desk

Technology

Cognitive Engineering

- Review of COTS Help Desk Software
- Specify end-to-end help desk system
  - platform-independence
  - COTS components
  - scalable architecture
  - maintainable/extensible case base and case retrieval structure

- Field Study of Current DAAC
- Model of User Help Requests
  - multiple dimensions
  - multiple levels of abstraction
- Case-Based Reasoning
  - cases organizes existing assistance requests
  - indeces provide access to previous responses
Preliminary analysis
- 400 email assistance requests to Goddard DAAC

Request Categories
- Data Availability
  - what data are available from EOSDIS?
- Ordering Data
  - how do I order data?
  - cost?
- Data Transfer
  - file transfer/tape reading assistance
- Using Data
  - how do I get what I want to know from the data I have?
- Internal Handling
  - handoffs to other DAACs

Preliminary Categorization of Assistance Requests
- Data Availability: 27%
- Internal Handling: 15%
- Other: 9%
- Data Use: 19%
- Data Transfer: 9%
Case Base
- Cases are prototypical user assistance requests and responses

Case Retrieval Structure
- Case indices defined by model of user assistance requests
- Multiple dimensions (Data Availability, Ordering Data, Data Use, Software Tools, etc.)
- Multiple levels of abstraction (Data Availability: By Discipline: Ocean Color)
AutoHelp Intelligence:
User Support Staff Interface

Intelligence:
- Only answer the same questions once
- Create new user assistance case
- Link help request to existing user assistance cases
- Modify case retrieval structure
Future Activities

- **End-to-End Technology Demonstration**
  - Refine AutoHelp Navigator applet
    - display enhancements
    - applet security
    - multiple browser support
  - Setup AutoHelp for outside access
    - install in the GSFC DAAC, or
    - maintain at Georgia Tech with DAACUSO access
  - Link illustrative user assistance requests to GSFC DAAC Web site and IMS pages

- **Design & Implement DAACUSO Support Staff Interface**

- **Cognitive Engineering Model**
  - Refine model of user assistance requests
    - questions & responses
  - Help to populate illustrative case base entries & case retrieval structure

- **Usability Evaluation**
  - Data collection
  - Data analysis
  - AutoHelp refinement based on evaluation
Question

I am now a member of the NASA/RESTEC ODUS science team and also involved in ODUS instrument design.

So I am very interested in TOMS trend data. Dr. Fumio Hasabe said you have Nimbus 7/TOMS, Meteor 3/TOMS, TOMS/UV Environmental Exposure, TOMS/Reflectivity version 7 CD-ROMS.

I would appreciate it very much if you could send me the above CD-ROMS to the following address. Thank you very much in advance.

Sincerely yours,
Akihiko Kuze
Electro-Optical Systems Department
Space Systems Division, NE Corp.
4038, Ikebe-cho, Tsukubi-ku, Yokohama, 224 Japan

Response from DAACUSO

You can order TOMS 7 CD-ROMS from the following the Goddard DAAC Web page:
User Support Staff (DAACUSO) Interface

Enter the new case

Question

Response

Link it into case base

Case Number

Data Availability

Ordering Data

Data Transfer

Using Data

Enter New Company Type
User Question
I'm having difficulty reading the PAL data tapes I ordered. Do you have any information about how I read them on my Sun workstation with an Exabyte drive?
Thanks,
End User

AutoHelp WebLink Response
http://eoshelp.isye.gatech.edu/autoHelp/nav/html/PalTapes.html
In response to your question:

I'm having difficulty reading the PAL data tapes I ordered. Do you have any information about how I read them on my Sun workstation with an Exabyte drive?

The information you need is now available via the Web at the following location:

http://eoehelp.isye.gatech.edu/aw/html/PalTapes.html

If your mailer supports HTML, the information is appended below.

Sincerely,

Goddard DAAC User Support Office
AutoHelp Support Staff Interface

User Question
I'm having difficulty reading the PAL data tapes I ordered. Do you have any information about how I read them on my Sun workstation with an Exabyte drive?

Thanks,
End User

AutoHelp WebLink Response
http://eoshelp.isye.gatech.edu/autoHelp/navIhtml/PalTapes.html

Category Selection

Data Availability: 
- Each System
- Source
- Program
- Datasets
- New

C2CS:
- Source
- Program
- Datasets
- New

Dataset Details:
- How to order
- Validation Code
- New

Insert Link
Cancel