U.S. GEOLOGICAL SURVEY NATIONAL COMPUTER TECHNOLOGY MEETING: ABSTRACTS AND PROGRAM APRIL 6-9, 1998 ST. LOUIS, MISSOURI

Compiled by Colleen A. Babcock and Sharon B. Mathey

U.S. GEOLOGICAL SURVEY
Open-File Report 98-280

Reston, Virginia
1998

I → III

FOREWORD

The U.S. Geological Survey's (USGS) Ninth National Computer Technology Meeting (NCTM) focused on computer-related activities supporting the mission and objectives of the USGS. Technical presentations addressed the support of event-driven information dissemination during floods, earthquakes, and other national disasters. NCTM '98 included presentations by cooperators and USGS scientists defining the importance of computer-related support during national disasters.

This report contains abstracts presented at the NCTM '98 meeting in St. Louis, Missouri. The abstracts are of technical papers and demonstrations relating actual experiences in support of national disasters, the use of the World Wide Web for dissemination of data, system administration techniques, and new technology currently being evaluated in USGS.

Extensive training continues to be a major part of the National Computer Technology Meeting. Five topic tracks for training were conducted at this meeting, including World Wide Web, telecommunications, NT system administration, Unix system administration, and programming. The training courses were presented as focused tracks, building from introductory level to detailed, advanced courses.

Colleen A. Babcock
Technical Coordinator

CONTENTS

PROGRAM

NCTM `98
"Building the Gateway to Earth Science Information"
April 6-10, 1998
Adam's Mark Hotel
Fourth and Chestnut
St. Louis, Missouri 63102

Monday, April 6, 1998

8:00 - 9:30 a.m. Keynote Session

Moderator - Colleen Babcock, WRD, Tucson, AZ

Welcome
Loyd Waite, Asst. District Chief, Rolla, MO

The System Administrators Role,
Gloria Stiltner, WRD, Reston, VA

Supporting Information Dissemination,
Susan Trapanese, WRD, Reston, VA

Introduction of Keynote Speaker,
Lewis Wade, WRD, Reston, VA

Keynote Speaker
Keng Lim, Vice President & General Manager
Application Servers & Tools,
Netscape Corporation

10:00 -11:30 a.m. Hazards Session

Moderator - Graig McHendrie, WRD, Menlo Park, CA

Introduction of Guest Speaker
Loyd Waite, Asst. District Chief, Rolla, MO

A Cooperator's Insight
Colonel Michael L. Brown, Assistant Director
Louisiana State Office of Emergency
Preparedness' Operations/Communications Division,
Baton Rouge, LA

The Global Disaster Information Network,
Peter L. Ward, GD, Menlo Park, CA

Network Partnering In Support Of Governmental
Hazards Mitigation Programs,
Carol Lawson, OPS, Menlo Park, CA

1:00 - 2:30 p.m. Plenary Session

Moderator - Susan Trapanese, WRD, Reston, VA

Displaying Real-Time Hydrologic Data on the Internet During the 1997 Flood in the Red River of the North Basin, North Dakota,
Russell E. Harkness, Gregg J. Wiche, and
Douglas G. Emerson, WRD, Bismarck, ND

Using the Internet to Distribute Live Seismic Data from the Global Seismographic Network
Robert L. Woodward, GD, Albuquerque, NM, and
Scott Halbert, Allied Signal Technical Services
Corporation, Albuquerque, NM

The Louisiana HydroWatch: Merging Real-Time Technologies into a Statewide Flood Monitoring Network,
Brian E. McCallum, WRD, Baton Rouge, LA;
Presented by Scott Beddingfield, WRD, Baton Rouge, LA

A Mirror Site for Near Real-Time Hydrologic Data in Texas
Dane J. Ohe and Willard J. Gibbons, WRD, Austin, TX

3:00 - 5:00 Plenary Session (continued)

Moderator - Scott McEwen, WRD, Denver, CO

3:00 - 3:20 p.m. Delivering Real--time Information to the Specific People at Risk,
Peter L. Ward, GD, Menlo Park, CA

3:20 - 3:40 p.m. A Case for Centralized Web Services
Harvey Fleet, BRD, Denver, CO

3:40 - 4:00 p.m. The Use of Architectures and Automated Tools to Improve Enterprise Monitoring and Management,
Michael M. McGreer, OPS, Reston, VA

4:00 - 5:00 p.m . Plans for NWIS Development and Data Delivery on the Web
Q&A with NWIS Staff
Alan Lumb, WRD, Reston, VA

Tuesday, April 7, 1998

Training Sessions

Morning Training Tracks: 8:00 a.m. - 12:00 noon

Web Track

Java Programming for Traditional Programmers*
Pat Rael, WRD, Reston, VA
*Pre-requisites: Minimal programming or shell script writing

Unix Track

System Administration, Part 1 (4 hours)
Non-DG/UX (Irix, Linux, Solaris)
Shawn Noble, WRD, Iowa City, IA, Scott McFarlane, WRD, Denver, CO,
Dan Winkless, WRD, Albuquerque, NM
-- Post-installation tuning
-- Users
-- File systems

Telecommunications Track

Latest in LAN Design, Switching, & Troubleshooting
Patty Damon, OPS, Denver, CO, and
Barbara Gilroy, OPS, Reston, VA
Latest in LAN Troubleshooting and Performance Software Tools
Network General Engineer

NT Track

Microsoft / Comp USA Presentation
Jon Waechter - Comp USA Educational Representative
Merrill Schebaum - Microsoft, St. Louis, MO
-- MCSE Program
-- NT Futures
Comp USA NT Administration Training - Part 1
Steve Austin and Jon Waechter, Comp USA MCSE
-- Network Basics (tcp/ip, smb)
-- NT Security

Afternoon Training Tracks: 1:00 - 5:00 p.m.

Web Track

Using Server-side Includes for Web Automation
Mary E. Powell, OPS, Reston, VA
Ask a Webmaster ("Town Meeting" w/Panel)
Gary Fisher, WRD, Baltimore, MD

Unix Track

System Administration, Part 2
Non-DG/UX (Irix, Linux, Solaris)
Shawn Noble, WRD, Iowa City, IA,
Scott McFarlane, Denver, CO,
Dan Winkless, Albuquerque, NM
-- Printers
-- Security

Telecommunications Track

Cisco Presents the Latest in Ethernet
LAN Switching Technology,
Mark Peters, Cisco
Netscape 102: Configuration
Pat Rael, WRD, Reston, VA

NT Track

Comp USA NT Administration Training, Part 2
Steve Austin and Jon Waechter, Comp USA

Wednesday, April 8, 1998

Training Sessions

Morning Training Sessions: 8:00 a.m. - 12:00 noon

Web Track

Introduction to VRML 97
Kevin Laurent and Maura Hogan, OPS, Reston, VA

Programming Track

Perl Programming (Part 1)
Jim Bisese, WRD, Austin, TX, and
David Boldt, WRD, Reston, VA

Telecommunications Track

WAN Monitoring and Troubleshooting-- We answer some of your most common questions concerning the DOInet and WRDnet WAN.
Greg Tepe, Cabletron Systems,
Jim Morris, Lawrence, KS, and Bob Wakelee, Reston, VA

Using ISDN for Remote Access-- Where and how to use ISDN from home and telecommuting.
Sunday Glover-Cox, GD, and Daphne Chinn, WRD, Reston, VA

NT Track

Upgrade Information on NCD's Wincenter 4.0 Hydra NT 4.0
Roger Koby, NCD District Sales Manager
Hien Ngo, NCD Senior Systems Engineer

Advanced NCD WinCenter NT Pro Configuration
Bruce MacInnis, NCD Educational Representative

Afternoon Training Tracks: 1:00 - 5:00 p.m.

Web Track

Using iHTML to Develop Web Applications
Mary E. Powell, OPS, Reston, VA

Mastering a Website -- A Birdseye View
Lorna Kendrix, WRD, Reston, VA

Programming Track

Perl Programming - (Part 2)
Jim Bisese, WRD, Austin, TX, and
David Boldt, Reston, VA

Telecommunications Track

Using and configuring Remote Dialup Access using SLIP & PPP
Mark Sweny, WRD, Atlanta, GA

RAT Panel: Latest on Bureau Remote Access Project
Carol Lawson, OPS, Menlo Park, CA,
Patty Damon, OPS, Denver, CO, and
Bob Wakelee, WRD, Reston, VA

NT Track

Internet Information Server
Chuck O'Hara, WRD, Pearl MS

Integrating UNIX and Windows in the USGS:
Providing Windows Networking Services from UNIX Servers
-- Methods of Sharing UNIX Files and Printers
(PC/NFS and Samba)
Liz Waechter, WRD, Austin, TX
-- Configuring LPR Network Printing on NT
Sam Martinez, WRD, Denver, CO
-- Configuring NT 4.0 Workstations to Authenticate
UNIX NIS Users Via the NISGINA Program
Sam Martinez, WRD, Denver, CO

Thursday, April 9, 1998

8:00 - 9:30 a.m. Web Development Tools
Moderator - Merritt Blalock, WRD, Reston, VA

Customer Requested Sample Reanalysis andVerification System at the
National Water Quality Laboratory
Thomas J. Bushly, WRD-NWQL, Arvada, CO

A Perl5 Data Base Interface Tool For Ingres
John P. Crisci, WRD-NWQL, Arvada, CO

Online Tools for the National Biological Information Infrastructure
Harvey Fleet, BRD, Denver, CO

A Paperless Method for Collecting Responses from Many Locations:
An Experience with a Web-based Questionnaire
Kenneth A. Skach, WRD, Portland, OR

8:00 am - 9:30 am System and Data Management
Moderator - Jim Bettandorff, WRD, Norcross, GA

Data Management - A Life Cycle Approach
Raymond C. Obuch, David A. Ferderer, and William S.Larson, GD, Denver, CO

Server-Clustering Technology for Supporting Mission-Critical Data and Applications
Charles G. O'Hara and Gail E. Kalen, WRD, Pearl, MS

Year 2000: Issues, Concerns, Strategies
Fred Travnicek, OPS, Reston, VA

The Future of Directory Services at USGS
Kevin W. Laurent, OPS, Reston, VA

10:00 -11:30 a.m. Web Development Tools - Continued
Moderator - Mark Negri, WRD, Reston, VA

Implementation of a World Wide Web-Based Problem Reporting and Tracking System
James R. Kirk, WRD, Reston, VA

Change-Request Management System for Software Engineering
Jennifer A. Willems, Hughes STX, EROS Data Cente, Sioux Falls, SD

Walk through Your Data: Using VRML to Create 3-D Scientific Visualizations
Maura J. Hogan and Kevin Laurent, OPS, Reston, VA

Providing Public Access to Ecological Information
Norman W. Hildrum and Linda E. Leake, BRD, Onalaska, WI

10:00 am -11:30 am Web Products
Moderator - Kathryn Gunderson, OPS, Reston, VA

Internet Access to U.S. Geological Survey Geospatial Data and Images
Donna K. Scholz, OPS, Reston, VA,
Dale A. Johnson, Kevin Lowell, and
Karla K. Sprenger, Hughes STX Corp, EROS Data Center, Sioux Falls, SD

Data Bases on the World Wide Web: A Case Study of the Biological Quality
Assurance Unit of the National Water Quality Laboratory
Sandra L. Turner and Allison R. Brigham, WRD-NWQL, Arvada, CO

Global Land Information System: Providing a Gateway to
Geospatial Information in a Web Environment
Karen M. Zanter, Hughes STX Corp., USGS EROS Data Center, Sioux Falls, SD

Interactive Digital Publications: Development Issues
Kenneth I. Takahashi, GD, Denver, CO

1:00 pm - 2:30 pm General Session
Moderator - Tom Wood, WRD, Reston, VA

USGS Energy Resources Program Decision Support System
Marc Levine, GD, Reston, VA

Development of a Web Site to Present a Three-Dimensional Ground-Water-Flow Model
Pete deVries, Paul E. Misut, and Jack Monti Jr., WRD, Coram, NY

Development of a National Biological Information Infrastructure,
Frank D'Erchia, BRD, Denver, CO, Anne Frondorf, BRD, Reston, VA, Maurice Nyquist, Susan Stitt and Gary Waggoner, BRD, Denver, CO

Development of a web-based map browser for the National Atlas of the United States
Bruce E. Wright, Deborah A. Cruse, Steven Kambly, NMD, Reston, VA and Brigitta Urban-Mathieux, WRD, Reston, VA

3:00 - 5:00 p.m. A Town Meeting
Moderator, Gloria Stiltner, WRD, Reston, VA

1. Information Council Activities - *Lew Wade*
2. Status of USGS Infrastructure Activities - *Lew Wade*
3. NT Training and the Certification Process, Career Growth for SA's - *Scott McEwen*
4. The Vision and the Transition for Computer Hardware and Software in WRD - *Gloria Stiltner*
5. ESRI Futures - *Mark Negri*
6. Futcom3 Activities - *Graig McHendrie*

Friday, April 10, 1998

8:30 a.m. -12:00 noon Computer Specialists Meeting

Northeastern Region -- *Merritt Blalock*
Southeast Region -- *Jim Bettandorff*
Central Region -- *Scott McEwen*
Western Region -- *Graig McHendrie*

12:00 noon MEETING ADJOURNED

Customer-Requested Sample Reanalysis and Verification System at the National Water Quality Laboratory

***Bushly**, Thomas J., USGS, National Water Quality Laboratory, 5293 Ward Rd. Arvada, Colorado 80002*

The U.S. Geological Surveys National Water Quality Laboratory (NWQL) has designed a new Customer Reanalysis Request (CRR) system using Ingres Windows 4GL application development software and Ingres Application-by-Forms (ABF) software. CRR was developed to consolidate the customer reanalysis process into the Laboratory Analytical Data System (LADS) and to replace an aging, obsolete system. Customers use a World Wide Web (WWW) interface to request a sample reanalysis or verification, which allows for direct processing of requests into the LADS data base and subsequent verification, processing, and reporting. The author describes the development of the WWW interface, the connection between the WWW interface and the LADS data base, the internal NWQL CRR application, and communication with customers.

A Perl5 Data Base Interface Tool for Ingres

***Crisci**, John P., USGS, Box 25046, MS 407, Denver Federal Center, Lakewood, Colorado 80225*

Data Base Interface-Ingres (DBI-Ingres) is a library of generic functions and variables for Perl that allows a user to connect to, query, insert into, delete from, and update an Ingres data base. The DBI is an Ingres Application Programming Interface (API) that requires one or more specific data-base drivers to communicate with a data base.

Data Base Driver-Ingres (DBD-Ingres) is an Ingres interface for Perl5 using DBI to access an Ingres data base. The DBD is the driver which is installed prior to installing the DBI. At the present (1997) time, drivers are available for Ingres, Oracle, Msql, Informix, and Sybase to name a few.

Practical and basic building-block examples to access, select, display reports, and update an Ingres data base are provided, along with information on requirements for installation, where to find useful information, and additional World Wide Web DBI-Ingres points of contact.

Development of a National Biological Information Infrastructure

***D'Erchia**, Frank, USGS, BRD, P.O. Box 25046, MS 300, Bldg. 20, Denver, Colorado 80225;*
***Frondorf**, Anne, USGS, BRD, MS 300, 12201 Sunrise Valley Drive, Reston, Virginia 20192;*
***Nyquist**, Maurice, USGS, BRD, P.O. Box 25046, MS302, Denver, Colorado 80225; **Stitt**, Susan, USGS, BRD, P.O. Box 25046, MS 302, Denver, Colorado 80225; and*
***Waggoner**, Gary, USGS, BRD, P.O. Box 25046, MS 302, Denver, Colorado 80225*

The U.S. Geological Survey is leading a broad cooperative effort to develop a National Biological Information Infrastructure (NBII). The NBII (HOT LINK www.nbii.gov) is a distributed electronic federation, through which biological data from a variety of sources including Federal and State government agencies, universities, natural history museums, private organizations, and others, is made more available for retrieval, integration, and application to resources management issues. In addition to making progress in supporting greater access to valuable biological data, the NBII program is successfully promoting the development and use of new standards that make it easier to describe and exchange these data. This includes the development of a biological "profile" of the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata that increases the utility of this standard for documenting biological data. Use of this standardized way of describing biological data makes it easier for biological scientists and other interested users to compare and contrast among many different biological data sources. It will also help to broaden the understanding and implementation of the FGDC geospatial metadata content standard within the biological sciences community. The NBII program has implemented a prototype NSDI/FGDC-compliant Clearinghouse node, which also incorporates searching capabilities on the extended "biological metadata" fields. This capability is being implemented initially on a node operating at the USGS Environmental Management Technical Center, with the expectation that this type of "biologically enhanced NSDI Clearinghouse node" could be implemented by other USGS offices and by NBII/NSDI partners and cooperators. The NBII program has also developed a pc-based software tool ("MetaMaker") which supports production of metadata in compliance with the FGDC geospatial metadata standard and the biological "profile" of the FGDC standard. The NBII program is also supporting the development of and utilizing the Integrated Taxonomic Information System (ITIS) as an authority file for scientific names to further support biological data exchange and integration. ITIS is the first national database of standardized nomenclature for U.S. plant and animal species. Having online access to this standard reference makes it possible for biologists to share data, even where their respective data sets may apply a different name to the same species.

These innovative components of the NBII program are discussed in the context of how improved access to and sharing of biological data benefits scientists.

Online Tools for the National Biological Information Infrastructure

Fleet, Harvey, USGS, BRD, MS 302, P.O. Box 25046, Denver, CO 80225-0046

In building the National Biological Information Infrastructure, the USGS is endeavoring to help people discover and apply biological data and information for managing and using the Nation's biological resources. To meet these goals, we are providing the NBII with tools to help people analyze and understand biological information. The approach involves placing tools on line for both specific and generic analysis of biological systems. The goal is to allow people, through the NBII and the World Wide Web, to apply online tools to the analysis and interpretation of biological data - either their own or those of others--without having to download, implement, and run the tools at their own sites. This approach supports a growing contemporary use of the World Wide Web for applications rather than only for providing access to data and information. In this paradigm people visit sites to perform analyses, such as with the National Atlas, in contrast to merely reading information or gathering data. Potential applications of this approach are unlimited and include ecological models, visualizations, simulations, forecasting, and decision support.

In time we hope through the NBII to serve a collection of online tools for various purposes.
Several prototype online tools will be demonstrated.

Displaying Real-Time Hydrologic Data on the Internet During the 1997 Flood in the Red River of the North Basin, North Dakota

***Harkness**, Russell E., USGS, WRD, 821 East Interstate Ave., Bismarck, ND 58501-1199;*
***Wiche**, Gregg J., USGS, WRD, 821 East Interstate Ave., Bismarck, ND 58501-1199; and*
***Emerson**, Douglas G., USGS, WRD, 821 East Interstate Ave., Bismarck, ND 58501-1199*

Record floods devastated many communities along rivers and streams in the Red River of the North Basin in North Dakota and Minnesota during the spring of 1997. Record-breaking snowfall over much of the region during the winter of 1996-97 along with added precipitation from a late-spring blizzard on April 5-6, 1997, caused the worst flooding in several areas in more than 100 years. The 1997 flood also was the first major flood during which real-time data were displayed on the Internet by the North Dakota District of the U.S. Geological Survey. During April, more than 400 discharge measurements were made at 53 gaging stations in the Red River of the North Basin. The most recent 7-day hydrographs of river stage and discharge for 37 of the 53 gaging stations were displayed on the Internet, and tabular listings of discharge measurements for all 53 gaging stations were updated twice daily. Other information displayed included rating tables of the stage/discharge relation for each of the stations, discharge hydrographs showing the relation of current conditions to conditions that occurred during the previous 18 months, and a flood-tracking chart comparing current river stages to river stages that occurred during the five highest previous floods. Although data displayed on the Internet were accompanied by the usual disclaimer indicating the data were provisional and subject to review, many Federal, State, and local water managers, emergency operations center staff, and the public made real-time decisions using the data.

During April, 588,000 hits, nearly a tenfold increase from the previous month, were made to the North Dakota District Homepage. The time required to provide quality assurance of the information displayed on the Internet placed a large burden on office personnel during the flood, and by mid-April, about halfway through the critical flood period, it was apparent that available staff did not have time to assure the quality of the data for all gaging stations. Thereafter, data were updated for the key gaging stations only although none of the stations were taken off-line. On the basis of these experiences, parts of the District's flood plan are being modified to meet water-users' expectations of the hydrologic data displayed on the Internet, and we are seeking ways to easily indicate the level of quality assurance given to data displayed.

Providing Public Access to Ecological Information

***Hildrum**, Norman W., USGS, Environmental Management Technical Center, Onalaska, Wisconsin 54650; **Leake**, Linda E., USGS Environmental Management Technical Center, Onalaska, Wisconsin 54650*

On a global scale, the volume of data and information on any particular topic is growing at a staggering rate. Our ability to assimilate this "mother lode" of knowledge is actually hampered by the sheer volume of data and information available. Futurist John Naisbitt, author of Megatrends and Megatrends 2000, maintains that *We are drowning in information, but starved for knowledge.* This world-wide data and information "explosion" is quickly leading many to realize that improved procedures and tools must be developed and implemented if we are to effectively organize, catalog, store, retrieve, and disseminate huge volumes of collected data and information. In support of that notion is Paul Saffo of the Institute for the Future, in Menlo Park, California, who says *Information overload is not a function of the volume of information out there. Its a gap between the volume of information and the tools we have to assimilate that information into useful knowledge.* Vice President Al Gore maintains *We now hold around the world an incredible wealth of information about the Earth and its inhabitants. That information could have a profound impact on our ability to protect our environment, manage natural resources, prevent and respond to disasters, and ensure sustainable development. . . . Unfortunately, many potential users either do not know that it exists or do not know how to access it.*

Data clearinghouses, which employ standardized approaches to data management and can be accessed via the World-Wide Web, bring some order to this problem. This paper outlines the nature and extent of the Environmental Management Technical Center's data clearinghouse that provides public access to ecological data and related information.

Walk Through Your Data: Using VRML to Create 3-D Scientific Visualizations

***Hogan**, Maura J., USGS, OPS, 12201 Sunrise Valley Drive, MS 807, Reston, Virginia 20192 and **Laurent**, Kevin W., USGS, OPS, 12201 Sunrise Valley Drive, MS 807, Reston, Virginia 20192.*

Scientists have always struggled with finding an appropriate vehicle to permit analysis and rapid modification of models simulating physical properties. With the emergence in the recent past of better tools for scientific visualization, the scientist's ability to visualize his model has increased. However, the interactive environment necessary to change the model rapidly or to view the model in ways not predetermined by the visualization specialist has not been enhanced by the advances in scientific visualization. Virtual Reality Modeling Language (VRML 2.0) is a new environment for both modeling and visualizing 3-D spaces. We are using VRML as a tool to allow scientists to represent data sets and physical models in a 3-D environment and to interact with and navigate through the resulting information space. Working with volcanologists from the Geologic Division, we have developed a model that uses a large collection of earthquake hypocenters to track magma flow within the structure of a volcano. This paper will present the model, findings about the process, and evaluations of the technologies used. Interface design and human-computer interaction theories will also be discussed in relation to VRML as a scientific visualization tool.

Implementation of a World Wide Web-Based Problem Reporting and Tracking System

Kirk, James R., USGS, WRD, 12201 Sunrise Valley Drive, MS 450, Reston, Virginia 20192.

The U.S. Geological Survey (USGS) has recently converted the National Water Information System (NWIS) from the PRIME-based minicomputers to a UNIX-based workstation/server environment. The NWIS Conversion Team needed a process to collect, track, and archive software problem reports (PR's) or change requests during systems testing and installation. A World Wide Web (Web) based interface to the Free Software Foundation's GNU's Not UNIX (GNU) GNATS Problem Report Management System was implemented within the UNIX and Ingres environments. The NWIS PR System, available in August 1996, provides the means to submit, review, and edit PR's and create summary status reports about existing PR's.

The NWIS PR System enhances communication among developers, testers, and users of the converted NWIS, by allowing them to enter or check the status of PR's using a Web Browser such as Mosaic, Netscape, or MS Explorer. The NWIS PR System automatically files incoming problem reports, notifies responsible persons of the existence of the problem, sends an acknowledgment to the submitter of the PR that the report was received, and makes these PR's accessible to queries and editing. Designed for use at a site that handles many problems through e-mail, the NWIS PR System maintains PR's in the form of text files with defined fields. Each PR is a separate file within a main repository, with editing access to the database limited to the originator and the responsible persons. Anyone with internal Web access, however, may submit, view, or produce report summaries of PR's by accessing the following URL: http://wwwnwis.er.usgs.gov/cgi-bin/gnats_home.pl.

Several options are available on the Web forms. Any user, developer, or manager may submit new PR's, view existing PR's, and query the PR database. Once a problem is recorded in the database, work can begin toward a solution. A problem's initial State is open. An acknowledgment is e-mailed to the originator of the PR, and copies of the report are forwarded to the person(s) responsible for resolving problems in that category. Responsibility for a given PR depends on the category of the problem. If a PR is neglected for 40 working hours, a reminder is e-mailed to the responsible person automatically. If the subject line of the e-mail notification is used and the gnats e-mail address is added to the recipient list, any further e-mail communications are automatically appended to the PR's audit trail. When a problem has been analyzed and the work has been assigned, the manager changes the PR's State to assigned. After a solution for the PR is found and implemented, the PR's State is changed to feedback. Each time the State of a PR changes, the submitter of the PR is notified of the reason for the change. If the person responsible for the PR is changed, the previous responsible person and the new responsible person are notified. The change and the reason for the change are also recorded in the audit trail field of the PR. When the originator of the PR confirms that the solution works, the State is changed to closed.

Domains were added in the latest revision to allow the reporting system to be used by many groups. This revision includes more than 285 categories for the domains of Distributed Information System (DIS), Hydrologic Analysis Support Section (HASS), NWIS, and Surface-Water Data Retrieval (NWIS-WEB). A domain is selected on the first Web page of the PR System. A parser also can be used to direct incoming e-mail addressed to "*_help" into the PR System; the PR is then forwarded to the support staff. Additional search options were added, which include: Search by Date, Severity, Priority, and/or Class of the PR. The Problem Reporting System ensures that problems or change requests are not ignored, but instead are resolved and documented.

The Future of Directory Services at USGS

Laurent, Kevin W., USGS, OPS-OIS, 12201 Sunrise Valley Drive, MS 807, Reston, Virginia 20192

First generation online directories were not much more than computerized phone books. Built upon this foundation, a new class of directory servers has emerged. These servers have the capability to tie together information about all of the enterprise resources: personnel, network hardware, services, and scientific and administrative documentation. The Directory Services Team (DST) is an interdivisional working group investigating the use of directory service technology both within the U.S. Geological Survey and Department of the Interior. This paper presents the recent work of the DST and will highlight the advanced features of directory services and provide examples of innovative applications that are using the new technology.

Network Partnering In Support of Governmental Hazards Mitigation Programs

Lawson, Carol, USGS, OPS, 345 Middlefield Road, MS 870, Menlo Park, CA, 94025

Many governmental agencies have hazards research and real time warning programs among their mission critical activities. The USGS has built partnerships with many of these agencies where expertise, information, and technological resources are complementary to each other. Networks form the backbone infrastructure upon which specialized information and data are exchanged in real time. This talk will address some of the network partnerships that have been cultivated between USGS and the National Weather Service, DOD Civil Defense agencies, the Pacific Disaster Center, and the NASA Ames Research Center in the interest of meeting the requirements for a reliable information infrastructure while minimizing cost and duplication of effort to each partner. Also addressed will be the negotiations underway with NOAA's Tsunami Warning Center and the Defense Research and Engineer Network Consortium to continue to build upon this critical nationwide information infrastructure in support of public safety and hazards mitigation programs at the USGS and these other agencies. Successes and problems encountered with forming and maintaining these partnerships will be discussed.

USGS Energy Resources Program's Decision-Support System

Levine, Marc, USGS, GD, 956 National Center, Reston, Virginia 20192

The USGS Energy Resources Program is developing an interactive Decision Support System (DSS), that will make available, via the Internet, map coverages and datasets required for decision making on energy related issues. This system will integrate various databases of USGS scientific investigations with state-of-the-art digital and Internet capabilities to provide a scientific Decision Support System comprising comprehensive National geospatial coverage and Internet accessibility for rapid analysis of emerging issues. The DSS will include capabilities for user-driven GIS (geographic information system) mapping and user-defined queries of coverages and active, production databases which will be linked from several sources.

The USGS Energy Resources Program Decision Support System initially will focus on GIS and database coverages required for making decisions regarding land- management and environmental issues related to energy resources. The primary coverages will include USGS maps and data that convey the results of energy resource assessments (oil, natural gas, and coal) and that characterize energy resource attributes that affect both energy resource utilization and environmental impacts of energy resource extraction and use (coal quality and chemistry, oil and natural gas chemistry, and chemistry of water produced with oil and natural gas). Although these data are created in different formats, they will be compiled into a common format for the DSS.

In addition, selected non-USGS digital map coverages, and related information will be included as essential complementary data. These datasets will include surface and subsurface land ownership, land-use coverage, biological information (e.g., endangered species habitats), and major transportation systems (railroads, pipelines and major highways).

Future capabilities of the DSS will provide statistical analysis and more complex modeling of selected data coverages to customize the output for the user.

The Louisiana HydroWatch: Merging Real-time Technologies into a Statewide Flood Monitoring Network

McCallum, Brian E., USGS, WRD, 3535 S. Sherwood Forest Blvd., Baton Rouge, LA 70896,

Presented by ***Scott Beddingfield****, WRD, Baton Rouge, LA*

During the past four years, the U.S. Geological Survey (USGS) has been involved in the ongoing design and installation of a statewide, real-time flood-monitoring network in Louisiana. This network, called the Louisiana HydroWatch, uses satellite and VHF transmitters at over 200 gaging stations located throughout the State to relay the latest hydrologic data to the USGS office in Baton Rouge. Data collected include water level, precipitation, wind speed and direction, and water-quality parameters, such as water temperature. The data are received, verified, and promptly disseminated using the Internet, facsimile (fax), and voice message. During possible flooding conditions, data are used by the news media, emergency officials, and the general public to make informed decisions concerning public safety.

The Louisiana HydroWatch is being developed through a unique partnership between the USGS and other Federal, State, and local agencies. Representatives from all interested agencies are involved in the design phase so that all data collection needs could be addressed. Funding for new stations has been generated by designing the network using a multi-functional approach so that data from a single station is used for multiple purposes. For example, data used in times of flooding to alert the public about potential safety threats are also used during normal conditions for purposes such as drainage studies, coastal restoration efforts, and long-term data collection.

Different from many established flood-warning networks, most of the gaging stations use telemetry through a reliable satellite network. The transmitters are programmed to transmit data on a 4-hour interval during normal conditions, and every fifteen minutes when pre-set thresholds are exceeded. In addition to the satellite telemetry, modem redundancy is used for more reliable data accessibility. Modems provide the capability for local cooperators to access the data automatically by computer base stations at their offices. Redundancy measures, such as backup power supplies, are implemented where possible during the data acquisition, verification, and dissemination processes to ensure that the data are available when it is most critically needed.

The dissemination of the data and ongoing public awareness campaign are primary goals of the Louisiana HydroWatch. After prompt verification, data are disseminated through the use of state-of-the-art Internet capabilities, automated fax distribution, and recorded voice messages. Data from stations located in the Amite River Basin can be used with a flood tracking chart to track rising river stages and to compare with historical flood data and the elevation of a property, to help the local citizen decide whether to stay or to evacuate.

Future plans for the Louisiana HydroWatch include the automation of fax and voice message delivery systems, upgrading the quality and timeliness of the Internet web page, and pager notification of threshold exceedence. More detailed integration of forecast and warning information from the National Weather Service (NWS) into real-time products released by the USGS is being designed. The upgrading and addition of gaging stations is continually being pursued on a project-by-project basis. Flood tracking charts, similar to the Amite River Basin Flood Tracking Chart, are currently being designed for the major drainage basins throughout Louisiana.

The Use of Architectures and Automated Tools to Improve Enterprise Monitoring and Management

McGreer, Michael M., USGS, OPS, 12201 Sunrise Valley Drive, MS815, Reston, Virginia, 20192

This paper addresses the architectures and automated tools necessary to ensure a U.S. Geological Survey Enterprise Information Infrastructure by the year 2002. The architecture will drive the development of the Enterprise Information Infrastructure. Automated tools are necessary to ensure that the infrastructure support real-time, secure, reliable, and cost-effective information sharing among users anywhere in the world.

Development of a Web Site to Present a Three-Dimensional Ground-Water-Flow Model

Misut, Paul E., 2045 Route 112, Bldg. 4, Coram, NY 11727 and Monti, Jack Jr., 2045 Route 112, Bldg. 4, Coram, NY 11727

Presented by ***Pete deVries***

A web site was developed to present a transient-state, three-dimensional, finite difference ground-water-flow model, which was constructed in cooperation with the New York City Department of Environmental Protection to evaluate water-supply alternatives. The web site presents (1) geographic information system (GIS) coverages of topography and land use, (2) stress configurations, hydrogeologic layering, and simulated responses generated by the model, and (3) photographs showing area features and fieldwork.

The web site was designed with the goal of ease-of-use with a laptop computer in a "stand alone" mode or connected to the internet. A prominent "next" button takes the user through a sequence of pages that provide background information necessary for comprehension of the conclusions; the pages also contain links that allow exploration of related topics. Each page contains an image-index button for access to the entire set of pages.

Graphic interchange file (GIF) animations were designed to display the month-by-month response of the ground-water system to hypothetical pumping scenarios. Ground-water-flow model results in the form of a binary cell-by-cell and time-step-by-time-step water-level distribution file were processed by a C program and then input into IBM Data Explorer1 (DX). DX provided adequate tools to view animations on screen; however, generation of GIF files entailed saving a numbered series of animation frames, then reformatting and concatenating. Parts of a large GIF movie were cut and pasted by using PC shareware to create final animations for inclusion in the web site.

Data Management - A Life-Cycle Approach

***Obuch**, Raymond C., USGS Central Region Energy Team (GD) Box 25046 MS 939, Denver, CO;*
***Ferderer**, David A., USGS Central Region Energy Team (GD) Box 25046 MS 939, Denver, CO 80225;*
***Larson**, William S., USGS Central Region Energy Team (GD) Box 25046 MS 939, Denver, CO 80225*

The U.S. Geological Survey's Central Region Energy Team, an administrative component of the Energy Resource Surveys Program, is charged with pursuing domestic and international energy resource assessments. The Central Region Energy Team conducts research in non-renewable resources such as coal, natural gas, oil, and gas hydrates using a wide variety of computer applications and scientific methodologies. The computer software tools and scientific methods involve the use of analytical lab equipment, computer hardware and software, and network infrastructure. The computer hardware includes client/server and desktop architectures such as X-terminal and 1Sun Solaris (Unix) as well as 1 Windows NT, 1Windows 95, and 1Macintosh. Unix server-based software tools include seismic processing, subsurface modeling, and Geographic Information Systems (GIS) packages as well as client/server Oracle database applications. Desktop computer applications include various word-processors/desktop publishers, spreadsheets, Geographic Information Systems, desktop database management systems, and geologic modeling packages.

In response to the increased demand for digital products by our customer base, the Central Region Energy Team has increased its output and variety of digital products. Digital products have outpaced most of the conventional U.S. Geological Survey (USGS) publications such as hardcopy maps, hardcopy professional papers, and hardcopy open-file reports, etc. As a result, digital data sets needed to generate the various digital publications are being created at a rapid pace. In addition, the complexity and variety of our various software applications has caused project data storage to increase from gigabytes to terabytes. The requirements of digital publication and the management of large data sets place additional demands on the management of computer resources such as hardware, software, and personnel.

To meet the demand for digital products and data, the Central Region Energy Team is required to evaluate work flow and data flow throughout the organization. Data management issues need to be addressed beginning with the project proposal/planning stage and continuing through project completion. Data collection, organization, documentation (metadata), quality assurance, data store creation, warehousing, and archiving are key components for effective data management through the life cycle of a project. Building and maintaining the Central Region Energy Team's data warehouse and archives provides other active projects a source of valuable data sets and information, and gives new projects a "jump-start" on the creation of their working data stores. Adopting the concepts and procedures of proper data management make good business sense when addressing business issues such as return on investment and the ability of project members to accomplish their tasks on time and within budget.

Server-Clustering Technology for Supporting Mission-Critical Data and Applications

O'Hara, Charles G., USGS, WRD, 308 South Airport Road, Pearl, MS, 39208; and
Kalen, Gail E., USGS, WRD, 308 South Airport Road, Pearl, MS, 39208

The U.S. Geological Survey, Mississippi District, has developed several projects that require the continuous, uninterrupted availability of hydrologic and spatial data. In conducting these projects, District personnel and cooperators outside the District need to be able to access these data in a reliable manner. To provide this capability, the District has investigated server-clustering technology specifically in the areas of failover of data, applications, and web services. The Mississippi District's approach to the problem of potential failure of mission-critical computer functions is to develop a Microsoft New Technology (NT) availability cluster.

Cluster is a term used in computer technology that generally refers to the ability of a group of computers to share tasks, data, and/or applications. In a cluster, failover refers to the ability of the group of computers in the cluster to recover from failure by automatically using redundant resources. An availability cluster solution is one in which important tasks, data, and/or applications are configured to be available regardless of individual component failure within the cluster. A description of the following will be presented:

-- The hardware and software configuration of Mississippi District's cluster;

-- An analysis of how such technology can be used to improve the availability and utility of existing hardware, software, and data resources; and

-- An overview of the system and the functionalities that the new hardware and software will provide.

A Mirror Site for Near Real-Time Hydrologic Data in Texas

Ohe, Dane J., USGS, WRD, 8011A Cameron Road, Austin, Texas 78754; and
Gibbons, Willard J., USGS, WRD, 8011A Cameron Road, Austin, Texas 78754

The U.S. Geological Survey (USGS) has established an extensive network of Data Collection Platforms (DCPs) in Texas that provides near real-time data for streamflow and basic water-quality measurements. Cooperators rely on these data, which the USGS provides on the Internet through World Wide Web (WWW) servers, to manage the water resources of the State and to forecast and provide warnings for floods. It is critical that these data be available 7 days a week, 24 hours a day. A review of USGS information systems infrastructure in Texas indicated several scenarios that could interrupt service to cooperators. It was determined that a separate WWW site operating at a remote location, called a mirror site, could prevent interruptions in service. This paper documents the rationale for the mirror site and the mechanics of its installation and operation. The mirror site downloads the data from the DCPs simultaneously with the primary site. In the event of a failure at the primary site, the mirror site continues to download the DCP data, thus allowing cooperators access to the data through the mirror site. The mirror site operates as independently as possible, requiring contact with the primary site only once an evening to become current with changes made on the primary site.

Internet Access to U.S. Geological Survey Geospatial Data and Images

***Scholz**, Donna K., USGS, OPS, 12201 Sunrise Valley Drive, MS 802, Reston, Virginia 22092;*
***Johnson**, Dale A., Hughes STX Corp., EROS Data Center, Sioux Falls, South Dakota 57198;*
***Lowell**, Kevin, Hughes STX Corp., EROS Data Center, Sioux Falls, South Dakota 57198; and*
***Sprenger**, Karla K., Hughes STX Corp., EROS Data Center, Sioux Falls, South Dakota 57198*

The U.S. Geological Survey (USGS) has made much of its cartographic and image data accessible through the Internet, and now finds that commercial customers for these data outnumber those in government and the education community combined. Increased data sales, as well as the change in customer bases for both the Global Land Information System and US GeoData Internet files downloaded, parallel the growing use of geographic information systems and the Internet. The rising interest in USGS products, the growth of the Internet, and the evolution of data delivery media to include compact disc-recordable and Internet file transfer are trends that are guiding the USGS as it expands online access to its products. Major new data releases and accompanying metadata for online query are scheduled for early 1998.

A Paperless Method for Collecting Responses from Many Locations: An Experience with a Web-Based Questionnaire

***Skach**, Kenneth A., USGS, WRD, 10615 SE Cherry Blossom Drive, Portland, Oregon 97216*

A Web-based tool was used to survey opinions from 65 U.S. Geological Survey, Water Resources Division (WRD) offices on the priority and effectiveness of 34 organizational units of WRD Headquarters operations. Each unit compiled a list of from 3 to 11 tasks to be evaluated (a total of 262 tasks). Each list was made into a Web page that used forms to accept numerical responses and written comments from respondents. An average of 56 responses for each of the 34 units (a total of 1,907 responses) was received electronically, eliminating the need for paper copy to be collected and manually processed for analysis. At the push of a Web-browser's button, numerical responses were directed into RDB (relational data base) files, where they were immediately available for data analysis, and comments were directed to separate text files. Awk scripts and perl scripts were used to compute desired statistics and to output the data into a readable format. The questionnaire was on-line and accepting responses for a period of 3 weeks, from May 28 through June 17, 1997, and summary statistics were compiled and being analyzed by June 18. Many tedious hours of manual work were avoided by the automation in this Web-based tool, and many respondents praised its user-friendly quality. Similar Web-based tools could have widespread applications throughout the USGS, making the gathering of information easier and more efficient.

For more details, see URL: http://oregon.usgs.gov/uo/comp_stuff/nctm98/

Interactive Digital Publications: Development Issues

Takahashi, Kenneth I., USGS, GD, PO Box 25046 MS939, Denver, CO 80225

Digital publications, particularly interactive CD-ROMs have become cost effective alternatives to our traditional hard copy products.They also enable animations and graphics techniques that add new dimensions to our work. This paper discusses and presents some preliminary products and work in progress for several Geologic Division projects. Specific issues to be discussed include cross platform development, graphics and data conversion, and authoring software pros and cons. Examples from the National Coal Assessment, the Arctic National Wildlife Refuge (ANWR) Petroleum Assessment, and the World Energy program will be presented to illustrate how we are extending previously developed interface techniques (DDS-30) to enable users to browse documents, and view new kinds of animated presentations. These include a virtual reality tour of the ANWR, featuring photos and interactive, panoramic views of 23 sites in and around the ANWR. I will discuss these products and issues related to their development.

Year 2000: Issues, Concerns, Strategies

Travnicek, Fred, USGS, OPS, 12201 Sunrise Valley Drive, MS 213, Reston, Virginia 20192

Panel members from Millennium Task Force to be determined

January 1, 2000, 12:00:01 a.m., the ultimate deadline. Few application systems, computers, communication devices and computer chips were designed to handle the year 2000. At a time when computer storage was at a premium, storing the year as two digits instead of four made economic sense. Hence the problem: at the millennial roll-over two-digit years will become 00, meaning 1900. The problem has spread well beyond systems and computers. Integrated circuitry with two-digit years is found everywhere, embedded in navigational equipment, scientific instruments, elevators and consumer electronics. This presentation provides the audience with a report of the steps the Geological Survey has taken to tackle the problem, progress made, a panel discussion (panel members from the Millennium Task Force) of current issues and ongoing activities, and a look at the Survey's reporting relationship with the Department and OMB.

Data Bases On The World Wide Web: A Case Study of the Biological Quality Assurance Unit of the National Water Quality Laboratory

Turner, Sandra L., USGS, Box 25046, MS 407, Denver Federal Center, Lakewood, Colorado 80225, and Brigham, Allison R., USGS, Box 25046, MS 407, Denver Federal Center, Lakewood, Colorado 80225

The Biological Quality Assurance Unit (BQAU) of the National Water Quality Laboratory launched a home page on the World Wide Web (WWW) in February 1996 to provide a user-friendly method of obtaining data associated with algal, benthic invertebrate, and fish samples. These samples were submitted for processing by biologists with the National Water-Quality Assessment (NAWQA) Program. All transactions from the initial entry of an Analytical Services Request (ASR) to the release of final data occur electronically via the BQAU Web site.

Password-protected information is entered initially by field biologists through WWW forms on the Internet. Data may be updated by the biologists themselves or by the Biological Unit (BU) production staff. Data updates are automatically loaded into an Ingres® data base that serves as a data warehouse for all reference and result information. Biologists may download final algal and invertebrate data in relational data-base (RDB) format from the Web by simple point and click. RDB is the format of choice for the NAWQA Program.

Algal, benthic invertebrate, and site ASR data are immediately available as individual reports in several formats -- the most popular being a dynamically generated FrameMaker summary report, which is useful as a shipping log. Data are manipulated easily, and FrameMaker reports can be produced regardless of the platform available to the user. Fish data are provided in a specialized format prepared for use in a custom-designed analytical program. With a Web browser and FrameMaker software, access is available on Unix, personal computer, or Macintosh computers. Application helpers can be associated with the browsers so that the data downloaded over the WWW can automatically be loaded into a spreadsheet.

ASR data are used to process calculations and to produce bottle labels. Information on the status of algal and invertebrate sample processing is updated daily on the Web through the local Intranet and made available to the NAWQA biologists either through dynamically generated ASCII or FrameMaker reports.

NAWQA Program biologists who started their program studies in fiscal year 1991 participated as the "test group" by providing sample information and data for over 6,000 samples collected from 1993 through 1995. Their efforts contributed to developing an automated system to handle all aspects of sample and data management, which is the foundation of the BU's ongoing activities and ensures user-friendly access to provisional and final sample data.

The Global Disaster Information Network

***Ward**, Peter L., USGS, GD, 345 Middlefield Road, MS977, Menlo Park, CA 94025*

On February 26, 1997, Vice President Gore requested evaluation of the feasibility of a Global Disaster Information Network. The resulting task force, on which I represented the Department of Interior, found the concept feasible in a report released in December, 1997.

The primary problems are organizational, both in terms of organizing ideas and in terms of getting organizations to work together. It is presently difficult to determine what information exists and where to get it. Data are in various formats and cannot be readily merged. It is difficult for emergency managers to determine which remote sensing assets best suit their needs. Analytical tools such as GIS often require major investments in hardware, software, and training. The quality and reliability of much information are often difficult to determine. Special modes of access are needed for certain types of information. In some cases, policies, or lack thereof, restrict the flow of critical information. It is often hard to scale the information to the level needed or to find the necessary information to make quick decisions regarding the best action to take. The fundamental problem is that disasters cut across many boundaries, including organizational, political, geographic, professional, topical, and sociological. While individual groups may be performing well in deriving information, the need for its integration and efficient dissemination is urgent.

For these reasons, the principal recommendation is to form a non-profit organization to represent all the stakeholders for disaster information. Primary tasks of this consensus-building group would be to design a logical structure for disaster information that would enhance rapid access to the appropriate information and to encourage standards. Another recommendation is to use robust Intranets, such as National GuardNet XXI, to assure availability to critical users when Internet is overloaded and until priority packet transmission is supported on Internet.

Delivering Real–Time Information to the Specific People at Risk

Ward, Peter L., USGS, GD, 345 Middlefield Road, MS977, Menlo Park, CA 94025

Real–time information saves lives and reduces disaster loss only if it is received by the people at risk and they take appropriate action. If people hear warnings that do not apply, they tend to ignore future warnings. Thus we need ways to focus real–time alerts and warnings on the population at risk. The Emergency Alert System (EAS), currently used primarily to transmit warnings of severe weather and flash floods, broadcasts up to a 2 minute message over commercial radio and TV and over NOAA Weather Radio. The digital codes preceding the message designate counties at risk, but radio stations are usually received throughout many counties and warnings may apply to only a fraction of a county. These codes can turn on appropriately equipped receivers. If the latitude and longitude of an anticipated event were broadcast and if the receiver knew its coordinates and had minimal computer power, then a warning would be relayed only by receivers in the area at risk and the warning could be customized to the location and person's interests. For example, the warning might be "Tornado touched down 5 miles to the northeast and is headed in your direction", or "Major earthquake 50 miles to the south, severe shaking starts in 15 seconds", or for an airplane "Volcano erupting 100 miles ahead, 5 miles west of your flight path." The technology exists or is planned to be able to broadcast such information to radios, TVs, cellular telephones, pagers, etc., to turn on the equipment, set the volume, and issue alerts. The need is to standardize on message content, on a way to send the information, and on receiver specifications. These and related issues are being investigated by a Working Group that I chair on Natural Disaster Information Systems chartered by the Subcommittee on Natural Disaster Reduction under the Committee on Environment and Natural Resources within the White House Office of Science and Technology Policy.

Change-Request Management System for Software Engineering

Willems, Jennifer A., Hughes STX, EROS Data Center, 47914 252nd Street, Sioux Falls, South Dakota 57198

Managing change is a critical component of the software engineering process. An effective change-request process improves both software development productivity and user satisfaction. The U.S. Geological Survey's EROS Data Center (EDC) has implemented a system to provide a consistent, dependable, and repeatable process for managing software requests. The system is based on a free software tool called GNATS, which is distributed by the Free Software Foundation as part of the GNU project. Modifications were made to GNATS to fit the software engineering environment at the EDC. Users can submit bug reports or enhancement requests by means of a web interface that was also developed at the EDC. After a request is submitted, the system directs the request to the proper technical staff by automated network communications and provides periodic reminders to staff until action is taken. This system, furthermore, facilitates user feedback about the progress of the request through the phases of evaluation, technical planning, and development response by using on line network communications. A web interface is also available for user queries concerning status of a request or review of submissions.

The change request system can be used to manage requests for multiple software systems. It also services longer range resource planning objectives by providing information that can be used to obtain facts about the evolving workload with respect to supported software systems, about responsiveness shown, and effort expended. This serves as an excellent example of developing technical solutions for solving internal process problems to improve efficiency and productivity.

Using the Internet to Distribute Live Seismic Data from the Global Seismographic Network

***Woodward**, Robert L., USGS, GD, Albuquerque Seismological Laboratory, Bldg. 10002, Kirtland AFB-E, Albuquerque, NM, 87115-5000; **Halbert**, Scott, Allied Signal Technical Services Corporation, Albuquerque Seismological Laboratory, Bldg. 10002, Kirtland AFB-E, Albuquerque, NM, 87115-5000*

We have developed a mechanism for distributing digital seismic data, in near-real-time, by use of the Internet. The seismic data are collected by USGS stations of the Global Seismographic Network at sites around the world. Data from these seismographic stations are used for a variety of purposes, such as earthquake reporting, tsunami warning, and nuclear monitoring. The data distribution mechanism, which we call the Live Internet Seismic Server (LISS), can support any number of simultaneous client connections. Each client connects to the LISS via the Internet and receives copies of the digital seismic waveform data which the server receives from the seismographic stations. Typical broadband seismic data records (at 20 Hz sampling) at the GSN stations contain about 30 s of data. As each record is filled it is sent, typically via the Internet, to the LISS server running at the USGS Albuquerque Seismological Laboratory. When a data record is received from a station, the LISS duplicates the record and sends copies to each client that is connected to the LISS. Latency of data obtained from the LISS is typically less than 30 seconds.

LISS's can be run in a chain, such that one LISS is a client to another LISS. In this way LISS's can be placed at different locations on the Internet to provide redundant paths for accessing the data. At present, auxiliary LISS's are running in Moscow and Beijing and these are forwarding data to the LISS at Albuquerque.

In our present version of the LISS the communication is essentially one way. That is, a client connects to the server and starts receiving data records. The client obtains data from different stations by connecting to different ports on the server. In the next generation LISS we hope to implement a simple command language, such that the client can query the server and customize the selection of data the client wishes to receive.

Data from 24 stations around the world are presently available by use of the LISS. In addition to distributing these data, the most recent 24 hours of data from each station are plotted in a manner resembling the popular drum style recording (helicorder) mechanism which is widely familiar to the public. These plots are updated every thirty minutes and are accessible via the WWW. These data plots, as well as more information on the LISS, can be obtained via the WWW at the URL:
http://aslwww.cr.usgs.gov/Seismic_Data/liss.htm.

Development of a Web-Based Map Browser for the National Atlas of the United States

***Wright**, Bruce E., USGS, NMD, 12201 Sunrise Valley Drive, MS 521, Reston, Virginia 22092;*
***Cruse**, Deborah A., USGS, NMD,12201 Sunrise Valley Drive, MS 561, Reston, Virginia 22092;*
***Kambly**, Steven, USGS, NMD, 12201 Sunrise Valley Drive, MS 561, Reston, Virginia 22092; and*
***Urban-Mathieux**, Brigitta, USGS, WRD, 12201 Sunrise Valley Drive, MS521, Reston, Virginia 22092*

The U.S. Geological Survey (USGS) is developing a new National Atlas of the United States. One component of this new atlas will be a computer-based application containing geographic information system analysis functions, sound, video, and other capabilities that it was not possible to include in the 1970 National Atlas published in book form. In 1996, the USGS developed a prototype to show prospective public and private partners what was envisioned for the new atlas. Development of a World Wide Web (WWW)-based map browser was started in March 1997, and the first beta release was in September 1997. The browser includes reference data from the proposed atlas and was developed so that potential users could interact with the initial atlas data sets and use some of the planned atlas functions. Browser development also allowed the development team to gain experience using WWW-based mapping tools, to determine the capabilities of this new medium, and to determine which atlas functions were possible using the Web. The development team used Microsoft Visual Basic and Environmental Systems Research Institute Map Objects Internet Map Server software to develop the application. The atlas application contains the following data layers: Federal lands, urban areas, water features, parkways and scenic rivers, railroads, roads, volcanos, seismic events, county boundaries, cities and towns, and states. Users can display any combination of these layers, zoom, pan, identify features, search for features and display the results, and search the Geographic Names Information System database and display the results.

Global Land Information System: Providing a Gateway to Geospatial Information in a Web Environment

***Zanter**, Karen M., Hughes STX Corp., USGS EROS Data Center, Sioux Falls, South Dakota 57198*

The Global Land Information System (GLIS) is an interactive computer system developed by the U.S. Geological Survey (USGS) for researchers seeking sources of information about the Earth's land surfaces. The GLIS was designed to describe data sets through extensive online metadata and data set documentation. Through GLIS, users can read descriptive technical documents and then graphically query inventory holdings to determine data availability. Additionally, digital preview images are available for selected data sets so that the user can view the scene to evaluate its potential usefulness. The GLIS also provides an online ordering capability and includes links to an Internet FTP site containing large amounts of USGS geospatial data that are available for downloading. The Web-based GLIS was released in April 1996 and has been serving the needs of varied researchers worldwide. The GLIS home page is located at the following address: http://edcwww.cr.usgs.gov/webglis.