THE DEVELOPMENT OF THE UNIVERSITIES WATER INFORMATION NETWORK

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Historical Background

The idea for a water resources information server on the Internet was spearheaded by Gen. Gerald G. Galloway and the Board of Directors of the Universities Council on Water Resources (UCOWR). In 1992, the United States Geological Survey (USGS) sponsored the project as part of its then proposed National Water Information Clearinghouse. The USGS provided annual funding and some basic hardware to establish the Universities Water Information Network (UWIN). UWIN is housed at the UCOWR Headquarters on the campus of Southern Illinois University at Carbondale. Two half-time staff are employed to administer the network.

An Advisory Council was created incorporating USGS personnel, UCOWR delegates, and others with interests in water resources and information technology. UWIN's mission was envisioned as helping to bring water resources to the information superhighway and the superhighway to water resource professionals. UWIN has been designed to complement the on-line efforts of the USGS, the other federal agencies, the state water institutes, and other groups on the Internet with water related interests. UWIN seeks to undertake projects that these other groups will not or cannot implement.

UWIN went on-line in August of 1993. In the interest of providing the widest possible service, UWIN was made available both over the Internet and by modem. At that time, Internet access was available by using gopher or telnet. Over the course of the first eight months on-line, several users suggested the need for a bulletin board system (bbs) as some existed at the time but were typically available only via modem. UWIN's bbs, WaterTalk, went on-line in April of 1994.

1994 also saw many innovations in Internet discovery software. Most notably, Mosaic (and now Netscape) made surfing the World Wide Web (WWW) extremely easy. The UWIN staff created a Web server in response to this change in technology. UWIN is currently maintaining its gopher and Web servers, as well as modem access. While we plan to continue supporting gopher and dial-in access for the immediate future, the Web server is quickly becoming our dominant focus. The World Wide Web is extremely easy for users to navigate and offers many exciting features such as graphics, sound, and full motion video.

Approximately 3,000 connections are made monthly to the UWIN gopher server with 35,000 files being opened. Well over 20,000 hits are made monthly on the UWIN WWW server and this figure has been rising quite rapidly as the WWW grows in popularity. Each month over 500 users log onto WaterTalk and more and more of these users are coming in through the WWW.

UWIN's Information Bases

Since UWIN went on-line in 1993, its databases and the types of information available have grown and evolved. UWIN's resources currently include:

Water Resources on the Internet. This directory is a listing of all water related information available on-line. The Web listing contains hotlinks to all the sites plus the ability to perform keyword searches over their descriptions. Users who know of a water related site not currently listed in this UWIN directory can use a WWW fill-out form to add it to this listing.

USGS WRSIC Research Abstracts. The USGS provided their WRSIC database for inclusion on UWIN. This database contains abstracts of water resources research published in journals (English language) since 1967. UWIN staff indexed this database making it fully searchable using user-provided keywords. Since 1993, the USGS has discontinued the funding for this database and discussions are ongoing as to how to keep it updated.

Expert Directory. UCOWR had historically maintained a small listing of water resource experts for its own use. The UWIN staff has updated and expanded this directory to include several thousand water professionals. The memberships of most major professional organizations were surveyed for voluntary inclusion in the Expert Directory. Each expert listing includes contact information, including some e-mail addresses, and an individual's areas of expertise. In 1995

a fill-out form was created so that water resources professionals could add their information to the database via the WWW. A copy of this form is then forwarded to the originator for verification, as well as to a UWIN staff member. If no corrections are received by the UWIN staff from the submitter, the entry is added to the database within a week or two.

Water Organizations. This file incorporates organizational information (purpose, membership, etc.) of various water groups. Any water-related organization can submit their information for inclusion. For example, the National institutes for Water Resources (NIWR) listing includes their publication directory, public information directory, and state institute expert listings. UCOWR also maintains its information on-line, including its delegate listing, annual meeting announcements, graduate education directory, Water Resources Update, etc.

Calendar of Water Events. The Calendar maintains information on water related conferences, workshops, short courses, etc. This database has an on-line fill-out form so that Web users can add information on their organization's activities to the Calendar. Unlike Expert Directory inclusion, events are added to the database immediately. This allows for timely posting of your events. Events mayby viewed by month or order of submission, or searched by keyword. Gopher and modem users can view events submitted on the WWW, but they are unable to electronically make submissions.

Employment Opportunities. This directory is divided into academic, non-academic, and graduate student opportunities. Water related jobs, internships, fellowships, etc. are listed to help centralize the exchange of information related to career development opportunities.

Press Releases. Any group can send their water-related press releases and other timely announcements to UWIN for posting.

The WaterTalk Bulletin Board System

WaterTalk went on-line in April of 1994. Over 500 connections are made to it each month. WaterTalk has a series of boards devoted to particular water-related topics. Currently, boards serve the following topics:

GIS
Ground Water Quality
Hydrology
International Water Issues

Water Education
Water Policy

Any user can make suggestions for additional boards. WaterTalk has many features including e-mail, private chat, on-line conferencing, etc. World Wide Web access to WaterTalk was added in October 1994 and is proving to be very popular. All postings to the WaterTalk boards are archived on UWIN with full searching capabilities.

UWIN is adding two more access methods to the WaterTalk boards. These boards are now available as mailing lists, called WTlists, and as Usenet style newsgroups, called the WaterTalk newsgroups. The WTlists allow users to take part in the discussions by e-mail. Preapproved sites can access the WaterTalk newsgroups by pointing newsreaders at UWIN's newsserver. It is also possible for UWIN to establish a "newsfeed" to newsservers who request it.

As each of these access methods reach the same boards, a message posted to either the WaterTalk boards, WTlists, or the WaterTalk newsgroups is distributed to all participants, no matter what their access method might be. Thus, a user can choose their preferred access method and not miss any messages in these discussions. Some participants prefer to log onto the WaterTalk bbs when it is convenient for their schedule, some participants prefer to receive a particular board's (e.g. Water Policy) messages at their e-mail account, and some prefer to participate via the newsgroups (e.g. USGS staff). Instructions for accessing the WaterTalk discussion boards using any of these three access methods can be requested from wtinfo@uwin.siu.edu.
Accessing UWIN and WaterTalk

UWIN's gopher server can be accessed by pointing your gopher client at gopher.uwin.siu.edu. Similarly UWIN's WWW server can be found at http://www.uwin.siu.edu. Gopher users will find a telnet link to WaterTalk under the WaterTalk main menu option labeled "Connect to WaterTalk." Similarly, WWW user scan access WaterTalk by following the WaterTalk hyperlink on UWIN's home page.

Modem users can access UWIN and WaterTalk by dialing (618) 453-3324 or (618) 453-3090 with their modems. Communications parameters of 8N1 should be used and terminal emulation should be set to vt100 or ANSI. Once connected, you will be presented with a login prompt. At the prompt enter either guest to access UWIN's information bases or bbs to connect to WaterTalk. Next, you will be prompted for a password. At this prompt enter uwin.

Technical Aspects of UWIN

UWIN serves gopher clients via the University of Minnesota's gopher server software. This software is running on a Data General Aviion which supports DG/UX, a version of the Unix operating system. WWW services are provided by a Sun Microsystems SPARC classic, also running a version of Unix. Currently, the National Center for Supercomputing Applications' (NCSA) httpd is being used for this task.

Both servers access UWIN's databases through custom gateway programs written in the Perl scripting and C programming languages. These gateways use WAIS to query databases and retrieve documents. In addition to WAIS, the WRSIC database uses pindex, a package created at UWIN, to efficiently index the database and retrieve for on-line presentation single abstracts formatted for gopher clients or WWW browsers. Perl was also used to create the functionality of the expert, events, and "Water Resources on the Internet" submission forms available on the WWW.

Besides well known software packages and custom programs, two lessor known packages are in use. WaterTalk is supported by a modified version of Eagles bbs2.1 (EBBS). This software is based on the Pirates bbs software which became very well known on the Internet for its use at the Hotel Mars bbs at Mississippi State. The WaterTalk mailing lists (WTlists) are made possible by Majordomo. This software is relatively new, and offers a great deal of flexibility to the administrator.

The modifications to EBBS include using real first and last names for login id's, the WWW user interface, and the capability to send and receive Internet mail. Additionally, EBBS has recently been modified to allow any of its boards to be a subscriber of a Majordomo mailing list. This modification makes communication between the WaterTalk bbs, WTlists, and WaterTalk newsgroups possible creating an integrated arena for discussions which may very well be a one-of-a-kind on the Internet.

Future UWIN Developments

Some of the types of things we are in varying stages of developing include:

1. Conducting periodic on-line WaterTalk conferences on particular water-related themes. Several experts will moderate these conferences and answer participants' questions. If you have a particular theme that you think would make an interesting conference, please suggest it to the UWIN staff. Early this fall, there will be a conference on "Water and the Internet" as a follow-up to this issue of the Update.

2. Providing e-mail capability for our WaterTalk participants who are modem users.

3. Building a "Syllabi Directory" for water resources related courses at all levels of instruction.

4. Creating interactive applications for the WWW. Our first applications will be geared toward educational simulations for elementary and high school students. This will become part of an on-line course for teachers.

Some Thoughts on Developing an Information Server

Our efforts over the past two years have taught us many things, mainly through trial and error, about providing information over the Internet. For those who are thinking of setting up an information server, we can offer the following to consider:

Clearly Identify Your Purpose. Your purpose in constructing and maintaining a server on the Internet should be well thought through. Make sure to 'surf' the Internet to investigate what others are doing related to your ideas. Develop a niche carefully. The current proliferation of servers can be frustrating to users when the sites contain little in the way of useful information.

Identify Your Potential Users. What audience will be interested in your server and how will you reach them? Consider the types of information that these users might find helpful and consider if you can meet these needs. Also, consider the technical sophistication of this group - will they need educating about the Internet. UWIN's purpose was well-served by utilizing the various water professional organizations to reach its targeted audience. The water institutes of NIWR were also very helpful.

Build on Other's Efforts. When developing your system, see what is already out there that is suited to your needs or can be modified. Regularly look around for new ideas and features that other servers have. Much of the software in use at other sites is free and can be obtained from anonymous ftp sites. Some of UWIN's features were created by others. These include the "UWIN Top 10 Lists" and "What's New" on UWIN's gopher, and the graphical usage statistics and the docfinder on UWIN's WWW site.

Information and Data Collection Efforts. It can take considerable time to collect information for your

directories(and perhaps a good deal of word processing as well). Are these efforts best done in-house or can they be done by an external group? Carefully considering the content of directories and how this information will be collected, presented, and updated helps eliminate wasted efforts. Once your server is up and running, ask users to submit information either by mail or electronically.

Systems Testing. Make an effort to thoroughly test your system and any new features you add. The UWIN staff has found it helpful to ask our users to assist us with this process. This task is becoming more difficult with the constantly increasing amount of software products and internet providers. Besides testing new features, old one should be tested regularly. Many users will point out problems with new services, but often hesitate to comment on existing ones. Recently we discovered that the NIWR databases had not been functioning for several weeks. They were rendered inoperative when a piece of software was upgraded.

Technical Advances. A difficult, yet interesting, task is trying to stay on top of all the technological advances that are occurring. These advances influence both what you can provide to your users and how your users interact with your services. The WWW interface to WaterTalk is a good example of this. Some users have experienced problems posting and even logging in. These problems were a result of the variety of WWW browsers being used. In most cases, upgrading to a newer version solved the problem.

Importance of User Feedback. We cannot stress the importance of user feedback in maintaining a server. The "UWIN Comment Box" provides a direct opportunity for users to ask questions, make suggestions, and tell us what we could be doing better. These comments have been invaluable in finding "bugs" in the system and letting us know what the users are thinking as they are utilizing the network.

Conclusion

We hope that this gives you a good overview of the UWIN system and its development. Given the inherent nature of the Internet, any information server is in a perpetual state of change. This evolution is essentially user driven, with the rapidly changing technologies providing new opportunities to serve user needs. The meeting of users' and potential users' needs will ultimately determine the success of any particular network and the Internet as a whole. This is especially true in light of the phenomenal proliferation of WWW sites.

UWIN strives to provide useful information to water professionals. We are currently working with several of the water professional organizations to coordinate our on-line information efforts. We welcome any and all comments about the UWIN system. Your comments, suggestions, ideas, and criticisms are needed to maximize the potential that this exciting technology holds for understanding, managing and sustaining our water resources. Water resource professionals must help influence how this tool will be used in light of our many goals.

Reference

Anderson, Faye and Greg A. Wade. 1995 (to appear). Developing an Information Server: UWIN. Proceedings of the 22nd Annual Conference of the American Society of Civil Engineers Water Resources Planning and Management Division.

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