NISTIR 5623

An Electronic Implementors' Workshop

Ted Landberg
Robert Bagwill
Brenda Gray

U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Institute of Standards
and Technology
Gaithersburg, MD 20899

NIST

NISTIR 5623

An Electronic Implementors' Workshop

Ted Landberg
Robert Bagwill
Brenda Gray

U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Institute of Standards
and Technology
Gaithersburg, MD 20899

March 1995

U.S. DEPARTMENT OF COMMERCE
Ronald H. Brown, Secretary

TECHNOLOGY ADMINISTRATION
Mary L. Good, Under Secretary for Technology

NATIONAL INSTITUTE OF STANDARDS
AND TECHNOLOGY
Arati Prabhakar, Director

Abstract

This report was prepared for the 13th Regional Implementors' Workshop Coordinating Committee Meeting held in Osaka, Japan, March 7-8, 1995. It describes the various elements of an electronic workshop and provides a list of capabilities needed to operate one. The primary elements of an electronic workshop include use of the Internet for basic communications such as electronic mail, public forums, and distribution of publications using computer based media. The necessary prerequisites for establishing an electronic workshop are discussed along with policy and procedures that must be put into place. Automating the operational activities of the OSE Implementors Workshop has meant substantial cost savings while improving the timeliness and accessibility of information to the public and members.

Table of Contents

An Electronic Workshop

I. Introduction

During the last year, the Workshop has been performing many of its secretariat functions electronically using digitally encoded formats of previously paper based documents. These functions include: publication and distribution of Workshop documents, communication with and between members, and balloting of motions before the Plenary. Going "electronic" was prompted by the need to reduce secretariat costs while at the same time decreasing the cycle time on Workshop transactions, particularly processing work in process and communications. The wide spread adoption of Internet communications by a majority of the Workshop participants enabled the electronic Workshop be successful. This report describes the various elements of an electronic workshop and provides a list of capabilities required to automate the operational activities common to Workshop Secretariat.

> **An Electronic Workshop is defined as** one which *conducts a majority of its activities using telecommunications and distributes its technical documents in a digital computer accessible format.*

The OSE Implementors' Workshop (OIW)

The Implementors' Workshop[1], created in 1983, was a response to information technology (IT) community's call for a neutral forum that would address industry wide interoperability issues. Co-sponsored by the National Institute of Standards and Technology (NIST) and the IEEE Computer Society, the OIW has access to and recognition by national and international standards organizations. The Workshop draws upon IT standards being developed by voluntary industry standards organizations such as the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers (IEEE), and the International Organization for Standardization (ISO). Users and vendors are able to forge agreements about how base standards will be implemented thereby facilitating the development of products that are interoperable. The OIW provides links between user requirement forums, the consensus-driven base standards community, and the market-driven technical community to reduce the time-to-market for complex technical products that require simultaneous consensus in a variety of technical areas.

Organizational Structure

NIST chairs the OIW and provides the OIW Secretariat. The workshops meet at NIST quarterly. Workshop organizational components include the Plenary, two standing committees - the Technical Liaison Committee and the Open System Environment (OSE) Committee, and Special Interest Groups (SIGs) that perform the technical work. The Plenary reviews and ratifies SIGs technical programs of work. SIGs may also have subsidiary working and study groups to address specific issues.

The OIW Work Cycle

The OIW's technical work cycle begins when external user organizations submit their application requirements and candidate technical specifications meeting those requirements to the OSE Committee. The Workshop uses these specifications and requirements as the elements for emerging implementors' aggreements and abstract conformance test suites. The SIGs meet during the workshop and may also hold interim meetings between workshops. Upon completing their technical work, the SIGs develop text for their technical documents they present to the Plenary for approval.

Products of the Workshop

The technical documents produced by the Workshop consist of Implementation Agreements and their associated Conformance Criteria. Workshop technical work progresses through a natural life-cycle. Initially, draft documents are made available for public review as "Working Implementation Agreements". These documents record early agreement and statements of direction on technical work. These Working Agreements are not considered stable enough for use in procurement reference; however, material that is in the Working Agreements may be used in prototyping and future planning. In general, the Working Agreements changes after each workshop, as technical work on new and existing topics progresses.

As individual technical agreements and conformance criteria are completed and viewed as unchanging, they are balloted by the Workshop Plenary to become one of the Stable Implementors Agreements. These technical documents are formatted using ISO/IEC documentation style directives.

Once a year, the Workshop Secretariat incorporates all stable text into a NIST publication (NIST SP), called the "*Stable Implementation Agreements for an Open Systems Environment*". The text in Stable Implementors Agreements may be used as a basis for product procurement. Between publications of the NIST SP, replacement page supplements of additional work progressed as Stable Implementors Agreements are issued as necessary after each Workshop. Stable and Working Documentation are both available on-line. Copies of the NIST Publication of the Stable Implementors' Agreement Document are sent to libraries and repositories throughout the world.

The Secretariat

Historically, Workshop Secretariats have provided a variety of services which include:

- maintaining membership rosters;
- communicating with members on workshop matters;
- editing, publishing, archiving, and distributing technical documents;
- transmitting correspondence and work to other standards bodies;
- facilitating consensus and international harmonization;
- conference management; and
- outreach programs to the public.

These functions are paper intensive, generating large volumes of archival documents and substantial mailings to the general membership.

Workshops have a geographically dispersed membership who voluntarily and intermittently come together to conduct their technical work. This creates a communications and timing problem in distributing documents and communicating with and between members. Distribution of paper documents becomes cumbersome and expensive. Today, many members want to obtain computer accessible versions of the documents because they can be documents in computer-based files for reference by their organizations.

Currently, the OIW Secretariat can expect to:

- handle 300-400 e-mail messages per staff member on workshop related items;
- edit and review over 3000 pages of implementor agreements;
- process for electronic distribution some 70 megabytes of Workshop technical documentation; and
- maintain on the server 10 individual e-mail forums for SIG chairs.

The remainder of this report will address the organizational and technical aspects of operating an electronic workshop.

II. Prerequisites

Three conditions must be present before a Workshop can begin electronic delivery of services.

1. A majority of the members have and are knowledgeable of computer based text processors, electronic mail and data file transfer technology. Implied in this first

prerequisite is that members have access to desktop computers, data, and software for electronic mail and file transfers.

2. Participants expect that correspondence and technical work are available in computer-based form. A second prerequisite is the receptivity of a large majority of the workshop participants to receive and send correspondence and technical work electronically. Unless most will actively support a program of doing business electronically, it will not be successful and will result in additional work for the staff.

   Some time ago, the OIW noticed an increased willingness to use the Internet to transmit important messages and documents. It saved time, postage, and more importantly allowed further processing by the staff when changes were necessary. The Secretariat encouraged electronic correspondence by sending announcements and messages to its SIG chairs. Slowly, electronic activity has developed to the point where there is very little correspondance mailed. The remaining mailings consist primarily correspondence to international standards bodies.

3. Sponsorship of Information Server[1] (InfoServer) Facilities for use by the Secretariat and Workshop members. Finally, a common infrastructure is needed for members of a Workshop to communicate. This requires computers be connected to a global network. E-mail forums, document archives, and file transfer are essential computer applications needed to perform the Secretariat services mentioned in the Introduction Section. Finally, operating an InfoServer requires administrative and technical support to provide a smooth running operation. Document files, mailing lists, and network connections must be maintained.

III. A natural progression -- from paper to electronic media

The process of moving from a paper to electronic media starts with preparing documents with a computer. This obvious truth is not so easy in practice. SIG document editors use a variety of incompatible word processors to create compound documents (text, tables, and graphics). Secretariat staffs ten are not knowledgeable of all the different software being used. In the case of our Stable Implementors Agreements, converting the collection to a standard computer based format, including line drawings, was a significant effort. Some SIG editors had used UNIX, DOS, or even Macintosh operating systems with a mix of different word processors. Conversion to a standard document and text format proved difficult and time consuming. Once completed, assembling the parts became easy and the opportunity to distribute publications on an InfoServer or a CD ROM possible. Currently, all new work is routinely submitted to the

---

[1] InfoServer - A network accessable computer ready to accept requests for services from Clients (users). An InfoServer's primary purpose for is for database applications and retrieval of document files.

Secretariat via Internet file transfers. This practice has the effect of ensuring that documents are computer based and greatly facilitates transfer of work between editors and the Secretariat.

IV. Policy Considerations

The decision to conduct activities electronically does require changes. There must be a commitment by management to support electronic operations with:

- technology resources,
- staff training,
- network connections,
- document publication in electronic form,
- internal procedures that accommodate electronic operations, and
- workshop policy changes.

Perhaps the most important and challenging policy issue is providing public access to the documents and computer resources. Opening up internal computers to the public raises security risks. Who funds computing resources to be used on a "no charge" access basis is also an economic issue. Operating an Anonymous FTP Site requires a conscious decision by management.

Another unresolved issue is the integrity of the text contained in the electronic versions of the Workshop documents. The ease which electronic documents can be altered by others may be a problem. Those users who may have concerns about document integrity should retrieve text directly from the source, which in this case is the official NIST Publication or the Workshop InfoServer.

A few more obvious operating procedures that must be put in place include:

1. Standardizing document formats and style guides. The fewer the better.

2. Discouraging submission of hard copy documents. If you accept hardcopy, your staff will have to re-key them.

3. Re-designing forms (registration, reports, etc.) for transmittal via e-mail over networks.

4. Filling Workshop leadership positions with those who can communicate with you via networks.

5. Maintaining member network addresses. This is a critical activity for the staff. Automate membership information.

6. Replying to queries and answering correspondence from others by e-mail when possible. Ask for network addresses when further communication is needed.

7. Maintaining archives in computer files. This includes technical documents, correspondence, minutes, and e-mail messages from secretariat staff.

8. Checking copyrights when accepting documents from outsiders. Ask about who owns documents and the terms and conditions for re-distribution.

V. A Taxonomy for Electronic Operations

This section will identify the software used to conducting activities electronically. The table below summarizes the functions and associated software support.

Service	Computer Application
Member Rosters - network addresses (Ids) - member information	Database Application Server based mail lists Registration Process
Correspondence - Communications - Forums	E-mail SIG Forums ListServ
Document Preparation	Word Processing Graphics Packages
Document Distribution	CD ROM InfoServer
Facilitating Consensus & International Harmonization	Balloting Groupware for managing commenting and revision process
Meeting Management	Registration, Room Scheduling, Fax/Modem Software
Public Access	Information Server Applications for Public Access

VI. Major Software Components

Conducting activities electronically requires the usual desktop office applications used to perform word processing, develop graphics, maintain member databases, transfer data files to other computers, and send e-mail messages. This report does not discuss this category of software because most readers are already familiar with desktop applications

Opening an organization's computer to the public via Internet requires specialized software. This generally includes:

Client/Server Platform

A computer system to function as a server with a minimum of 500-1000 megabytes storage and associated communications software. The OIW uses a UNIX operating system on a TCP/IP network for its system. Other specialized server software[2] is required for managing file transfers (FTP), remote terminal access (Telnet) and e-mail (SMTP). Companion software is required by the users (clients) for each of these functions, (i.e. FTP, Telnet, and a mail user agent). All of this software is readily available commercially.

Standard Electronic Mail

A simple electronic mail application is at the center of any Electronic Workshop. Mail enables members and the Secretariat to perform a variety of communications absolutely essential for operations. The OIW uses the Simple Mail Transfer Protocol (SMTP) along with a commonly implemented message format defined in the Internet Engineering Task Force's Standard RFC-822. Most messages are ASCII text although there may be files transmitted with special characters not defined in the common ASCII character set.

Anonymous FTP

FTP (File Transfer Protocol) is designed to transfer files between remote hosts. FTP software for both client end and Server is widely available, with many mature implementations. The Anonymous FTP facility allows the public (unregistered users) access to a set of controlled directories on an Information Server. FTP provides commands to list the contents of directories, and to retrieve and send files This is the primary way an organization can offer public access to collections of data files. Many vendors offer this software as part of their system and there are public domain versions offered by Universities.

Forum List Maintenance

The Workshop uses software which accepts specially encoded messages from senders

requesting to be added to a mail distribution list. Users may enroll in a mail list, obtain descriptions of the public forum, or have their name deleted from the list. This software is invaluable for operating a public forum because it automatically enrolls and deletes unregistered user ids from the distribution without staff intervention.

The OIW has setup several SIG forums for its members. This enables technical work to be continued between quarterly meetings and greatly accelerates the progression of technical discussions. The Secretariat also uses mail exploders to broadcast announcements to the entire membership. This is also how the OIW ballots its motions.

VII. Server Operations

NIST maintains an Internet-based InfoServer. The InfoServer provides drafts of documents created by NIST researchers, as well as documents furnished by the Workshop. The InfoServer was established to support in-house staff who needed to transfer files and expanded to offering electronic versions of NIST publications on the Internet. Its Internet name is "nemo.ncsl.nist.gov" or addressed as "129.6.58.156" from the network. Services have been progressively added to the Server.

Anonymous FTP was the first access method supported. An "OIW" directory was created within the FTP directory tree. Workshop editors were given a UNIX shell account and ownership of that directory. The public can access files using anonymous FTP.

The enhanced version of the FTP server we used, written by Bryan D. O'Connor at Washington University in Saint Louis, allows password-controlled groups to be defined. When necessary to let OIW members upload documents, a special FTP group and password was created. The FTP server will also notify the user when the README file in directory was last updated, and will display the contents of a file called ".message" when the user changes to the directory containing that file. Those features allow the directory owner to describe the contents of the directory in detail.

A directory was created for each SIG. The SIG chair was given a regular UNIX shell account, and was given ownership of that directory.

Next, a mail archive server was added. The server is a set of scripts written by Johan Vromans in the programming language Perl. The server was previously configured just to serve POSIX testing files. It was reconfigured to allow users with access to Internet email to request OIW files by email.

Gopher is a client/server protocol, created by the University of Minnesota, designed to support menu-style access to files. When the Gopher server was added to the system, it was configured to use the same directories as FTP. This meant that as soon as a file was made available via FTP, it

was available via Gopher.

When a Gopher user accesses the system, they see a list of files, directories, or links, which can be selected by using arrow keys to select them or by typing the number of the item. Since most of the OIW files were created in the DOS environment, the file names are limited to a 11 character length. Gopher allows long, descriptive names to be associated will the usually short file names. Had they chosen to use it, the directory owners could have replaced the file name with a document's title on the Gopher menus.

HTTP is another client/server protocol which was designed to support hypertext-style interaction. When the HTTP server was added to the system, it also was configured to use the same directories as FTP and Gopher. The most popular HTTP clients have a graphical user interface which allows users to read and/or download files by point-and-click. Both Gopher and HTTP servers allow external programs or scripts to be called.

To support remote searching of the files, a fourth protocol/server was added, WAIS. WAIS is an implementation of a subset of the ANSI Z39.50 Information Search and Retrieval protocol. All the files in the FTP tree were indexed using the program supplied with the free WAIS software. The Gopher and HTTP servers were configured to allow users to search the WAIS indices via Gopher and HTTP.

Finally, care must be taken to protect an InfoServer open to the public from attacks by unfriendly intruders. The firewall system[3] for network and server security should be considered when placing an InfoServer in service. The firewall approach implements an important set of security policies, defines services and access to be permitted, and implements that policy by selecting a special set of network configurations.

VIII. Publishing on a CD ROM

The OIW was spending over $40,000 a year printing the Stable and Working Implementation Agreements. The entire document was almost 3000 pages, a stack of paper standing 46 cm high. Clearly the publication was too unwieldy to be used or transported.

With most of the work already in computer readable format, the OIW opted to publish Version 7 in March 1994 using optical disk technology. A second decision made early in the process was to use full text rather than a raster format for the pages images. Because many members wanted to use portions of the text in their internal publications, a processable text format was provided. Finally, the ISO 9660 format was used to provide Interoperability on several computer platforms.

The OIW uses NIST to publish its work. NIST has a rather extensive editorial and style requirements it imposes on the Workshop's technical documents. The CD ROM includes a "jewel box" pamphlet that has information about the Workshop and instructions on how to access

information on the CD ROM.

Each Part (chapter) of our Stable and Working Implementation Agreements are reproduced in three formats: a plain ASCII text, a final form page image -- Postscript™, and a process able document (i.e. WordPerfect™ or Word™) . These formats provide the widest possible choices of document display for users of the CD ROM.

All the data files containing the technical documents selected for the CD ROM are run through a pre-mastering program which puts the files on a tape in ISO 9660 formatter. This tape is sent to a CD ROM mastering factory. Turn around time is usually less than 10 days. The cost for about 500 CD ROM copies is about $2700, a 16 fold decrease compared to printing on paper.

IX. E-mail Balloting

Perhaps the most dramatic example of the movement to an "electronic mode" of operation was balloting by e-mail. Historically, the OIW held a Voting Plenary Meeting on the last day of its quarterly meetings. Motions were proposed and those holding "voting cards" balloted by a "show of hands". Each organization attending the Workshop on a regular basis had one vote. At the September 1994 OIW Plenary Meeting, the membership voted to ballot motions via Internet E-mail. Procedures were developed to ballot electronically. Existing rules for determining voting eligibility and criteria for approval of motions were retained. Electronic balloting did require accelerating the submission of computer-based text for technical work being balloted. Also, written versions of the motions along with descriptive materials which had been given orally by the presenters had to be submitted to the Secretariat.

Balloting Process

The process begins during workshop week when SIGs vote on a set of motions they wish to present to the Workshop Plenary. These motions are for technical work being proposed as drafts or in final form. Additionally, formal comments on the work of other standards bodies, called Liaison Statements are presented. SIGs meeting at times other than during the Workshop Week also may submit items to be balloted. These are submitted to the Secretariat after the interim meeting and added to the other motions. Those attending the regular Workshop conferences register to vote for their respective companies by signing up for a “voting card”. Their names, companies they represent, and e-mail addresses are recorded by the Secretariat for later use in establishing the e-mail voter distribution list. Proxy voting is not allowed.

The voting process is as follows:

1. All motions are turned into the OIW Secretariat. They were marked as "Working", "Stable", "Informational Liaisons" or "harmonization" motions. This collection of motions becomes the electronic ballot.

2. A ballot is prepared containing the following information:

   - dates for reviewing motions;
   - dates for voting period;
   - electronic address and fax address for returning the ballot;
   - a point of contact list for any questions the delegate has about the motion;
   - each motion has a title, brief description of rationale for bring to a vote, location on the InfoServer of full test versions of technical work, and SIG voting results.

3. A final review of the motions by the SIG Chairs is made prior to ballot distribution.

4. Two user accounts are established for the balloting process:

   - a special voting account, called "oiw-vote" to email the ballot to delegates; and
   - an account and separate directory for each SIG that contains the full text files of work being voted.

5. The ballot is broadcast to those holding *voting cards*. An example of a motion on the electronic ballot is shown below

   4. **Message Manufacturing Specification SIG**

      FILE NAME: Part 20 - Message Manufacturing Specifications
      "20w_9412.w51", "20w_9412.txt", "20w_9412.ps"

      TITLE: EDITORIAL CHANGES IN ANNEX D (AMM11 ISP)

      PURPOSE: Miscellaneous editorial changes in Annex D (AMM11 ISP) top match ISP text in working agreements to final text of ISP AMM11 submitted for ballot.

      DESCRIPTION: (1) Changes to draft 6 revision 2 of AMM11-1,2,3 before submission to SGFS. (2) Searched text for "DISP" references and changed to "ISP" to conform to guidelines published by SGFS on ISP preparation. (3) Changed headers from ISO/IEC ISP 14221-x ; Submittal copy, June 1994 to ISO/IEC ISP 14221-x:1995 to conform to guidelines published by SGFS on ISP preparation. (4) Fixed typos in base column of A.4.4.7 and A.4.4.13 of AMM11-3 per AOW MMS SIG comments accepted by EWOS EGMMS and OIW MMSSIG in Sept 1994.

      SIG VOTE: Yes 5 No 0 AB 0

6. After the voting period has closed, the secretariat retrieves all ballot replies from the special email accounts. Hard copies are made and kept as a permanent record of the

voting process. A report tallying how each delegate voted is prepared and made available to the entire Workshop. This provides a means of verifying the vote authenticity. Since the number of voters is small (under 50) and they are well known by the Secretariat, the risk of voter fraud is minimal.

Clearly, many long standing rules for balloting voluntary consensus based standards have been relaxed to enable electronic voting. Many scenarios can be envisioned where the voting process can be skewed by a group advocating a particular result. However, given the newness of the process and its potential for greatly accelerating the standards process, some leeway is appropriate at this juncture in the game.

E-mail balloting may turn out to be the single most important decision the OIW has made in the last year. If consensus voting can be done by e-mail, then the possibility that meetings can also be held at other times and places -- even on Internet. The concept that standards can be developed by a group who communicate though e-mail frees the process from time and place constraints of formal face-to-face meetings. This is an enormous breakthrough which can lead to increased participation by those who can not afford to travel and dramatically reduced cycle times for standard development.

X. The Future

The awareness and use of the Internet by a growing number of companies and individuals is prompting a re-thinking of how people transact business communications. The standards development process is a prime candidate for conducting much of their work using this new media. Increasingly, those attending standards meeting must offer a compelling business case before expending funds for travel and time away from the office. The case for participating in an electronic forum while still at your desk is much simpler to make. Consequently, the movement toward conducting much of the work now done at meetings via e-mail is compelling if these standards development organizations are to remain viable.

Some future use of electronic operations may include:

1. Providing Groupware software to facilitate group editing and consensus commenting on technical work proceeding through SIGs.

2. Conference registration via e-mail with credit card payment capabilities.

3. Using a Portable Document Format (PDF) for distributing technical work.

Bibliography

1. NIST. Stable Implementation Agreements for Open System Environment Version 8 Edition 1. Special Publication 500-224, December 1994

2. Ed Krol. The Whole Internet. O'Reilly & Associates, Inc. 1992

3. NIST. Keeping Your Site Comfortably Secure: An Introduction to Internet Firewalls. Special Publication 800-10, December 1994