The Chemical Substance Information Network: User Service Office Evaluation and Feedback†

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The Chemical Substances Information Network (CSIN) has been accessible to nonproject-related users since November of 1981. Since that time, over 235 users from 69 organizations have been trained in the use of the system. The purpose in releasing the prototype CSIN to this community of users is to provide a real-world environment for testing both the CSIN concept and its implementation to date. The CSIN Administration has established a CSIN User Services Office (USO) to act as a bridge between the users, CSIN Administration, and the development contractor. The USO serves a dual purpose: first, to provide training, documentation, and problem solving to the users and, second, to provide user feedback to CSIN Administration. The USO has in place several methods for measuring system performance, system usage, and user satisfaction that have been used to conduct a formal evaluation. A preliminary evaluation conducted during the first year of CSIN operation shows that the CSIN concept is well accepted and useful.

INTRODUCTION

The Chemical Substances Information Network (CSIN) was made accessible to nonproject-related users in November of 1981. Since that time, 235 users from 69 organizations have been trained to use the system. The experience levels of the users range from the totally computer naive to professional information searchers. All of the users are in some way concerned with the acquisition of and/or use of information about chemical substances. The organizations include groups from the private sector (industry, academia, and public interest groups) and from federal, state, and local governments. The purpose in releasing the prototype CSIN to this community of users is to provide a real-world environment for testing both the CSIN concept and its implementation to date and to develop a user group that will be actively involved in the enhancement and future development of the network.

To further these goals, CSIN Administration established the CSIN User Services Office (USO). The USO, run by Bolt Beranek and Newman Inc., acts as a bridge between the users, CSIN Administration, the development contractor (Computer Corporation of America), the commercial communications networks, and, in some instances, the remote database vendors. The USO serves a dual purpose: first, to provide training, documentation, and problem solving to the users and, second, to provide user feedback to CSIN Administration. It provides continuous monitoring to determine if CSIN is useful and viable and, if worthy of further development, to identify the directions that further development should take.

Because of their contact with all components of the network, the USO staff members are in a unique position to accumulate useful data on the characteristics of the user community, the current system performance, and those aspects of the system that the users find inadequate. The analysis of such data should provide a useful guide both for assessing system acceptance and setting priorities for the development of new system capabilities. Two techniques were used in the acquisition of these data: the continual solicitation of user feedback and a formal evaluation study. From November 1981 through July 1982, data were collected in a systematic way, and an analysis was carried out in February of 1983.[1] The evaluation included, in addition to the parameters mentioned above, a productivity study designed to compare the use of CSIN to the direct use of the various systems for specific searches.

This evaluation is interesting not only for the preliminary information obtained about CSIN but also for the information obtained about ways to evaluate systems such as CSIN. This second level of evaluation allowed us to make a determination as to the value of the various information gathering techniques in providing us with useful data.

OVERVIEW OF CSIN

The concept of a totally coordinated network of on-line chemical information systems, which forms the basis for CSIN, was originally proposed in 1977 as a means of satisfying information requirements associated with the Toxic Substances Control Act of 1976 (TSCA) and other chemically oriented legislation. A Requirements Survey conducted in 1977 by the Mitre Corp. demonstrated that, in fact, most consumers of chemical information have needs that can only be satisfied by searching multiple databases.[2] CSIN is being developed as an alternative to the expensive and time-consuming sequential searching of individual databases.

CSIN is not another computerized database.[3-5] It does not simply link the component systems. CSIN provides the user with the capability to retrieve and relate information about chemical substances from many information resources that are independent and autonomous in their selection and use of computer hardware, software, search strategies, and file and record formats. This means that the full capabilities of the remote resources are available to the user without requiring the user to interact with those systems individually. Further, CSIN itself provides the user with additional utilities and capabilities that are available regardless of which remote resource is being accessed.

CSIN is currently in the second stage of its planned development.[6] The following functions and utilities are operational: (1) automatic connection and log-on procedures for user-selected component systems; (2) capture and local storage of data coming from any of the remote component systems; (3) automatic transformation of data from the format of one component system's database into the format of any other component system's database; (4) ability to transmit stored

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Table I. Disciplines Represented

discipline	no.	discipline	no.
chemistry/biochemistry	37	miscellaneous	13
biological sciences	23	mathematics/statistics	7
liberal arts	16	psychology	5
library/information science	13	environmental sciences/ engineering	4
engineering (chemical, civil, etc.)	11	industrial hygiene	3
		education	3
public health/ medicine	10	computer science	2
		law	2
business/public administration	10		

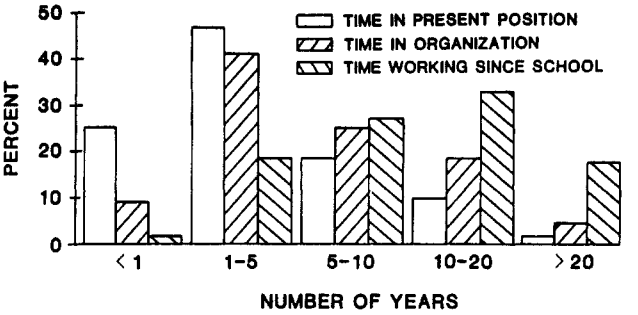

Figure 1. Work experience of CSIN users.

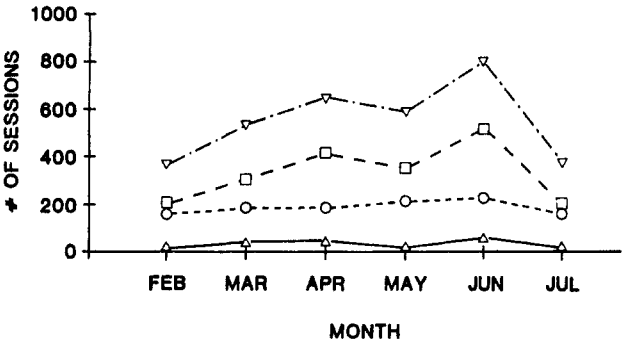

Figure 2. CSIN script sessions: (○) number of sessions using CHEMID script; (△) number of sessions using MANUFACT script; (□) number of sessions using TOXEFF script; (▽) total number of sessions.

data to a remote system as though those data were being keyed in on-line by the user; (5) retention of lists of search terms, called query lists, to be used repeatedly as partial search criteria for any of the component system's databases; (6) a text editor, which allows modification of standard query lists, creation of user query lists, or editing of data obtained as search output; (7) automated search facilities, called scripts, which automate common sequences of user interactions while still allowing the user to define some of the variables in the search criteria.

For the past year, emphasis has been placed on improving system reliability and performance and on adding users to test the current capabilities rather than on the enhancement of existing features or on the development of new features.

USER SURVEYS

The first task of the evaluation was to develop a profile of the user community and their information seeking behavior. This was done primarily through three user surveys. The first is administered at the time of the initial training and is designed to provide base-line data. The second, a follow-up survey, is sent to the members of each training workshop 6 months after the completion of their training. These two surveys are intended to assess how users seek information on chemical substances, before and after exposure to CSIN. The third survey, administered on-line, is designed to assess the user's impression of a particular CSIN session.

During this evaluation period, 124 users were trained. Of these, 110 completed the initial survey.

The initial survey showed that half of the workshop participants classified themselves as information specialists, while the others were end users of chemical substances information. Ninety-five percent have at least one college degree, and over 50% have advanced degrees. The disciplines represented show a wide range with the heaviest concentration in the chemical and biological sciences (Table I). The work experience of our users is varied, with more than half the users having worked 3 or less in their current position, 5 years or less in the organization, but over 10 years since leaving school (Figure 1).

Tables II–IV show the breadth of information needed, the frequency of need, and the response time required.

The follow-up survey was sent to the members of each user group 6 months after that group had gained access to CSIN. Ninety-one of these surveys were sent and 40 returned. The basic profile of the users did not change appreciably over this period. Forty-five percent of the respondents had incorporated CSIN into the steps that they take to obtain chemical information.

The on-line survey appeared randomly at the conclusion of a session from January 1982 through July 1982. It was pretested for 6 weeks and revised. The actual period of evaluation extended from April 1 through July. During this time, 160 surveys were completed. While the general impression of the sessions was favorable, these data were difficult to evaluate because so many users, especially the more experienced users, deliberately terminated their sessions without completing the survey.

SYSTEM USAGE

The next aspect of the network to be evaluated was that of actual system usage. Our primary sources of data on system usage are the monthly system log files from the Computer Corporation of America, which provide data on the amount of use of CSIN and each component database system by each user during a calendar month. These data are collected in terms of both number of hours spent and number of sessions.

As the number of users and user organizations has grown, the proportion of each using CSIN in any one month appears to have settled out to about 60% (Table V). This decrease in the proportion of active to registered users is not an unusual finding during the active growth stage of a system.

To examine the patterns of daily usage, we developed a set of analysis programs that took "snapshots" of the system each time a user logged on or off, calculated the number of simultaneous users at that moment, and then summarized for each day the number of different users, the number of different

Table II. Breadth of Information Need[a]

	information specialist	end user scientist	end user administrator	other	all users
all relevant information	27 (50.0)	12 (42.9)	11 (47.8)	6 (25.0)	48 (43.6)
resonable coverage	27 (50.0)	17 (60.7)	13 (56.5)	11 (45.8)	55 (50.0)
single answers/citations	0	1 (3.6)	0	2 (8.3)	3 (2.7)

[a] Values in parentheses are percent.

Table III. Frequency of Need[a]

	information specialist	end user scientist	end user administrator	other	all users
daily	27 (50.0)	7 (25.0)	8 (34.8)	6 (25.0)	41 (37.3)
once/week	16 (29.6)	14 (50.0)	10 (43.5)	2 (8.3)	31 (28.2)
once/month	3 (5.6)	3 (10.7)	2 (8.7)	4 (16.7)	10 (9.1)
few/year	4 (7.4)	6 (21.4)	3 (13.0)	7 (29.2)	18 (16.4)

[a] Values in parentheses are percent.

Table IV. Response Time Need[a]

	information specialist	end user scientist	end user administrator	other	all users
immediate	15 (27.8)	8 (28.6)	7 (30.4)	9 (37.5)	30 (27.3)
24 h	31 (57.4)	17 (60.7)	13 (56.5)	6 (25.0)	55 (50.0)
1 week	17 (31.5)	9 (32.1)	8 (34.8)	4 (16.7)	34 (30.9)
2+ weeks	5 (9.3)	2 (7.1)	2 (8.7)	1 (4.2)	8 (7.3)

[a] Values in parentheses are percent.

organizations, and the number of separate log-ins (Table VI).

The mean number of users and organizations using CSIN per day did increase over the 6 months as the number having access grew. The number of script sessions decreased somewhat over time (Figure 2); however, the length of the script sessions increased (Figure 3). This indicates that although users were not logging in as frequently, their sessions on CSIN were longer. This is probably a result of users becoming more familiar with the capabilities of CSIN and thus able to accomplish more work in one sitting. Also, the number of log-ins may have been artificially high in the earlier months, due to the large numbers of disconnect problems the system experienced.

Overall usage increased to a peak 216 h in April and then dropped off in May, when the system suffered considerable downtime. Usage climbed again in June, dropping off again slightly in July (Figure 4). Five groups received EPA grants to use CSIN: the Association of New Jersey Environmental Commissions, the Ecology Centers of Louisiana, the Houston League of Women Voters, the National Governors' Association, and the Worker's Institute for Safety and Health. CSIN use by these five grantee groups peaked in April and then

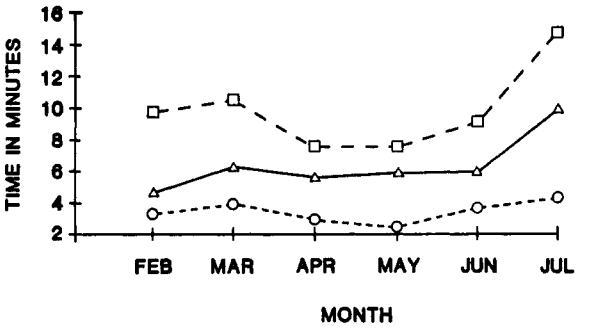

Figure 3. Average length of script sessions: (○) CHEMID; (△) MANUFACT; (□) TOXEFF.

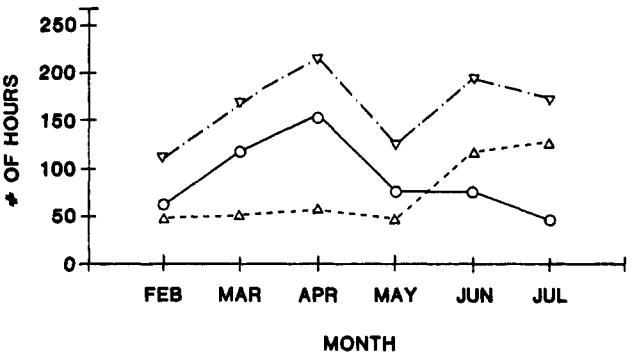

Figure 4. CSIN use by grantees and nongrantees: (○) grantees; (△) nongrantees; (▽) total use. For the grantees, five groups received EPA grants to use CSIN. Usage by grantees dropped after April due to funding running out.

dropped off considerably, due in large part to their running low on funding. Usage by nongrantees more than doubled during the 6 months, reflecting the increasing number of such groups accessing the system.

To look at system load from the user's perspective, the average number of simultaneous users was calculated for each 2-h time period during the 9-to-5 day and for the periods "before 9:00 a.m." and "after 5 p.m.". As expected, peak usage was from 1:00 p.m. to 5:00 p.m.; however, average simultaneous usage never exceeded 1.7 users.

Table V. Proportion of Active Use among Organizations and Individuals Having Access to CSIN from November 1981 to July 1982

	Nov	Dec	Jan	Feb	March	April	May	June	July
no. of organizations having access to CSIN	7	13	16	21	21	21	29	29	35
no. of organizations active this month	6	13	13	14	11	11	18	23	22
proportion of organizations that were active (%)	85.7	100	81.2	66.7	52.4	52.4	62.1	79.3	62.9
no. of CSIN user accounts available	9	20	23	32	34	49	71	78	96
no. of active accounts this month	8	18	21	27	21	34	43	48	50
proportion of accounts that were used (%)	88.9	90	91.3	84.4	61.8	69.4	60.6	61.5	52.1

Table VI. Summary of Daily Usage

	Feb	March	April	May	June	July
			No. of Different Users per Day			
mean	11.68	10.96	10.86	12.89	12.86	14.25
median	10.00	11.00	10.00	12.00	12.00	12.50
standard deviation	5.14	2.70	3.73	5.55	5.08	7.03
range	6–21	6–17	7–21	4–30	6–28	5–37
			No. of Different Organization per Day			
mean	7.26	7.30	6.77	8.11	8.64	10.10
median	7.00	7.00	6.50	8.00	8.00	10.00
standard deviation	2.60	1.55	1.27	2.93	3.66	3.71
range	2–12	5–10	4–9	3–16	4–21	3–16
			No. of Log-ins per Day			
mean	32.63	31.65	28.73	27.28	24.82	28.05
median	28.00	29.00	27.50	26.50	23.50	27.50
standard deviation	12.64	10.99	10.09	9.29	8.79	11.83
range	12–55	11–56	12–56	9–46	13–44	7–51

Table VII. Distribution of Number of Simultaneous Users

simultaneous users	Feb count	March count	April count	May count	June count	July count
1	562	595	527	411	419	440
2	260	372	304	254	240	280
3	97	172	123	104	108	128
4	37	58	49	34	60	59
5	19	12	13	4	22	33
6	13	3	1	0	8	17
7	8	0	0	0	3	4
8	2	0	0	0	0	0
9	1	0	0	0	0	0

To provide a better sense of what the load on the system typically was for users, a frequency distribution of the number of simultaneous users was done (Table VII). This table shows clearly that there were often two or three simultaneous users, and not infrequently, there were four or five.

USER SERVICES

An important component of the CSIN system is the User Services Office (USO). This Office is responsible for providing the human interface between the user community and the technical aspects of CSIN. Two major activities of the USO, the CSIN training workshop and the CSIN telephone service, were included in this evaluation.

The USO conducted seven CSIN Training Workshops during this period of evaluation (November 1981 through July 1982). A total of 124 people from 39 organizations were trained. At the conclusion of the workshop, each trainee completed a workshop evaluation form. The responses to these forms for the seven workshops were accumulated and constitute the basis for the evaluation.

The first section of the workshop evaluation provides background material on the workshop participants. The participants in the seven workshops were evenly divided between information specialists and end users of information, and that split is reflected in the answers to many questions throughout the questionnaire. There were participants who found the pace too slow as well as those who found it too fast; some wanted extra time on computers in general, while others wanted to start immediately researching compounds as they would in their jobs.

In addition, the experienced users were familiar with the contents of the available databases, while inexperienced users were not. While the experienced users were quick to point out the databases CSIN lacked, inexperienced users wanted the workshop to provide more coverage of the existing databases, their content, limitations, and costs.

The trainees particularly liked the hands-on exercises, although the lectures, instructors, and materials also got favorable comments. Suggested improvements included more hands-on time, longer workshops, greater tailoring to individual user problems, and more technical information on the databases. After 2-days exposure to CSIN, over half of the trainees found its user friendliness to be its most useful feature. Additional useful features included the utilities and the variety of available databases. Trainees perceived the limited capabilities, limited databases, operational difficulties, and uncertainty of costs to be CSIN's main liabilities.

Many of the user suggestions, both for improving the workshop and for improving CSIN, have been implemented. The workshop has been lengthened, and additional laboratory exercises have been included; more information is being provided on the component systems and their databases; the text editor has been significantly improved; quick reference cards are being provided; the visual aids have been improved, especially through the addition of a video projector that projects the image of the terminal screen; and time in the workshop has been set aside for discussion with the participants on improvements to the system.

Table VIII. Number of Calls to User Services Office by Organization and Individuals from November 1981 through July 1982

month	total calls	user orgns repd[a]	calls from users	calls from nonusers[b]	new users trained[c]	new orgns added[c]
Nov	21	7	21	0	14	8
Dec	25	6	25	0	14	6
Jan	33	7	33	0	46	5
Feb	40	6	38	2	13	5
March	54	12	42	12	0	0
April	59	16	54	5	4	1
May	60	12	54	6	0	0
June	35	14	30	5	13	8
July	64	17	60	4	20	6
totals	391	97	357	34	124	39

[a] This column shows the number of different organizations represented by the users who called. [b] This column shows the number of calls received from individuals who were not CSIN users at the time. [c] These two columns show the growth of the user community during the months for which the calls are shown.

The CSIN USO maintains a telephone service for CSIN users. USO personnel are available from 8:30 a.m. to 5:30 p.m. Eastern Standard Time. At other times, the telephone is attached to an automatic answering and recording device. This allows users in different time zones to leave problems for the USO, who will then call them the next day. The primary purpose of the telephone service is to provide trained human assistance to users who are experiencing difficulties using the system. It also provides a convenient mode of communication between users and the system developers. The USO maintains a log of all telephone calls, and this log is reviewed by non-USO personnel, who randomly select callers to evaluate the degree of satisfaction with the helpfulness and responsiveness of the USO personnel. The log is also used for problem shooting and identification of trends.

The number of calls to the telephone service increased from month to month over the period of the evaluation except for a slight fall-off in June (Table VIII). The majority of the calls were from users, and most of these were seeking general information about how to accomplish some task with CSIN.

In order to perform an ongoing assessment of the quality of service being provided to users via telephone by the CSIN USO, users who have called the telephone service were surveyed weekly. Although the number of follow-up questionnaires completed was small, a high level of satisfaction with the telephone service was indicated. All but 2 of the 13 respondents indicated that the call had provided them with the necessary information to complete their task. Of the two "no" responses, one wrote that she knew how to avoid the problem now but not what to do if it occurred again. USO staff were notified of this and called her to provide further information. The other "no" respondent needed to know when CSIN would be up again; by the time the USO could call with that information, she had already discovered it herself.

PRODUCTIVITY EXPERIMENTS

In addition to looking at the user community, system usage, and the USO, we conducted three structured productivity experiments. In the context of CSIN, productivity can be measured as a comparison between using CSIN to search for information on chemical substances and searching for that same information by other means. This comparison was made by having three different users conduct three separate controlled search experiments of varying degrees of complexity first in CSIN script mode and then by direct search of the component database systems, for a total of 18 experiments.

Table IX. Experiment 1: Comparison of Script and Direct Access to Databases

data point	script	direct	significant at 0.05?
total no. of keystrokes required to complete	162	1612	yes
total time spent at terminal to complete (min)	32.0	34.5	yes
total time spent retrieving chemical identifiers (min)	2.5	1.5	yes
time spent in remote system for chemical identifiers (min)	1.1	1.5	yes
total time spent retrieving references (min)	28.4	31.8	yes
time spent in remote system for references (min)	24.8	31.8	yes

The experiments were pretested by a professional literature searcher from the chemical industry, modified slightly to reflect comments by the pretester, and sent to the three users—one each in industry, government, and public-interest groups. We were testing the null hypothesis under the assumption that the script mode would be more efficient. Means were compared by use of one-tailed t tests.

Eleven data points were defined for analysis: (1) total number of user keystrokes; (2) total time at the terminal; (3) total time in each remote system for each part of the search; (4) total time to find and collect chemical identifiers (CSIN + remote); (5) total time in the remote system finding and collecting chemical identifiers; (6) time in CSIN finding and collecting chemical identifiers; (7) total time to search for references (CSIN + remote); (8) total time in remote systems searching for references; (9) time in CSIN searching for references; (10) time in editor to edit CHEMID output; (11) time in the editor to create query lists.

Once these data points were identified, they were collected in tables where all statistical tests were done. In looking at the data, one needs to be careful about attaching too much importance to results based on such a small sample size. In order to draw even general conclusions, much more testing needs to be done. However, these results do indicate that the CSIN concept itself is sound, even though no conclusions about this implementation can be drawn, and that a user friendly interface can be used without loss of time, efficiency, or relevancy.

The output from the searches was evaluated for relevancy. The output from the script mode was compared to output from the direct mode, and differences were explained through analysis of the trail files.

In each experiment, the first task is to retrieve all possible ways to refer to the chemical(s) of interest; these are called the *chemical identifiers*. Since some data bases use CAS Registry Numbers, while others use preferred names or even common names for indexing, no single identifier can be relied on to retrieve all references to a given chemical. The next task was to combine the chemical identifiers with additional search terms; these may be standard lists provided within CSIN, called *standard query lists*, or they may be lists of terms generated by the users, called *user query lists*. In either case, the terms in the query lists are in a standard format that is automatically transformed by CSIN to the format appropriate for the specific data base to be searched.

Experiment 1. This was the simplest of the three experiments. It was a search for the chemical identifiers of a single chemical, acrolein, which were then combined with one system-standard query list: reproduction. CSIN script mode performed quite well (Table IX). The number of keystrokes required was 10 times less, while the time spent searching for references in the remote databases was decreased by 20%, as compared to searching the databases directly.

Table X. Experiment 2: Comparison of Script and Direct Access to Databases

data point	script	direct	significant at 0.05?
total no. of keystrokes required to complete	403	5880	yes
total time spent at terminal to complete (min)	88.0	121.7	yes
time spent in remote system for chemical identifiers (min)	7.7	6.3	no
time spent in remote system for references (min)	52.7	111.3	yes

Table XI. Experiment 3: Comparison of Script and Direct Access to Databases

data point	script	direct	significant at 0.05?
total no. of keystrokes required to complete	248	1425	yes
total time spent at terminal to complete (min)	30.2	38.1	yes
time spent in remote system for chemical identifiers (min)	2.6	3.2	no
time spent in remote system for references (min)	16.3	30.2	yes

Experiment 2. Experiment 2 was much more complex. It required that the user first find chemical identifiers for a list of five chemicals and then use two system query lists to identify pertinent abstracts. The user was also given some latitude in the choice of databases. The effects of adding terms is shown in the increased difference in the mean number of keystrokes (Table X). Script mode required 14.5 times fewer keystrokes, while time searching for citations in the remote system was reduced by 52.6%, compared to searching the databases directly.

Experiment 3. This experiment was similar to experiment 1 in that information was required for only one chemical. The major difference was the creation of a user query list. This should increase the total terminal time for the script search by the amount of time the user spent in the text editor creating the query list. It should also increase the number of keystrokes required in script mode (Table XI). In fact, the script mode required 5.7 times fewer keystrokes, and the time spent searching for citations was reduced by 21%, compared to searching the databases directly.

The retrieved citations were printed from one trial each of the script and direct searches for each experiment by each user. The user then evaluated this output as *very relevant*, *moderately relevant*, or *not relevant*. Before looking at the differences, it is useful to consider the factors that can affect search output. (1) Number of records retrieved is determined by (a) records in database at the time the search is conducted and (b) search terms used for chemical identifiers and query list terms, including special search features such as truncation, text work qualification, and adjacency searching. (2) Duplicate records in some databases can exaggerate the number of differences. (3) The relevance of the records retrieved is a subjective judgment: (a) differences in technical background or a different view of the purpose of a given search will cause a variation in judgment; (b) the same searcher may classify the same documents differently; (c) lack of variation in the relevancy judgments may either be due to internal consistency or may simply not represent independent judgments.

Overall, there was very little difference in the output. Given the subjective nature of the relevancy classification, the differences are even less significant. In experiment 1, which was the simplest search and involved no user decisions in script mode, all variations in output were due to either file updates or user error. Experiments 2 and 3 required decisions about

the use of search terms, and this added another source of variation. For an individual user, direct search did not better than the scripts in retrieving relevant citations.

In general, the results of the study show that the CSIN script mode is more efficient than a comparable direct search of vendor databases. Keystrokes are reduced by a factor ranging from 5 to 14, and total time spent at the terminal as well as time connected to the remote resources is significantly shorter for the script search. When the searches are in fact comparable (i.e., the identical search terms are used for both searches), there is no difference in output. The script search is more reproducible and less error prone. Analysis of the trail files of the direct searches yielded suggestions for the improvement of the script logic. The users conducting the searches also had many valuable suggestions for system improvement such as removing the requirement for chemical identifiers in every script search and allowing for the inclusion of database-specific search *codes*, as opposed to search terms.

The productivity experiments were something of a disappointment. They seemed likely to provide good information on the benefits of the CSIN concept. However, the amount of effort required to run them precluded having a statistically significant sample of users. Productivity experiments will be repeated in the future with less ambitious goals; in particular, we plan to run a single experiment with many more replications to obtain a base line for future comparisons.

SUMMARY OF CONCLUSIONS

CSIN is being tested by a diverse community of users, as measured by their previous experience with and frequency of need for searching on-line database systems. The study indicates that they are using the system to do useful work. At the same time, they are providing valuable input as to the limitations of the present implementation of the system and the directions it should take for the future. System usage is steady increasing as the user base expands. Increased usage has not adversely affected system performance.

The training workshop is well received. The attendees rate the training materials, visual aids, and level of instruction from good to excellent. They are able to return to their home organizations and use the system successfully. The telephone service also received good marks. It is perceived as a valuable service staffed by helpful, knowledgeable people.

CSIN provides a viable alternative for searching for chemical information, especially for the user who is unfamiliar with the various component systems. For certain kinds of searches, it requires fewer keystrokes and less time than searching the database systems directly without degrading the output.

In summary, those aspects of CSIN covered by this evaluation show an overall favorable rate of system acceptance. Given the incomplete nature of the CSIN prototype at the time of this evaluation, it seems highly probable that the addition of selected user-identified enhancements would result in an even greater rate of acceptance.

The first reason for a system evaluation is to monitor the viability of the system, and the second is to facilitate planning for future development. There are two ways to evaluate a system like CSIN. One is through a formal evaluation; the other is through the continuous solicitation of user feedback. An organization such as the USO is ideally situated to conduct such an evaluation. It has two important attributes: ready access to the users and an understanding of what to measure and how to measure it.

In terms of the formal evaluation, the initial user survey was very useful in defining the user population and identifying their information-seeking behavior. The follow-up survey was less useful. For a variety of reasons, most CSIN trainees did not become actual users until about 2–5 months after their initial training. Therefore, at 6 months they had not been using the system long enough for it to affect their information-seeking behavior. The on-line survey was the least useful in terms of the information it provided, and it also annoyed the users.

The system usage files provided very useful data in terms of how much the system is being used, what its growth rate is, and which parts of the system are being used most. The productivity study was also useful in showing the viability of the concept and pointing toward areas for improvement. However, it is difficult, because of the amount of time required to do the experiments, to obtain a sufficiently large sample size for drawing conclusions.

A telephone service, readily available to all users, is essential to gathering continuous feedback. Conversely, the telephone service follow-up provided essentially no useful information. A better indication of its success is its continued use. The workshop evaluation surveys were very powerful in providing instant feedback and were used extensively in the evolution of the workshop. In fact, each of the data-measurement devices employed in the formal study is useful for the continued monitoring of the system. The formal evaluation defines a system at a specific time. The results of the formal evaluation served to confirm and validate anecdotal impressions the USO already had about what needed to be changed and what new things would be valuable.

We will continue to use the initial user survey to make sure we know who our users are. We will increase the time of the follow-up survey to 10–12 months and monitor the impact of CSIN on our users. We are currently redesigning the on-line survey to provide some useful information on the success of individual sessions without its current drawbacks. System usage is evaluated on a monthly basis. Users are listened to daily.

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