

## Users' Reactions to a Corporate-Designed Current-Awareness Bulletin

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Having attained a relative degree of sophistication in automated data processing and photo-composition techniques, producers of information services, aided by scientists, are now looking at ways to improve the nature of the services offered, i.e., to generate services more specifically tailored to the needs of individual segments of the scientific community. This paper discusses users' reactions to an experimental pilot service designed by Chemical Abstracts Service, Exxon Chemical Technology, and the information services of Exxon Research and Engineering Company. An information package derived from the CAS data base was designed for a small, but geographically dispersed group of scientists and engineers with a common subject interest (Exxon Chemical Technology staff). The service has been in operation for over a year and the reactions of the users have now been carefully studied.

### BACKGROUND

Currently, three main avenues for effective current awareness are available to research scientists: Selective Dissemination of Information (SDI) profiles can be contracted from several commercial organizations or from an in-house information service; commercial abstract bulletins such as *CA Selects*, aimed at broad interest groups, can be purchased; or scientists can keep up to date by carefully selected reading in a given area of specialization. The cost and effectiveness of these methods vary according to subject complexity, audience size, and need for abstracts, among other factors. The results of the CAS/Exxon experiment have provided an alternative method of current-awareness: an abstract bulletin specifically tailored to Exxon's research and business needs.

In recent years Exxon Chemical Technology has decentralized research activities by moving them away from the major site in New Jersey. Research facilities have been built close to major plant operating sites in the U.S., Canada, and Europe, although the main library and information support facilities remain centered in New Jersey since it would not be feasible to duplicate them at each site. Thus, while the research scientists and engineers have thereby become more accessible to and cognizant of the needs of the production and operating staffs, the strong and important support of both traditional and modern information services has become less accessible to research staffs. Consequently, both the Chemical Technology staff and the Exxon Research Information staff quickly recognized that there was a need for an effective subject-oriented, current-awareness bulletin that was accessible at all plant locations.

At about the time that these operating changes took place at Exxon, Chemical Abstracts Service began experimenting with *CA Selects*.<sup>1</sup> *CA Selects* is a series of printed bulletins on specialized topics derived from the CAS abstracts information base. Both CAS and Exxon felt that the approaches used by Blake et al., in developing *CA Selects* would be equally workable in designing an information package specifically directed toward Exxon's corporate interests and needs.

### CAS/EXXON EXPERIMENT

In early 1977, Exxon Chemical Technology staff, information scientists, and CAS personnel met to explore the possibility of using the CAS information base to generate a proprietary, in-house current-awareness bulletin similar to *CA Selects*. Two search profiles, intended to be flexible enough to respond to constantly changing needs, were developed as

a result of the meetings and were "fine-tuned" by early 1978. At that point, two bulletins, collectively entitled, *Updates* for Exxon, went into routine production. Each biweekly issue contained those abstracts and bibliographic citations recently published in *Chemical Abstracts* that pertained to Polyethylene and Chemical Intermediates.

Both CAS and Exxon management were very interested in the relative benefits (from a user perspective) of the *Updates* as compared with the more traditional vehicles for current-awareness. Consequently, a survey was developed by CAS Market Research staff and distributed to users after they had several months experience with the *Updates*.

### SURVEY METHODOLOGY

In May 1978, an interview form was designed to help identify some of the possible benefits or problems associated with use of the *Updates*. The information collected in the ensuing interviews was used to design a questionnaire that was mailed to each reader of the *Updates* in July 1978. The total response rate was slightly over 70%, representing 78 usable questionnaires. Coding of the questionnaire for computer analysis was done manually at CAS. Tabulation and initial analysis by computer using the Statistical Package for the Social Sciences (SPSS)<sup>2</sup> were also done at CAS.

### SURVEY RESULTS

While the Exxon chemical scientist and engineers involved in the study were located in several geographic areas, the great majority of the respondents were located in Baton Rouge, as shown below.

location	% respondents
Baton Rouge, LA	70
Belgium	21
Linden, NJ	6
Baytown, TX	3

The job titles of the *Updates* users ranged from Contact Engineers to Technical Department and Operations Department Managers, although over two-thirds of the respondents were involved in research activities at the Associate or Senior level.

title	% respondents
engineer (and eng. assoc.)	59
manager	19
chemist (and res. assoc.)	17
other scientist	5

Among the total group of respondents, 40% had a Ph.D., 25% a master's, and 35% a bachelor's degree.

An obvious consideration for evaluating the relative effectiveness of a current-awareness service is the type of information resources currently available to and utilized by the survey group. The participants were asked to identify the four main sources of information important to them. Eighty-five percent indicated journals as one of the main sources; corporate (proprietary) information, colleagues, and books comprised the next largest source indicated, followed by general abstracting services. About two-thirds of the respondents claimed to read between one and six journals regularly, while four people read over eleven journals on a regular basis.

Other obvious criteria for a good current-awareness service is timeliness and a high usage rate. CAS originally intended that all recipients would receive a personal copy of the *Updates*, but the survey revealed that about 65% of respondents actually received a personal copy. The responses indicated, however, that over half of the users would be willing to share a copy with a small number of others. Over 60% of the users indicated that they reviewed the *Updates* within two days of receipt and over 80% indicated that they took less than 20 minutes to review the contents. The amount of material available for reviewing by users is apparent from the following figures:

<i>Updates for Exxon</i>	av. no. of pages/issue	av. no. of abstracts/ issue
chemical intermediates	31	309
polyethylene	8	80

Without the availability of the *Updates*, the information relevant to these two subjects could be reviewed in a corresponding issue(s) of CA. The equivalent figures for most related sections of CA, however, are:

	av. no. of pages/issue	av. no. of abstracts/ issue
organic sections of CA	128	1280
macromolecular sections of CA	95	950

Other sections of CA may also contain references to "Chemical Intermediates" and "Polyethylene" which the individual searcher may or may not pick up in his search. Such references, however, would ordinarily be picked up by the *Update's* profile.

The quality of presentation and the style of abstracted information have previously been shown<sup>3</sup> to be of considerable importance in the effective utilization of current-awareness resources. The appearance and content of the abstracts in the *UPDATES* are identical with those printed in CA. The survey showed that 90% of the respondents indicated that they read each title in the section of interest to them.

Since *Updates* for Exxon are intended to be current-awareness bulletins, the actual way that users handle the bulletins is of interest. Close to half of the recipients dispose of the bulletin in one way or another; about one-third retain the bulletins or portions for future reference, as shown below.

	% respondents
discard issue	26
route to others	20
file whole or part	34
other	20

The relatively high degree of bulletin disposal reflects the expected reaction of users who feel confident that they are receiving complete and current information.

Another measure of the effectiveness of a current-awareness bulletin, both in terms of timeliness and relevance, is the

volume of requests for original articles, abstracts, etc. Ninety-one percent of those answering a related question indicated that they request between one and three articles per *Updates* issue. Also in the survey, four individuals indicated that the *Updates* have replaced one of the sources previously used for keeping up to date with appropriate technology; two stated that computer searches, presumably of the SDI-type, have been replaced; and the others indicated that the *Updates* had replaced journals and abstracting services.

The survey questionnaire also addressed the issue of alternatives to *Updates*. In the absence of *Updates*, targeted toward specified technologies, 40% of the current users indicated that they would have to spend more time personally reviewing the published literature. Another very large group, over 30%, replied that they would do no current-awareness reading. Although this finding in itself provides reason enough to continue the *Update* bulletins, further analysis was done to determine the composition of the 30%. This group was composed mostly of scientists/engineers (16 of 22) who would seem to have particular need for the information in the *Updates* as opposed to managers (6 of 22) who may or may not have need for the current-awareness aspects of the *UPDATES*.

## BENEFITS

The foregoing responses and reactions to *Updates* are factual and objective in nature. However, such responses neither show a monetary value nor provide a basis for estimating financial return. The perceived value of any information service is the measure of its success or failure. The following statements reflect the respondents' opinions of the value of the service, and some indication of a benefits-to-cost ratio for Exxon.

Respondents to the questionnaire provided a large number of subjective and certainly meaningful positive responses. Quantification of these responses is not really possible, nor is elaboration, since respondents were not required to identify themselves. Typical of these subjective responses are:

- six to eight hours saved per month
- money saved in the research effort
- provided new ideas for research and literature searches
- provided enough information to work the problem
- identified hard to analyze additives
- redirected our investigation
- avoided having to scan the entire Macromolecular section of CA
- have picked up ideas that could have been missed in a manual CA scan
- information saved much time
- found good explanation and solution
- identified patents in two separate areas
- provided information on a competitor's process

The vast majority (96%) of the respondents felt that the *Updates* do meet their expectations for a current-awareness service. As to relevance, about 99% of respondents felt that the information in *Updates* was relevant to the subject area of interest. Almost 90% stated that they were not aware of any relevant abstracts being missed.

The quantification of benefits is often difficult to achieve. However, some directional indications of value are available from the responses to the questionnaire. Among many subjective comments on this was one that identified a saving of three-four hours of reading time twice a month. Probably the majority of users do their professional journal and abstract reading in noncompany hours; thus for a highly conservative estimate of value benefit to the *Updates for Exxon* user community, we may use a figure of two hours per month time saving. On this basis, the following estimated cost savings to Exxon in terms of staff time are obtained. (It is not clear if this should be costed as a savings to the company or the in-

dividual, since the proportion of reading done on personal time vs. company time is not known.)

time value, 2 h/month  $\times$  \$30-50/h/professional =  
\$60-100 saving/prof/month = \$720-1200/prof/year

Even at this conservative value level, the ratio of benefits to costs for the *Updates* is well over a factor of 10.

### EXPERIMENT SUMMARY

*Updates for Exxon* have effectively filled a recognized gap in access to and awareness of current developments in technology pertinent to the needs of Exxon Chemical. The contents of the *Updates*, as currently prepared, are relevant to the needs of over 90% of the recipients and substantial numbers of original articles are requested on the basis of *Updates* abstracts.

An important finding is that in the absence of a targeted subject-oriented bulletin, such as *Updates*, a large number (over 30%) of users would attempt no current-awareness program at all, while others would request more literature services or attempt, at a cost in time, to find nearby library resources to fill their needs.

This experimental program has provided CAS with the opportunity to demonstrate its ability to produce timely and relevant information in a package designed for a geographically dispersed group of Exxon scientists and engineers with a common subject interest. The result for the Exxon staff has been access to information support where there was little on site. Savings to Exxon in time and other benefits are estimated

to be substantial and sometimes directly measurable.

### BEYOND PRESENT UPDATES

Variations to the service described in this paper are possible, and these could enable information base producers to provide the end users of information with potential results not unlike this experiment with Exxon. Some possibilities are: business information to support scientific investigations; services based on information needs stimulated by the regulatory actions of government agencies to satisfy the responsibilities of patent, engineering, health, personnel, and legal departments; services which are responsive to the interests of a targeted audience and combine information from a variety of bases.

The advent of powerful information-based production systems affords new opportunities for the technological community to request information such as found in individualized information services and for producers to satisfy these requests. Indeed, studies are currently underway with Exxon to develop the concepts utilized in the *Updates* into other fields of technology and business interests.

### REFERENCES AND NOTES

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## Unique, Unambiguous Representation of Chemical Structures by Computerization of a Simple Notation

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SNN (Structure-Nomenclature Notation) is based on the features of chemical structure and uses rules derived from conventional chemical nomenclature. The molecule is split into fragments by structure-determining vertices. These fragments are coded (C number and heteroatom symbols) and linked together by special signs. The computer assigns to each compound the BUS (Beilstein Unique Sequence) number, according to which the compound can be assigned its proper place within the Beilstein System. Another canonical representation derived from SNN is the Fragment Connection Table (FCT), which requires significantly less machine storage than conventional atom connection tables.

### INTRODUCTION

The best and least ambiguous form of representation of a chemical compound is its structural formula. Furthermore, a linear representation is desirable, briefly characterizing the molecule and making it easy to locate in registers. Nomenclature has up to now fulfilled this task, albeit in an ever-worsening manner, as common names are frequently not unique and sometimes ambiguous, and systematic names are often difficult to handle because of their length, and complicated rules are called for.

Several linear notations manage a fairly brief form of representation, but the rules are so complicated that general use is out of the question. The aim of this paper is to describe a method which combines well-known elements of nomenclature and well-known elements of graphic representation to a uniform linear notation. This notation must be readily under-

standable, easy to handle, and suitable for computerization.

The method is founded upon the pioneering work of F. K. Beilstein, universally recognized to be the first to organize organic chemical compounds into a reference book in a systematic manner.

**Some Historical Background of the Beilstein System.** In 1881 Friedrich Konrad Beilstein published the first edition of the handbook that is named after him. After the third edition the number of known chemical compounds rose to over 100 000, and it became clear that a special system needed to be developed in order to catalog logically the multitude of compounds. The Beilstein System in use to the present day was developed and tested between 1907 and 1912 by B. Prager, P. Jacobson, P. Schmidt, and D. Stern. Great care was taken that each compound would be unfailingly classified in its proper place.