

new social and economic dimension to technological planning, and that puts a stamp of relevance on innovation.

Technological choices have to be made, in any event, one way or another. The question is: Will such choices continue to be made willy-nilly, haphazardly, cavalierly, and in a slipshod, profit-centered, disorganized manner? Or can policies and priorities somehow be set in a more rational, deliberate way and based on broader and better points of view? Can we learn to identify and weigh the trade-offs in the decisions we must make, and recognize how a decision made today may irrevocably affect the decisions we may want to make tomorrow?

What the advocates of technology assessment are seeking are hard-headed, practical methods to do just these things. Few of them would claim that they know how to do it now, at least in depth. We have some pilot studies, but little more.

I have said little about how technology assessment might impinge upon the handling of chemical literature. I leave this to the reader's imagination and intellect. But I do suspect that technology assessment will place some novel demands on the type of information that must go into the development of new chemical products and processes.

The Untapped Resource—Unpublished Manuscripts*

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The organization of a centralized, cumulative collection of unpublished manuscripts is described, whereby research directors, administrators, and laboratory scientists can be periodically alerted to progress and discovery within their respective fields. Classification and publication information is presented on 394 unpublished manuscripts maintained in the Baxter Laboratories, Inc. Unpublished Manuscript File from December, 1960 through March, 1965. Of the 302 manuscripts accepted for publication, 51% were published within 4 months and 90% within 16 months of receipt into the file. Clinical papers—written in English, treating clinical sciences (mainly internal medicine), and eventually published in clinical journals—dominated the collection.

In an era of scientific advances ranging from lunar exploration to organ transplantation, it is insufficient for the progressive scientist merely to keep abreast of the literature in his field; he must keep ahead of it. Research organizations have a responsibility to know what subjects need investigation, to be aware of and evaluate research trends, and to inform and advise those who must determine the course of research efforts.¹ Delays in present publication procedures or the unsuitability of data for publication seriously retard such research planning.

Frequently, through contact with his contemporaries at scientific conferences, the modern scientist is informed of innovations prior to their publication. A system whereby scientists could be periodically alerted to progress and discovery within their respective fields would serve as the epitome of vigilance. This service can be accomplished by means of a cumulative collection of unpublished manuscripts.

Centralization of the collection ensures rapid access of the manuscript to research directors, administrators, and laboratory scientists; and positive control, thus preventing abuse of the confidential status of any manuscript in the file.

In accord with the traditional spirit of scientists, most investigators are generous in the prepublication disclosure of the results of their research work. Consequently, the acquisition and collection of manuscripts submitted for or

prior to publication present no major obstacle to the establishment of an unpublished manuscript file.

ESTABLISHMENT OF THE FILE

Baxter Laboratories, Inc., Morton Grove, Ill., instituted a storage system for unpublished manuscripts in 1960. Sources of these manuscripts include internal generation—i.e., authorship by company personnel; outside consultants; outside investigators—i.e., basic scientists or clinicians investigating either potential or established products; preprints distributed at scientific conferences; editors transmitting galley proofs citing Baxter products; committee membership in scientific and professional societies and quasi-governmental councils; ghost writers; and other industrial firms.

DESCRIPTION OF THE PROCESSING PROCEDURES

Upon acquisition, an unpublished manuscript is labeled, classified, duplicated, and filed under suitable security regulations. In labeling a manuscript, the following identification criteria are indicated: full name of author(s); institutional connection; security classification—i.e., a description of the confidential nature of the material and limitations on its distribution; pertinent circumstances related to the acquisition; and author's plans for publication, if known. Classification of a manuscript places it in one of the following major categories: clinical paper, basic science paper, applied science paper, abstract, review, or lecture. After being properly labeled and classified, an unpublished manuscript is duplicated and filed.

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Table I. Disposition of Manuscripts

	Period I Dec. '60-Jan. '62 (13 mos)	Period II Jan. '62-Jan. '63 (12 mos)	Period III Jan. '63-Feb. '64 (13 mos)	Period IV Feb. '64-Mar. '65 (13 mos)
Published	78	72	70	82
Unpublished	18	26	30	18
Total	96	98	100	100

To execute these processing procedures in an orderly fashion, a custodian of the files was appointed, and the following regulations observed: the confidential status of an unpublished manuscript is preserved at all times, the file is maintained under lock and key, and access is on a "need to know" basis—i.e., certain designated manuscripts can be obtained only with the expressed permission of the author, while others are freely distributed. In every case, the security stipulations of the author are honored meticulously.

Periodically, an edited list of the files' holdings is distributed to appropriate individuals; those desiring copies of manuscripts may request them from the custodian by phone or memo. This confidential list incorporates the recent entries into the file together with the popular documents of past issues. Authors are encouraged to relay information concerning the submission, acceptance, or publication status of their manuscripts to the custodian of the file. In particular, new submissions are solicited in the preface to each list. All unpublished manuscripts remain in the file until recognition of their publication, upon which the publication terms are recorded, and the manuscript is transferred to a reprint file. Interested parties are then informed of its publication.

DATA ANALYSES

To explicate the recordings of this storage system, the following analyses present publication and classification information on all manuscripts maintained in the Baxter Unpublished Manuscript File from December, 1960 through March, 1965.

Table I illustrates the ultimate disposition of 394 manuscripts amassed in the unpublished manuscript file in the course of four periods, each period acquiring approximately 100 manuscripts. (Six other manuscripts were withdrawn from the collection—two unidentified entries from Period I and four duplicate entries, two from Period I and two from Period II. These manuscripts were not included in the final total.) The impressive 78% over-all publication rate attests to the feasibility of a prepublication alerting system. Since three-fourths of the file eventually merited publication, the value of the file as a timely communication device is apparent.

The potential marketing edge afforded by this storage system can be precisely weighed in terms of "lead-time"—i.e., the time from the acquisition of the manuscript until its actual publication. Table II presents the lead-time, in range, median, and mean values, gained by storing the 302 manuscripts which ultimately attained publication.

The data points representing volumes of unpublished manuscripts over time (months) are plotted in Figure 1. An exponential curve was fitted to these data by a least squares regression program. The resulting curve revealed that about one-half (51%) of the manuscripts were published within four months of acquisition—critical months in the ever-competing field of scientific research. Ninety

Table II. "Lead-Time" (Months) before Publication of Manuscripts

	Period I	Period II	Period III	Period IV
Range	< 1 to 36	< 1 to 86	< 1 to 29	< 1 to 58
Median	4.0	5.0	6.0	5.0
Mean	6.2	8.3	7.4	8.1

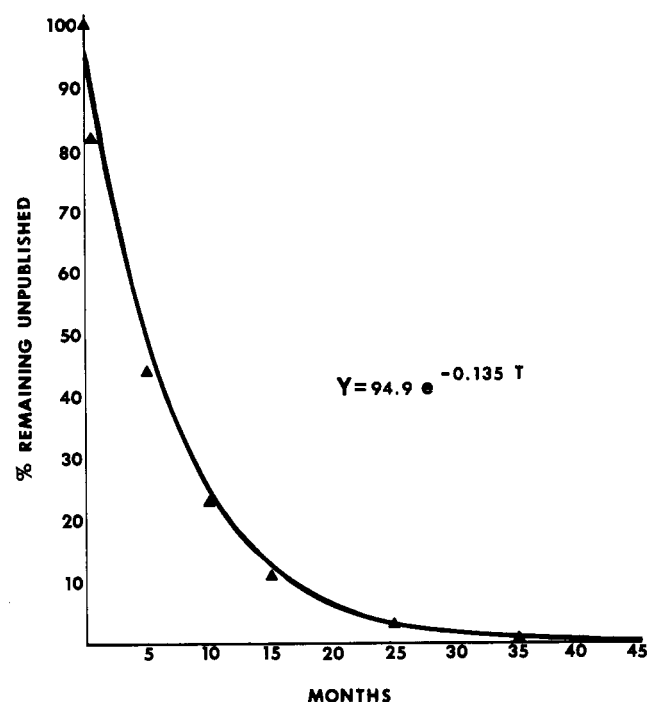


Figure 1. Time lag in publication of 302 manuscripts

per cent of the manuscripts accepted for publication were published within 16 months of receipt into the file. In 1% of the cases, the delay in publication exceeded three years.

Four languages were represented among the nearly 400 manuscripts obtained during these collection periods (Table III). English was the most prominent language, comprising 91% of the total. French manuscripts represented 8% of the sample, while Spanish and German accounted for about 1% each.

Further classification placed the 394 manuscripts in one of the following categories: clinical science papers, basic science papers, applied science papers, abstracts, reviews, lectures, or miscellaneous (Table IV).

The 302 published manuscripts (Table I) appeared in various publication forms as defined in Table V.

Continuing the classification, each manuscript was associated with one of three subject classes, namely clinical, basic, or applied science (Table VI).

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Table III. Languages Represented

	Period I	Period II	Period III	Period IV
English	88	94	97	78
French	6	2	2	21
Spanish	2	1	1	—
German	—	1	—	1
Total	96	98	100	100

Table IV. Categories of Manuscripts

	Period I	Period II	Period III	Period IV
Clinical papers	48	48	31	30
Basic science papers	16	30	22	18
Abstracts	22	12	20	9
Applied science papers	—	—	11	21
Reviews	5	5	2	4
Lectures	1	—	9	12
Miscellaneous ^a	4	3	5	6
Total	96	98	100	100

^aMiscellaneous includes letters to the editor, editorials, popular science papers, books, meeting minutes, and theses.

Table V. Publication Forms of Manuscripts

	Period I	Period II	Period III	Period IV
Clinical	58	52	44	32
Basic science (Biol)	15	8	7	16
Basic science (Chem)	—	2	7	14
General science	1	—	2	—
Proceedings of scientific meetings	3	7	8	18
Chapter in book	1	2	2	1
Miscellaneous ^a	—	1	—	1
Total	78	72	70	82

^aMiscellaneous includes one pamphlet distributed in conjunction with a scientific exhibit and one government report.

Table VI. Subject Matter of Manuscripts

	Period I	Period II	Period III	Period IV
Clinical science	57	50	31	51
Basic science	39	48	58	27
Applied science	—	—	11	22
Total	96	98	100	100

Table VII. Clinical Science Subdivisions

	Period I	Period II	Period III	Period IV
Internal medicine	43	24	17	29
Surgery	1	7	2	3
Hematology	1	6	4	4
Endocrinology	3	2	1	1
Clin. biochemistry	—	5	3	2
Therapeutics (Other than above)	9	6	4	12
Total	57	50	31	51

Table VIII. Basic Science Subdivisions^a

	Period I	Period II	Period III	Period IV
Chemistry	1	10	2	1
Natural history	3	1	3	4
Physiology	—	2	8	1
Biochemistry	10	10	11	—
Pharmacology	25	20	22	20
Clinical pathology	—	5	12	1
Total	39	48	58	27

^a U.S. Library of Congress Classification System.

Table IX. Sources of Manuscript Acquisition

	Period I	Period II	Period III	Period IV
Outside investigator	56	43	16	7
Company author	7	7	11	11
Outside consultant	8	10	15	6
Government agency	5	4	3	1
Preprint, scientific meeting	—	1	11	17
Ghost writer	4	9	—	1
Another firm	—	7	—	27
Friends	14	12	33	22
Miscellaneous ^a	2	5	11	8
Total	96	98	100	100

^a Miscellaneous includes gifts of editors and associates (nonauthors), abstracts written by Baxter representatives, and purchases.

Subdivisions within these categories, listed in Tables VII and VIII, manifest the trends of scientific writing during a given period of time which in turn reflect the scientific activities in the laboratory and clinic.

The final analysis involves the sources of manuscript acquisition. Although briefly cited previously, the sources are more fully identified in Table IX.

ADVANTAGES OF THE SERVICE

A unique collection is presented which has performed a valuable service to the employees of a research and development organization. The unpublished manuscript file has provided timely and useful information to research scientists, enabling them to improve their thinking and to make more rapid progress in their laboratory research. The file has also given guidance and mental stimulation to the directors of Research and Development. In some cases, the collection has afforded both time and knowledge in the design of advertising strategy—time which otherwise would have vanished in delay due to the existing lag time between completion of research and publication in appropriate journals. At no time has there been any violation of trust of the authors who deposited manuscripts in the collection. Furthermore, the manuscripts have sometimes furnished necessary data for inclusion in new drug applications filed with the Food and Drug Administration in Washington. Patent attorneys sometimes have found the file a fruitful source of information in drafting their applications.

LITERATURE CITED

- (1) Roberts, I., "The Dissemination and Use of Research Reports," *Int. Nurs. Rev.* 14(5), 43-8 (1967).