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ABSTRACT

The purpose of this study is to assist the university or college archivist in his understanding of the problems involved in processing an important type of archival material that relates to scientists and engineers. It provides perspectives, suggestions, and facts which will assist archivists in identifying, collecting, and preserving historical documentation needed for the appraisal of academic contributions to scientific knowledge, the dissemination of scientific information and scientific education. The policies and procedures given are generally applicable to scientific and technical documentation. (MF)

Archival Evaluation and Processing of University Records Relating to Science and Technology

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Introduction

Science and technology have a pervasive influence on modern society. Their development in the twentieth century has placed unprecedented demands on a youthful and unprepared archival profession. The exponential expansion of scientfiic research and knowledge and the impact of recent technology on documentary systems present a major challenge to archivists. Scholarly research on the development of science is hampered by the sheer bulk of documentation and the lack of effective techniques for its evaluation. Archivists and manuscripts curators must recognize the importance of scientific and technological source materials and collect those useful in research for biographies, institutional histories, popular science narratives, periodical articles, textbooks and monographs on the history of ideas. University or college archivists often have the best opportunity to acquire publications, official files and personal papers relating to scientists and engineers. I hope this study will assist them in understanding the problems involved in processing an important type of archival material and encourage them in the tasks of evaluation, transfer, description and preservation.

Universities have made major contributions to the development of science and technology in manpower, training and new knowledge. In making these contributions, they have created a huge volume of documentation, which archivists must evaluate and select the small portion which will be prepared for research use. Between 1890 and 1920, institutions of higher education assumed a leadership role in American life. Only after the first generation of professors passed from the scene, did universities and colleges establish archives to document the contributions of institutions and individuals. In 1939, the first major university archives was instituted at Harvard University. The University of Illinois considered an archives in 1920, but did not establish a program until 1963. The national trend to support scholarly research in universities and colleges has resulted in the creation of about 600 archives. Archives in academic institutions are predicated on the assumption that the work of the faculty and students is as important as that of elected representatives, civil servants, corporate management and ecclesiastical hierarchy. The university archives is an integrative force which recognizes and strengthens faculty ties to the university as a community of scholars. By fostering scholarship, especially research in intellectual and social history, the archives helps to establish the character and influence of the institution.

In developing archival institutions, Americans lay the bases for serious research on contributions of their fellows to the development of society. Archives are not only the memory of society, but the key to its improvement. The archivist is responsible for preserving the means of communicating with the future and the past. For him there is one culture and one power - that of the mind. He evaluates the work of thousands of men and selects the significant material needed for future administrative use and scholarly research. All information recorded, policies stated and actions reported document activities that may interest a researcher. The archivist determines if the record has sufficient value to justify the cost of continued retention or preservation in archival custody. In most large organizations, at least 90% of the paperwork does not have such value. The main intellectual challenge of archival work is the opportunity to study and evaluate the mind of man as expressed in documentation and select the portion that should be kept. The archivist assesses present and prospective research interests, weighs available expert opinion and accepts responsibility for decisions concerning records preservation. Archivists are generalists in the collection and evaluation of documentation and specialists in the arts of preservation. Archives are unique. They are not acquired, processed, described or used like books and published material. Relying on the principle of provenance and the doctrine of respect des fonds, archivists consider the association of documents in the context of the creating institution's or individual's needs. Archival material is arranged by source, rather than by subject.

The evaluation of scientific and technological records is a common archival problem. Archivists in government and private corporations also face a flood of paper, film and tape generated by the rapid development of modern science and technology. A study

directed toward the university archivist should benefit his colleagues in other institutions. The policies and procedures given on the following pages are generally applicable to scientific and technological documentation wherever it may be found. As few scientists become historians and few historians master science, few archivists will gain a detailed knowledge of the scientific origins and the historical uses of the documentation they preserve. I hope that those who read this study will find perspectives, suggestions and facts which will assist them in identifying, collecting and preserving historical documentation needed for the appraisal of academic contributions to scientific knowledge, the dissemination of scientific information and scientific education.

I thank the Council on Library Resources and the University of Illinois for the financial support of this study. The advice and counsel of the University faculty, fellow members of the Society of American Archivists, the Society's Committee on Scientific and Technological Manuscripts and interested historians of science, archivists, records managers and custodians of scientific records in a dozen universities and several federal agencies have been indispensable. The work of graduate research assistants Richard Saunders, Marcia Tuckey Dorfman, Evaggelos Vallianatos and Harry Fara and many undergraduates has been very useful in compiling bibliographies and testing archival methodology. The supervisory work and typing of Mrs. Jane Hutson and Miss Toby Fishbein kept the project on schedule. In offering an initial discussion of a major professional problem, I ask your tolerance of its shortcomings and invite you to join in achieving its goal - a deeper understanding of modern man.

Maynard Brichford
University of Illinois Archives
May 1, 1969

I. Scientific and Technological Archives

Archives are records kept for research or administrative use after the initial need for their creation has been met. The archivist selects those files which will most effectively document activities that may interest men in the future. The essential problems of the university archivist do not differ from those of his counterparts in federal, state and local governments; business; industry and professional associations. Universities are a newer area of archival interest and they have developed in an age when science and technology have undergone rapid growth, but their records relate to the same general problems of institutional development and management. One of the most unique and important factors in the spectacular growth of American universities in the past three generations has been their speed in adapting to, and their success in meeting, current social needs. They trained farmers' sons to be businessmen, businessmen's sons to be engineers and engineers' sons to be scientists. The documentation in universities is a cross section of a vital element in American life.

Science and technology have not produced records which are essentially different from those in other areas of human activity. Policy statements, administrative subject files, procedures manuals, fiscal records, case files, data storage units, work papers and research publications are common to both the office and the laboratory. Many documentary problems and their solutions have been the same for the scientist and the non-scientist. Archivists have borrowed management skills to meet the modern problems of volume and complexity of documentary sources. Office systems, paperwork controls and records management result from the application of new techniques to current problems, rather than the subject content of the records that are created or maintained. The major professional challenge confronting archivists is the development of a research competency capable of evaluating the varied and changing documentation produced by modern society.

One of the most unique characteristics of records relating to science and technology has been that they have received less attention from historians and archivists. The gross national archival budget has long been weighted toward military, genealogical, political and diplomatic activities. A very interesting study could be made of the total sum spent in this country for archival programs by breaking it down into subject matter areas and objects of expenditures. A survey of 20,629 collections listed in the National Union Catalog of Manuscript Collections shows 739 or 3.6% in the fields of science and technology for the past 100 years. Considering the impact of these aspects of modern life on society, archivists and manuscripts curators face a serious challenge. Historical research methodology will lose ground if we must rely on the papers of politicians, missionaries, businessmen and war veterans to document the development of modern society.

II. Evaluation

A. General Considerations

The most significant archival function is the evaluation of the mass of source material to select that portion that may be kept. This is the area of the greatest professional challenge to the archivist. He must assess present and prospective research interests, weigh available expert opinion and accept full responsibility for decisions concerning the preservation of records. Buildings for service, equipment for preservation and methodologies for operations are less important than the quality of the professional staff engaged in evaluation.

Looking at scientific and technological records from the viewpoint of a university archivist, the basic principles of archival evaluation are pertinent. All records have some research value. The information recorded, policies stated and actions reported document activities that may interest the researcher. The basic question is - Does the record have sufficient value to justify the costs of its acquisition, processing and retention in archival custody? The archivist must weigh his financial resources against the prospective usefulness of the records he acquires.

The archivist seeks those records with the greatest research significance, covering the broadest range of activities for the longest time, with the smallest volume of the most easily understandable records. He seeks records of policy decisions, records which reflect the functions of the organization, or the interests of the individual, and which are representative of a significant range of institutional or individual activities. He may select other records for their informational content. Their value is primarily as well-organized, accessible sources of useful factual data.

The intellectual challenge of archival work is its most valuable asset. For those who are willing to accept the opportunity to study and evaluate the mind of man, it offers a career of unlimited variety and depth. In a discussion of records appraisal, Lewis Darter pointed out that the archivist must know his subject matter. "He must be an economist, a sociologist, a scientist, an engineer, military strategist, a theologian; there is no end to the demands upon him."[1] The university archivist may work in all of the academic disciplines and scientific specialties. In compiling the working list of fields for a bibliography for the history of science and technology, we included 376 areas of specialization. Only if the archivist is challenged by evaluation, can he deal effectively with the records of science and technology.

The archivist is far more than an artful conversationalist who unlocks the secrets of the past by extracting advice, opinions and documents from others. He is no more procurer, than he is "dead file clerk." He accepts the responsibility, assembles the evidence, makes the diagnosis and prescribes the remedy - all without leaving a thumbprint on Clio's scales. While the archivist must bear primary responsibility for the evaluation and preservation of source material, his success depends on the extent to which he can enlist the support of others. The grantor, the researcher, the journal writer, the textbook writer and the historian are a progression. Each must understand the significance of his role and the importance of documenting the processes of change in a manner which will facilitate communication within his discipline and with the public.

The most difficult task in archival evaluation is deciding that a record is not likely to be needed for scholarly research. Here the archivist must look at current scholarship, research trends and his own experience in research work. As an academic discipline, the history of science and technology is essentially a twentieth century development. Historians of science are more likely to be concerned about the problems of source materials in the seventeenth century. Their professional orientation has been toward ancient, medieval, renaissance and seventeenth through nineteenth century science. The historians of science who participated in the 1960 Isis Conference on Science Manuscripts discussed the problems of preserving nineteenth and twentieth century scientific

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[1]Lewis J. Darter, Jr. "Selective Retention of Records of Archival Value" (unpublished paper read at Tenth TVA Interdivisional Records Conference, October 26, 1965), p. 2.

documentation and the effects of new communications systems on source material for the history of science. Until we have a significant research production in the history of recent science and technology, we will have problems in the archival evaluation of source material.

The basic evaluation decision is to keep a record series or file. It is based on an appraisal of the research significance of the originating organization or office whose records constitute an archival record group or sub-group. The record series is a group of documents having a common arrangement and a common relationship to the functions of the office that created them. If the series is kept, it is inadvisable to extend the evaluation process to folders and documents except for the removal of duplication and easily identified classes of documents. Collective evaluation and collective description characterize the archival approach to documentation.

B. Aids in Evaluation

Sound methods of evaluation can be based on the use of scientific bibliographies, consultation with scientists and historians and the application of conventional archival rules for records appraisal.

1. Subject specialists

Consultations with specialists in subject fields have often been advocated as the best means of evaluating scientific documentation. On the whole, such consultations are overrated. It is difficult to find a specialist with

a - a comprehensive knowledge of the material,
b - the perspective of the intellectual historian or the historian of science, and
c - the archivist's knowledge of the problems involved in segregation, description, preservation and use of the materials.

The specialist generally views his work on the basis of personal knowledge and experience, rather than with the objectivity of a historian. He asks the questions of an interested scientist, rather than those of the historical researcher. His research tends to be autobiographical rather than an analytical evaluation of all extant sources of information. Archivists should consult experts in the field, but they should remember that the specialist's contribution is an informed, contemporary judgment on the state and significance of his science.

2. Users

Consultations with users are suggested as sufficient guides in determining which records should be kept. Research scholars can often provide good counsel and effective support, but the archivist soon learns that their perspective is even less objective than the subject specialist. Researchers usually wish to preserve everything related to their subject or area of interest and are quite indifferent to the needs of other researchers, especially those in other disciplines. Lewis Darter quotes Dr. Paul Buck as writing that "the appetite of the scholar for historical evidence is insatiable and that catering to his needs (real or fanciful) is like throwing peanuts to pigeons or shoveling corn to swine."[2]

3. Bibliographies

The successful evaluation of scientific documentation requires continuing study of research use. The archivist should have a broad knowledge of published historical, biographical and basic scientific and periodical works in the area of science or technology covered by the records he is evaluating. Annotated bibliographies for general works on the history of science and technology and twenty-nine specific fields will be published in a separate study. Without a sound personal research background and a wide knowledge of research in other fields, the archivist cannot anticipate the research needs of others.

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[2]Darter, op. cit., p. 3.

4. Professional societies

Archival and scientific associations are another source of assistance for the university archivist. The Society of American Archivists' Committee on Scientific and Technological Manuscripts has a list of specialists in various areas of scientific and archival knowledge and will put an archivist in touch with an organization or an individual who will help him. A list of persons associated with archival programs of scientific and technological societies will be included in the separate study mentioned above.

5. Processors

An important consideration in university archives is the use of processors as evaluators. Archivists recognize that the function of evaluation should be quickly followed by processing. Most university archivists rely heavily upon assistants for processing records, especially advanced graduate students. This is especially true of major office files and the papers of individual faculty members. As the processor goes through a collection, he acquires a familiarity with the material which is probably equalled only by the file clerk or secretary who was responsible for the creation and maintenance of the file. If possible, the processor should do the initial reading in the field and prepare general reports on a collection at the evaluation stage, as this will yield important dividends when he writes a description of the material as he proceeds with the processing operations.

6. Procedural records and documentation trends

The creators of records are the best source of information on thier purpose and content. No one understands a record series as well as the custodian of the file. Many corporations and governments have excellent policy and procedures manuals for management operations. The archivist studying scientific research documentation will find that such essential bridges between plans and results are very scarce. He must find ways of securing contemporary records of scientific and technological research methodology. Diaries, laboratory notebooks, procedures manuals, committee minutes or whatever the format, he must get them if researchers are to comprehend the mountain of published reports.

The archivist must be aware of trends in documentation. Locating, selecting and interpreting historically significant documentation demands new techniques appropriate to twentieth century scientific enterprise. Future research in the history of science will draw more heavily on published sources. The growth of publications is an outstanding feature of scientific research in the first half of the twentieth century. The creation of data storage files promises to be an outstanding characteristic of the second half. Computers and miniaturization have created vast reservoirs of data which may be manipulated and delivered at high speeds. A major problem of the archivist will remain that of keeping abreast of the changing world of documentation technology. Time will continue to alter the volume and form of documentation. Paper, film, holes and magnetic impulses are constantly combined in new systems to facilitate the rapid storage, searching and retrieval of information. Professional men in science and technology are usually among the first to apply new records-keeping technology to their own operations. Carbon paper, photography, business forms, photocopying, duplicating equipment and electronic data processing have brought the technological revolution to the office. The rapid expansion of scientific and technological enterprise has added to the complexities of documentation problems in these areas. Distinctions between evidential and informational values and administrative and research uses become lost in the complexities of evaluating systems established to record contributions of teams of skilled specialists.

III. Processing

Archival processing follows evaluation and includes acquisition, transfer, arrangement, description and preservation. Acquisition will depend upon the laws, regulations and program statements outlining the responsibilities of the archivist and upon his ability and ingenuity in contacting and securing the confidence of the sources of archival material. Once the sources agree to transfer the records to his custody, the archivist will apply the basic doctrines of archival arrangement and follow a general sequence of processing procedures.

A. Arrangement

A principle and two doctrines provide the general guidelines for archival arrangement. The principle of provenance may be stated as the principle of grouping by source rather than subject. The doctrine of respect des fonds holds that the contents of a record series or fonds should be kept separate and distinct. The doctrine of the "sanctity of the original order" requires the archivist to leave the documents in the order in which he received them.

Records are usually arranged in chronological, alphabetical or numerical order. Large office files may be arranged by status (active, transfer and inactive) and collections of personal papers may be arranged by type of record (correspondence, publications, manuscripts and photographs). Records may also have no understandable order or have become disarranged in the process of transfer or storage. One of the most common errors of inexperienced archivists is the hasty assumption that a record series has no discernible arrangement. The archivist should make every effort to identify the existing arrangement and retain it. If no arrangement can be ascertained, the archivist should arrange the records in a simple system compatible with the original function of the records and prospective research uses. More specialized or technical collections need less arrangement as likely users will be able to sift through a supplementary finding aid or the series without an alphabetical or chronological order. Archivists should avoid ill-advised practices such as dividing a collection of papers into a series of collections by segregating the incoming correspondence from prominent people.

The archivist may find personal, professional and administrative papers mixed together. Where the papers of a geologist were mixed with his business correspondence as editor of a professional journal and large quantities of subscription notices in no definite arrangement, the types of correspondence were sorted. Personal correspondence was arranged alphabetically by correspondent and chronologically thereunder. The journal correspondence was arranged in the same manner. Subscription and book order correspondence were both arranged in chronological order by year.

Archivists and manuscript curators should consider the potential demand for functional groupings of a variety of documentation. Publications, photographs, correspondence, laboratory journals and research tapes may be grouped in an office, in a functional relationship which would be destroyed if they are divided by type of material when removed from active office use or transferred to a research institution. The archivist should retain the grouping and arrangement created by the scientist or technologist who used the records. Description of discrete items, as in library classification cataloging, is less likely to provide adequate control over research materials accumulated in modern science and technology. As the arrangement and the subject classification systems develop for a particular scientific research project, they control the significance and the utilization of the documentation.

B. Processing Procedure

The following procedure is illustrative of the basic steps taken in processing archival and manuscripts material:

1. Transfer. Material shipped to the archival repository generally arrives packed in any transfer files or cardboard boxes which may be available to the clerical staff or donor. The transferring office should include file guides, pack material in its proper file sequence and identify the contents of each numbered box on a transfer sheet. If they are not prepared to follow this procedure, the archivist should arrange for his staff to box material for transfer.

2. Fumigation. The first step when incoming material reaches the archives is to inspect it for infestation by insects. If evidences of silverfish, roaches or other harmful insects are found in the records, they should be fumigated at once. If the archives does not have a fumigation chamber, careful spraying of the box may be substituted. If the archives occupies only a portion of a larger building like a library, a regular program of insecticide spraying around exterior walls and stack ranges is advisable.

3. Cleaning. Old records which have been in storage are usually very dirty. When the boxes are received, the archivist should clean the records before processing or storing them. If a forced air, vented cleaning table is not available, a hand vacuum, mop or cloth may be used to remove the dirt. Dirty storage boxes should be destroyed and the records should be transferred to archival boxes or transfer files to await processing. Where dirt adheres to a document, an art gum eraser may be used to remove some of the accumulation.

4. Identification. When material is received, all boxes should be identified. If the contents are not indicated by markings or labels on the ends of the boxes or by reference to a transmittal list, the boxes should be opened so that the contents can be determined and the proper sequence for processing established.

5. Accessioning. As soon as material is received in the archives, the archivist should attach a note giving the accession date; office of origin; series title, volume and inclusive dates; name, room number and building of the person responsible for the transfer; and a provisional archival control number or designation. He may also record the person who received the material and notes about subsequent transfers. Some archivists will prefer to maintain an accession register. The type of accession record required usually depends on the length of time between receipt of the records and processing.

6. Sequence. Before examining the contents of folders, the processor should determine the primary and secondary arrangements of the record series. If the files contain more than one complete alphabetical sequence, he should make a general examination of each sequence to determine which contains the earliest material. He should then begin to process, starting with A in the earlier sequence.

7. Supplies. The processor should acquire a ballpoint pen, a pencil, a supply of acid neutral file folders, boxes and a ruled pad for taking notes for the preparation of a supplementary finding aid to describe the series. The processor should also be equipped with a large table and a chair in a well-lighted, well-heated and well-ventilated area. Bins, shelving and other sorting devices may be required where large volumes of records or publications are received in disorder. The processor may wish to have a vacuum cleaner, a dust mop and a work coat to protect clothing from dirt. He should also have a stapler and a large wastepaper basket.

8. Boxes. While small quantities of documents may be placed in envelopes, archival material is generally filed in a low-cost, standard sized box or container. If a 10 x 5 x 12 or 10 x 5 x 15 fibredex document case or similar prepared container is used, there are no preparation problems. If a knocked-down cardboard box is used, the box should be stapled, taped or folded to receive the folders as they are processed. It is well to put 10 x 12 x 15 records center boxes on end or tilted at an angle so that folders will compress themselves as the box is filled. The archivist may prefer to place small quantities of valuable manuscripts in flat boxes, which may be stacked on the shelves. Before putting processed folders in a new box, the box should be identified with penciled record series and box numbers on the end in a place that will be covered by the descriptive label. The processor should begin by placing the control number for the record series on his notepad and writing Box 1.

9. Control number and series title. The record series control number is assigned on the basis of the organizational origin of the file. A series may be 15/4/1: 15 for the College of Liberal Arts and Sciences, 4 for the Botany Department and 1 for the General Subject File. A term such as "general subject file" may be assigned, subject to revision when processing is completed. The series title should be descriptive of the contents of the file and, if possible, should be the same title as is used by the department of origin.

10. Removal of harmful objects. When paper clips are found, they should be removed and thrown away. They may be replaced with a staple if the clipped material is in danger of losing its relationship among the other material in the folder. In general, stapling is acceptable for publications or multi-page papers. For a two-page letter it is probably better not to replace a paper clip with a staple. Under no circumstances should gummed tape be used to repair any documents of long term value. All rubber bands should be removed.

11. Folder labels. After opening the first folder, the processor checks the contents to compare them with the identification on the folder label. He should make sure that the label carries an accurate description of the contents of the folder and that the inclusive dates are on the label. If they are not on the label, they should be determined by inspecting the contents and placed on the folder label. If the folder is torn, brittle, dirty or unserviceable due to poor quality, it should be replaced with a new folder suitably labeled.

12. Dating. Documents may be dated by internal evidence, diplomatics (style of writing) or examining adjacent documents. A universal calendar is useful in determining the year in which a document was created. Unless the document has a special monetary or exhibit value, a missing date may be entered lightly in pencil in the upper right hand corner. If the processor is not positive of the date, it should be preceded by "ca."

13. Weeding. Before processing, it is advisable to form certain general policies with respect to weeding the contents of a file. Normally, the processor can not justify taking the time required for "weeding" or making decisions as to the significance of individual items in a correspondence file. This does not prevent a decision to cull automatically certain types of materials, such as extra copies of published documents, filing supplies, junk mail advertising, unused forms and routine financial records reflecting transactions which are covered in summary reports and published documents. Registration forms or blanks which are not essential to understanding the accompanying documentation may be destroyed. The processor should also discard extra copies of correspondence. Where duplicate copies of letters are found, the original or the sharpest carbon should be preserved. The processor will also encounter routine transmittals, acknowledgements and notifications, which may be included in the file or attached to other correspondence. Such material should be culled when it exists in sufficient volume to effect a major savings in space with respect to the total volume of the file and when it may be destroyed without removing significant information from the record content of the file. For instance, a letter acknowledging receipt of a controversial report or a letter transmitting a significant document may be worthy of preservation if the researcher needs to verify receipt of information. Decisions concerning weeding should be made on the basis of the entire file so the processor is not continually deliberating on individual documents. In determining whether weeding will occur, the processor should decide if it is possible to easily identify those portions of the file which may be discarded, preferably complete folders or information of a specific format which can be identified by color or location within the folders and which does not require a reading of the documents.

14. Filing aids. Out cards, notices that material has been removed, cross reference sheets and similar items should be left in the identical sequence in which they are found in the file. File guides should be noted and discarded or returned to the office of origin for reuse.

15. Supplementary finding aids. Before the records are transferred, the archivist should attempt to locate any file manuals and guides or existing descriptions and indexes for the record series. They may be on the basis of, or a substitute for, the finding aids which he will prepare. On his pad of notes for the supplementary finding aid, the processor should copy the subject designation and inclusive dates from the folder label and place below them any specific information about the contents of the folder which would be useful for researchers. After going through the material to determine the dates, the processor should hastily scan the file looking at the most significant documents and those which are most useful in determining the subjects discussed and the correspondents involved. This would include persons writing or receiving letters in the office and persons who are writing to or receiving letters from the office. This list will continue to grow as each folder designation and description (where required) is added. While calendar listings of all documents are seldom made, letters which summarize the subject matter content of the folder, give a particularly graphic description of a man or event, or which are from important people may be noted as to content and date. When the processor has finished his work, the archivist edits the notes on the pad for clarity, accuracy and completeness before they are typed as a supplementary finding aid.

16. Cumulative series description sheet. As the processor acquires information of a general nature, it should be kept on a separate sheet for the record series and should

contain complete notes concerning the form or physical type of documents found in the file, the types and names of the principal correspondents and the subject matter content of the record series. For the first few folders, it is well to go through all of the material to get the full scope of the correspondence represented and of the subject matter treated. Entries may be combined when the final description is prepared. When this becomes repetitive, the scanning process needs to be directed only toward unusual items. The general notes on types of material, correspondents and the types of subjects will grow rapidly with the first few folders and very slowly thereafter. The general note is designed to provide a basis for the preparation of an inventory worksheet or a control card which will describe the contents of the entire record series in general terms.

17. Inventory worksheet and control card. The record series inventory worksheet will show series number, series title, inclusive dates, volume, arrangement, reason for creation, subject or informational content, office of origin, accession date and control number. The main part of the worksheet is a narrative description of the potential research significance of the record series. Information contained in the supplementary finding aid is evaluated, condensed, combined and arranged in a standard manner to provide a brief description of the major significance of the series. For most publications and small record series, only an inventory worksheet is required. The worksheet shows the physical character and source of accessions and may contain more information than the summary record series control card.

18. Division of folders. In processing folders containing more than 40 documents, the folder should be folded at the score mark at the bottom. If it contains over 100 documents, the possibility of dividing the material into separate folders should be considered. This can be done if the material is filed alphabetically or chronologically. Where another system is employed, it may be impossible to effect such a division within a reasonable length of time.

19. Envelopes. When one finds letters in envelopes, they should be removed, unfolded and reverse folded. Brittle records may require humidification before they are unfolded. The envelope should be checked to determine that the return address and the date are on the letter. If so, the envelope should be discarded provided the stamp or cover does not have a marketable value.

20. Box divisions. When a box is nearly filled, the processor should look for a suitable folder for starting a new box. If possible, the first folder in the next box should contain material distinct from and in alphabetical or chronological sequence with the last folder in the preceding box to facilitate label identification of the contents.

21. Box label list. As the processor boxes the material, he notes box divisions on his draft supplementary finding aid or prepares a separate label list showing record series number, title and inclusive dates and the specific beginning and ending file designations, dates and number for each box.

22. Oversize material. If items are too large for the archival container, the processor should complete a cross reference sheet which will refer the user to the record series number in a file for over-sized material. A small number of legal size documents may be folded to fit a letter-size box. If the documents are too large for a legal-size box, they should be placed in the oversize file.

23. Artifacts. Bulky museum objects and other artifacts should be removed from folders and transferred to a box or other storage location. A cross reference sheet may be included.

24. Shelving. When the boxes are filled and labeled, they should be shelved in a closed stack area on standardized shelving. A useful shelf size is 38 inches wide, 12 inches high and 12 inches deep. Due to variations in the frequency of use of archival material, shelves to within a few inches of the ceiling can be used. File cabinets are too expensive and wasteful of space for archival series that are not very active or maintained for quick reference use.

IV. Records Management

Records management can effect a significant improvement in the quality of office files and facilitate their evaluation. It can even affect publications and the content of personal papers. The greatest progress has been made in business offices and auxiliary service enterprises. Much of the documentation relating to science and technology is part of building a body of knowledge. A twenty-year research project is not the same as the transaction file so often found in government and business. A university is also notable for its scrambled lines of communications. It may have almost as many chiefs as Indians and their strongest tribal loyalties may be to a professional association or fellow researchers outside the institution that employs them. Records management will come to the universities, but it will not come on the wings of a Federal Records Act or a management consultant's report.

The best way of controlling the accumulation of scientific records of research significance is to provide for their regular transfer to archival custody under records disposal schedules. A records schedule or plan for the periodic transfer or destruction of designated series after specific retention periods is based on a records inventory. In inventorying records, the archivist should use a form showing inventory date, record series title, inclusive dates, volume, annual accumulation, office of origin, reason for creation of the record, informational content of the series, types of documents included, arrangement and recommended retention period.

The retention period recommended by the administrator in charge of the records should be reviewed by the legal officer, auditor and archivist. The legal officer should determine that the record will not be needed as evidence in future legal actions. The auditor or auditors responsible for the agency's fiscal post-audit should determine the period that the record series is needed for their purposes. The archivist should decide if the record should be preserved for historical or other scholarly research.

While a records disposal program will have the greatest immediate impact on an archival program, files management can have a very significant influence on archival operations. Processing time can be cut if the files arrive in good order with an up-to-date filing guide. Good quality folders and papers, the absence of paper clips and duplicate copies and built-in procedures for the disposal of routine material upon transfer will save many hours of archival processing time. The management of forms, mail, reports and issuances and the protection of vital records may also benefit the archivist.

V. Publications

Published material forms the core of a modern archival collection. Press, print shop and duplicating room are pouring forth an ever-increasing torrent of university publications. Two thirds of the 2000 record series in the University of Illinois Archives are publications. Annual reports; professional journals; research monographs; technical bulletins; abstracts and preprints; reprint series; short course, conference and seminar announcements, programs and proceedings; promotional brochures; publicity releases; popular circulars; newsletters - the list is a long one. Publications have become a medium of normal communication as well as a badge of institutional and professional recognition.

While this situation may be attributed to the scientist's desire for rapid communication, there are signs that the volume of published information is saturating the market. One scientist has observed that some of his colleagues scarcely use books, journals, abstract guides and libraries. "Of much greater importance is the mimeograph or the photo-duplicator (for preprints), air mail and telephone (for point-to-point rapid information), and the travel authorization (for conventions, symposia and the seminar circuits)."[3] Librarians protest "against the publication of material adding nothing to our knowledge of the subject" and conclude that the publication of scientific periodicals is "a gigantic suicidal pact, in which the advancement of science is hampered by the inability of research workers to trace new facts among the masses of literature that must eventually suffocate those in pursuit of

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[3]Robert S. Daniel, "Psychology" in Robert B. Downs and Frances B. Jenkins, eds. Bibliography: Current State and Future Trends p. 333.

true knowledge."[4]

While the documents librarian, information retrieval specialist and technical information officer supply the needs of management personnel, the archivist is responsible for the permanent preservation of an institution's scientific and technological publications. Of particular importance are printed proceedings of academic bodies, annual reports, policy manuals and the principal series of research reports. Despite its volume, published documentation is easier to identify and read and more compact than unpublished material. Duplication is more common and more easily controlled. A procedure to discard routine notifications and announcements may be adopted if there is a sufficient volume of such material to justify the staff time required for its identification and segregation.

Whether they are received as regular shipments from a principal source or as scattered items, publications should be filed by office of publication for processing or checking against gaps in existing series. If a permanent copy is on file, the duplicates may be filed in a subject reference file or discarded. It is advisable to process published series before handling related series or office files and faculty papers. The processor will obtain a knowledge of the organization, its major accomplishments and its goals from its publications, which will be useful in evaluating and describing unpublished material. Tables of contents and title pages of published documents provide essential information on content and provenance. The archivist groups published material in series by function or subject content rather than cataloging individual items by author, title and subject. He applies group description techniques in characterizing the purpose and content of a series. He organizes publications as evidence of the functions of the office of origin and integrates them with office records and private papers to bring together a complete documentary picture of the organization. If the publications are not part of a regularly issued series, they may be grouped by generic headings such as departmental issuances, promotional brochures and course materials. As archival publications do not customarily circulate, they can be filed in standard archival boxes and do not require binding. If the publication is of an exceptional size or is likely to be used frequently, binding may be necessary.

VI. Official Files

The traditional domain of archivists are the official administrative files relating to policies, operations and housekeeping activities. Created under charter or statutory authority by fellow employees, these records comprise the basic documentation in the university. They include the subject files of the president, deans, divisions, departments, institutes, bureaus, centers and committees. Alphabetical subject files; chronological correspondence files; administrative issuances, directives and manuals; personnel or case files; and financial records are common in all offices.

One of the basic characteristics of a departmental file is its focus on administrative inter-departmental affairs rather than on scientific matters. This does not mean that the material is useless for scientific research. The correspondence of a botany department head may be rich with scientific information on topics such as embryology and the life history of the conifers. It would be a primary source for anyone engaged in research in those areas, or for a historian of science studying the growth of biological work at the university or writing a history of botany. The files are valuable for a researcher investigating growth of the department and making a quantitative and qualitative evaluation of its present scientific standing. They show progress in scientific and administrative work, expansion in laboratories, acquisition of modern equipment and hiring of new staff members as research and teaching scholars. The department head may give an international reputation to a department, as its prestige rises when research activities open new horizons to science.

The most common problem encountered in evaluating official files is establishing the significance of a bulky series in relation to the total documentation available. The archivist must decide whether a given records series provides a valuable perspective or

[4] John L. Thornton and R. I. J. Tully, Scientific Books, Libraries and Collectors, A Study of Bibliography and the Book Trade in Relation to Science (Library Association, London, 1962), p. 247.

information which cannot be found in other files or publications. He will generally keep files of presidents, deans and department heads, but may overlook files in auxiliary offices and committees. Committee files often contain much of the documentation of faculty participation and influence in university policy-making and administration.

Official files are usually in better order than private papers and easier to process in the manner described in the section on processing procedures. Special attention should be given to locating any available filing manuals, classification guides or indexes. The archivist should realize that files at different levels of administrative responsibility often contain duplication. The costs of locating the duplicate copy in another record series and the danger of distorting the documentation picture at the administrative level which created the file should rule out culling all but the most obvious and unnecessary duplication. The key decisions must be at the series rather than the folder or document levels.

VII. Personal Papers

The papers of teaching and research faculty and science administrators comprise the most interesting segment of university scientific documentation. No other type of institution has as many individuals whose records should be preserved. Faculty papers provide a personalized account of institutional development and research accomplishments. They include correspondence; clippings and scrapbooks; journals and notebooks; press releases; manuscript copies of papers, talks and addresses; research notes; photographs; programs; instructional materials - such as syllabi, notes, examinations, texts and slides; professional organization files; publications and subject reference files of catalogs, brochures and reprints.

Personal papers relate a man's academic career to his total interests and constitute an important historical record. They offer intimate contact with a mind and a personality. Quantification and instrumentation in the sciences and relativism and historicism in the humanities often evade the centrality of man's creative contributions. The complex technology of urban civilization increases the significance of studies of man's mind. Scholars agree that a major research challenge is the study of conditions leading to innovation. Why do some men succeed and others fail to open new areas for human thought? In understanding the contributions of men to society, the typical man may be as significant as the key man. We need to see him in context with life and study his adaptation to social situations. The surest way to counteract over-specialization in research is to study man - his motives and methods. Other approaches cannot equal the careful study of archival and manuscript documentation as a means of understanding the reasons for man's actions.

Some archivists and historians have lamented that modern technology has made the letter obsolete and that scientists may phone, confer or read screens without leaving a documentary record. The implication is that archivists are caught between the documents librarian and the switchboard operator. In discussing informal communication among psychologists, Prof. Daniel noted that as scientific information is communicated it reaches larger audiences in a more formal manner, but not necessarily in a form of greater usefulness to the recipient. "Channels of information exchange are based upon known research interests of the scientists in the group, hence the information always has higher relevancy than does formal material because the retrieval and identification steps are less demanding. Probably the most valuable feature inherent in the informal format is the semi-privacy. Psychologists are more willing to speculate, to generalize, to be self-critical, to reveal their way of thinking, to interact creatively with others, and in general to be freer in their communication.

Feedback from such communication surely assists the communicator to shape his own work as well as to reward and encourage him in its continuation."[5] Creative men need channels of informal exchange. They also need to organize, record and communicate their knowledge. The man who can conduct his affairs on the telephone or in the library and committee room and record his information in a computer memory unit is not one whose papers would have been preserved in the Archives.

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[5]Daniel, op.cit., p. 333.

Personal papers should be evaluated as an essential part of the documentation of the university. They reveal professional interests and opinions which frequently clarify matters mentioned in the official files of the President, deans or departments. Faculty papers will be found in university offices, home studies, attics, basements and other locations. The archivist should keep in constant touch with faculty activities to determine which individuals have significant collections of papers. Letters to active faculty, retiring faculty, emeriti and the next of kin can convey his interest. While some likely individuals may not have significant accumulations of papers, the dilligent archivist will uncover rich veins of documentation in unexpected places.

One of the most difficult decisions is to determine whose personal papers should be preserved. There are several ways of identifying outstanding men in a field.

1. Nobel laureates.
2. members of the National Academy of Sciences and the National Academy of Engineering.
3. fellows of professional societies.
4. winners of awards and prizes.
5. starred entries in American Men of Science (through 7th edition, 1944).
6. distinguished teachers and researchers, e.g. experienced and popular lecturers and supervisors of large numbers of significant graduate theses.
7. researchers who have shifted their areas of interest as their field has developed.
8. rank and file faculty whose documentary record is especially complete and concise.

The archivist has an initial responsibility to evaluate the academic strengths of the institution he serves. For this purpose, he should consider the Cartter, Keniston, Hughes and other reports on quality in higher education, and factors other than public opinion.[6] He should bring a scholarly objectivity to this difficult and interesting task. The information he gains in studying the strengths of the institution will be useful in evaluating the significance of faculty papers and office files that he may collect. On rare occasions, it may even corroborate the press releases.

A significant body of documentation relating to research in engineering is the accumulation of many years. Frequently this documentation appears to have little organization and to include large quantities of marginal materials. When it is evaluated to determine the feasibility of long-term retention for research in the history of technology or the development of a research program at an institution or by an individual, the researcher may not be familiar with the subject matter and the progression of the research projects involved. He must rely heavily on identifying information such as date and subject placed on the material at the time it was created and supplementary finding aids produced by archivists. More important than simple identification of the documentary material is the researcher's ability to fathom the procedures and habits of the director and key members of the research staff. Many steps are not documented. Lines of research are dropped or resumed in new areas after varying periods of time. The archivist with access to persons creating documentation of major research significance should recommend that a contemporary record of research procedures and documentation policies should be created and transferred to the archives with the material.

He should avoid recommending a consolidated subject filing system as a cure-all for obvious deficiencies in the research files. The research scientist, like the file clerk, succeeds largely on the basis of his powers of association. While he may operate at a much more abstract and more varied level than a file clerk, his research must be based on the ability to recall and power to retrieve documentation from many areas. For this purpose, he may

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[6] Allan M. Cartter, An Assessment of Quality in Graduate Education (American Council on Education, Washington, 1966, 131 pp.); Hayward Keniston, Graduate Study and Research in the Arts and Sciences at the University of Pennsylvania (Pennsylvania, Philadelphia, 1959, 150 pp.); Raymond M. Hughes, Report of the Committee on Graduate Instruction (American Council on Education, Washington, 1934, 43 pp.) and Raymond M. Hughes, A Study of the Graduate Schools of America (Oxford, Ohio, 1925, 32 pp.)

have established detailed classification systems for published scientific literature and project files for federal contract work, consulting projects, technical committees of professional associations and academic courses and seminars.

The first and most essential step in appraising noncurrent documentation in engineering is obtaining from participants a written statement of the research methodology with respect to documentation. If this can be obtained, the evaluation of the correspondence, reprints, reports and other documents will be greatly expedited and the resulting selection of a significant fraction of the total mass will interest future researchers.

It is desirable to secure all of a man's papers, or at least a major portion, at the same time. Single folders and items sent over a period of time lose their relationship to the whole, complicate the preparation of a finding aid and are a nuisance for the archivist.

It is advantageous to receive only those papers which will be of research significance. In a letter expressing his interest in papers, the archivist should specify what can be destroyed. The regular destruction of the following types of records helps assure the preservation of valuable items.

1. extra copies.
2. routine acknowledgements, transmittals, notifications, form letters and sales and promotional literature.
3. duplicated notices of university activities and regulations.
4. workpapers and research notes containing information which is recorded or summarized elsewhere.
5. financial documents such as requisitions, cancelled checks, bills and bank statements.
6. typescripts of published books and articles, galley proofs and page proofs without significant annotations and commentaries.
7. publications and reprints of other men on topics which are not closely related to the interests or work of the recipient.
8. classroom records concerning the academic performance of students which are generally maintained centrally in the Comptroller's or Registrar's Office in sufficient detail for historical research.

It is important to maintain a chronological file of a man's published articles. At Illinois, we supplement a scientist's correspondence with a set of his publications filed in chronological order. Accompanied by a curriculum vita or bio-bibliography, these reprints and separates constitute a sort of intellectual autobiography.

Faculty should be encouraged to arrange for the transfer to the archives of documents recording how new concepts and theories spread through the scientific community and how the profession has grown and changed with them. Their papers may include published and unpublished reports of conferences, minutes of meetings of professional societies, membership and financial records of such societies and the records of university departments and divisions.

VIII. Project Files

Science and technology have produced large quantities of research and development project files. Universities often maintain project files in the research director's office, business office, departmental office, principal investigator's office, grantor's representative's office and any other office that can justify a need to know. These files are in addition to the records kept by the contractor or grantor agency.

Project files contain documentation relating to project authorization, scientific observations and conclusions, test and experimental data, fiscal administration and design. Authorization documentation includes proposals, approvals, award documents, amendments, continuations, extensions, cancellations and completion notices relating to the contract or grant. Scientific observations and conclusions are recorded in laboratory notebooks, progress reports, publications and final technical reports. Substantial quantities of test and experimental data may exist in the form of rough notes, work papers, punched cards and electronic tapes. The administration of the contract produces procurement authorization

records, financial statements and maintenance records. The design of test or experimental equipment or the development of a prototype is often documented by drawings, specifications, films and photographs. Correspondence and minutes of meetings accumulate in connection with each type of records. Patent files, site visit reports and documentation on the negotiation of indirect cost percentages are found in association with project files and should be retained for their research value.

The documentation in contract files depends on the type of contract, source of funds and university requirements. Cost reimbursement contracts produce more documents than fixed price agreements. The federal departments of Defense and Health, Education, and Welfare, the National Science Foundation, international aid programs, state agencies, foundations and industries all have different records-keeping requirements. The Ohio State University Research Foundation requires principal investigators "to keep systematic notes properly dated, signed and witnessed, and to preserve carefully all data pertaining to and collected during the work on the project, and to deliver all such notes and other data. . .to the Foundation upon demand or upon the completion or earlier termination of the project. . . ." It collects copies of all reports submitted to project sponsors and maintains files including primary documentation, related correspondence, principal investigator's data books, fiscal general ledger accounts and general reports on each project.

Among the important considerations bearing upon the retention of project files are security, patents, audits and historical research. Access to and disposal of records relating to classified research are subject to the contractor's or grantor's regulations. Patent rights normally remain with the grantor in directed research and pass to the grantee institution in non-directed research. Laboratory notebooks are used to record and preserve scientific and engineering raw data and provide legal evidence of the date of conception of inventions to establish patent rights. Project files for federal contracts are subject to audit by the contracting agency and the General Accounting Office. Research and development contracts contain standardized sections on the examination of records which usually require the contractor to keep records reflecting all net costs for three years after the date of final payment. Records of contracts where there have been appeals, disputes, exceptions or litigation are to be retained indefinitely. Contract provisions relating to records retention apply to the university's audit copy. Among researchers who will be interested in project files are historians of science and technology, higher education and public administration. A survey of research and development files in nine universities revealed that few central contract files contained much documentation of value to the scholar studying scientific research. Files created by administrative offices were designed to meet administrative needs, e.g. statistical tabulations for reports and departmental success ratios on proposals. University administrators were primarily concerned about the sources of future support, rather than documenting the reasons for and the results of research.

The university archivist should preserve two types of research and development files. He should retain a complete central file on all university projects. Such files are usually located in the offices of trustees, graduate or research deans, comptrollers or research foundations and include contracts, amendments, technical reports and correspondence. They may occasionally contain large quantities of fiscal records documenting the administration of the research grant or contract. The archivist should select for preservation that file which contains the most complete picture of university scientific activity. It should include the most signed record copies of basic documents and the fewest routine fiscal records and transmittals.

The archivist should also retain project files of principal investigators acquired with personal papers or from departmental offices. They may be the only source of full information on the scientific or technological aspects of the project. When restricted to scientists and research of special significance, such files provide useful documentation for a comprehensive study of a research project in context with the investigator's professional interests. Duplicate, repetitive or routine documents not necessary to an understanding of the research and development activity may be destroyed. It is practically impossible to apply records disposal schedules to the project director's files as such records are decentralized and personal. The archivist should acquire the files as personal papers and regard the weeding of routine material as a processing decision.

The university records retention program should cover official research and development files. Universities should adopt records retention periods consistent with federal practices and regulations. Retention schedules for business office records should be applied to research records, provided federal audits have been completed. While the contract and its amendments and modifications should be retained, only about a third of the correspondence has sufficient research value to warrant continued preservation. Correspondence relating to the continuation or extension of the contract should be kept. Proposals and exhibits with accompanying photographs and charts should be retained. Test and experimental data should be destroyed when the information they contain is condensed in published reports or statistical summaries. Magnetic tape and punched cards should be appraised in terms of the usefulness of the data they contain to future scientific research and historians of science. For this purpose, suitable program records should be kept and keyed to the tape and card files. A final voucher or report with a breakdown of costs between salaries and wages, retirement, materials, travel and indirect costs should be preserved. If a department or an investigator maintains an extra copy of financial documents, they should be covered by the university records retention policy for similar records.

An archivist must consider the whole documentary picture and should seek to preserve a central file rather than collecting fragments from decentralized offices and laboratories. In this light, he considers the preservation policies of federal agencies which award grants to his institution and the central files maintained in the university's research office. He may assume that federal archivists will evaluate federal agency records and preserve project files documenting the national research program. Federal records disposal schedules generally require the preservation of research plans, all progress reports, final reports, all published articles, drawings and specifications, authorizations, completion notices and correspondence. The historian of modern science will have a special need for an overview of all the lines of research in an area, which can best be determined from the records of agencies with major responsibilities for the financial support of such research. Federal records of grants to university scientists and engineers reflect the same administrative interests as the university's central files. Records of "in-house" research by federal agencies closely resemble university research files.

In 1960, the National Archives and Records Service issued General Records Schedule 19 for federal research and development records. The schedule identified records possessing historical and scientific research value as those

1. resulting from program direction, review and analysis, reflecting organization, functions, procedures and operations in a comprehensive manner, and
2. accumulating from the conduct of individual projects and containing scientific and technical data and conclusions which may be useful in scientific research.

It noted that data accumulated during scientific projects is generally recorded in laboratory notebooks and summarized in technical reports. "While the technical reports will normally show the progressive and final results of the research effort, they do not always show how these results were achieved, or when a theory, device, or process was first conceived or reduced to practice. The laboratory notebooks and other subsidiary scientific papers record the methods and procedures used daily by the scientist in research performance, and possess potential reference value for future scientific research, as well as the establishment of patent or invention rights." The schedule noted that contracts may require the contractor "to furnish the results of research to the agency in the form of technical reports, experimental data, or comparable media. All records furnished by the contractor pursuant to terms of the contract become the property of the Government" and subject to federal records retention schedules. Federal agencies have complete sets of reports and plans for directed research, even including marked notebooks given to contractors. For non-directed research, resulting from a university grant or contract, federal agency documentation is often lacking in significant material other than technical reports required by the contract document.

The National Archives urged federal agencies to develop selection standards for project case files and authorized the destruction of source data files "when competent scientific personnel agree that the files have served all research purposes." Under this policy, staff scientists determine which parts of their work papers may be destroyed. As the

federal general schedule did not cover contractor's records, the National Archives has prepared a records retention policy statement covering all fiscal records on cost reimbursement research and development contracts. The statement will be included in the Armed Services Procurement Regulations and apply to most contractors for federal research and development work. It proposes that the contractors may dispose of records described after specified time periods and applies to financial and cost, pay administration and procurement and supply records. The establishment of uniform minimum retention periods by the government should enable university business offices to dispose of large quantities of records, University archivists should arrange for the transfer of central project files to the archives for evaluation before records disposal is undertaken based solely on federal retention requirements. They should incorporate both the minimum federal requirements and a program for the periodic transfer of significant material to the archives in university records retention schedules.

A categorical retention schedule or list of valuable items in project files will not solve all the archivist's problems with research and development files. The source and the information contained in scientific and technological records determine their research value, not the form of the record. Archival evaluation requires judgment based on complete series and the significance of the contributions of men and research activities, rather than the classification of records into convenient types. Progress reports, procedural records and correspondence containing opinions and explanations should be kept. Other items may be destroyed in accordance with records disposal schedules for official files and at the discretion of the archivist in the case of personal papers.

IX. Sound Recordings

A. Oral History

Oral history is a new and useful sound recording technique and part of the total documentation that may be preserved for research use. It is a tape recorded recollection or interview sought to record events and motivations that might be forgotten and which are not documented or are inadequately documented by other records. It is essentially supplementary research source material, rather than "history." The recollections of prominent scientific researchers and administrators supplement official files, publications and papers which have been acquired by the Archives. The telephone, rapid means of transportation, erasable magnetic tapes, closed circuit television, conferences and records management have limited the availability of written documentation for many modern activities, but the sheer abundance of documentation is an even greater stimulus to oral history than the lack of written evidence. With over 2 billion, 700 million documents in the National Archives and 7 million, 500 thousand in the University of Illinois Archives, the researcher seeks that brief, authoritative summary of events which is the goal of the oral historian.

An institution should not plunge into an oral history program, but should regard it as part of a total prescription. Its advantages must be weighed in terms of cost and program priorities. One writer has observed that "oral history is the most expensive form of collecting" other than the direct purchase of documents, because "it requires such a heavy allotment of staff time."[7] An oral history program requires financial support for preparation, equipment and supplies, interviewing, transcribing, editing, description and servicing. While some agencies contract for most of these services, budgetary considerations remain a severe limitation on most programs.

The archivist must consider the totality of documentary resources in evaluating records and determining if he should seek supplementary material. He applies the same standards to oral history tapes and transcripts as he applies to office records, personal manuscripts, publications and photographs. Tape-recorded interviews are compared to original documentary sources such as correspondence, diaries, autobiographies, depositions, memoirs and reminiscences. As they are only one type of sound recording, they are also compared with recordings produced in the ordinary course of business, such as dictation disks and tapes, recorded conference proceedings and lectures and radio and television broadcast disks and tapes. Recordings of a symposium discussion may afford a more economical and

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7Ruth B. Bordin and Robert M. Warner, The Modern Manuscript Library (Scarecrow Press, New York, 1966), p. 22.

useful source of research material than planned interviews. People who react favorably to an audience may lose their eloquence when confronted with a tape recorder in the hands of an agent of posterity. Richard Hewlett and Oscar Anderson in their history of the Atomic Energy Commission concluded that tape recording their many interviews would have destroyed "the atmosphere of informality" they sought. The archivist should be particularly sensitive to changing patterns of documentation. As reproduction costs are lowered, more material is published. While many publications and files have an institutional and impersonal character, homo sapiens is a compulsive documenter. He will write his views in the margins and in letters to friends or relatives. Sabbaticals, vacations and illnesses have stimulated better information on university affairs than official files. In appraising oral history tapes, the archivist must consider the significance of the human voice. The researcher yearns to hear the voice of his subject. Tones and inflections carry meanings and suggestions that no transcription or published version can convey.

B. Interviewing

The goals of the oral history interviewer should be freedom, spontaniety, truth, completeness, brevity and relevance to potential research use. In the October, 1957 American Archivist, Corinne Gilb gave her general hypotheses for the interviewer.[8]

1. Know what is already well documented and do not duplicate what can be found in other sources;
2. Shed light on major historical trends and significant human experiences worth documenting and do not collect anecdotes of old men and name-dropping chitchat;
3. Formulate research aims with far more insight and foresight than the average researcher to anticipate scholars' needs;
4. Decide what you are trying to learn, frame tentative hypotheses and make an intelligent selection of persons to be interviewed;
5. Seek the unique and the specific in the person interviewed. A biographical interview reveals how events have affected an individual life and how the life has affected events. An interview that explores a whole life can be evaluated for interrelations;
6. Oral history's greatest strength comes from the human limitation that we tend to see in other people those qualities that have some relevance to ourselves;
7. The need for careful standards should not be allowed to fetter vision and imaginative experimentation.

Interviews should always precede an oral history recording session. Notes on the interviews, biographical material on the person interviewed, copies or lists of his publications and selected documents and photographs should enable the archivist to prepare an appropriate list of questions or an agenda of points to be discussed during the interview. Each tape should carry complete identification, including interviewee, interviewer, date and location of interview. The value of oral history interviews is enhanced by the number of persons interviewed. An isolated reminiscence will not carry as much weight with a competent historian as a recollection which can be verified or contradicted by the testimony of others.

C. Description of Oral History Resources

Sound recordings are relatively easy to process if they are identified and the archivist is content with preparing a descriptive finding aid and keeping the original tape. Indexes should key subjects and quotes to a footage indicator. Our finding aids average about six pages for two reels of tape. For the senile, they may be subject indexes to disconnected remarks. For the lucid, they may be paraphrasings and quotations from the topics discussed. The preparation of an edited and transcribed autobiographical interview or deposition is a time-consuming and expensive activity. Transcriptions require experienced typists, careful proofing of punctuation and spelling and the approval of the interviewee. While a transcription is the easiest format for the researcher to use, the cost will severely restrict the number of interviews that a small archives can undertake.

[8]Gilb, "Tape-Recorded Interviewing: Some Thoughts from California," in American Archivist, 20:335 (October, 1957).

D. Uses of Oral History

A primary consideration is the eventual research use of the interview. Close contact between user and interviewer may make the tape a form of research note rather than an objective statement of historical evidence. The archivist should consider changing patterns of research in religious, national political, economic, diplomatic, social and intellectual history. He must keep open channels of communication with all researchers. Research methods are an increasingly neglected area in graduate studies. In the March 1962 issue of Isis, Saul Benison suggested using oral history materials and procedures in graduate seminars. A major benefit of an oral history program is that it forces the historian to make serious evaluations of his other sources and frequently emphasizes motivations.

The oral history interview is subject to the same copyright and literary property right problems as written documentation. While archivists in public agencies are not often subject to copyright laws, most manuscripts curators attempt to secure releases of literary rights from donors. We should be concerned about the availability of our documentation, but the doctrine of fair use will continue to be our most effective means for opening recent materials to research use. The archivist should always accept the minimum reasonable restrictions on access necessary to secure the tape recording or approved transcription for research use.

The "Sources for History of Quantum Physics Project" was an excellent example of the effective use of oral history in securing supplementary documentation for an area of modern science. As explained in the project report, the staff began with the systematic preparation of biographies, bibliographies and institutional histories. They supplied subject outlines to the persons interviewed, sought to record chronological biographical discussions, transcribed and retained the tapes and published a comprehensive guide to the materials collected. The project staff microfilmed papers essential for an understanding of the interviews and attempted to secure the deposit of the original documents in the appropriate archival repository.

X. Photographs

A. Photography

Photographs, drawings, paintings, posters, advertisements, catalogs and labels all provide an indispensable dimension to our understanding of modern science and technology. The location and selection of pictorial representations is especially important in areas which deal primarily with the physical world. Since its origin in 1826, photography has become a significant segment of modern documentation. Tintypes and glass plates have given way to low cost negatives and prints, motion pictures and microphotography. Within the past half century, modern technology has enabled photographers to expose huge quantities of negatives. Photographs are both products of modern science and technology and the means for recording many of its achievements. While photography was first used in portraiture and recording public ceremonies, scientists and engineers soon began using the new technique to record construction, apparatus and models.

B. Photographic Files

Photographic files may be kept for three purposes. The most common long-term use of photographs is in utility files or morgues documenting a special occasion, kept as a representation of that occasion and sought as illustrations of the specific people, places or activities involved. Such files usually contain reference prints arranged according to commonly requested subjects and are most often consulted by the public for reproduction in newspapers, books, magazines and telecasts or use in exhibits.

The second type of photographic record is the in-depth recording of visual information by thorough photography of a subject or a process to record the elements of its life and structure. Extensive documentation by a sequence of photographs is called record photography and is a pictorial counterpart of oral history. Its skillful application may preserve valuable data concerning artifacts, buildings and cultural phenomena. One of the greatest needs is for photographs of processes or routine activities which provide insights that enable researchers to describe events in words. Photographic essays are valuable

archival resources.

The third type or iconographic file consists of pictorial representations illustrating or relating to a subject. The archivist studies the mass of photographic documentation and selects those representations for preservation which document an experience with authenticity and flavor. Where the photographer selects the subject in record photography, the archivist selects the subjects and the photographs in establishing an iconographic file. He compares the ways in which a subject has been pictured "by different artists or photographers, at different times, in differing circumstances and for differing reasons."[9]

C. Evaluation

The evaluation of photographic materials includes the general principles applicable to other forms of documentation. Two special considerations are the problems of quantity and quality. For research purposes, the archivist should not be overly concerned with problems of volume. While the client may select the best shot for a gift or a publication, the researcher needs to study the image. Several views may provide a more complete pictorial description of a subject and clarify the selection criteria. We have over a hundred portraits of one university president taken over a 15-year period. If the archivist attempts selection, Vanderbilt suggests that it should "be reasonably consistent and cumulatively meaningful."[10]

Quality considerations are more important in evaluating photography than in evaluating other forms of documentation. Where legibility may be the only physical consideration in appraising a manuscript, a good photograph must have good focus to secure sharpness in detail, proper light exposure for good contrasts in tones and colors and significant compositional arrangement.

Among the many subjects in which the historian of science or technology is interested are experiments, apparatus, models, exhibits, buildings, building construction, bridges, research laboratories, test results, contrast photographs to show results of fertilization or breeding, classes, extension demonstrations, power plants, machinery, railroad engineers, aeroplanes, fire engines, office equipment, engines, ships, guns, computers, livestock, animals, anatomy, diseases, plants, fields, portraits, groups of scientists, professional societies and fraternities.

D. Subject Classification

Classification of photographs according to a system appropriate to the archival institution permits the subject filing of reference prints and obviates the need for special catalogs and indexes. A subject filing system for the major photographic collection also provides a convenient place for filing occasional photographs received as gifts and cross reference sheets for significant photographs in official files and personal papers. The University of Illinois Archives subject classification guide has 29 primary, 208 secondary and 137 tertiary subject headings. The American Institute of Physics has prepared a classification scheme for its Depository of Physics Photographs to serve authors, publishers, editors and teachers. The American Society for Microbiology Archives Inventory List includes photographic classifications for apparatus, bacterial cultures, banquets, buildings, groups, individuals, postcards, microscopes, negatives and annual meetings. If a subject filing system is used, the source and acquisition date of the photographs should be given on the back of each print. The secondary arrangement in a subject file is usually chronological.

E. Identification

All prints should be identified by placing subject classification, date, subject and location on the negative jacket or the back of the reference print. Individuals should be

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[9]Paul Vanderbilt, "Our Own Time" in Wisconsin Then and Now, 10:1-5 (June, 1964), p. 3.

[10]Ibid. p. 2.

identified by name. If the exact date cannot be established by reference to chronologies, styles, automobiles, buildings, shrubbery, and human ages, an approximation qualified by "ca." should be made.

F. Storage

Prints and negatives should be segregated to minimize handling of the negatives, which should be filed numerically and located by cross reference numbers placed on the back of reference prints and the jackets of negatives. If funds are available, copy negatives and reference prints should be made to complete the negative reproduction file and the reference file. The mounting of prints should be minimized and undertaken with great care. Information on standards and specifications for storage containers and envelopes may be obtained from suppliers. Standard archival boxes are satisfactory.

XI. Data Processing Records

Data processing records have been a major factor in the development of documentation systems since World War II. The automated manipulation of quantified data according to prepared programs has speeded calculations and drastically altered data storage and processing operations. Paperwork has both increased and become more standardized. Systems analysis and source data automation have been developed to simplify and bring order to the creation of office documentation. Archivists concerned with modern records cannot ignore the computer storage unit, tab listing and punched card.

Automation has had its greatest initial impact in the business office and statistical services, where machine processing has facilitated and standardized records maintenance and the production of reports. It may force the improvement of systems or it may fix outmoded procedures and information handling techniques. Most records produced by data processing operations have important informational values and little evidential value. Data processing records serve as an example of a technological innovation supplementing the human mind to secure accuracy and speed in calculations and information retrieval. They are the joint product of the machine designer, programmer and the supplier of the source data. They yield only the information which is committed to the equipment. Records managers have sought to standardize data processing terminology and promote the keeping of program records which will enable auditors to verify original computations and scholars to search data for new relationships. The National Archives estimates that it will add 2250 tapes a year to its holdings over the next six years. It has specified the type of program manual which will serve as a preliminary inventory and provide the archival user with significant data on the organization, content and retrieval of taped information.

Miniaturization through storage of magnetic impulses, tape to film converters and machine readable photography makes possible the preparation and retention of more documentation. The increasing volume of scientific and technological data stored on magnetic tapes poses new problems for the archivist. He may attempt to obtain a sampling of data processing records to represent a larger whole. He may preserve programming records to document the procedural justification for reports. Researchers in the history of science and technology should be vitally concerned with project or program validity. He should be cautious about storing coded source data and keep it only when its significance or its provenance and form will permit future researchers to process it for new purposes. He should consider transferring records of archival value from the original magnetic tapes to a more permanent storage medium. Data processing records are bulky and often routine, but the archivist cannot afford to neglect them any more than he can avoid the responsibility to evaluate the huge masses of quantified data produced by machines or ignore the attempts to automate archival control and subject indexing.

XII. Finding Aids

As the archivist processes record series, he should prepare a description. In writing the description, he should stress those characteristics which prompted him to preserve the series. The description may be in several formats such as sheets, cards or labels. The only essential descriptive record is a separate basic card or sheet for each record series. This is a primary finding aid. Other finding aids may be prepared when the need justifies the required time.

A good example of supplementary finding aids for official records are the preliminary inventories published by the National Archives. The inventories contain administrative histories of the offices creating the records followed by descriptive listings of the series in the record group. Series descriptions include a title line, showing name of series, inclusive dates and volume, and a narrative paragraph description of subject content, containing a note on arrangement. Special place or subject indexes are included as appendices. In some instances, the indexes are published as special lists. Descriptions of material on a subject which may be found in a number of record groups have been published as reference information circulars.

The major influences on the preparation of archival finding aids have been the Historical Records Survey inventories and the preliminary inventories issued by the National Archives. Largely the result of instructions prepared by Theodore R. Schellenberg, the record series inventories have been modified and adapted to the needs of many institutions.[11] Published guides and primary finding aids contain brief descriptions of each record series. Inventory entries usually include title, dates, arrangement, volume, office of origin and a narrative description of the types of material and the evidential and informational content of the series. Whether published as guides or maintained as cards, the series descriptions provide basic archival control and reference information.

Few American archival repositories prepare finding aids which describe individual items on catalog cards, chronological calendars or document lists. The Imperial College of Science and Technology of the University of London has published lists of the correspondence and papers of several prominent scientists and engineers which are in the Imperial College Archives. The publications include brief biographical notes prepared by the archivist, information concerning the provenance and acquisition of the papers and a list of abbreviations. The main part of the publications is an alphabetical list of correspondents showing correspondent's name, dates and address and the document number, date and subject. Family letters and documents other than correspondence are listed separately.

The Library of Congress' Manuscript Division has prepared registers of private papers in its custody. The registers include a brief note on the source of the papers; a "scope and content note" listing dates, types of materials, prominent correspondents and principal subjects covered; a biographical note, usually arranged in chronological order; a "description of series" section showing container numbers, inclusive dates, arrangement and brief descriptions of each major type of material in the series and a "container list" showing type of material, dates and contents of containers. Lists of important publications are often included. Designed to provide custodial control, facilitate reference service and form the basis for preparation of catalog entries, registers describe the arrangement of the collection rather than the detailed content of documents. The University of Chicago uses the Library of Congress register format. Syracuse and other universities have published manuscript inventories, which combine features of the National Archives preliminary inventories and the Library of Congress registers. The University of Illinois Archives does not publish its finding aids. It has devoted its resources to the preparation of 2000 pages of descriptive finding aids for 250 record series. The aids are essentially annotated folder lists arranged in the order in which they were boxed. The Archives relies on the National Union Catalog of Manuscript Collections and its own control cards to provide basic information on record series for researchers and its reference staff. Each finding aid is headed by the record series number, office of origin, series title and inclusive dates. The body of the finding aid is a list of folder headings and inclusive dates. Where folder headings are not useful (e.g. Be, Bi, Bo, Br, Bu), or the office was concerned with a wide range of administrative or research activities, folder descriptions may mention types of material, subjects and names of correspondents. Where chronological files repeat folder headings (e.g. departmental names), the finding aid lists common headings and the inclusive dates for each heading at the beginning and then lists the specific dates and the unique or exceptional folders found in each box. It may also be be advisable to include explanatory notes on the organization of the office.

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[11] Theodore R. Schellenberg, The Management of Archives (Columbia, New York, 1965), p. 56.

Finding aids for personal papers follow the same general pattern as those for official files. The main variation is that a few words, a line or a paragraph describing the contents of a folder appear more often. If several folders relate to the same topic, the subject and inclusive dates may be followed by a note that there are four folders. For an alphabetical correspondence file, the descriptive note on the folder will list a few subjects and names of correspondents with their institutional connections. Where many important figures have written letters which are scattered throughout the papers, an alphabetical list of correspondents with subjects and dates of especially significant letters may be added to the finding aid. If available, the processor will attach a Who's Who type of biographical sketch and a list of publications to the finding aid. Publications filed with the papers are checked on the list. Only for extremely valuable files will the processor list the date, correspondent and subject for any significant portion of the letters.

For oral history finding aids, the body of the document should show inclusive footage measurements for each primary subject heading followed by a paragraph on the topics discussed. The paragraph should include quotations of especially significant statements. The course of the interview should proceed in a general chronological order. If the entire tape is transcribed, the transcription is filed with the tape and the finding aid is abbreviated to a table of contents format.

The advantages of a finding aid in the same order as the file is that it 1) is easier to consult than the original documents, 2) provides a control on the series to prevent disarrangement and 3) may be prepared in the course of the normal processing of the series. Finding aids should be designed to facilitate photocopying to answer mail inquiries concerning archival holdings.

Several scientific organizations and special archival collections have established catalogs of manuscript sources or central files of information on the contents and availability of collections of source material in their field. Occasionally such a register may serve a region or a state. The archivist, historian or librarian in charge of these files may save the researcher great amounts of time and effort.

XIII. Research Use

The primary responsibility of the archivist is to provide source materials for research use. He studies research uses to provide the most effective service to scholars just as he studies them to evaluate scientific and technological records for preservation. The most important use of recent materials will often be administrative requests to reactivate files or to obtain specific information from files transferred to the Archives for the proparation of a development report or summary of background data on a subject. As administrative needs decline in importance, the research needs of historians, philosophers, sociologists and political scientists become more significant. Scholarship in the history of science can provide an invaluable historical perspective for the scientist and enable the non-scientist to understand and appreciate the scientific point of view.

Most researchers in the history of science fall into four classes:

1. Scientists with historical interests.
2. Historians of science who have mastered an area of scientific knowledge as well as the discipline of the historian.
3. Historians who appreciate the influence of science on society and study the historical role of the scientific institution or individual.[12]
4. Journalists and popularizers who seek an understanding of the history of science to explain or publicize scientific activities through the mass media.

Scientists writing the history of science tend to write autobiographies. They give personal views of historical developments which may be based on the greatest knowledge and presented with consummate skill and objectivity, but the result is a scientist's view of the answers to a scientist's questions. The scales of history are not balanced by a depth

[12] A. Hunter Dupree, "The History of American Science - A Field Finds Itself" in The American Historical Review, 71:863-874 (April, 1966)

of commitment or a reverence for a "calling" or the "past", but by an analytical evaluation of the evidence and the methodology of a profession which studies man.

One historian of science has described his work as "a comparative historical investigation of the structure of mind and society, of the intellectual, technical and social conditions, favouring or discouraging . . . original scientific discoveries and technical inventions" and their use.[13] Historians of science seek to explain the processes of scientific change, including the conceptual, methodological and institutional development of science and its interaction with the larger social and intellectual environment. The central concepts of philosophy at any given time may be a determining element of the scientific thought. Historians seek to find out the degree to which past men of science may have been "right" in terms of their own times and to discover whether a scientist's statements did or did not follow from either his explicit or implicit assumptions or the general presuppositions of the age in which he lived.

Historians of science tend to study priority, influence and methodology. Influenced by Alexander Koyré, they have sought answers in the internal history of the subject rather than the social, economic and political history of the times. They are often fascinated by problems of why one scientist succeeded in solving a mystery of nature when others failed, of why science developed at one time and not another, and in one country rather than another. Among the questions which they ask are:

1. To what extent did a man's intellectual and social environment condition his approach to scientific problems?
2. Where did a man receive the stimulation to engage in a line of research? Did he know of the research of another? Was he first to state, report or publish an account of a new concept or theory?
3. Why did a scientific concept appear when it did and how can we explain the reception it received?
4. How did one scientist influence later scientists?
5. Why did a man select a particular area for research?
6. What was a man's original contribution?
7. Can his approach to his field be characterized as qualitative, historical, eclectic and profuse, or as quantitative, scientific, methodological and precise?
8. What factors influenced policy in a scientific organization?

As a branch of intellectual history, the history of science deals with problems associated with the development of individuals of new ways of looking at old problems and the recognition of the existence of new problems. As graduate programs in the recent history and philosophy of science increase in quality and quantity, more scholars study the philosophy of science, sociology of science and the relations between science and technology and science and public policy. One of the most significant contributions of America and its universities has been the application of scientific theory in a complex technological society. Archivists share with historians a responsibility for a paradigmatic approach to the history of modern technology. They must cooperate in coping with the flood of published documentation, preserving original source material and arousing the interest of researchers.

Science writers have been trained to acquaint the public with the development of modern science. They enable the citizen to know something about a vast enterprise which has profound effects on him as a taxpayer and a consumer. Scientific research has become so important and so complex that the scientist needs an interpreter to explain his activities to the public. Newspaper reporters, public information officers and editors of commemorative and promotional histories are among the regular users of scientific materials in university archives. While more controls on access to and use of papers may be required, the creator or donor of records and the archivist should recognize the journalist's "need to know" and responsibility to report.

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[13] Alistair C. Crombie, ed., Scientific Change (Basic Books, New York, 1963), p. 4.

In meeting the research needs of their clientele, archivists are responsible for the promotion of high standards in historical writing. This responsibility is fully as significant as their obligation to improve the quality of source material by the application of records management techniques. They should provide impartial and effective guidance and counsel to users of archival materials. The failure to use archives, or their misuse, in serious research may reflect the indifference of the archivist as well as the carelessness of the author. Our understanding of science and technology depends directly upon the competence of the archivists who have evaluated and preserved the documentation upon which serious investigations must be based. Archivists holding scientific and technological records can meet their professional responsibilities with a basic mastery of archival methodology as set forth in this study and the works in its bibliography and a broad understanding of scholarly research and available sources for the study of science and technology.

XIV. Archival Bibliography

A. General

1. American Association for State and Local History Technical Leaflets in History News (1963-)

No.	Author	Title
7	Sam B. Warner Jr.	Social Statistics, A Local Historian's Guide March 1963 v. 18, pp. 67-70
8	Donald C. Anthony	Caring for Your Collections, Manuscripts . . . April 1963 v. 18, pp. 83-86
13	Harold W. Tribolet	Rare Book and Manuscript Preservation Technique September 1963 v. 18, pp. 169-176
14	Carolynne L. Wendel	Genealogical Research November 1963 v. 19, pp. 7-12
21	Richard W. Hale Jr.	Methods of Research for the Amateur Historian June 1964 v. 19, pp. 129-132
31	Ralph G. Newman	Appraisals and "Revenooers", Tax Problems of the Collector October 1965 v. 20, pp. 211-216
35	William G. Tyrrell	Tape-Recording Local History May 1966 v. 21, pp. 89-106
36	Paul Vanderbilt	Filing Your Photographs June 1966 v. 21, pp. 117-124
41	Seymour V. Connor	A System of Manuscript Appraisal May 1967 v. 22, pp. 103-108

A series of useful low-cost leaflets on activities of historical agencies, which may be obtained as separates from the American Association for State and Local History. Written in "how to do it" style for local historical societies and museums, they include information on sources of supply and manufacturers' addresses and bibliographies.

2. Bordin, Ruth B. and Warner, Robert M.
The Modern Manuscript Library
(Scarecrow, New York, 1966, 151 pp.)

A useful description of "manuscript librarianship" based on operations at the Michigan Historical Collections. The authors discuss manuscript collecting, processing, finding aids, administrative problems, publications and serving the researcher and the general public. The volume includes bibliographical notes, sample forms and an index.

3. Brichford, Maynard; Cassady, Theodore; Duckett, Kenneth and Havener, Ralph
Proceedings of the Conference on Archival Administration for Small Universities, Colleges and Junior Colleges. Occasional Paper No. 88 (University of Illinois Graduate School of Library Science, Urbana, 1967, 48 pp.)

Proceedings of a 1966 conference on college and university archives including discussions of the objectives, organization and location of an archival program; library and archival methods of arrangement, classification and control; archival processing and description; records disposal schedules and records management; repair and preservation; microfilming; space and shelving and research use, reference service and promotion.
Bibliography.

4. Brichford, Maynard
"Informing the Government About Its Archives" in The American Archivist, 30:565-573 (October, 1967)

A discussion of archival goals, attitudes and reporting, politics and the mass media; publicity and the archival image.

5. Harvard University
The Harvard University Archives
(Guides to the Harvard Libraries No. 4, Cambridge, 1957, 10 pp.)

A brief description of the functions, procedures, availability and resources of the Harvard University Archives.

6. Hesseltine, William B. and McNeil, Donald R., eds.
In Support of Clio: Essays in Memory of Herbert A. Kellar
(State Historical Society of Wisconsin, Madison, 1958, 214 pp.)

A collection of essays on the Historical Records Survey, manuscript collecting, public archives, mechanical aids in historical research, foundations, historical organizations, agricultural history, editing and restorations. Each essay is followed by a brief bibliography.

7. Jenkinson, Hilary
A Manual of Archive Administration
Percy Lund, Humphries & Co., London, 1922, 1965, 22nd edition, 256 pp.)

The classic work on English archival practice containing discussions of the duties of the archivist, methodology and preservation. Subject indexed.

8. Kane, Lucile M.
A Guide to the Care and Administration of Manuscripts
(American Association for State and Local History, Nashville, 1960, 1967, 2nd edition, 74 pp.)

A useful guide for manuscripts collectors covering controls, organizing a collection, sorting, evaluation, preservation and cataloging. Bibliography.

9. Mood, Fulmer and Carstensen, Vernon
"University Records and Their Relation to General University Administration" in College and Research Libraries, 11:337-345 (October, 1950)

Two historians discuss the need for college and university archives, records management and the administrative location of the archival program.

10. Muller, Samuel; Feith, J. A. and Fruin, Robert
Manual for the Administration and Description of Archives
(H. W. Wilson, New York, 1898, 1940, 2nd edition, 225 pp.)

An English translation of an influential work written to bring together rules relating to the arrangement and description of archives in the Netherlands. The Manual had a major influence on the development of modern archival practice in Western Europe and the United States. Indexed.

11. National Archives
Archival Principles: Selections from the Writings of Waldo Gifford Leland
National Archives Staff Information Paper No. 20
(Government Printing Office, Washington, 1955, 13 pp.)

Notes on the contributions of an American archival pioneer and brief extracts from his writings on the care, definition, transfer, custody, destruction, classification, description and use of archives (1909-1921).

12. Posner, Ernst
American State Archives
(Chicago, Chicago, 1964, 397 pp.)

A report of a 1962-63 survey of state archival agencies by a leading American archivist. Dr. Posner covers the historical development of state archives; surveys the legislation, budgets, staffing, civil service, plans and needs of each state; and concludes with chapters on his findings and standards. The report provides quantities of data on the organization and administration of state archival and records management functions. The work includes glossary, statistical tables, bibliography and index.

13. Schellenberg, Theodore R.
Modern Archives; Principles and Techniques
(Chicago, Chicago, 1956, 247 pp.)

A book on archival practice growing out of Dr. Schellenberg's 1954 lectures in Australia. Based on his experience in the National Archives, it covers archival institutions, library relationships, records management, classification, filing and arrangement, appraisal, preservation, description, publication and reference service. Indexed.

14. Schellenberg, Theodore R.
The Management of Archives
(Columbia, New York, 1965, 383 pp.)

A survey of the development and application of archival principles and techniques written by the leading contributor to American archival methodology. The author discusses methodologies, arrangement, description, notational systems, the preparation of finding aids, maps and photographs. The volume includes definitions, notes, bibliographies and an index.

15. Stevens, Rolland, ed.
University Archives
(Edwards Brothers, Ann Arbor, 1965, 95 pp.)

A collection of papers presented at the 1964 11th Allerton Park Institute of the University of Illinois Graduate School of Library Science, including contributions of Oliver W. Holmes on the history and theory of archival practice, Thornton Mitchell on records management, Edith Fox on collecting, Maynard Brichford on appraisal and processing, Harold Tribolet on conservation, Clifford Shipton on reference use and Laurence Veysey on research use. Bibliographies.

16. Thompson, Edwin A., comp.
A Glossary of American Historical and Literary Manuscript Terms
(Author, Washington, 1965, 183 pp.)

The only recent attempt to produce a comprehensive glossary of terms used in cataloging and processing by manuscripts curators and archivists. The glossary includes abbreviations and a bibliography.

B. Evaluation

1. Bauer, G. Philip
"The Appraisal of Current and Recent Records" in The National Archives Staff Information Circulars, 13:1-25 (June, 1946)

A significant discussion of records values by Dr. Bauer and Mr. Herman Kahn based on experience in handling the records of federal agencies.

2. Brichford, Maynard
"Preservation of Business Records" in History News, 11:77 (August, 1956)

A brief discussion of policies and standards applicable to the collection and selection of business records for archival preservation.

3. Brichford, Maynard, comp. and ed.
Descriptive Inventory of Resources for the Ecology of Mental Health and Work with the Disadvantaged
(University of Illinois, Urbana, 1967, 324 pp.)

An example of a survey of university research projects and resources essential for the effective evaluation of archival documentation. Project/resource descriptions list office, staff, dates, objectives, methods, conclusions and publications. The inventory includes name, subject, support and project indexes.

4. Lewinson, Paul
"Archival Sampling" in The American Archivist, 20:291-312 (October, 1957)

A discussion of sampling in the selection of federal records for archival preservation, including information on types of records, objectives of sampling, statistical sampling and reliability and cost factors.

5. Lewinson, Paul
"Toward Accessioning and Standards - Research Records" in The American Archivist, 23:297-309 (July, 1960)

An experienced archivist discusses appraisal standards for research records kept by the federal government.

6. Schellenberg, Theodore R.
"The Appraisal of Modern Public Records" in Bulletins of the National Archives, 8:1-46 (October, 1956)

A basic contribution to the literature on archival evaluation, in which Dr. Schellenberg distinguishes between primary and secondary values and between evidential and informational values. In his 3-page conclusion, he summarizes his views on archival appraisal standards.

C. Processing

1. National Archives
"The Preparation of Preliminary Inventories" in The National Archives Staff Information Papers, 14:1-14 (Washington, 1950)

A description of the techniques employed by the National Archives staff in the preparation of 169 preliminary inventories of federal records. Based on fifteen years experience, this circular is a useful guide for the preparation of archival descriptive control documents and finding aids.

2. Rieger, Morris
"Packing, Labeling and Shelving at the National Archives" in The American Archivist, 25:417-426 (October, 1962)

An illustrated article on containers, storage equipment and supplies used by the National Archives.

D. Arrangement

1. Holmes, Oliver W.
"Archival Arrangement; Five Different Operations at Five Different Levels" in The American Archivist, 27:21-41 (January, 1964)

A useful introduction to the principles of archival arrangement at the depository, record group and subgroup, series, filing unit and document levels based on federal practices. Dr. Holmes also discusses boxing, shelving and labeling and the archival document controling each level.

2. National Archives
"The Control of Records at the Record Group Level" in The National Archives Staff Information Papers, 15:1-12 (Washington, 1950)

A brief summary of the National Archives' concepts and policies relating to the organization, management and control of record groups.

3. National Archives
"Principles of Arrangement" in The National Archives Staff Information Papers, 18:1-14 (Washington, 1951)

A statement of the principle of arrangement of records followed in the National Archives, including the principle of respect des fonds or provenance and the arrangement of archives in record groups, subgroups, series and file units.

4. Schellenberg, Theodore R.
"Archival Principles of Arrangement" in The American Archivist, 24:11-24 (January, 1961)

A discussion of the principles of provenance and original order as applied to archival materials and the archivist's obligation to determine and preserve the original arrangement of the records committed to his care and custody.

E. Preservation and Security

1. Cunha, George D. M.
Conservation of Library Materials
(Scarecrow Press, Metuchen, N. J., 1967, 406 pp.)

A manual and bibliography on the care, repair and restoration of books, prints, maps, manuscripts and similar materials.

2. Nelson, Harold E.
"Fire Protection for Archives and Records Centers" in Records Management Quarterly, 2:19-23 (January, 1968)

A brief article on fire damage and control, sprinkler systems and warning equipment related to records, records containers and structures.

3. McCamy, Calvin S. and Pope, Chester L.
"Summary of Current Research on Archival Microfilm". National Bureau of Standards Technical Note #261 (Washington, 1965)

A report on the technical problems associated with the production, use and preservation of microfilm.

4. Minogue, Adelaide E.
"The Repair and Preservation of Records" in Bulletins of the National Archives, 5:1-56 (September, 1943)

An old, but standard, discussion of repair and preservation problems, techniques and methods.

5. National Fire Protection Association
Protection of Records, 1967
(National Fire Protection Association, Boston, 1967, 96 pp.)

NFPA Standard No. 232 for the protection of records contains useful information on fire-resistive vaults, rooms, safes, containers and devices.

6. Simon, Louis A.; Gondos, Victor and Van Schreeven, William J.
"Buildings and Equipment for Archives" in Bulletins of the National Archives, 6:1-32 (June, 1944)

A standard discussion of archival buildings and equipment which should be brought up to date in 1969 by a Reader on Archives and Records Center Buildings edited by Mr. Gondos.

F. Records Management

1. California Records Management Committee, University of
Records Management Handbooks on "Disposition Schedule" and "Records Disposition," 7 pp. and 24 pp. (Berkeley, 1963)

Two pamphlets on the University of California program for inventorying, appraising and scheduling the disposition of records. The "Disposition Schedule" is intended to be a general university-wide records disposition schedule.

2. Cooper, Joseph D.
How to Communicate Policies and Instructions
(BNA, Washington, 1960, 348 pp.)

An authoritative and comprehensive book on communicating policies and procedures.

3. Leahy, Emmett J. and Cameron, Christopher J.
Modern Records Management
(McGraw-Hill, New York), 1965, 236 pp.)

A survey of records management with emphasis on illustrations and examples of basic techniques. Attributing the paperwork problem to technology, government regulations and the hoarding instinct, the authors suggest that it may be controlled by records retention schedules; record centers; improved filing systems and controls on the creation of correspondence, forms, reports, instructions and mail.

4. Marien, Ray
Marien on Forms Control
(Prentice-Hall, Englewood Cliffs, 1962, 246 pp.)

Written ten years after Frank Knox's Design and Control of Business Forms by a forms specialist with Olin Mathieson, this volume is Prentice-Hall's answer to

McGraw-Hill. Both volumes provide a thorough coverage of forms design, with the Marien work including more on the impact of automatic data processing on office forms. See also Wallace B. Sadauskas, Manual of Business Forms (Office Publications, New York, 1961, 236 pp.)

5. National Archives and Records Service
Amendment to "Federal Procurement Regulations" concerning "Retention of Records by Contractors and Subcontractors" in the Federal Register, 34:7147-7150 (May 1, 1969)

Regulations "to relieve the burden of excessive records retention requirements."

6. National Archives and Records Service
Records Management Handbooks

Title	Pages	Published	Price
Bibliography for Records Managers	58	1965	
Plain Letters	47	1955	
Form Letters	33	1954	25¢
Guide Letters	23	1955	
Forms Analysis	62	1960	40¢
Forms Design	89	1960	
Source Data Automation	78	1965	
Source Data Automation Equipment Guide	120	1962	
Source Data Automation Systems	183	1963	
Copying Equipment	82	1966	
Agency Mail Operations	47	1957	30¢
Files Operations	76	1964	
File Stations	39	1966	
Subject Filing	40	1966	30¢
Communicating Policy and Procedure	67	1967	45¢
Applying Records Schedules	23	1961	20¢
Federal Records Centers	39	1967	
Protecting Vital Operating Records	19	1958	

7. North Carolina State Department of Archives and History
"College and University Records Retention and Disposition Schedule," 10 pp. (Raleigh, 1964)

A general records retention schedule proposed for adoption by institutions of higher education.

G. Reference Service and Use

1. Bell, Whitfield J. and Smith, Murphy D., comps.
Guide to the Archives and Manuscript Collections of the American Philosophical Society
(American Philosophical Society Memoirs Vol. 66, Philadelphia, 1966, 182 pp.)

A comprehensive guide to the Society's archival and manuscript holdings, which contain much source material bearing on the development of American science. Subject and name indexed.

2. Burke, Frank G.
"The Application of Automated Techniques in the Management and Control of Source Materials" in The American Archivist, 30:255-278 (April, 1967)

A report on the Library of Congress' Manuscript Division system for the automated control of collections and data retrieval through subject matter indexing based on the Library's register system.

3. Delgado, David J.
Guide to the Wisconsin State Archives
(State Historical Society, Madison, 1966, 262 pp.)

A checklist of 1249 records series in the Wisconsin Archives. Brief administrative histories of state agencies forming 87 record groups are followed by listings of single, or a series of related, record series. Agency divisions

or sub-groups are used to divide the series entries. The title, inclusive dates, volume and series control number is given for each entry. Subject indexed.

4. Evans, Frank B.
"The State Archivist and the Academic Researcher - 'Stable Companionship'," in The American Archivist, 26:319-321 (July, 1963)

An essay on the importance of research uses of state archives.

5. Fox, Edith M.; Jacklin, Kathleen and Buchanan, John
Cornell University Collection of Regional History and the University Archives Report of the Curator and Archivist, 1958-1962
(Cornell, Ithaca, 1963, 141 pp.)

A standard guide to the manuscript and archival holdings of a major university. Entries show name, dates and volume of each collection, followed by a brief narrative description. Collections in the Regional Historical Collection and the University Archives are arranged alphabetically. Subject indexed.

6. Library of Congress, comp.
The National Union Catalog of Manuscript Collections, 1959-1968
(Edwards, Shoe String and Library of Congress, 1962-68, 7 volumes)

A union listing of manuscripts collections in United States repositories. Entries include NUCMC number, title, inclusive dates, volume, depository, scope and content note and information on finding aids and provenance. The volumes include periodic cumulative subject-name and repository indexes and lists of contributing repositories.

7. Rhoads, James B.
"Alienation and Thievery: Archival Problems" in The American Archivist, 29:197-208 (April, 1966)

A discussion of the problems of protecting archival resources from theivery, disappearance and mutilation.

8. Shera, Jesse H.
Documentation and the Organization of Knowledge
(Archon, Hamden, Connecticut, 1966, 185 pp.)

A stimulating collection of fourteen essays arguing "the essential unity of librarianship" and the importance of documentation and the bibliographic organization of subjects.

9. Starr, Louis, ed.
The Oral History Collection of Columbia University
(Columbia, New York, 1964, 181 pp.)

A guide to oral history materials in the leading American repository of recollections and reminiscences collected by tape-recorded interviews and transcribed for research use. In 1966, Columbia published a guide to oral history programs at other institutions. Supplements cover the period to 1968.

10. Warner, Robert M. et. al., comps.
College and University Archives in the United States and Canada
(Society of American Archivists, Ann Arbor, 1966, 108 pp.)

A directory of 596 college and university archives listing the name and address of the institution; name and title of the archivist; number of staff members; general description of the quantity and nature of the archives, and information on the availability of material for research use. Arranged alphabetically by state with lists of institutions reporting no archives (316) and not reporting (348).

H. Sound Recordings

1. Benison, Saul
"Reflections in Oral History" in The American Archivist, 28:71-83 (January, 1965)

A brief discussion of the possibilities and limitations of oral history as a

documentation technique by a leading practitioner.

2. Gilb, Corinne L.
"Tape-Recorded Interviewing: Some Thoughts From California" in The American Archivist, 20:335-344 (October, 1957)

A thorough review of oral history techniques with emphasis on goals, the interviewer's responsibilities and precepts for interviewing.

3. Schippers, Donald L. and Tusler, Adelaide
A Bibliography on Oral History
(Oral History Association, Los Angeles, 1968, 18 pp.)

A descriptive listing of 116 publications. Oral history literature has been characterized by enthusiasm and attention to techniques. The usual article on oral history begins with an account of the origin of the author's program and attempts to trace it back to a great name like Herodotus or Hubert H. Bancroft. A sizeable percentage of the articles on the subject are mixtures of promotional enthusiasm and outright bilge.

I. Scientific, Technological and Business Records

1. American Institute of Physics
"Notebooks, Correspondence, Manuscripts: Sources for the Fuller Documentation of the History of Physics"
(American Institute of Physics, New York, 1963, 8 pp.)

A brief appeal for the preservation of source materials directed toward a scientific profession.

2. Kipp, Laurence J., ed.
Source Materials for Business and Economic History
(Harvard Graduate School of Business Administration, Cambridge, 1967, 154 pp.)

The proceedings of a 1966 colloquium attended by researchers, librarians and archivists concerned with the collection and use of business records. The participants discussed collecting policies, useful source materials, selecting significant records, researcher's access problems, archival training, financial support and institutional cooperation.

3. Kuhn, Thomas S.; Heilbron, John L.; Forman, Paul and Allen, Lini
Sources for History of Quantum Physics, An Inventory and Report
(American Philosophical Society, Philadelphia, 1967, 176 pp.)

A catalog of source materials which includes chapters on project activities and procedures involving preliminary research, oral history, microfilming and the collection of manuscripts.

4. Woolf, Harry et. al.
"The Conference on Science Manuscripts," in Isis, 53:3-157 (Baltimore, 1962)

Papers presented at a 1960 Conference of the History of Science Society, including case studies of scientific research, discussions of archival selection, collection and description of manuscripts and oral history.

J. Bibliographies

1. Chatfield, Helen L.
"Bibliography: College and University Archives: A Bibliographic Review" in The American Archivist, 28:101-108 (January, 1965)

An annotated bibliography of early writings in the field.

2. Downs, Robert B. and Jenkins, Frances B.
Bibliography: Current State and Future Trends
(University of Illinois, Urbana, 1967, 611 pp.)

A survey of current bibliographic practices at the national level, for four types of materials and in twenty-nine subject fields. Indexed.

3. Evans, Frank B., comp.
The Administration of Modern Archives: A Select Bibliographic Guide
(General Services Administration, Washington, 1968, 146 pp.)

A comprehensive dittoed compilation of writings pertinent to archival administration including sections on bibliographic aids, general works, archival principles, archival values, history, librarianship, records management, records appraisal, buildings and equipment, preservation and rehabilitation, arrangement, description, non-textual records, reference service, microphotography, exhibits and publications, historical manuscripts, administrative problems, federal records, state and local records, business and labor records, college and university records and church records. Each section is divided into recommended and additional readings for use in the National Archives and Records Service's archival training programs. See also annual bibliographies in The American Archivist.

4. Perman, Dagmar H., ed.
Bibliography and the Historian, The Conference at Belmont
(Clio Press, Washington, 1967, 171 pp.)

A collection of twenty-three studies prepared for a conference on bibliographical services to history. The contributions focus on new technology and bibliographic services for historians. The volume is valuable as a current survey of programs and plans.

5. Shera, Jesse H.
Historians, Books and Librarians
(Western Reserve, Cleveland, 1953, 126 pp.)

A general discussion and summarization of a librarian's view of historical research written "to make librarians more aware of the world of historical scholarship" and the historian's demands on the library. Chapter bibliographies.