

classification system is a purely manual search system in which the functions of search and retrieval are combined into one operation. A patent examiner scans the documents in a given subclass or group of subclasses and pulls out those four or five documents which he wishes to take back to his desk for further study and for use in writing his action on a pending application before him. The newer techniques described above for managing technical information in the Patent Office are being employed for performing the search function only, or for identifying those four or five documents, frequently embedded within 40 or 50 drops from a single search, which the examiner wants to take back to his desk. However, until such time as the difficulties in retrieving the desired documents and getting them into the examiner's hands effectively and efficiently can be overcome, it is felt that large-scale replacement of the present U.S. patent classification system will not come about.

## LITERATURE CITED

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## Transfer of Security-Classified Information\*

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**The safeguarding of security-classified information and the systematized transfer of information are inseparable but fundamentally conflicting requirements of the Defense Documentation Center (DDC) missions and activities. DDC experiences complex and costly burdens to achieve and maintain a realistic balance between information control and information dissemination. These impacts are related to interfaces with sources and users, to in-house processing and storage of documents and data, to announcement media, to data retrieval and miscellaneous products and services, and to the development of advanced systems and capabilities for improved information transfer. Areas of special difficulty or new interest are described and estimates of the cost impacts of processing security-classified information are summarized with respect to various processing functions.**

As the major centralized Department of Defense facility for the transfer of scientific and technical information, the Defense Documentation Center (DDC) deals with large amounts of classified information. DDC is a major field activity of the Defense Supply Agency, and supports research, development, test, and evaluation programs being conducted by or for the Department of Defense. DDC collects, processes, stores, announces, retrieves, and supplies information in all the scientific and engineering fields of interest to the Defense Department and its contractor family. Its Work Unit Information System encompasses the storage and retrieval of data about on-going research and development. DDC's Technical Report System deals with documented records of completed work. The agency's information and documentation systems use a large computer facility which, on the one hand, permits

great service speed and manipulation of huge amounts of information but, on the other, compounds the difficulties of safeguarding classified information by its very efficiency in providing such material.

The thousands of Defense-sponsored RDT&E facilities, laboratories, and test stations, both in-house and extramural, are simultaneously sources of input to DDC and users of DDC outputs. Security controls imposed at the point of information generation or upon transfer to DDC also apply when data and reports are provided to users by DDC.

DDC is in effect an information wholesaler, and the classified portion of this information moves in a restricted path within limits prescribed by a common set of regulations. DDC itself rarely classifies information, and then only internally-generated bibliographies and reference tools. However, as an element of the federal government, DDC must observe established policies for the safe-

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guarding and control of security-classified information, while accomplishing its assigned substantive missions. Because of the fundamentally conflicting objectives of information transfer and information control, the responsibilities attendant to the handling of security information create special complexities and impacts in essentially all aspects of the information transfer process.

DDC's role in information control assumes a special importance because of its strategic position in the flow of unclassified Defense technical information to the public domain. While DDC does not directly serve the general public, it does provide to the Clearinghouse for Federal Scientific and Technical Information (CFSTI) of the Department of Commerce several thousands of documents annually, which have been determined by responsible Defense agencies to be suitable for public release. CFSTI announces these publicly available documents in its twice-monthly publication, "U.S. Government Research and Development Reports," and furnishes either hard copies or microfiche at nominal cost. CFSTI announces and sells these reports of DoD-sponsored RDT&E on the same basis as the reports of AEC, NASA, Agriculture, and other federal agencies with R&D programs. DDC provides vital support to the responsible Defense agencies by monitoring this information transfer to the public domain to detect and resolve security omissions and inaccuracies, to ensure uniform observance of security regulations, and to preclude the inadvertent public release of security-classified information.

DDC collects, catalogs, analyzes, and indexes about 50,000 technical report titles a year, and stores detailed bibliographic data and citations of the reports in its computer system for subsequent retrieval and transfer. This input is comprised of 20-25% security-classified reports and 35-40% unclassified, unlimited reports available to the public, with the remainder unclassified, but of limited or controlled distribution. To handle effectively this much input of this composite character requires scheduled mass-processing techniques, as well as a variety of fairly common measures for clearly identifying and distinguishing the security character of each item in the processing flow, and for maintaining adequate physical compartmentation of work areas, work in process, and various related stores. The correct security and automatic declassification markings are monitored at the point of input, and careful security control is imposed for the classifications authorized for DDC by its basic regulation, DoD Instruction 5100.38—i.e., Confidential, Secret, and Restricted Data. Accession (AD) numbers are assigned to documents in characteristic number ranges to help identify and safeguard classified and limited reports; at present, the 500 000 series is used for classified, 600 000 for publicly available unclassified, and 800 000 for unclassified limited documents.

All classified documents and records are placed under strict manual accountability controls. Secret documents are controlled through a central registry, and receipts are maintained for all transfers of Secret information, both internally and externally. Validation of requests for Secret document copies, hard copy or microfilm, triggers the automatic printing of the correct receipts and address labels. Careful inventory records are maintained as the numbers of individual document holdings are increased

by new accessions and reproduction of hard copies or microfiche, and decreased as requests are filled.

Some of the more complex impacts of processing classified information are caused by the fact that document descriptive data are created and stored in some 36 data fields. Certain of these fields—titles and abstracts, for example—may have their own security classification, not necessarily that of the over-all report. The complete descriptive entry for a document may also have to be classified because the combination of otherwise-unclassified subject terms, title, or other fields, taken in context, represents a classified description. In addition to such difficult determinations, procedures have had to be worked out to allow suppression of classified data in retrieval processes, so that the remaining unclassified description can be included in unclassified bibliographies, announcement media, and other products.

The data storage medium currently in use at DDC involves a series of remote typewriter terminals, IBM-2741's, which input to an IBM-1440 computer. Data are entered through these terminals in a single end-of-processing-line operation. For the input of unclassified, unlimited Defense-sponsored reports, CFSTI has similar remote terminals about 5 miles away, hooked directly into DDC's IBM-1440 disk storage by direct telephone lines. For obvious reasons, elaborate lockout mechanisms have been devised to prevent any classified data in the computer store from leaking back to CFSTI through their terminals.

Descriptive data input for documents is assembled over a twice-monthly cycle, checked for accuracy, and transferred to the main computer storage, now a UNIVAC-1108, as part of the data base for answering all future service requests concerning documents. Newly-added data are formatted by program and sent to GPO on magnetic tape for printing of the twice-monthly announcement bulletin, *TAB*. Printing is accomplished in GPO by a very rapid computer-actuated photocomposition process called Linotron. The six indexes to *TAB* and the quarterly and annual cumulations of these indexes will soon be composed by this process, as well. *TAB* has been classified Confidential, after many years as an unclassified announcement bulletin, because of the security sensitivity of such an ordered cumulation of information, much of which concerns classified projects, and because of its wide dissemination. Care has been taken to maintain the indexes as unclassified reference tools.

The descriptive data for document input also become the basis for document release, since subject field and group information about each document are included. These data are stored in an inventory file, also containing stock level, report classification, release limitations, etc. Requests for classified and limited reports are then matched against this file, at which time a number of conditions must be met. The requester must be an approved user involved in government in-house or contractor R&D effort, and in the case of classified reports, the subject of the report must match a subject profile based on the requester's certified need-to-know in relation to his contract or R&D task.

The same descriptive data for document input are used to update inverted files, consisting of retrieval elements such as contract, subject descriptor, corporate source, etc.,

with pertinent AD (document accession) numbers posted under them. These files are used for all computer searches. Many of them are so-called packed files; spaces, hyphens, etc., are dropped to increase search speed and to avoid problems caused by inconsistencies in format of like data elements.

The direct file is in numeric AD number order and contains the full descriptive entries for each document. Searching in the inverted files locates document AD numbers pertinent to a question. The bibliographic result, however, is printed out as full or selected-field entries from the direct file for these AD numbers.

Bibliographies are developed from this operation, and the classification of the entries and individual data fields of each pertinent entry determine the security level of each bibliography.

There is a healthy and growing trend to use source-generated descriptive data whenever possible. The DD Form 1473 fulfills this purpose for documents, and is required by DoD Instruction 3200.8 to appear in every report copy prepared to document DoD-sponsored technical effort. This form resembles the DDC data worksheet, and much descriptive cataloging data, titles, abstracts, etc., are quoted directly from it or modified only slightly, thus avoiding repetitive effort.

The Work Unit Information System, which contains information on the on-going research projects of DoD and NASA, carries streamlined, source-generated input one step further by requiring data submission in machineable form, magnetic tape and punched cards. DDC's function as a transfer point for these data involves monitoring this source-generated input, and modifying and adding to it in the case of subject retrieval terms and corporate source codes.

Retrieval from the work unit (DD Form 1498) file produces a great variety of statistical and substantive reports. This system was for several years treated as experimental, and great emphasis was put on writing programs to meet individual output requirements in order to obtain particular formats. A large number of these retrieval programs and formats have now been standardized, and the system has shifted to a relatively stable "menu" of search routines and output formats. New programming is necessary only for exceptional requests.

In addition to these two major systems—for documents and for summaries of current effort—DDC operates a number of smaller data banks. Some of these are complete and separate entities; some are subsets of other data. Some contain information which can be disseminated generally; some are restricted to use by specific categories of requesters.

The broad range of DDC services includes report bibliographies on individual request, more than 20,000 a year, and scheduled bibliographies on frequently-asked-for subjects which are published and updated regularly to provide ready-made answers. Hard copies and microfiche of documents are furnished on request. A recent Defense policy change has instituted a \$3-per-copy service charge for

hard copies. Microfiche and bibliographies are still furnished without charge to established users.

DDC also operates and maintains the DoD Central Authority File for registration and certification for access to services and products within the DoD scientific and technical information program. In this role, the agency acts as a central transfer point for right-of-access information based on facility clearance, subject profile need-to-know, and whether or not a valid RDT&E contract is in force.

An effective system of on-line computer-generated security controls is under development in the agency. This system will provide a complete and expeditious automated accountability capability which will supplement the present manual system of inventory controls. It will maintain historical receipt-to-shipment-or-destruction transaction records for Secret documents and microform. It will also provide a quick-reaction alert system to permit effective monitoring to detect any security discrepancies.

The costs of processing security-classified information are major budgetary factors. While precise cost information is difficult to develop, DDC made an extensive analysis of security cost impacts in 1965 and the estimates developed then are believed to be still relatively valid. Almost 9% of total DDC costs, both direct and indirect, were attributable to satisfying requirements associated with the processing and transfer of security-classified information. The percentages varied widely, of course, among individual work functions. For example, in descriptive cataloging, the added cost impact of processing security-classified information was estimated to be about 1%, in indexing and abstracting it was 6.5%, in the preparation of bibliographic responses to reference queries it was 20.6%, and in the mailroom, 26.1%. These estimated percentages reflect experience in a large-scale documentation center, where classified material comprises 20–25% of the workload. Security cost impacts would probably vary considerably if the total volume or the proportion of classified material differed materially.

With such voluminous and varied stores of data, all DDC operations must be constantly alert to the security classification status and implications of individual data elements and data items, of combinations and cumulations of such data, of the reports or documents to which the data pertain, and of the organizations and people providing input or requesting output. It is an important and complex responsibility in such an environment to see that all information is transferred which should be transferred to all who should have it, and that none should be released to anyone not entitled to get it.

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