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DDC 10 YEAR REQUIREMENTS AND PLANNING STUDY

Survey Results Report

AUERBACH ASSOCIATES INC.
121 North Broad St.
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Progress Report

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Results of a survey are presented that sampled DDC's user population to
provide a significant input to the contractor's recommendations for facilitating
the transfer of DoD S&TI for the 1978-1988 period. The survey determined the
use of, needs for, and views regarding the adequacy of both current and future
DDC technical information products and services.

The survey utilized telephone interview techniques to a randomly selected

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sample of 700 support, management, and bench level individuals engaged in Defense research, development, test and evaluation (RDT&E) activities. Twenty-five organizations from each of four DDC user organization categories were drawn randomly from the DoD Dissemination Authority List (DAL). The four categories are: DoD Key Users, DoD Non-Key Users, Contractor Key Users, and Contractor Non-Key Users.

Among the user population studied, improvements in the quality of information provided and response time are seen as the most pressing needs. Ranking second and third, respectively, among predicted needs are improvements in information currency (or "up-to-dateness of information") and provision of an increased amount of information available. Less important are needs in improvement in the formats and media in which information appears.

R&D CONTRACT STATUS REPORT
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AUER-2325/2326-TR-3

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SECTION I. INTRODUCTION AND SUMMARY

The findings in this report are directed toward:

1. Identifying and documenting the Scientific and Technical
    Information (S&TI) and Research, Development, Test, and
    Evaluation (RDT&E) management information requirements of
    the Department of Defense (DoD) RDT&E community for the
    1978-1988 period.

2. Identifying user problems associated with acquisition and
    application of S&TI/RDT&E management information provided
    by DDC or other Government or non-Government sources.

This User Survey Report is one of five major portions of AUERBACH's long
range planning study for DDC. The other four are: a Literature Survey, an Expert
Panel Review, an Interagency Survey and an Internal Review of DDC Plans and opera-
tions. The findings of all five facets of the study will be combined in a sub-
sequent final report.

1.1   SUMMARY OF FINDINGS

Current Requirements

●   Local libraries are the primary formal source of information,
     while "distant" libraries are preferred by a very small minority

●   Technical reports are preferred to other formats for information
     presentation

●   Variation in information requirements is strongly dependent upon
     job type, i.e., bench level, management or support

- Printed media are preferred to computer printouts and microforms

- Users will not pay for information services unless the quality of service is substantially improved and targeted toward their precise needs.

- Increases beyond the current level of response time are unacceptable

- DDC services are seen as no better or worse than those provided by a specific comparable source, such as a service provided by NASA or NTIS

- Support personnel reported a significantly higher rate of Information Analysis Center (IAC) utilization than bench level or management personnel but total IAC usage is low.

Current Problems

- DDC's RDT&E management information services require more improvement than S&TI services

- Most users are unaware of the full range of DDC services.

- Major problems in information access and use are quality, response time, quantity and up-to-dateness, in that order.

- Minor problem areas are in information presentation (formats and media)

Predicted Requirements:

- Users will require higher quality service with reduced response time

- Users will pay "a little bit" more for information services, but only if they are improved and targeted toward their precise needs

- For DDC, increased demand is seen for the Defense RDT&E On-Line System (DROLS), Current Awareness Bibliographies, and RDT&E management information services

Predicted Problem:

- Problems in obtaining and applying information during the 1978-1988 period are predicted to be of the same kind as are currently being experienced, but these problems are predicted to increase in intensity.

1.2   SUMMARY OF CONCLUSIONS

Conclusions Directed Toward Provision of Improved DDC Products and Services:

- The current and predicted needs for improved quality of information services point up the requirements for:

(a) critically analyzed outputs (information analysis)

(b) access to files of verified, factual data

In summary, DDC should move from a position of providing only bibliographic, document-oriented service to the provision of fact and information service as well.

- Continued reliance upon personal files, projected increased demand for Current Awareness service, and preference for technical reports and journals in hard copy require greater emphasis upon the human (i.e., behavioral, attitudinal) rather than the technological aspects of improved information service.

- The fact that those with Top Secret clearances saw DDC as coming closer to meeting their needs than those with Secret clearances highlights the importance of DDC as a source of classified information and justifies the continuation of its providing this information.

- The need for a thorough review and modification of the DDC RDT&E management information system is indicated by the findings that:

  (a) management non-DDC users reported more satisfaction in the information service they received elsewhere than DDC management users

  (b) management respondents reported more problems in accessing and using information than bench level respondents

  (c) support personnel ranked management user satisfaction higher than did these users themselves

- Almost half of the survey respondents utilize subscription service, but there is no indication that this will ever replace retrospective, demand search service, so DDC must continue to provide both modes of service. However, the volume of demand service for documents may decrease if DDC provides fact service and more ADD service.

- Demand for DROLS service may increase even beyond the high levels predicted in this report if DDC converts from leased line to dial-up mode. This will result in a significant burden upon DDC hardware.

- Two findings indicate that the abstract bulletin, TAB, could be phased out during the target period because in the future, demand for Current Awareness and DROLS services will increase. If these demands are met, the usefulness of TAB will diminish.

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• Improved access to Information Analysis Centers (IAC's) by bench
  level personnel is required, as indicated by the fact that support
  personnel are the chief IAC users, presumably to provide informa-
  tion to bench-level users in their organizations.

Conclusions Directed Toward Improved Management of the RDT&E Information Transfer Process:

• The problems and requirements reported in information currency
  and response time indicate that improved management of all
  aspects of both the S&TI and the RDT&E management information
  system is required, from information generation to end use.

• The fact that the local library is the overwhelming first choice
  of a source for information and that a "distant" library such as
  DDC is one of the last choices indicates that:

  (a) DDC should concentrate its efforts on serving end users
       through local librarians.

  (b) increased decentralization and regionalization of DDC reference
       services is required

  (c) remote, on-site access devices, such as DROLS, will be welcomed

• The need for development and application of a value system for
  information services is highlighted by the fact that most users
  are unaware of the cost of information.

• The fact that users appear willing to pay for improved quality
  and reduced response time opens the way to developing an increased
  measure of accountability in the DoD RDT&E information transfer process

• More behavioral research is required in developing improved in-
  formation system outputs, since 77% of respondents reported some
  disadvantages in using even their preferred information formats.

• DDC must be even more concerned than other information transfer
  organizations (such as NTIS) with the rapid delivery of current
  information, especially if it is classified. This conclusion is
  based upon the finding that users with Top Secret classifications
  found the currency of the information they received less satisfac-
  tory than did those with Secret or lower level classifications.
  DDC is one of the few S&TI and RDT&E management information ser-
  vices that provide classified information.

Conclusions Directed Toward Improved Marketing of DDC Products and Services:

• The extremely low level of awareness of most DDC services (i.e.,
  only 4 out of 22 DDC services are known to more than 50% of the
  respondents who are DDC users) among all classes of users indicates
  a need for improved user education programs targeted specifically
  toward demonstrating how DDC services can satisfy requirements
  of each class. Users indicated by a margin of 75% that they would
  welcome such educational programs.

- The importance of marketing of DDC services is emphasized by the fact that DDC Digest, a user education tool, was ranked as second most useful DDC subscription service.

- The DDC user population consists of a variety of strata, and each must be considered independently in the development of new products, services, processing modifications and marketing programs, etc. This fact is attested to by the low correlations between user types and responses to questions. Particular attention should be directed toward the delineation of information requirements of users by job type.

- DDC should continue to direct a significant portion of the marketing of its services toward DoD Contractors (i.e., continuation of the "contractor access program"), since more contractors than DoD respondents reported problems with the amount of information they had been receiving; also because fewer contractors than DoD personnel were aware of DDC services.

- The discrepancies between user satisfaction and support personnel perception of the degree of user satisfaction militates for the establishment of a user feedback system which will provide direct feedback from users without the intervention of support personnel, who would tend to act as filters.

1.3 SUMMARY OF METHODOLOGY

In order to gather the information necessary for this forecasting study, AUERBACH used a combination of telephone interviewing and mailed questionnaires. The methodology consisted of three steps:

(a) Drawing the sample

(b) Development of the interview schedule and conduct of the interviews

(c) Data analyses and interpretation of results

A more complete description of the methodology is contained in Appendix A.

1.3.1 Drawing of Sample

A total of 2,886 user organizations with an estimated population of 150,000 users were surveyed. This population was stratified as follows:

- Type of Organization/Organizational Use of DDC

    - DoD Organizations - Key Users
    - DoD Organizations - Non-Key Users
    - Contractor Organizations - Key Users
    - Contractor Organizations - Non-Key Users

- Type of Job

    - Bench level personnel
    - Management personnel
    - Support personnel (librarians, information specialists, etc.)

- Individual Use/Non Use of DDC

    - Individual users of DDC
    - Individuals who do not use DDC

A random sample of twenty-five organizations was selected from each of
the four types of organizations. Twenty staff members were then selected randomly
from each organization. These twenty were selected to include all three types
of jobs, and both users and non-users.

1.3.2   Development of the Interview Schedule and Conduct of the Interviews

Survey respondents were initially contacted by phone, scheduled for an
interview and then sent a packet, including a set of cards that provided the
response alternatives for a majority of the questions in the interview.

Two highly structured interview schedules were developed: one addressed
toward managers and bench personnel, and the other addressed to support personnel.
Interviewers training sessions were conducted, and 4% of all interviews were
monitored to ensure quality control and reliability. A total of 698 interviews
were successfully completed (See Section II and Appendix B for a categorization
of the interviewed population).

1.3.3   Data Analysis

The analysis of the data for this project proceeded in three phases:

- Identification of major independent variables of interest
  (e.g., DDC user vs. non-user) via multiple regression analysis

- Dtermination of significant effects of independent variables
  on dependent variables (e.g., favorite media) via variance
  and contingency analysis

- Identification and prediction of future trends in the S&TI/RDT&E
  management information environment.

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SECTION II: CATEGORIZATION OF USERS/POTENTIAL USERS

This study focuses upon the population of users and potent :1 users
of S&TI and RDT&E management information in the DoD community. Th /efore, the
sample was designed to represent the major characteristics of th/. members of this
population. These are:

- Type of Organization

    - DoD organizations
    = DoD contractor organizations

- Organizational Use of DDC

    - Key user (heavy user) organizations
    - Non-key user organizations

- Type of Job

    - Bench level personnel
    - Management personnel
    - Support personnel

- Individual Use/Non-Use of DDC

    - Individual users of DDC
    - Individual non-users of DDC

All of the characteristics listed above produced significant differences
between groups. However, different job types clearly produced in the most meaning-

ful distinctions among users and potential users. Therefore, it is the principal
means by which users and potential users can and should be categorized for
planning purposes. See Appendix B for a complete detailed breakdown of the sample
population.

Additional variables not serving as strata in the sample, but analyzed
for their influence upon user attitudes and behavior are:

        (a)   Highest degree obtained
        (b)   Security classification
        (c)   Years of experience in research and development
        (d)   Hours per week engaged in research
        (e)   COSATI Fields

The characteristics of respondents in terms of these variables are also
contained in Appendix B.

SECTION III. THE CURRENT S&TI AND RDT&E MANAGEMENT INFORMATION ENVIRONMENT

The interview schedule used in this survey was designed to elicit information requirements and problems by identifying critical incidents in respondents' search strategies. First respondents were questioned regarding the physical location that they first go to when searching for information (i.e., the source), and then the questions were shifted to formats (e.g., journal articles, technical reports, etc.) in which they receive information most useful to them, and then to the physical means of the presentation, or media of information. Respondents who were identified as DDC users were then asked a series of questions regarding their requirements for and problems with DDC products and services.

3.1   CURRENT REQUIREMENTS

3.1.1   Primary Sources of Information

- 50.7% (N=306) of the respondents choose their in-house library as their primary formal source of information

- A distant second and third, in the order of preference are respectively departmental collections (80 or 13.2%) and users' personal collections (79 or 13.1%). Friend, peer or associate is the only other source receiving frequent mention (43 or 7.1%)

- Only 2.3% (14) of respondents indicate a preference for a "distant" library as a first choice information source

- 90.3% of the respondents report that they typically find their most useful information at their first source

- The more years of experience in R&D activities, the lower the percentage of information that a researcher finds at his first step in the search process. At subsequent steps in the search process:

  (1) there is a positive correlation (.13) between hours/week doing bench research and success in finding useful information

  (2) management personnel find a higher percentage of information (29.1%) than bench level workers (24.1%).

See Appendix C, Table C-1 for a tabular presentation of findings in the area of primary sources of information.

3.1.2 Informal Sources of Information

A series of questions was specifically directed toward respondents' use of informal sources of information, including use of personal and departmental collections.

- Researchers with more R&D experience (16.6 years vs. 13.8) and those with Ph.D.'s (25, 21% vs. 53, 10%) rely more heavily on their own personal collections than those with less experience and those without Ph.D.'s.

- Three categories of respondents agreed with greater frequency than their counterparts that they could use assistance in organizing their personal collections: 49.5% of those with doctorates (55) versus 32.7% of those without doctorates (153), 41.6% of those in contractor organizations (114) vs. 30.3% (99) in DoD agencies and 38.5% (184) of the DDC users versus 27.4% (35) of non-users.

- Users with bachelors degrees (35 or 12.8%) rely more heavily on department collections than those with Ph.D.'s (7 or 5.9%).

3.1.3 Formats

- Technical reports and journals are by far the most useful formats, preferred as "most useful" by 34.8% (N=243) and 16.3% (N=114) of the respondents, respectively.

- Other formats receiving mention include handbooks and manuals (N=62) abstract journals (N=61) and computer generated bibliographies (N=58), each preferred by approximately 8% of the respondents.

- The formats reported by the users to be the second most useful in their information searches follow an almost identical pattern except that technical reports receive less mention.

- 520 (77%) of the respondents report some disadvantages in utilizing their preferred formats and almost as many, 478 (71.2%), report some disadvantages in utilizing their second most preferred format. In general, more users with a Ph.D. (100 or 87.7%) and more of those working in contractor organizations (250 or 83.1%) report disadvantages with the formats they find to be most useful than do those without the Ph.D. (394 or 76.8%) and those in DoD agencies (266 or 72.3%) respectively.

Frequencies for each format may be found in Appendix C, Table C-2.

3.1.4   Media

- The vast majority of respondents (588 or 84.2%) indicated that they rely most heavily on printed (hard copy) documents. This overwhelming and continued reliance on printed documents is significant, considering the technological innovations in the information science field during the past several years.

- Verbal communication comes in as the second most preferred, with 51 (7.3%) respondents indicating that it serves as their primary medium.

- Microfiche and computer printouts are mentioned by 20 (2.9%) and 19 (2.7%) respondents.

Preference for various media are listed in Table C-3 in Appendix C.

3.1.5   User Charges

A number of questions were asked regarding users' attitudes toward the costs of the services that they utilize.

- Users are unaware of the cost of information. (In many cases, the overwhelming majority of user organizations attach no contingencies to the amount of money users spend on information services. Therefore, survey respondents' reports regarding cost data need careful scrutiny.)

- The vast majority of those responding (478 or 80.3%) say that they would prefer a service they pay for that covers precise needs in specialty areas to a free service covering broad areas. This majority consists of significantly more respondents working in non-key organizations, (202 or 84.2%) than those working in key organizations (269 or 77.3%).

- Respondents were asked if they currently subscribe to any services which automatically provide information according to previously registered categories. Three hundred twenty-seven, or 46.8% of those responding indicate that they do subscribe to such a service. Of these, 185 (56.6%) say that they pay for the service.

- A series of questions was asked in order to determine users' willingness to "trade off" between improvements in the aspect of service that they rate the lowest, and increases in cost. Three hundred fifty-nine (73.1%) respondents reported that they would be willing to pay more to improve information services, while only 132 (26.9%) say that they would not be willing to pay more. Of those who responded to questioning about how much more they would be willing to pay, 31.8% (70) say that they would be willing to pay "a lot more", 24.9% (106) indicate that they would be willing to pay "somewhat more" and 43.3% (161) say that they would be willing to pay "just a little bit" more.

- Respondents were then asked if they would be willing to wait longer in order to improve the services that they receive: 58.3% (222) said no and 41.7% (159) said yes. The predominant attitude among those who do say that they would be willing to wait longer is that they would only be willing to wait "a little bit" longer to improve the services they receive.

In summary, survey respondents are not enthusiastic about either an increase in cost or an increase in response time. However, it does seem clear that they would be more willing to accept increases in cost than an increase in response time.

3.1.6   DDC Products and Services

Respondents who indicated that they were users of DDC were asked to compare DDC services with a comparable service provided by another agency that the interviewee said that he used, in terms of six dimensions:

Quantity of information provided
Quality of information provided
Time lag, in terms of response time
Currency of information provided ("up-to-dateness")
Medium in which the information is provided
Format in which the information is provided

Survey participants responded on a 5-point scale from "Always met my needs" (a score of 1) to "Never met my needs" (a score of 5) for each of the six dimensions.

- There are no significant differences between DDC and other
  agencies on any of the six dimensions. Users perceive the
  services provided by the DDC and comparable agencies as
  approximately equivalent in meeting their needs in these
  respects.

- There were significant differences between those with Top-
  Secret classifications and those with Secret classifications
  on the quality and the currency dimensions. In both cases,
  those with Top-Secret clearances see the DDC services as .3
  points closer to meeting their needs than do those with Secret
  clearances.

3.1.6.1 Awareness of DDC Services

A series of questions was asked to determine the awareness of DDC users
regarding specific DDC services. These questions were not directed to DDC non-
users who were assumed to be unaware of any DDC services. Detailed results appear
in Appendix C, Tables C-4 and C-5.

- The best known DDC demand service is the Technical Report Program,
  (known to 290, or 86.3%, of respondents) which is followed closely
  in awareness by Report Bibliographies (75.6%). The other demand
  services fall further down the list and are not nearly so well
  known as these two.

- Among the subscription services, TAB is by far the best known
  with 283 (84.2%) respondents reporting awareness. TAB is followed
  by the DDC Digest, with 174 (51.8%) users indicating awareness,
  and then by ADD and Current Awareness Bibliographies.

- Questions about specific DDC services produced hesitancy and an
  apparent lack of knowledge of these services on the part of many
  DDC users. Of the 544 DDC users in the survey, only 336 (61.8%)
  were able to give meaningful responses to the question on awareness
  of specific DDC services. Many of the 208 users (38.2%) who were
  not able to answer these questions know that they use DDC, but are
  not sure which of the information products and services that come
  to their attention are from DDC and which are from another agency.

- Users in DoD agencies are significantly more aware of DDC services
  than are users in DoD contractor organizations.

- Support personnel are often not aware of many of the DDC services.
  The percentage of support personnel who are aware of DDC services
  range from as low as 38.6% (for Current Awareness) to 88.6% (for
  TAB).

3.1.6.2 Preference Among DDC Services

Respondents were asked to rank the DDC subscription and demand services
separately in terms of those that they found to be most useful. Detailed results

appear in Appendix C, Tables C-4 and C-5. Usage by job type is shown in Tables C-6 and C-7.

- The Technical Report Program is by far the most popular of <u>demand</u> services with 207 (63.1%) respondents rating it most useful.

- Report Bibliography Service is a distant second in popularity, with only 59 (18%) respondents choosing it as the most useful service.

- In a choice of second most useful, Report Bibliographies rank first (107 respondents, 40.7%) and the R&T Work Unit Information System rank second (43 respondents, 16.3%)

- Among the DDC subscription services, TAB receives by far the most votes for first choice, with 190 (71.4%) participants choosing it. ADD received 26 votes (9.8%) as first choice.

- The <u>DDC Digest</u> is the second choice as most useful <u>subscription</u> service, with 56 (32.7%) respondents.

- Lack of awareness was again revealed when respondents were asked to rank specific DDC services in terms of those that are most and least useful to them. Only 263 of 336 (78.3%) chose a second most useful demand service, 152 (45.2%) chose a least useful service and 105 (31.3%) chose a next to the least useful demand service. The pattern was similar for subscription services.

3.1.6.3 RDT&E Management Information System

A series of questions was designed to measure various aspects of users' perceptions of the RDT&E Management Information System (MIS) -- WUIS, IR&D and Program Planning Reports. The differences between the WUIS and the IR&D data base must be interpreted differently, because contractors do not have access to IR&D.

- 124 (22.8%) of the DDC users interviewed report using the R&T Work Unit Information System

- 51 (9.4%) report having used Program Planning Reports.

- 42 report that they used the IR&D data base. (This amounts to 7.7% of <u>all</u> DDC users, but 11.3% of the <u>DoD</u>/DDC users. Only DoD personnel are permitted access to the IR&D).

- In general, attitudes toward the six dimensions of the services provided by these MIS data bases are on the favorable side.

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- WUIS is used by a larger percentage of DoD researchers (93 or 30.9%) than contractors (31 or 12.8%). A majority of support personnel (52 or 59.1%) use WUIS. The same patterns of use by job type may be observed for Program Planning Reports and the IR&D data bases, with support personnel utilizing them more heavily than management and bench level users.

Table C-8 in Appendix C shows these findings in tabular form.

3.1.7   Information Analysis Centers

Detailed information regarding the use of various Information Analysis Centers is presented in Table C-9. Here, it may be seen that few bench and management personnel use these centers. While the percentages for the support personnel are much larger than for the bench and management users, even these are quite low.

3.1.8   User Training and Marketing

Respondents were asked if they felt that training programs on DDC services would be of help to them.

- 75.4% (N=279) say that they thought it would help; 24.6% (N=91) say no

- Of those who expressed interest in such training, 91.8% (N=256) say that they would make use of it, if it were available. Many spontaneously added the provision that training programs "...should not take too much time."

3.2   CURRENT PROBLEMS IN INFORMATION USE

In order to identify current problems regarding various aspects of information services, users were asked to describe their information search experiences along the six dimensions previously described for evaluation of DDC services. Since the correlations among the six dimensions were very low, it was assumed that the six dimensions were measuring distinctly different aspects of information search services. As a result, the responses to these dimensions were anlayzed separately.

- On the whole, respondents felt at least "mildly satisfied" with all aspects of information services which they currently receive, since the average scores on all six dimensions were on the positive side of the neutral point.

- In general, respondents report fewer problems in terms of the media and formats in which information appears. Average scores on the five point scale (from "never met my needs," represented by a score

of 5, to "always met my needs," represented by a score of 1)
form a cluster at the low end of the scale and are shown below
in parenthesis:

Minor Problem Areas

Format   (2.06)
Media   (1.98)

- A second cluster, indicating a higher degree of problems experi-
  enced, is formed by the other four dimensions: information
  quantity (amount), quality, response time (time lag) and currency.
  Average scores on the five point scale are:

Major Problem Areas

Quality   (2.35)
Response Time   (2.31)
Quantity   (2.26)
Currency   (2.20)

- DoD agency personnel report that the amount of information they
  receive comes closer to meeting their needs than do the DoD Con-
  tors (2.11 vs. 2.36).

- Management personnel report that the quality of information is
  further from meeting their needs than do bench level users
  (2.48 vs. 2.24).

- Management personnel report less satisfaction than the support
  personnel thought they were experiencing. This discrepancy
  between management and support personnel indicates that support
  personnel see management as experiencing significantly more
  satisfaction than they actually do on this dimension. In addition,
  DDC users among management personnel report less satisfaction
  t'.en managers who do not use DDC services (2.57 vs. 2.16).

- In terms of the up-to-dateness of the information they receive,
  those with Top-Secret classifications report less satisfaction
  with this aspect of service than their counterparts with Secret
  classifications (2.44 vs. 2.14). It appears that there is a
  strong relationship between Top-Secret classifications and the
  individual researcher's need for up-to-date information.

- Support personnel perceive the managers and bench level users
  as more satisfied with the currency of information than they
  actually are. However, this discrepancy appears only among
  those with Top-Secret classifications (2.52 vs. 2.08).

- Bench level users report somewhat more satisfaction with the format
  in which they receive their information than do management level
  users (1.98 vs. 2.12).

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SECTION IV. · PREDICTED S&TI AND RDT&E
MANAGEMENT INFORMATION ENVIRONMENT

The series of questions regarding the six dimensions of information
services that were asked for 1975 was also asked retrospectively for 1970 and for
the respondents' expectations for 1980. Tre⁻ ·s across these three time periods
were computed for each of the six dimensions.

4.1   PREDICTED REQUIREMENTS

4.1.1   General

- Approximately 25% of the users feel that improvements in quality
  and response time would be most useful to them. 17.9% feel that
  improvements in currency would be most useful, while 11.2% are
  most interested in increasing the amount of information. Finally,
  about 9% see change in media and format as most useful.

- Management personnel are more often interested than are support
  personnel in improving quality, whereas support personnel are
  more interested in changing the media than are bench researchers
  or managers. Bench level researchers more often feel that improve-
  ment in currency would be most useful to them. See Table D-1,
  Appendix D for details.

- In order to effect the improvements they would like to see by 1980,
  526 (87.7%) respondents say that they'd be willing to pay more,
  while 74 (12.3%) say they would not be willing to do so. 37% would
  be willing to wait longer to receive information, but 63% would not
  be willing.

- 50% of the respondents say that they would be willing to pay for
  a service that is matched precisely to their needs. Of this group,
  the percentage of DoD Contractors was higher than that of DoD

researchers (98 or 40.3% vs. 55 or 18.3%).

4.1.2   Remote On-Line Retrieval Services

- 59.2% (322) DDC users are currently unfamiliar with remote on-line
  services even though remote on-line retrieval systems appear to
  be the "wave of the future". 40.8% (222) of the DDC users report
  they had heard about the possibility of on-line information ser-
  vices, but only 114 (20.9%) say they have used such a system.

- There is a striking lack of familiarity with the DDC RDT&E on-
  line system (DROLS) except among the support personnel (75% vs.
  18.4%).

- DoD researchers (98 or 32.6%) are more familiar than contractors
  (50 or 20.6%) with DROLS. (This is probably because more DoD per-
  sonnel are provided with access to DROLS than are contractors.)

4.1.3   Future Demand for DDC Services

Past records of DDC activity were analyzed in order to estimate
potential future demand upon DDC for various categories of service. System
records were analyzed separately at yearly intervals for each category of service.
Records were utilized as far back as the criteria for recording of input and output
volume of a particular DDC service remained unchanged.

- Technical Reports

  System records for Technical Report output were analyzed from
  FY 1972 to FY 1973. Data prior to 1972 were excluded, because
  DDC introduced charges for services in FY 1972, thereby affecting
  user behavior and making comparisons between pre-and post-1972
  system records misleading. Inspection of these system records
  reveals that output for Demand Technical Reports is lower in
  recent years relative to Automatic Document Distribution (ADD).
  Changes in both hard copy and microfiche Demand Technical Reports
  have been erratic, suggesting a slight absolute decrease relative
  to ADD; that is, the proportion of Technical Reports delivered
  on demand has been decreasing. Because of the erratic pattern
  here, no predictions were made for Demand Technical Reports.

  In 1972, DDC delivered 168,855 technical reports as part of the
  ADD Program. In 1973, the total was 207,274; in 1974 343,882
  and in 1975 382,358. The method of least squares was applied
  to the data points to determine the "best fitting" curve or
  straight line. Then output for future years was estimated on
  the basis of extrapolation from this best fitting line. It should
  be noted here that the accuracy of forecasting based on this
  approach is limited by the assumptions that are made. For example,

it is assumed that no additional variables will be introduced in
the future. If one assumes no other extraneous variables (such
as in DoD RDT&E programming or budgeting), then a reasonably
accurate prediction can be made. Using this approach, the best
prediction for the 1988 level of demand for ADD Technical Reports
is 882,546. This prediction is based on FY 1974 and FY 1975,
becuase including 1972 and 1973 would have produced unreasonably
high predictions. In other words, it is believed that the sudden
increases for 1972 to 1973 and from 1973 to 1974 are not
representative for future annual changes. The sharp increases
during these years may be partly a result of user readjustment
after the policy and price changes in 1972. Predictions for
each intervening year between 1976 and 1988 for changes in ADD
output may be found in Appendix D, Table D-2 and Figure D-7.

● Current Awareness Bibliographies

Starting with 2,399 Current Awareness Bibliographies in 1970,
the demand rose to 14,683 in 1974. Of all the system records,
this service came closest to departing from a straight line.
Several curved line functions, such as parabolic and exponential,
were fit to the data, but all yielded unrealistically high pre-
dictions. It is recognized that this service is currently not
generally available to all DDC users. However, if limitations
are removed, demand could well exceed predictions based on
extrapolations from a straight line that excludes the first two
years of system record keeping. Therefore, a "best fitting" line
was determined for 1972 through 1974, and forecasting was based
on these three points. Predictions for 1976 are 23,933 and for
1988, 82,933. See Table D-3 and Table D-9, Appendix D.

● Defense RDT&E On-Line System (DROLS)

It is predicted that on-line remote services will reach 360,600
searches by 1988 (See Appendix D, Table D-4 and Figure D-9).
However, the sudden recent increase in usage of DROLS from 1973
to 1974 makes predictions less accurate and stable than would be
the case were data available over a longer period of time. There-
fore, predictions for DROLS may be less accurate than the other
predictions advanced in this report. Specifically, predictions
for DROLS may underestimate future levels of user demand. In
spite of this, DROLS is predicted to be among the DDC services
with heaviest demand.

● Management Information Services

System records for usage of the management information data bases
are extensive and provide five separate, but related forecasts
of future demand. Predictions for 1988 are as follows:

IR&D - Output	4,738
Program Planning Reports - Output	790
Work Units - Input	96,000
Work Units - Output	33,984
Work Units - Changes	272,040

These predictions show that future levels of demand for management information services will rise steadily. Even though input to the Work Unit data base will most likely remain stable, services that are derived from these data bases will increase.[1] See Tables D-5 and D-8 and Figures D-10 and D-13 in Appendix D.

In summary, significantly increased demand is predicted for three categories of currently-provided DDC services:

- Current Awareness Bibliographies
- DROLS
- RDT&E management inform :ion services

These predictions are particularly interesting, since (a) Current Awareness Bibliography service is not well-advertised by DDC, and (b) the other two services were introduced relatively recently.

4.2   PREDICTED PROBLEMS

Respondents were asked about their experience in gathering information in 1970 and 1975, and about their expectations for 1980 in terms of the six dimensions (quantity, quality, response time, currency, formats, media).

- A clearcut pattern emerged showing a significant decrease in problems experienced in gathering information between 1970 and 1975.

- When users were asked to predict how close each aspect of service would come to meeting their needs in the future, there was a large and highly significant increase in problems anticipated in 1980.

- Using the method of least squares, extrapolations were made beyond 1980 to 1988. For each of the six dimensions, the result is a continued increase in anticipated problems through 1988.

- Formats and media were seen as the dimensions least likely to be problems in 1980 (similar to results presented in Section 3.2 above).

- Quantity, quality, response time, and currency were seen as most likely to be problems in 1980. (Similar to results presented in Section 3.2 above).

Graphs showing these projections are shown in Appendix D, Figures D-1 to D-6.

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[1] Since no changes in Work Unit input are predicted, a graph and table are not present in Appendix D.

GLOSSARY

GLOSSARY

This glossary is intended to facilitate use of this Survey Results Report by providing definitions of DDC products and services, statistical terms, acronyms, and information storage and retrieval terminology. Cross references are made in some definitions to terms which are related to defined terms, and which are also defined in this glossary. (These terms are underlined).

Abstract Journal

A publication appearing at regular intervals, containing citations and abstracts of selected documents in a particular subject field or fields. (e.g., TAB)

Accountability

The quality or state of being answerable (responsible) for decisions made.

ADD

Automatic Document Distribution. A service which supplies microfiche copies of DDC documents in specific subject areas to users who have supplied a subject interest "profile."

Average

A quantity arrived at by adding a series of quantities together in any order, and dividing by their number. (Also called "arithmetic mean." Compare: Modal Score).

Awareness (of a service)

Knowledge that a given service exists, whether or not the respondent has used it.

Bench Level (personnel)

Personnel performing primarily research, development, testing, and evaluation activities. Also sometimes referred to as researchers. (Contrast: Management personnel).

Bibliographic (service)

A type of information service which provides information in the form of documents, (reports, books, etc.) or abstracts of documents, or document citations (Contrast: Fact service)

Cathode Ray Tube (CRT)

A possible component of an on-line information system consisting of a vacuum tube (similar to a TV screen) on which text or data can be projected by the computer for direct viewing by a person doing an on-line search or query.

Comparable Source

An information service supplied by a non-DDC agency which is similar to a given DDC service (e.g., the NASA technical report program is comparable to DDC Technical Report Program).

Computer-Generated Bibliography

A computer-printed list of documents produced as the output of a computer search by subject area(s) of a machine-readable file of document citations.

Consultant

An individual or organization who gives professional advice or services in response to a respondent's information needs.

Contingency Analysis

A statistical method for computing the probability of the joint occurrence of attributes.

Contractor Access Program

A DDC program to test the feasibility of providing Defense contractors with access to the Defense RDT&E On-Line System (DROLS).

COSATI

Committee On Scientific And Technical Information of the Federal Council for Science and Technology. A committee which had responsibility for the coordination of Federal agency programs on information for science and technology. It was disbanded in 1973.

Critical Incident (technique)

A means of eliciting information in a survey by asking the respondent about a specific event with which he was involved.

CRT

See Cathode Ray Tube.

Currency (of information)

The up-to-dateness of the information. Generally refers to the length of time between when a piece of research was performed and when information about the research is made available.

Current Awareness Bibliographies

A DDC service which provides bi-weekly bibliographies of citations for documents in specific subject areas announced in the current TAB issues, according to user subject interest "profiles."

DDC Digest

A four-page DDC publication distributed automatically, at intervals of between one and two months, to all established users of DDC, to announce plans, changes in service, and other developments in the scientific and technical information field.

Defense R&D of the 1960's

A list of DDC technical reports (with indexes) accessioned during 1960-1969, available as a publication or on magnetic tape (with abstracts) or on reel microfilm (without abstracts).

Defense R&D of 1970

A list of DDC technical reports accessioned during 1970, available as a publication, on magnetic tape, or on reel microfilm.

Demand Service

An information service which provides information (data or document) in response to a specific request. Also called Request service. (Contrast: Subscription service)

Departmental Collection

A collection of documents or information files retained by the respondent's organizational department and kept in one location.

Dial-Up (Communications service)

Data transmission service via telephone communications lines. Charge is made on a seconds-of-use basis, similar to long distance telephone service. (Contrast: Leased line)

Distant Library

A library or information center which is located more than a short distance from the respondent. (Contrast: Local library)

Document

A piece of textual information, such as a book, technical report, letter, journal article. (A document can exist in hard copy, microform, or other media.)

DRIT

Defense Retrieval and Indexing Terminology. The official published listing of the DDC Natural Language Data Base (NLDB), a natural language technical vocabulary of unique terms extracted from technical summaries, titles and abstracts, and used to automatically and manually index DDC data bases.

DRIT-H

Defense Retrieval Indexing Terminology Hierarchy. An alphabetical listing of the DRIT vocabulary terms displayed with their hierarchical relationships to other main terms within the Natural Language Data Base. (See also DRIT).

DROLS

The Defense RDT&E On-Line System. A service whereby a DDC users may query any of several DDC data banks (technical reports, WUIS, and R&D Program Planning data bank) by means of an on-line terminal connection consisting of a cathode ray tube (CRT) display device with a keyboard and attached printer. Also called the RDT&E On-Line System. (Contrast: Report bibliography service)

Extrapolation

The process of inferring a future trend from an observed series of events occurring over a period of time.

Fact (services)

A type of information service which provides information in the form of data (usually numeric) or an answer to a specific question. (Contrast: Bibliographic service)

Formal Source of Information

A source such as library or an information analysis center which is set up a priori in a formal manner to provide information to a general or specific set of potential users. (Contrast: Informal source of information)

Format (of information)

The physical arrangement in which information is presented, e.g., in a book, journal, technical report, abstract bulletin.

Friend, Peer, Associate

A professional or otherwise technically knowledgeable person who is known to the respondent. (Frequently a co-worker).

Hard Copy

The print medium. Paper copy.

IAC

Information Analysis Center. A data gathering and dissemination center, similar to a library, but which specializes in a narrow, highly technical subject area, and provides authoritative data review, evaluation, and synthesis in that subject area.

Independent Variable

A variable, or condition, which is not dependent on other variables, i.e., representing a condition which does not change as a function of other variables being considered.

Informal Source of Information

A source of information not formally set up and not generally available to a wide audience, e.g., a personal or departmental collection of documents, casual conversations with colleagues, etc. (Contrast: Formal source of information.)

Information

Knowledge or intelligence communicated or received.

In-house Library

A library or information center which is a part of the respondent's organization; or, which is administered from outside the organization, but located on the organization's property and available to that organization's personnel. Also called Local library. (Contrast: Distant library).

Intermediary (in information service)

A person such as a librarian, search specialist, or terminal operator who procures information and makes it available to a requestor or user.

IR&D

Independent Research and Development. A data bank of research information performed by industrial organizations, not wholly funded by the DoD.

Key Users (of DDC)

The 200 user organizations (out of a total of 2,886 user organizations) which order the most technical reports in a given year. (This is taken as an index of use). (Contrast: Non-Key Users)

Leased Line (Communications service)

Data transmission service via a communication line installed specifically for a given customer. Charge is made on a monthly basis depending on the distance between end points of the communication line. Also called "private line" or "dedicated line." (Contrast: Dial-up)

Least Squares

A statistical method of fitting a line to a set of points on a graph in such a way that the sum of the distances of the points from the line is a minimum.

Local Library

A library or information center which is a part of the respondent's organization and located at reasonable proximity to the respondent's office or laboratory, or which is administered from outside the organization, but located on the organization's property and available to that organization's personnel. Also called In-house Library. (Contrast: Distant Library).

Management (personnel)

Personnel performing predominantly supervisory or managerial activities (Contrast: Bench level personnel).

Mechanized Information Service

An information service in which a query or search is made of one or more data banks by means of a computer, and which produces as output: data, document citations, or abstracts.

Medium (of information)

The way in which information appears, e.g., in print, on microfilm, on a computer printout.

Microfiche

An information medium in the form of a series of reduced photographic images in rows on a piece of film about 4"x 6" square, which can be enlarged (by means of a microfiche reader/printer) for viewing or printing.

Microfilm (roll film)

An information medium in the form of a strip of film, usually 16 mm wide bearing a photographic record on a reduced scale of printed or other graphic matter, that can be enlarged (by means of a microfilm reader/printer) for viewing or printing.

Microform

A generic term for the various information media in which printed or graphic matter is recorded in photographically reduced form, and may be enlarged for viewing or printing. Includes Microfilm, Microfiche, microcards, and aperture cards.

Modal Score

The quantity that occurs most frequently in a set of varying quantities (Compare: Average).

Multiple Regression Analysis

A type of statistical analysis, used in analysis of the results of this survey, which considers a number of independent variables characteristic of the population and determines which of these is most highly related to the way in which survey respondents differed in their answers to survey questions.

Non-Key Users (of DDC)

User organizations which do not fall into the top 200 user organizations in terms of the quantity of technical reports ordered in a given year. (Contrast: Key users).

Non-User (of DDC)

An individual member of a DDC user organization who has not knowingly used a DDC service within the past few years.

NTIS

National Technical Information Service. A government agency within the U.S. Department of Commerce which is responsible for the public distribution and sale of Government-sponsored research, development, and engineering documents prepared by Federal agencies, their contractors, and grantees.

On-Line Remote Information Service

A computerized information service in which a user may communicate directly with the computer to perform a search or query (or submit input) by means of a keyboard at a location at any distance from the computer itself, but hooked up to the computer via telecommunication. A CRT (cathode ray tube) and a printer may also be present with the keyboard.

Personal Collection

A collection of documents or information files belonging to the respondent and kept in his office or laboratory.

Program Planning Information System

A DDC service in which descriptions of R&D projects planned by DoD organizations are made available in the R&D Program Planning Data Bank. Input is made on DD form 1634.

Quality (of information)

The technical quality of information, including accuracy, relevance and organization.

Quantity (of information)

The amount of information, including amount of documents and amount of data.

RDT&E On-Line System

See DROLS

RDT&E (Program)

Research, Development, Test, and Evaluation Program. The DoD's defense research program.

Referral Service (DDC)

A DDC service providing names of sources beyond DDC of Government-sponsored scientific and technical information services not available in DDC (e.g., information analysis centers, laboratories, audiovisual depositories, etc).

Remote On-Line Service

See On-Line Remote Information Service.

Report Bibliography

A bibliography (in the form of a DDC document)resulting from a tailor-made literature search on a particular subject, performed in batch mode at the request of a user. (Contrast: DROLS)

Report Bibliography on Magnetic Tape (RBMT)

A bibliography in machine readable form (on magnetic tape) resulting from a DDC tailor-made literature search on a particular subject, performed in batch mode at the request of a user. (Compare: Report Bibliography)

Request Service

An information service which provides information (data or document) in response to a specific request. Also called Demand service. (Contrast: Subscription service).

Respondent

A person interviewed as part of this Survey.

Response Time (of information)

The elapsed time between a person's request for information and the arrival of the requested information. (Sometimes called "turnaround time")

RBMT

See Report Bibliography on Magnetic Tape.

Retrospective Service

A service providing information (usually in the form of documents, cita-
tions, or abstracts) that was originally published during a specified past
period of time.

Scheduled Bibliography

A bibliography (in the form of a DDC document) resulting from a DDC
literature search of a specific subject of current or anticipated interest.
(These are not dependent on user requests. Contrast: Report Bibliography)

Selective Dissemination of Information

A type of information service in which information is provided on a
continuing basis according to previously registered subject interest categories.

Selective Dissemination of Information Software Packages

A set of five machine-independent computer programs available from DDC
for user organizations to be used on the TAB on tape data base, to produce
bibliographies for individual users according to their individual subject
profiles. (See also: Selective Dissemination of Information)

Source (of information)

The physical location the respondent goes to to find information, e.g.,
local library, personal collection, distant library.

Standard Deviation

A statistical concept designating a measure of variability around a point
representing the average of a given series of quantities. All the individual
deviations from the average are squared, then averaged. The square root of
this quantity is called the "standard deviation."

S&TI

Scientific and Technical Information. (Also referred to as STINFO)

Subscription Service

An information service which can be obtained by requesting it once, but
which provides information on a continuing basis, e.g., journal subscriptions,
selective dissemination of information.

Support (personnel)

Personnel in occupations providing information support services, e.g.,
technical librarians, information scientists, and terminal operators.

TAB

Technical Abstract Bulletin. A bi-weekly DDC publication which provides citations and abstracts of new classified and limited DDC reports. Indexes to TAB are cumulated quarterly and annually.

Technical Report Program

A DDC program in which technical reports produced by Defense facilities and their contractors are accessioned, processed, and made available to DDC users.

User (of DDC)

An individual member of a DDC user organization who has knowingly used a DDC service within the past few years.

User Feedback System

A system of obtaining from a given group of people on a regular basis data about their information wants, needs, and problems.

Variance

The square of the standard deviation, i.e., the average of the squares of the deviations from the average point of a frequency distribution. (Compare: Standard deviation).

WUIS

The Research and Technology Work Unit Information System. A DDC service producing a collection of technically oriented summaries describing research and technology projects currently in progress. Input is made on Form 1498.

APPENDICES

A. Detailed Methodology

B. Description of Sample

C. Current DoD S&TI/RDT&E Management Information Environment

D. Predicted DoD S&TI/RDT&E Management Information Environment

APPENDIX A.   DETAILED METHODOLOGY

A. DETAILED METHODOLOGY

In order to gather the information necessary for this forecasting study, AUERBACH and its subcontractor, CRITERION DEVELOPMENT ASSOCIATES (CDA), used a combination of the techniques of telephone interviewing and mailed question-naires. The methodology consisted of three steps:

    (a) Drawing the sample

    (b) Development of the interview schedule and conduct of the interviews

    (c) Data analysis and interpretation of results

A.1 Drawing of Sample

The exact size of the population surveyed in this study is not known, because the Defense Documentation Center's records describe only user organiza-tions, rather than individual users. The best estimate of the total number of individual users, however, is 150,000. They are affiliated with 2,886 user organiza-tions.

A stratified sampling plan with random sampling within strata was followed in order to ensure a representative sampling plan and minimize bias in the resulting sample. The population of user organizations was stratified as follows:

    (a) Step One

        (1) DoD – Key user organizations[1]
        (2) DoD organizations – Non-key user organizations
        (3) Contractor organizations – Key users
        (4) Contractor organizations – Non-key users

    (b) Step Two

        (1) Bench Level Personnel
        (2) Management Personnel
        (3) Support Personnel[2]

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[1] Key user organizations are those which rank in the top 200 in terms of ordering technical reports from DDC. Non-key organizations are the remaining 2,686.

[2] "Support personnel" are defined as librarians, information specialists, terminal operators, etc.

(c) Step Three

      (1)   Individual users of DDC
      (2)   Individuals who do not use DDC

At Step One, the 2,886 user organizations were divided into the four groups listed above. Then a random sample of twenty-five organizations was drawn from each group. Backups were included in this number to ensure adequate sampling in the case of non-cooperation.

At Step Two, initial contacts were made by the interviewers. For each organization in the sample, they contacted the individual who was listed in DDC records as the "focal point". A specially designed procedure was utilized to obtain a random sample of twenty of the staff members involved in R and D in each organizations.

Step Three divided survey participants into users of DDC and non-users. This information was obtained during the interview, and was not available prior to that time.

The procedure outlined above was designed to produce 650-800 interviews with a maximum of 200 in each group listed at Step One. This sample size was chosen in order to assure a confidence level of 95% for the percentages obtained in the survey. The chances are 95 in 100 that the sampling error associated with survey results will be ± 4 percentage points or less.

A.2   Development of the Interview Schedule and Conduct of the Interviews

AUERBACH and CDA developed a unique methodology specifically for this contract. Survey respondents were initially contacted by phone, asked to participate, scheduled for an interview and then sent a packet. The packet included a set of cards that provided the response alternatives for a majority of the questions in the interview. These cards vastly reduced the problems of recency effect and response set so often encountered when structured responses are obtained over the telphone.

This interview methodology combined the advantages of both telephone interviewing and the mailed questionnaire, while simultaneously eliminating the disadvantages of both.

The interview schedule was highly structured in order o ensure maximum consistency and reliability among interviews. The interview schedule used for the bench level and management personnel contained 194 questions. Support personnel have different information needs and use patterns than do managers and bench personnel, hence, a separate interview schedule was constructed for them, which consisted of 159 questions.[3]

Interviewer training sessions were conducted at the outset of the project, and follow-up sessions were held to discuss problems and questions. During the interviewing, thirty-one interviews (just over 4%) were monitored unobtrusively in order to assure quality control and establish interjudge reliability. Inter-judge reliability coefficients were computed between the monitor and the interviewer for each of the 31 interviews that were monitored. Percentage of agreement ranged from 84% - 97%, with an average percentage of agreement for all 31 pairs of 93.2%.

A.3   Data Analysis

The analysis of the data for this project proceeded in three phases:

(a) Identification of major independent variables of interest
     (e.g., DDC user vs. non-user)

(b) Determination of significant effects of independent variables
     on dependent variables (e.g., preferred media).

(c) Identification and prediction of future trends in the DoD
     S&TI/RDT&E management information enviornment.

A.3.1   Identification of Major Independent Variables of Interest

In this study, there are dozens of potentially significant independent variables that define the preferences, attitudes and behaviors exhibited by the respondents in their information search strategies. In order to identify those variables that are the best predictors of variability in the responses to questions in the interview, a series of multiple regression analyses were performed to identify the major variables to be utilized at the second phase of the analysis.

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[3] See R&D Contract Status Report: Survey Plan (AUER-2325/2326-100-TR-1, August 15, 1975) for complete details on the methodology, the sampling plan and the interview schedules.

A.3.2   Determination of Significant Effects of Independent Variables on
         Dependent Variables

         Analysis of variance and contingency analysis were performed on each
of the quantifiable interview questions to identify the interview questions that
can be accounted for (at a significance level of $p < 0.05$) in terms of one or more
of the independent variables in this study.

A.3.3   Identification and Prediction of Future Trends in the S&TI/RDT&E
         Environment

         This third step in the analysis consisted of two parts, both of which
were designed to provide an empirical basis for forecasting.

         (a) Trend analysis was performed on the respondents' answers to
              questions about various aspects of services in 1970, 1975, and
              1980.

         (b) Curve fitting was conducted using the method of least squares
              to predict future problems and to predict future demand for
              various DDC services.

APPENDIX B

DESCRIPTION OF SAMPLE

Description of the Survey Sample

The sample will be described first in terms of the four independent variables used to stratify the sample. Then its characteristics will be described in terms of the four additional independent variables in the multiple regression analyses.

Variables used to stratify the sample

(a) Contractor versus DoD organizations: There are 326 respondents in the survey working for contractors and 372 working for DoD agencies. The split was 46.7% versus 53.3%.

(b) DDC users versus non-users: Slightly over 3 out of every 4 survey respondents are DDC users (77.9% versus 22.1%).

(c) Key user organizations versus non-key organizations: There are 441 respondents working in key organizations and 257 respondents in non-key organizations (63.2% and 36.8% respectively).

(d) Bench level vs. Support vs. Management: 94 support personnel are included in the sample as respondents, accounting for 13.5% of its over-all size. Bench level researchers number 235, accounting for 33.7% of the sample, while management personnel account for 369 or 52.8% of the sample.

Additional variables describing the sample

(a) Highest degree obtained: The most common degree level obtained by survey respondents is the bachelor's degree, earned by 274 or 39.3%. The master's degree is the highest degree obtained by 210 or 30.1%, while 119 hold the Ph.D. (17.1%). Numerous respondents report additional credits beyond the degree levels they indicated. The small number of Ph.D.'s should be noted.

(b) Security Classification: Nearly seven out of 10 respondents (69.6%) report Secret classification, while 23.1% report Top-secret, only 2.3% report Confidential and 5% report no classification.

(c) Years of Experience: The average number of years of experience in R&D for survey respondents is 14.10. The shape of the distribution was roughly normal, with approximately two-thirds falling between five years and twenty-three years.

(d) Hours per week engaged in research: The average number of hours per week that survey respondents report they were engaged in research is 23.69. The distribution is bimodal, however, with 127 respondents reporting 40 hours.

(e) COSATI Fields: The majority of the bench level and management survey
respondents work in the hard sciences with emphasis on applied aspects.
The four major fields respondents report most often were in order:
Electronics/Electrical Engineering, Mechanical/Industrial/Civil/Marine
Engineering, Physics, Navigation/Communications/Detection and Counter-
measures. Data from 99 respondents are missing because the Support
personnel were not asked to choose a COSATI field. Six others did not
answer this question.

TABLE B-1

Description of Sample:
Number of Respondents in
Each User Category

User Categories	Respondents	Percentage
Respondents in Contractor Organizations	326	46.7%
Respondents in DoD Organizations	372	53.3%
	698	100.0%
DDC Users	544	77.9%
Non-Users	154	22.1%
	698	100.0%
Respondents in Key Organizations	441	63.2%
Respondents in Non-Key Organizations	257	36.8%
	698	100.0%
Bench Level Respondents	235	33.7%
Support Level Respondents	94	13.5%
Management Level Respondents	369	52.8%
	698	100.0%
High School Degree	30	4.3%
2 Year Degree	17	2.4%
Bachelors Degree	274	39.3%
Masters Degree	210	30.1%
Ph.D.	119	17.1%
Missing Data	48	6.8%
	698	100.0%

TABLE B-1
(Continued)

User Categories	Respondents	Percentage
Top Secret	161	23.1%
Secret	486	69.6%
Confidential	16	2.3%
No Classification	35	5.0%
	698	100.0%

Average Years Experience (N = 698)	14.10	
Standard Deviation	8.86	

Hours Per Week in Research (N = 604)*	23.69	
Standard Deviation	16.17	
Modal Score	40	(N = 127)

*Does not include Support Personnel

Table B-2

Description of Sample:
Breakdown and Interaction
Of Major User Categories --
Job Type by DDC User/
Non-User by Contractor vs.
DoD by Key/Non-Key
User Organization

	Bench User	Bench Non User	Support User	Support Non User	Mgmt User	Mgmt Non User	
Con Non-Key	26	15	12	1	55	30	139
Con Key	53	20	30	0	67	17	187
DoD Key	82	10	30	0	118	14	254
DoD Non-Key	16	13	16	5	39	29	118
	177	58	88	6	279	90	698

Table B-3

Number of Respondents Selecting Various
COSATI Fields as Their Major Areas of Specialization

COSATI Fields	Respondents	Percentage
Electronics/Electrical Engineering	107	15.3%
Mechanical/Industrial/Civil/Marine Engineering	61	8.7%
Physics	58	8.3%
Navigation/Communications/Detection/ Countermeasures	51	7.3%
Aeronautics	44	6.3%
Ordnance	40	5.7%
Military Sciences	38	5.4%
Materials	29	4.2%
Mathematical Sciences	26	3.7%
Behavioral/Social Sciences	23	3.3%
Propulsion and Fuels	21	3.0%
Biological/Medical Sciences	20	2.9%
Missile Technology	17	2.4%
Chemistry	14	2.0%
Atmospheric Sciences	11	1.6%
Nuclear Science/Technology	10	1.4%
Earth Sciences/Oceanography	7	1.0%
Energy Conversion	7	1.0%
Methods and Equipment	7	1.0%
Space Technology	5	.7%
Agriculture	2	.3%
Astronomy/Astrophysics	1	.1%
[Support personnel and Missing Data	99	14.1%]
	698	99.8%*

*Rounding errors

APPENDIX C

CURRENT DOD S&TI/RDT&E
MANAGEMENT INFORMATION ENVIRONMENT

TABLE C-1

Number and Percentage of
Respondents Choosing Various
Sources as Most Preferred

SOURCES	NUMBER OF RESPONDENTS	PERCENTAGE
In-house Library	306	50.7%
Department Collection	80	13.2%
Personal Collection	79	13.1%
Friend, Peer, Associate	43	7.1%
Mechanized Information Service	21	3.4%
Distant Library	14	2.3%
Consultant	6	1.0%
Supervisor	2	.3%
Publisher, Bookstore	1	.2%
Seminars/Meetings/Conferences	0	0.0%
Other	53	8.7%
	604*	100.0%

*Does not include Support personnel

Table C-2

Summary of Preferences for Various Formats --
Including Effects of Independent Variables

Formats	Respondents	Percentage	Independent Variables *
Technical Reports	243	34.8%	M/B>Ph.D.**: S>B/M: K>NK: Users>N
Journals	114	16.3%	PhD>B/M: Con>DoD: NK>K: More hrs.
Handbooks and Manuals	62	8.9%	M/B>Ph.D.: DoD>Con: NK>K: N>Users
			Less exp. Fewer hrs.
Abstract Journals	61	8.7%	K>NK: More hrs.
Computer Generated Bibliographies	58	8.3%	
Personal Conversation	47	6.7%	M>B: Fewer hrs.
Books	33	4.7%	
Published Bibliographies	15	2.1%	
Management Reports	13	1.9%	M/B>Ph.D.: Mgmt>Bench: DoD>Con
Review/State of the Art Papers	9	1.3%	
Commercial Brochures	8	1.2%	
Numeric Data	5	.7%	
Current Awareness	3	.4%	
Other	27	3.9%	
	698	99.9%***	

*Legend
M,B,Ph.D. = Masters, Bachelors, Doctorate
K,NK = Key, Non-key
Mgmt, Bench, S = Management, Bench, Support
Con, DoD = Ccntractor, DoD
hrs. = Hours per week engaged in research
exp. = Years of experience in R&D

**Interpret as follows: Fewer Doctorates preferred
                           Technical Reports than Masters
                           and Bachelors level researchers

***Rounding errors

Table C-3

Number and Percentage of Respondents Choosing
Various Media as
Most Preferred

Media	Respondents	Percentage
Printed Documents	588	84.2%
Verbal Communication	51	7.3%
Microfiche	20	2.9%
Computer Printouts	19	2.7%
Microfilm	11	1.6%
Charts	2	.3%
Punched Cards	1	.1%
Magnetic Tape	1	.1%
CRT	1	.1%
Other	4	.6%
	698	99.9%*

*Rounding errors

TABLE C-4

Number of DDC Users Who Reported Awareness of Various DDC Demand Services and Number Who Ranked Each Service as Most Useful, Second Most Useful, Least Useful and Next to Least Useful

Demand Service	# of Respondents Aware *	Aware %	# Ranking First	% Ranking First	# Ranking Second	% Ranking Second	# Ranking Least Useful	% Ranking Least Useful	# Ranking Next to Least Useful	% Ranking Next to Least Useful
Technical Report Program	290	86.3%	207	63.1%	39	14.9%	3	2.0%	0	0.0%
Report Bibs	254	75.6%	59	18.0%	107	40.8%	12	7.9%	6	5.8%
Scheduled Bibs	158	47.0%	8	2.4%	17	6.5%	22	14.6%	11	10.6%
R&T Work Unit Info. System	157	46.7%	14	4.3%	43	16.4%	13	8.6%	12	11.5%
DDC Referral Services	148	44.0%	8	2.4%	10	3.8%	20	13.2%	14	13.5%
RDT&E On Line	126	37.5%	24	7.3%	17	6.5%	16	10.6%	4	3.8%
R&D Program Planning	118	35.1%	4	1.2%	11	4.2%	16	10.6%	15	14.4%
IR&D	117	34.8%	3	.9%	13	4.9%	16	10.6%	11	10.6%
DRIT	101	30.1%	1	.3%	2	.8%	11	7.3%	13	12.5%
DRIT-H	82	24.4%	0	0.0%	1	.4%	3	2.0%	12	11.5%
Defense R&D of the 60's	81	24.1%	0	0.0%	1	.4%	19	12.6%	5	4.8%
RBMT	65	19.3%	0	0.0%	1	.4%	0	0.0%	1	1.0%
			328	99.9%**	262	100.0%	151	100.0%	104	100.0%

* N = 336
** Rounding errors

C-4

TABLE C-5

Number of DDC Users Who Reported Awareness of Various DDC Subscription Services and Number Who Ranked Each Service as Most Useful, Second Most Useful, Least Useful and Next to Least Useful

Subscription Service	# of Respondents Aware*	% Aware	First Ranking #	First Ranking %	Second Ranking #	Second Ranking %	Least Useful Ranking #	Least Useful Ranking %	Next to Least Useful Ranking #	Next to Least Useful Ranking %
TAB	283	84.2%	190	71.4%	28	16.4%	11	11.1%	3	5.3%
DDC Digest	174	51.8%	11	4.1%	56	32.7%	19	19.2%	6	10.3%
ADD	133	39.6%	26	9.8%	23	13.4%	14	14.1%	4	7.0%
Current awareness Bibliographies	122	36.3%	21	7.9%	26	15.2%	6	6.1%	8	14.0%
TAB on Tape	79	23.5%	5	1.9%	4	2.3%	23	23.2%	14	24.6%
Recurring Reports (IR&D)	76	22.6%	4	1.5%	7	4.1%	12	12.1%	3	5.3%
Recurring Reports (WUIS)	75	22.3%	4	1.5%	16	9.4%	1	1.0%	1	1.8%
Selective Dissemination of Information Software Pkgs.	67	19.9%	4	1.5%	9	5.3%	11	11.1%	11	19.3%
Recurring Reports (Program Planning)	57	16.9%	1	.4%	2	1.2%	2	2.0%	7	12.3%
			266	100.0%	171	99.9%**	99	99.9%**	57	99.9%**

*N = 336

**Rounding errors

TABLE C-6

Percentages of DDC Users in Bench Level, Support and Management Categories Who Reported Awareness of DDC Demand Services [*]

DDC Services	Support	Bench	Mgmt
Technical Report Program	85.22	44.6%	47.3%
Report Bibs	79.5%	36.7%	41.2%
Scheduled Bibs	78.4%	17.5%	20.1%
R&T Work Unit Info System	75.0%	16.9%	21.9%
DRIT .	73.9%	3.9%	10.4%
RDT&E On Line	63.6%	11.9%	17.6%
DRIT-H	63.6%	2.3%	7.9%
DDC Referral Services	63.6%	10.7%	25.8%
Defense R&D of the 60's	59.1%	1.7%	9.3%
IR&D	56.8%	7.3%	19.9%
R&D Program Planning	51.1%	13.6%	17.6%
RBMT	46.6%	1.7%	7.5%
Current Awareness	38.6%	2.3%	5.2%

[*] N = 544

TABLE C-7

Percentages of DDC Users in Bench
Level, Support, and Management
Categories Who Reported Awareness
of DDC Subscription Services*

DDC SERVICES	SUPPORT	BENCH	MGMT
TAB	88.6%	43.3%	44.3%
DDC Digest	85.3%	14.3%	25.5%
ADD	77.5%	6.8%	18.4%
Current Awareness Bibliographies	70.6%	11.4%	13.8%
TAB on Tape	54.4%	5.7%	6.0%
Recurring Reports (WUIS)	53.9%	2.8%	7.7%
Selective Dissemination of Information Software Pkgs.	50.5%	4.5%	4.9%
Recurring Reports (IR&D)	49.4%	4.6%	8.5%
Recurring Reports (Program Planning)	43.7%	1.7%	5.3%

*N = 544

Table C-8

Percentages of Bench, Support,
And Management Personnel
Who Have Used WUIS, IR&D
And Program Planning Reports
(DDC Users, Only)

	#Overall	%Overall	#Bench	%Bench	#Support	%Support	#Mgmt	%Mgmt
WUIS	124	22.8%	20	11.3%	52	59.1%	52	18.6%
IR&D	42	7.7%	4	2.3%	17	19.3%	21	7.5%
PPR	51	9.4%	7	3.9%	20	22.7%	24	8.6%

N (Bench) = 17,
N (Support) = 88
N (Management) = 279
N (Overall) = 544

TABLE C-9

Percentages of DDC Users in Bench Level,
Support and Management Categories
Who Have Used Various
Information Analysis Centers*

Information Analysis Center	Support	Bench	Mgmt
Infrared Information and Analysis Center	42.0%	7.9%	7.9%
Metals and Ceramics Information Center	39.7%	3.4%	6.8%
Shock and Vibration Information Center	37.5%	2.3%	3.2%
Ch... ...al Propulsion Information Agency	36.4%	1.7%	6.8%
Re... ...ity Analysis Center	31.8%	.6%	5.0%
Nondestructive Testing Data Support Center	27.3%	.6%	4.3%
Thermophysical and Electronic Properties Information Analysis Center	26.1%	3.4%	3.6%
Plastics Technical Evaluation Center	25.0%	.6%	3.2%
DoD Nuclear Information and Analysis Center	19.3%	5.1%	4.6%
Mechanical Properties Data Center	18.2%	3.4%	4.3%
Electronic Properties Information Center	17.0%	0.0%	3.9%
Tactical Technology Center	13.6%	0.0%	2.9%
Machinability Data Center	10.2%	.6%	2.5%
Radiation Shielding Information Center	9.1%	0.0%	.7%
Physical Data Group, Lawrence Livermore Laboratory	7.9%	2.3%	1.8%
USAF Environmental Technical Applications Center	6.8%	0.0%	.4%
Environmental Information Division (Air Force)	6.8%	1.1%	2.9%
Strategic Technology Office Data Base	5.7%	0.0%	1.1%
Soil Mechanics Information Analysis Center	5.7%	.6%	1.4%
Coastal Engineering Information Analysis Center	3.4%	0.0%	0.0%
Concrete Technology Information Center	3.4%	0.0%	1.4%
Hydraulic Engineering Information Analysis Center	2.3%	.6%	.3%
Pavements & Soil Trafficability Information Analysis Center	2.3%	0.0%	1.1%
Chemical Kinetics Information Center	2.3%	1.1%	1.4%
Data Collection and Processing Group, Scripps Institution of Oceanography	2.3%	.6%	2.5%
X-Ray Attenuation Coefficient Information Center	1.1%	.6%	0.0%
Institute of Polar Studies	1.1%	.6%	2.5%
Bathythermograph Data Processing and Analysis Facility	0.0%	0.0%	.4%

*N = 544

APPENDIX D

PREDICTED DOD S&TI/RDT&E
MANAGEMENT INFORMATION ENVIRONMENT

TABLE D-1

Percentage of Various Categories of Respondents
Reporting the Dimension of Information Service
For Which Future Change Would Be Most Userul

Dimension	Overall *	Bench	Support	Mgmt
Response Time	24.9%	25.3%	25.3%	24.6%
Quality	24.7%	24.1%	14.7%	28.2%
Currency	17.9%	25.3%	13.3%	14.7%
Amount	11.2%	9.8%	10.7%	12.3%
Medium	9.8%	4.3%	28.0%	7.9%
Format	9.6%	8.6%	8.0%	10.7%
Combination of abcve	1.6%	2.5%	0.0%	1.6%

*N = 665

TABLE D-2

Annual Predictions for
Automatic Document Distribution - Output

1976	420,834
1977	459,310
1978	497,736
1979	536,262
1980	574,738
1981	613,214
1982	651,690
1983	690,166
1984	728,642
1985	767,118
1986	805,594
1987	844,020
1988	882,546

TABLE D-3

Annual Predictions for
Current Awareness – Output

Year	Output
1976	23,933
1977	28,833
1978	33,733
1979	38,633
1980	43,533
1981	48,433
1982	53,333
1983	58,233
1984	63,133
1985	68,033
1986	72,933
1987	77,833
1988	82,933

Note: This prediction is based upon
the assumption of unlimited
availability of Current Awareness
Bibliographies. At present, this
is an unannounced, limited
availability service.

TABLE D-4

Annual Predictions for
Defense Retrieval On-Line System - Remote Searches

1976	108,640
1977	129,600
1978	150,640
1979	171,640
1980	192,640
1981	213,640
1982	234,640
1983	255,640
1984	276,640
1985	297,640
1986	318,640
1987	339,600
1988	360,600

TABLE D-5

Annual Predictions for
the Independent, Research
and Development Data Base - Output

1976	1,492
1977	1,762
1978	2,033
1979	2,303
1980	2,574
1981	2,844
1982	3,115
1983	3,385
1984	3,656
1985	3,926
1986	4,197
1987	4,467
1988	4,738

TABLE D-6

Annual Predictions for
Program Planning Reports - Output

Year	Output
1976	598
1977	614
1978	630
1979	646
1980	662
1981	678
1982	694
1983	710
1984	726
1985	742
1986	758
1987	774
1988	790

TABLE D-7

Annual Predictions for
The Work Unit Information System - Output

1976	16,366
1977	17,842
1978	19,318
1979	20,794
1980	22,170
1981	23,652
1982	25,128
1983	26,604
1984	28,080
1985	29,656
1986	31,032
1987	32,508
1988	33,984

TABLE D-8

Annual Predictions for
Changes in the Work Unit
Information System

.

1976	129,000
1977	140,920
1978	152,340
1979	164,760
1980	176,680
1981	188,600
1982	200,520
1983	212,440
1984	224,360
1985	236,280
1986	248,200
1987	260,120
1988	272,040
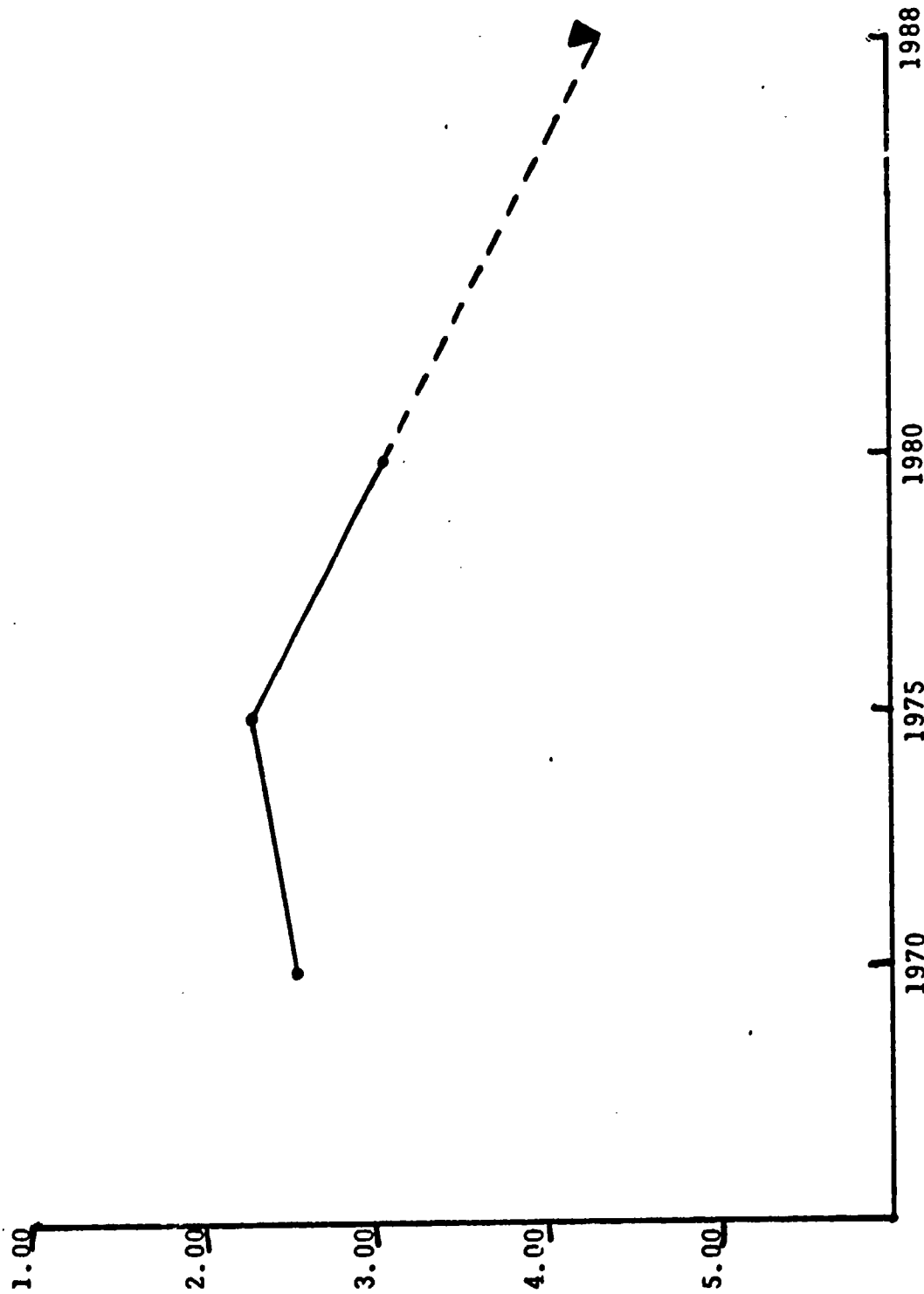
Figure D-1:

Degree to which users predict amount of information
they receive in the future will meet their needs

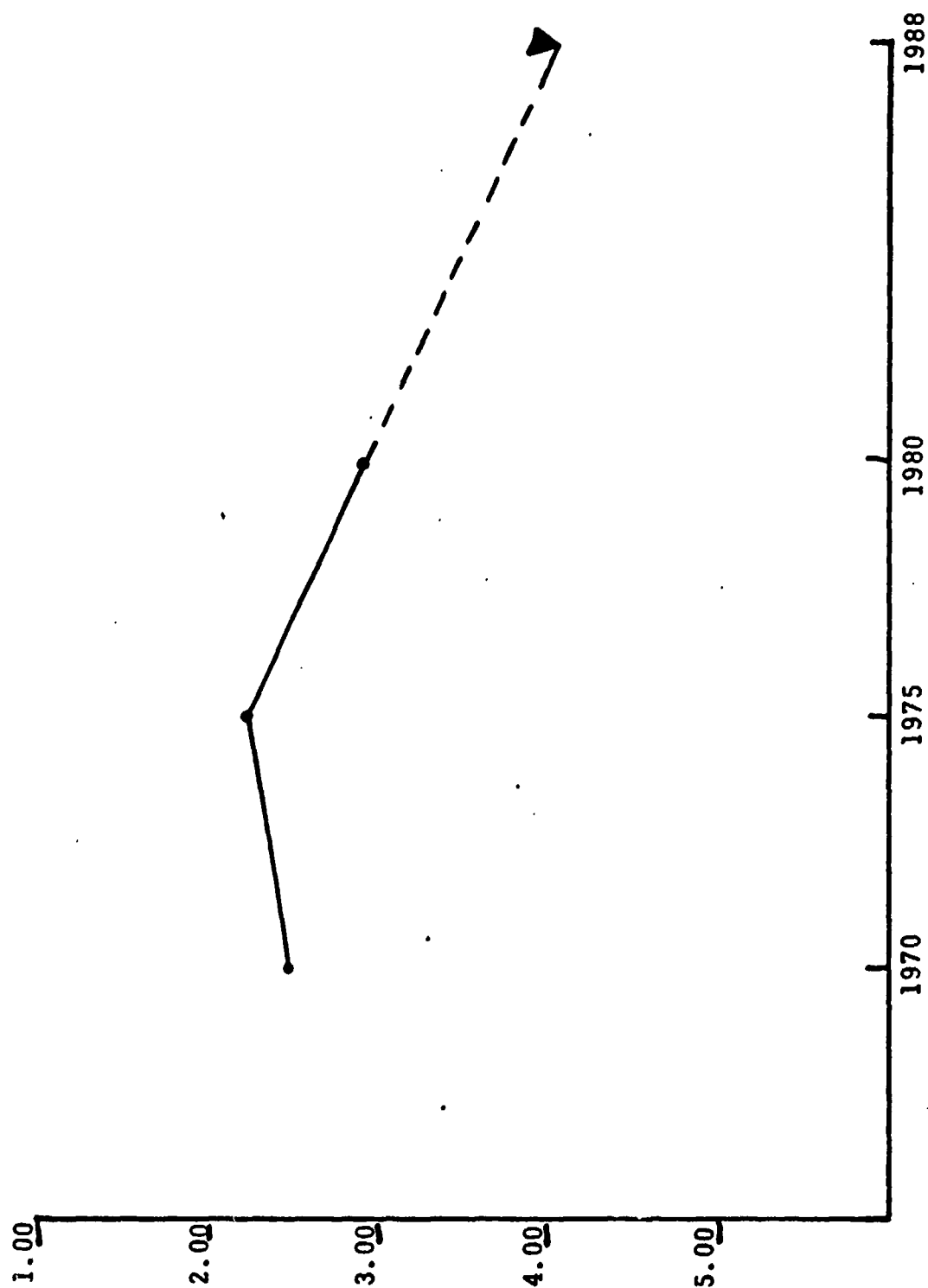Legend: 1.00 = "Will meet my needs at all times"; 5.00 = "Will never meet my needs"

D-9
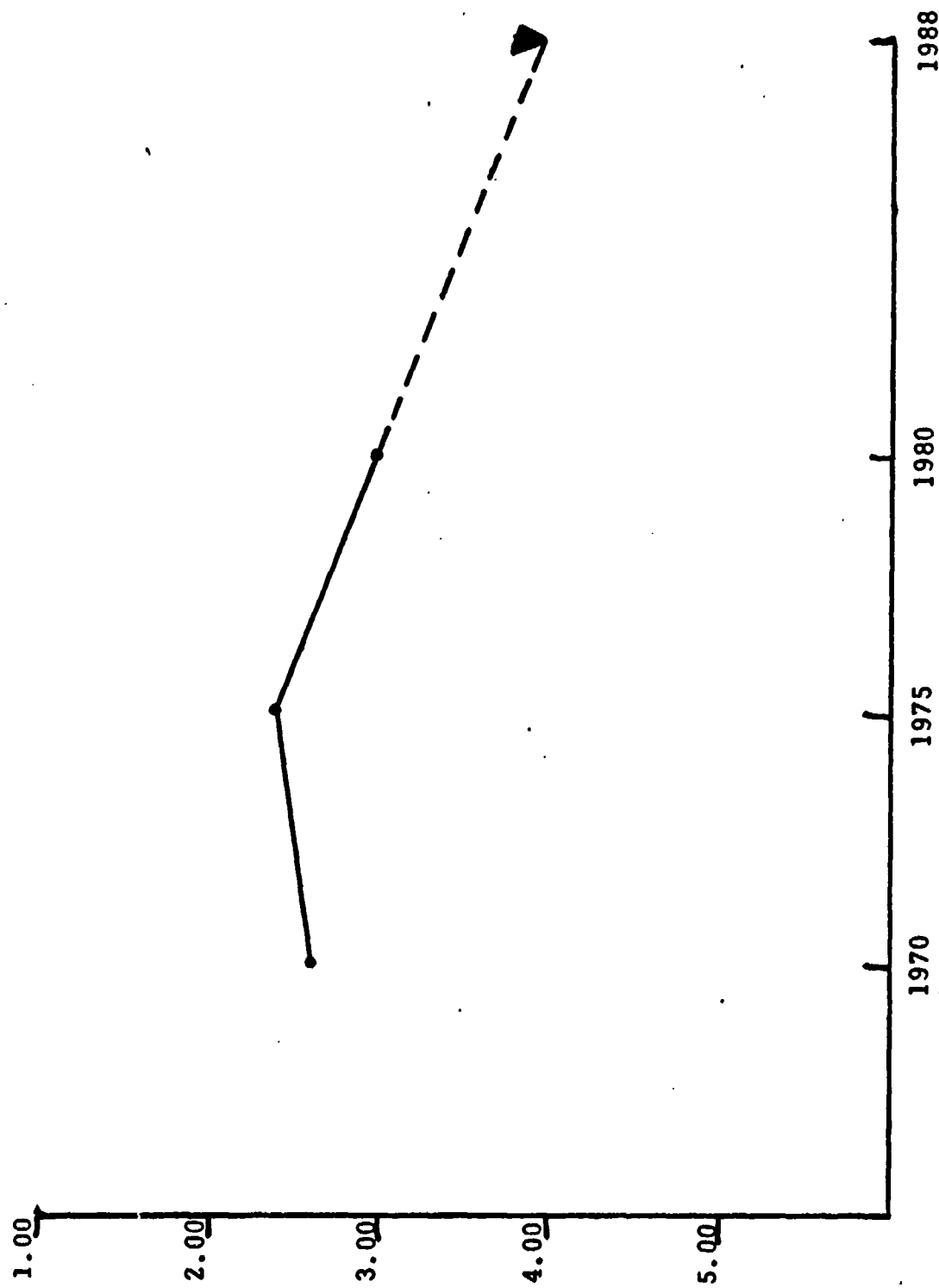
Figure D-2:

Degree to which users predict quality of information
they receive in the future will meet their needs

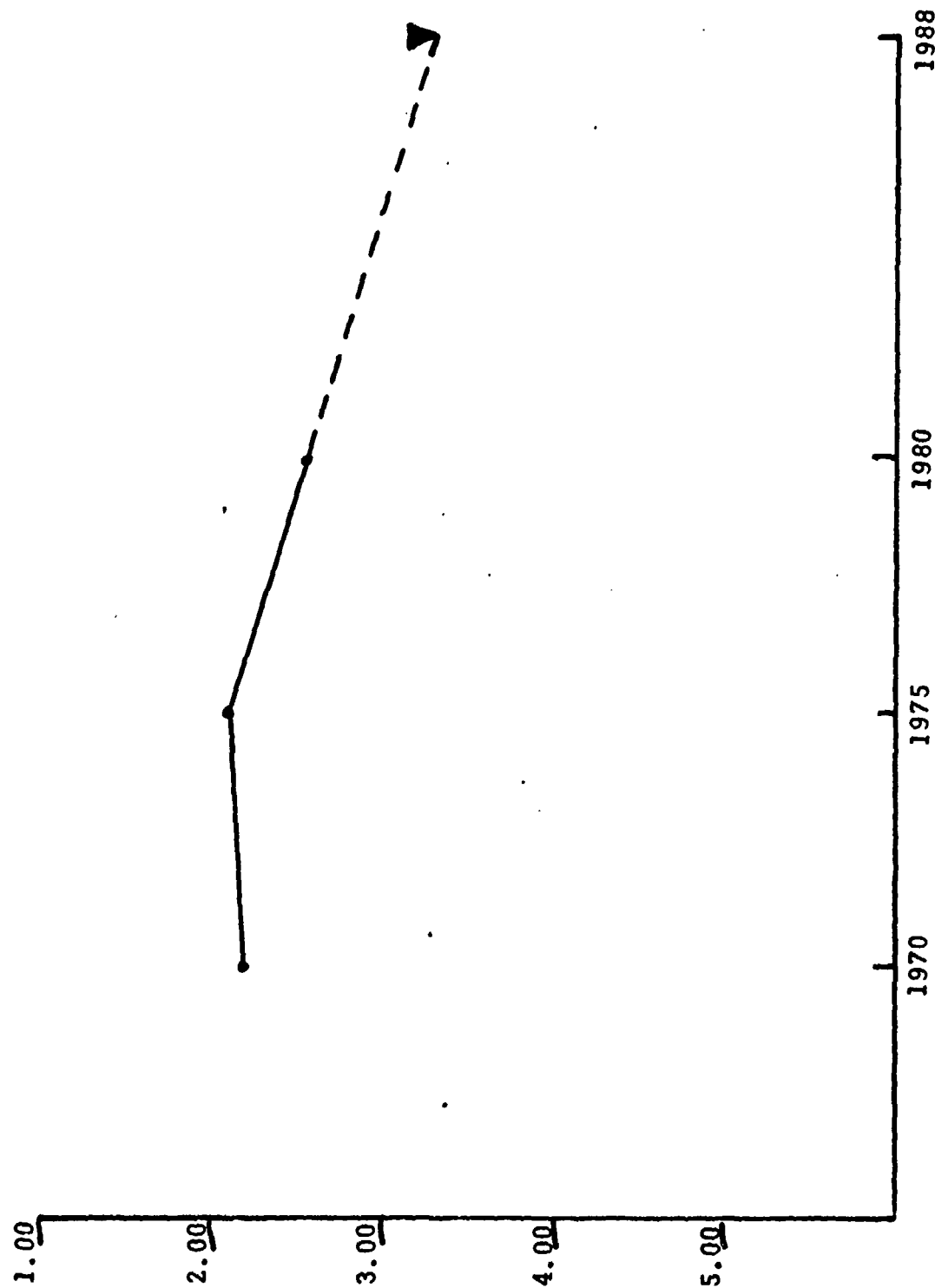Legend: 1.00 = "Will meet my needs at all times"; 5.00 = "Will never meet my needs"
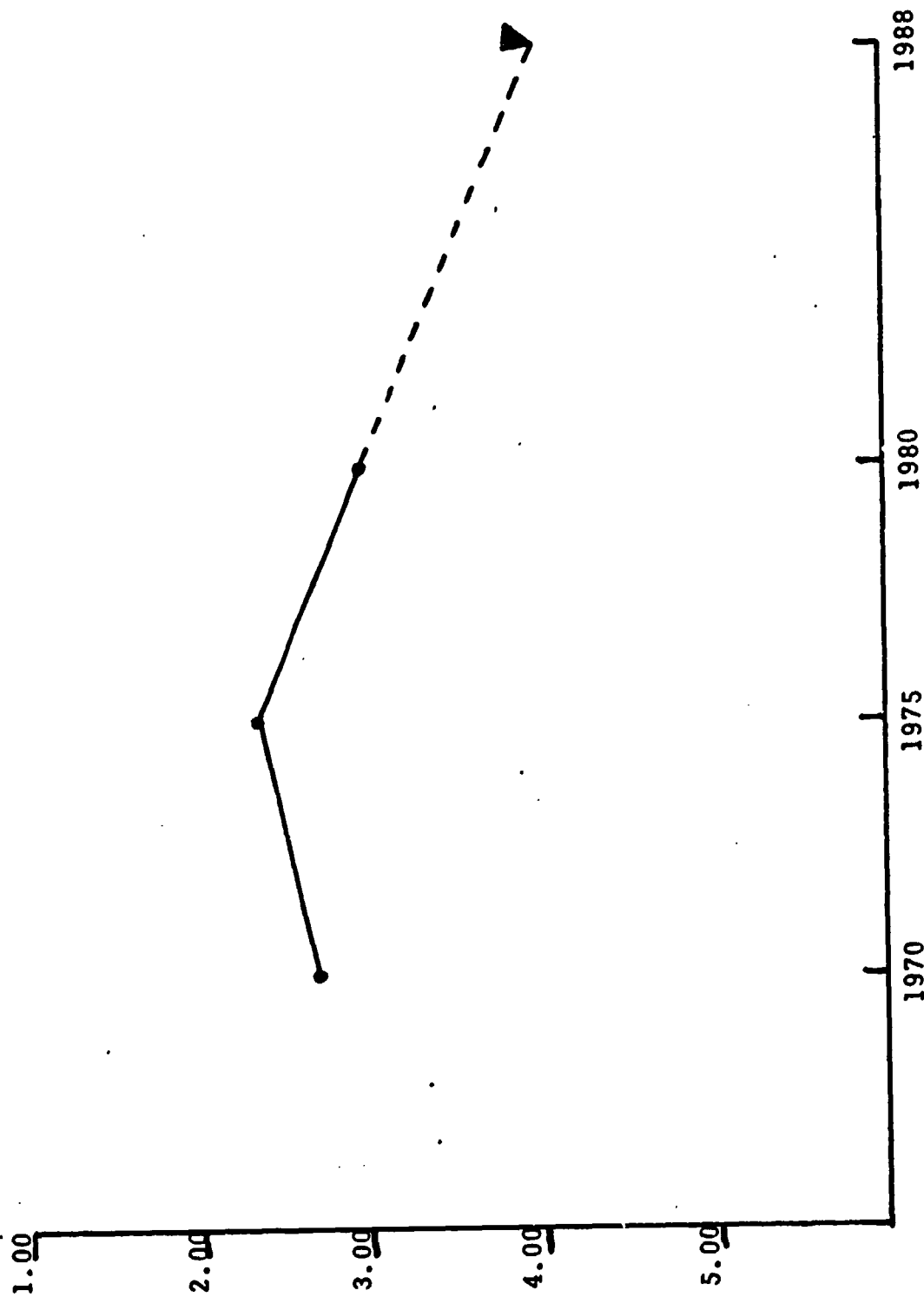
Figure D-3

Degree to which users predict the time lag of information
they receive in the future will meet their needs

Legend: 1.00 = "Will meet my needs at all times"; 5.00 = "Will never meet my needs"

Figure D-4

Degree to which users predict the currency of information they receive in the future will meet their needs

Legend: 1.00 = "Will meet my needs at all times"; 5.00 = "Will neven meet my needs"

Figure D-5:

Degree to which users predict that the medium in which they
receive information in the future will meet their needs

Legend: 1.00 = "Will meet my needs at all times"; 5.00 = "Will never meet my needs"
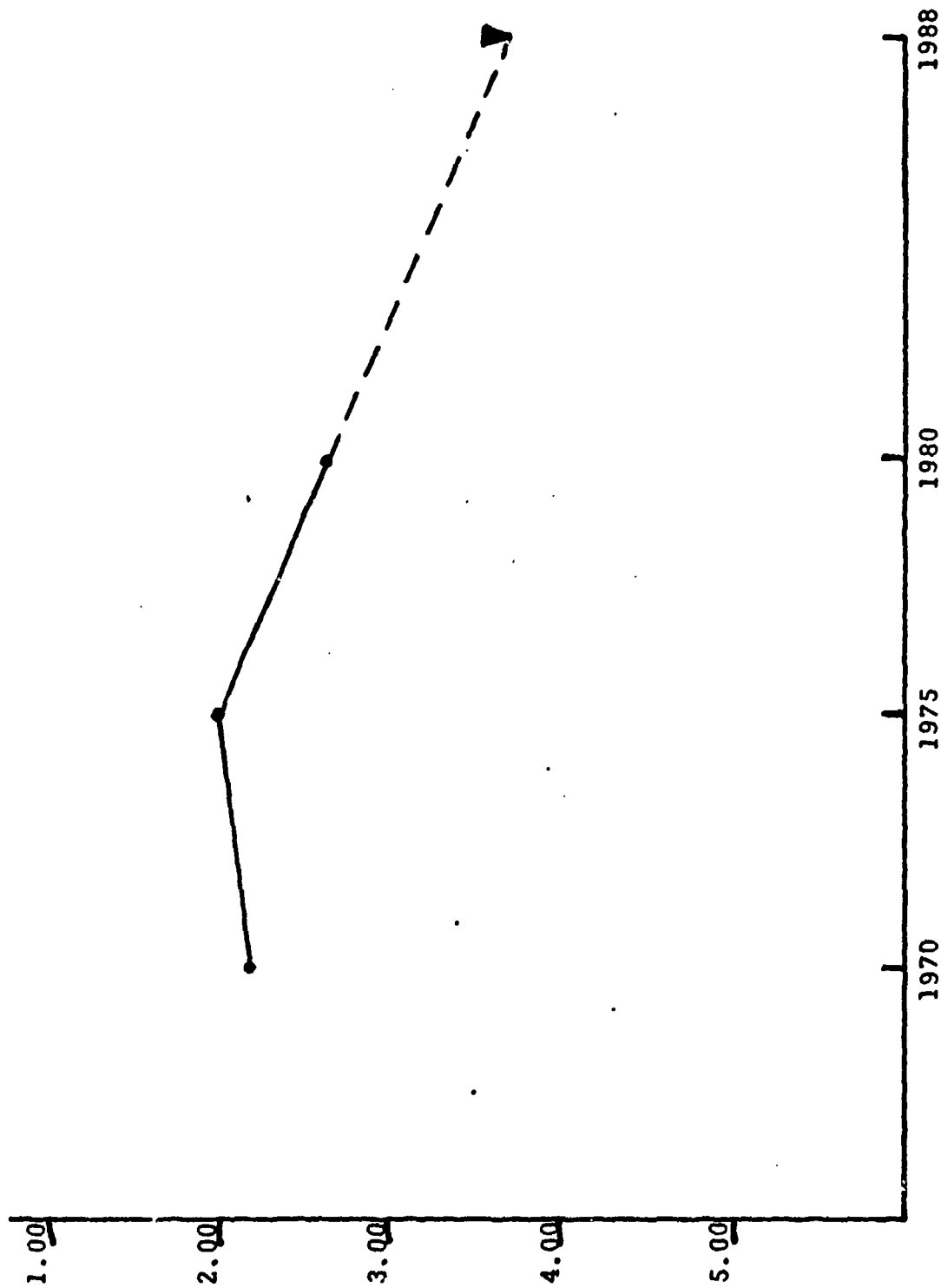
Figure D-6:

Degree to which users predict that the format in which they receive information in the future will meet their needs

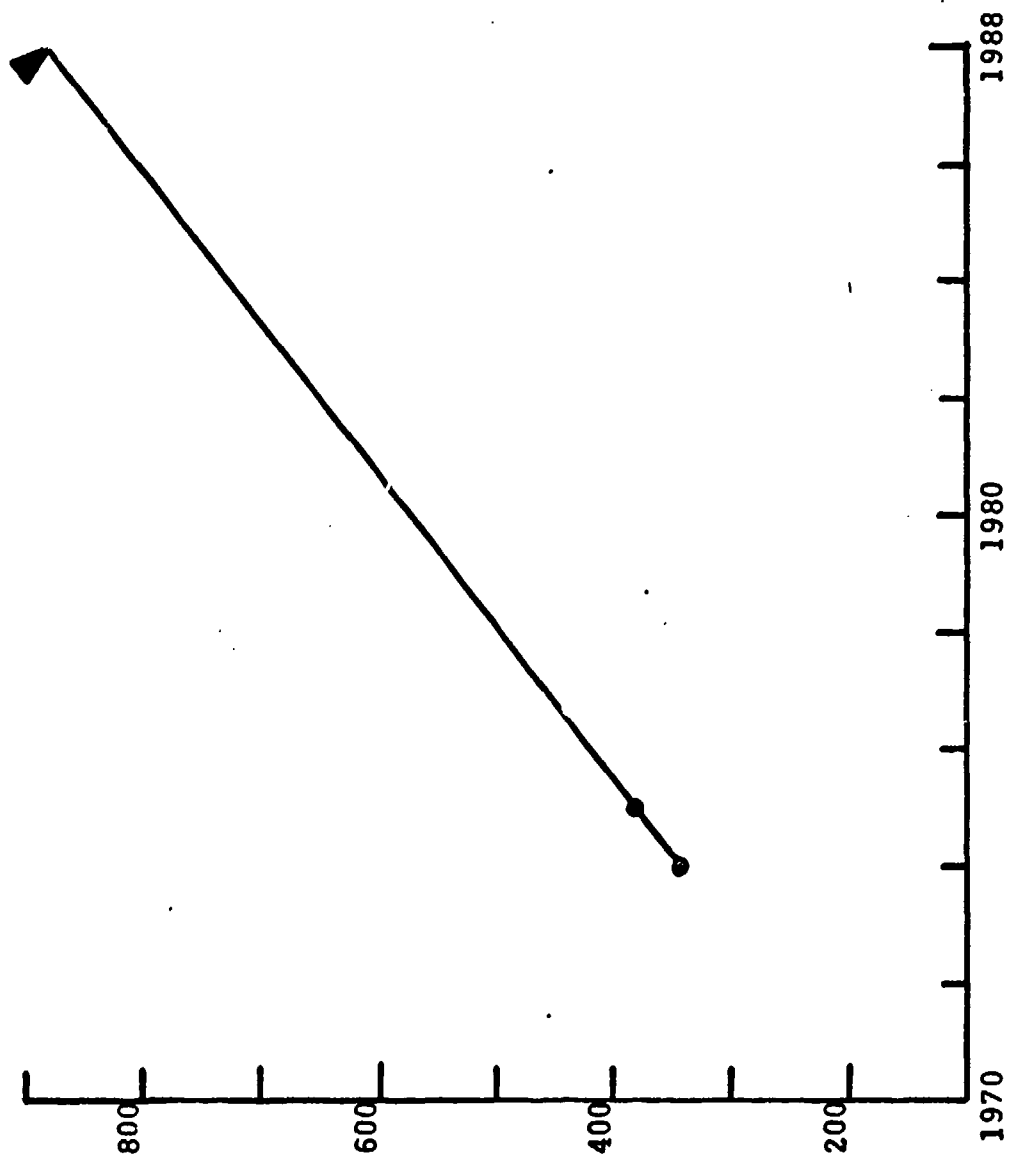Legend: 1.00 = "Will meet my needs at all times"; 5.00 = "Will never meet my needs"

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Figure D-7:

Annual Predictions for
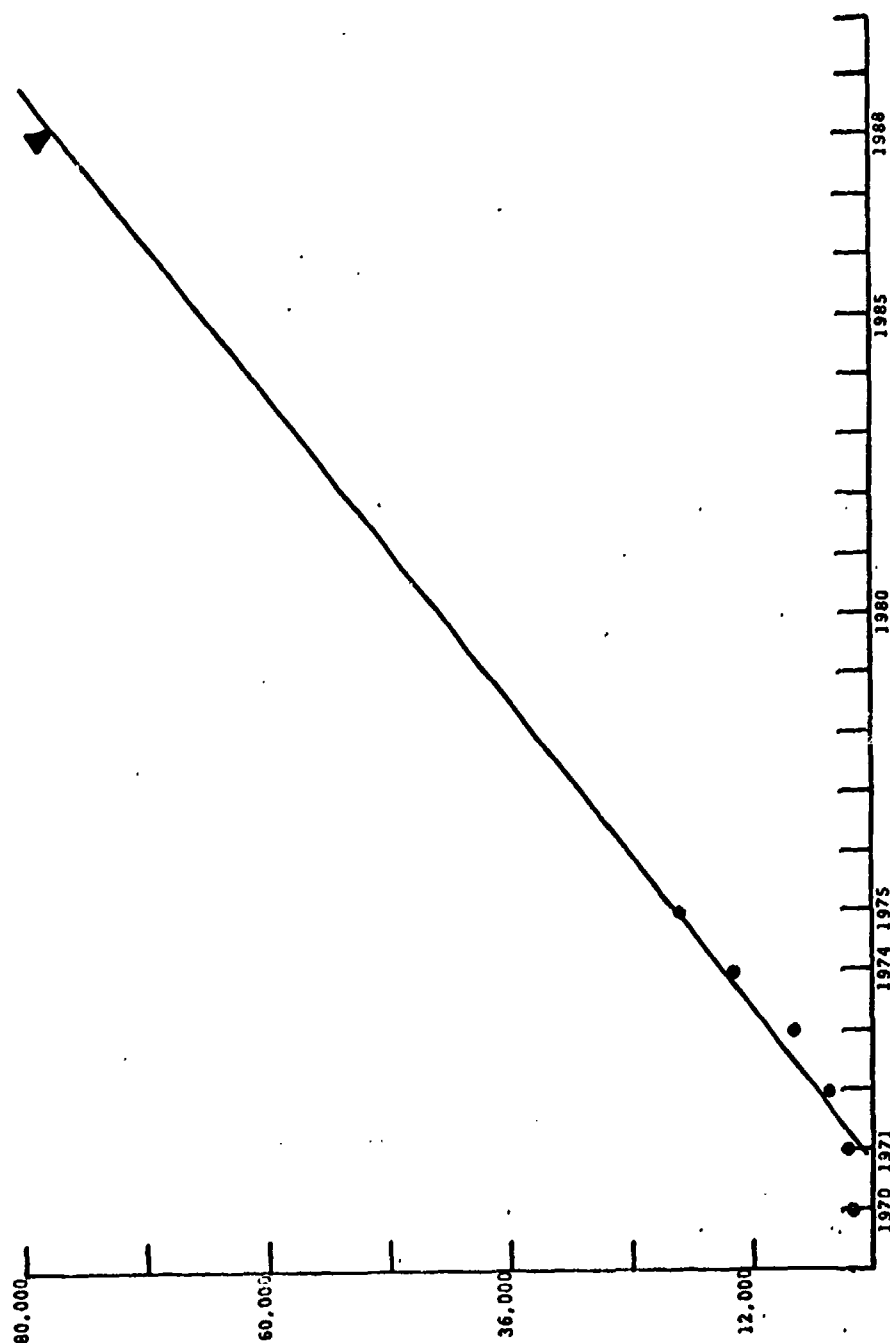Automatic Document Distribution – Output

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Figure D.-8:

Note: This prediction is based upon the assumption of unlimited availability of Current Awareness Bibliographies At present, this is an unannounced, limited availability service.

Annual Predictions for Current Awareness -- Output

80.000

60.000

36,000

12,000

1970 1971   1974 1975   1980   1985   1988