NASA/DoD Aerospace Knowledge Diffusion Research Project

NASA Technical Memorandum 109061

Report Number 19

The U.S. Government Technical Report and the Transfer of Federally Funded Aerospace R&D: An Analysis of Five Studies

Thomas E. Pinelli
NASA Langley Research Center
Hampton, Virginia

Rebecca O. Barclay
Rensselaer Polytechnic Institute
Troy, New York

John M. Kennedy
Indiana University
Bloomington, Indiana

January 1994

National Aeronautics and Space Administration

Department of Defense

INDIANA UNIVERSITY

Best
Available
Copy

The U.S. Government Technical Report and the Transfer of Federally Funded Aerospace R&D: An Analysis of Five Studies

Thomas E. Pinelli, Rebecca O. Barclay, and John M. Kennedy

ABSTRACT

The U.S. government technical report is a primary means by which the results of federally funded research and development (R&D) are transferred to the U.S. aerospace industry. However, little is known about this information product in terms of its actual use, importance, and value in the transfer of federally funded R&D. To help establish a body of knowledge, the U.S. government technical report is being investigated as part of the *NASA/DoD Aerospace Knowledge Diffusion Research Project.* In this report, we summarize the literature on technical reports and provide a model that depicts the transfer of federally funded aerospace R&D via the U.S. government technical report. We present results from five studies of our investigation of aerospace knowledge diffusion vis-à-vis the U.S. government technical report and close with a brief overview of on-going research into the use of the U.S. government technical report as a rhetorical device for transferring federally funded aerospace R&D.

INTRODUCTION

NASA and the DoD maintain scientific and technical information (STI) systems for acquiring, processing, announcing, publishing, and transferring the results of government-performed and government-sponsored research. Within both the NASA and DoD STI systems, the U.S. govern- ment technical report is considered a primary mechanism for transferring the results of this research to the U.S. aerospace community. However, McClure (1988) concludes that we actually know little about the role, importance, and impact of the technical report in the transfer of federally funded R&D because little empirical information about this product is available.

To help fill this knowledge void, we are examining the U.S. government technical report as part of the *NASA/DoD Aerospace Knowledge Diffusion Research Project.* This project investigates, among other things, the information environment in which U.S. aerospace engineers and scientists work, the information-seeking behavior of U.S. aerospace engineers and scientists, and the factors that influence the use of STI (Pinelli, Kennedy, and Barclay, 1991; Pinelli, Kennedy, Barclay, and White, 1991). The results of this investigation could (1) advance the development of practical theory, (2) contribute to the design and development of aerospace information systems, and (3) have practical implications for transferring the results of federally funded aerospace R&D to the U.S. aerospace community. The project fact sheet is Appendix A.

In this report, we summarize the literature on technical reports and provide a model that depicts the transfer of federally funded aerospace R&D through the U.S. government technical report. We present results from five studies of our investigation of aerospace knowledge diffusion vis-à-vis the U.S. government technical report and close with a brief overview of on-going research into the use of the U.S. government technical report as a rhetorical device for transferring federally funded aerospace R&D.

THE U.S. GOVERNMENT TECHNICAL REPORT

Although they have the potential for increasing technological innovation, productivity, and economic competitiveness, U.S. government technical reports may not be utilized because of limitations in the existing transfer mechanism. According to Ballard, et al., (1986), the current system "virtually guarantees that much of the Federal investment in creating STI will not be paid back in terms of tangible products and innovations." They further state that "a more active and coordinated role in STI transfer is needed at the Federal level if technical reports are to be better utilized."

Characteristics of Technical Reports

The definition of the technical report varies because the report serves different roles in communication within and between organizations. The technical report has been defined etymologically, according to report content and method (U.S. Department of Defense, 1964); behaviorally, according to the influence on the reader (Ronco, et al., 1964); and rhetorically, according to the function of the report within a system for communicating STI (Mathes and Stevenson, 1976). The boundaries of technical report literature are difficult to establish because of wide variations in the content, purpose, and audience being addressed. The nature of the report -- whether it is informative, analytical, or assertive -- contributes to the difficulty.

Fry (1953) points out that technical reports are heterogenous, appearing in many shapes, sizes, layouts, and bindings. According to Smith (1981), "Their formats vary; they might be brief (two pages) or lengthy (500 pages). They appear as microfiche, computer printouts or vugraphs, and often they are loose leaf (with periodic changes that need to be inserted) or have a paper cover, and often contain foldouts. They slump on the shelf, their staples or prong fasteners snag other documents on the shelf, and they are not neat."

Technical reports may exhibit some or all of the following characteristics (Gibb and Phillips, 1979; Subramanyam, 1981):

- Publication is not through the publishing trade.
- Readership/audience is usually limited.
- Distribution may be limited or restricted.
- Content may include statistical data, catalogs, directions, design criteria, conference papers and proceedings, literature reviews, or bibliographies.

- Publication may involve a variety of printing and binding methods.

The SATCOM report (National Academy of Sciences - National Academy of Engineering, 1969) lists the following characteristics of the technical report:

- It is written for an individual or organization that has the right to require such reports.

- It is basically a stewardship report to some agency that has funded the research being reported.

- It permits prompt dissemination of data results on a typically flexible distribution basis.

- It can convey the total research story, including exhaustive exposition, detailed tables, ample illustrations, and full discussion of unsuccessful approaches.

History and Growth of the U.S. Government Technical Report

The development of the [U.S. government] technical report as a major means of communicating the results of R&D, according to Godfrey and Redman (1973), dates back to 1941 and the establishment of the U.S. Office of Scientific Research and Development (OSRD). Further, the growth of the U.S. government technical report coincides with the expanding role of the Federal government in science and technology during the post World War II era. However, U.S. government technical reports have existed for several decades. The Bureau of Mines *Reports of Investigation* (Redman, 1965/66), the *Professional Papers of the United States Geological Survey,* and the *Technological Papers of the National Bureau of Standards* (Auger, 1975) are early examples of U.S. government technical reports. Perhaps the first U.S. government publications officially created to document the results of federally funded (U.S.) R&D were the technical reports first published by the National Advisory Committee for Aeronautics (NACA) in 1917.

Auger (1975) states that "the history of technical report literature in the U.S. coincides almost entirely with the development of aeronautics, the aviation industry, and the creation of the NACA, which issued its first report in 1917." In her study, *Information Transfer in Engineering*, Shuchman (1981) reports that 75 percent of the engineers she surveyed used technical reports; that technical reports were important to engineers doing applied work; and that aerospace engineers, more than any other group of engineers, referred to technical reports. However, in many of these studies it is often unclear, as in Shuchman's study, whether U.S. government technical reports, non-U.S. government technical reports, or both are included.

The U.S. government technical report is a primary means by which the results of federally funded R&D are made available to the scientific community and are added to the literature of science and technology (President's Special Assistant for Science and Technology, 1962). McClure (1988) points out that "although the [U.S.] government technical report has been variously reviewed, compared, and contrasted, there is no real knowledge base regarding the role, production, use, and importance [of this information product] in terms of accomplishing this task." Our analysis of the literature supports the following conclusions reached by McClure:

- The body of available knowledge is simply inadequate and noncomparable to determine the role that the U.S. government technical report plays in transferring the results of federally funded R&D.

- Further, most of the available knowledge is largely anecdotal, limited in scope and dated, and unfocused in the sense that it lacks a conceptual framework.

- The available knowledge does not lend itself to developing "normalized" answers to questions regarding U.S. government technical reports.

THE TRANSFER OF FEDERALLY FUNDED AEROSPACE R&D AND THE U.S. GOVERNMENT TECHNICAL REPORT

Three paradigms -- appropriability, dissemination, and diffusion -- have dominated the transfer of federally funded (U.S.) R&D (Ballard, et al., 1989; Williams and Gibson, 1990). Whereas variations of them have been tried within different agencies, overall Federal (U.S.) STI transfer activities continue to be driven by a "supply-side," dissemination model.

The Dissemination Model

The **dissemination model** emphasizes the need to transfer information to potential users and embraces the belief that the production of quality knowledge is not sufficient to ensure its fullest use. Linkage mechanisms, such as information intermediaries, are needed to identify useful knowledge and to transfer it to potential users. This model assumes that if these mechanisms are available to link potential users with knowledge producers, then better opportunities exist for users to determine what knowledge is available, acquire it, and apply it to their needs. The strength of this model rests on the recognition that STI transfer and use are critical elements of the process of technological innovation. Its weakness lies in the fact that it is passive, for it does not take users into consideration except when they enter the system and request assistance. The **dissemination model** employs one-way, source-to-user transfer procedures that are seldom responsive in the user context. In fact, user requirements are seldom known or considered in the design of information products and services.

The Transfer of (U.S.) Federally-Funded Aerospace R&D

A model depicting the transfer of federally funded aerospace R&D through the U.S. government technical report appears in figure 1. The model is composed of two parts -- the **informal** that relies on collegial contacts and the **formal** that relies on surrogates, information producers, and information intermediaries to complete the "producer to user" transfer process.

When U.S. government (i.e., NASA) technical reports are published, the initial or primary distribution is made to libraries and technical information centers. Copies are sent to surrogates for secondary and subsequent distribution. A limited number are set aside to be used by the author for the "scientist-to-scientist" exchange of information at the collegial level.

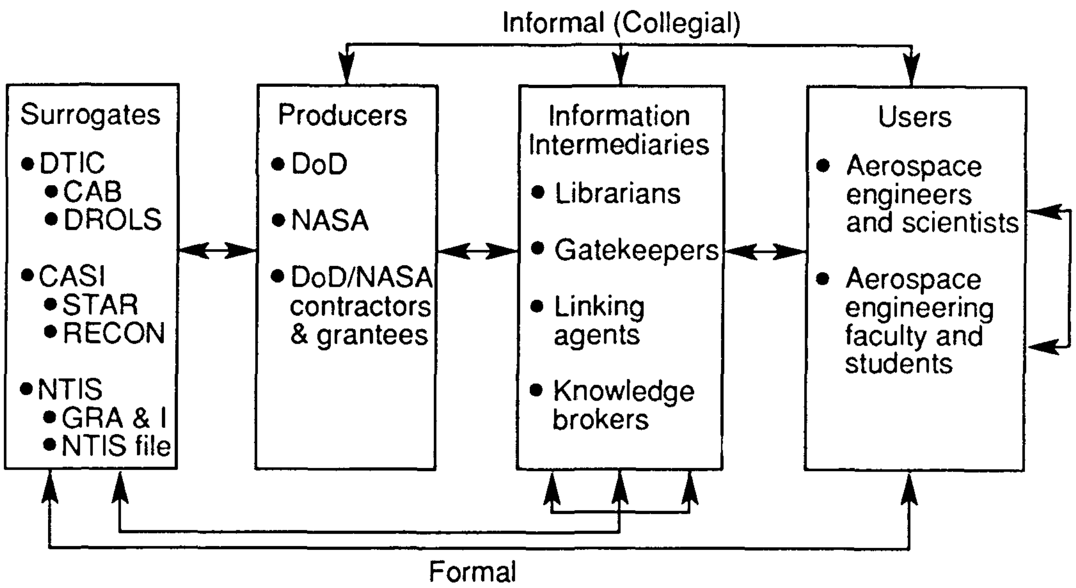


Figure 1. The U.S. Government Technical Report in
a Model Depicting the Dissemination of
Federally Funded Aerospace R&D.

Surrogates serve as technical report repositories or clearinghouses for the producers and include the Defense Technical Information Center (DTIC), the NASA Center for Aero Space Information (CASI), and the National Technical Information Service (NTIS). These surrogates have created a variety of technical report announcement journals such as *CAB* (Current Awareness Bibliographies), *STAR* (Scientific and Technical Aerospace Reports), and *GRA&I* (Government Reports Announcement and Index) and computerized retrieval systems such as DROLS (Defense RDT&E Online System), RECON (REsearch CONnection), and NTIS On-line that permit online access to technical report data bases. Information intermediaries are, in large part, librarians and technical information specialists in academia, government, and industry. Those representing the producers serve as what McGowan and Loveless (1981) describe as "knowledge brokers" or "linking agents." Information intermediaries connected with users act, according to Allen (1977), as "technological entrepreneurs" or "gatekeepers." The more "active" the intermediary, the more effective the transfer process becomes (Goldhor and Lund, 1983). Active intermediaries move information from the producer to the user, often utilizing interpersonal (i.e., face-to-face) communication in the process. Passive information intermediaries, on the other hand, "simply array information for the taking, relying on the initiative of the user to request or search out the information that may be needed" (Eveland, 1987).

The overall problem with the total Federal STI system is that "the present system for transferring the results of federally funded STI is passive, fragmented, and unfocused;" effective knowledge transfer is hindered by the fact that the Federal government "has no coherent of systematically designed approach to transferring the results of federally funded R&D to the user" (Ballard, et al., 1986). In their study of issues and options in Federal STI, Bikson and her colleagues (1984) found that many of the interviewees believed "dissemination activities were afterthoughts, undertaken without serious commitment by Federal agencies whose primary concerns were with [knowledge] production and not with knowledge transfer;" therefore, "much of what has been learned about [STI] and knowledge transfer has not been incorporated into federally supported information transfer activities."

Problematic to the **informal** part of the system is that knowledge users can learn from collegial contacts only what those contacts happen to know. Ample evidence supports the claim that no one researcher can know about or keep up with all the research in his/her area(s) of interest. Like other members of the scientific community, aerospace engineers and scientists are faced with the problem of too much information to know about, to keep up with, and to screen. To compound this problem, information itself is becoming more interdisciplinary in nature and more international in scope.

Two problems exist with the **formal** part of the system. First, the **formal** part of the system employs one-way, source-to-user transmission. The problem with this kind of transmission is that such formal one-way, "supply side" transfer procedures do not seem to be responsive to the user context (Bikson, et al., 1984). Rather, these efforts appear to start with an information system into which the users' requirements are retrofit (Adam, 1975). The consensus of the findings from the empirical research is that interactive, two-way communications are required for effective information transfer (Bikson, et al., 1984).

Second, the **formal** part relies heavily on information intermediaries to complete the knowledge transfer process. However, a strong methodological base for measuring or assessing the effectiveness of the information intermediary is lacking (Beyer and Trice, 1982). In addition, empirical data on the effectiveness of information intermediaries and the role(s) they play in knowledge transfer are sparse and inconclusive. The impact of information intermediaries is likely to be strongly conditional and limited to a specific institutional context.

According to Roberts and Frohman (1978), most Federal approaches to knowledge utilization have been ineffective in stimulating the diffusion of technological innovation. They claim that the numerous Federal STI programs are "highest in frequency and expense yet lowest in impact" and that Federal "information dissemination activities have led to little documented knowledge utilization." Roberts and Frohman also note that "governmental programs start to encourage utilization of knowledge only after the R&D results have been generated" rather than during the idea development phase of the innovation process. David (1986), Mowery (1983), and Mowery and Rosenberg (1979) conclude that successful [Federal] technological innovation rests more with the transfer and utilization of knowledge than with its production.

AEROSPACE KNOWLEDGE DIFFUSION AND THE U.S. GOVERNMENT TECHNICAL REPORT: AN ANALYSIS OF FIVE STUDIES

We have surveyed aerospace engineers and scientists in the U.S. and abroad as part of five studies. Survey populations have included members of professional (technical) societies as well as aerospace engineers and scientists at comparable aeronautical research facilities. Data follow that deal with technical report use from five studies. A self-administered (self-reported) mail survey was used to gather data. A brief overview of the methodology is provided for each study. Data are presented in the order in which the surveys were conducted.

Study 1 -- AIAA Membership

Two self-administered (self-reported) questionnaires were used for data collection. The membership (approximately 34,000) of the American Institute of Aeronautics and Astronautics (AIAA) in January 1989 served as the study population. Survey 1 investigated the relationship between the use of U.S. government technical reports and selected (seven) institutional and (six) sociometric variables. Survey 2 investigated the use and importance of Advisory Group for Aerospace Research and Development (AGARD), DoD, and NASA technical reports; reasons for non-use of these reports; how U.S. aerospace engineers and scientists find out about (become aware of) and physically obtain these reports; the influence of seven factors on the use of these reports; and the use of specified technical information (e.g., computer program listings) in electronic format. The sample frame for both surveys consisted of 6,781 AIAA members (1 out of 5) who resided in the U.S. Survey data were analyzed using the Statistical Package for the Social Sciences (SPSS). The AIAA questionnaires are Appendixes B and C.

Survey 1. Random sampling was used to select 3,298 members from the sample frame to participate in survey 1. Two thousand and sixteen (2,016) usable questionnaires were received by the established cut-off date. With an adjusted sample of 2,894 and 2,016 completed questionnaires, the adjusted response rate for survey 1 was 70 percent. The survey spanned the period from May 1989 to October 1989. The following composite participant profile was based on survey 1 demographic data: works in industry (52.6%), works in management (37.5%) or in design/ development (28.1%), has a graduate degree (70.3%), was educated (trained) as an engineer (83.0%), currently works as an engineer (67.5%), has an average of 21 years of professional work experience, and has had some part of this work funded by the U.S. government (82.9%).

Survey 2. Random sampling was used to select 1,735 members from the sample frame to participate in survey 2. With an adjusted sample of 1,553 and 975 completed questionnaires, the adjusted response rate for survey 2 was 63 percent. Survey 2 was conducted from July 1989 through February 1990. The following composite participant profile was based on survey 2 demographic data: works in industry (49.3%), works in management (35.1%) or in design/ development (26.9%), has a graduate degree (72.5%), was educated (trained) as an engineer (83.6%), currently works as an engineer (66.7%), has an average of 21 years of professional work experience, and has had some part of this work funded by the U.S. government (84.3%).

Survey 1

Use. Data regarding the use of U.S. government technical reports were collected from survey 1 participants. Within the context of other technical information products (i.e., conference-meeting papers, journal articles, and in-house technical reports), survey respondents were asked to indicate their use of and the importance of these information products and approximately how many times they had used each product in the past 6 months in performing their present professional duties. As shown in table 1, almost all the U.S. aerospace engineers and scientists in survey 1 use the four information products in performing their present profes-

Table 1. Use of Technical Information Products

Information Products	Percentage Using Product In -- Academia (n = 341)	Government (n = 454)	Industry (n = 1,044)	Overall Percentage Using Product (n = 1,839)
Conference-Meeting Papers	99.4	99.1	95.5	97.1
Journal Articles	99.4	97.4	95.5	96.7
In-house Technical Reports	97.9	99.6	98.8	98.8
U.S. Government Technical Reports	98.9	99.1	96.6	96.6

sional duties. There is no statistical difference in use among the academically-, government-, and industry-affiliated respondents. In terms of the highest level of education, career, and years of professional work experience, almost all the respondents use the four information products in performing their present professional duties.

Importance. Respondents rated the importance of conference-meeting papers, journal articles, in-house technical reports, and U.S. government technical reports using a 1 to 5 point scale (table 2). Of the four information products, in-house technical reports received the highest overall mean rating. The overall mean importance rating, although lower, does not differ considerably for conference-meeting papers, journal articles, and U.S. government technical reports. Statistically, academically-affiliated respondents attribute a higher importance rating to conference-meeting papers and journal articles. Government- and industry-affiliated respondents attribute a higher importance rating to in-house technical reports. (Government-affiliated respondents probably view U.S. government technical reports as synonymous with in-house technical reports.)

Statistically, participants who hold a doctoral degree attribute a higher importance rating to conference-meeting papers and journal articles. Survey participants who hold a master's, bachelor's, or no degree rate in-house technical reports more important than do survey participants who hold a doctoral degree. Scientists rate conference-meeting papers and journal

Table 2. Importance of Technical Information Products

Information Products	Average[a] (Mean) Importance Rating In -- Academia (n = 341)	Government (n = 454)	Industry (n = 1,044)	Overall Average (Mean) Importance Rating (n = 1,839)	Total Respondents
Conference-Meeting Papers	4.04	3.64	3.31	3.53	1,777
Journal Articles	4.35	3.49	3.26	3.52	1,775
In-house Technical Reports	3.02	3.98	4.05	3.84	1,766
U.S. Government Technical Reports	3.45	3.73	3.44	3.51	1,778

[a] A 1 to 5 point scale was used to measure importance with "1" being the lowest possible importance and "5" being the highest possible importance. Hence, the higher the average, the more important the product.

articles more important than engineers rate them. Engineers rate in-house technical reports more important than scientists rate them. Engineers and scientists rate the importance of U.S. government technical reports about equal. With two small exceptions, the importance rating of the four information products increases as years of professional work experience increase.

Frequency of Use. Survey participants were asked to indicate the number of times they had used each of the four information products in a 6-month period in the performance of their professional duties (table 3). Data are presented both as means and medians. In-house technical

Table 3. Frequency of Technical Information Product Use

Information Products	Average Number of Times (Median) Product Used In 6-Month Period For Respondents In -- Academia (n = 341)	Government (n = 454)	Industry (n = 1,044)	Overall Average Number of Times (Median) Products Used (n = 1,839)	Total Respondents
Conference-Meeting Papers	17.98 (7.00)	13.41 (4.00)	9.23 (4.00)	12.02 (4.00)	1,527
Journal Articles	26.60 (10.00)	15.41 (5.00)	9.99 (4.00)	14.74 (5.00)	1,503
In-house Technical Reports	9.22 (5.00)	17.91 (6.00)	23.91 (8.00)	20.30 (6.00)	1,535
U.S. Government Technical Reports	10.01 (5.00)	12.41 (5.00)	11.49 (4.00)	11.45 (5.00)	1,495

reports are used to a much greater extent than the other three information products are used. Conference-meeting papers and journal articles are used to a greater extent by academically-affiliated participants. In-house technical reports are used to a greater extent by government- and industry-affiliated participants. Average use of U.S. government technical reports is about equal for all three groups. With the exception of in-house technical reports, use of the three remaining information products increases as the level of education increases. Survey participants possessing a doctorate make significantly greater use of conference-meeting papers and journal articles.

Scientists make greater use of the four information products than do engineers. Engineers and scientists make about equal use of in-house technical reports. Scientists make greater use of conference-meeting papers and journal articles than do engineers. The use of the four information products does not seem related to increasing years of professional work experience.

Purpose of Use. To help define the role of the U.S. government technical report within a formal information structure, survey respondents were asked to indicate what percentage of the conference-meeting papers, journal articles, in-house technical reports, and U.S. government technical reports they use are for purposes of education, research, management, and other. Overall, they use conference-meeting papers most often for research, followed by education and management (table 4).

About 74 percent of the conference-meeting papers used by survey participants working as scientists are used for research, and about 55 percent of the conference-meeting papers used by survey participants working as engineers are used for research. It is noteworthy that as the years of professional work experience increase, the use of conference-meeting papers for purposes of education and research decreases. The use of conference-meeting papers for purposes of management increases as years of professional work experience increase.

Table 4. Use (Purpose) of Conference-Meeting Papers

Purpose	Average Percentage Of Use For Respondents In --			Overall Average Percentage Of Use	Total Respondents
	Academia (n = 341)	Government (n = 454)	Industry (n = 1,044)	(n = 1,839)	
Education	20.16	25.27	25.41	24.23	1,355
Research	70.37	50.09	47.86	53.34	1,355
Management	6.05	17.62	18.16	15.38	1,355
Other	3.41	7.02	8.57	7.05	1,355

On average, journal articles are used most often for research, followed by use for education and management. Overall, journal articles are used about 52 percent of the time for research (table 5).

Table 5. Use (Purpose) of Journal Articles

Purpose	Average Percentage Of Use For Respondents In --			Overall Average Percentage Of Use (n = 1,839)	Total Respondents
	Academia (n = 341)	Government (n = 454)	Industry (n = 1,044)		
Education	23.09	29.76	28.86	27.80	1,327
Research	69.14	49.41	45.60	51.83	1,327
Management	5.27	14.04	16.22	13.22	1,327
Other	2.50	6.79	9.32	7.15	1,327

Statistically, survey participants who hold a doctorate make greater use of journal articles than do participants with a master's degree or less. About 72 percent of the journal articles used by survey participants who work as scientists are used for research, and about 53 percent of the journal articles used by survey participants who work as engineers are used for research. As years of professional work experience increase, the use of journal articles for education and research decreases. The use of journal articles for management increases as the years of professional work experience increase.

In-house technical reports are used most often for research (52.9%), followed by management (21.5%) and education (16.2%) (table 6). Academic participants use in-house reports most often for research, followed by use for education and management. Government and industry respondents use in-house technical reports most often for research, followed by use for management and education.

Table 6. Use (Purpose) of In-house Technical Reports

Purpose	Average Percentage Of Use For Respondents In --			Overall Average Percentage Of Use (n = 1,839)	Total Respondents
	Academia (n = 341)	Government (n = 454)	Industry (n = 1,044)		
Education	14.76	18.20	15.61	16.20	1,349
Research	66.94	50.73	50.38	52.86	1,349
Management	11.70	23.73	22.94	21.54	1,349
Other	6.70	7.33	11.07	9.39	1,349

About 71 percent of the in-house technical reports used by survey participants working as scientists are used for research, and about 57 percent of the in-house technical reports used by survey participants working as engineers are used for research. As years of professional work experience increase, the use of in-house technical reports for purposes of education and research decreases. The use of in-house technical reports for management increases as years of professional work experience increase.

Overall, U.S. government technical reports are used most often for research, followed by education and management. Overall, U.S. government technical reports are used about 56 percent of the time for research (table 7.)

Table 7. Use of (Purpose) U.S. Government Technical Reports

Purpose	Average Percentage Of Use For Respondents In -- Academia (n = 341)	Average Percentage Of Use For Respondents In -- Government (n = 454)	Average Percentage Of Use For Respondents In -- Industry (n = 1,044)	Overall Average Percentage Of Use (n = 1,839)	Total Respondents
Education	17.04	18.79	18.11	18.09	1,332
Research	70.50	52.60	52.18	55.89	1,332
Management	7.71	20.09	19.25	17.22	1,332
Other	4.75	8.52	10.47	8.80	1,332

Academically-affiliated participants use U.S. government technical reports most often for research (70.5%), followed by use for education and management. Government- and industry-affiliated respondents use U.S. government technical reports about 52 percent of the time for research, followed by use for management and education.

About 72 percent of the U.S. government technical reports used by survey participants who work as scientists are used for research, and about 59 percent of the U.S. government technical reports used by survey participants who work as engineers are used for research. Survey participants who work as engineers make greater use of U.S. government technical reports for education (18.93%) than do those participants who work as scientists (13.89%). As years of professional work experience increase, the use of U.S. government technical reports for education and research decreases. The use of U.S. government technical reports for management increases as years of professional work experience increase.

Overall, research purposes account for the use of more than 50 percent of the four information products. Within academia, research use accounts for about 70 percent of these products. In academia, conference-meeting papers, journal articles, and U.S. government technical reports are used more for educational than for management purposes. In industry, in-house technical reports are used more for management than for educational purposes.

Survey 2

Use. Survey participants were asked to provide information about their use of certain information products (table 8). Survey respondents make the greatest use of journal articles (85%)

Table 8. Use of Technical Information Products

Information Products	Percentage	Number
Conference-Meeting Papers	84.1	820
Journal Articles	85.2	831
Technical Translations	24.5	239
AGARD Technical Reports	32.2	314
DoD Technical Reports	58.7	572
NASA Technical Reports	73.5	717

and conference-meeting papers (84%), followed by NASA and DoD technical reports (74% and 59%), AGARD technical reports (32%), and technical translations (25%).

Importance. Survey participants were asked to rate the importance of these same information products. (See table 9.) Importance was measured on a 1 to 5 point scale with "1"

Table 9. Importance of Technical Information Products

Information Products	Average[a] (Mean) Importance Rating	Number
Conference-Meeting Papers	3.65	956
Journal Articles	3.66	949
Technical Translations	2.84	841
AGARD Technical Reports	2.09	842
DoD Technical Reports	2.98	901
NASA Technical Reports	3.31	933

[a]A 1 to 5 point scale was used to measure importance, with "1" being the lowest possible importance and "5" being the highest possible importance. Hence, the higher the average (mean), the greater the importance of the product.

being the lowest possible importance and "5" being the highest possible importance. Survey participants accorded the highest importance rating to the information products they used the most -- journal articles and conference-meeting papers. In terms of U.S. government technical reports, survey participants assigned a higher importance rating to NASA technical reports than to those published by the DoD. AGARD technical reports are used more frequently than technical translations (34% vs 25%). However, survey respondents assigned a higher level of importance to technical translations than to AGARD technical reports ($\bar{X}$ = 2.84 vs. $\bar{X}$ = 2.09).

Frequency of Use. Survey 2 participants were asked to indicate the average number of technical translations, AGARD technical reports, DoD technical reports, and NASA technical reports they used in a 6-month period. (See table 10.) Although a higher percentage of the survey participants used NASA technical reports (74%) than DoD technical reports (59%), the average number of DoD technical reports used was slightly higher. Although the percentage of respondents using AGARD technical reports and technical translations was low, the frequency of use rate and the overall use rate for these information products were consistent.

Table 10. Frequency of Technical Information Product Use

Information Products	Average Number of Times (Median) Used in a 6-Month Period	Number
Technical Translations	4.5 (2.0)	131
AGARD Technical Reports	4.2 (2.0)	190
DoD Technical Reports	9.0 (4.0)	424
NASA Technical Reports	8.5 (5.0)	521

The use of the four technical information products was correlated with their importance rating (table 11). Although the correlations were statistically significant, they were low for each of the four products. NASA technical reports had the highest use-to-importance correlation.

Table 11. Technical Information Product Use Correlated With Product Importance

Information Products	Pearson's *r*	Number
Technical Translations	0.191*	128
AGARD Technical Reports	0.161*	188
DoD Technical Reports	0.198*	418
NASA Technical Reports	0.239*	516

* $P \leq 0.05$

Reasons for Non-Use. Survey 2 participants who did not use selected technical information products were asked to indicate their reasons for non-use of these products (table 12). About 69% of the survey respondents gave not relevant to their research as their reason for non-use of technical translations, followed by not availability/accessibility (54.8%), the time it takes to

Table 12. Reasons for Non-Use of Selected Technical Information Products

	Technical Translations		AGARD Reports		DoD Reports		NASA Reports	
Reasons	%	n	%	n	%	n	%	n
Not Available/Accessible	**54.8**	**278**	**53.7**	**212**	**49.6**	**127**	**39.0**	64
Not Relevant To My Research	**68.8**	**366**	**70.0**	**297**	**69.0**	**194**	**72.9**	159
Not Used In My Discipline	**45.1**	**205**	**51.1**	**181**	**37.1**	**85**	**47.5**	86
Not Reliable/Technically Inaccurate	7.9	27	3.1	8	5.5	10	2.3	3
Not Reliable/Language Inaccurate	13.5	47	16.2	44	17.1	33	5.4	122
Takes Too Long To Get Them	**51.0**	**214**	----	----	----	----	----	----
Not Timely/Current	39.1	152	----	----	----	----	----	----

physically obtain a translation (51.0%), and not used in their discipline (45.1%). Reliability, in terms of either technical accuracy or language accuracy, was not a major factor in the non-use of technical translations.

Seventy percent of the survey participants gave "not relevant to my research" as their reason for not using AGARD technical reports. About 51 percent of the respondents listed "not used in my discipline" and about 54 percent of the respondents listed "not available/accessible" as reasons for not using AGARD technical reports. Sixty nine percent of the survey participants gave "not relevant to my research" as their reason for non-use of DoD technical reports followed by "not available/accessible (49.6%) and "not used in my discipline" (37.1%). About 73 percent of the respondents gave "not relevant to my research" as their reason for non-use of NASA technical reports followed by "not used in my discipline" (47.5%).

Survey 2 participants were asked to rate selected technical information products on the following characteristics: quality of information, accuracy/precision of data, adequacy of data/documentation, organization/format, quality of graphics, timeliness/currency, and "advancing the state of the art" in their discipline (table 13). Survey participants rated the quality of information highest ($\bar{X}$ = 4.11) for AGARD technical reports, followed by the precision/accuracy of the data ($\bar{X}$ = 3.99), and adequacy of data/documentation ($\bar{X}$ = 3.83). Survey participants rated the quality of information in DoD technical reports highest ($\bar{X}$ = 3.89), followed by precision/ accuracy of data ($\bar{X}$ = 3.81), adequacy of data/documentation ($\bar{X}$ = 3.58), and organization/format ($\bar{X}$ = 3.58). Survey participants rated the quality of information in NASA technical reports the highest ($\bar{X}$ = 4.18), followed by precision/accuracy of data ($\bar{X}$ = 4.12), and organization/format ($\bar{X}$ = 3.90).

Table 13. Average (Mean) Rating of Selected Technical Information Products

Characteristics	AGARD Reports		DoD Reports		NASA Reports	
	Average (Mean)[a] Rating	Number	Average (Mean)[a] Rating	Number	Average (Mean)[a] Rating	Number
Quality Of Information	**4.11**	**227**	**3.89**	**500**	**4.18**	**625**
Precision/Accuracy Of Data	**3.99**	**227**	**3.81**	**501**	**4.12**	**626**
Adequacy of Data/Documentation	3.83	225	3.58	499	3.90	622
Organization/Format	3.81	225	3.58	499	3.92	624
Quality of Graphics (e.g., charts, photos, figures)	3.62	228	3.41	500	3.88	626
Timeliness/Currency	3.60	225	3.56	498	3.80	622
"Advancing the State of the Art" in Your Discipline	3.57	223	3.52	493	3.84	612

[a]A 1 to 5 point scale was used to measure importance, with "1" being the lowest possible importance and "5" being the highest possible importance. Hence, the higher the average (mean), the greater the importance of the product.

Purpose of Use. Survey 2 participants were asked the purpose(s) for which they use the four technical information products. The bulk of these products are used for research, followed by management, and education. Use (purpose) responses from survey 1 and 2 were compared (table 14). The use patterns are very similar: the technical information products from both surveys are used most often for research.

Table 14. Use (Purpose) of Technical Information Products

Information Products	Percentage* (Number) Used for the Following Purposes			
	Education	Research	Management	Other
Survey 1				
Conference-Meeting Papers	24.23 (1,355)	53.34 (1,355)	15.38 (1,355)	7.05 (1,355)
Journal Articles	27.80 (1,327)	51.83 (1,327)	13.22 (1,327)	7.15 (1,327)
In-house Technical Reports	16.20 (1,349)	52.86 (1,349)	21.54 (1,349)	9.39 (1,349)
U.S. Government Technical Reports	18.09 (1,332)	55.89 (1,332)	17.22 (1,332)	8.80 (1,332)
Survey 2				
Technical Translations	40.2 (101)	86.5 (142)	45.0 (27)	34.7 (15)
AGARD Technical Reports	47.1 (56)	85.5 (207)	43.0 (28)	45.3 (19)
DoD Technical Reports	40.5 (37)	83.9 (413)	51.9 (131)	50.9 (63)
NASA Technical Reports	45.7 (169)	84.9 (530)	47.3 (107)	51.1 (59)

*Percentages do not total 100 percent for Survey 2 responses.

Factors Affecting Use. Survey 2 participants were asked to indicate the extent to which their use of the selected technical information products was affected by seven factors. Their responses are contained in table 15. Accessibility, technical quality, and relevance exert the greatest influence on overall use. Relevance, comprehensiveness, and technical quality, influence the use of technical translations. Accessibility, relevance, and technical quality are the factors that influence the use of AGARD technical reports. Relevance, accessibility, and fmailiarity influence the use of DoD technical reports. Relevance, accessibility, and familiarity influence the use of NASA technical reports.

Table 15. Factors Affecting the Use of Selected Technical Information Products

Information Products	Average[a] (Mean) Influence of the Factor on Use							Total Respondents
	Accessibility	Ease of Use	Expense	Familiarity	Technical Quality	Comprehensiveness	Relevance	
Survey 1								
Conference-Meeting Papers	**3.79**	3.43	2.50	3.56	**3.74**	3.38	**3.97**	1,552
Journal Articles	**3.88**	3.51	2.64	3.58	**4.03**	3.59	**3.87**	1,509
In-house Technical Reports	**4.01**	3.61	2.50	**3.78**	3.77	3.51	**4.15**	1,538
U.S. Government Technical Reports	**3.65**	3.38	2.51	3.52	**3.73**	3.55	**3.90**	1,573
Survey 2								
Technical Translations	3.54	3.43	2.34	3.40	**3.68**	**3.73**	**3.86**	223
AGARD Technical Reports	**4.09**	3.78	2.74	3.84	**3.91**	3.74	**4.07**	621
DoD Technical Reports	**3.79**	3.36	2.33	3.27	**3.47**	3.19	**3.83**	155
NASA Technical Reports	**3.89**	3.45	2.55	**3.59**	3.54	3.43	**3.94**	492

[a] A 1 to 5 point scale was used to measure influence, with "1" being the lowest possible influence and "5" being the highest possible influence Hence, the higher the average (mean), the greater the influence of the product.

Awareness. Survey 2 respondents were asked how they find out about AGARD, DoD, and NASA technical reports and how they obtain them. The findings are shown in figure 2 and figure 3. Survey 2 respondents who used AGARD, DoD, and NASA technical reports were asked to indicate the various means by which they find out these reports (figure 2). For presentation and discussion, the awareness choices are grouped into three categories: **Producer**, which includes announcement journals such as *STAR*; **User**, which includes colleagues and coworkers; and **Intermediary**, which includes interaction with a librarian or technical information specialist.

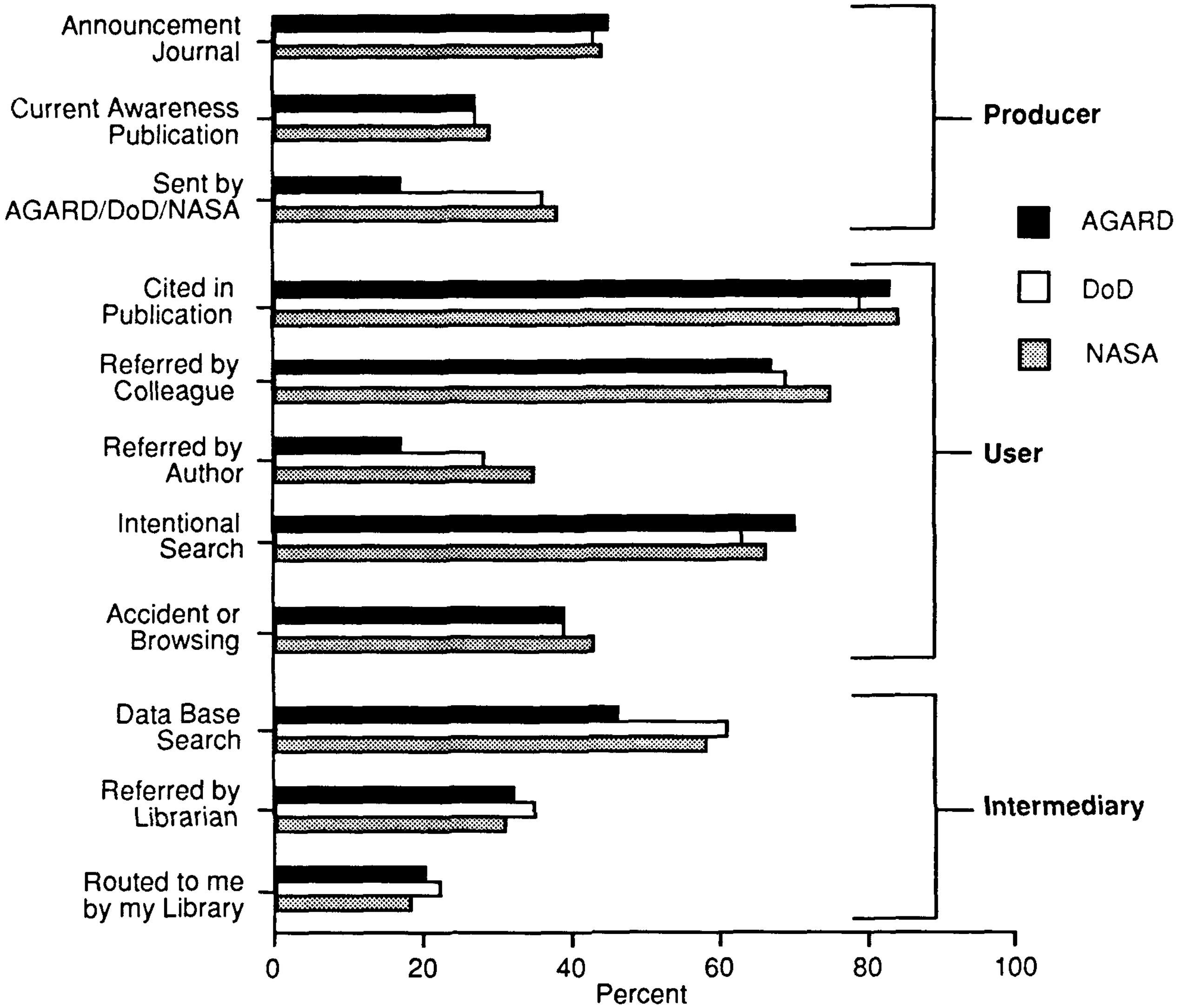


Figure 2. How U.S. Aerospace Engineers and Scientists Find Out about DoD and NASA Technical Reports.

Little difference was demonstrated in how U.S. aerospace engineers and scientists find out about DoD and NASA technical reports. **User** methods dominate awareness choices with "cited in a publication" and "referred by a colleague" being selected most often. **Intermediary** methods ranked second with "data base search" being selected most frequently. **Producer** methods ranked third with "announcement journals" such as *STAR* being selected most frequently.

Acquisition. From a list of seven sources, survey 2 respondents were asked how they actually access or obtain copies of DoD and NASA technical reports (figure 3). For presentation and discussion, the acquisition choices have been grouped into 3 categories: **Producer**, including sent by author; **User**, including obtained from a colleague; and **Intermediary**, including routed to me by my library.

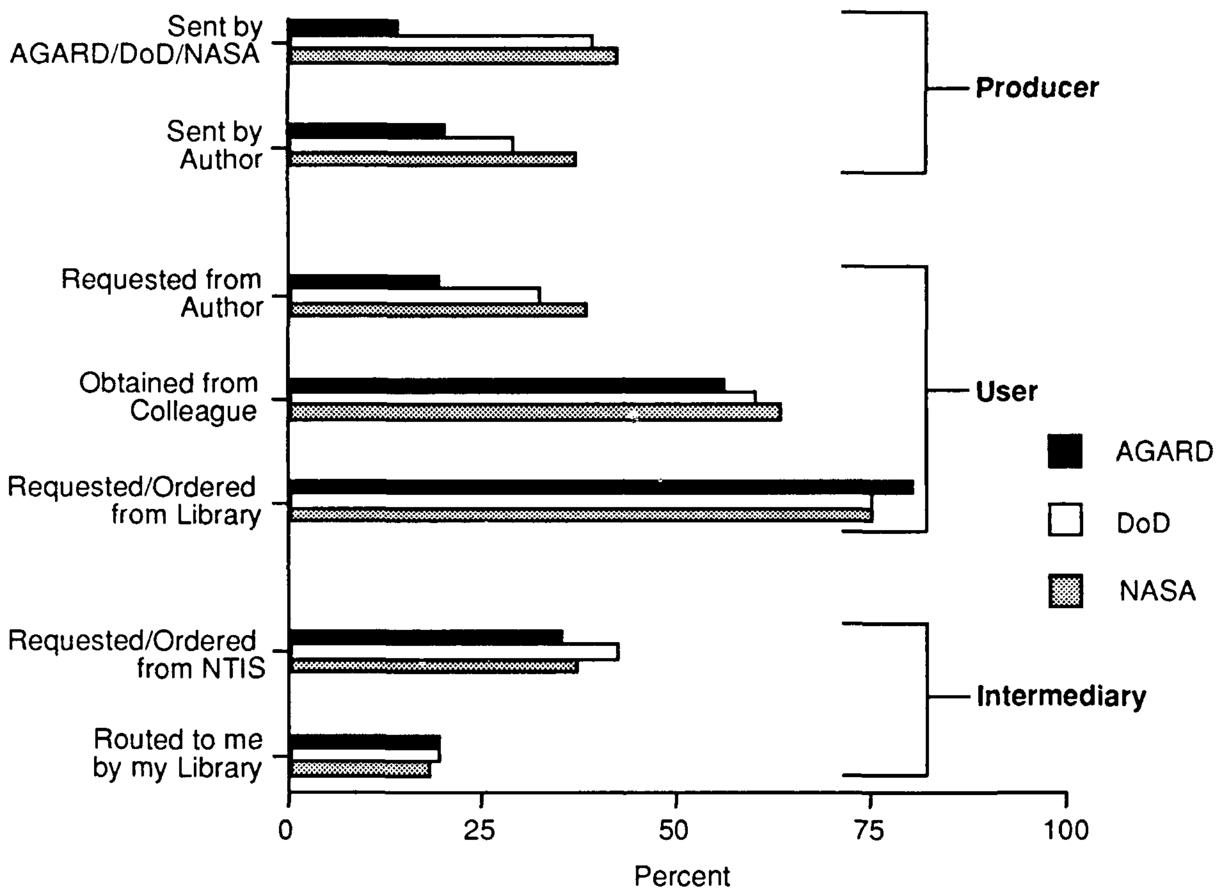


Figure 3. How U.S. Aerospace Engineers and Scientists Acquire DoD and NASA Technical Reports.

Overall, **User** methods dominate access choices with "requested/ordered from my library" being selected most frequently (figure 3). **Producer** methods ranked second with "sent by DoD and NASA" being selected most frequently. **Intermediary** methods were third with "requested/ordered from NTIS" being selected more frequently.

Study 2 -- SAE Membership

Study 2 utilized survey research in the form of a self-administered mail questionnaire. Survey participants consisted of U.S. aerospace engineers and scientists who were on the Society of Automotive Engineers (SAE) mailing list (not necessarily members of the SAE). A list of 2,000 U.S. aerospace engineers and scientists served as the sample frame. Individuals on the SAE mailing list were selected as the study population in an attempt to ensure representation of those U.S. aerospace engineers and scientists performing duties in design, development, manufacturing, and production.

After final approval, 2,000 surveys were printed and mailed on August 6-7, 1991. By November 29, 1991, the cut-off date, 946 completed surveys were received. The adjusted completion rate for the survey was 67 percent. The following composite participant profile was based on the SAE demographic data: works in industry (92.2%), works in design/development (60.2%), has a bachelor's degree (52.7%), was educated (trained) as an engineer (90.8%), currently works as an engineer (90.1%), and has an average of 18 years of professional aerospace work experience. The SAE questionnaire is Appendix D.

SAE survey participants were asked several questions designed to obtain a greater understanding of the factors affecting the use of technical reports. In this study, technical reports were placed within the context of two other technical information products: conference-meeting papers and journal articles. The technical reports published by AGARD, DoD, and NASA, as well as in-house technical reports were included in the SAE study.

Use. Survey participants were asked if they used the aforementioned technical information products in performing their present professional duties. Table 16 includes data regarding use. In-house technical reports enjoyed the highest use rate, followed by journal articles and conference-meeting papers. DoD and NASA technical reports were used by fewer than half of the SAE survey respondents.

Table 16. Use of Technical Information Products

Information Products	Percentage	Number
Conference-Meeting Papers	59.7	565
Journal Articles	63.2	598
AGARD Technical Reports	11.5	109
In-house Technical Reports	83.4	789
DoD Technical Reports	44.4	420
NASA Technical Reports	44.4	420

Importance. SAE survey participants were asked "how important is it for you to use the aforementioned technical information products in performing your present professional duties?" Table 17 includes data regarding the importance of the use of these technical information pro-

Table 17. Importance of Technical Information Products

Information Products	Mean ($\bar{X}$)	Number
Conference-Meeting papers	2.54	946
Journal Articles	2.65	946
AGARD Technical Reports	1.92	682
In-house Technical Reports	3.28	946
DoD Technical Reports	2.67	832
NASA Technical Reports	2.57	854

[a]A 1 to 5 point scale was used to measure importance, with "1" being the lowest possible importance and "5" being the highest possible importance. Hence, the higher the average (mean), the greater the importance of the product.

ducts. A 1 to 5 point scale (1.0 = very unimportant; 5.0 = very important) was used to measure importance. Of the six information products, in-house technical reports received the highest overall mean rating. The overall mean importance rating for the five remaining technical information products, although lower, does not differ considerably for conference-meeting papers, journal articles, DoD technical reports, and NASA technical reports. The overall mean importance rating for AGARD technical reports is somewhat lower than the overall importance ratings for the five remaining technical information products.

Frequency of Use. SAE survey participants were asked to indicate the number of times they had used each of the six technical information products in a 6-month period in the performance of their professional duties (table 18). Data are presented both as means and medians. In-house

Table 18. Average Number of Times (Median) Technical Information Products Used in a 6-Month Period

Information Products	Mean ($\bar{X}$)	Median
Conference-Meeting Papers	4.13	2.00
Journal Articles	6.90	2.00
AGARD Technical Reports	0.29	0.00
In-house Technical Reports	9.72	5.00
DoD Technical Reports	3.09	0.00
NASA Technical Reports	2.40	0.00

technical reports were used ($\bar{X}$ = 9.72) to a much greater extent than were the other technical information products. Of the five remaining technical information products, journal articles are used most often followed by conference-meeting papers, DoD technical reports, and NASA technical reports. AGARD technical reports were used least frequently by survey participants. The median number of times that AGARD, DoD, and NASA technical reports were used in the past six months was 0.00, indicating that the majority of SAE survey respondents did not use these technical information products during that period.

Awareness. Those respondents (43.6%) that used the results of federally funded aerospace R&D in their work were asked how often they learned about these results from a list of 12 sources (figure 4). For presentation and discussion, the awareness choices are grouped into four categories: **Producer**, which includes announcement journals such as *STAR*; **User**, which includes colleagues and coworkers; **Intermediary (internal)**, which includes interaction with a librarian or technical information specialist, and **Intermediary (external)**, which includes interactions with professional societies.

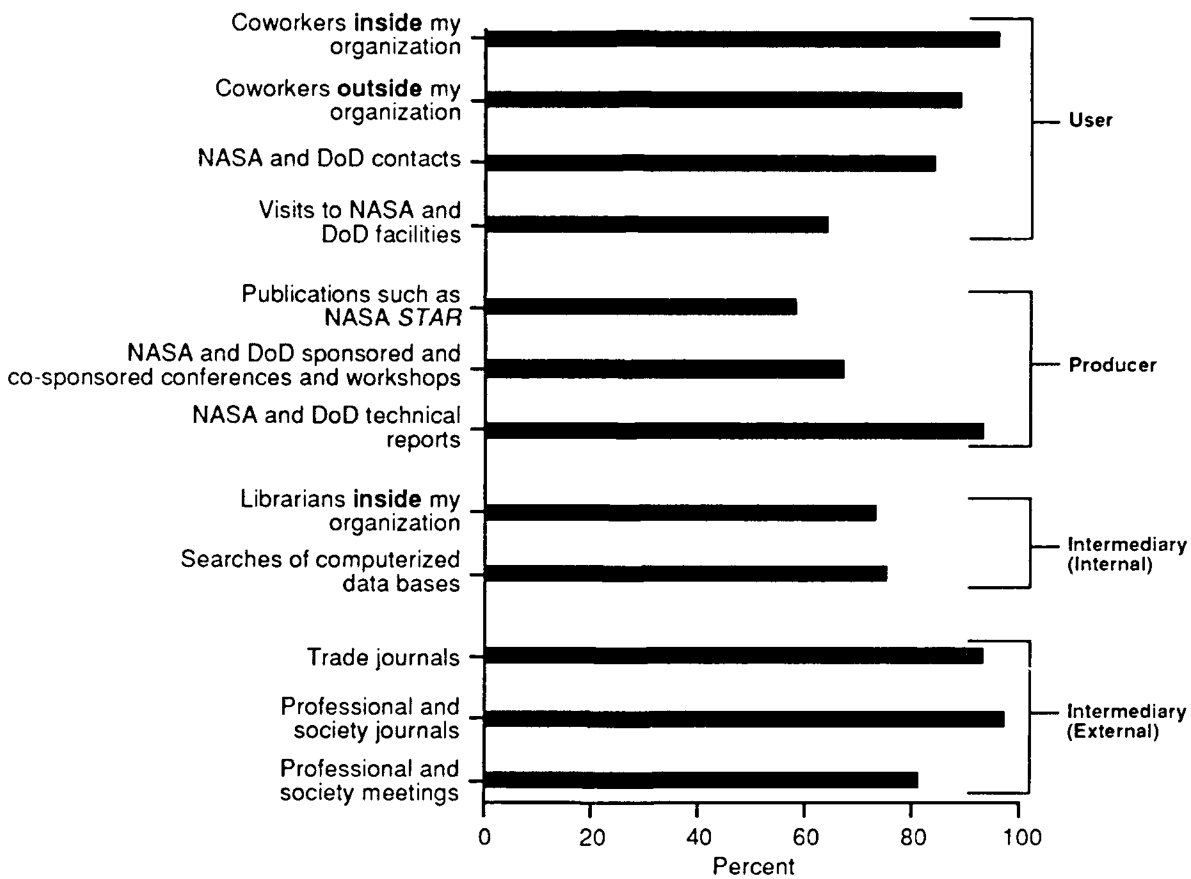


Figure 4. How U.S. Aerospace Engineers and Scientists Find Out about the Results of Federally Funded Aerospace R&D.

Intermediary (external) methods ranked first with professional and society journals and trade journals selected first and second. **User** methods ranked second with coworkers inside the organization and colleagues outside the organization selected first and second. **Intermediary (internal)** methods ranked third with the selection of librarians and searches of data bases being selected about equally. **Producer** methods ranked fourth with NASA and DoD technical reports selected first.

Acquisition. From a list containing five choices, survey 2 respondents who used the results of federally funded aerospace R&D were asked to identify any problems they encountered in using them (figure 5). Survey 2 respondents identified "time and effort it took to locate the results" (52%) and "time and effort it took to physically obtain the results" (41%) as problems. Distribution limitations/security restrictions (23%), organization/format of the results (15%), and accuracy/reliability of the results (10%) were cited less frequently. To the extent that the choices can be characteristic of DoD and NASA technical reports, the results can be interpreted to mean that the problems lie more with finding out about and obtaining these reports than with the production of the reports as rhetorical devices or information packages.

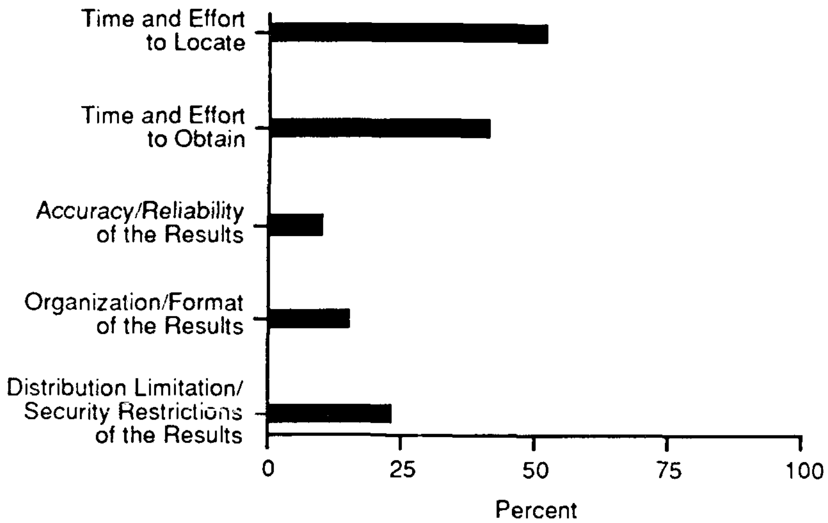


Figure 5. Problems Associated With U.S. Aerospace Engineers and Scientists Using the Results of Federally Funded Aerospace R&D.

Product Ratings. Even if they did not use them, SAE survey participants were asked to rate the six technical information products on eight characteristics. For example, respondents were asked to indicate the extent to which they thought that conference-meeting papers are easy/difficult to obtain. A 1 to 5 point scale (1.0 = easy to obtain; 5.0 = difficult to obtain) was used to measure their opinions. The higher the number, the more difficult conference-meeting papers are considered by survey participants to obtain. An overall mean ($\bar{X}$) rating was calculated. A mean ($\bar{X}$) rating for users and non-users was also computed.

The highest overall ratings for conference-meeting papers (table 19) were associated with (1) good/poor technical quality, (2) good/bad prior experiences using them, and (3) inexpensive/expensive. Statistically significant differences were found between users and non-users for the

Table 19. Rating of Conference-Meeting Papers

Rating Factors	User Rating ($\bar{X}$) n = 565	Non-User Rating ($\bar{X}$) n = 381	Overall Rating ($\bar{X}$) n = 946
Being easy/difficult to obtain	2.92	2.71	2.84*
Being easy/difficult to use or read	3.09	2.76	2.96*
Being inexpensive/expensive	3.01	3.04	3.02
Being of good/poor technical quality	3.19	3.13	3.17
Having comprehensive/incomplete information	3.02	2.85	2.96*
Being relevant/irrelevant to my work	3.20	2.69	3.00*
Obtaining them at a nearby/distant location	2.84	2.73	2.80
Having good/bad prior experiences using them	3.18	2.81	3.03*

* *t* values are statistically significant at $p \leq 0.05$.

following 5 characteristics: (1) easy/difficult to obtain, (2) easy/difficult to use or read, (3) comprehensive/incomplete information, (4) relevant/irrelevant to my work, and (5) good/bad prior experiences using them. With one exception, users rated conference-meeting papers more favorably (e.g., being expensive/inexpensive) than non-users rated conference-meeting papers.

The ratings for journal articles appear in table 20. The highest overall ratings were associated with (1) good/poor technical quality, (2) easy/difficult to obtain, (3) inexpensive/expensive, (4) good/bad prior experiences using them, and (5) obtaining them at a nearby/distant location. Overall, non-users rated journal articles lower than did those respondents who actually used the product. Statistically significant differences were found between users and non-users for seven of the eight characteristics. Comprehensive/incomplete information is the exception.

Table 20. Rating of Journal Articles

Rating Factors	User Rating ($\bar{X}$) n = 554	Non-User Rating ($\bar{X}$) n = 318	Overall Rating ($\bar{X}$) n = 872
Being easy/difficult to obtain	3.57	3.08	3.39*
Being easy/difficult to use or read	3.29	2.94	3.16*
Being inexpensive/expensive	3.51	3.15	3.38*
Being of good/poor technical quality	3.55	3.36	3.48*
Having comprehensive/incomplete information	3.10	3.02	3.07
Being relevant/irrelevant to my work	3.22	2.53	2.97*
Obtaining them at a nearby/distant location	3.42	2.99	3.26*
Having good/bad prior experiences using them	3.55	3.04	3.36*

* t values are statistically significant at $p \leq 0.05$.

The ratings for in-house technical reports appear in table 21. The highest overall ratings for in-house technical reports were associated with (1) inexpensive/expensive (2) obtaining them at

Table 21. Rating of In-house Technical Reports

Rating Factors	User Rating ($\bar{X}$) n = 789	Non-User Rating ($\bar{X}$) n = 157	Overall Rating ($\bar{X}$) n = 946
Being easy/difficult to obtain	3.96	3.48	3.88*
Being easy/difficult to use or read	3.48	3.03	3.41*
Being inexpensive/expensive	4.36	4.02	4.30*
Being of good/poor technical quality	3.47	3.08	3.40*
Having comprehensive/incomplete information	3.42	3.03	3.35*
Being relevant/irrelevant to my work	3.75	2.90	3.61*
Obtaining them at a nearby/distant location	4.16	3.64	4.07*
Having good/bad prior experiences using them	3.59	2.97	3.49*

* t values are statistically significant at $p \leq 0.05$.

a nearby/distant location, (3) easy/difficult to obtain, (4) relevant/irrelevant to my work, and (5) good/bad prior experiences using them. Users of in-house technical reports rated them more favorably than did non-users of in-house technical reports. Statistically significant differences were found between users and non-users of in-house technical reports and all eight rating characteristics.

The ratings for AGARD technical reports appear in table 22. The highest overall ratings for AGARD technical reports were associated with (1) good/poor technical quality, (2) comprehensive/incomplete information, (3) easy/difficult to read and use, (4) good/bad prior experiences using them, and (5) inexpensive/expensive. Users of AGARD technical reports rated them more favorably than did non-users of AGARD technical reports. Statistically significant differences were found between users and non-users of AGARD technical reports for six of the eight characteristics -- inexpensive/expensive and nearby/distant location are the two exceptions.

Table 22. Rating of AGARD Technical Reports

Rating Factors	User Rating ($\bar{X}$) n = 109	Non-User Rating ($\bar{X}$) n = 837	Overall Rating ($\bar{X}$) n = 946
Being easy/difficult to obtain	2.87	2.58	2.63*
Being easy/difficult to use or read	3.26	2.99	3.04*
Being inexpensive/expensive	3.08	2.98	3.00
Being of good/poor technical quality	3.49	3.18	3.24*
Having comprehensive/incomplete information	3.41	3.13	3.18*
Being relevant/irrelevant to my work	3.40	2.81	2.91*
Obtaining them at a nearby/distant location	2.86	2.76	2.78
Having good/bad prior experiences using them	3.41	2.95	3.03*

* t values are statistically significant at $p \leq 0.05$.

The ratings for DoD technical reports appear in table 23. The highest overall ratings for DoD technical reports were associated with (1) inexpensive/expensive, (2) good/poor technical quality, (3) comprehensive/incomplete information, (4) relevant/irrelevant to my work, and (5) good/bad prior experiences using them. Users of DoD technical reports rated them more favorably than did non-users of DoD technical reports. Statistically significant differences were found between users and non-users of DoD technical reports for all eight characteristics.

Table 23. Rating of DoD Technical Reports

Rating Factors	User Rating ($\bar{X}$)	Non-User Rating ($\bar{X}$)	Overall Rating ($\bar{X}$)
	n = 366	n = 359	n = 725
Being easy/difficult to obtain	2.96	2.57	2.77*
Being easy/difficult to use or read	3.15	2.88	3.01*
Being inexpensive/expensive	3.50	3.05	3.28*
Being of good/poor technical quality	3.35	3.17	3.26*
Having comprehensive/incomplete information	3.31	3.14	3.23*
Being relevant/irrelevant to my work	3.50	2.87	3.19*
Obtaining them at a nearby/distant location	3.08	2.71	2.90*
Having good/bad prior experiences using them	3.30	2.99	3.15*

* t values are statistically significant at $p \leq 0.05$.

The ratings for NASA technical reports appear in table 24. The highest overall ratings for NASA technical reports were associated with (1) good/poor technical quality, (2) inexpensive/

Table 24. Rating of NASA Technical Reports

Rating Factors	User Rating ($\bar{X}$)	Non-User Rating ($\bar{X}$)	Overall Rating ($\bar{X}$)
	n = 420	n = 526	n = 946
Being easy/difficult to obtain	3.51	2.95	3.23*
Being easy/difficult to use or read	3.54	3.15	3.35*
Being inexpensive/expensive	3.76	3.26	3.52*
Being of good/poor technical quality	3.68	3.48	3.59*
Having comprehensive/incomplete information	3.52	3.36	3.44*
Being relevant/irrelevant to my work	3.50	2.79	3.15*
Obtaining them at a nearby/distant location	3.28	2.78	3.04*
Having good/bad prior experiences using them	3.55	3.09	3.33*

* t values are statistically significant at $p \leq 0.05$.

expensive, (3) comprehensive/incomplete information, (4) easy/difficult to read, (5) good/bad prior experiences using them. Users of NASA technical reports rated them more favorably than did non-users of NASA technical reports. Statistically significant differences were found between users and non-users of NASA technical reports on all eight characteristics.

Correlation coefficients (Pearson's *r*) were calculated for the SAE frequency of use and rating responses. The correlations compared "past month's usage" with the eight opinion ratings for each of the six technical information products. A positive and significant correlation ($p \leq 0.05$) was found between the use of the six information products and the following rating factors:

Conference-Meeting Papers

	r
o relevant to my work	.166*
o easy to use or to read	.124*
o good prior experiences	.113*

AGARD Technical Reports

	r
o good prior experiences	.252*
o relevant to my work	.180*
o good technical quality	.128*
o comprehensive data and information	.102*
o easy to use or read	.083*

Journal Articles

	r
o good prior experiences	.187*
o relevant to my work	.187*
o easy to obtain	.146*
o easy to use or read	.131*
o nearby location or source	.087*

DoD Technical Reports

	r
o relevant to my work	.143*
o nearby location or source	.142*
o inexpensive	.110*

In-House Technical Reports

	r
o relevant to my work	.165*
o good prior experiences	.126*
o nearby location or source	.080*
o comprehensive data and information	.073*
o easy to obtain	.067*

NASA Technical Reports

	r
o relevant to my work	.201*
o easy to obtain	.169*
o inexpensive	.144*
o good prior experiences	.117*
o easy to read or use	.111*

*$p \leq 0.05$.

Study 3 -- RAeS Membership

Members of the Royal Aeronautical Society (RAeS) were surveyed in an attempt to investigate the technical communications practices of aerospace engineers and scientists in Britian. A self-administered (self-reported) survey was used for data collection. A random selection of 1,487 members were surveyed. The adjusted response rate was 75 percent. Data were collected between October 1991 and February 1992. The following composite participant profile was based on RAeS survey data: works in industry (45%), works as a manager (21%) or in design/development (20%), has a bachelor's degree (31%), was educated (trained) as an engineer (81%), currently works as an engineer (59%), and has an average of 23 years of professional work experience. The RAeS questionnaire is Appendix E.

RAeS survey participants were asked several questions designed to obtain a greater understanding of the factors affecting the use of technical reports. In this study, technical reports were placed within the context of two technical information products: conference-meeting papers and journal articles. AGARD, Royal Aerospace Establishment (RAE), in-house, and NASA technical reports were included in this study.

Use. RAeS survey participants were asked if they used the aforementioned technical information products in performing their present professional duties (table 25). In-house technical reports enjoyed the highest use rate (79%) followed by journal articles (58%) and conference-meeting papers (50%). RAE, AGARD, and NASA technical reports were used by 31%, 21%, and 23% of the RAeS survey respondents, respectively.

Table 25. Use of Technical Information Products

Information Products	Percentage	Number
Conference-Meeting papers	49.8	299
Journal Articles	57.7	316
AGARD Technical Reports	20.5	123
In-house Technical Reports	79.2	475
RAE Technical Reports	31.2	187
NASA Technical Reports	22.7	136

Importance. RAeS survey participants were asked to indicate "how important is it for you to use the aforementioned technical information products in performing your present professional duties." Table 26 includes data regarding the importance of use technical information products. A 1 to 5 point scale (1.0 = very unimportant; 5.0 = very important) was used to measure importance. In-house technical reports received the highest importance rating ($\bar{X}$ = 3.76) followed by conference-meeting papers ($\bar{X}$ = 2.49) and journal articles ($\bar{X}$ = 2.38.). The importance ratings for AGARD, RAE, and NASA reports were considerably lower.

Table 26. Importance of Technical Information Products

Information Products	Mean ($\bar{X}$)	Number
Conference-Meeting Papers	2.49	571
Journal Articles	2.38	565
AGARD Technical Reports	1.70	531
In-house Technical Reports	3.76	575
RAE Technical Reports	2.00	551
NASA Technical Reports	1.78	541

[a]A 1 to 5 point scale was used to measure importance, with "1" being the lowest possible importance and "5" being the highest possible importance. Hence, the higher the average (mean), the greater the importance of the product.

Frequency of Use. RAeS survey participants were asked to indicate the number of times each of the six technical information products had been used in a 6-month period in the performance of their professional duties (table 27). Data are presented both as means and medians. In-house

Table 27. Average Number of Times (Median) Technical Information Products Used in a 6-Month Period

Information Products	$\bar{X}$ (Median)	Number
Conference-Meeting Papers	3.56 (2.00)	566
Journal Articles	3.06 (2.00)	561
AGARD Technical Reports	0.78 (0.00)	539
In-house Technical Reports	16.19 (5.00)	521
RAE Technical Reports	1.35 (0.00)	540
NASA Technical Reports	2.37 (0.00)	542

technical reports were used ($\bar{X}$ = 16.19) to a much greater extent than were the other technical information products followed by conference-meeting papers ($\bar{X}$ = 3.56) and journal articles ($\bar{X}$ = 3.06). Technical report use was less, with NASA reports being used more than RAE and AGARD reports. The median number of times that AGARD, RAE, and NASA technical reports were used in the past six months was 0.00, indicating that the majority of RAeS survey respondents did not use these technical information products during that period.

Awareness. RAeS respondents were asked how they find out about RAE and NASA technical reports and how they obtain them. The findings are shown in figure 6 and figure 7. RAeS respondents who used RAE and NASA technical reports were asked to indicate the various means by which they find out these reports (figure 6). For presentation and discussion, the awareness choices are grouped into three categories: **Producer**, which includes announcement journals such as *STAR*; **User**, which includes colleagues and coworkers; and **Intermediary**, which includes interaction with a librarian or technical information specialist.

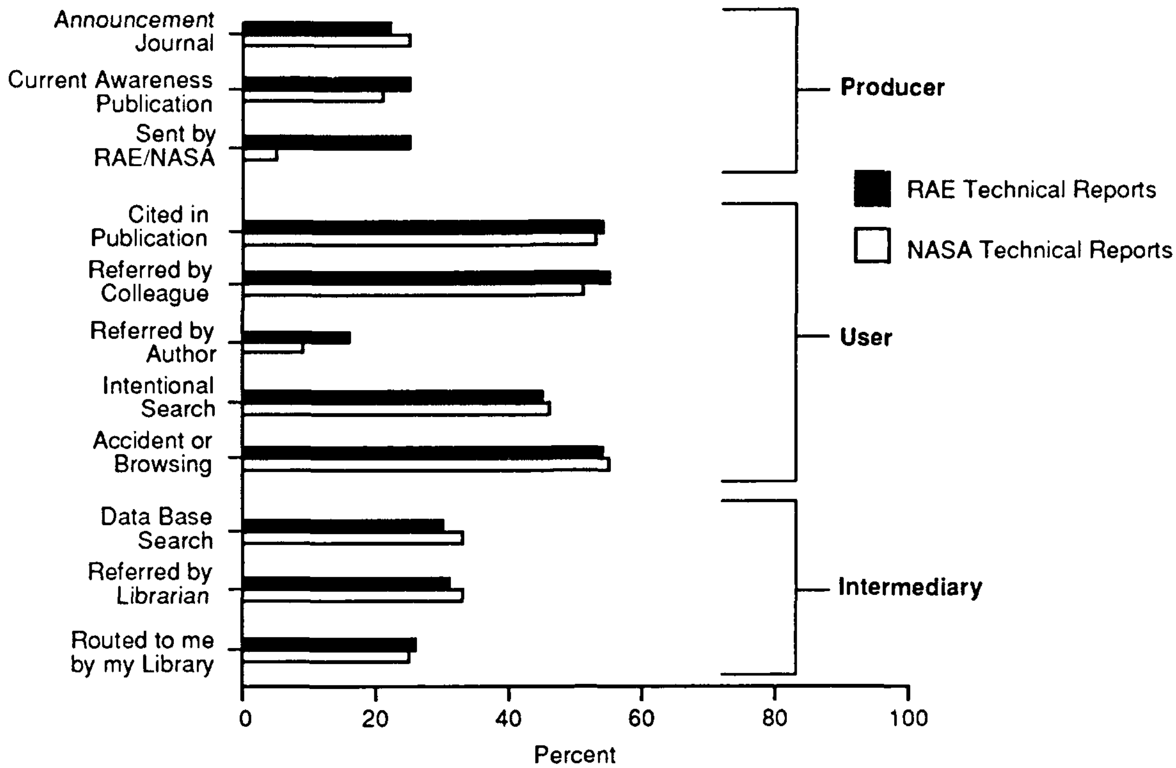


Figure 6. How British Aerospace Engineers and Scientists Find Out About RAE and NASA Technical Reports.

Minor differences were demonstrated in how British aerospace engineers and scientists find out about RAE and NASA technical reports. **User** methods dominate awareness choices with "cited in a publication," "referred by a colleague," and "accident or browsing" being selected most often. **Intermediary** methods ranked second with "data base search" and "referred by librarian" being selected most frequently. **Producer** methods ranked third with "announcement journals" such as *STAR*, and "current awareness publication" being selected most frequently.

Acquisition. From a list of seven sources, RAeS respondents were asked how they actually access or obtain copies of RAE and NASA technical reports (figure 7). For presentation and discussion, the acquisition choices have been grouped into 3 categories: **Producer**, including sent by author; **User**, including obtained from a colleague; and **Intermediary**, including routed to me by my library.

Differences between how RAeS respondents acquire RAE and NASA technical reports are "collegial" in nature and include "sent by RAE/NASA," "sent by author," and "requested by author." Overall, **User** methods dominate access choices with "requested/ordered from my library" and "obtained from a colleague" being selected most frequently (figure 7). **Producer** methods ranked second for RAE technical reports with "sent by RAE" being selected most frequently and third for NASA technical reports with "sent by author" being selected most frequently. **Intermediary** methods ranked third for RAE reports and second for NASA reports with "routed to me by my library" being selected most frequently for both.

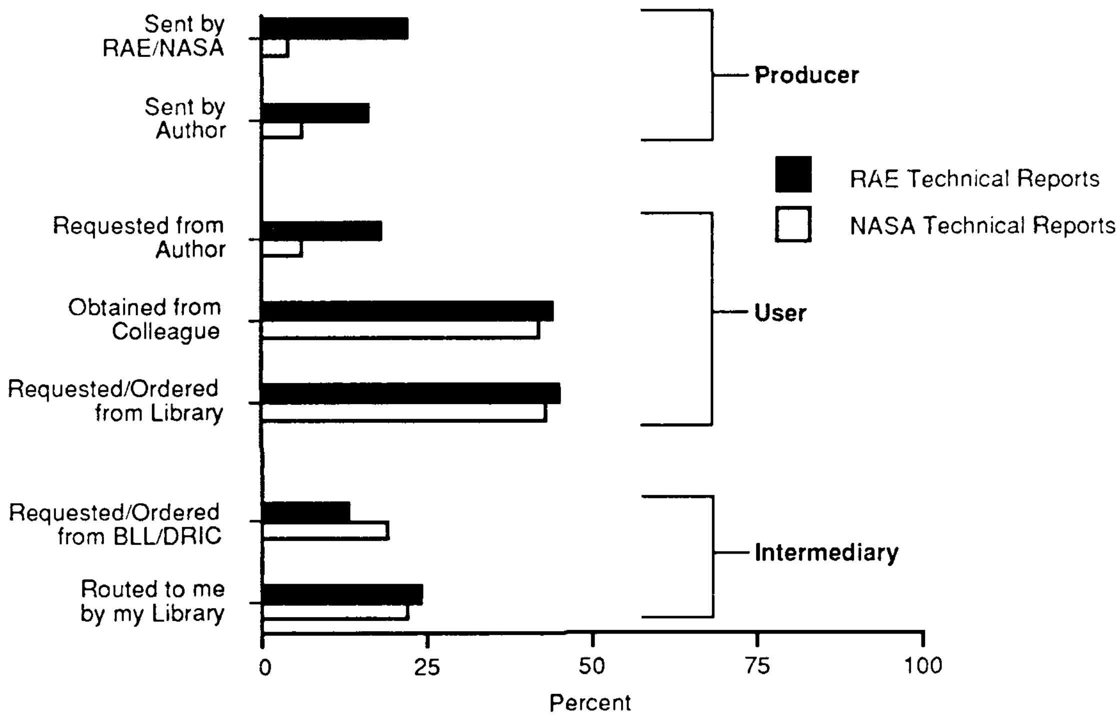


Figure 7. How British Aerospace Engineers and Scientists Acquire RAE and NASA Technical Reports.

Awareness. RAeS and AIAA respondents who use them were asked how they find out about NASA technical reports and how they obtain them. The findings are shown in figure 8 and figure 9. RAeS and AIAA respondents who used NASA technical reports were asked to indicate the various means by which they find out these reports (figure 8). For presentation and discussion, the awareness choices are grouped into three categories: **Producer**, which includes announcement journals such as *STAR*; **User**, which includes colleagues and coworkers; and **Intermediary**, which includes interaction with a librarian or technical information specialist.

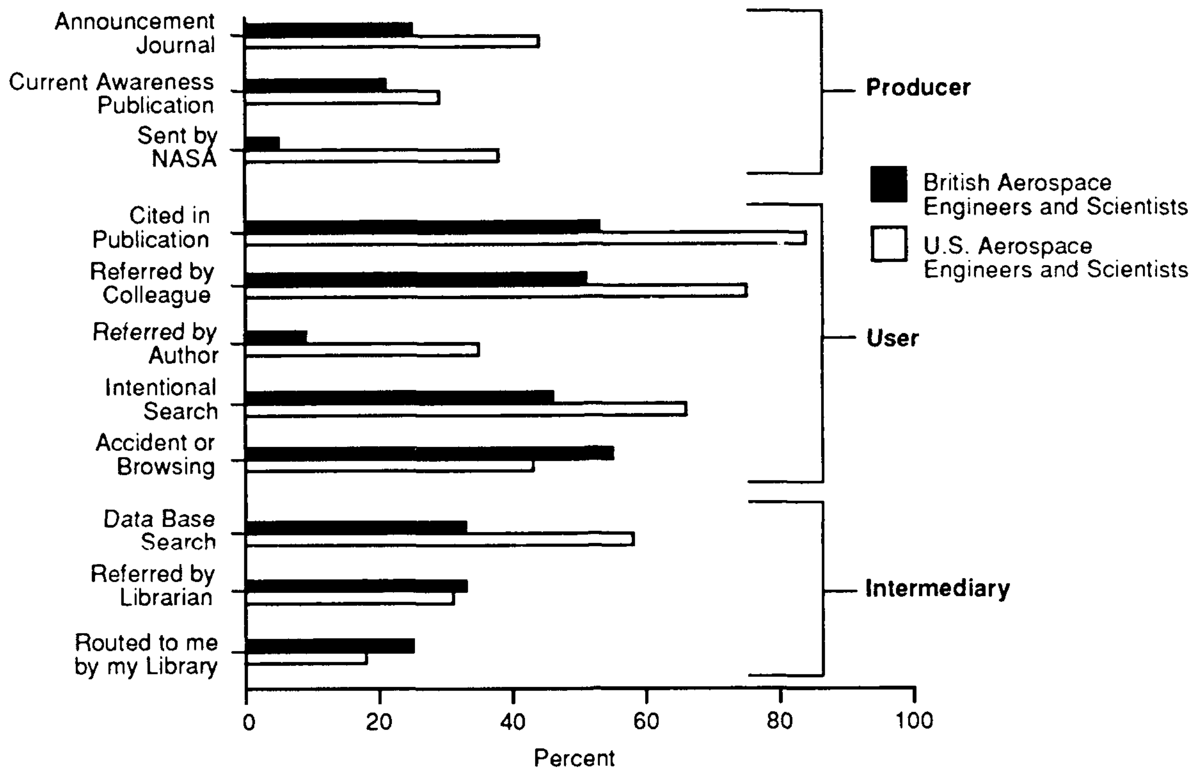


Figure 8. How British and U.S. Aerospace Engineers and Scientists Find Out About NASA technical Reports.

Certain differences exist between how RAeS and AIAA respondents find out about NASA technical reports. Overall, AIAA respondents made greater use of the various means than did their RAeS counterparts. **User** methods dominate access choices for both groups with "cited in a publication" and "referred by a colleague" being selected most frequently by AIAA respondents and "accident or browsing" and "cited in a publication" being selected most frequently by RAeS respondents (figure 8). **Producer** methods ranked second for AIAA respondents with "announcement journal" being selected most frequently and third for RAeS respondents with "announcement journal" being selected most frequently. **Intermediary** methods ranked second for RAeS members with "data base search" and "referred by librarian" being selected most frequently and ranked third for AIAA members with "data base search" being selected most frequently.

Acquisition. From a list of seven sources, RAeS and AIAA respondents were asked how they actually access or obtain copies of NASA technical reports (figure 9). For presentation and discussion, the acquisition choices have been grouped into 3 categories: **Producer**, including sent by author; **User**, including obtained from a colleague; and **Intermediary**, including routed to me by my library.

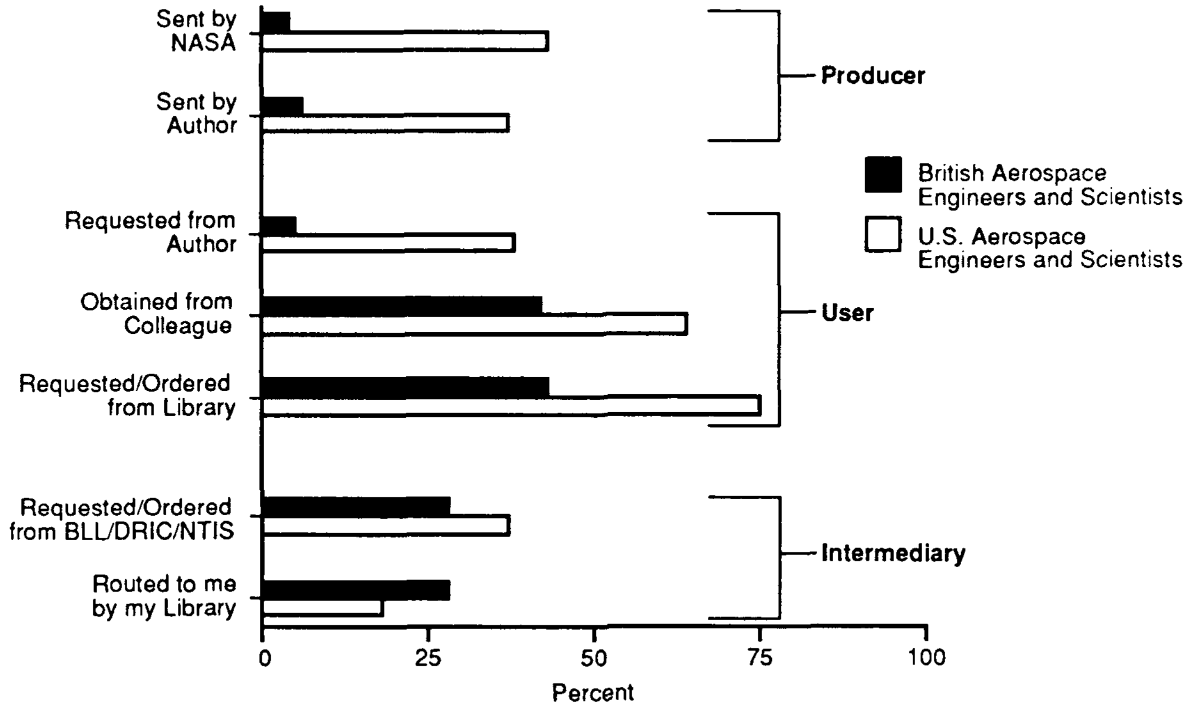


Figure 9. How British and U.S. Aerospace Engineers and Scientists Acquire NASA Technical Reports.

Differences between how RAeS and AIAA respondents acquire NASA technical reports are collegial in nature and include "sent by NASA," "sent by author," and "requested by author." Overall, **User** methods dominate access choices with "requested/ordered from my library" and "obtained from a colleague" being selected most frequently (figure 9). **Producer** methods ranked second for AIAA members with "sent by NASA" being selected most frequently and third for RAeS members with "sent by author" being selected most frequently. **Intermediary** methods ranked second for RAeS members and third for AIAA members with "routed to me by my library" and "requested/ordered from BLL/DRIC being selected most frequently for RAeS members and "ordered from NTIS" being selected most frequently.

Product Ratings. Even if they did not use them, RAeS survey participants were asked to rate the six technical information products on eight characteristics. For example, respondents were asked to indicate the extent to which they thought that conference-meeting papers are easy/difficult to obtain. A 1 to 5 point scale (1.0 = easy to obtain; 5.0 = difficult to obtain) was used to measure their opinions. The higher the number, the more difficult conference-meeting papers were considered by survey participants to obtain. An overall mean ($\bar{X}$) rating was calculated. A mean ($\bar{X}$) rating for users and non-users was also computed.

The ratings for conference-meeting papers appear in table 28. The highest overall ratings were associated with (1) good/poor technical quality, (2) inexpensive/expensive, (3) easy/difficult to obtain, (4) easy/difficult to use and (5) obtaining them at a nearby/distant location.

Statistically significant differences were found between users and non-users for seven of the eight characteristics -- good/poor technical quality is the exception. Overall, users rated the characteristics higher than did non-users of conference-meeting papers.

Table 28. Rating of Conference-Meeting Papers

Rating Factors	User Rating ($\bar{X}$) n = 255	Non-User Rating ($\bar{X}$) n = 311	Overall Rating ($\bar{X}$) n = 566
Being easy/difficult to obtain	3.55	2.95	3.24*
Being easy/difficult to use or read	3.43	3.07	3.24*
Being inexpensive/expensive	3.48	3.22	3.36*
Being of good/poor technical quality	3.50	3.36	3.45
Having comprehensive/incomplete information	2.81	2.98	2.91*
Being relevant/irrelevant to my work	3.51	2.36	2.95*
Obtaining them at a nearby/distant location	3.20	2.75	2.97*
Having good/bad prior experiences using them	3.42	2.45	2.94*

* *t* values are statistically significant at $p \leq 0.05$.

The ratings for journal articles appear in table 29. The highest overall ratings for journal articles were associated with (1) easy/difficult to obtain, (2) inexpensive/expensive, (3) easy/difficult to use or read, (4) good/poor technical quality, and (5) obtaining them at a nearby/distant location. Statistically significant differences were found between users and non-users for the following six characteristics: (1) easy/difficult to obtain, (2) inexpensive/expensive (3) easy/difficult to use of read, (4) obtaining them at a nearby/distant location, (5) good/bad prior experiences using them, and (6) relevant/irrelevant to my work. Overall, users rated the characteristics of journal articles higher than did non-users of journal articles with the single exception of "comprehensive/incomplete information."

The ratings for in-house technical reports appear in table 30. The highest overall ratings for in-house technical reports were associated with (1) inexpensive/expensive (2) obtaining them at a nearby/distant location, (3) easy/difficult to obtain, (4) relevant/irrelevant to my work, (5) having good/bad prior experiences using them. Statistically significant differences were found between users and non-users for all eight characteristics. Overall, users rated the characteristics higher than did non-user of in-house technical reports.

Table 29. Rating of Journal Articles

Rating Factors	User Rating ($\bar{X}$) n = 248	Non-User Rating ($\bar{X}$) n = 313	Overall Rating ($\bar{X}$) n = 561
Being easy/difficult to obtain	4.08	3.45	3.76*
Being easy/difficult to use or read	3.82	3.28	3.56*
Being inexpensive/expensive	3.77	3.56	3.66*
Being of good/poor technical quality	3.51	3.47	3.51
Having comprehensive/incomplete information	2.89	3.00	2.96
Being relevant/irrelevant to my work	3.43	2.34	2.87*
Obtaining them at a nearby/distant location	3.76	3.20	3.46*
Having good/bad prior experiences using them	3.67	2.64	3.15*

* *t* values are statistically significant at $p \leq 0.05$.

Table 30. Rating of In-house Technical Reports

Rating Factors	User Rating ($\bar{X}$) n = 410	Non-User Rating ($\bar{X}$) n = 110	Overall Rating ($\bar{X}$) n = 520
Being easy/difficult to obtain	4.52	3.29	4.30*
Being easy/difficult to use or read	3.85	3.17	3.75*
Being inexpensive/expensive	4.73	3.76	4.56*
Being of good/poor technical quality	3.75	3.39	3.71*
Having comprehensive/incomplete information	3.46	3.20	3.44*
Being relevant/irrelevant to my work	4.42	2.70	4.14*
Obtaining them at a nearby/distant location	4.52	3.29	4.31*
Having good/bad prior experiences using them	4.19	2.73	3.98*

* *t* values are statistically significant at $p \leq 0.05$.

The ratings for AGARD technical reports appear in table 31. The highest overall ratings for AGARD technical reports were associated with (1) good/poor technical quality, (2) inexpensive/ expensive, (3) comprehensive/incomplete information, (4) easy/difficult to use or read, (5) easy/difficult to obtain, and (6) nearby/distant location. Statistically significant differences were found between users and non-users of AGARD technical reports and all but the two following characteristics -- inexpensive/expensive and nearby/distant location. With the exception of "easy/difficult to obtain," users rated the characteristics higher than did non-user of AGARD technical reports.

Table 31. Rating of AGARD Technical Reports

Rating Factors	User Rating ($\bar{X}$) n = 104	Non-User Rating ($\bar{X}$) n = 469	Overall Rating ($\bar{X}$) n = 563
Being easy/difficult to obtain	2.66	2.69	2.91*
Being easy/difficult to use or read	3.53	2.87	3.03*
Being inexpensive/expensive	3.85	3.13	3.29*
Being of good/poor technical quality	3.81	3.29	3.42*
Having comprehensive/incomplete information	3.20	3.04	3.08
Being relevant/irrelevant to my work	3.73	2.17	2.55
Obtaining them at a nearby/distant location	3.69	2.67	2.89*
Having good/bad prior experiences using them	3.63	2.43	2.69*

* *t* values are statistically significant at $p \leq 0.05$.

The ratings for RAE technical reports appear in table 32. The highest overall ratings for RAE technical reports were associated with (1) *inexpensive/expensive*, (2) good/poor technical

Table 32. Rating of RAE Technical Reports

Rating Factors	User Rating ($\bar{X}$) n = 366	Non-User Rating ($\bar{X}$) n = 359	Overall Rating ($\bar{X}$) n = 725
Being easy/difficult to obtain	3.79	2.98	3.28*
Being easy/difficult to use or read	3.69	3.09	3.31*
Being inexpensive/expensive	4.07	3.32	3.61*
Being of good/poor technical quality	3.88	3.36	3.57*
Having comprehensive/incomplete information	3.57	3.11	3.30*
Being relevant/irrelevant to my work	3.82	2.33	2.85*
Obtaining them at a nearby/distant location	3.81	2.82	3.16*
Having good/bad prior experiences using them	3.78	2.60	3.00*

* *t* values are statistically significant at $p \leq 0.05$.

quality, (3) easy/difficult to use or read, (4) comprehensive/incomplete information, and (5) easy/difficult to obtain. Statistically significant differences were found between users and non-users of RAE technical reports on all 8 characteristics. Overall, users rated the character- istics higher than did non-users of RAE technical reports.

The ratings for NASA technical reports appear in table 33. The highest overall ratings for NASA technical reports were associated with (1) good/poor technical quality, (2) comprehensive/incomplete information, (3) inexpensive/expensive, (4) easy/difficult to read, and (5) having good/bad prior experiences using them. Statistically significant differences were found between users and non-users of NASA technical reports on all 8 characteristics. Overall, users rated the characteristics higher than did non-users of NASA technical reports.

Table 33. Rating of NASA Technical Reports

Rating Factors	User Rating ($\bar{X}$) n = 368	Non-User Rating ($\bar{X}$) n = 384	Overall Rating ($\bar{X}$) n = 752
Being easy/difficult to obtain	3.15	2.39	2.61*
Being easy/difficult to use or read	3.34	2.86	3.00*
Being inexpensive/expensive	3.46	2.93	3.10*
Being of good/poor technical quality	3.90	3.40	3.52*
Having comprehensive/incomplete information	3.39	3.16	3.23*
Being relevant/irrelevant to my work	3.71	2.24	2.61*
Obtaining them at a nearby/distant location	3.47	2.42	2.69*
Having good/bad prior experiences using them	3.76	2.39	2.72*

* t values are statistically significant at $p \leq 0.05$.

Correlation coefficients (Pearson's r) were calculated for the RAeS frequency of use and rating responses. The correlations compared "past month's usage" with the eight opinion ratings for each of the six technical information products. A positive and significant correlation ($p \leq 0.05$) was found between the use of the six information products and the following rating factors:

Conference-Meeting Papers

	r
o relevant to my work	.345*
o easy to use or to read	.222*
o good prior experiences	.382*
o easy to obtain	.202*
o inexpensive	.159*
o nearby location or source	.128*

AGARD Technical Reports

	r
o good prior experiences	.307*
o relevant to my work	.364*
o good technical quality	.138*
o nearby location or source	.200*
o easy to use or read	.192*
o easy to obtain	.186*
o inexpensive	.106*

Journal Articles

	r
o good prior experiences	.383*
o relevant to my work	.338*
o easy to obtain	.157*
o easy to use or read	.109*
o nearby location or source	.098*

RAE Technical Reports

	r
o relevant to my work	.284*
o nearby location or source	.224*
o inexpensive	.234*
o easy to obtain	.157*
o easy to read or use	.164*
o good technical quality	.164*
o comprehensive data and information	.131*
o good prior experiences	.293*

In-House Technical Reports

	r
o relevant to my work	.166*
o good prior experiences	.160*
o nearby location or source	.096*
o easy to obtain	.202*

NASA Technical Reports

	r
o easy to read or use	.130*
o relevant to my work	.163*
o nearby location or source	.113*
o good prior experiences	.164*

*$p \leq 0.05$.

Study 4 - Netherlands and U.S.

Aerospace engineers and scientists at three similar research organizations in the Netherlands and the United States (U.S.) were surveyed to investigate technical communications practices. Data were collected through self-administered (self-reported) questionnaires at comparable aeronautical research facilities: the National Aerospace Laboratory (NLR) in the Netherlands, the NASA Ames Research Center in the U.S., and the NASA Langley Research Center in the U.S. Surveys were distributed to 200 researchers at NLR, and 109 were received by the established cut-off date for a completion rate of 55 percent. Surveys were distributed to 558 researchers at the two NASA installations, and 340 were received by the established cut off date for a completion rate of 61 percent. A follow-up survey containing additional questions about technical communications training, technical report use, and language skills was distributed to the U.S. respondents. (These questions were initially included in the Dutch survey.) Two hundred eighty-seven of the 340 U.S. respondents completed and returned the follow-up survey for an adjusted response rate of 84%. The survey at NLR was conducted during November - December of 1992, and the surveys at the NASA centers were conducted during July - August of 1992 with the follow-up in December 1992. The Netherlands questionnaire is Appendix F.

The following "composite" participant profiles were based on the demographic data. The Dutch survey participant works as a researcher (63%), has a graduate degree (80%), was trained as an engineer (74%) and currently works as an engineer (75%), has an average of 12 years professional work experience, and reads and speaks two foreign languages with considerable fluency. The U.S. survey participant works as a researcher (82%), has a graduate degree (73%), was trained as an engineer (80%), currently works as an engineer (69%), has an average of 17 years of professional work experience, and belongs to a professional/technical society (78%).

Foreign Language Skills. Survey respondents provided information about their foreign language skills, specifically their reading and speaking competencies in the languages used by major international aerospace producers (table 34). All the Dutch respondents (100%) read and speak English and German and read and speak French to a lesser extent (92%). U.S. respondents reported little fluency in any foreign languages. Both groups reported little fluency in either Japanese and Russian. The mean ($\bar{X}$) ability to read and speak German and French was higher for the Dutch than for the U.S. group. The mean ($\bar{X}$) ability to read and speak Japanese and Russian, although low for both groups, was higher for the U.S. group.

Use. To better understand the transborder migration of aerospace STI via the technical report, survey participants were asked about their use of foreign and domestically produced technical reports (table 35) and the importance of these reports in performing professional duties (table 36). Both groups make the greatest use of their own technical reports (96% of the Dutch use NLR reports and 97% of the U.S. group use NASA technical reports). Other than their own reports, the Dutch use NASA (82%); AGARD (71%); German DFVLR, DLR, and MBB (69%); and British ARC and RAE (50%) technical reports.

Table 34. Foreign Language Fluency Among Dutch and U.S. Aerospace Engineers and Scientists

Language	Netherlands n = 109			U.S. n = 287		
	Read %	Speak %	$\bar{X}$ Ability[a]	Read %	Speak %	$\bar{X}$ Ability[a]
English	100	100	---- ----	b	b	---- ----
French	92	92	2.5 2.1	32	22	1.7 1.6
German	100	99	4.0 3.4	22	15	1.7 1.6
Japanese	7	6	1.0 1.0	4	5	1.7 1.7
Russian	8	5	1.0 1.0	7	5	1.6 1.6

[a] A 1 to 5 scale was used to measure language ability with "1" being passably and "5" being fluently; hence, the higher the average (mean) the greater the ability of survey respondents to speak/read the language.

[b] English is the native language for these respondents.

Table 35. Use of Foreign and Domestically Produced Technical Reports by Dutch and U.S. Aerospace Engineers and Scientists

Country/Organization	Netherlands		U.S.	
	%	(n)	%	(n)
NATO AGARD	70.6	(77)	82.2	(236)
British ARC and RAE	49.5	(54)	54.0	(155)
ESA	44.0	(48)	5.9	(17)
Indian NAL	7.3	(8)	6.3	(18)
French ONERA	43.1	(47)	41.1	(118)
German DFVLR, DLR, and MBB	68.8	(75)	36.2	(104)
Japanese NAL	11.0	(12)	11.5	(33)
Russian TsAGI	0.9	(1)	8.4	(24)
Dutch NLR	96.3	(105)	19.9	(57)
U.S. NASA	81.7	(89)	96.5	(277)

Other than their own reports, the U.S. group uses AGARD (82%) and British ARC and RAE (54%) technical reports. Neither group makes particular use of Japanese NAL, Indian NAL, or Russian TsAGI technical reports. Survey respondents were asked about their access to these technical reports. Overall, the Dutch appear to have better access to foreign technical reports than do their U.S. counterparts; the exception, of course, is access to NASA technical reports.

Importance. Technical report importance was measured on a 1 to 5 point scale with 1 = very unimportant and 5 = very important. Both groups were asked to rate the importance of selected foreign and domestic technical reports in performing their present professional duties. The average (mean) importance ratings are shown in table 36. The Dutch rated the importance of U.S. NASA reports ($\bar{X}$ = 3.69) second only to their own ($\bar{X}$ = 4.32) followed by German DFVLR, DLR, and MBB reports ($\bar{X}$ = 3.22) and AGARD reports ($\bar{X}$ = 3.18). The U.S. group rated NASA reports most important ($\bar{X}$ = 4.26) followed by AGARD reports ($\bar{X}$ = 3.42).

Table 36. Importance of Foreign and Domestically Produced Technical Reports to Dutch and U.S. Aerospace Engineers and Scientists

	Netherlands		U.S.	
Country/Organization	Rating[a] $\bar{X}$	(n)	Rating[a] $\bar{X}$	(n)
NATO AGARD	3.18	(108)	3.42	(282)
British ARC and RAE	2.87	(105)	2.89	(266)
ESA	2.35	(108)	1.44	(242)
Indian NAL	1.46	(101)	1.40	(241)
French ONERA	2.36	(107)	2.25	(257)
German DFVLR, DLR, and MBB	3.22	(108)	2.20	(247)
Japanese NAL	1.57	(104)	1.63	(239)
Russian TsAGI	1.31	(97)	1.60	(231)
Dutch NLR	4.32	(109)	1.81	(246)
U.S. NASA	3.69	(108)	4.26	(285)

[a] A 1 to 5 point scale was used to measure importance with "1" being the the lowest possible importance and "5" being the highest possible importance; hence, the higher the average (mean) the greater the importance of the report series.

Study 5 - India and U.S.

An exploratory study investigated the technical communications practices of aerospace engineers and scientists at two comparable research facilities: the Indian Institute of Science (IIS) in Bangalore, India and the NASA Langley Research Center, Hampton, VA in the U.S. Data were collected using self-administered (self-reported) mail surveys. Questionnaires were distributed to 150 researchers at the IIS and 72 were received by the established cut-off date for a completion rate of 48 percent. Questionnaires were distributed to 383 researchers at the NASA Langley Research Center and 150 were received by the established cut-off date for a completion rate of 53 percent. The survey at the IIS was conducted during March - June of 1993, and the survey at the NASA Langley Research Center was conducted during July - August of 1992 with a follow-up in December 1992. The India and U.S. questionnaire is Appendix F.

The following "composite" participant profiles were based on the demographic data. The India survey participant works as a researcher (62%), has a graduate degree (93%), was trained as an engineer (76%) and currently works as a scientist (54%), has as an average of 20 years professional work experience, and is a member of a professional/technical society (85%). The U.S. survey participant works as a researcher (88%), has a graduate degree (72%), was trained as an engineer (86%), currently works as an engineer (75%), has an average of 18 years of professional work experience, and belongs to a professional/technical society (85%).

Foreign Language Skills. Survey respondents were asked to provide information about their foreign language skills, specifically their reading and speaking competencies in the languages used by major international aerospace producers. The findings appear in table 37. The India respondents read and speak English. All respondents reported limited fluency in foreign languages. Both groups reported little fluency in either Japanese and Russian. The mean ($\bar{X}$) ability to read and speak French, German, and Japanese was higher for India than for the U.S. group. The mean ($\bar{X}$) ability to read and speak Russian, although low for both groups, was higher for the U.S. group.

Table 37. Foreign Language Fluency Among India and U.S. Aerospace Engineers and Scientists

Language	India n = 71			U.S. n = 150		
	Read %	Speak %	$\bar{X}$ Ability[a]	Read %	Speak %	$\bar{X}$ Ability[a]
English	100	100	4.9 4.9	100[b]	100[b]	---- ----
French	13	10	2.8 2.9	32	17	1.5 1.5
German	40	30	2.4 2.3	23	11	1.4 1.3
Japanese	1	4	3.0 1.7	1	2	1.0 1.0
Russian	1	0	1.0 0.0	7	4	1.3 1.2

[a] A 1 to 5 scale was used to measure ability with "1" being passably and "5" being fluently; hence, the higher the average (mean) the greater the ability of survey respondents to speak/read the language.

[b] English is the native language for these respondents.

Use. To better understand the transborder migration of aerospace STI via the technical report, respondents were asked about their use of foreign and domestically produced technical reports (table 38) and the importance of these reports in performing their professional duties (table 43). Both groups make the greatest use of their own technical reports (79% of the India respondents use NAL reports and 96% of the U.S. group use NASA technical reports). In addition to their own reports, the India respondents use NASA (96%); AGARD (69%); German DFVLR, DLR, and MBB (58%); and British ARC and RAE (75%) technical reports.

Table 38. Use of Foreign and Domestically Produced Technical Reports by India and U.S. Aerospace Engineers and Scientists

Country/Organization	India		U.S.	
	%	(n)	%	(n)
AGARD	69.0	(49)	85.7	(114)
British ARC and RAE	74.6	(53)	66.9	(89)
ESA	35.2	(25)	8.3	(11)
Indian NAL	78.9	(56)	9.8	(13)
French ONERA	43.7	(31)	50.4	(67)
German DFVLR, DLR, and MBB	57.7	(41)	45.9	(61)
Japanese NAL	18.3	(13)	16.5	(22)
Russian TsAGI	2.8	(2)	16.5	(22)
Dutch NLR	31.0	(22)	25.6	(34)
U.S. NASA	95.8	(68)	97.0	(129)

In addition to their own reports, the U.S. group uses AGARD (86%) and British ARC and RAE (67%) technical reports. Neither group makes great use of Japanese NAL, Dutch NLR, ESA, or Russian TsAGI technical reports. Survey participants were also asked about their access to these technical reports series. Overall, the U.S. group appears to have better access to foreign technical reports than do their India counterparts. Both groups have about equal access to NASA technical reports.

Importance. Technical report importance was measured on a 1 to 5 point scale with 1 = very unimportant and 5 = very important. Both groups were asked to rate the importance of selected foreign and domestic technical reports in performing their present professional duties. The average (mean) importance ratings are shown in table 39. The India respondents rated the importance of U.S. NASA reports ($\bar{X}$ = 4.47) followed by AGARD ($\bar{X}$ = 4.30), and British ARC and RAE reports ($\bar{X}$ = 4.16). The U.S. group rated NASA reports most important ($\bar{X}$ = 4.37) followed by AGARD ($\bar{X}$ = 3.65) and British ARC and RAE reports ($\bar{X}$ = 3.22).

Table 39. Importance of Foreign and Domestically Produced Technical Reports to India and U.S. Aerospace Engineers and Scientists

	India		U.S.	
Country/Organization	Rating[a] $\bar{X}$	(n)	Rating[a] $\bar{X}$	(n)
NATO AGARD	4.30	(69)	3.65	(133)
British ARC and RAE	4.16	(69)	3.22	(127)
ESA	3.77	(62)	1.52	(116)
Indian NAL	3.97	(70)	1.51	(116)
French ONERA	3.25	(63)	2.48	(123)
German DFVLR, DLR, and MBB	3.50	(62)	2.40	(119)
Japanese NAL	2.63	(35)	1.75	(113)
Russian TsAGI	2.15	(20)	1.81	(109)
Dutch NLR	3.03	(34)	1.95	(118)
U.S. NASA	4.47	(71)	4.37	(133)

[a] A 1 to 5 point scale was used to measure importance with "1" being the lowest possible importance and "5" being the highest possible importance; hence, the higher the average (mean) the greater the importance of the report series.

FINDINGS

It should be noted that the data reported in this report reflect the responses of aerospace engineers and scientists belonging to a professional society and/or working at a specific aeronautical facility. The data may not be generalizable to aerospace engineers and scientists who are not members of professional societies or who may belong to other professional societies. Because the participants were members of professional societies and/or worked at a specific aeronautical facility, the findings may not necessarily be generalizable to the population of all British, Dutch, Indian, or U.S. aerospace engineers and scientists.

1. U.S. government technical reports are used by and are important to U.S. aerospace engineers and scientists who are members of the AIAA. Overall, U.S. government technical reports are used most often by these individuals for research. As years of professional work experience increase, the use of U.S. government technical reports by AIAA members for education and research decreases. The use of U.S. government technical reports by AIAA members for management increases as years of professional work experience increase.

2. "Not relevant to my research" and "not used in my discipline" are the reasons most frequently given for the non-use of (U.S.) DoD and NASA technical reports by AIAA members.

3. The quality of information and the precision/accuracy of the data in DoD and NASA technical reports are highly rated by U.S. aerospace engineers and scientists belonging to the AIAA.

4. Relevance, accessibility, and technical quality influence the use of DoD technical reports. Relevance, accessibility, and familiarity influence the use of NASA technical reports by U.S. aerospace engineers and scientists belonging to the AIAA.

5. **User** methods, with "cited in a publication" and "referred by a colleague" being selected most often, dominate the choices by which U.S. aerospace engineers and scientists belonging to the AIAA find out about DoD and NASA technical reports. **Intermediary** methods rank second with "data base search" being selected most frequently. **Producer** methods rank third with "announcement journals" such as *STAR* being selected most frequently.

6. **User** methods, with "requested/ordered from my library" being selected most frequently, dominate the access choices by which U.S. aerospace engineers and scientists belonging to the AIAA acquire DoD and NASA technical reports. **Producer** methods rank second with "sent by DoD and NASA" being selected most frequently. **Intermediary** methods rank third with "requested/ordered from NTIS" being selected most frequently.

7. SAE respondents use DoD and NASA technical reports less than AIAA respondents in performing their professional duties; they assign a lower importance rating and use fewer DoD and NASA technical reports, on average, than AIAA respondents.

8. **User** methods, with "coworkers inside my organization," and **intermediary (external)** methods, with professional and society journals being selected most frequently, dominate the choices by which SAE respondents find out about the results of federally funded aerospace R&D. **Producer** methods, with NASA and DoD technical reports being selected most frequently, rank last.

9. SAE respondents cite "time and effort to locate" and "time and effort to obtain" as the most frequently identified problem associated with using the results of federally funded aerospace R&D.

10. SAE respondents give the highest overall product ratings to in-house technical reports, followed by NASA technical reports and journal articles. They rate conference-meeting papers highest for "good/bad prior experiences using them," journal articles highest for "good/poor technical quality," in-house technical reports highest for "inexpensive/expensive," AGARD technical reports highest for "good/poor technical quality," DoD technical reports highest for "inexpensive/expensive," and NASA technical reports highest for good/poor technical quality."

11. Overall, statistically significant correlation coefficients for SAE frequency use and rating responses were highest for "relevant to my work" (5 of 6 products). The exceptions was AGARD technical reports with "good prior experiences" scoring highest.

12. With the exception of in-house technical reports, RAeS respondents use the technical information products less than SAE respondents do and much less than the AIAA respondents do in performing their professional duties; they assign a lower importance rating and use fewer of these information products, on average, than do the SAE and AIAA respondents.

13. Minor differences were demonstrated in how RAeS respondents find out about RAE and NASA technical reports. **User** methods dominate awareness choices with "cited in a publication," "referred by a colleague," and "accident or browsing" being selected most often. **Intermediary** methods rank second with "data base search" and "referred by librarian" being selected most frequently. **Producer** methods rank third with "announcement journals" such as *STAR*, and "current awareness publication" being selected most frequently.

14. Differences between how RAeS respondents acquire RAE and NASA technical reports are "collegial" in nature and include "sent by RAE/NASA," "sent by author," and "requested by author." Overall, **User** methods dominate access choices with "requested/ordered from my library" and "obtained from a colleague" being selected most frequently (figure 7). **Producer** methods rank second for RAE technical reports with "sent by RAE" being selected most frequently and third for NASA technical reports with "sent by author" being selected most frequently. **Intermediary** methods rank third for RAE reports and second for NASA reports with "routed to me by my library" being selected most frequently for both.

15. RAeS respondents assigned the highest overall product ratings to in-house technical reports, followed by RAE technical reports and journal articles. They rated conference-meeting papers highest for "good/poor technical quality," journal articles highest for "easy/difficult to obtain," in-house technical reports highest for "inexpensive/expensive," AGARD technical reports highest for "good/poor technical quality," RAE technical reports highest for "inexpensive/expensive," and NASA technical reports highest for good/poor technical quality."

16. Overall, statistically significant correlation coefficients for RAeS frequency use and rating responses were highest for "good prior experiences" (4 of 6 products). The exceptions were in-house technical reports with "easy to read or use" and AGARD technical reports with "relevant to my work" scoring highest.

17. U.S. and Dutch respondents make the greatest use of domestically produced technical reports and rank them highly in terms of importance in performing their professional duties. The U.S. respondents report extensive use of AGARD reports and British ARC and RAE technical reports. The Dutch also report extensive use of NASA reports; AGARD reports; German DFVLR, DLR, and MBB reports; and British ARC and RAE reports.

18. U.S. and India respondents make the greatest use of NASA technical reports and rank them highest in terms of importance in performing their professional duties. Both groups make extensive use of (and consider important) AGARD and British ARC and RAE technical reports.

CLOSING REMARKS

The analysis of the data collected in the five studies indicates that the U.S. government technical reports plays a significant role in the transfer or diffusion of federally funded aerospace R&D. The analysis determined that the use, importance, and frequency of use vary between and among aerospace engineers and scientists; that user methods play a major role in how aerospace engineers and scientists become aware of U.S. government technical reports and that intermediary methods play a significant role in how aerospace engineers and scientists obtain these reports.

On the other hand, we actually know very little about the technical report as a rhetorical device or information product for transferring the results of federally funded aerospace R&D. We have proposed a study as part of the *NASA/DoD Aerospace Knowledge Diffusion Research Project* called a "Survey of Reader Preferences Concerning the Format of Technical Report." This research is directed at determining the opinions of aerospace engineers and scientists regarding the format (organization) of the technical report and the usage of technical report components. Through the use of survey research (self-administered questionnaires), aerospace engineers and scientists would be asked to (1) identify which report components are read and in what sequence; (2) ascertain which components should be included and the optimal organization of those report components; and (3) distinguish reader preferences concerning such matters as reference format, representation of dimensional values, and layout. The results of the study could be used to establish a benchmark that could be used for assessing existing reports formats and for planning the production of electronic technical reports for use in aerospace.

REFERENCES

Adam, R. 1975 — "Pulling the Minds of Social Scientists Together: Towards a Science Information System." *International Social Journal* 27(3): 519-531.

Allen, T. J. 1977 — *Managing the Flow of Technology: Technology Transfer and the Dissemination of Technological Information Within the R&D Organization*. Cambridge, MA: MIT Press.

Auger, C. P. 1975 — *Use of Technical Reports Literature.* Hamden, CT: Archon Books.

Ballard, S., et. al., 1989 — *Innovation Through Technical and Scientific Information: Government and Industry Cooperation.* Westport, CT: Quorum Books.

Ballard, S., et. al., 1986 — *Improving the Transfer and Use of Scientific and Technical Information. The Federal Role: Volume 2 - Problems and Issues in the Transfer and Use of STI.* Washington, DC: National Science Foundation. (Available from NTIS, Springfield, VA; PB-87-14923.)

Bikson, T. K., B. E. Quint, and L. L. Johnson 1984 — *Scientific and Technical Information Transfer: Issues and Option.* Washington, DC: National Science Foundation. (Available from NTIS, Springfield, VA; PB-85-150357; also available as Rand Note 2131.)

Beyer, J. M. and H.M. Trice 1982 — "The Utilization Process: A Conceptual Framework and Synthesis of Empirical Findings." *Administrative Science Quarterly* 27: 591-622.

David, P. A. 1986 — "Technology Diffusion, Public Policy, and Industrial Competitiveness." In *The Positive Sum Strategy: Harnessing Technology for Economic Growth.* R. Landau and N. Rosenberg, eds. Washington, DC: National Academy Press.

Eveland, J. D. 1987 — *Scientific and Technical Information Exchange: Issues and Findings.* Washington, DC: National Science Foundation. (Not available from NTIS.)

Fry, B. M.
1953

Library Organization and Management of Technical Reports Literature. Washington, DC: The Catholic University of America Press.

Gibb, J. M. and
E. Phillips
1979

Better Fate for the Grey, or Non-Conventional, Literature." *Journal of Communication Studies* 1: 225-234.

Godfrey, L. E. and
H.F. Redman
1973

Dictionary of Report Series Codes. (2nd ed.) NY: Special Libraries Association.

Goldhor, R. S. and
R. T. Lund
1983

"University-to-Industry Advanced Technology Transfer: A Case Study." *Research Policy* 12: 121-152.

Mathes, J. C. and
D. W. Stevenson
1976

Designing Technical Reports. Indianapolis, IN: Bobbs-Merrill.

McClure, C. R.
1988

"The Federal Technical Report Literature: Research Needs and Issues." *Government Information Quarterly* 5(1): 27-44.

McGowan, R. P. and
S. Loveless
1981

"Strategies for Information Management: The Administrator's Perspective." *Public Administration Review* 41(3): 331-339.

Mowery, D. C.
1983

"Economic Theory and Government Technology Policy." *Policy Sciences* 16: 27-43.

Mowery, D. C. and
N. Rosenberg
1979

"The Influence of Market Demand Upon Innovation: A Critical Review of Some Recent Empirical Studies." *Research Policy* 8(2): 102-153.

National Academy
of Sciences -
National Academy
of Engineering
1969

Scientific and Technical Communication: A Pressing National Problem and Recommendations for Its Solution. Report by the Committee on Scientific and Technical Communication. Washington, DC: National Academy Sciences; AKA the SATCOM Report.

Pinelli, T. E.,
J. M. Kennedy, and
R. O. Barclay
1991

"The NASA/DoD Aerospace Knowledge Diffusion Research Project." *Government Information Quarterly* 8(2): 219-233.

Pinelli, T. E., J. M. Kennedy, R. O. Barclay, and T. F. White 1991 — "Aerospace Knowledge Diffusion Research." *World Aerospace Technology '91: The International Review of Aerospace Design and Development* 1(1): 31-34.

President's Special Assistant for Science and Technology 1962 — *Scientific and Technological Communication in the Government.* Washington, DC: Government Printing Office; AKA the Crawford Report.

Redman, H. F. 1965/1966 — "Technical Reports: Problems and Predictions." *Arizona Librarian* 23: 11-17.

Roberts, E. B. and A. L. Frohman 1978 — "Strategies for Improving Research Utilization." *Technology Review* 80 (March/April): 32-39.

Ronco, P. G., et. al. 1964 — *Characteristics of Technical Reports That Affect Reader Behavior: A Review of the Literature.* Boston, MA: Tufts University, Institute for Psychological Research. (Available from NTIS, Springfield, VA PB-169 409.)

Shuchman, H. L. 1981 — *Information Transfer in Engineering.* Glastonbury, CT: The Futures Group.

Smith, R. S. 1981 — "Interaction Within the Technical Report Community." *Science and Technology Libraries* 1(4): 5-18.

Subramanyam, K. 1981 — *Scientific and Technical Information Resources.* NY: Marcel Dekker.

U.S. Department of Defense 1964 — *Glossary of Information Handling.* Defense Logistics Agency, Defense Documentation Center. Cameron Station, Alexandria, VA.

Williams, F. and D. V. Gibson 1990 — *Technology Transfer: A Communication Perspective.* Newbury Park, CA: Sage Publications.

APPENDIX A

NASA/DoD AEROSPACE KNOWLEDGE DIFFUSION RESEARCH PROJECT

Fact Sheet

The production, transfer, and use of scientific and technical information (STI) is an essential part of aerospace R&D. We define STI production, transfer, and use as *Aerospace Knowledge Diffusion*. Studies tell us that timely access to STI can increase productivity and innovation and help aerospace engineers and scientists maintain and improve their professional skills. These same studies remind us that we know little about aerospace knowledge diffusion or about how aerospace engineers and scientists find and use STI. To learn more about this process, we have organized a research project to study knowledge diffusion. Sponsored by NASA and the Department of Defense (DoD), the NASA/DoD Aerospace Knowledge Diffusion Research Project is being conducted by researchers at the NASA Langley Research Center, the Indiana University Center for Survey Research, and Rensselaer Polytechnic Institute. This research is endorsed by several aerospace professional societies including the AIAA, RAeS, and DGLR and has been sanctioned by the AGARD and AIAA Technical Information Panels.

This 4-phase project is providing descriptive and analytical data regarding the flow of STI at the individual, organizational, national, and international levels. It is examining both the channels used to communicate STI and the social system of the aerospace knowledge diffusion process. Phases 1 investigates the information-seeking habits and practices of U.S. aerospace engineers and scientists and places particular emphasis on their use of government funded aerospace STI. Phase 2 examines the industry-government interface and places special emphasis on the role of the information intermediary in the knowledge diffusion process. Phase 3 concerns the academic-government interface and places specific emphasis on the information intermediary-faculty-student interface. Phase 4 explores the information-seeking behavior of non-U.S. aerospace engineers and scientists from Brazil, Western Europe, India, Israel, Japan, and the Soviet Union.

The results will help us to understand the flow of STI at the individual, organizational, national, and international levels. The results of our research will contribute to increasing productivity and to improving and maintaining the professional competence of aerospace engineers and scientists. They can be used to identify and correct deficiencies, to improve access and use, to plan new aerospace STI systems, and should provide useful information to R&D managers, information managers, and others concerned with improving access to and utilization of STI. The results of our research are being shared freely with those who participate in the study. You can get copies of the project publications by contacting Dr. Pinelli.

Dr. Thomas E. Pinelli
Mail Stop 180A
NASA Langley Research Center
Hampton, VA 23665
(804) 864-2491
Fax (804) 864-8311
tompin@teb.larc.nasa.gov

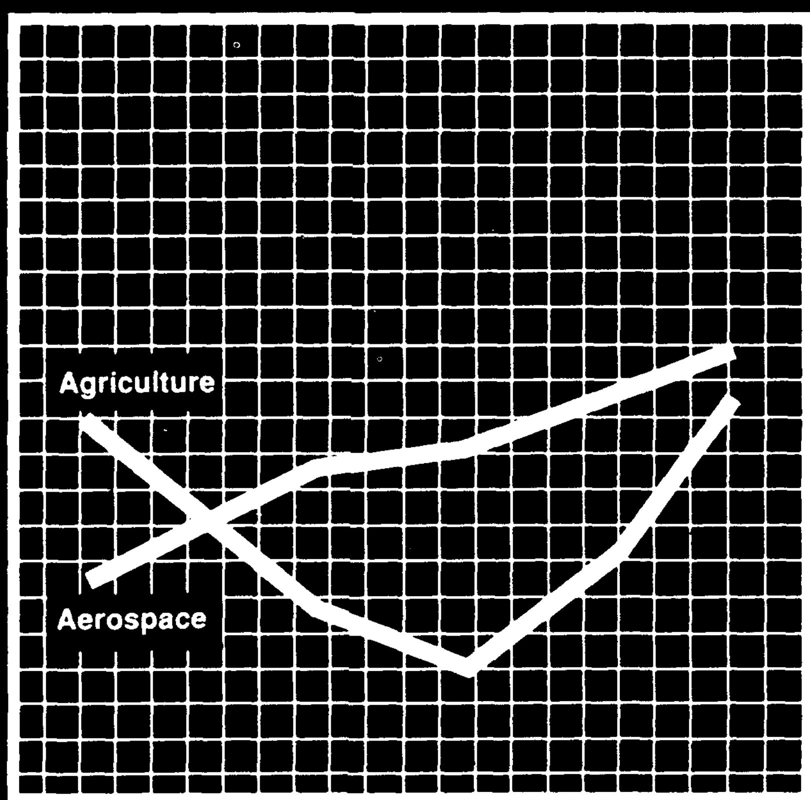
Dr. John M. Kennedy
Center for Survey Research
Indiana University
Bloomington, IN 47405
(812) 855-2573
Fax (812) 855-2818
kennedy@isrmail.soc.indiana.edu

Rebecca O. Barclay
Dept. of Language, Literature & Communication
Rensselaer Polytechnic Institute
Troy, NY 12180
(804) 399-5666
(518) 276-8983
Fax (518) 276-6783

APPENDIX B

AIAA Survey 1 Questionnaire

The Role of the *U.S. Government Technical Report* in Aerospace



U.S. Trade Surplus for Aerospace and Agriculture, 1984-1989

The AIAA has endorsed this research project.

These data will help us determine the use, production, and importance of information by aerospace engineers and scientists.

1. Which of the following information sources do YOU use in performing YOUR present professional duties? (Circle number)

CONFERENCE/MEETING PAPERS	1 YES	2 NO
JOURNAL ARTICLES	1 YES	2 NO
IN-HOUSE TECHNICAL REPORTS*	1 YES	2 NO
GOVERNMENT TECHNICAL REPORTS	1 YES	2 NO

2. In terms of performing YOUR present professional duties, how important are the following information sources? One indicates the source is very important; 5 indicates that the source is not at all important. (Circle number)

	VERY IMPORTANT			VERY UNIMPORTANT	
CONFERENCE/MEETING PAPERS	1	2	3	4	5
JOURNAL ARTICLES	1	2	3	4	5
IN-HOUSE TECHNICAL REPORTS	1	2	3	4	5
GOVERNMENT TECHNICAL REPORTS	1	2	3	4	5

3. In the past six months, approximately how many times did you use each of the following information sources in performing your present professional duties?

	In the past six months
CONFERENCE/MEETING PAPERS	______
JOURNAL ARTICLES	______
IN-HOUSE TECHNICAL REPORTS	______
GOVERNMENT TECHNICAL REPORTS	______

* In-house reports are those produced at your location/installation.

OPEN

The next few pages ask the factors that have influenced your use of certain information sources. For each reason, e.g., accessibility, please indicate by circling from 1 to 5 whether this reason greatly influenced or had no influence at all on your decision.

ABOUT CONFERENCE/MEETING PAPERS (If not used, go to Journal Articles)

To what extent was their use influenced by . . .	GREATLY INFLUENCED				NOT INFLUENCED
4. ACCESSIBILITY, that is, the ease of getting to the information source?	1	2	3	4	5
5. EASE OF USE, that is, the ease of comprehending or utilizing the information?	1	2	3	4	5
6. EXPENSE, that is, low cost in comparison to other information sources?.......	1	2	3	4	5
7. FAMILIARITY OR EXPERIENCE, that is, prior knowledge or previous use of the information source?	1	2	3	4	5
8. TECHNICAL QUALITY OR RELIABILITY, that is, the information sources were expected to be the best in terms of quality, accuracy, and reliability?	1	2	3	4	5
9. COMPREHENSIVENESS, that is, the expectation that the information source would provide broad coverage of the available knowledge?	1	2	3	4	5
10. RELEVANCE, that is, the expectation that a high percentage of the information retrieved from the source would be used?	1	2	3	4	5

ABOUT JOURNAL ARTICLES
(If not used, go to In-House Technical Reports.)

To what extent was their use influenced by . . .	GREATLY INFLUENCED				NOT INFLUENCED
11. ACCESSIBILITY, that is, the ease of getting to the information source?	1	2	3	4	5

ABOUT JOURNAL ARTICLES	GREATLY INFLUENCED			NOT INFLUENCED
12. EASE OF USE, that is, the ease of comprehending or utilizing the information? 1	2	3	4	5
13. EXPENSE, that is, low cost in comparison to other information sources? ... 1	2	3	4	5
14. FAMILIARITY OR EXPERIENCE, that is, prior knowledge or previous use of the information source? 1	2	3	4	5
15. TECHNICAL QUALITY OR RELIABILITY, that is, the information sources were expected to be the best in terms of quality, accuracy, and reliability? ... 1	2	3	4	5
16. COMPREHENSIVENESS, that is, the expectation that the information source would provide broad coverage of the available knowledge? 1	2	3	4	5
17. RELEVANCE, that is, the expectation that a high percentage of the information retrieved from the source would be used? 1	2	3	4	5

ABOUT IN-HOUSE TECHNICAL REPORTS (If not used, go to Government Technical Reports.)

To what extent was their use influenced by . . .	GREATLY INFLUENCED			NOT INFLUENCED
18. ACCESSIBILITY, that is, the ease of getting to the information source? 1	2	3	4	5
19. EASE OF USE, that is, the ease of comprehending or utilizing the information? 1	2	3	4	5
20. EXPENSE, that is, low cost in comparison to other information sources? 1	2	3	4	5
21. FAMILIARITY OR EXPERIENCE, that is, prior knowledge or previous use of the information source? 1	2	3	4	5

ABOUT IN-HOUSE TECHNICAL REPORTS	GREATLY INFLUENCED				NOT INFLUENCED
22. TECHNICAL QUALITY OR RELIABILITY, that is, the information sources were expected to be the best in terms of quality, accuracy, and reliability?	1	2	3	4	5
23. COMPREHENSIVENESS, that is, the expectation that the information source would provide broad coverage of the available knowledge?	1	2	3	4	5
24. RELEVANCE, that is, the expectation that a high percentage of the information retrieved from the source would be used?	1	2	3	4	5

ABOUT GOVERNMENT TECHNICAL REPORTS (If not used, go to Q32.)

To what extent was their use influenced by . . .	GREATLY INFLUENCED				NOT INFLUENCED
25. ACCESSIBILITY, that is, the ease of getting to the information source?	1	2	3	4	5
26. EASE OF USE, that is, the ease of comprehending or utilizing the information?	1	2	3	4	5
27. EXPENSE, that is, low cost in comparison to other information sources?	1	2	3	4	5
28. FAMILIARITY OR EXPERIENCE, that is, prior knowledge or previous use of the information source?	1	2	3	4	5
29. TECHNICAL QUALITY OR RELIABILITY, that is, the information sources were expected to be the best in terms of quality, accuracy, and reliability?	1	2	3	4	5
30. COMPREHENSIVENESS, that is, the expectation that the information source would provide broad coverage of the available knowledge?	1	2	3	4	5
31. RELEVANCE, that is, the expectation that a high percentage of the information retrieved from the source would be used?	1	2	3	4	5

In the past six months, what percentage of each of the following information sources were used for educational purposes (e.g., teaching, professional development); research; and for the management (e.g., planning, budgeting) of research? (If not used, skip to the next information source.)

	Educational	Research	Management	Other	Total
32. CONFERENCE/MEETING PAPERS	___%	___%	___%	___%	100%
33. JOURNAL ARTICLES	___%	___%	___%	___%	100%
34. IN-HOUSE TECHNICAL REPORTS	___%	___%	___%	___%	100%
35. GOVERNMENT TECHNICAL REPORTS	___%	___%	___%	___%	100%

36. Do YOU use the following types or kinds of information in performing YOUR present professional duties? (Circle numbers)

BASIC SCIENTIFIC AND TECHNOLOGY INFORMATION	1 YES	2 NO
IN-HOUSE TECHNICAL DATA	1 YES	2 NO
COMPUTER PROGRAMS	1 YES	2 NO
TECHNICAL SPECIFICATIONS	1 YES	2 NO
PRODUCT & PERFORMANCE CHARACTERISTICS	1 YES	2 NO

37. In the past six months, approximately what percentage of the **basic scientific and technology information** YOU used in performing your present professional duties were found in the following information sources? (Circle 1 if you did not use basic scientific and technology information.)

CONFERENCE/MEETING PAPERS	___%	1. I did not use basic scientific and technology information.
JOURNAL ARTICLES	___%	
IN-HOUSE TECHNICAL REPORTS	___%	
GOVERNMENT TECHNICAL REPORTS	___%	

38. In the past six months, approximately what percentage of the **in-house technical data** YOU used in performing your present professional duties were found in the following information sources? (Circle 1 if you did not use in-house technical data.)

CONFERENCE/MEETING PAPERS	___%	1. I did not use in-house technical data.
JOURNAL ARTICLES	___%	
IN-HOUSE TECHNICAL REPORTS	___%	
GOVERNMENT TECHNICAL REPORTS	___%	

39. In the past six months, approximately what percentage of the **computer programs** YOU used in performing your present professional duties were referenced or mentioned in the following information sources? (Circle 1 if you did not use computer programs.)

CONFERENCE/MEETING PAPERS	____%	1. I did not use computer programs.
JOURNAL ARTICLES	____%	
IN-HOUSE TECHNICAL REPORTS	____%	
GOVERNMENT TECHNICAL REPORTS	____%	

40. In the past six months, approximately what percentage of the **technical specifications** YOU used in performing your present professional duties were found in the following information sources? (Circle 1 if you did not use technical specifications.)

CONFERENCE/MEETING PAPERS	____%	1. I did not use technical specifications.
JOURNAL ARTICLES	____%	
IN-HOUSE TECHNICAL REPORTS	____%	
GOVERNMENT TECHNICAL REPORTS	____%	

41. In the past six months, approximately what percentage of the **product and performance** characteristics YOU used in performing your present professional duties were found in the following information sources? (Circle 1 if you did not use product and performance characteristics.)

CONFERENCE/MEETING PAPERS	____%	1. I did not use product and performance characteristics.
JOURNAL ARTICLES	____%	
IN-HOUSE TECHNICAL REPORTS	____%	
GOVERNMENT TECHNICAL REPORTS	____%	

These data will help determine the use of libraries and technical information centers, library and technical information services, and the use of information technology by aerospace engineers and scientists.

42. Does YOUR organization have a library and/or technical information center?

1 YES → 43. How far from it are you? ______ (Distance)

2 NO

44. How many times in the past six months have YOU:

______ VISITED A LIBRARY/TECHNICAL INFORMATION CENTER

______ SOUGHT THE HELP OF A STAFF MEMBER WHILE VISITING A LIBRARY/TECHNICAL INFORMATION CENTER

______ BEEN OFFERED ASSISTANCE BY A STAFF MEMBER WHILE VISITING A LIBRARY/TECHNICAL INFORMATION CENTER

______ REQUESTED SOMETHING IN WRITING OR ELECTRONICALLY FROM A LIBRARY/TECHNICAL INFORMATION CENTER

______ REQUESTED SOMETHING BY TELEPHONE FROM A LIBRARY/TECHNICAL INFORMATION CENTER

______ REQUESTED SOMETHING THROUGH A PROXY FROM A LIBRARY/TECHNICAL INFORMATION CENTER

______ REQUESTED SOMETHING OR HAD A LIBRARY REQUEST SOMETHING FROM SOME OTHER LIBRARY/TECHNICAL INFORMATION CENTER

45. Which of the following statements best describes any reasons YOU did not visit or request something from a library or technical information center in the past six months? (Circle numbers) If you DID visit or request something, skip to Q46.

HAD NO INFORMATION NEEDS	1 YES	2 NO
MY INFORMATION NEEDS WERE MORE EASILY MET SOME OTHER WAY	1 YES	2 NO
TRIED THEM ONCE OR TWICE BEFORE BUT THEY WERE NOT ABLE TO HELP ME	1 YES	2 NO
THE LIBRARY/TECHNICAL INFORMATION CENTER IS PHYSICALLY TOO FAR AWAY FROM WHERE I WORK	1 YES	2 NO
THE LIBRARY/TECHNICAL INFORMATION CENTER STAFF IS NOT COOPERATIVE OR HELPFUL	1 YES	2 NO
THE LIBRARY/TECHNICAL INFORMATION CENTER DOES NOT UNDERSTAND MY INFORMATION NEEDS	1 YES	2 NO
THE LIBRARY/TECHNICAL INFORMATION CENTER DOES NOT HAVE THE INFORMATION I NEED	1 YES	2 NO
I HAVE MY OWN PERSONAL LIBRARY AND DO NOT NEED A LIBRARY/TECHNICAL INFORMATION CENTER	1 YES	2 NO
THE LIBRARY/TECHNICAL INFORMATION CENTER IS TOO SLOW IN GETTING THE INFORMATION I NEED	1 YES	2 NO
WE HAVE TO PAY TO USE THE LIBRARY/TECHNICAL INFORMATION CENTER	1 YES	2 NO
WE ARE DISCOURAGED FROM USING THE LIBRARY/ TECHNICAL INFORMATION CENTER	1 YES	2 NO

46. In terms of performing YOUR present professional duties, how important is a library or technical information center? One indicates it is very important; 5 indicates it is not at all important. (Circle number)

VERY IMPORTANT			VERY UNIMPORTANT	
1	2	3	4	5

47. In performing YOUR present professional duties, how do YOU view YOUR use of the following information technologies? (Circle numbers)

Information Technologies	I Already Use It	I Don't Use It, But May In the Future	I Don't Use It and Doubt If I Will
ELECTRONIC DATA BASES	1	2	3
ELECTRONIC NETWORKS	1	2	3
LASER DISC/VIDEO DISC/CD-ROM	1	2	3
MICROGRAPHICS AND MICROFILMS	1	2	3
TELECONFERENCING	1	2	3
VIDEO CONFERENCING	1	2	3
ELECTRONIC DATA BASES	1	2	3
FAX OR TELEX	1	2	3
ELECTRONIC BULLETIN BOARDS	1	2	3
ELECTRONIC MAIL	1	2	3
COMPUTER CASSETTE/ CARTRIDGE TAPES	1	2	3
FLOPPY DISKS	1	2	3
DESK-TOP/ELECTRONIC PUBLISHING	1	2	3
VIDEO TAPE	1	2	3
MOTION PICTURE FILM	1	2	3
AUDIO TAPES AND CASSETTES	1	2	3

These data will help us determine how aerospace engineers and scientists use information to solve technical problems.

48. Briefly describe the most important technical project, task, or problem you have worked on in the past six months.

____
____
____
____
____
____

49. In completing your most important technical project, task, or problem during the past six months, what steps did you follow in looking for the information YOU needed to complete the project, task or to solve the problem? (Enter "1" beside the first step, "2" beside the second step, and so forth.)

STEP

____ I SEARCHED A DATABASE OR HAD IT SEARCHED FOR ME

____ I CHECKED WITH A LIBRARIAN/TECHNICAL INFORMATION SPECIALIST OUTSIDE MY ORGANIZATION

____ I CHECKED WITH A LIBRARIAN/TECHNICAL INFORMATION SPECIALIST IN MY ORGANIZATION

____ I CONSULTED LIBRARY SOURCES (E.G., CONFERENCE/MEETING PAPERS, JOURNAL ARTICLES, TECHNICAL REPORTS)

____ I SPOKE WITH A KEY PERSON OUTSIDE MY ORGANIZATION TO WHOM I USUALLY LOOK FOR NEW INFORMATION

____ I SPOKE WITH A KEY PERSON IN MY ORGANIZATION TO WHOM I USUALLY LOOK FOR NEW INFORMATION

____ I DISCUSSED THE PROBLEM WITH MY SUPERVISOR

____ I DISCUSSED THE PROBLEM INFORMALLY WITH A COLLEAGUE(S)

____ I USED MY PERSONAL STORE OF TECHNICAL INFORMATION, INCLUDING SOURCES I KEEP IN MY OFFICE

50. Which of the following BEST characterizes the technical project, task, or problem in Q48? (Circle one number)

1 EDUCATIONAL (e.g., for professional development, teaching, current awareness, or preparation of a lecture/presentation)

2 RESEARCH (either basic or applied)

3 DESIGN

4 DEVELOPMENT

5 MANUFACTURING

6 PRODUCTION

7 MANAGEMENT (e.g., planning, budgeting, and management of research)

8 COMPUTER APPLICATIONS

51. Were government technical reports used to complete the technical project or task or in solving the problem in Q48?

1 YES   2 NO (If NO, then skip to Q56.)

52. How did you find out about the government technical report(s)? (Circle numbers)

I USED MY PERSONAL STORE OF TECHNICAL INFORMATION	1 YES	2 NO
BY INTENTIONAL SEARCH OF LIBRARY RESOURCES	1 YES	2 NO
BY ASKING A COLLEAGUE IN MY ORGANIZATION	1 YES	2 NO
BY ASKING A COLLEAGUE OUTSIDE OF MY ORGANIZATION	1 YES	2 NO
BY ASKING A LIBRARIAN OR TECHNICAL INFORMATION SPECIALIST	1 YES	2 NO
BY ASKING MY SUPERVISOR	1 YES	2 NO
SOMEONE INFORMED ME WITHOUT MY ASKING	1 YES	2 NO
BY ACCIDENT, BROWSING, OR LOOKING FOR OTHER INFORMATION	1 YES	2 NO
I SEARCHED A DATABASE OR HAD IT SEARCHED FOR ME	1 YES	2 NO

53. At what stage in the technical project or task or in solving the problem did YOU use the government technical report(s)? (Circle number)

THROUGHOUT THE DURATION OF THE TECHNICAL PROJECT, TASK, OR TECHNICAL PROBLEM	1 YES	2 NO
NEAR THE BEGINNING	1 YES	2 NO
NEAR THE MIDDLE	1 YES	2 NO
NEAR THE END	1 YES	2 NO

54. To what degree was the information found in the government technical report(s) effective in completing the technical project or task or in solving the problem? (Circle number)

EXTREMELY EFFECTIVE			EXTREMELY INEFFECTIVE	
1	2	3	4	5

55. To what degree was the information found in the government technical report(s) efficient (e.g., time spent, cost) in completing the technical project or task or in solving the problem? (Circle number)

EXTREMELY EFFICIENT			EXTREMELY INEFFICIENT	
1	2	3	4	5

These data will help determine if aerospace engineers and scientists with different backgrounds have different information practices.

56. Which is the highest level of education that YOU have completed? (Circle one number)

1 NO DEGREE
2 TECHNICAL OR VOCATIONAL DEGREE
3 BACHELOR'S DEGREE
4 MASTER'S DEGREE
5 DOCTORATE
6 POST DOCTORATE
7 OTHER (specify)_____

57. Next, compare YOUR educational preparation and present duties. (Circle number)

Educational Preparation	Present Professional Duties
1 ENGINEER	1 ENGINEER
2 SCIENTIST	2 SCIENTIST
3 OTHER (specify)____	3 OTHER (specify)____

58. YOUR years of professional work experience in aerospace: ___ YEARS.

59. The type of organization where YOU work. (Circle one number)

1 ACADEMIC
2 GOVERNMENT (DOD)
3 GOVERNMENT (NASA)
4 GOVERNMENT (OTHER)
5 INDUSTRIAL
6 NOT-FOR-PROFIT
7 RETIRED OR NOT EMPLOYED
8 OTHER (specify)____

60. What is YOUR primary professional duty? (Circle only one number.)

1 ACADEMIC/TEACHING (may include research)
2 RESEARCH
3 ADMINISTRATIVE/MANAGEMENT (for profit sector)
4 TECHNICAL ADMINISTRATIVE/ MANAGEMENT (for profit sector)
5 ADMINISTRATIVE/MANAGEMENT (Government, not-for-profit)
6 TECHNICAL ADMINISTRATIVE/ MANAGEMENT (Government, not-for-profit)
7 DESIGN/DEVELOPMENT/RDTE
8 MANUFACTURING/PRODUCTION
9 MARKETING/SALES
10 SERVICE/MAINTENANCE
11 OTHER (specify)_____

61. What is YOUR principal AIAA interest group? (Circle only one number)

1 AEROSPACE SCIENCES
2 AIRCRAFT SYSTEMS
3 INFORMATION & LOGISTIC SYSTEMS
4 PROPULSION & ENERGY
5 SPACE & MISSILE SYSTEMS
6 STRUCTURES, DESIGN & TEST
7 OTHER (specify)_____

62. Which of the following best characterizes YOUR area of work or characterizes the application of YOUR work? (Circle one number)

1 AERONAUTICS
2 ASTRONAUTICS
3 ENGINEERING
4 GEOSCIENCES
5 LIFE SCIENCES
6 MATHEMATICAL & COMPUTER SCIENCES
7 MATERIALS & CHEMISTRY
8 PHYSICS
9 SPACE SCIENCES
10 OTHER (specify)_____

63. Is ANY of YOUR current work funded by the Federal government? (Circle number)

1 YES 2 NO

64. Who supplies the largest proportion of funds for YOUR current research/project(s)? (Circle number)

1 FEDERAL GOVERNMENT
2 PRIVATE INDUSTRY
3 EDUCATIONAL INSTITUTION
4 NOT-FOR-PROFIT INSTITUTION
5 OTHER (specify)_____

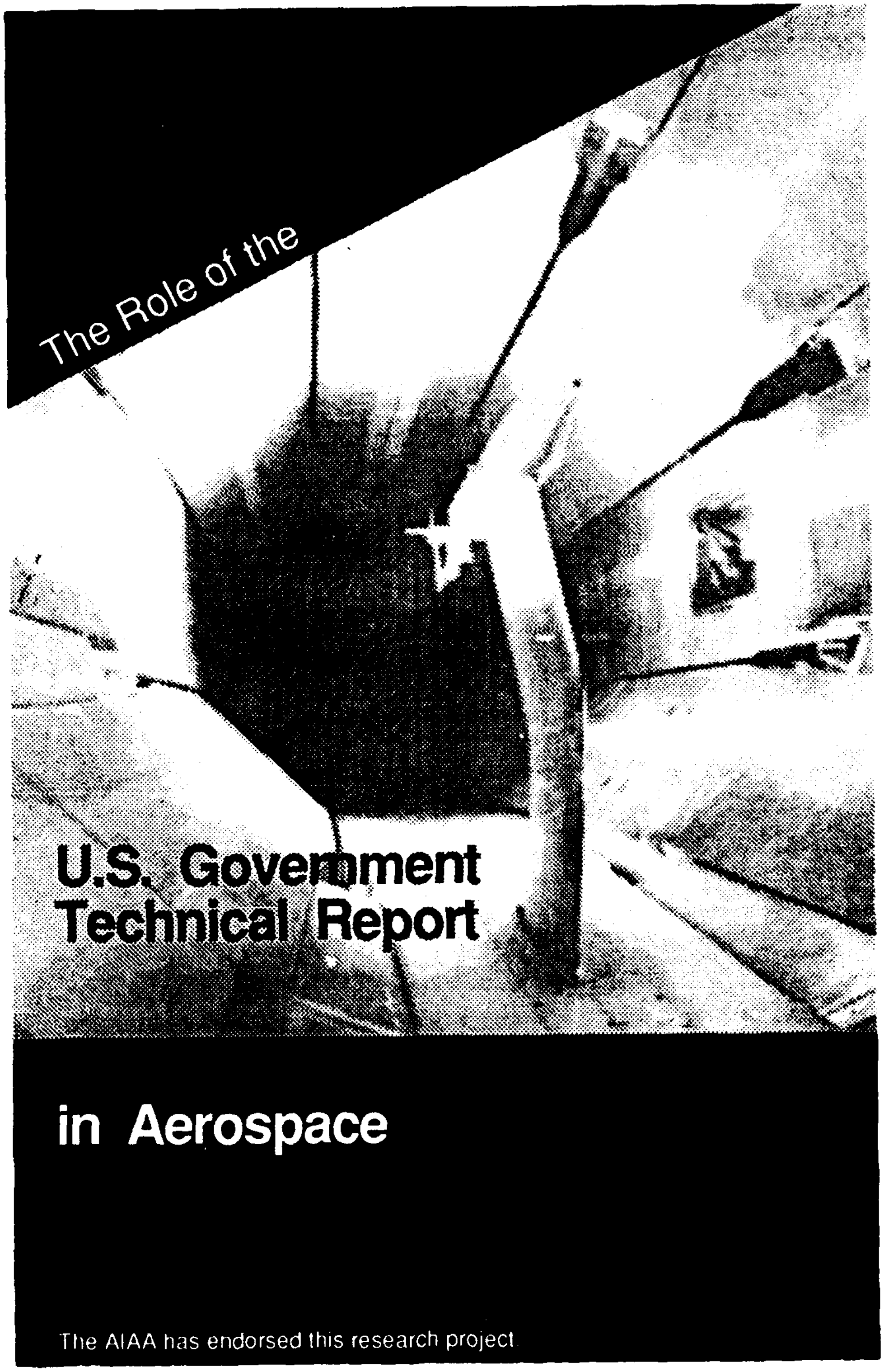
(OVER)

65. Is there anything else you would care to say regarding this research?

Mail to:
1022 East Third Street
Indiana University
Bloomington, IN 47401

APPENDIX C

AIAA Survey 2 Questionnaire



These data will help us determine the use and importance of selected information products by aerospace engineers and scientists.

1. Which of the following information sources do YOU use in performing YOUR present professional duties? (Circle answer)

CONFERENCE/MEETING PAPERS	YES	NO
JOURNAL ARTICLES	YES	NO
TECHNICAL TRANSLATIONS	YES	NO
TECHNICAL REPORTS - AGARD	YES	NO
TECHNICAL REPORTS - DOD	YES	NO
TECHNICAL REPORTS - NASA	YES	NO

2. In terms of performing YOUR present professional duties, how important is each of the following information sources? (Circle number)

	VERY IMPORTANT				NOT AT ALL IMPORTANT
CONFERENCE/MEETING PAPERS	1	2	3	4	5
JOURNAL ARTICLES	1	2	3	4	5
TECHNICAL TRANSLATIONS	1	2	3	4	5
TECHNICAL REPORTS - AGARD	1	2	3	4	5
TECHNICAL REPORTS - DOD	1	2	3	4	5
TECHNICAL REPORTS - NASA	1	2	3	4	5

These data will help us gather specific information about technical translations.

3. In the past SIX MONTHS, about how many times did YOU use a TECHNICAL TRANSLATION? (Circle none or enter the number)

NONE

____ NUMBER

If 1 or more, what percentage of the TECHNICAL TRANSLATIONS were in:

_____% Paper

_____% Microfiche

What percentage of these TECHNICAL TRANSLATIONS were used for the following purposes:

_____% Education

_____% Research

_____% Management

_____% Other

GO TO Q 4.

If NONE, why did YOU NOT use TECHNICAL TRANSLATIONS? (Circle answer)

NOT AVAILABLE/ACCESSIBLE	YES	NO
NOT RELEVANT TO MY RESEARCH	YES	NO
NOT USED IN MY DISCIPLINE	YES	NO
NOT RELIABLE/TECHNICALLY INACCURATE	YES	NO
NOT RELIABLE/LANGUAGE INACCURATE	YES	NO
NOT TIMELY/CURRENT	YES	NO
TAKES TOO LONG TO GET THEM	YES	NO

IF NONE, PLEASE GO TO AGARD TECHNICAL REPORTS, Q 5, Page ?.

4. To what extent has each of the following factors influenced YOUR use of TECHNICAL TRANSLATIONS? (Circle number)

	GREATLY INFLUENCED				NOT INFLUENCED
ACCESSIBILITY: the ease of getting to the information source	1	2	3	4	5
EASE OF USE: the ease of comprehending or utilizing the information	1	2	3	4	5
EXPENSE: low cost in comparison to other information sources	1	2	3	4	5
FAMILIARITY OR EXPERIENCE: prior knowledge or previous use of the information source	1	2	3	4	5
TECHNICAL QUALITY OR RELIABILITY: the information was expected to be the best in terms of quality, accuracy, and reliability	1	2	3	4	5
COMPREHENSIVENESS: the expectation that the information source would provide broad coverage of the available knowledge	1	2	3	4	5
RELEVANCE: the expectation that a high percentage of the information retrieved from the source would be used	1	2	3	4	5

These data will help us gather specific information from aerospace engineers and scientists about AGARD, DOD, and NASA technical reports.

5. In the past SIX MONTHS, about how many times did YOU use an AGARD TECHNICAL REPORT? (Circle none or enter the number)

NONE

_____ NUMBER

If 1 or more, what percentage of the AGARD TECHNICAL REPORTS were in:

_____% Paper
_____%Microfiche

What percentage of these AGARD TECHNICAL REPORTS were used for the following purposes:

_____% Education
_____% Research
_____% Management
_____% Other

GO TO Q 6.

If NONE, why did YOU NOT use an AGARD TECHNICAL REPORT? (Circle answer)

NOT AVAILABLE/ACCESSIBLE	YES	NO
NOT RELEVANT TO MY RESEARCH	YES	NO
NOT USED IN MY DISCIPLINE	YES	NO
NOT RELIABLE/TECHNICALLY INACCURATE	YES	NO
NOT TIMELY/CURRENT	YES	NO

OTHER ____________________

IF NONE, PLEASE GO TO DOD TECHNICAL REPORTS, Q 10, Page 4.

6. How often do you find out about AGARD TECHNICAL REPORTS from each of these sources? (Circle number)

	FREQUENTLY	SOMETIMES	SELDOM	NEVER
Bibliographic database search	1	2	3	4
Announcement journal (e.g., STAR)	1	2	3	4
Current awareness publication (e.g., SCAN)	1	2	3	4
Cited in a report/journal/conference paper	1	2	3	4
Referred to me by colleague	1	2	3	4
Referred to me by librarian/technical information specialist	1	2	3	4
Routed to me by library	1	2	3	4
By intentional search of library resources	1	2	3	4
By accident, by browsing, or looking for other material	1	2	3	4
AGARD sends them to me	1	2	3	4
The author sends them to me	1	2	3	4
Other ______________________	1	2	3	4

7. How often do you usually obtain physical access to AGARD TECHNICAL REPORTS from each of these sources? (Circle number)

	FREQUENTLY	SOMETIMES	SELDOM	NEVER
AGARD sends them to me	1	2	3	4
The author sends them to me	1	2	3	4
I request them from the author	1	2	3	4
I request/order them from my library	1	2	3	4
I request/order them from NTIS	1	2	3	4
I get them from a colleague	1	2	3	4
They are routed to me by my library	1	2	3	4
Other______________________	1	2	3	4

8. How would you rate AGARD TECHNICAL REPORTS on each of the following characteristics? (Circle number)

	EXCELLENT	GOOD	FAIR	POOR	NO OPINION
Quality of information	1	2	3	4	5
Precision/accuracy of data	1	2	3	4	5
Adequacy of data/documentation	1	2	3	4	5
Organization/format	1	2	3	4	5
Quality of graphics (e.g., charts, photos, figures)	1	2	3	4	5

RATING AGARD TECHNICAL REPORTS

Timeliness/currency	1	2	3	4	5
"Advancing the state of the art" in your discipline	1	2	3	4	5

9. To what extent has each of the following factors influenced YOUR use of AGARD TECHNICAL REPORTS? (Circle number)

	GREATLY INFLUENCED				NOT INFLUENCED
ACCESSIBILITY: the ease of getting to the information source	1	2	3	4	5
EASE OF USE: the ease of comprehending or utilizing the information	1	2	3	4	5
EXPENSE: low cost in comparison to other information sources	1	2	3	4	5
FAMILIARITY OR EXPERIENCE: prior knowledge or previous use of the information source	1	2	3	4	5
TECHNICAL QUALITY OR RELIABILITY: the information was expected to be the best in terms of quality, accuracy, and reliability	1	2	3	4	5
COMPREHENSIVENESS: the expectation that the information source would provide broad coverage of the available knowledge	1	2	3	4	5
RELEVANCE: the expectation that a high percentage of the information retrieved from the source would be used	1	2	3	4	5

10. In the past SIX MONTHS, about how many times did YOU use a DOD TECHNICAL REPORT? (Circle none or enter the number)

NONE

_____ NUMBER

If 1 or more, what percentage of the DOD TECHNICAL REPORTS were in:

_____% Paper

_____% Microfiche

What percentage of these DOD TECHNICAL REPORTS were used for the following purposes:

_____% Education

_____% Research

_____% Management

_____% Other

GO TO Q 11.

If NONE, why did YOU NOT use a DOD TECHNICAL REPORT? (Circle answer)

NOT AVAILABLE/ACCESSIBLE	YES	NO
NOT RELEVANT TO MY RESEARCH	YES	NO
NOT USED IN MY DISCIPLINE	YES	NO
NOT RELIABLE/TECHNICALLY INACCURATE	YES	NO
NOT TIMELY/CURRENT	YES	NO

OTHER ______________________

IF NONE, PLEASE GO TO NASA TECHNICAL REPORTS, Q 15, Page 6.

11. How often do you find out about DOD TECHNICAL REPORTS from each of these sources? (Circle number)

	FREQUENTLY	SOMETIMES	SELDOM	NEVER
Bibliographic database search..............................	1	2	3	4
Announcement journal (e.g., STAR)....................	1	2	3	4
Current awareness publication (e.g., SCAN).......	1	2	3	4
Cited in a report/journal/conference paper...........	1	2	3	4
Referred to me by colleague................................	1	2	3	4
Referred to me by librarian/technical information specialist...	1	2	3	4
Routed to me by library.......................................	1	2	3	4
By intentional search of library resources...........	1	2	3	4
By accident, by browsing, or looking for other material..	1	2	3	4
DOD sends them to me.......................................	1	2	3	4
The author sends them to me..............................	1	2	3	4
Other ______________________________	1	2	3	4

12. How often do you usually obtain physical access to DOD TECHNICAL REPORTS from each of these sources? (Circle number)

	FREQUENTLY	SOMETIMES	SELDOM	NEVER
DOD sends them to me.......................................	1	2	3	4
The author sends them to me..............................	1	2	3	4
I request them from the author...........................	1	2	3	4
I request/order them from my library..................	1	2	3	4
I request/order them from NTIS..........................	1	2	3	4
I get them from a colleague................................	1	2	3	4
They are routed to me by my library...................	1	2	3	4
Other ______________________________	1	2	3	4

13. How would you rate DOD TECHNICAL REPORTS on each of the following characteristics? (Circle number)

	EXCELLENT	GOOD	FAIR	POOR	NO OPINION
Quality of information...	1	2	3	4	5
Precision/accuracy of data..................................	1	2	3	4	5
Adequacy of data/documentation........................	1	2	3	4	5
Organization/format	1	2	3	4	5
Quality of graphics (e.g., charts, photos, figures)...	1	2	3	4	5

Timeliness/currency	1	2	3	4	5
"Advancing the state of the art" in your discipline	1	2	3	4	5

14. To what extent has each of the following factors influenced YOUR use of DOD TECHNICAL REPORTS? (Circle number)

	GREATLY INFLUENCED				NOT INFLUENCED
ACCESSIBILITY: the ease of getting to the information source	1	2	3	4	5
EASE OF USE: the ease of comprehending or utilizing the information	1	2	3	4	5
EXPENSE: low cost in comparison to other information sources	1	2	3	4	5
FAMILIARITY OR EXPERIENCE: prior knowledge or previous use of the information source	1	2	3	4	5
TECHNICAL QUALITY OR RELIABILITY: the information was expected to be the best in terms of quality, accuracy, and reliability	1	2	3	4	5
COMPREHENSIVENESS: the expectation that the information source would provide broad coverage of the available knowledge	1	2	3	4	5
RELEVANCE: the expectation that a high percentage of the information retrieved from the source would be used	1	2	3	4	5

15. In the past SIX MONTHS, about how many times did YOU use a NASA TECHNICAL REPORT? (Circle none or enter number)

NONE

_____ NUMBER

If 1 or more, what percentage of the NASA TECHNICAL REPORTS were in:

_____% Paper
_____% Microfiche

What percentage of these NASA TECHNICAL REPORTS were used for the following purposes:

_____% Education
_____% Research
_____% Management
_____% Other *GO TO Q 16.*

If NONE, why did YOU NOT use an NASA TECHNICAL REPORT? (Circle answer)

NOT AVAILABLE/ACCESSIBLE	YES	NO
NOT RELEVANT TO MY RESEARCH	YES	NO
NOT USED IN MY DISCIPLINE	YES	NO
NOT RELIABLE/TECHNICALLY INACCURATE	YES	NO
NOT TIMELY/CURRENT	YES	NO
OTHER _______________	YES	NO

IF NONE, PLEASE GO TO Q 20, Page 9.

16. How often do you find out about NASA TECHNICAL REPORTS from each of these sources? (Circle number)

	FREQUENTLY	SOMETIMES	SELDOM	NEVER
Bibliographic database search	1	2	3	4
Announcement journal (e.g., STAR)	1	2	3	4
Current awareness publication (e.g., SCAN)	1	2	3	4
Cited in a report/journal/conference paper	1	2	3	4
Referred to me by colleague	1	2	3	4
Referred to me by librarian/ technical information specialist	1	2	3	4
Routed to me by library	1	2	3	4
By intentional search of library resources	1	2	3	4
By accident, by browsing, or looking for other material	1	2	3	4
NASA sends them to me	1	2	3	4
The author sends them to me	1	2	3	4
Other ______________________	1	2	3	4

17. How often do you usually obtain physical access to NASA TECHNICAL REPORTS from each of these sources? (Circle number)

	FREQUENTLY	SOMETIMES	SELDOM	NEVER
NASA sends them to me	1	2	3	4
The author sends them to me	1	2	3	4
I request them from the author	1	2	3	4
I request/order them from my library	1	2	3	4
I request/order them from NTIS	1	2	3	4
I get them from a colleague	1	2	3	4
They are routed to me by my library	1	2	3	4
Other ______________________	1	2	3	4

18. How would you rate NASA TECHNICAL REPORTS on each of the following characteristics? (Circle number)

	Excellent	Good	Fair	Poor	No Opinion
Quality of information	1	2	3	4	5
Precision/accuracy of data	1	2	3	4	5
Adequacy of data/documentation	1	2	3	4	5
Organization/format	1	2	3	4	5
Quality of graphics (e.g., charts, photos, figures)	1	2	3	4	5
Timeliness/currency	1	2	3	4	5
"Advancing the state of the art" in your discipline	1	2	3	4	5

19. To what extent has each of the following factors influenced YOUR use of NASA TECHNICAL REPORTS? (Circle number)

	GREATLY INFLUENCED				NOT INFLUENCED
ACCESSIBILITY: the ease of getting to the information source	1	2	3	4	5
EASE OF USE: the ease of comprehending or utilizing the information	1	2	3	4	5
EXPENSE: low cost in comparison to other information sources	1	2	3	4	5
FAMILIARITY OR EXPERIENCE: prior knowledge or previous use of the information source	1	2	3	4	5
TECHNICAL QUALITY OR RELIABILITY: the information was expected to be the best in terms of quality, accuracy, and reliability	1	2	3	4	5
COMPREHENSIVENESS: the expectation that the information source would provide broad coverage of the available knowledge	1	2	3	4	5
RELEVANCE: the expectation that a high percentage of the information retrieved from the source would be used	1	2	3	4	5

Extensive data tabulations, mathematical presentations, and lengthy computer programs are usually printed in the Appendix of NASA technical reports. How likely would YOU be to use this type of information if it was provided in electronic format (e.g., floppy disk) rather than in printed form? (Circle number.)

20. Data Tables/Mathematical Presentations

1 VERY UNLIKELY → 21
2 SOMEWHAT UNLIKELY → 21
3 SOMEWHAT LIKELY → 22
4 VERY LIKELY → 22

21. Which best explains your reason for being unlikely to use Data Tables/ Mathematical Presentations in electronic format? (Circle number.)

1 NO/LIMITED COMPUTER ACCESS
2 HARDWARE/SOFTWARE INCOMPATIBILITY
3 PREFER PRINTED FORMAT
4 OTHER ______________

22. Computer Program Listings

1 VERY UNLIKELY → 23
2 SOMEWHAT UNLIKELY → 23
3 SOMEWHAT LIKELY → 24
4 VERY LIKELY → 24

23. Which best explains your reason fo being unlikely to use Computer Program Listings in electronic forma:? (Circle number.)

1 NO/LIMITED COMPUTER ACCESS
2 HARDWARE/SOFTWARE INCOMPATIBILITY
3 PREFER PRINTED FORMAT
4 OTHER______________

24. NASA technical reports come in both paper and microfiche format. How likely would YOU be to use a computerized, online system (with full text and graphics) for NASA technical reports? (Circle number.)

1 VERY UNLIKELY → 25
2 SOMEWHAT UNLIKELY → 25
3 SOMEWHAT LIKELY → 26
4 VERY LIKELY → 26

25. Which best explains your reason for being unlikely to use a computerized, online system for NASA technical reports? (Circle number.)

1 NO/LIMITED COMPUTER ACCESS
2 HARDWARE/SOFTWARE INCOMPATIBILITY
3 PREFER PRINTED FORMAT
4 OTHER______________

26. NASA technical reports come in both paper and microfiche format. How likely would YOU be to use a CD-ROM system (with full text and graphics) for NASA technical reports? (Circle number.)

1 VERY UNLIKELY → 27
2 SOMEWHAT UNLIKELY → 27
3 SOMEWHAT LIKELY
4 VERY LIKELY

GO TO Q 28.

27. Which best explains your reason for being unlikely to use a CD-ROM system for NASA technical reports? (Circle number.)

1 NO/LIMITED COMPUTER ACCESS
2 HARDWARE/SOFTWARE INCOMPATIBILITY
3 PREFER PRINTED FORMAT
4 OTHER ______________

Finally, we would like to collect some background information that will be helpful with the analysis of the data.

28. Which is the highest level of education that YOU have completed? (Circle one number)

1 NO DEGREE
2 TECHNICAL OR VOCATIONAL DEGREE
3 BACHELOR'S DEGREE
4 MASTER'S DEGREE
5 DOCTORATE
6 POST DOCTORATE
7 OTHER ____________

29. Are you trained as: (Circle number)

1 AN ENGINEER
2 A SCIENTIST
3 OTHER ____________

30. Would your present professional duties be classified as: (Circle number)

1 AN ENGINEER
2 A SCIENTIST
3 OTHER ____________

31. How many years of professional work experience in aerospace do you have?

_____ YEARS in aerospace

32. Is the type of organization where YOU work: (Circle ONLY one number)

1 ACADEMIC
2 GOVERNMENT (DOD)
3 GOVERNMENT (NASA)
4 GOVERNMENT (OTHER)
5 INDUSTRIAL
6 NOT-FOR-PROFIT
7 RETIRED OR NOT EMPLOYED
8 OTHER ____________

33. What is YOUR primary professional duty? (Circle ONLY one number)

1 ACADEMIC/TEACHING (may include research)
2 RESEARCH
3 ADMINISTRATIVE/MANAGEMENT (profit sector)
4 TECHNICAL ADMINISTRATIVE/ MANAGEMENT (profit sector)
5 ADMINISTRATIVE/MANAGEMENT (Government, non-profit)
6 TECHNICAL ADMINISTRATIVE/ MANAGEMENT (Government, non-profit)
7 DESIGN/DEVELOPMENT/RDTE
8 MANUFACTURING/PRODUCTION
9 MARKETING/SALES
10 SERVICE/MAINTENANCE
11 PRIVATE CONSULTANT
12 OTHER ____________

34. What is YOUR principle AIAA interest group? (Circle ONLY one number)

1 AEROSPACE SCIENCES
2 AIRCRAFT SYSTEMS
3 INFORMATION & LOGISTICS SYSTEMS
4 PROPULSION & ENERGY
5 SPACE & MISSILE SYSTEMS
6 STRUCTURES, DESIGN & TEST
7 OTHER ____________

35. Which of the following best characterizes YOUR area of work or the application of YOUR work? (Circle ONLY one number)

1 AERONAUTICS
2 ASTRONAUTICS
3 ENGINEERING
4 GEOSCIENCES
5 LIFE SCIENCES
6 MATHEMATICAL & COMPUTER SCIENCES
7 MATERIALS & CHEMISTRY
8 PHYSICS
9 SPACE SCIENCES
10 OTHER ____________

36. Is ANY of YOUR current work funded by the Federal Government? (Circle answer)

YES NO

OVER

37. **Who supplies the largest proportion of funds for YOUR current research/project(s)? (Circle number)**

1 FEDERAL GOVERNMENT
2 PRIVATE INDUSTRY
3 EDUCATIONAL INSTITUTION
4 NON-PROFIT INSTITUTION
5 OTHER (specify) ____________________

OPTIONAL QUESTIONS

38. **What, in your opinion, is the greatest problem(s) in finding out about and obtaining the results of federally-funded aerospace R&D?**

____

____

____

____

____

39. **What suggestions can you offer for improving access to the results of federally-funded aerospace R&D?**

____

____

____

____

____

40. **Is there anything else YOU would care to say regarding this research?**

____

____

____

____

____

Mail to:
1022 East Third Street
Indiana University
Bloomington, IN 47401

APPENDIX D

SAE Questionnaire

Phase 1 of the NASA/DoD Aerospace Knowledge Diffusion Research Project

Technical Communications

in **Aerospace:**

SAE Survey

Sponsored by the National Aeronautics and Space Administration and the Department of Defense with the cooperation of Indiana University and the Society of Automotive Engineers (SAE)

1. **Think of the most important job-related project, task, or problem you have worked on in the past 6 months. Which category best describes this work? (Check ONLY ONE Box)**

☐ Educational (e.g., for professional development or preparation of a lecture)

☐ Research (either basic or applied)

☐ Design

☐ Development

☐ Manufacturing

☐ Production

☐ Computer applications

☐ Management (e.g., planning, budgeting, and managing research)

☐ Other (specify)____

2. **How would you describe the overall complexity of the technical project, task, or problem you categorized in Q.1? (Circle Number)**

Very Simple 1 2 3 4 5 **Very Complex**

3. **How would you rate the amount of technical uncertainty that you faced when you started the technical project, task, or problem categorized in Q.1? (Circle Number)**

Little Uncertainty 1 2 3 4 5 **Great Uncertainty**

4. **While you were involved in the technical project, task, or problem, did you work alone or with others? (Check Box)**

☐ **Alone** ☐ **With others** → In how many groups did you work? ____________

↓ About how many people were in each group? ________

5. **Which of the following best describes the kinds of duties you performed while working on the project? (Check Box)**

☐ Engineering ☐ Science ☐ Management ☐ Other (specify)________________

6. **What steps did you follow to get the information you needed for this project, task, or problem? Please sequence these items (e.g., #1, #2, #3, #4, #5) or put an X beside the steps you did not use.**

Sequence

_____ Used my personal store of technical information, including sources I keep in my office

_____ Spoke with co-workers or people inside my organization

_____ Spoke with colleagues outside my organization

_____ Spoke with a librarian or technical information specialist

_____ Used literature resources (e.g., conference papers, journals, technical reports) found in my organization's library

(If you used none of the above steps, check here_____)

7. **Do you use the results of federally funded aerospace R&D in your work? (Check Box)**

☐ **Yes** ☐ **No (Skip to Q.12)**

7a. **How often do you learn about the results of federally funded aerospace R&D from the following sources? (Check Box)**

	Never	**Seldom**	**Sometimes**	**Frequently**
Co-workers inside my organization	☐	☐	☐	☐
Colleagues outside my organization	☐	☐	☐	☐
NASA and DoD contacts	☐	☐	☐	☐
Publications such as NASA STAR	☐	☐	☐	☐
NASA and DoD sponsored and co-sponsored conferences & workshops	☐	☐	☐	☐
NASA and DoD technical reports	☐	☐	☐	☐
Professional and society journals	☐	☐	☐	☐
Librarians inside my organization	☐	☐	☐	☐
Trade journals	☐	☐	☐	☐
Searches of computerized data bases	☐	☐	☐	☐
Professional and society meetings	☐	☐	☐	☐
Visits to NASA and DoD facilities	☐	☐	☐	☐

8. **Did you use the results of federally funded aerospace R&D in completing the project, task, or problem, you categorized in Q.1? (Check Box)**

☐ **Yes** ☐ **No**

9. **Were these results published in either a NASA or DoD technical report? (Check Box)**

☐ **Yes** ☐ **No**

10. **How important were these results in completing the project, task, or problem, you categorized in Q.1? (Check Box)**

Very Unimportant ☐ ☐ ☐ ☐ ☐ **Very Important**

11. **Which, if any, of the following problems were associated with using these results? (Check All Boxes that Apply)**

☐ The time and effort it took to locate the results

☐ No problems

☐ The time and effort it took to physically obtain the results

☐ The accuracy, precision, and reliability of the results

☐ The legibility or readability of the results

☐ The organization or format of the results

☐ The distribution limitations or security restrictions of the results

12. **In your work, how important is it for you to communicate (e.g., producing written materials or oral discussions) technical information effectively? (Check Box)**

Very Unimportant ☐ ☐ ☐ ☐ ☐ **Very Important**

13. **In the past 6 months, about how many hours did you spend each week <u>communicating</u> technical information?**

(output)
_________hours per week writing
_________hours per week communicating orally

14. **Compared to 5 years ago, how has the amount of time you have spent communicating technical information changed? (Check Box)**

☐ Increased ☐ Stayed the same ☐ Decreased

15. **In the past 6 months, about how many hours did you spend each week working with technical information <u>received</u> <u>from</u> <u>others</u>?**

(input)
_________hours per week working with written information
_________hours per week receiving information orally

16. **As you have advanced professionally, how has the amount of time you have spent working with technical information <u>received</u> <u>from</u> <u>others</u> changed? (Check Box)**

☐ Increased ☐ Stayed the same ☐ Decreased

17. **What percentage of your written technical communications involve:**

Writing alone	______%	⟶ (If 100% alone, skip to Q.20)
Writing with one other person	______%	
Writing with a group of 2 to 5 persons	______%	
Writing with a group of more than 5	______%	
	100%	

18. **In general, do you find writing as part of a group more or less productive (i.e., quantity/quality) than writing alone? (Check Box)**

☐ A group is more productive than writing alone ☐ A group is about as productive as writing alone ☐ A group is less productive than writing alone

19. **In the past 6 months, did you work with the same group of people when producing written technical communications? (Check Box)**

☐ **Yes** ⟶ About how many people were in the group: ______number of people

☐ **No** ⟶ With about how many groups did you work: ______number of groups

↓ About how many people were in each group: ______ number of people

20. **Approximately how many times in the past 6 months did you write or prepare the following alone or in a group? (If in a group, how many people were in each group?)**

		Times in Past 6 Months Produced		
		Alone	In a group	**Average No. of People**
a	Abstracts	______ times	______ times →	______
b	Journal articles	______	______	______
c	Conference/Meeting papers	______	______	______
d	Trade/Promotional literature	______	______	______
e	Drawings/Specifications	______	______	______
f	Audio/Visual materials	______	______	______
g	Letters	______	______	______
h	Memoranda	______	______	______
i	Technical proposals	______	______	______
j	Technical manuals	______	______	______
k	Computer program documentation	______	______	______
l	AGARD technical reports	______	______	______
m	U.S. Government technical reports	______	______	______
n	In-house technical reports	______	______	______
o	Technical talks/Presentations	______	______	______

21. **Approximately how many times in the past 6 months did you use the following?**

		Times used in 6 months
a	Abstracts	______
b	Journal articles	______
c	Conference/Meeting papers	______
d	Trade/Promotional literature	______
e	Drawings/Specifications	______
f	Audio/Visual materials	______
g	Letters	______
h	Memoranda	______
i	Technical proposals	______
j	Technical manuals	______
k	Computer program documentation	______
l	AGARD technical reports	______
m	U.S. Government technical reports	______
n	In-house technical reports	______
o	Technical talks/Presentations	______

22. **(Even if you don't use them...) What is your opinion of JOURNAL ARTICLES? (Circle Number)**

They are easy to physically obtain	1	2	3	4	5	They are difficult to physically obtain
They are easy to use or to read	1	2	3	4	5	They are difficult to use or to read
They are inexpensive	1	2	3	4	5	They are expensive
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have comprehensive data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experiences using them	1	2	3	4	5	I've had bad prior experiences using them

23. **If you were deciding whether or not to use JOURNAL ARTICLES in your work, how important would the following factors be? (Check Box)**

	Very Unimportant Factor				Very Important Factor
Are easy to physically obtain	☐	☐	☐	☐	☐
Are easy to use or to read	☐	☐	☐	☐	☐
Are inexpensive	☐	☐	☐	☐	☐
Have good technical quality	☐	☐	☐	☐	☐
Have comprehensive data and information	☐	☐	☐	☐	☐
Are relevant to my work	☐	☐	☐	☐	☐
Can be obtained at a nearby location or source	☐	☐	☐	☐	☐
Had good prior experiences using them	☐	☐	☐	☐	☐

24. **In your work, how important is it for you to use JOURNAL ARTICLES? (Circle Number)**

Very Unimportant 1 2 3 4 5 **Very Important**

25. **Do you use JOURNAL ARTICLES in your work? (Check Box)**

☐ **Yes** ☐ **No (Skip to Q.27)**

26. **How many times in the past 6 months have you used JOURNAL ARTICLES?**

__________**Times in the Past 6 Months**

27. **(Even if you don't use them...) What is your opinion of <u>CONFERENCE</u> <u>or</u> <u>MEETING</u> <u>PAPERS</u>? (Circle Number)**

They are easy to physically obtain	1	2	3	4	5	They are difficult to physically obtain
They are easy to use or to read	1	2	3	4	5	They are difficult to use or to read
They are inexpensive	1	2	3	4	5	They are expensive
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have comprehensive data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experiences using them	1	2	3	4	5	I've had bad prior experiences using them

28. **If you were deciding whether or not to use <u>CONFERENCE</u> <u>or</u> <u>MEETING</u> <u>PAPERS</u> in your work, how important would the following factors be? (Check Box)**

	Very Unimportant Factor				Very Important Factor
Are easy to physically obtain	☐	☐	☐	☐	☐
Are easy to use or to read	☐	☐	☐	☐	☐
Are inexpensive	☐	☐	☐	☐	☐
Have good technical quality	☐	☐	☐	☐	☐
Have comprehensive data and information	☐	☐	☐	☐	☐
Are relevant to my work	☐	☐	☐	☐	☐
Can be obtained at a nearby location or source	☐	☐	☐	☐	☐
Had good prior experiences using them	☐	☐	☐	☐	☐

29. **In your work, how important is it for you to use <u>CONFERENCE</u> <u>or</u> <u>MEETING</u> <u>PAPERS</u>? (Circle Number)**

Very Unimportant 1 2 3 4 5 **Very Important**

30. **Do you use <u>CONFERENCE</u> <u>or</u> <u>MEETING</u> <u>PAPERS</u> in your work? (Check Box)**

☐ **Yes** ☐ **No (Skip to Q.32)**

31. **How many times in the past 6 months have you used <u>CONFERENCE</u> <u>or</u> <u>MEETING</u> <u>PAPERS</u>?**

__________Times in the Past 6 Months

32. **(Even if you don't use them...) What is your opinion of <u>IN-HOUSE</u> <u>TECHNICAL</u> <u>REPORTS</u>? (Circle Number)**

They are easy to physically obtain	1	2	3	4	5	They are difficult to physically obtain
They are easy to use or to read	1	2	3	4	5	They are difficult to use or to read
They are inexpensive	1	2	3	4	5	They are expensive
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have comprehensive data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experiences using them	1	2	3	4	5	I've had bad prior experiences using them

33. **If you were deciding whether or not to use <u>IN-HOUSE</u> <u>TECHNICAL</u> <u>REPORTS</u> in your work, how important would the following factors be? (Check Box)**

	Very Unimportant Factor				Very Important Factor
Are easy to physically obtain	☐	☐	☐	☐	☐
Are easy to use or to read	☐	☐	☐	☐	☐
Are inexpensive	☐	☐	☐	☐	☐
Have good technical quality	☐	☐	☐	☐	☐
Have comprehensive data and information	☐	☐	☐	☐	☐
Are relevant to my work	☐	☐	☐	☐	☐
Can be obtained at a nearby location or source	☐	☐	☐	☐	☐
Had good prior experiences using them	☐	☐	☐	☐	☐

34. **In your work, how important is it for you to use <u>IN-HOUSE</u> <u>TECHNICAL</u> <u>REPORTS</u>? (Circle Number)**

Very Unimportant 1 2 3 4 5 **Very Important**

35. **Do you use <u>IN-HOUSE</u> <u>TECHNICAL</u> <u>REPORTS</u> in your work? (Check Box)**

☐ **Yes** ☐ **No (Skip to Q.37)**

36. **How many times in the past 6 months have you used <u>IN-HOUSE</u> <u>TECHNICAL</u> <u>REPORTS</u>?**

__________ **Times in the Past 6 Months**

37. (Even if you don't use them...) What is your opinion of AGARD TECHNICAL REPORTS? (Circle Number)

They are easy to physically obtain	1	2	3	4	5	They are difficult to physically obtain
They are easy to use or to read	1	2	3	4	5	They are difficult to use or to read
They are inexpensive	1	2	3	4	5	They are expensive
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have comprehensive data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experiences using them	1	2	3	4	5	I've had bad prior experiences using them

38. If you were deciding whether or not to use AGARD TECHNICAL REPORTS in your work, how important would the following factors be? (Check Box)

	Very Unimportant Factor				Very Important Factor
Are easy to physically obtain	☐	☐	☐	☐	☐
Are easy to use or to read	☐	☐	☐	☐	☐
Are inexpensive	☐	☐	☐	☐	☐
Have good technical quality	☐	☐	☐	☐	☐
Have comprehensive data and information	☐	☐	☐	☐	☐
Are relevant to my work	☐	☐	☐	☐	☐
Can be obtained at a nearby location or source	☐	☐	☐	☐	☐
Had good prior experiences using them	☐	☐	☐	☐	☐

39. In your work, how important is it for you to use AGARD TECHNICAL REPORTS? (Circle Number)

Very Unimportant 1 2 3 4 5 **Very Important**

40. Do you use AGARD TECHNICAL REPORTS in your work? (Check Box)

☐ **Yes** ☐ **No (Skip to Q.42)**

41. How many times in the past 6 months have you used AGARD TECHNICAL REPORTS?

__________**Times in the Past 6 Months**

42. **(Even if you don't use them...) What is your opinion of DoD TECHNICAL REPORTS? (Circle Number)**

They are easy to physically obtain	1	2	3	4	5	They are difficult to physically obtain
They are easy to use or to read	1	2	3	4	5	They are difficult to use or to read
They are inexpensive	1	2	3	4	5	They are expensive
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have comprehensive data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experiences using them	1	2	3	4	5	I've had bad prior experiences using them

43. **If you were deciding whether or not to use DoD TECHNICAL REPORTS in your work, how important would the following factors be? (Check Box)**

	Very Unimportant Factor				Very Important Factor
Are easy to physically obtain	☐	☐	☐	☐	☐
Are easy to use or to read	☐	☐	☐	☐	☐
Are inexpensive	☐	☐	☐	☐	☐
Have good technical quality	☐	☐	☐	☐	☐
Have comprehensive data and information	☐	☐	☐	☐	☐
Are relevant to my work	☐	☐	☐	☐	☐
Can be obtained at a nearby location or source	☐	☐	☐	☐	☐
Had good prior experiences using them	☐	☐	☐	☐	☐

44. **In your work, how important is it for you to use DoD TECHNICAL REPORTS? (Circle Number)**

Very Unimportant 1 2 3 4 5 **Very Important**

45. **Do you use DoD TECHNICAL REPORTS in your work? (Check Box)**

☐ **Yes** ☐ **No (Skip to Q.47)**

46. **How many times in the past 6 months have you used DoD TECHNICAL REPORTS?**
___________**Times in the Past 6 Months**

47. (Even if you don't use them...) What is your opinion of NASA TECHNICAL REPORTS? (Circle Number)

They are easy to physically obtain	1	2	3	4	5	They are difficult to physically obtain
They are easy to use or to read	1	2	3	4	5	They are difficult to use or to read
They are inexpensive	1	2	3	4	5	They are expensive
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have comprehensive data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experiences using them	1	2	3	4	5	I've had bad prior experiences using them

48. If you were deciding whether or not to use NASA TECHNICAL REPORTS in your work, how important would the following factors be? (Check Box)

	Very Unimportant Factor				Very Important Factor
Are easy to physically obtain	☐	☐	☐	☐	☐
Are easy to use or to read	☐	☐	☐	☐	☐
Are inexpensive	☐	☐	☐	☐	☐
Have good technical quality	☐	☐	☐	☐	☐
Have comprehensive data and information	☐	☐	☐	☐	☐
Are relevant to my work	☐	☐	☐	☐	☐
Can be obtained at a nearby location or source	☐	☐	☐	☐	☐
Had good prior experiences using them	☐	☐	☐	☐	☐

49. In your work, how important is it for you to use NASA TECHNICAL REPORTS? (Circle Number)

Very Unimportant 1 2 3 4 5 **Very Important**

50. Do you use NASA TECHNICAL REPORTS in your work? (Check Box)

☐ **Yes** ☐ **No (Skip to Q.52)**

51. How many times in the past 6 months have you used NASA TECHNICAL REPORTS?

__________**Times in the Past 6 Months**

over ⟶

The following data will be used to determine whether people with different backgrounds have different technical communication practices.

52. **Please list all of your degrees.**

- ☐ No degree
- ☐ Bachelors in ____________
- ☐ Masters in ____________
- ☐ M B A
- ☐ J D
- ☐ Doctorate in ____________
- ☐ Other (specify) ____________

53. **Your years of professional aerospace work experience:** ________Years

54. **The type of organization where you work: (Check ONLY ONE Box)**

- ☐ Academic
- ☐ Industry
- ☐ Government
- ☐ Not-for-profit
- ☐ Other (specify) ____________

55. **Which of the following BEST describes your primary professional duties? (Check ONLY ONE Box)**

- ☐ Research
- ☐ Administration/Mgt (private sector)
- ☐ Administration/Mgt (not-for-profit)
- ☐ Design/Development
- ☐ Teaching/Academic (may include research)
- ☐ Manufacturing/Production
- ☐ Private consultant
- ☐ Service/Maintenance
- ☐ Marketing/Sales
- ☐ Other (specify) ____________

56. **Your academic preparation was as a(n):**

- ☐ Engineer
- ☐ Scientist
- ☐ Other (specify) ____________

57. **In your present job, you consider yourself primarily a(n):**

- ☐ Engineer
- ☐ Scientist
- ☐ Other (specify) ____________

58. **The SAE aerospace membership categories are listed below. Please check the ONE box that best classifies your organization.**

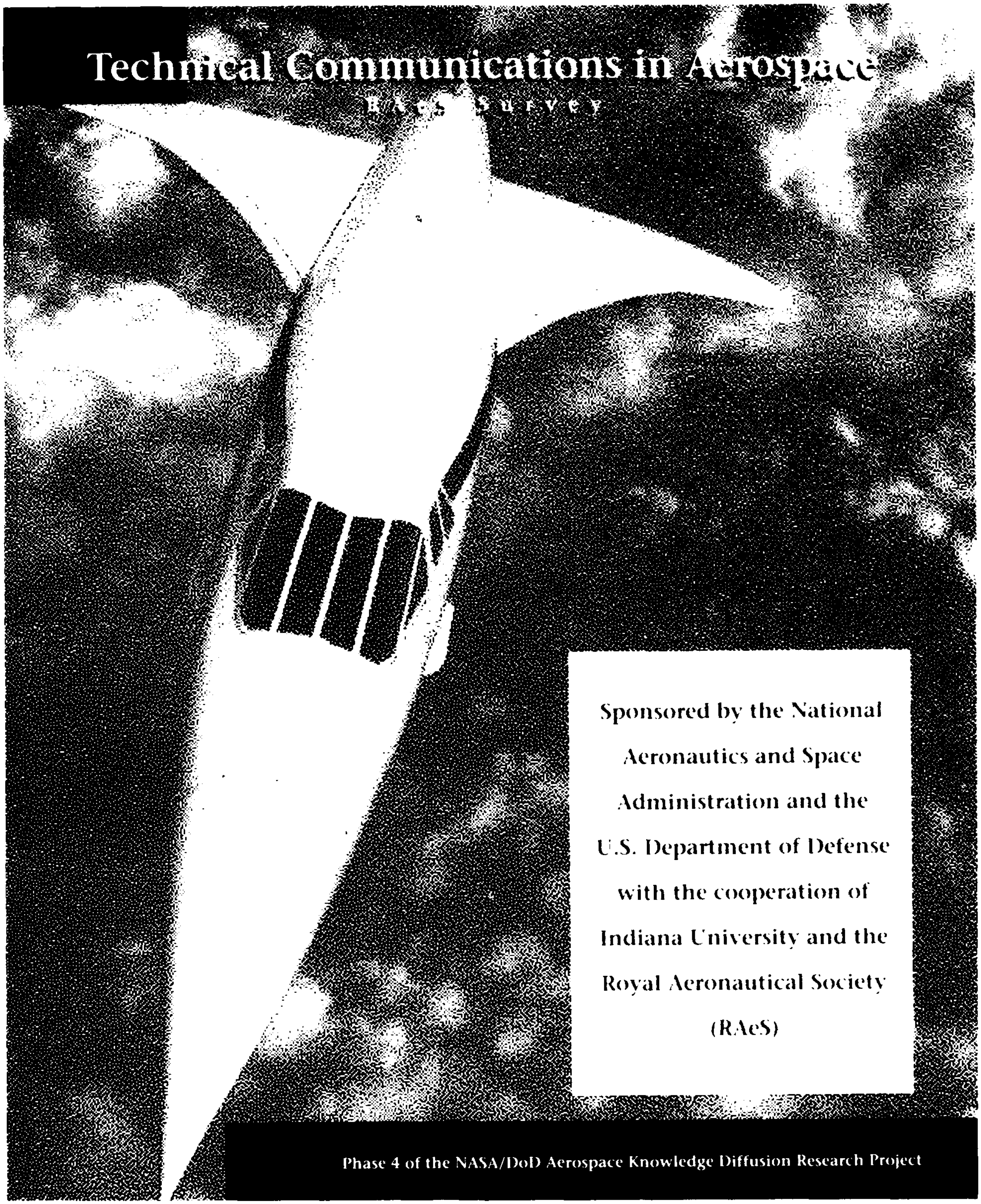
- ☐ Airplanes
- ☐ Helicopters
- ☐ Space vehicles (incls. missiles & satellites)
- ☐ Parts, accessories, & component mfg.
- ☐ Operations & maintenance
- ☐ Avionics, electronic, and electrical systems
- ☐ Ground support
- ☐ Air transportation - trunk, regional & int'l
- ☐ Air transportation - business & general aviation
- ☐ Other (specify) ____________

Project Number :

Reply to: **NASA Langley Research Center**
Mail Stop 180 A
Hampton, VA 23665-5225

APPENDIX E

RAeS Questionnaire



1. **Are you a member of a Branch of the Royal Aeronautical Society? (Please circle a number.)**

1 Yes

2 No

2. **During the past season, how often did you attend: (Please indicate how many times.)**

RAeS Conferences:	**RAeS Lectures:**	**RAeS Courses:**
_____ Times at Hamilton Place	_____ Times at Hamilton Place	_____ Times at Hamilton Place
_____ Times at a Branch	_____ Times at a Branch	_____ Times at a Branch

3. **If applicable, please provide the name of the Branch where you most recently attended a Conference, Lecture, or Course in the past season.**

Branch most recently attended for a RAeS Conference: ______________________________

Branch most recently attended for a RAeS Lecture: ______________________________

Branch most recently attended for a RAeS Course: ______________________________

4. **<u>If you did not attend</u> a RAeS Conference, Lecture, or Course at a Branch site in the past six months, what reasons did you have for not attending? (Please circle <u>ALL</u> numbers that apply.)**

	<u>Yes</u>	**<u>No</u>**
I was not interested in any topics	1	2
I find the lecture programmes uninteresting	1	2
I live too far from a Branch to attend	1	2
I work too far from a Branch to attend	1	2

Other (Please specify.) ______________________________

5. **About how far away do you live from the nearest Branch?** ______ miles

6. **During the past year, how many times did you use the RAeS library?**

_____Times **(If you did not use the RAeS library, please TICK here _____ and skip to Q. 10.)**

7. **When you used the RAeS library over the past year, was the information you wanted: (Please circle number for each.)**

	<u>Yes</u>	**<u>No</u>**
Technical	1	2
Commercial	1	2
General	1	2
Historical	1	2

8. **If you circled more than one "yes" on Q. 7, which did you use most often? (Please circle ONLY ONE number.)**

1	Technical	3	General
2	Commercial	4	Historical

9. **When you use the RAeS library, do you normally use: (Please circle number for each.)**

	Yes	No
Loan Material	1	2
Photocopies	1	2

10. **Do you think that the RAeS provides an adequate information service? (Please circle a number.)**

1 Yes

2 No ——► **How would you like to see it improved?** ______________________

____

11. **Should the RAeS develop a computerized data centre that would allow access to the RAeS library holdings by modem? (Please circle a number.)**

1 Yes

2 No

The following questions are about the RAeS publication AEROSPACE.
(Please circle a number for each.)

		Yes	No
12.	**Do you look at AEROSPACE when seeking career opportunities?**	1	2
13.	**Do you think AEROSPACE should contain a regular page on education and training?**	1	2
14.	**Do you think the RAeS should publish more journals covering sectors of specialist aerospace subjects?**	1	2
15.	**Do AEROSPACE articles influence your own buying decisions?**	1	2
16.	**Do AEROSPACE articles help you do your job better?**	1	2
17.	**In your current position, do you:**		
	1. Make procurement decisions?	1	2
	2. Influence procurement decisions?	1	2

18. **As a RAeS member, would you be interested in acting as a mentor for young persons at nearby schools or work? (Please circle a number.)**

1 Yes

2 No

19. Are you registered with the Engineering Council as: (Please circle a number.)

	Yes	No
Chartered Engineer	1	2
Incorporated Engineer	1	2
Engineering Technician	1	2

(If you are RETIRED, please TICK here _____ and skip to the top of page 10.)

The following questions concern the most important TECHNICAL project, task, or problem you have worked on in the past six months.
(If you are not involved with technical projects, tasks, or problems, please TICK here _____ and skip to the top of page 10.)

20. Thinking of the most important job-related project, task, or problem you have worked on in the past six months, which category best describes this work? (Please tick ONLY ONE box.)

☐ Educational (e.g., for professional development or preparation of a lecture)

☐ Research (either basic or applied)

☐ Design

☐ Development

☐ Manufacturing

☐ Production

☐ Computer applications

☐ Management (e.g., planning, budgeting, and managing research)

☐ Other (Please specify.) ____________________

21. Considering the time you spent on this project only, how would you describe the kinds of duties you performed while working on the project in terms of engineering, science, and management? (Please enter amounts as percentages that total 100%.)

______% Engineering

______% Science

______% Management

______% Other (Please describe.) ____________________

22. How would you describe the overall complexity of the technical project, task, or problem you categorised in Q. 20? (Please circle a number.)

Very simple 1 2 3 4 5 Very complex

23. How would you rate the amount of technical uncertainty that you faced when you started the technical project, task, or problem categorised in Q. 20? (Please circle a number.)

Little uncertainty 1 2 3 4 5 Great uncertainty

24. **While you were involved in the technical project, task, or problem, did you work with others, or did you work alone? (Please circle a number.)**

1 With others ——► **With about how many other persons?** ________

2 Alone

25. **What steps did you follow to get the information you needed for this project, task, or problem?**
(Please sequence these items (e.g., 1, 2, 3, 4, 5) and put an X beside the steps you did not use.)

Sequence

_____ Used my personal store of technical information, including sources I keep in my office

_____ Spoke with co-workers or people inside my organisation

_____ Spoke with colleagues outside my organisation

_____ Spoke with a librarian or technical information specialist

_____ Used literature resources (e.g., conference papers, journals, technical reports) found in my organisation's library

(If you used none of the above steps, please TICK here_____.)

The following questions concern your use of information sources.

26. **Which of the following information sources do you use in performing your present professional duties? (Please circle a number for each source.)**

	Yes	No
Conference/Meeting Papers	1	2
Journal Articles	1	2
In-House Technical Reports	1	2
AGARD Technical Reports	1	2
RAE Technical Reports	1	2
NASA Technical Reports	1	2

27. **In terms of performing your present professional duties, how important is each of the following sources? (Please circle a number for each source.)**

	Not at All Important				Very Important
Conference/Meeting Papers	1	2	3	4	5
Journal Articles	1	2	3	4	5
In-House Technical Reports	1	2	3	4	5
AGARD Technical Reports	1	2	3	4	5
RAE Technical Reports	1	2	3	4	5
NASA Technical Reports	1	2	3	4	5

28. **In the past six months, approximately how many times did you use CONFERENCE/MEETING PAPERS in performing your present professional duties?**

_____ Times in the past six months

29. **Even if you don't use them, please rate CONFERENCE/MEETING PAPERS on each of the following. (Please circle a number for each rating.)**

Physically, they are easy to obtain	1	2	3	4	5	Physically, they are difficult to obtain
They are easy to read or to use	1	2	3	4	5	They are difficult to read or to use
They are cost free	1	2	3	4	5	They are costly
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have complete data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experience using them	1	2	3	4	5	I've had poor prior experience using them

30. **In the past six months, approximately how many times did you use JOURNAL ARTICLES in performing your present professional duties?**

_____ Times in the past six months

31. **Even if you don't use them, please rate JOURNAL ARTICLES on each of the following. (Please circle a number for each rating.)**

Physically, they are easy to obtain	1	2	3	4	5	Physically, they are difficult to obtain
They are easy to read or to use	1	2	3	4	5	They are difficult to read or to use
They are cost free	1	2	3	4	5	They are costly
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have complete data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experience using them	1	2	3	4	5	I've had poor prior experience using them

32. **In the past six months, approximately how many times did you use NASA TECHNICAL REPORTS in performing your present professional duties?**

_____ Times in the past six months

33. Even if you don't use them, please rate NASA TECHNICAL REPORTS on each of the following. (Please circle a number for each rating.)

Physically, they are easy to obtain	1	2	3	4	5	Physically, they are difficult to obtain
They are easy to read or to use	1	2	3	4	5	They are difficult to read or to use
They are cost free	1	2	3	4	5	They are costly
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have complete data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experience using them	1	2	3	4	5	I've had poor prior experience using them

34. How often do you find out about NASA TECHNICAL REPORTS from each of these sources? (Please circle a number for each source.)

	Frequently	Sometimes	Seldom	Never
Bibliographic database search	1	2	3	4
Announcement journal (e.g., STAR)	1	2	3	4
Current awareness publication (e.g., SCAN)	1	2	3	4
Cited in a report/journal/conference paper	1	2	3	4
Referred to me by colleague	1	2	3	4
Referred to me by librarian	1	2	3	4
Routed to me by library	1	2	3	4
By intentional search of library resources	1	2	3	4
By accident, by browsing, or looking for other material	1	2	3	4
NASA informed me	1	2	3	4
The author informed me	1	2	3	4
Other________________________				

35. How often do you usually obtain physical access to NASA TECHNICAL REPORTS from each of these sources? (Please circle a number for each source.)

	Frequently	Sometimes	Seldom	Never
NASA sends them to me	1	2	3	4
Referred to me by the author	1	2	3	4
The author sends them to me	1	2	3	4
I request/order them from my library	1	2	3	4
I request/order them from British Library Lending Division (BLLD)	1	2	3	4
I request/order them from Defense Research Information Center (DRIC)	1	2	3	4
I get them from a colleague	1	2	3	4
They are routed to me by my library	1	2	3	4

36. In the past six months, approximately how many times did you use IN-HOUSE TECHNICAL REPORTS in performing your present professional duties?

_____ Times in the past six months

37. Even if you don't use them, please rate IN-HOUSE TECHNICAL REPORTS on each of the following. (Please circle a number for each rating.)

Physically, they are easy to obtain	1	2	3	4	5	Physically, they are difficult to obtain
They are easy to read or to use	1	2	3	4	5	They are difficult to read or to use
They are cost free	1	2	3	4	5	They are costly
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have complete data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experience using them	1	2	3	4	5	I've had poor prior experience using them

38. In the past six months, approximately how many times did you use AGARD TECHNICAL REPORTS in performing your present professional duties?

_____ Times in the past six months

39. Even if you don't use them, please rate AGARD TECHNICAL REPORTS on each of the following. (Please circle a number for each rating.)

Physically, they are easy to obtain	1	2	3	4	5	Physically, they are difficult to obtain
They are easy to read or to use	1	2	3	4	5	They are difficult to read or to use
They are cost free	1	2	3	4	5	They are costly
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have complete data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experience using them	1	2	3	4	5	I've had poor prior experience using them

40. **In the past six months, approximately how many times did you use <u>RAE TECHNICAL REPORTS</u> in performing your present professional duties?**

______ Times in the past six months

41. **Even if you don't use them, please rate <u>RAE TECHNICAL REPORTS</u> on each of the following. (Please circle a number for each rating.)**

Physically, they are easy to obtain	1	2	3	4	5	Physically, they are difficult to obtain
They are easy to read or to use	1	2	3	4	5	They are difficult to read or to use
They are cost free	1	2	3	4	5	They are costly
They are of good technical quality	1	2	3	4	5	They are of poor technical quality
They have complete data and information	1	2	3	4	5	They have incomplete data and information
They are relevant to my work	1	2	3	4	5	They are irrelevant to my work
They can be obtained at a nearby location or source	1	2	3	4	5	They must be obtained from a distant location or source
I've had good prior experience using them	1	2	3	4	5	I've had poor prior experience using them

42. **How often do you find out about <u>RAE TECHNICAL REPORTS</u> from each of these sources? (Please circle a number for each source.)**

	Frequently	**Sometimes**	**Seldom**	**Never**
Bibliographic database search	1	2	3	4
Announcement journal (e.g., STAR)	1	2	3	4
Current awareness publication (e.g., DRA)	1	2	3	4
Cited in a report/journal/conference paper	1	2	3	4
Referred to me by colleague	1	2	3	4
Referred to me by librarian	1	2	3	4
Routed to me by library	1	2	3	4
By intentional search of library resources	1	2	3	4
By accident, by browsing, or looking for other material	1	2	3	4
The RAE informed me	1	2	3	4
The author informed me	1	2	3	4

Other______________________________

43. How often do you usually obtain physical access to RAE TECHNICAL REPORTS from each of these sources? (Please circle a number for each source.)

	Frequently	Sometimes	Seldom	Never
RAE sends them to me	1	2	3	4
The author sends them to me	1	2	3	4
I request them from the author	1	2	3	4
I request/order them from my library	1	2	3	4
I request/order them from BLLD	1	2	3	4
I request/order them from DRIC	1	2	3	4
I get them from a colleague	1	2	3	4
They are routed to me by my library	1	2	3	4

These data will help us determine what use is made of libraries and technical information centres and services, and how information technology is used by aerospace engineers and scientists.

44. Does your organisation have a library and/or technical information centre? (Please circle a number.)

1 Yes ———▶ **45. How far are you from it?** _______ miles

2 No **(If No, skip to Q. 48.)**

46. In the past six months, about how often did you use your organisation's library/technical information centre? (Please circle a number.)

Not often 1 2 3 4 5 Very often

47. In terms of performing your present professional duties, how important is your organisation's library/technical information centre? (Please circle a number.)

Not at all important 1 2 3 4 5 Very important

48. In the past year, did you use any of the following external libraries to perform your present professional duties? (Please circle a number for each.)

	Yes	No
RAeS library	1	2
Public library	1	2
University or other school library	1	2

Other library (Please specify.) ______________________________

These last few questions concern your background and professional training.

49. What is the highest level of education you have completed? (Please circle ONLY ONE number.)

1 No degree
2 Ordinary national certificate
3 Higher national certificate
4 Ordinary national diploma
5 Higher national diploma
6 Bachelor's degree
7 Master's degree
8 Doctorate
9 Postdoctorate
10 Licence (Please specify.) ____________

50. What is your primary professional duty? (Please circle ONLY ONE number.)

1 Academic/teaching (may include research)
2 Research
3 Administrative/management in industry
4 Administrative/management in government, non-profit
5 Design/development
6 Manufacturing/production
7 Marketing/sales
8 Service/maintenance
9 Private consultant
10 Other ____________

51. What is the type of organisation where you work? (Please circle ONLY ONE number.)

1 Academic
2 Government
3 Industry
4 Non-profit
5 Retired or unemployed
6 Other ____________

52. Are you trained as: (Please circle a number.)

1 An engineer 2 A scientist 3 Other ____________

53. Would your present professional duties be classified as: (Please circle a number.)

1 An engineer 2 A scientist 3 Other ____________

54. How many years of professional work experience in aerospace do you have?

________Years in aerospace

55. Do you currently have a pilot's licence? (Please circle a number.)

1 Yes → **56. How many flying hours do you have?** _____ hours

2 No **(If No, skip to Q. 58.)**

57. For what aircraft are you licenced? ____________

OVER →

58. **Are you a qualified engineer? (Please circle a number.)**

1 Yes 2 No **(If No, skip to Q. 60.)**

59. **Are you: (Please circle a number.)**

	Yes	No
An aircraft maintenance engineer	1	2
Licenced as an aircraft maintenance engineer	1	2
A flight engineer	1	2
Licenced as a flight engineer	1	2

60. **What is your principal RAeS interest group? (Please circle ONLY ONE number.)**

1 Aeromarine (joint group with SUT and RINA)
2 Aerodynamics
3 Air Law
4 Air Transport
5 Airworthiness and Maintenance
6 Aviation Medicine
7 Avionics Systems
8 Flight Simulation
9 Graduates, Young Technicians and Students
10 Guided Flight
11 Historical
12 Human-Powered Aircraft
13 Light Aeroplanes
14 Management Studies
15 Mechanical and Structural
16 Propulsion
17 Rotorcraft
18 Space
19 Test Pilots

61. **Which of the following best characterizes your area of work or application of your work? (Please circle ONLY ONE number.)**

1 Acronautics
2 Astronautics
3 Engineering
4 Space Sciences
5 Mathematics & Computer Sciences
6 Materials & Chemistry
7 Physics
8 Other ______________________

62. **Is any of your work funded by the British Government? (Please circle a number.)**

1 Yes 2 No

63. **Who supplies the largest proportion of funds for your current research/project(s)? (Please circle a number.)**

1 British Government
2 Private Industry
3 Educational Institution
4 Non-profit
5 Do not receive research funds
6 Other ______________________

Thank you for your time and cooperation.

APPENDIX F

Netherlands, India, and U.S. Survey

1. In your work, how important is it for you to ***communicate*** (for example, producing written materials or oral discussions) technical information ***effectively***? (Circle number)

   Very Unimportant 1 2 3 4 5 Very Important

2. In the past 6 months, about how many hours did you spend each week ***communicating (producing)*** technical information?

   (output) ____ hours per week writing

   ____ hours per week communicating orally

3. Compared to 5 years ago, how has the amount of time you have spent ***communicating*** technical information changed? (Circle number)

   1. Increased
   2. Stayed the same
   3. Decreased

4. In the past 6 months, about how many hours did you spend each week working with technical information ***received from others***?

   (input) ____ hours per week working with written information

   ____ hours per week receiving information orally

5. As you have advanced professionally, how has the amount of time you have spent working with technical information ***received from others*** changed? (Circle number)

   1. Increased
   2. Stayed the same
   3. Decreased

6. What percentage of your written technical communications involve:

Writing alone	____%	(If 100% alone, go to question 9.)
Writing with one other person	____%	
Writing with a group of 2 to 5 persons	____%	
Writing with a group of more than 5 persons	____%	
	100%	

7. In general, do you find writing as part of a group more or less productive (that is, producing more written products or producing better written products) than writing alone? (Circle number)

   1. A group is ***less*** productive than writing alone
   2. A group is ***about*** as productive as writing alone
   3. A group is ***more*** productive than writing alone
   4. Do not know; difficult to judge; cannot really say

8. In the past 6 months, did you work with the same group of people when producing written technical communications? (Circle number)

   1. Yes — About how many people were in the group: _____ number of people

   2. No — With about how many groups did you work: _____ number of groups

      About how many people were in each group: _____ number of people

9. Approximately how many times in the past 6 months did you ***write or prepare*** the following alone or in a group? (If in a group, how many people were in each group?)

Times in Past 6 Months Produced

	Alone	In a Group	
a. Abstracts	___Times	___Times	___Average No. of People
b. Journal articles	___	___	___
c. Conference/Meeting papers	___	___	___
d. Trade/Promotional literature	___	___	___
e. Drawings/Specifications	___	___	___
f. Audio/Visual materials	___	___	___
g. Letters	___	___	___
h. Memoranda	___	___	___
i. Technical proposals	___	___	___
j. Technical manuals	___	___	___
k. Computer program documentation	___	___	___
l. In-house technical reports	___	___	___
m. Technical talks/Presentations	___	___	___

10. Approximately how many times in the past 6 months did you *USE* the following?

a. Abstracts ___Times used in 6 months

b. Journal articles ___

c. Conference/Meeting papers ___

d. Trade/Promotional literature ___

e. Drawings/Specifications ___

f. Audio/Visual materials ___

g. Letters ___

h. Memoranda ___

i. Technical proposals ___

j. Technical manuals ___

k. Computer program documentation ___

l. U.S. Government technical reports ___

m. In-house technical reports ___

n. Technical talks/Presentations ___

11. What types of technical information do you *USE* in your present job? (Circle appropriate numbers)

	Yes	No
Basic scientific and technical information	1	2
Experimental techniques	1	2
Codes of standards and practices	1	2
Computer programs	1	2
Government rules and regulations	1	2
In-house technical data	1	2
Product and performance characteristics	1	2
Economic information	1	2
Technical specifications	1	2
Patents	1	2

12. What types of technical information do you *PRODUCE* (or expect to produce) in your present job? (Circle appropriate number)

	Yes	No
Basic scientific and technical information	1	2
Experimental techniques	1	2
Codes of standards and practices	1	2
Computer programs	1	2
Government rules and regulations	1	2
In-house technical data	1	2
Product and performance characteristics	1	2
Economic information	1	2
Technical specifications	1	2
Patents	1	2

13. Have you ever taken a course in technical communications/writing? (Circle the appropriate number)

1. Yes, as an undergraduate
2. Yes, after graduation
3. Yes, both
4. Presently taking
5. No

14. How much has this course helped you to communicate technical information? (Circle the appropriate number)

1. A lot
2. A little
3. Not at all

Go to Question 15.

15. Do you think that undergraduate aerospace engineering and science students should have training or course work in technical communications (for example, technical writing/oral presentations)? (Circle the appropriate number)

1. Yes
2. No
3. Don't know

Go to question 19.

If you answered "yes" to Question 15, please answer Questions 16, 17, and 18.

16. Do you think a technical communications course for undergraduate aerospace engineering and science students should be: (Circle the appropriate number)

1. Taken for academic credit
2. Not taken for academic credit
3. Don't know

17. Do you think the technical communications course should be: (Circle the appropriate number)

1. Taken as part of a required course
2. Taken as part of an elective course
3. Don't know

18. Do you think the technical communications course should be: (Circle the appropriate number)

1. Taken as part of an engineering course (for example, Engineering 201)
2. Taken as a separate course (for example, Technical Writing 101)
3. Taken as part of another course (that is, neither Engineering or English)
4. Don't know

19. Which of the following ***principles*** should be included in an undergraduate technical communications course for aerospace engineers and scientists? (Circle the appropriate numbers)

	Yes	No
Defining the purpose of the communication	1	2
Assessing the needs of the reader	1	2
Organizing information	1	2
Developing paragraphs (introductions, transitions, and conclusions)	1	2
Writing sentences	1	2
Notetaking and quoting	1	2
Editing and revising	1	2
Choosing words (avoiding wordiness, jargon, slang, sexist terms)	1	2
Other (specify) ____________		

20. Which of the following ***mechanics*** should be included in an undergraduate technical communications course for aerospace engineers and scientists? (Circle the appropriate numbers)

	Yes	No
Abbreviations	1	2
Acronyms	1	2
Capitalization	1	2
Numbers	1	2
Punctuation	1	2
References	1	2
Spelling	1	2
Symbols	1	2
Other (specify) ____________		

21. Which of the following ***on-the-job*** skills should be included in an undergraduate technical communications course for aerospace engineers and scientists? (Circle the appropriate numbers)

	Yes	No
Abstracts	1	2
Letters	1	2
Memoranda	1	2
Technical instructions	1	2
Journal articles	1	2
Conference/Meeting papers	1	2
Literature reviews	1	2
Technical manuals	1	2
Newsletter/newspaper articles	1	2
Oral (technical) presentations	1	2
Technical specifications	1	2
Technical reports	1	2
Use of information sources	1	2
Other (specify) ____________		

22. Do you use computer technology to prepare technical information? (Circle the appropriate number)

1. Always
2. Usually
3. Sometimes
4. Never   Go to question 25.

If you answered "never" to Question 22, please skip to Question 25, otherwise, please answer Question 23.

23. How much has computer technology increased your ability to communicate technical information? (Circle the appropriate number)

1. Yes, a lot
2. Yes, a little
3. No
4. Don't know

24. Do you *USE* any of the following software to prepare written technical information? (Circle the appropriate numbers)

	Yes	No
Word processing	1	2
Outliners and prompters	1	2
Grammar and style checkers	1	2
Spelling checkers	1	2
Thesaurus	1	2
Business graphics	1	2
Scientific graphics	1	2
Desktop publishing	1	2

25. How do you view your *USE* of the following electronic/information technologies in communicating technical information? (Circle the appropriate number)

Information Technologies	I already use it	I don't use it, but may in the future	I don't use it and doubt if I will
Audio tapes and cassettes	1	2	3
Motion picture film	1	2	3
Video tape	1	2	3
Desktop/electronic publishing	1	2	3
Computer cassette/cartridge tapes	1	2	3
Electronic Mail	1	2	3
Electronic bulletin boards	1	2	3
FAX or TELEX	1	2	3
Electronic data bases	1	2	3
Video conferencing	1	2	3
Computer conferencing	1	2	3
Micrographics & microforms	1	2	3
Laser disc/video disc/CD-ROM	1	2	3
Electronic networks	1	2	3

26. At your work place, do you use electronic networks in performing your present duties?

1. Yes

2. No

3. No, because I do not have access to electronic networks

Go to question 32.

If you answered "yes" to Question 26, please answer questions 27, 28, 29, 30, and 31.

27. At your work place, how do you access electronic networks?

1. By using a mainframe terminal

2. By using a personal computer

3. By using a workstation

28. How important is the use of electronic networks in performing your present duties?

Very Unimportant 1 2 3 4 5 Very Important

29. In a typical week, how many hours did you *USE* electronic (computer) networks?

______Hours in a typical week

30. Do you use electronic networks for the following purposes?

	Yes	No
1. To connect to geographically distant sites	1	2
2. For electronic mail	1	2
3. For electronic bulletin boards or conferences	1	2
4. For electronic file transfer	1	2
5. To log into remote computers for such things as computational analysis or to use design tools	1	2
6. To control remote equipment such as laboratory instruments or machine tools	1	2
7. To access/search the library's catalog	1	2
8. To order documents from the library	1	2
9. To search electronic (bibliographic) data bases (e.g., Dialog)	1	2
10. For information search and data retrieval	1	2
11. To prepare scientific and technical papers with colleagues at geographically distant sites	1	2

31. Do you use electronic (computer) networks to communicate with:

	Yes	No
1. Members of your work group	1	2
2. Other people in your organization (at the ***SAME*** geographic site) who are not in your work group	1	2
3. Other people in your organization (at a geographically ***DIFFERENT*** site) who are ***NOT*** in your work group	1	2
4. People outside of your organization	1	2

32. How likely would you be to ***USE*** the following information if it was available in electronic format?

	Very Unlikely				Very Likely
1. Data tables/mathematical presentations	1	2	3	4	5
2. Computer program listings	1	2	3	4	5
3. Online system (with full text and graphics) for technical papers	1	2	3	4	5
4. CD-ROM system (with full text and graphics) for technical reports	1	2	3	4	5

33. Which of the following best explains why you would not be using these materials in electronic format?

1. No/limited computer access
2. Hardware/software incompatibility
3. Prefer printed format
4. Other (specify) ______________________________

34. Does your organization have a library/technical information center? (Circle the appropriate number)

1. Yes, in my building
2. Yes, but not in my building ⟶ ___Km
3. No   Go to question 37.

If you answered "yes" to Question 34, please answer Questions 35 and 36.

35. In the past 6 months, about how often did you ***USE*** your organization's library/technical information center?

_____Number of times in past 6 months

36. In terms of performing your present professional duties, how important is your organization's library/technical information center? (Circle the appropriate number)

Not at all important   1   2   3   4   5   Very important

37. When faced with solving a technical problem, which of the following sources do you usually consult?

↓

Please sequence these items (for example, Number 1, 2, 3, 4, 5) and put an X beside the steps you did not use.

Sequence

____Used my personal store of technical information, including sources I keep in my office

____Spoke with co-workers or people inside by organization

____Spoke with colleagues outside my organization

____Spoke with a librarian or technical information specialist

____Used literature resources (for example, conference papers, journals, technical reports) found in my organization's library)

____Searched (or had someone search for me) an electronic (bibliographic) database in my library

(If you used none of the above steps, check here____.)

38. Do you *USE* technical reports from the following organizations or countries in performing your present professional duties? (Circle numbers)

		Yes	No	Don't Have Access
1	AGARD reports	1	2	9
2	British ARC and DRA(RAE) reports	1	2	9
3	Chinese CAE and CARDC reports	1	2	9
4	Dutch NLR reports	1	2	9
5	ESA reports	1	2	9
6	Indian NAL	1	2	9
7	French ONERA reports	1	2	9
8	German DLR(DFVLR), and DA(MBB) reports .	1	2	9
9	Japanese NAL reports	1	2	9
10	Russian TsAGI reports	1	2	9
11	U.S. NASA/DoD reports	1	2	9

39. How *IMPORTANT* are these reports in performing your present professional duties? (Circle numbers)

		Very Unimportant				Very Important	Don't Have Access
1	AGARD reports	1	2	3	4	5	9
2	British ARC and DRA(RAE) reports	1	2	3	4	5	9
3	Chinese CAE and CARDC reports	1	2	3	4	5	9
4	Dutch NLR reports	1	2	3	4	5	9
5	ESA reports	1	2	3	4	5	9
6	Indian NAL	1	2	3	4	5	9
7	French ONERA reports	1	2	3	4	5	9
8	German DLR(DFVLR), and DA(MBB) reports . .	1	2	3	4	5	9
9	Japanese NAL reports	1	2	3	4	5	9
10	Russian TsAGI reports	1	2	3	4	5	9
11	U.S. NASA/DoD reports	1	2	3	4	5	9

40. Your native language:

________________________ Please specify

41. How well do you read the following languages: (Circle numbers)

		Passably				Fluently	Do not Read This Language
1	Chinese	1	2	3	4	5	9
2	English	1	2	3	4	5	9
3	French	1	2	3	4	5	9
4	German	1	2	3	4	5	9
5	Japanese	1	2	3	4	5	9
6	Russian	1	2	3	4	5	9
7	Spanish	1	2	3	4	5	9
8	Other (please specify) ________________________						

42. How well do you speak the following languages: (Circle numbers)

		Passably				Fluently	Do not Speak This Language
1	Chinese	1	2	3	4	5	9
2	English	1	2	3	4	5	9
3	French	1	2	3	4	5	9
4	German	1	2	3	4	5	9
5	Japanese	1	2	3	4	5	9
6	Russian	1	2	3	4	5	9
7	Spanish	1	2	3	4	5	9
8	Other (please specify) ________________________						

These data will be used to determine whether people with different backgrounds have different technical communication practices.

43. Sex:

1. Female 2. Male

44. Education:

1. No degree
2. Bachelor
3. Master
4. Doctorate
5. Other (specify) ____________

45. Years of professional work experience:

______total years of work experience ______total years of professional aerospace work

46. Your native country: ______________________________

47. Country where you work: ___________________________

48. Type of organization where you work: (Circle ONLY ONE number)

1. Academic
2. Industrial
3. Not-for-profit
4. Government
5. Other (specify) _________

49. Which of the following BEST describes your primary professional duties? (Circle ONLY ONE number)

01 Research
02 Administration/Mgt
03 Design/Development
04 Teaching/Academic (may include research)
05 Manufacturing/Production
06 Private consultant
07 Service/Maintenance
08 Marketing/Sales
09 Other (specify) _________

50. Was your academic preparation as an:

1. Engineer
2. Scientist
3. Other (specify) ________

51. In your present job, do you consider yourself primarily an:

1. Engineer
2. Scientist
3. Other (specify) ________

52. Are you a member of a professional (national) engineering, scientific, or technical society?

1. Yes
2. No

53. Please list society (using initials/letters).

____
____
____
____
____

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	January 1994	Technical Memorandum

4. TITLE AND SUBTITLE
The U.S. Government Technical Report and the Transfer of Federally Funded Aerospace R&D: An Analysis of Five Studies*

5. FUNDING NUMBERS
WU 505-90

6. AUTHOR(S)
Thomas E. Pinelli, Rebecca O. Barclay, and John M. Kennedy

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
NASA Langley Research Center
Hampton, VA 23681-0001

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
National Aeronautics and Space Administration
Washington, DC 20546-0001

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
NASA TM-109061

11. SUPPLEMENTARY NOTES
*Report number 19 under the NASA/DoD Aerospace Knowledge Diffusion Research Project. Thomas E. Pinelli: Langley Research Center, Hampton, VA; Rebecca O. Barclay: Rensselaer Polytechnic Institute, Troy, NY; John M. Kennedy: Indiana University, Bloomington, IN.

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Unclassified-Unlimited

Subject Category 82

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

The U.S. government technical report is a primary means by which the results of federally funded research and development (R&D) are transferred to the U.S. aerospace industry. However, little is known about this information product in terms of its actual use, importance, and value in the transfer of federally funded R&D. To help establish a body of knowledge, the U.S. government technical report is being investigated as part of the *NASA/DoD Aerospace Knowledge Diffusion Research Project.* In this report, we summarize the literature on technical reports and provide a model that depicts the transfer of federally funded aerospace R&D via the U.S. government technical report. We present results from five studies of our investigation of aerospace knowledge diffusion vis-á-vis the U.S. government technical report and close with a brief overview of on-going research into the use of the U.S. government technical report as a rhetorical device for transferring federally funded aerospace R&D.

14. SUBJECT TERMS
Knowledge diffusion; Aerospace engineers and scientists; Information use; U.S. government technical reports

15. NUMBER OF PAGES
114

16. PRICE CODE
A06

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	