NASA/DoD Aerospace Knowledge Diffusion Research Project

Paper Eleven:

"The Voice of the User — How U.S. Aerospace Engineers and Scientists View DoD Technical Reports"

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THE NASA/DOD AEROSPACE KNOWLEDGE DIFFUSION RESEARCH PROJECT

A Research Agenda

Introduction

Worldwide, the aerospace industry is experiencing significant changes whose implications may not be well understood.[1] Increasing cooperation and collaboration among nations will result in a more international manufacturing environment, altering the current structures of domestic and foreign aerospace industries. International alliances will result in a more rapid diffusion of technology, increasing pressure on aerospace organizations to push forward with new technological developments and to take steps designed to maximize their inclusion into the research and development (R&D) process.

To remain world leaders in industry, aerospace producers must take the steps necessary to improve and maintain the professional competency of aerospace engineers and scientists and to enhance innovation and productivity as well as maximize the inclusion of recent technological developments into the R&D process. How well these objectives are met in the U.S., and at what cost, depends on a variety of factors, but largely on the ability of aerospace engineers and scientists to acquire and process the results of government funded R&D.

The ability of aerospace engineers and scientists to identify, acquire, and utilize scientific and technical information (STI) is of paramount importance to the efficiency of the R&D process. Testimony to the central role of STI in the R&D process is found in numerous studies (Fischer, 1980). These studies show, among other things, that U.S. aerospace engineers and scientists devote more time, on the average, to the communication of technical information than to any other scientific or technical activity (Pinelli, et al., 1989). A number of studies have found strong relationships between the communication of STI and technical performance at both the individual (Allen, 1970; Hall and Ritchie, 1975; and Rothwell and Robertson, 1973) and group levels (Carter and Williams, 1957; Rubenstein, et al., 1971; and Smith, 1970). Therefore, we concur with Fischer's (1980) conclusion that the "role of scientific and technical communication is thus central to the success of the innovation process, in general, and the management of R&D activities, in particular."

In terms of empirically derived data, very little is known about the diffusion of knowledge in the aerospace industry both in terms of the channels used to communicate the ideas and the information-gathering habits and practices of the members of the social system (i.e., aerospace engineers and scientists). Most of the channel studies in the U.S., such as the work by Gilmore, et al., (1967) and Archer (1964), have been concerned with the transfer of aerospace technology to non-aerospace industries.

Most of the studies involving U.S. aerospace engineers and scientists, such as the work by McCullough, et al., (1982) and Monge, et al., (1979), have been limited to the use of NASA STI products and services and have not been concerned with information-gathering habits and practices. Although researchers such as Davis (1975) and Spretnak (1982) have investigated the importance of technical communications to engineers, it is not possible to determine from the published results if the study participants included aerospace engineers and scientists. It is likely that an understanding of the process by which STI in the aerospace industry is communicated through certain channels over time among the members of the social system would contribute to increasing productivity, stimulating innovation, and improving and maintaining the professional competence of aerospace engineers and scientists.

Overview of the U.S. Aerospace Knowledge Diffusion Process

A model (figure 1) that depicts the transfer of U.S. government funded aerospace R&D is composed of two parts---the **informal** that relies on collegial contacts and the **formal** that relies on surrogates, information products, and information intermediaries to complete the "producer to user" transfer process. The producers are NASA and the DOD and their contractors and grantees. Producers depend upon surrogates and information intermediaries to complete the knowledge transfer process. When U.S. government 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 individual level.

Surrogates serve as technical report repositories or clearinghouses for the producers and include the Defense Technical Information Center (DTIC), the NASA Scientific and Technical Information Facility (NASA STIF), and the National Technical Information Service (NTIS). These surrogates have created a variety of technical report

[1] "Aerospace" includes aeronautics, space science, space technology, and related fields.

announcement journals such as TRAC (Technical Report Announcement Circular) and STAR (Scientific and Technical Aerospace Reports) and computerized retrieval systems such as DROLS (Defense RDT&E Online System) and RECON (REmote CONsole) that permit online access to technical report databases.

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 take information from one place and move it to another, often face-to-face. 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).

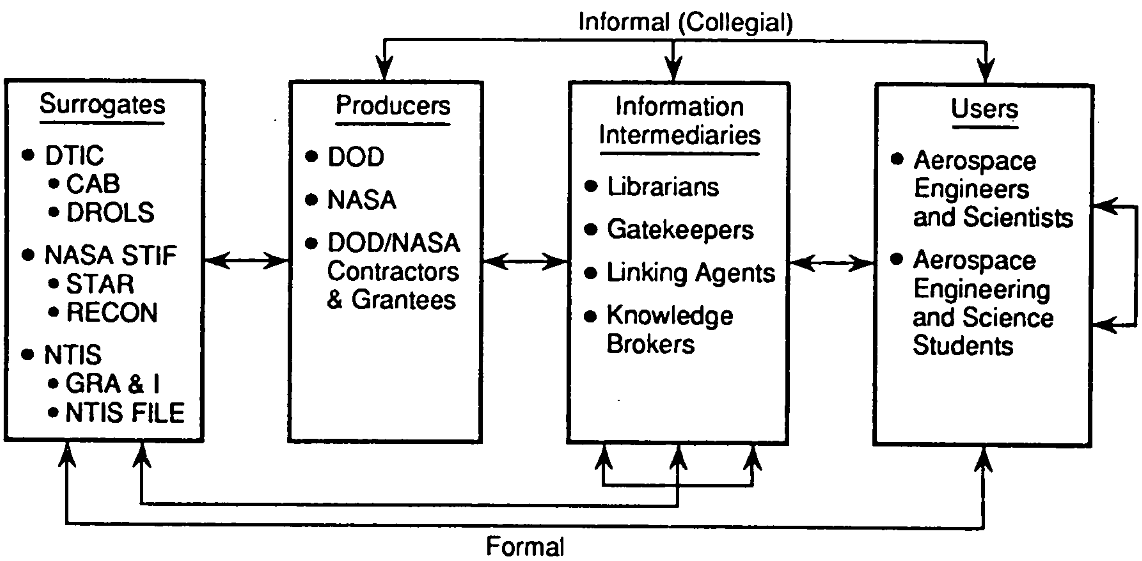

Figure 1. A Model Depicting the Transfer of Federally Funded Aerospace R&D.

The problem with the U.S. 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 the Federal government "has no coherent or 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."

The problem with 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 of 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---information that is becoming more interdisciplinary in nature and increasingly 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 findings 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.

Project Overview

The **NASA/DOD Aerospace Knowledge Diffusion Research Project** is a cooperative effort that is sponsored by NASA, Code RF and Code NTT and the DOD, Office of the Assistant Secretary of the Air Force, Deputy for Scientific and Technical Information. The research project is a joint effort of the Indiana University, Center for Survey Research and the NASA Langley Research Center. As scholarly inquiry, the project has both an immediate and a long term purpose. In the first instance, it provides a practical and pragmatic basis for understanding how the results of NASA/DOD research diffuse into the aerospace R&D process. Over the long term, it provides an empirical basis for understanding the aerospace knowledge diffusion process itself and its implications at the individual, organizational, national, and international levels.

Despite the vast amount of scientific and technical information (STI) available to potential users in the U.S., several major barriers to effective knowledge diffusion exist. **First**, the very low level of support for knowledge transfer in comparison to knowledge production suggests that dissemination efforts are not viewed as an important component of the R&D process. **Second**, there are mounting reports from users about difficulties in getting appropriate information in forms useful for problem solving and decision making. **Third**, rapid advances in many areas of S&T knowledge can be fully exploited only if they are quickly translated into further research and application. Although the United States produces significant amounts of basic aerospace R&D, foreign users may be better able to apply the results. **Fourth**, current mechanisms are often inadequate to help the user assess the quality of available information. **Fifth**, the characteristics of actual usage behavior are not sufficiently taken into account in making available useful and easily retrieved information.

These deficiencies must be remedied if the results of government funded R&D are to be successfully applied to innovation, problem solving, and productivity. Only by maximizing the R&D process can aerospace industries participate effectively and contribute at the international level. The **NASA/DOD Aerospace Knowledge Diffusion Research Project** will provide descriptive and analytical data regarding the flow of STI at the individual, organizational, national, and international levels. It will examine both the channels used to communicate information and the social system of the aerospace knowledge diffusion process. The results of the project should provide useful information to R&D managers, information managers, and others concerned with improving access to and utilization of STI.

Project Assumptions

1. Rapid diffusion of technology and technological developments requires an understanding of the aerospace knowledge diffusion process.

2. Knowledge production, transfer, and utilization are equally important components of the aerospace knowledge diffusion process.

3. Understanding the channels; the information products involved in the production, transfer, and utilization of aerospace information; and the information-seeking habits, practices, and preferences of aerospace engineers and scientists is necessary to understand aerospace knowledge diffusion.

4. The knowledge derived from government funded aerospace R&D is indispensable in maintaining the vitality of the aerospace industry and essential to maintaining and improving the professional competency of aerospace engineers and scientists.

5. The government technical report plays an important, but as yet undefined, role in the transfer and utilization of knowledge derived from government funded aerospace R&D.

6. Librarians, as information intermediaries, play an important, but as yet undefined, role in the transfer and utilization of knowledge derived from government funded aerospace R&D.

Project Objectives

1. Understanding the aerospace knowledge diffusion process at the individual, organizational, and national levels, placing particular emphasis on the diffusion of government funded aerospace STI.

2. Understanding the international aerospace knowledge diffusion process at the individual and organizational levels, placing particular emphasis on the information policies and systems used to diffuse the results of government funded aerospace STI.

3. Understanding the roles played by government technical reports and aerospace librarians in the transfer and utilization of knowledge derived from federally funded aerospace R&D.

4. Achieving recognition and acceptance throughout the aerospace community that STI is a valuable strategic resource for innovation, problem solving and productivity.

5. Providing results that can be used to optimize the effectiveness and efficiency of the STI aerospace transfer system and exchange mechanism.

Project Design

The initial thrust of the project is largely exploratory and descriptive; it focuses on the information channels and the members of the social system associated with the aerospace knowledge diffusion process. As scholarly inquiry, the project has both an immediate and a long term purpose. In the first instance, it provides a pragmatic basis for understanding how the results of government funded research diffuse into the aerospace R&D process. Over the long term, the project will provide an empirical basis for understanding the aerospace knowledge diffusion process at the individual, organizational, national, and international levels. An outline of the descriptive portion of the project is contained in Table 1 as "A Five Year Program of Research on Aerospace Knowledge Diffusion." (See appendix.)

Phase 1 of the 4-phase project is concerned with the information-seeking habits and practices of U.S. aerospace engineers and scientists, with particular emphasis being placed on their use of government funded aerospace STI products and services. (See Phase 1 of Table 1 on page 8.) A number of studies have indicated that researchers' information input and output activities are related or, at least, associated. Their communication behavior can be viewed as a system of information input and output activities and characterized as a series of complex interactions affected by a variety of factors. These factors influence the use and production of information and can be used to understand and explain the use and production of information sources and products (e.g., NASA/DOD technical reports).

The conceptual model shown in figure 2 assumes a consistent internal logic that governs the information-seeking and processing behavior of aerospace engineers and scientists despite any individual differences they may exhibit. This logic is the product of several interacting structural and sociometric factors, the purpose for which the information is needed, and the perceived utility of various information sources and products. The model is shown as a flow chart consisting of several functions and actions, including an evaluation function and a reinforcement function that provides feedback.

The results of the **Phase 1 pilot study** indicate that U.S. aerospace engineers and scientists spend approximately 65 percent of a 40-hour work week communicating STI. The types of information and the information products used and produced in performing professional duties are similar, with basic STI and in-house technical data most frequently reported. STI **internal** to the organization is preferred over **external** STI, which includes NASA/DOD technical reports, journal articles, and conference/meeting papers. Respondents identified informal channels and personalized sources as the primary method of STI seeking, followed by the use of formal information sources, when solving technical problems. Only after completing an informal search, followed by using formal information sources, do they turn to librarians and technical information specialists for assistance.

Phase 2 focuses on aerospace knowledge transfer and use within the larger U.S. social system, placing particular emphasis on the flow of aerospace STI in government and industry and the role of the information intermediary (i.e., the aerospace librarian/technical information specialist) in knowledge transfer. (See Phase 2 of Table 1 on page 8.) In Phase 2, the process of innovation in the U.S. aerospace industry is conceptualized as an information processing system which must deal with work-related uncertainty through patterns of technical communications.

Information processing in U.S. aerospace R&D (figure 3) is viewed as an ongoing problem solving cycle involving each activity within the innovation process, the larger organization, and the external world. For purposes of this study, the innovation process is conceptualized as a process of related activities or units beginning with research at one end and service and maintenance on the other.[2]

These activities or units are highly differentiated, however. They operate on different time frames, with different goals, and with varying professional orientations (Rosenbloom and Wolek, 1970). These differences in norms and values also carry with them different internal coding schemes which suggest that each unit may possess specific and unique information requirements and information processing patterns. In addition, each unit is likely to have different sources of effective feedback, evaluation, and information support (Tushman and Nadler, 1980).

For any given task, each activity or unit within the innovation process "must [based on open system theory] effectively import technical and market information from the external information world" (Tushman and Nadler, 1980). New [external] and established [internal] information must be effectively processed within the work area; decisions, solutions, and approaches must be worked on and coordinated within each activity and within the organization; and outputs, such as decisions, processes, products, and information, must effectively be transferred to the external environment. The outputs of this process create conditions for another set of activities, thereby initiating another information processing cycle. Throughout the process, organizations must be sensitive to the differences between the activities or units that comprise the innovation process. Specialized feedback, evaluation, and support may be required to process new information from internal and external sources (Gerstberger, 1971).

It is, however, the nature of organizations engaged in innovation to isolate themselves from the outside world, to

[2]The proposition that innovation is a linear process, a view presented by Myers and Marquis (1969), is not universally accepted. Langrish, et al., (1972) have rejected "linear models" of the innovation process as unrealistic.

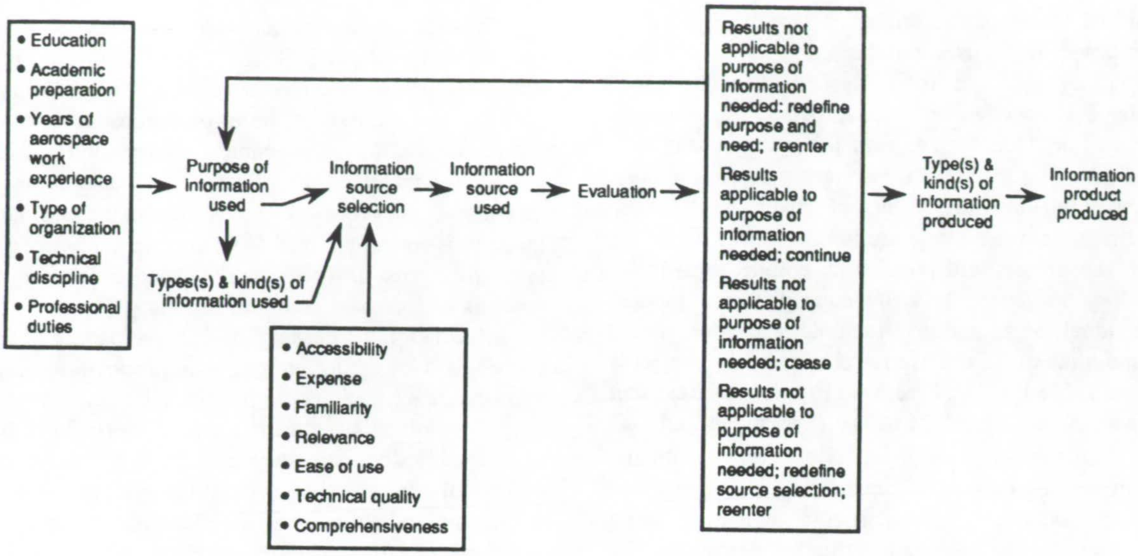

Figure 2. A Conceptual Model for the Use, Transfer, and Production of Scientific and Technical Information by U.S. Aerospace Engineers and Scientists.

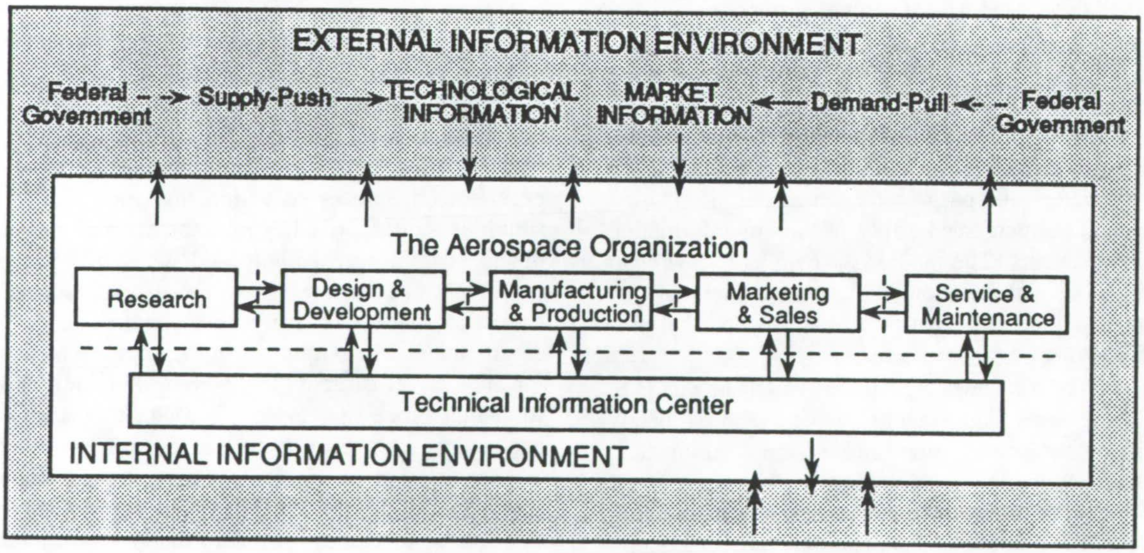

Figure 3. The Aerospace Innovation Process as an Information Processing System.

erect barriers to communication with their external environment, and to rely on information internal to the organization (Gerstenfeld and Berger, 1980). This behavior occurs because of the need for organizations to exercise control over those situations in which they interact with the "outside" and to reduce uncertainty, and because these organizations are frequently involved in activities of a proprietary nature (Fischer, 1980; Allen, 1970). Numerous studies have found a strong relationship between successful innovation, idea formulation, and information **external** to the organization (Dewhirst, et al., 1979; Allen, 1977; Project Sappho, 1972). The danger, then, for organizations engaged in innovation is to become isolated from their **external** environment and from information **external** to the organization (Fischer, 1980).

Phase 3 focuses on knowledge use and transfer at the individual and organizational levels in the academic sector of the U.S. aerospace community. (See Phase 3 of Table 1 on page 8.) Faced with shrinking enrollments, particularly at the graduate level, university aerospace programs must find ways to maintain the talent pool that will advance aerospace technological development. To prepare future aerospace engineers and scientists, academic programs must have access to "state of the art" STI. Consequently, NASA and the DOD must ensure the effective and efficient delivery of government funded aerospace STI. An understanding of individual information-seeking behavior, the flow of aerospace STI, and the STI transfer system in academia should provide NASA/DOD with important insights for program development.

Phase 4 examines knowledge production, use, and transfer among non-U.S. individuals and aerospace organizations, specifically in Great Britain, West Germany, and Japan. (See Phase 4 of Table 1 on page 8.) As collaboration among aerospace technology producers increases, a more international manufacturing environment will arise, fostering an increased flow of trade. At the same time, however, international industrial alliances will result in a more rapid diffusion of technology, prompting new technological developments. To cooperate in joint ventures and to collaborate successfully at the international level, aerospace industries will need to develop methods to collect, translate, analyze, and disseminate the best of foreign aerospace STI. An understanding of the processes by which aerospace engineers and scientists communicate at the individual and organizational levels becomes essential for formulating aerospace STI systems, policies, and practices.

Project Status

The relative status of the four phases comprising the initial thrust of the project appears below. Status is stated in terms of definition, development, implementation, and analysis.

- **Planning** — Task is stated in terms of objectives to be accomplished and measurable outcomes; study group and sample frame identified; and feasibility and relative cost/difficulty established.
- **Development** — Task is planned and documented; questions formulated, reviewed, and pretested; questionnaires printed and transmittal letters prepared; sample selected and verified; and data collection and analysis established.
- **Implementation** — Task is undertaken; questionnaires are mailed, returned, and processed; and data are input, adjusted, and reduced.
- **Analysis** — Task is completed; data are analyzed, documented, and presented.

PROJECT	Planning	Development	Implementation	Analysis
Phase 1				
AIAA	●	●	●	◕
SAE	●	◐	○	○
Phase 2	●	●	●	◐
Phase 3	●	●	●	◐
Phase 4				
RAeS	●	◐		
DGLR	●			
JSASS	●			

○ TO BE DONE ◐ >50% COMPLETE ◕ >75% COMPLETE ● COMPLETE

Project Reporting

In addition to periodic communication with the sponsoring organizations, project status will be reported on a periodic basis. Status will be reported through the submission of written reports as well as oral presentations.

The principal vehicle for documenting the project results will be a series of NASA technical reports. In addition, papers will be presented at national and international conferences to keep the academic, government, and industrial aerospace information communities informed of project results and involved in the research process.

Project Publications

Pinelli, Thomas E.; Myron Glassman; Walter E. Oliu; and Rebecca O. Barclay. **Technical Communications in Aeronautics: Results of an Exploratory Study.** Washington, DC: National Aeronautics and Space Administration. NASA TM-101534, Part 1, February 1989. 106 p. (Available from NTIS, Springfield, VA; 89N26772.)

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Blados, Walter R.; Thomas E. Pinelli; John M. Kennedy; and Rebecca O. Barclay. **External Information Sources and Aerospace R&D: The Use and Importance of Technical Reports by U.S. Aerospace Engineers and Scientists.** Paper prepared for the 68th AGARD National Delegates Board Meeting, 29 March 1990, Toulouse, France.

Kennedy, John M. and Thomas E. Pinelli. **The Impact of a Sponsor Letter on Mail Survey Response Rates.** Paper presented at the Annual Meeting of the American Association for Public Opinion Research, Lancaster, Pennsylvania, May 19, 1990.

Pinelli, Thomas E. and John M. Kennedy. **Aerospace Librarians and Technical Information Specialists as Information Intermediaries: A Report of Phase 2 Activities of the NASA/DoD Aerospace Knowledge Diffusion Research Project.** Paper presented at the Special Libraries Association, Aerospace Division - 81st Annual Conference, Pittsburgh, PA, June 13, 1990.

Pinelli, Thomas E. and John M. Kennedy. **Aerospace Knowledge Diffusion in the Academic Community: A Report of Phase 3 Activities of the NASA/DoD Aerospace Knowledge Diffusion Research Project.** Paper presented at the 1990 Annual Conference of the American Society for Engineering Education, Engineering Libraries Division, Toronto, Canada, June 27, 1990.

Pinelli, Thomas E.; Rebecca O. Barclay; John M. Kennedy; and Myron Glassman. **Technical Communications in Aerospace: An Analysis of the Practices Reported by U.S. and European Aerospace Engineers and Scientists.** Paper presented at the International Professional Conference (IPCC), Post House Hotel, Guilford, England, September 14, 1990.

Pinelli, Thomas E. and John M. Kennedy. **The NASA/DoD Aerospace Knowledge Diffusion Research Project: "The DoD Perspective."** Paper presented at the Defense Technical Information Center (DTIC) 1990 Annual Users Training Conference, Alexandria, VA, November 1, 1990.

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Pinelli, Thomas E. **The Information-Seeking Habits and Practices of Engineers.** Science & Technology Libraries 11:3 (Spring 1991):

Pinelli, Thomas E.; John M. Kennedy; Rebecca O. Barclay; and Terry F. White. **The NASA/DoD Aerospace Knowledge Diffusion Research Project.** World Aerospace Technology 1:1 (March 1991):

Pinelli, Thomas E.; John M. Kennedy; and Rebecca O. Barclay. **The NASA/DoD Aerospace Knowledge Diffusion Research Project.** Government Information Quarterly 8:2 (May 1991):

Appendix

Table 1. A Five Year Program of Research on Aerospace Knowledge Diffusion

	Phase 1 1989–1991	Phase 2 1990–1992	Phase 3 1990–1991	Phase 4 1991–1994
Level	•National •Individuals •U.S. Aerospace Engineers and Scientists	•National •Individuals and Organizations •Aerospace librarians in gov't and industry •U.S. gov't and aerospace industries	•National •Individuals and Organizations •U.S. academic faculty, students, and engineering libraries	•International •Individuals and Organizations
Focus	•Knowledge production and use	•Knowledge transfer and use	•Knowledge transfer and use	•Knowledge production, transfer, and use
Emphasis	•Use, importance, and production of NASA/DOD STI (e.g., technical reports) •Impediments to access, transfer, and use of NASA/DOD STI •Use and importance of AGARD and non-U.S. STI •Use and importance of information technology •Information sources used in problem solving	•Use, importance, and production of NASA/DOD STI (e.g., technical reports) •Impediments to access, transfer, and use of NASA/DOD STI •Use and importance of AGARD and non-U.S. STI •Use and importance of information technology •Effectiveness of system used to transfer U.S. gov't funded STI	•Use, importance, and production of NASA/DOD STI (e.g., technical reports) •Impediments to access, transfer, and use of NASA/DOD STI •Use and importance of AGARD and non-U.S. STI •Use and importance of information technology •Effectiveness of system used to transfer U.S. gov't funded STI	•Use and importance of NASA/DOD STI •Use of AGARD and non-U.S. STI •Impediments to access, transfer, and use of aerospace STI •Use of information technology •System used to transfer results of gov't funded aerospace STI non-U.S. aerospace STI, and systems, policies, and practices
Subjects	•AIAA membership •SAE membership	•U.S. aerospace librarians in gov't and industry •Selected U.S. gov't facilities and aerospace companies	•U.S. aerospace faculty, academic engineering libraries, and U.S. aerospace students (seniors) in USRA capstone design courses	•RAeS •DGLR •JSASS •aerospace faculties and students •aerospace librarians
Method	•Pilot study •Self-administered mail questionnaires •Telephone follow-ups	•Self-administered mail questionnaires •Personal interviews •Telephone follow-ups	•Self-administered mail questionnaires •Personal interviews •Telephone follow-ups	•Pilot study •Self-administered mail questionnaires
Desired Outcomes	•Understanding of individual information-seeking behaviors of U.S. aerospace engineers and scientists •Explain use/non-use of U.S. gov't funded STI products and services by U.S. aerospace engineers and scientists	•Understanding of the internal flow of aerospace STI in gov't and industry •Understanding of the system used to transfer results of U.S. gov't funded aerospace STI	•Understanding of the internal flow of aerospace STI in academia •Understanding of the system used to transfer results of U.S. gov't funded aerospace STI	•Understanding of individual information-seeking behavior •Understanding of the system used to transfer results of gov't funded aerospace STI •Understanding of non-U.S. aerospace STI systems, policies, and practices

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NASA/DoD AEROSPACE KNOWLEDGE DIFFUSION RESEARCH PROJECT PUBLICATIONS

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Pinelli, Thomas E. and John M. Kennedy. **Aerospace Librarians and Technical Information Specialists as Information Intermediaries: A Report of Phase 2 Activities of the NASA/DoD Aerospace Knowledge Diffusion Research Project. Paper 4.** Paper presented at the Special Libraries Association, Aerospace Division - 81st Annual Conference, Pittsburgh, PA, June 13, 1990.

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"The Voice of the User – How U.S. Aerospace Engineers and Scientists View DoD Technical Reports"

by

Dr. Thomas E. Pinelli
NASA Langley Research Center
Hampton, Va

and

Dr. John M. Kennedy
Indiana University
Bloomington, IN

Presented to the Defense Technical Information Center's (DTIC)
Managers Planning Conference

1 May 1991
Solomon's Island, MD

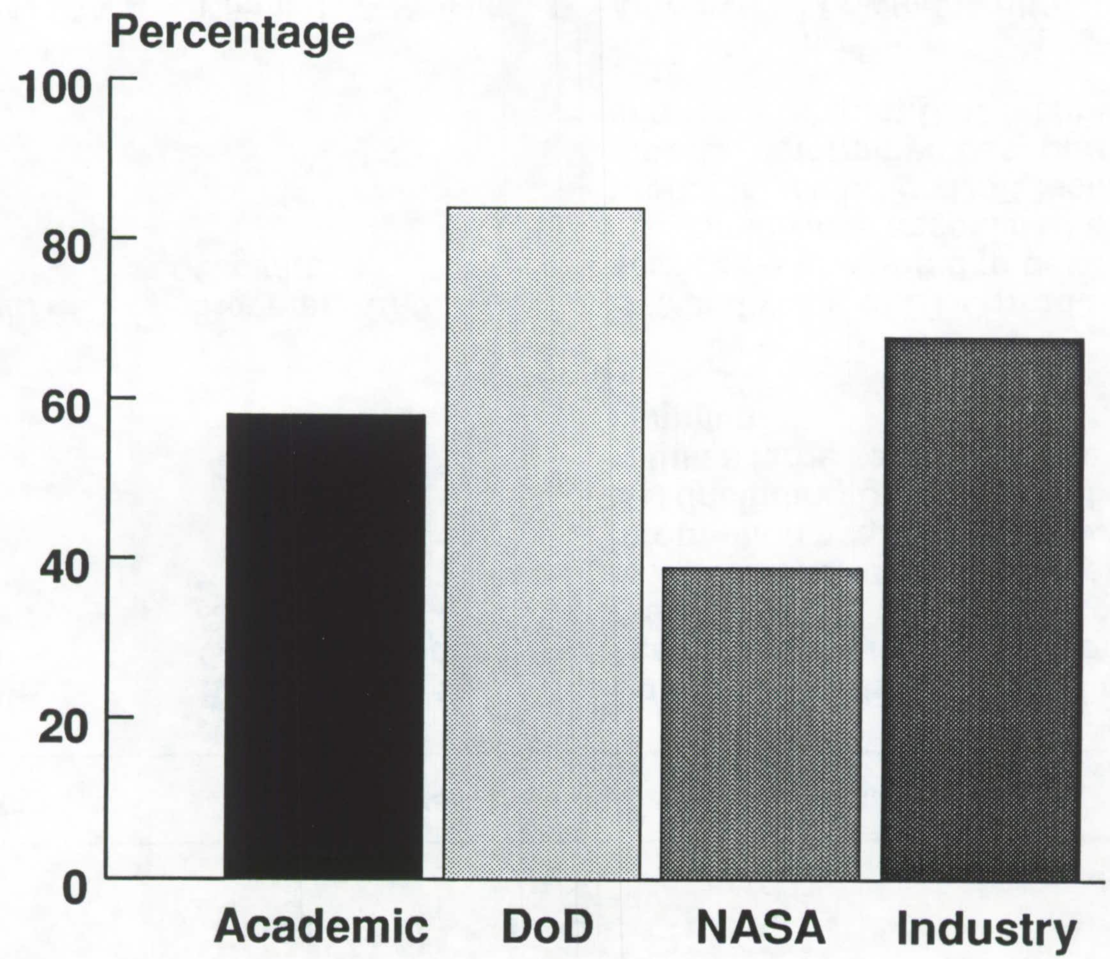
The Approach

- Phase 1 -- Survey of U.S. Aerospace Engineers and Scientists
- 3 Surveys -- Members of the American Institute of Aeronautics
- Survey 1 -- 2016 respondents (67 percent response rate)
- Survey 2 -- 975 respondents (63 percent response rate)
- Survey 3 -- 955 respondents (64 percent response rate)
- Supplement to Survey 1 -- 465 respondents (49 percent response rate)

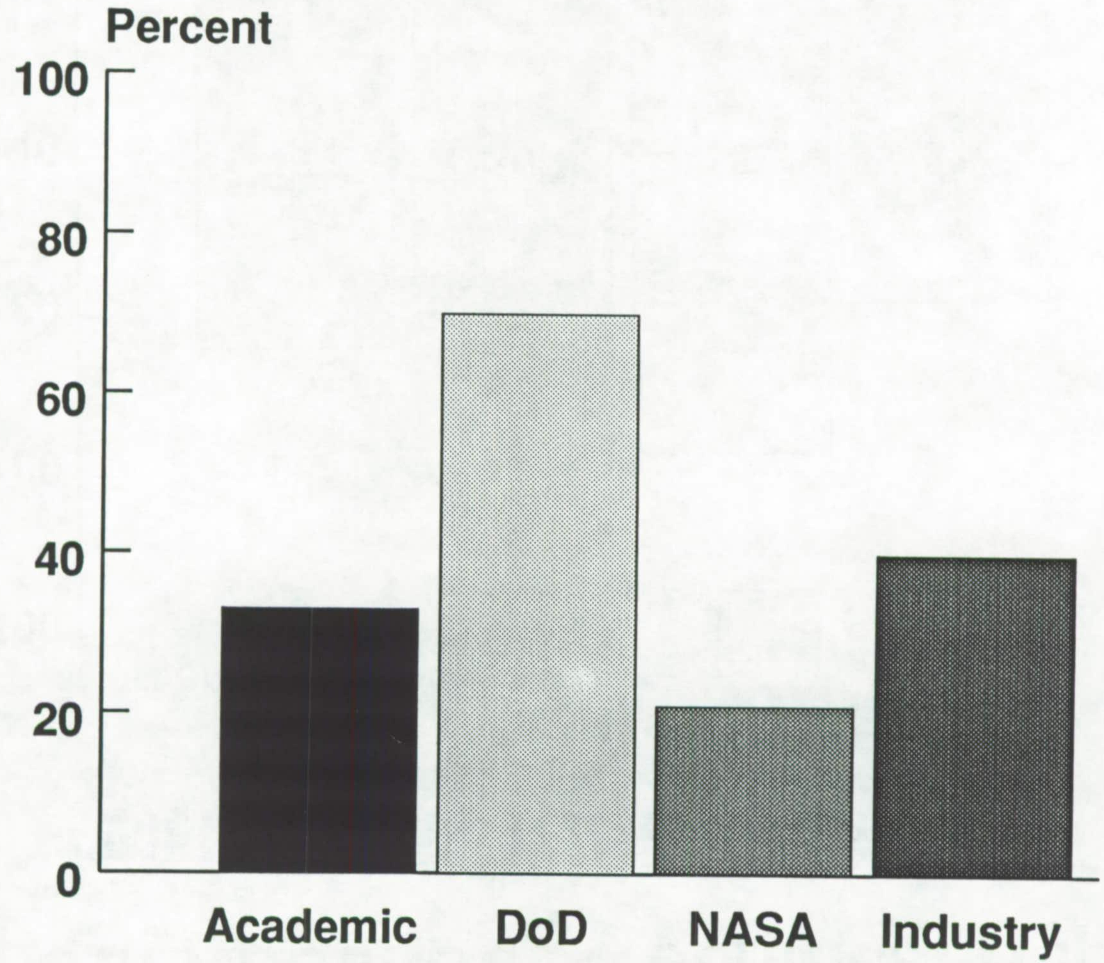
Related Research

Year	Agency	Investigators	Contributions
1965 1966	DoD DoD	Berul Goodman, Hodges, & Allen	DoD User-Needs Studies -- first large scale attempts by a major component of the Federal STI community to determine the "broad picture" and understand information acquisition, flow, and use of STI (including DoD technical reports) within a large segment of the R&D community.
1983	DoD/DTIC	Roderer, King, & Brovard	Use and value of DTIC products and services -- attempted to determine the economic value associated with DTIC products, including DoD technical reports; determined use, purpose of use, and readership of DoD technical reports.
1989	DoD/NASA	Kennedy & Pinelli	Aerospace knowledge diffusion -- attempting to understand and describe the diffusion of aerospace knowledge especially the results of Federally funded R&D.

Use of DoD Technical Reports by U.S. Aerospace Engineers and Scientists



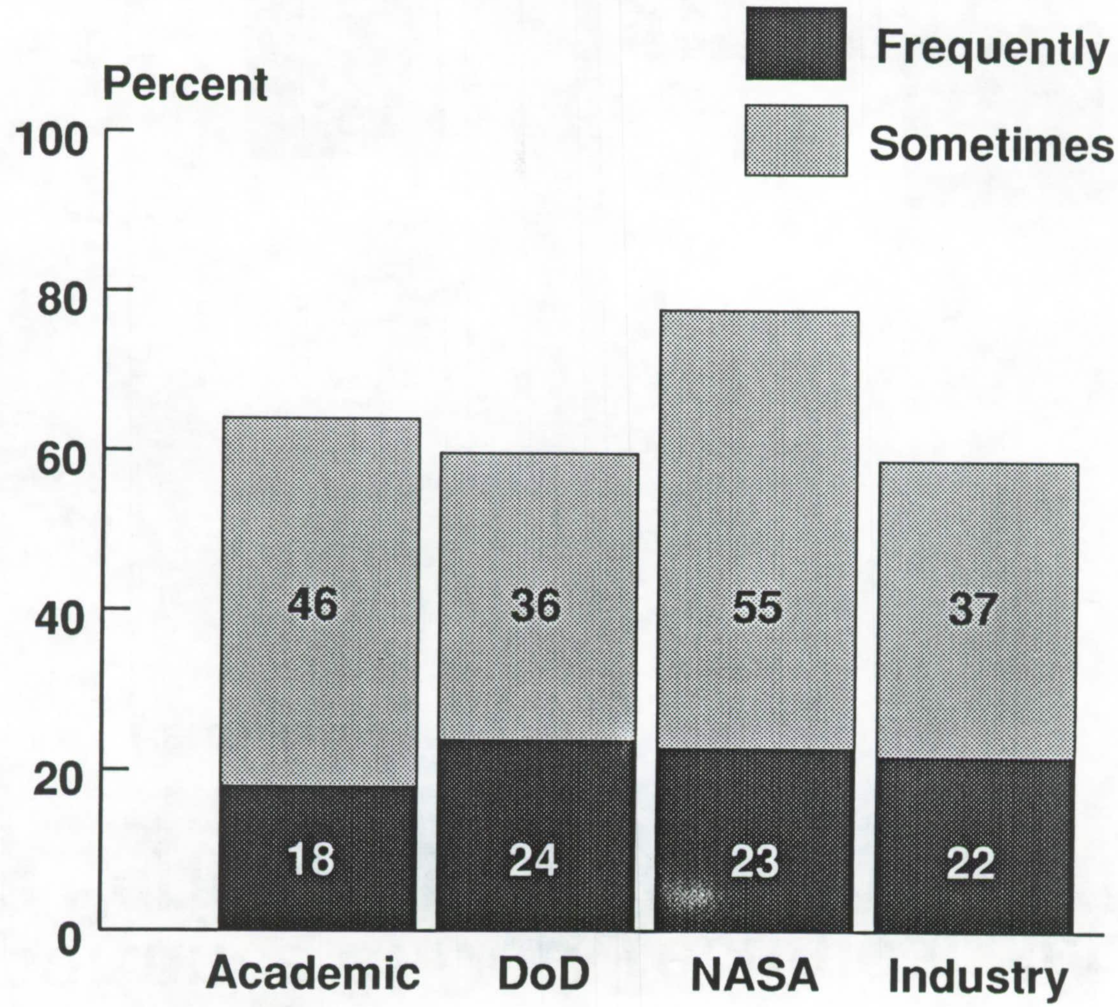
Importance of DoD Technical Reports in Performing Professional Duties



"1" and "2" on a 5 Point Scale

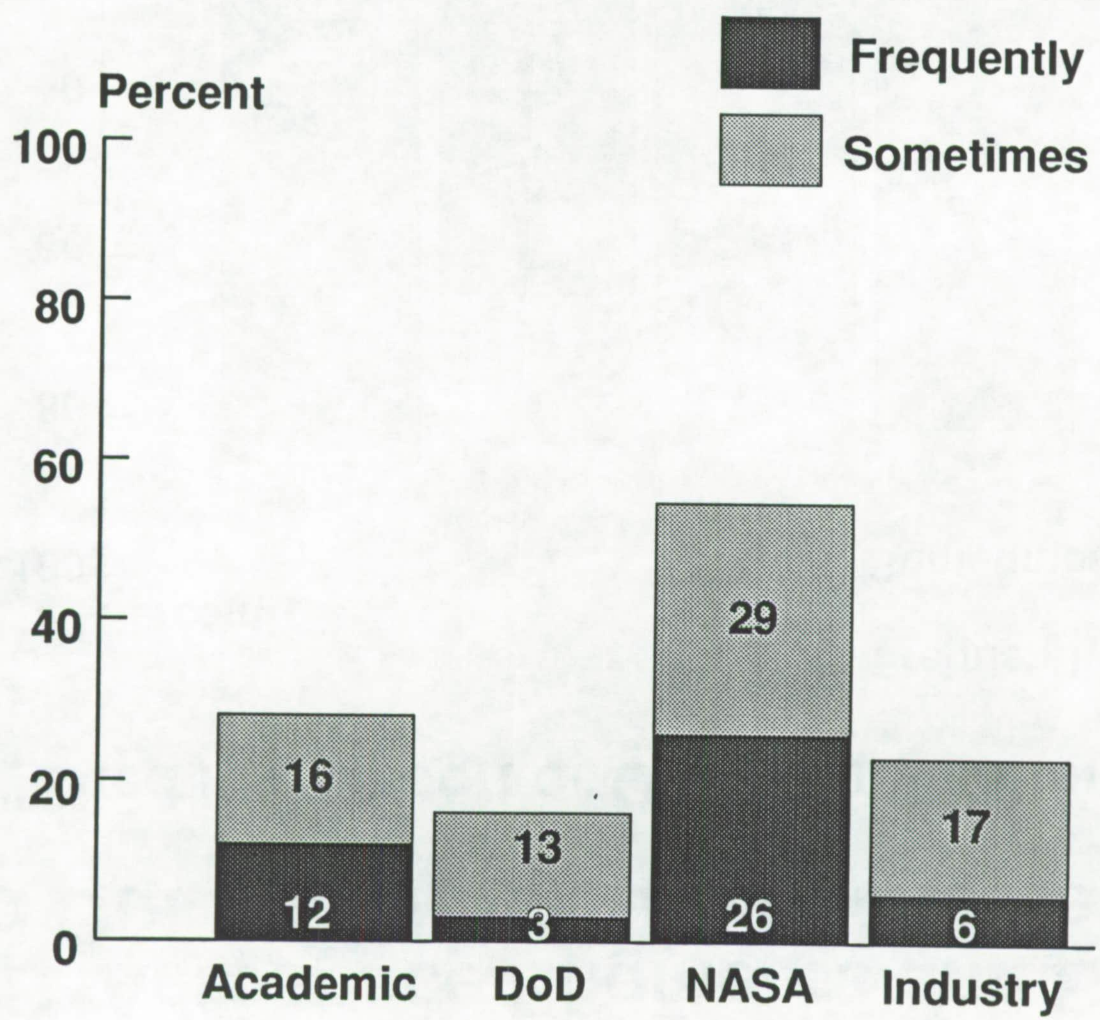
How U.S. Aerospace Engineers and Scientists Find Out About DoD Technical Reports

"Bibliographic Database Search"



How U.S. Aerospace Engineers and Scientists Find Out About DoD Technical Reports

"Current Awareness Publication"



How U.S. Aerospace Engineers and Scientists Find Out About DoD Technical Reports

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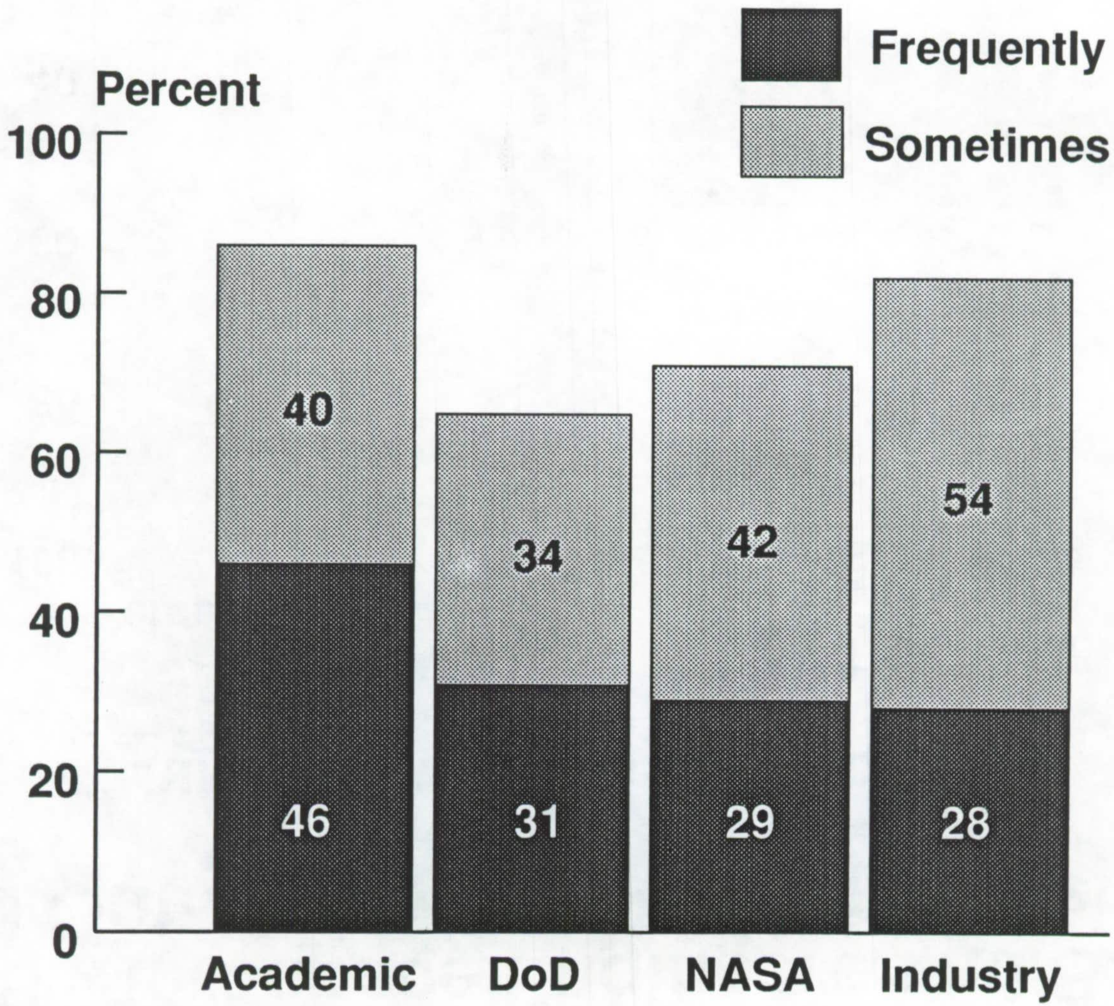
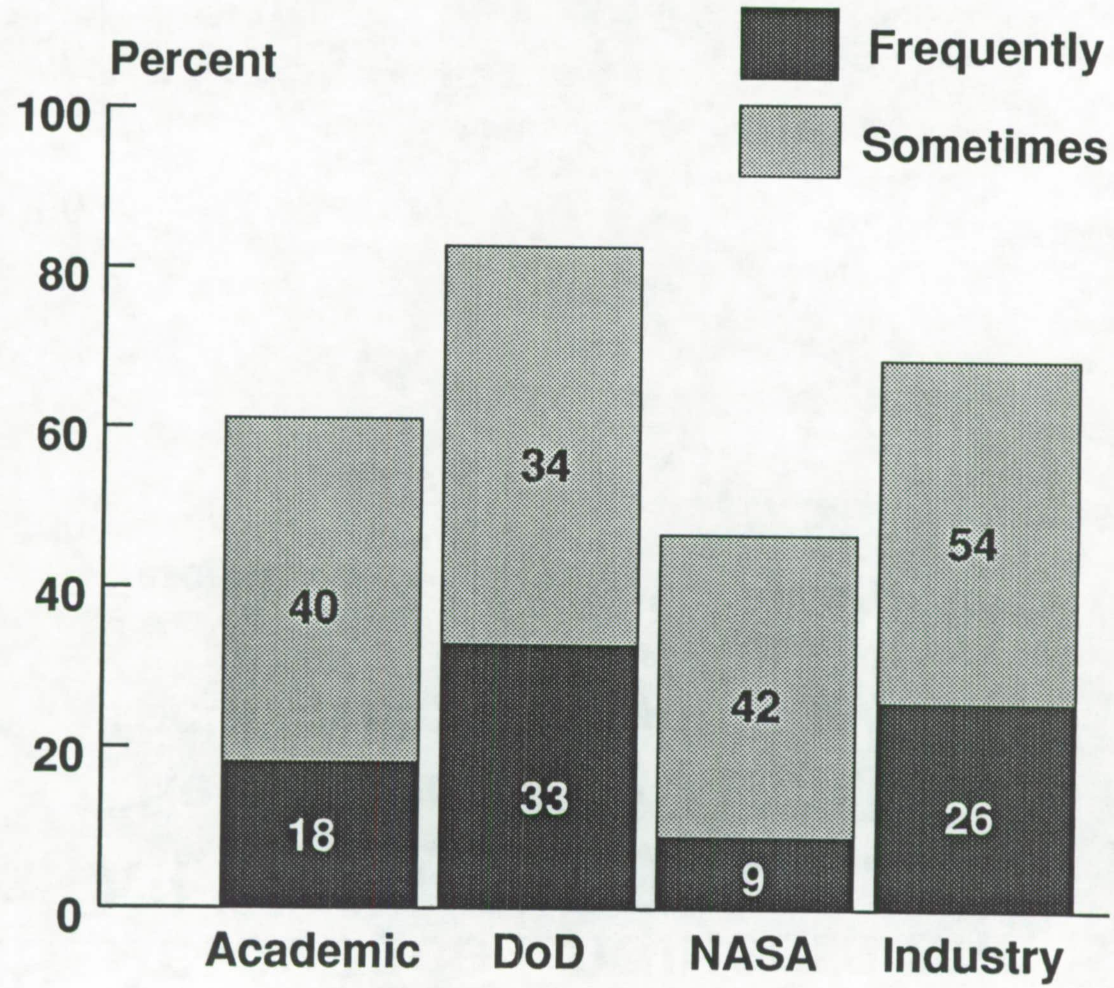


How U.S. Aerospace Engineers and Scientists Find Out About DoD Technical Reports

"Referred to Me by Colleague"



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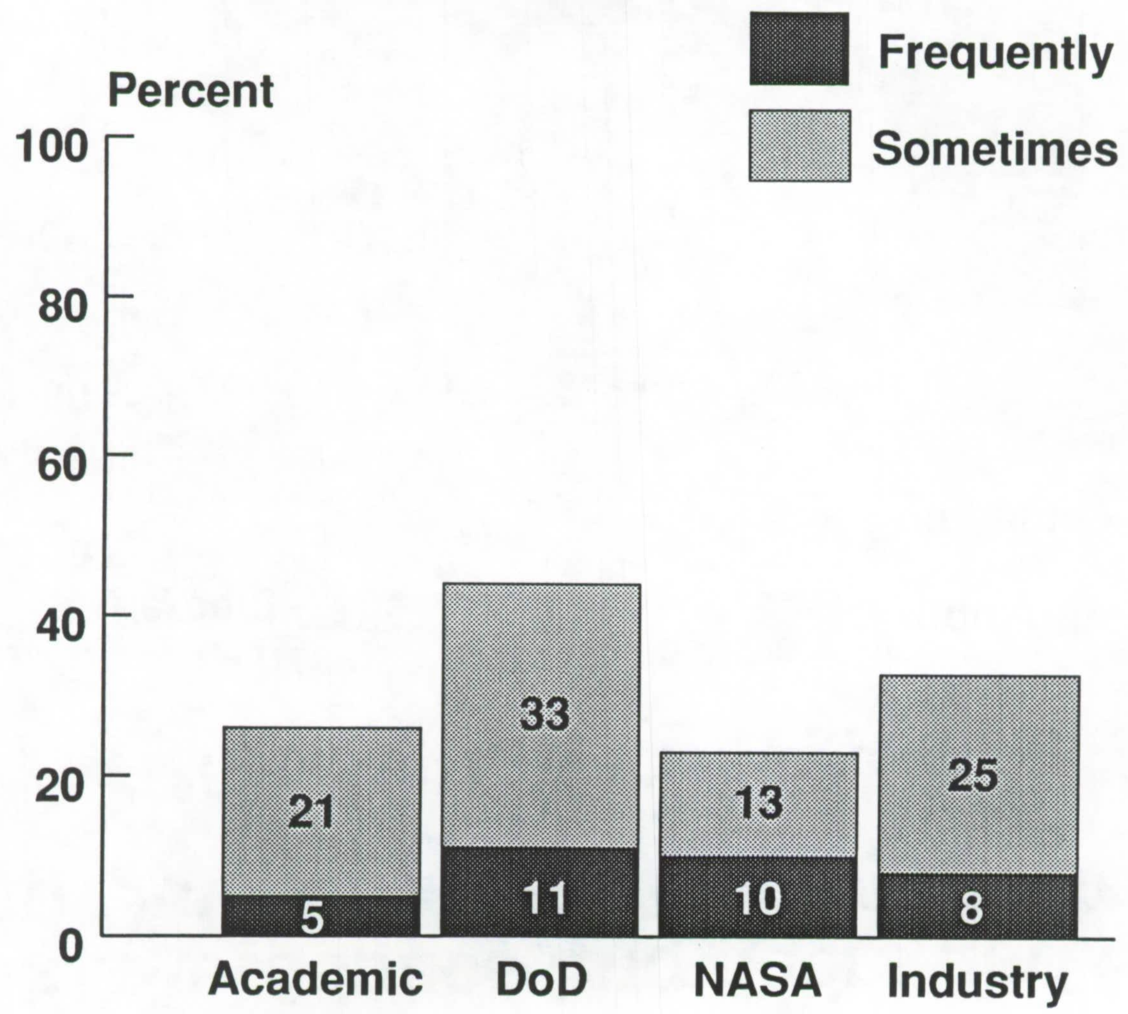
How U.S. Aerospace Engineers and Scientists Find Out About DoD Technical Reports

"Referred to Me by a Librarian or Technical Information Specialist"



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How U.S. Aerospace Engineers and Scientists Find Out About DoD Technical Reports

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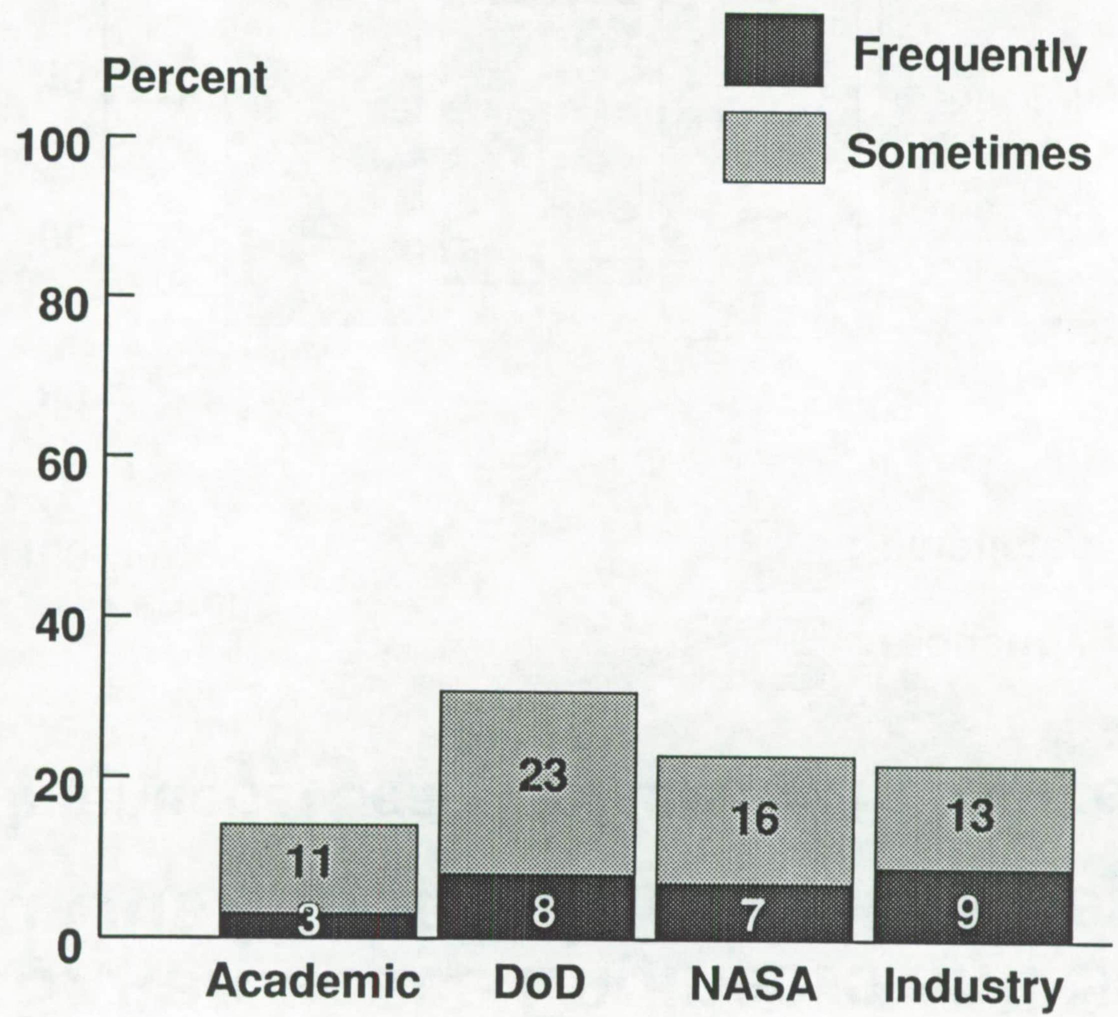

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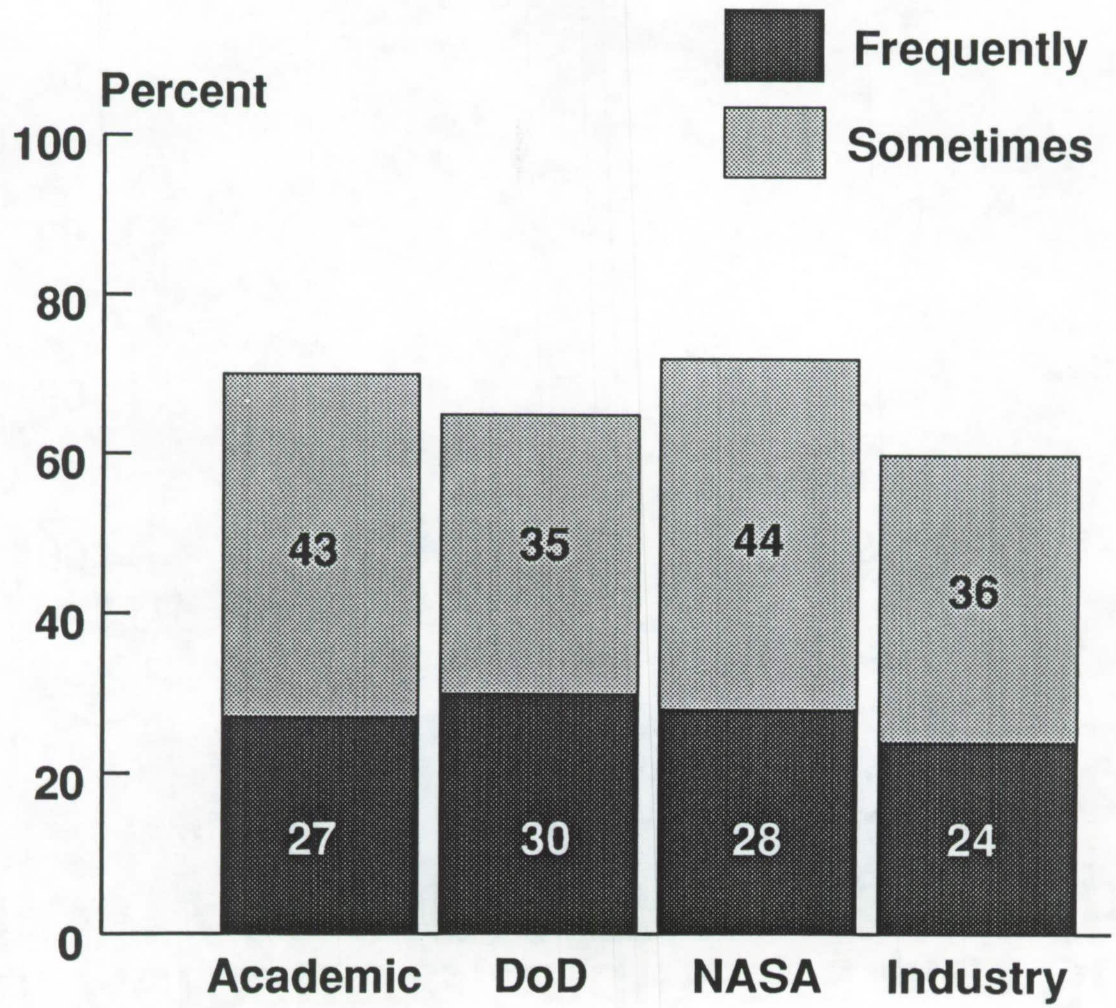
How U.S. Aerospace Engineers and Scientists Find Out About DoD Technical Reports

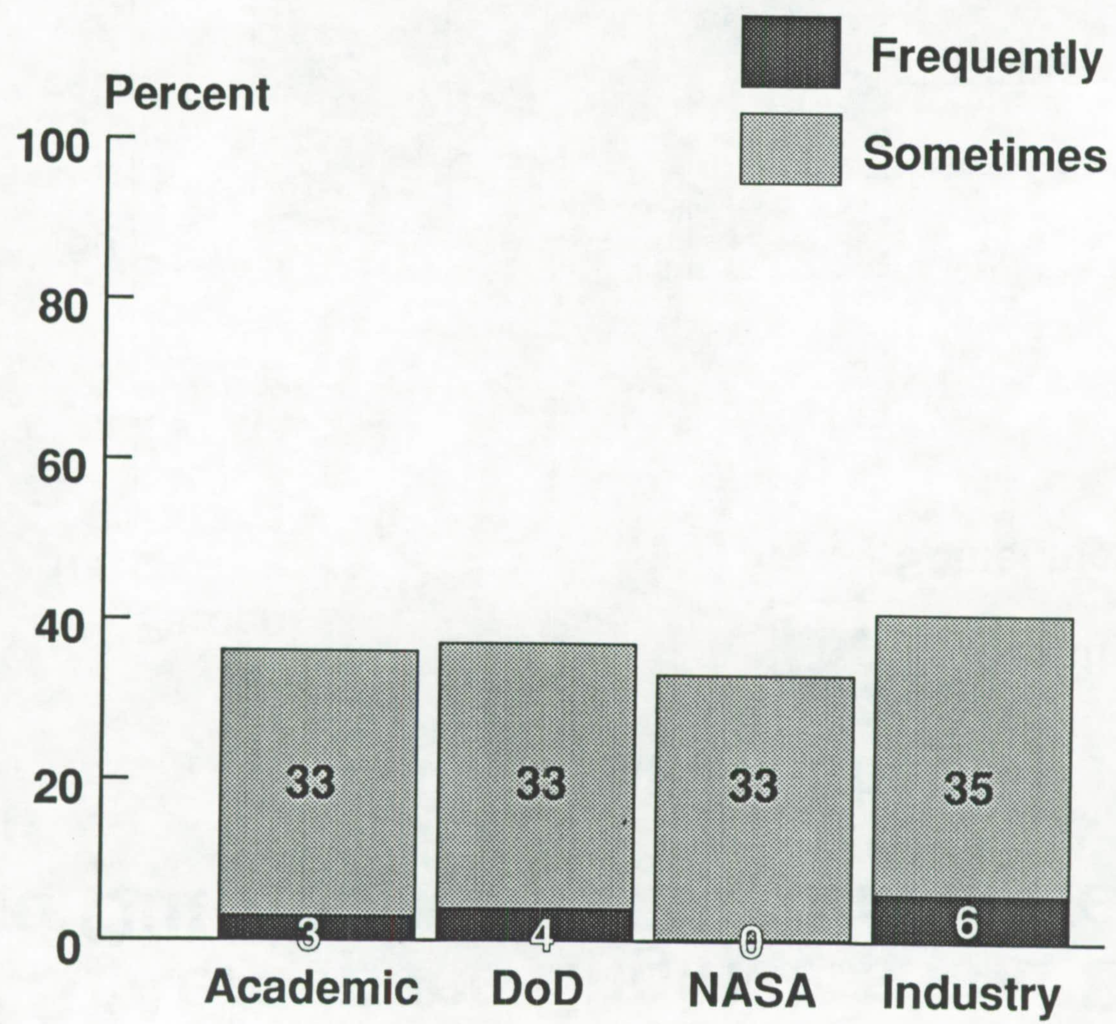
"Intentional Search of Library Resources"



G/Intentional Search|91-926

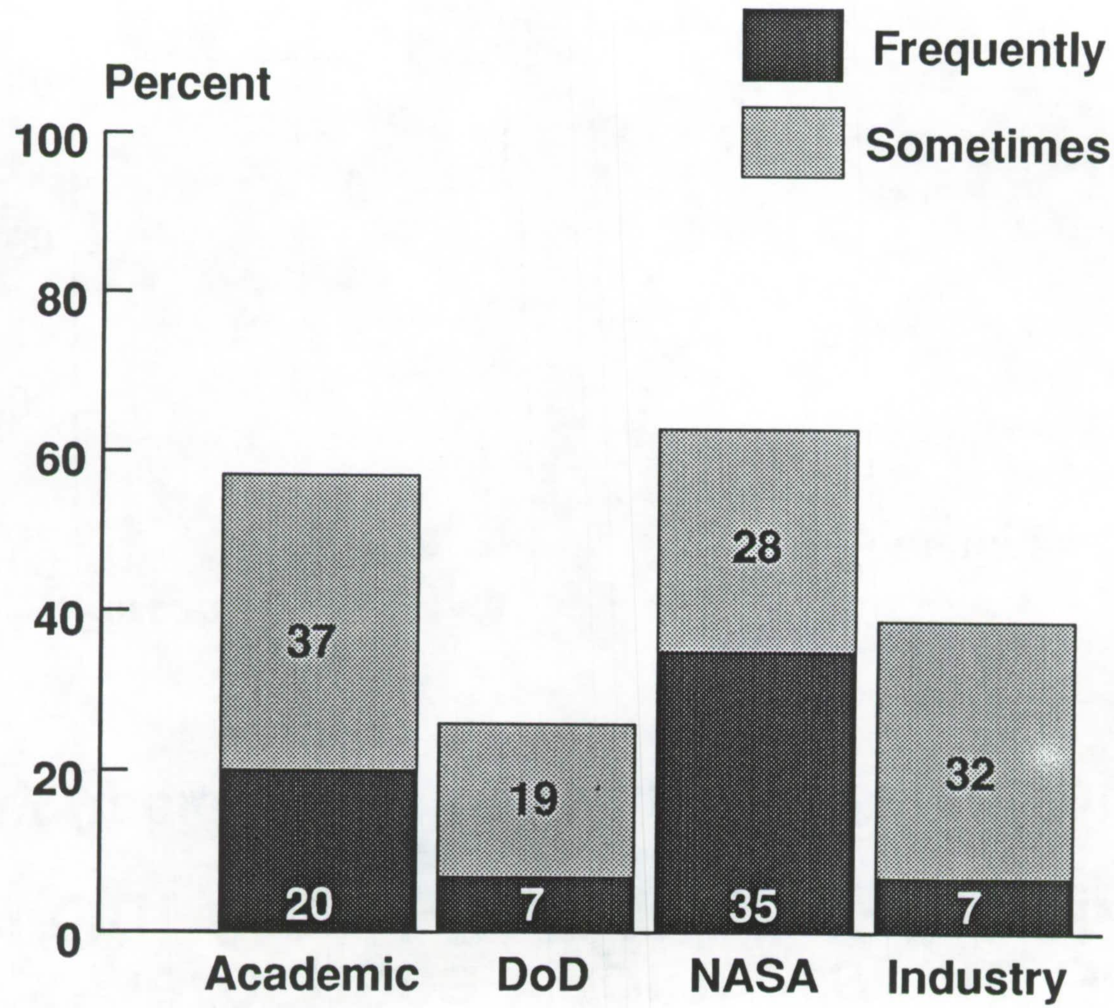
How U.S. Aerospace Engineers and Scientists Find Out About DoD Technical Reports

"By Accident, by Browsing, or Serendipity"



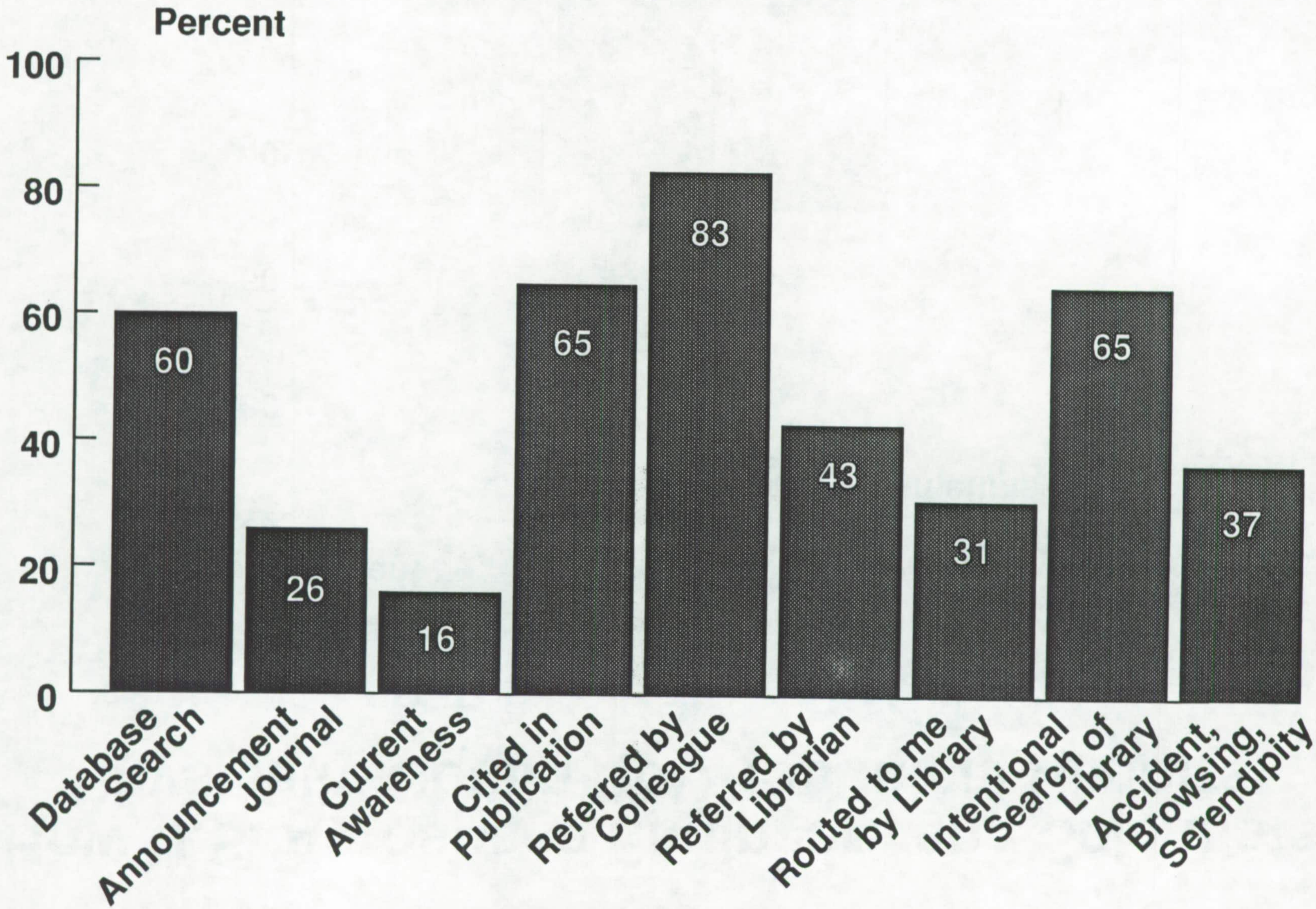
How U.S. Aerospace Engineers and Scientists Find Out About DoD Technical Reports

"Announcement Journal"



How U.S. Aerospace Engineers and Scientists Find Out About DoD Technical Reports

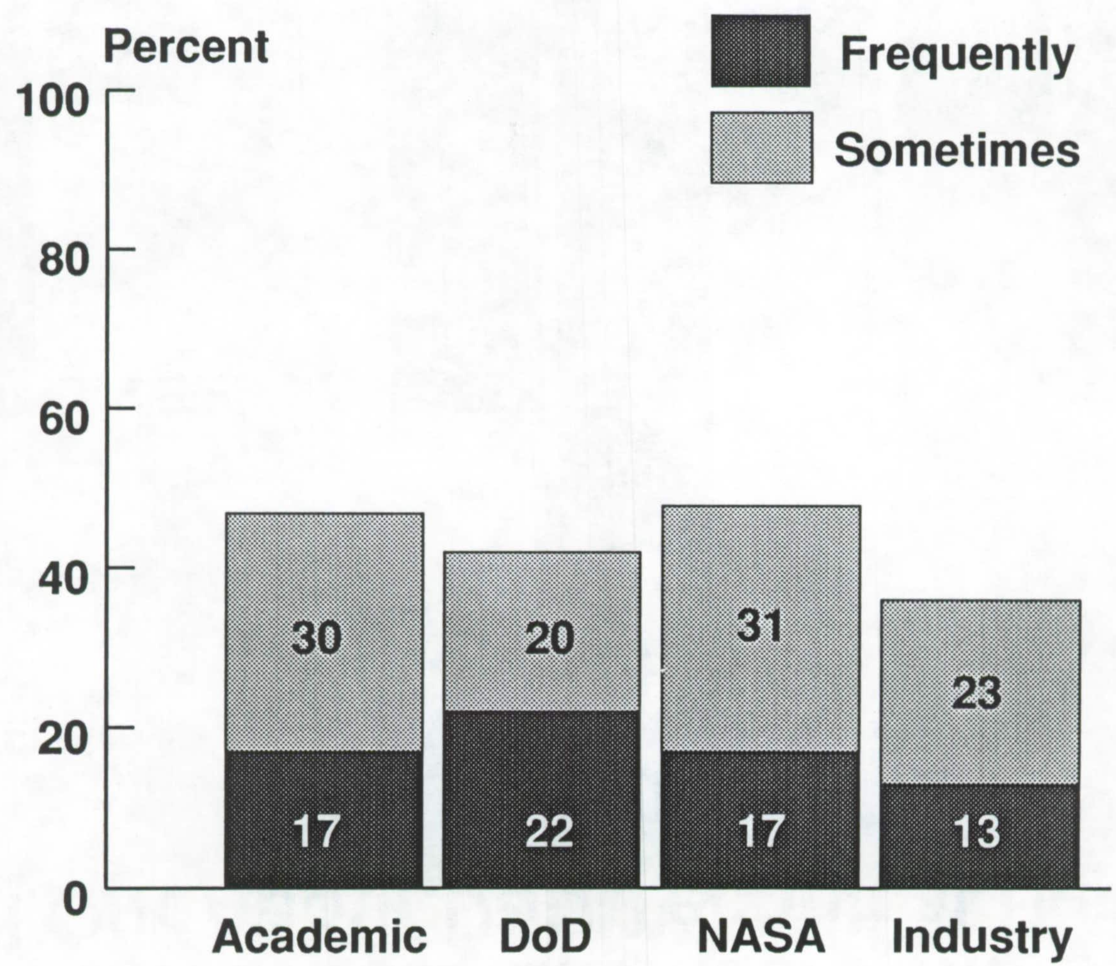
"DoD Respondents"



G/How- DoD Respon|91-926

How U.S. Aerospace Engineers and Scientists Physically Obtain DoD Technical Reports

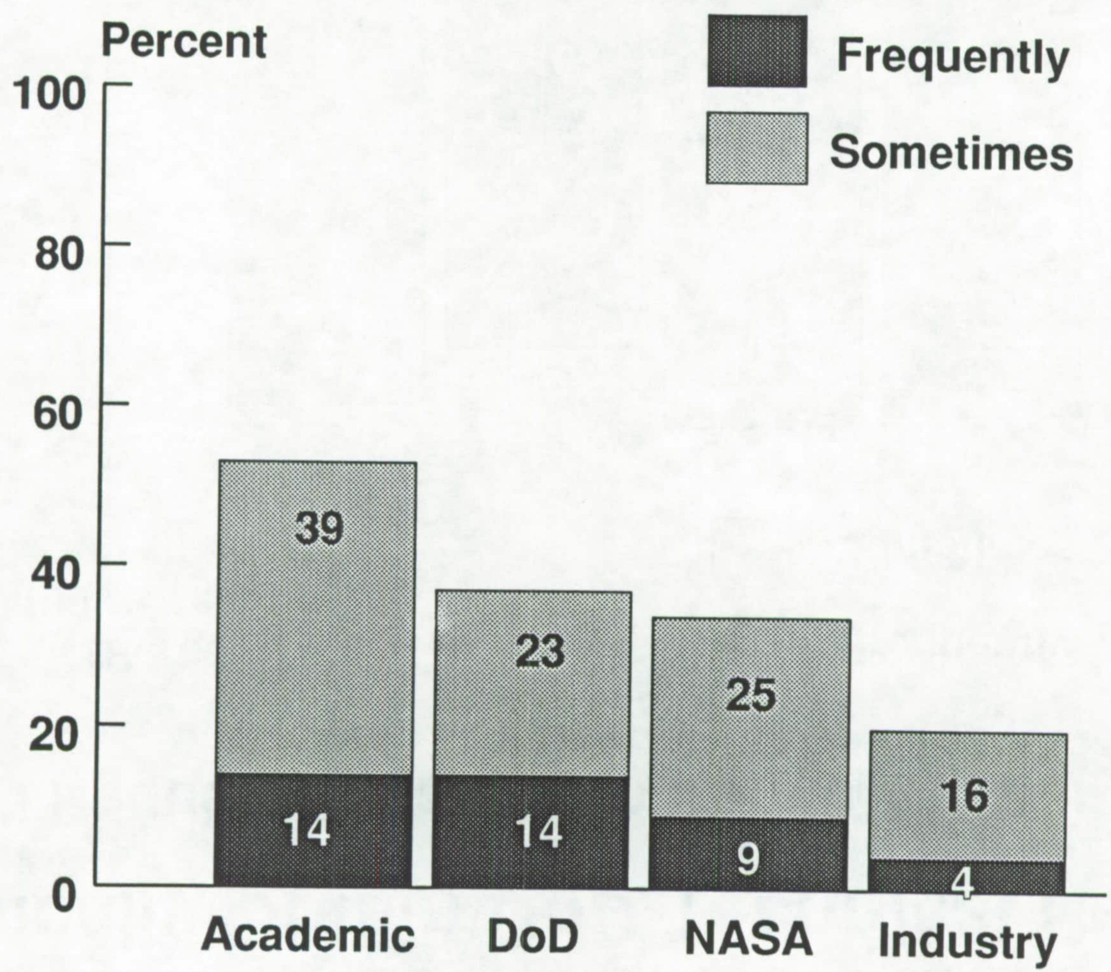
"DoD Sends Them to Me"



G/DoD Sends Them|91-926

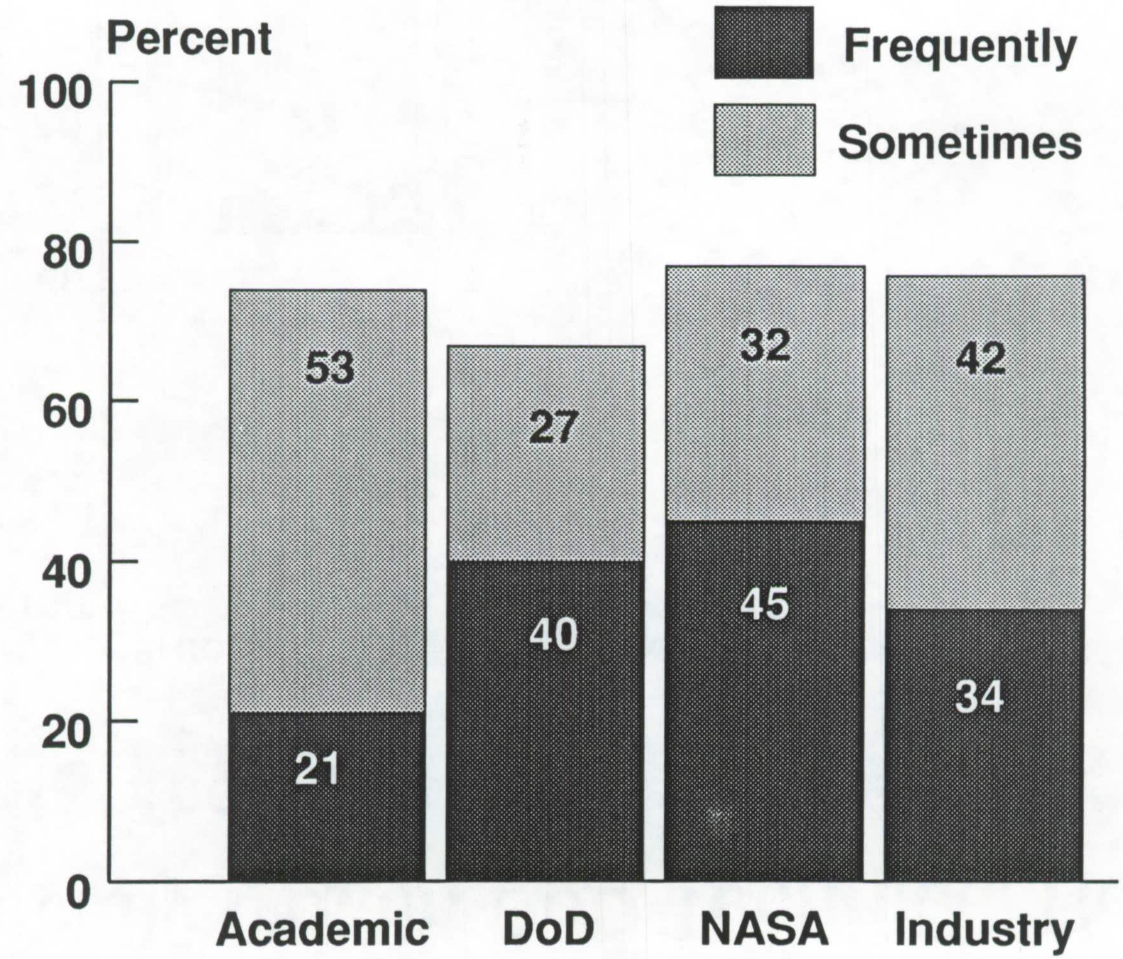
How U.S. Aerospace Engineers and Scientists Physically Obtain DoD Technical Reports

"The Author Sends Them to Me"



How U.S. Aerospace Engineers and Scientists Physically Obtain DoD Technical Reports

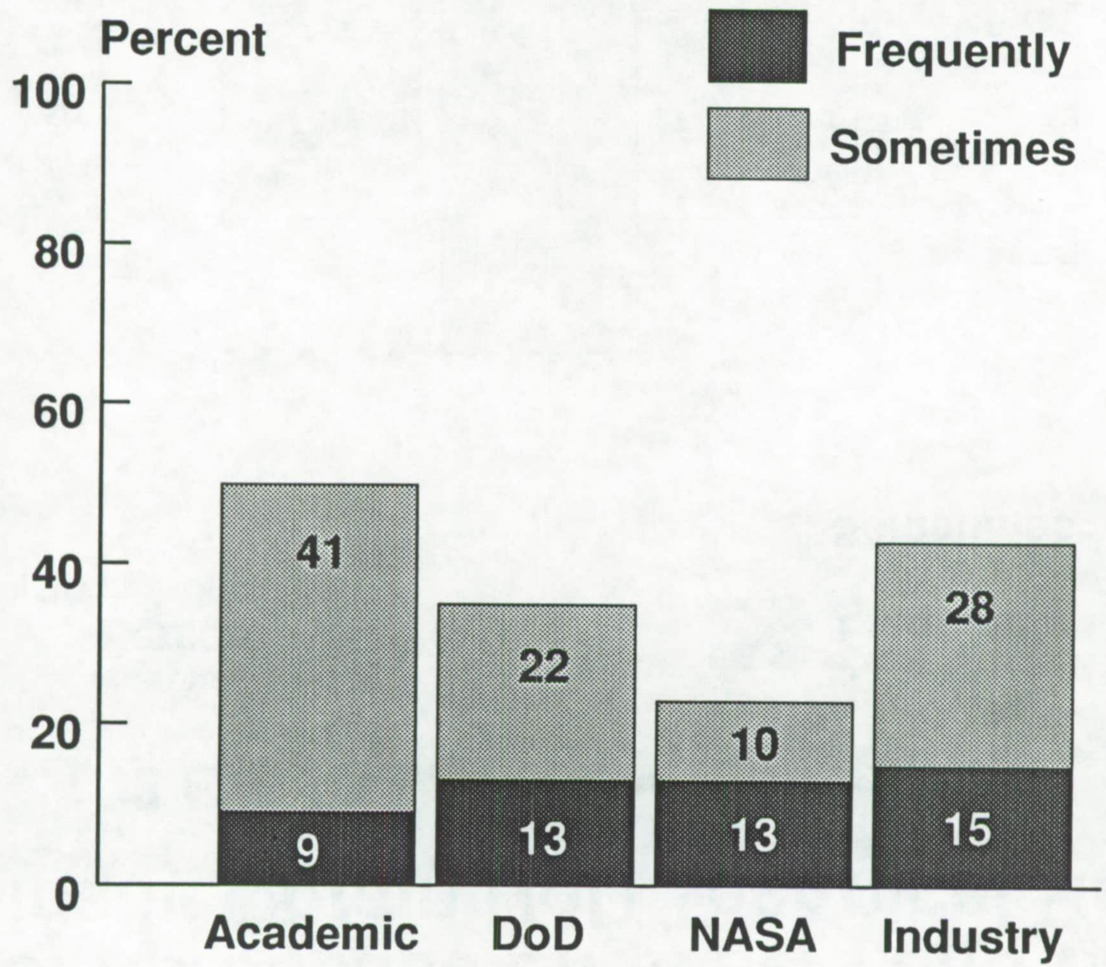
"I Request/Order Them from My Library"



G/Request/Order Them|91-926

How U.S. Aerospace Engineers and Scientists Physically Obtain DoD Technical Reports

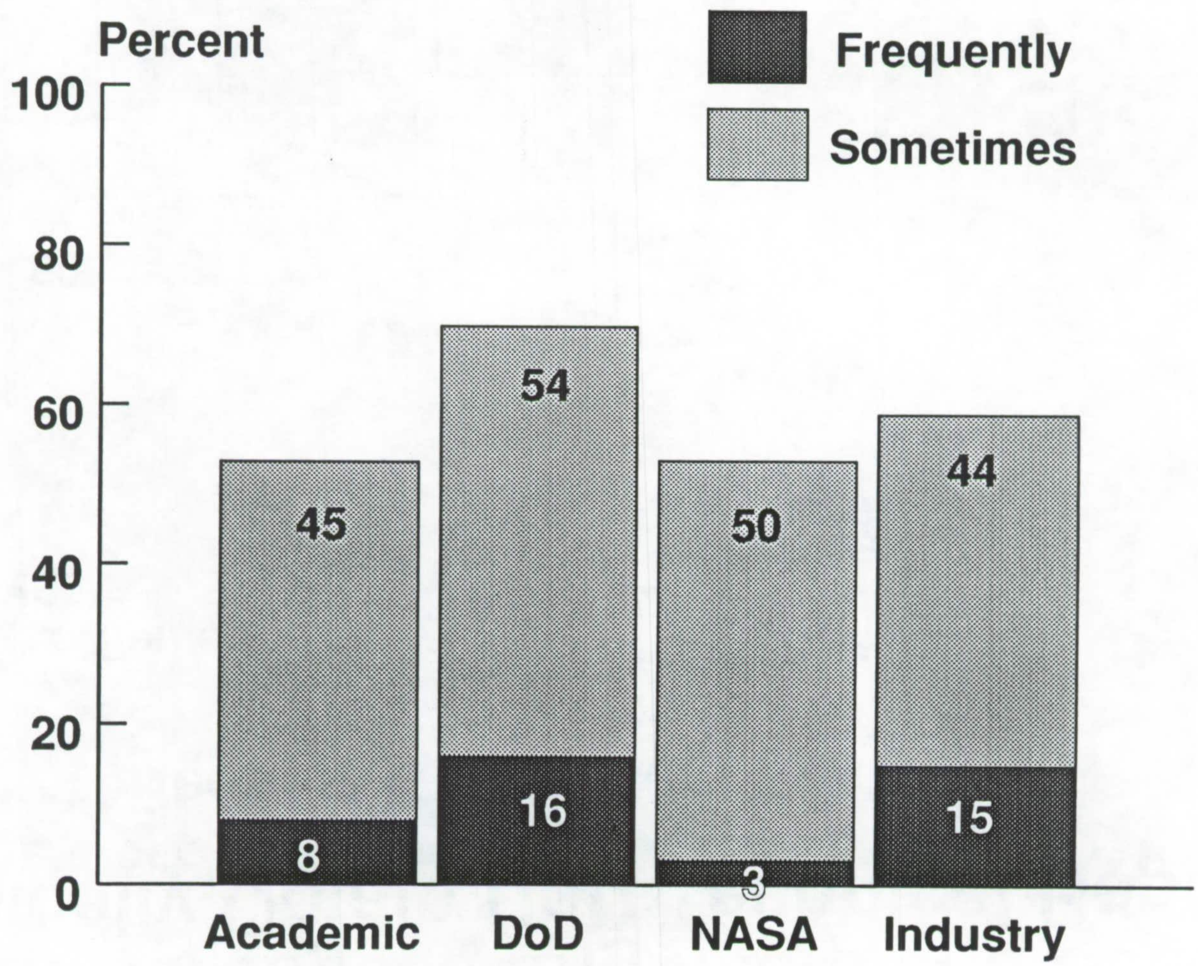
"I Request/Order Them from NTIS"



G/Request/Order Them NTIS|91-926

How U.S. Aerospace Engineers and Scientists Physically Obtain DoD Technical Reports

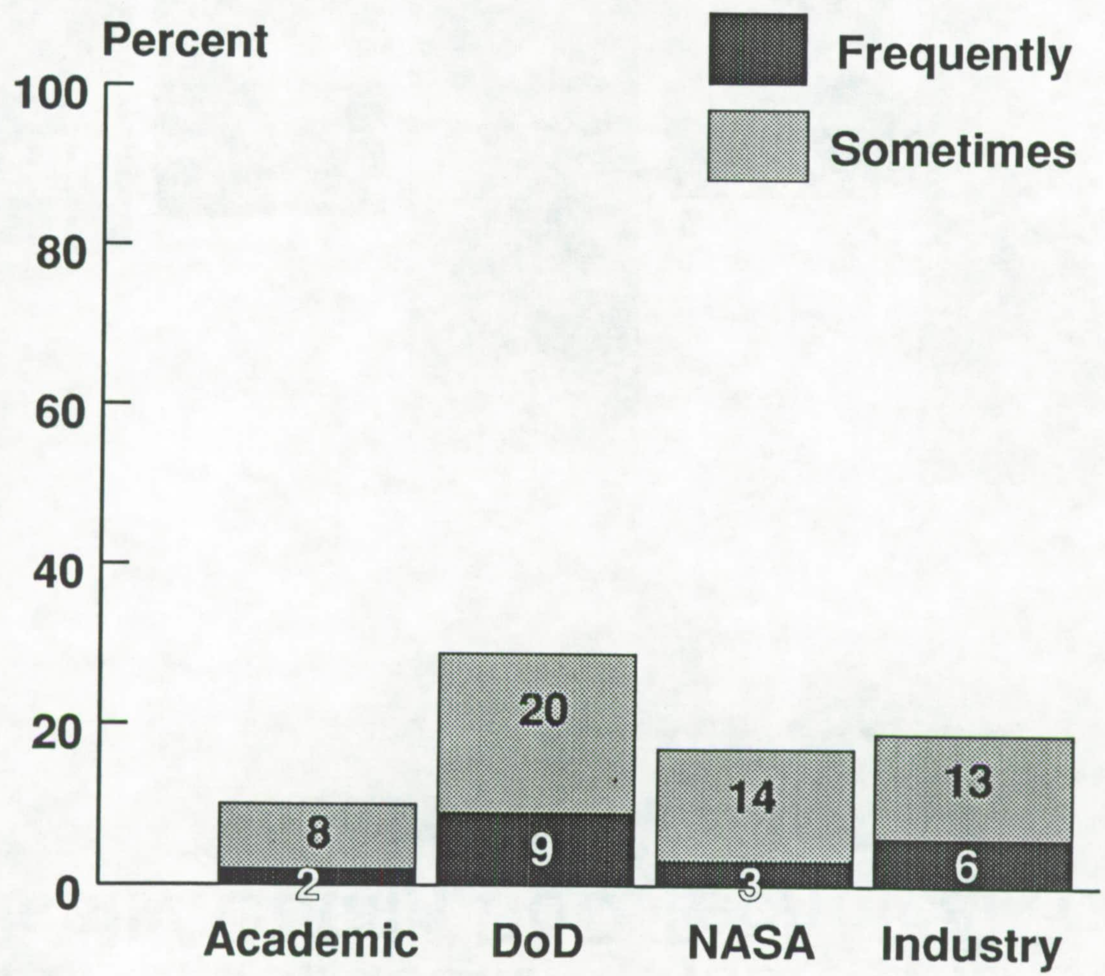
"I Get Them From a Colleague"



G/Get Them Frm Collg|91-926

How U.S. Aerospace Engineers and Scientists Physically Obtain DoD Technical Reports

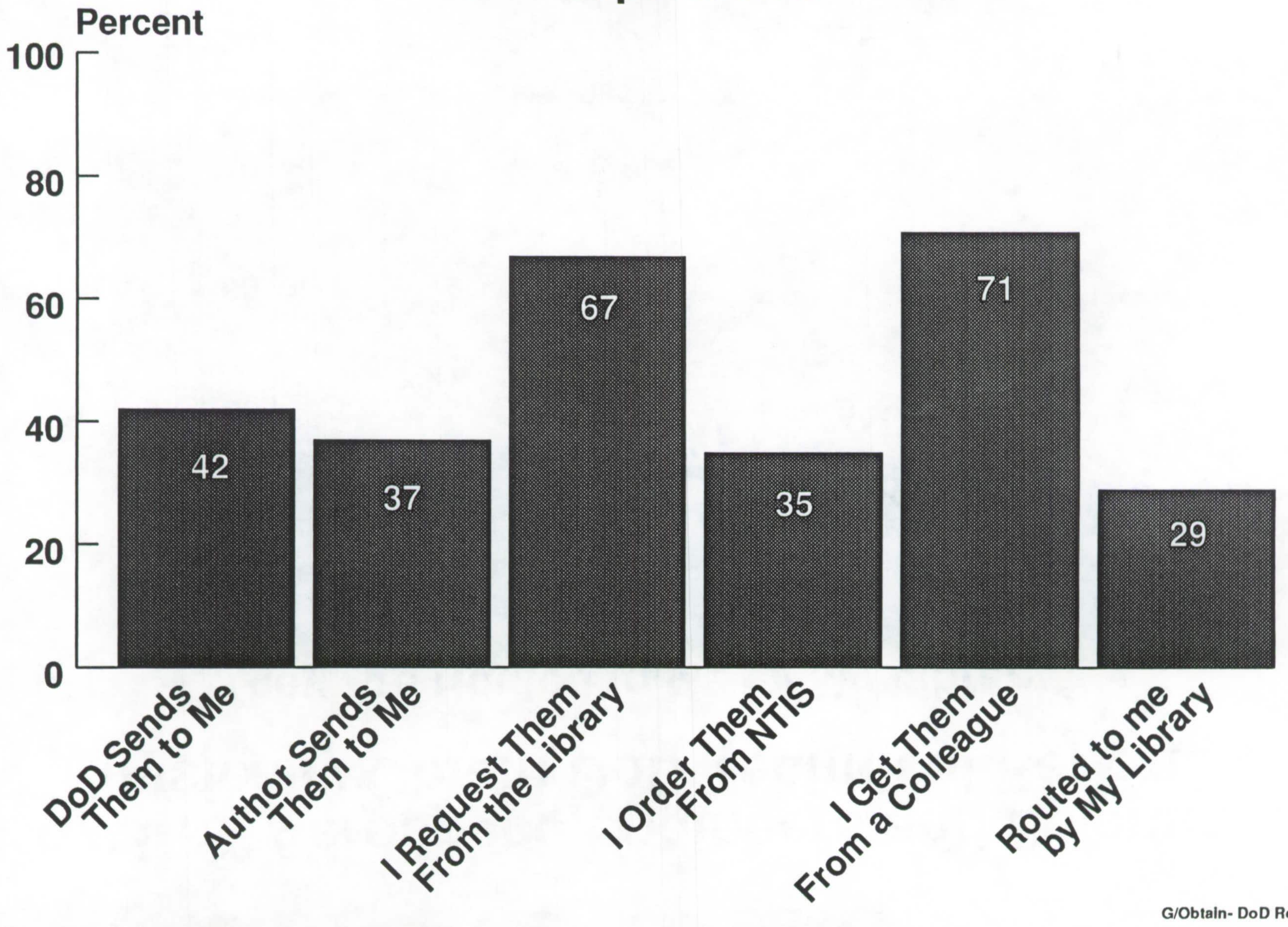
"They Are Routed to Me by My Library"



G/Routed frm Library|91-926

How U.S. Aerospace Engineers and Scientists Physically Obtain DoD Technical Reports

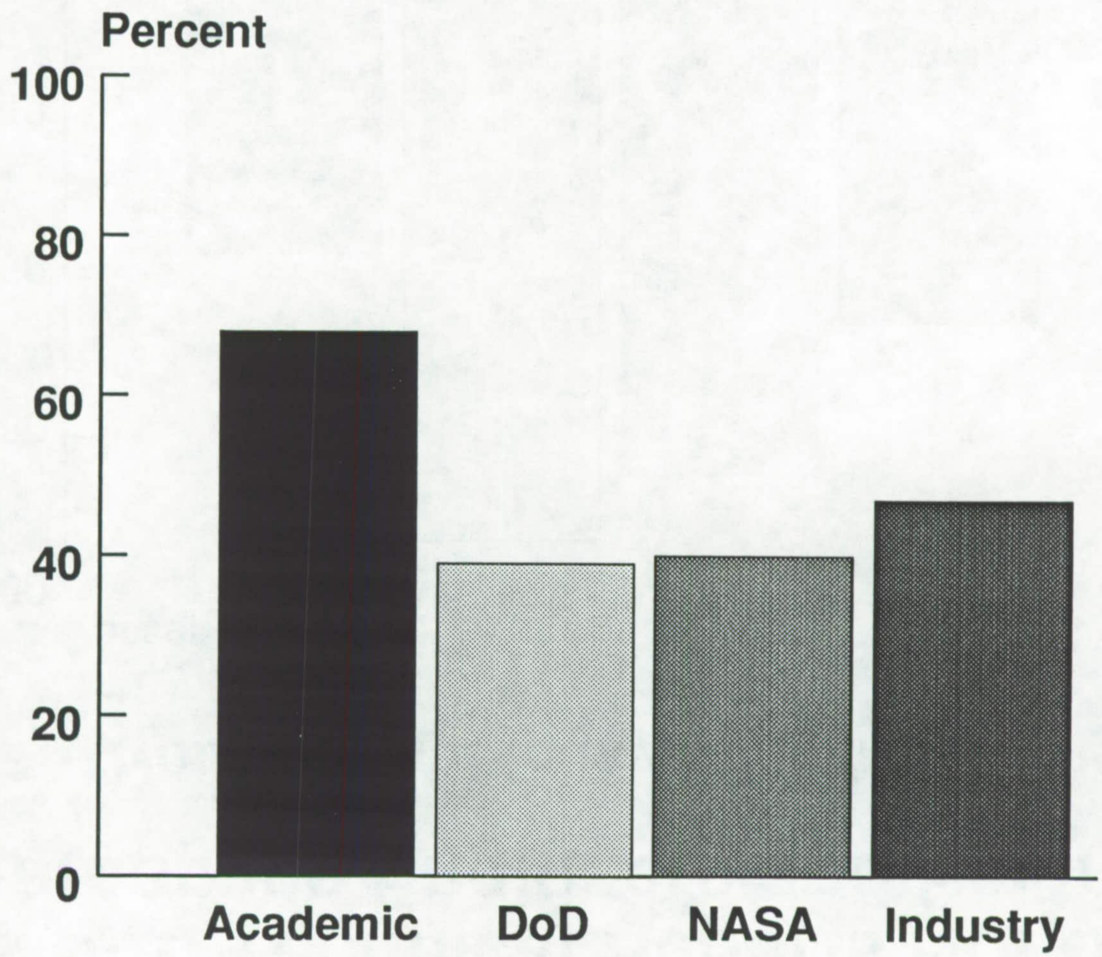
"DoD Respondents"



G/Obtain- DoD Respon|91-926

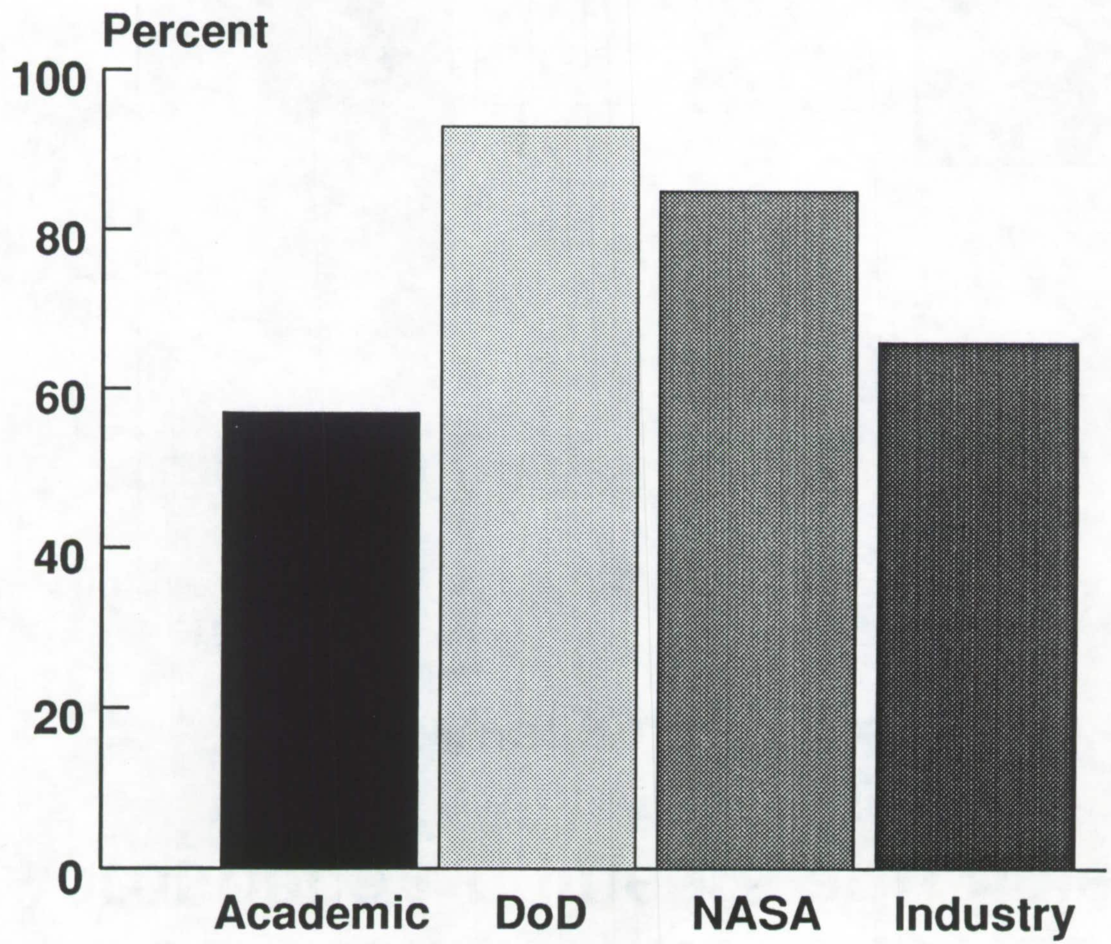
Reasons DoD Technical Reports Not Used by U.S. Aerospace Engineers and Scientists

"Not Available/Accessible"



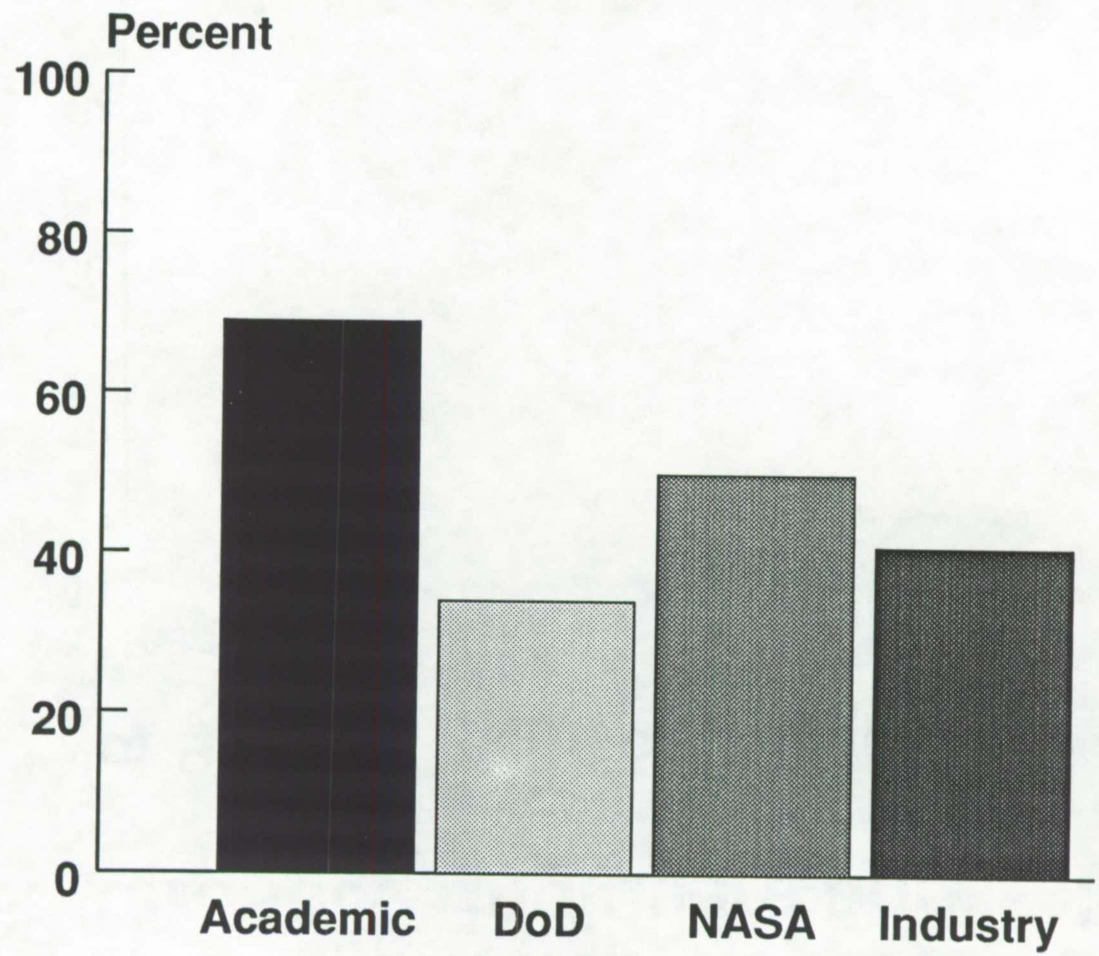
Reasons DoD Technical Reports Not Used by U.S. Aerospace Engineers and Scientists

"Not Relevant to My Research"



Reasons DoD Technical Reports Not Used by U.S. Aerospce Engineers and Scientists

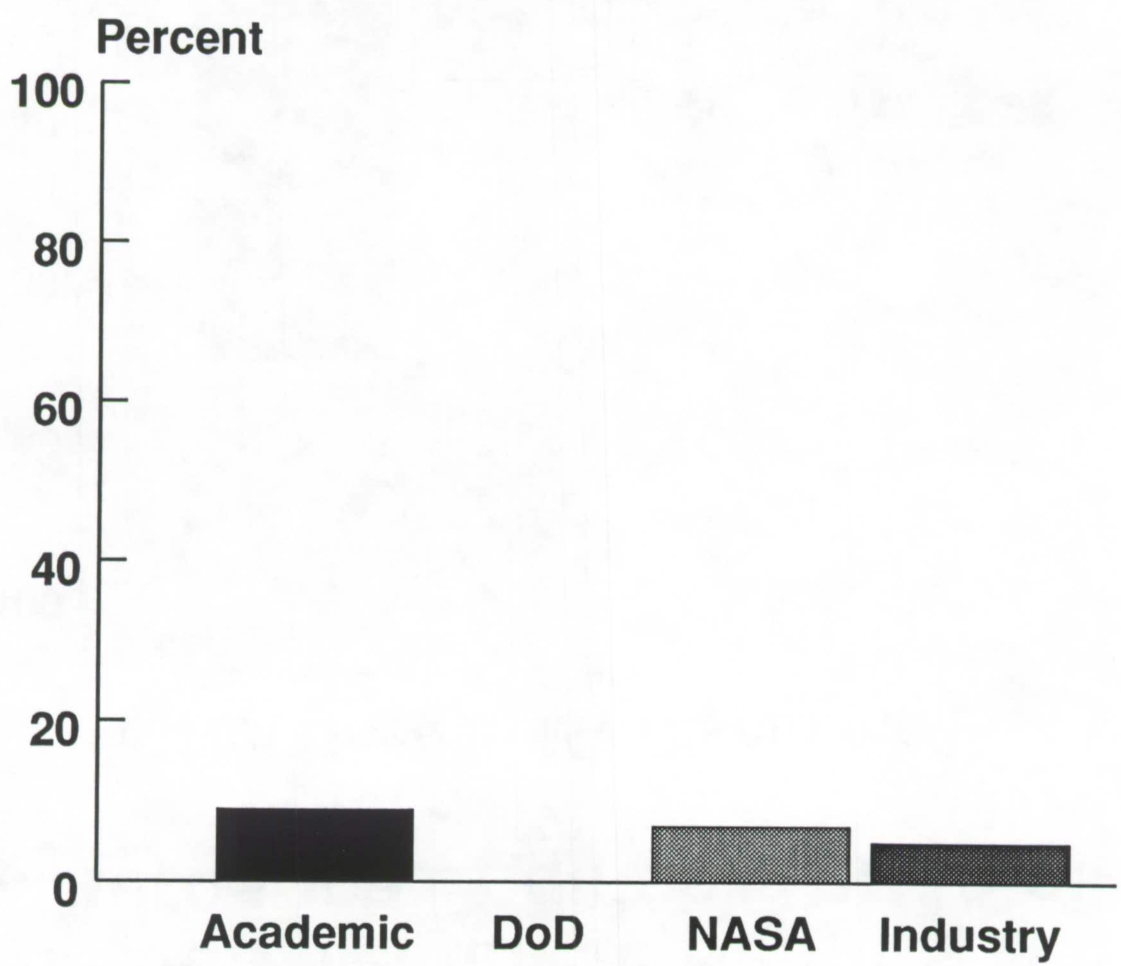
"Not Used in My Discipline"



G/Reasons "Not my dscpln"|91-926

Reasons DoD Technical Reports Not Used by U.S. Aerospce Engineers and Scientists

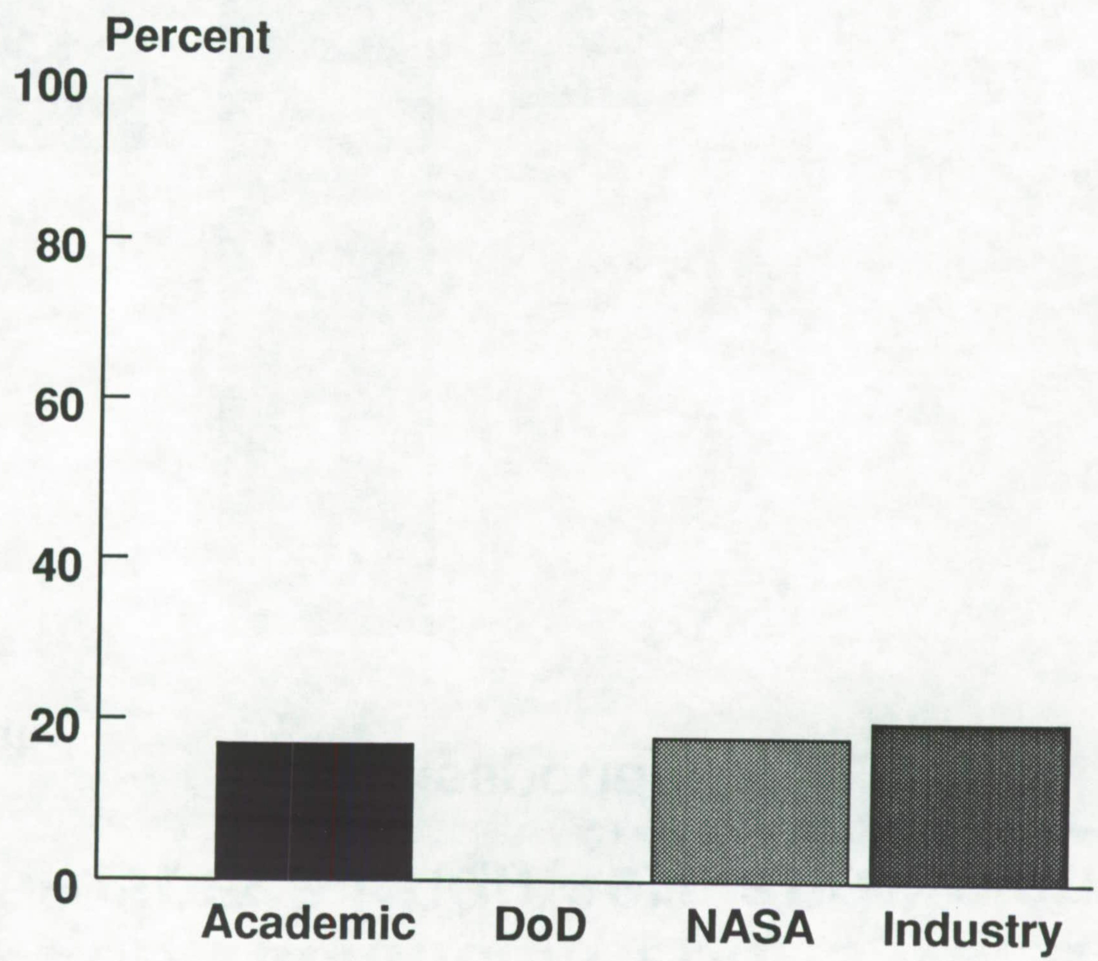
"Not Reliable/Technically Inaccurate"



G/Reasons "Not Relible"|91-926

Reasons DoD Technical Reports Not Used by U.S. Aerospace Engineers and Scientists

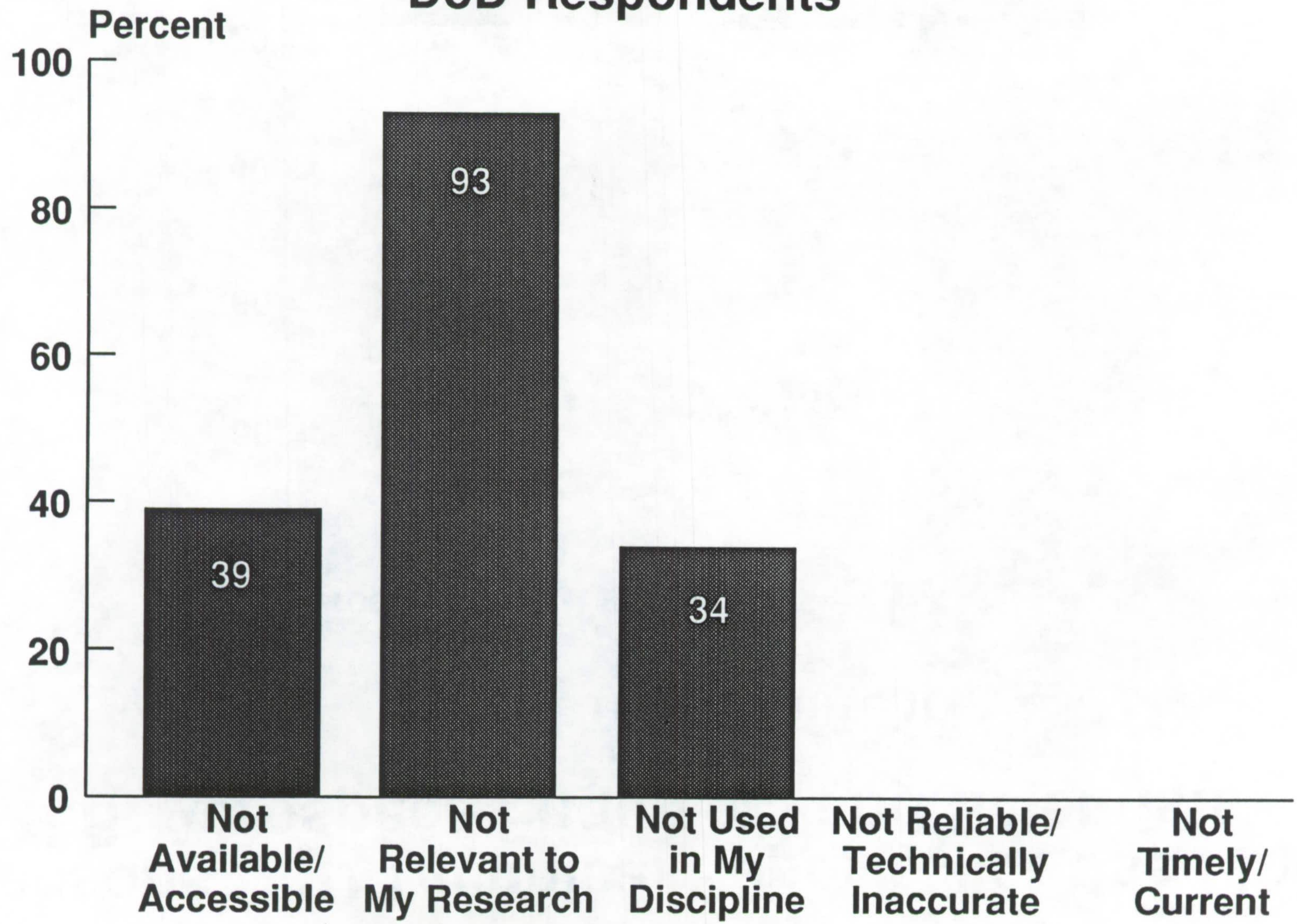
"Not Timely/Current"



G/Reasons "Not Timely"|91-926

Reasons DoD Technical Reports Not Used by U.S. Aerospace Engineers and Scientists

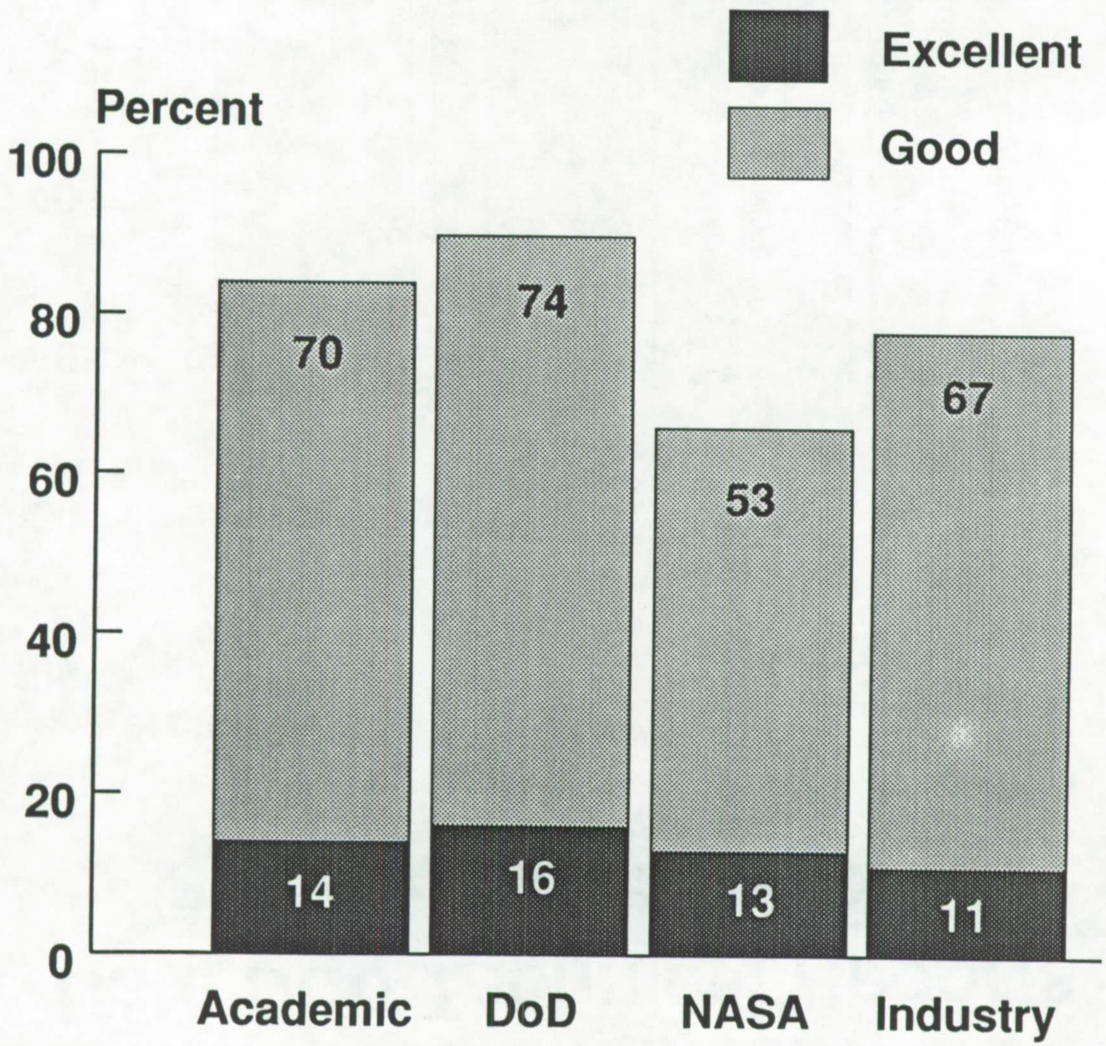
“DoD Respondents”



G/Reasons Not Used- DoD|91-926

How U.S. Aerospace Engineers and Scientists Rate DoD Technical Reports

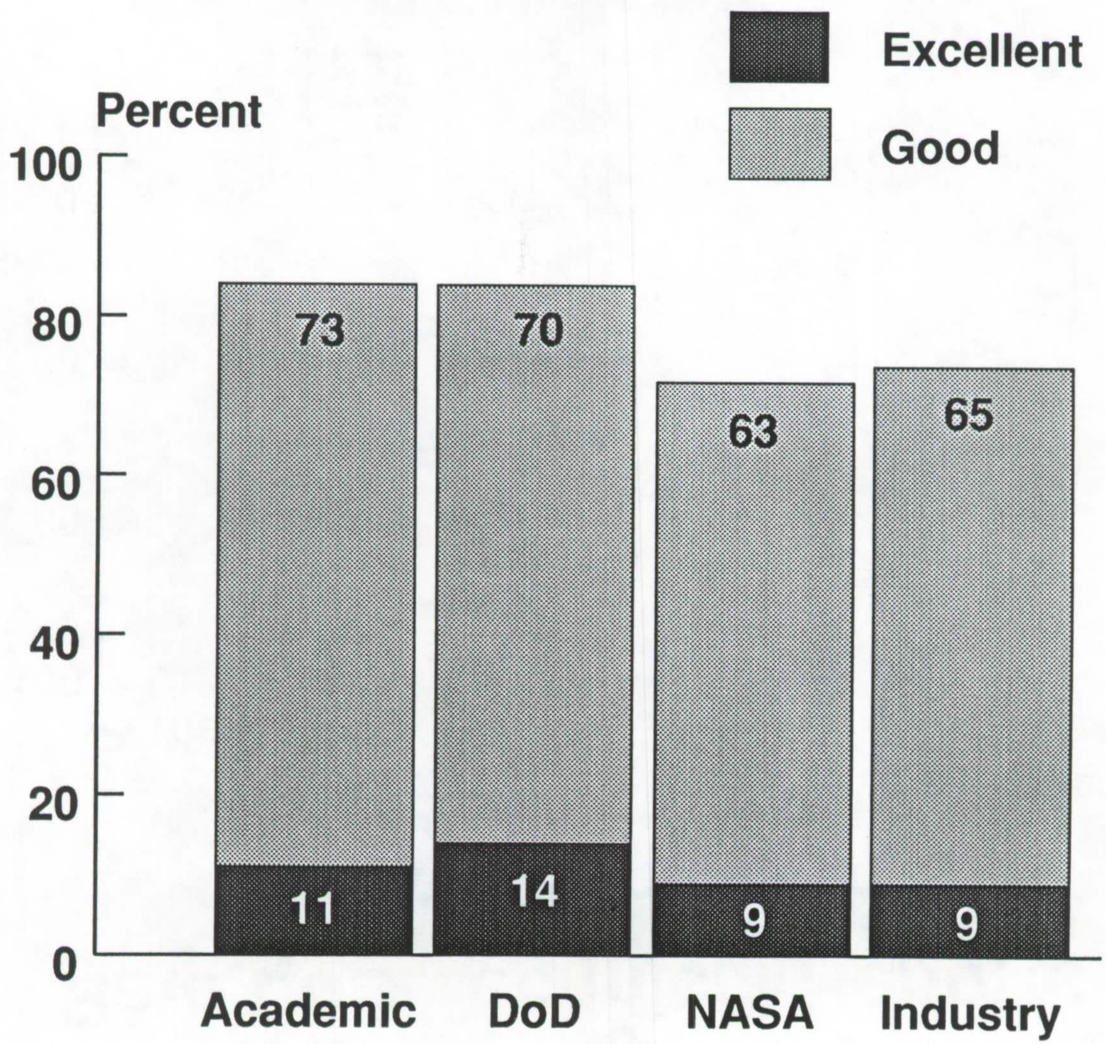
"Quality of Information"



G/Rate - Quality of Info|91-926

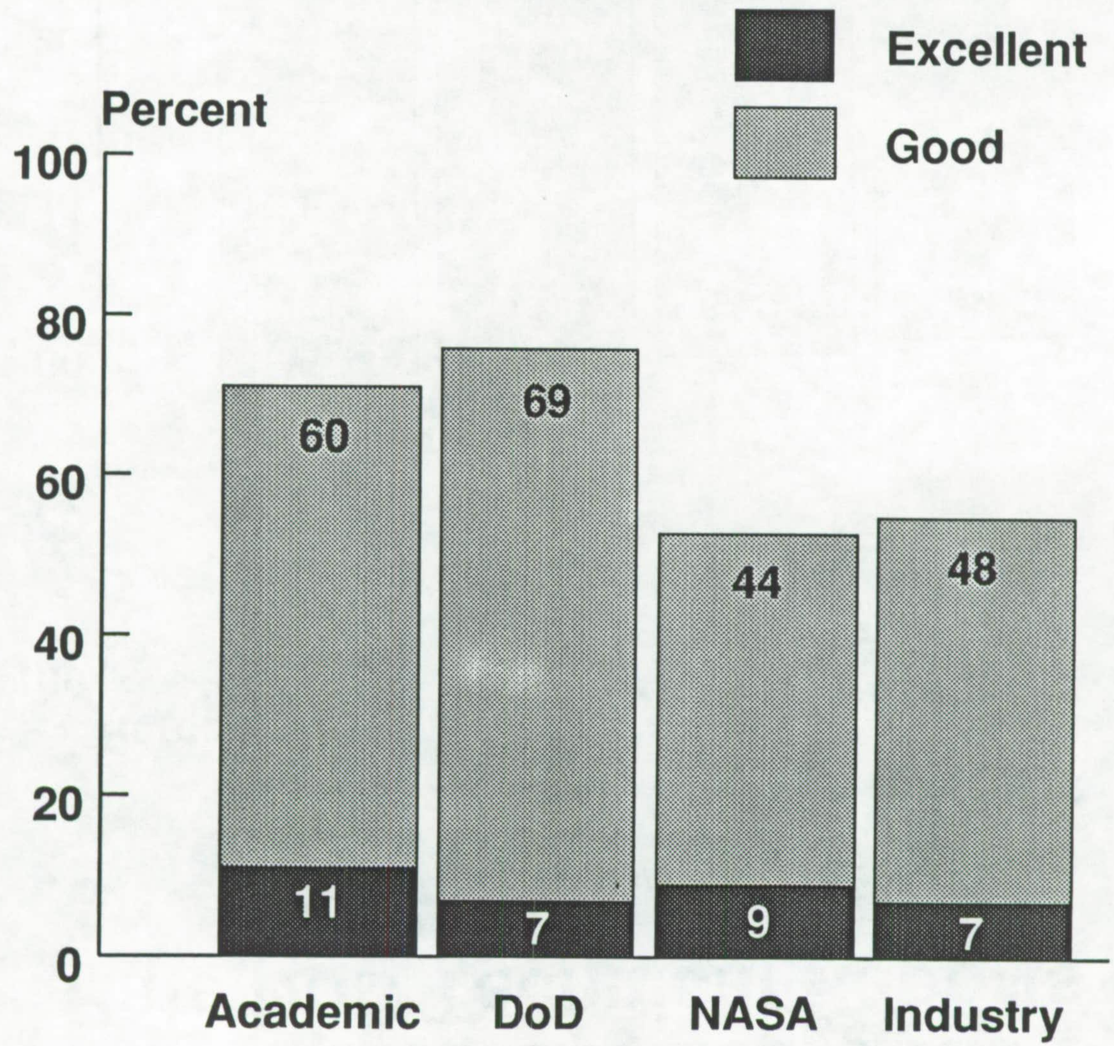
How U.S. Aerospace Engineers and Scientists Rate DoD Technical Reports

"Precision/Accuracy of Data"



How U.S. Aerospace Engineers and Scientists Rate DoD Technical Reports

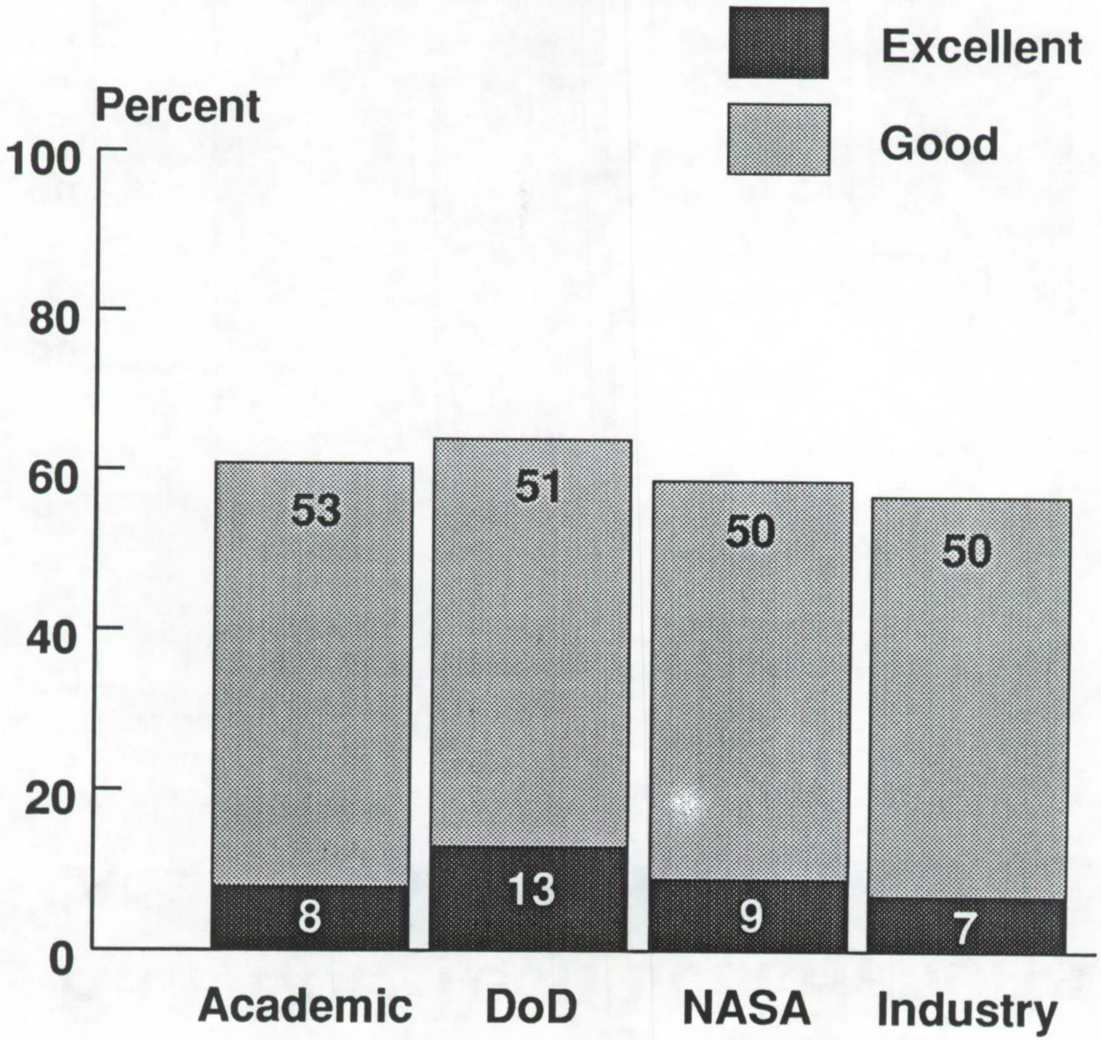
"Adequacy of Data/Documentation"



G/Rate - Adequacy Data|91-926

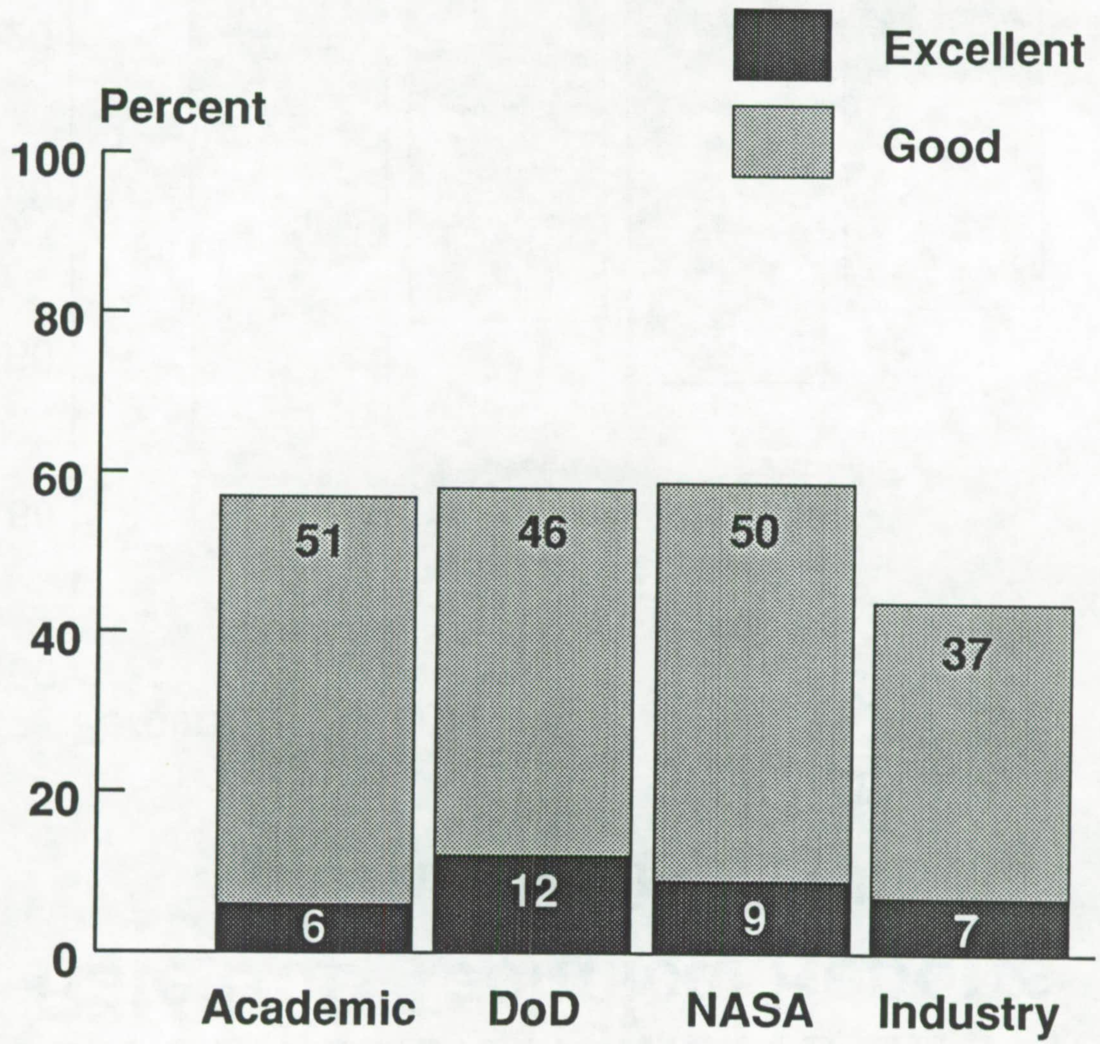
How U.S. Aerospace Engineers and Scientists Rate DoD Technical Reports

"Organization/Format"



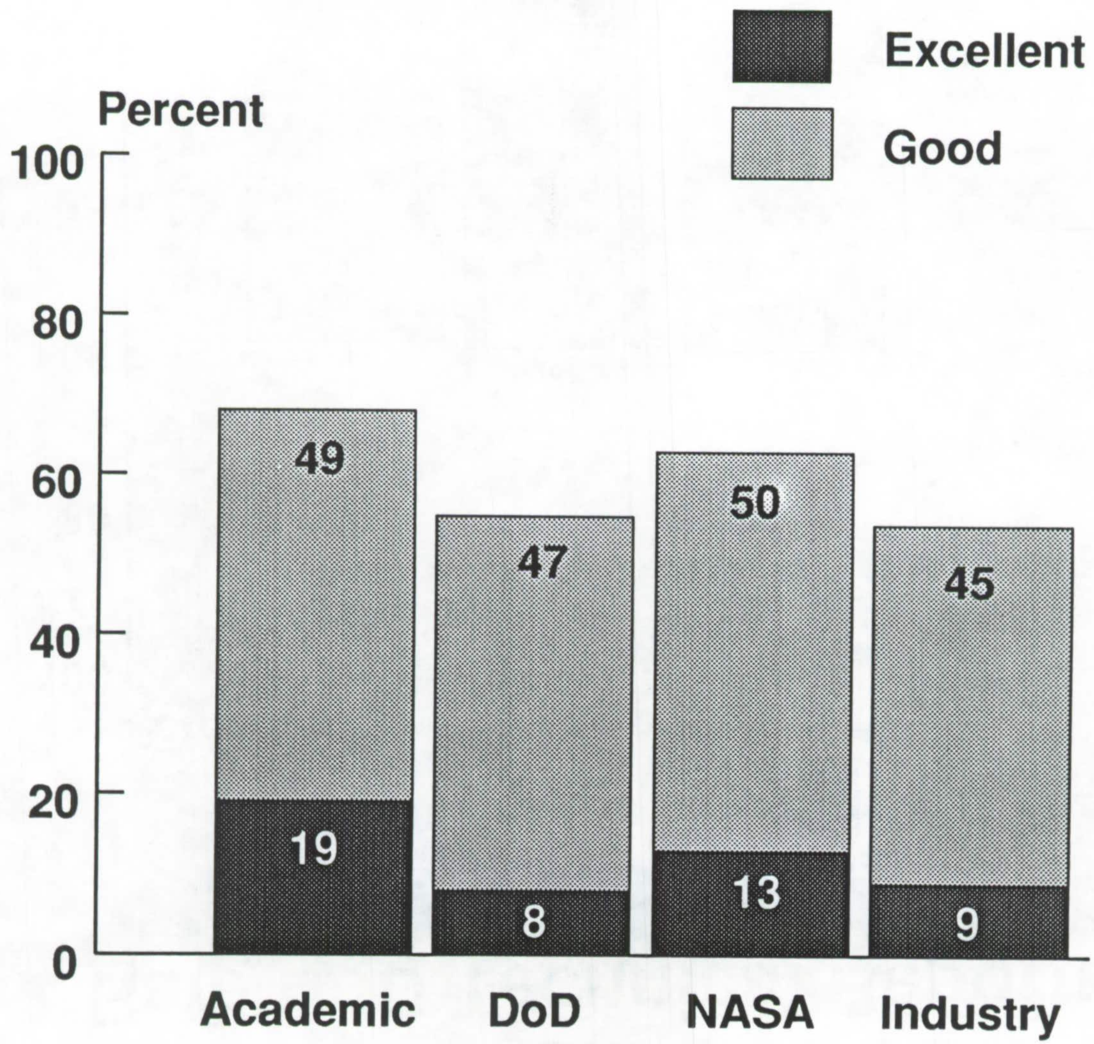
How U.S. Aerospace Engineers and Scientists Rate DoD Technical Reports

"Quality of Graphics"



How U.S. Aerospace Engineers and Scientists Rate DoD Technical Reports

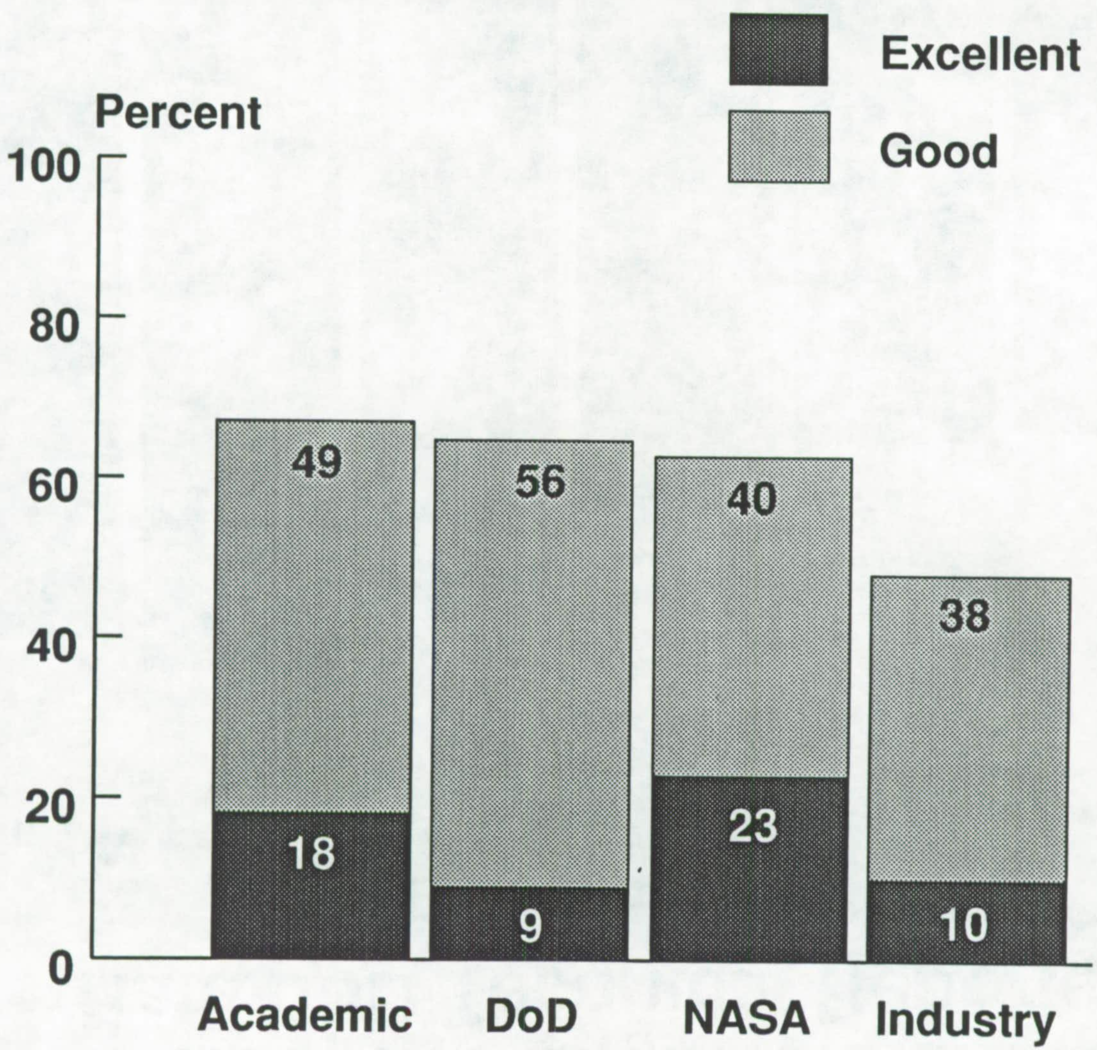
"Timeliness/Currency"



G/Rate - Timeliness|91-926

How U.S. Aerospace Engineers and Scientists Rate DoD Technical Reports

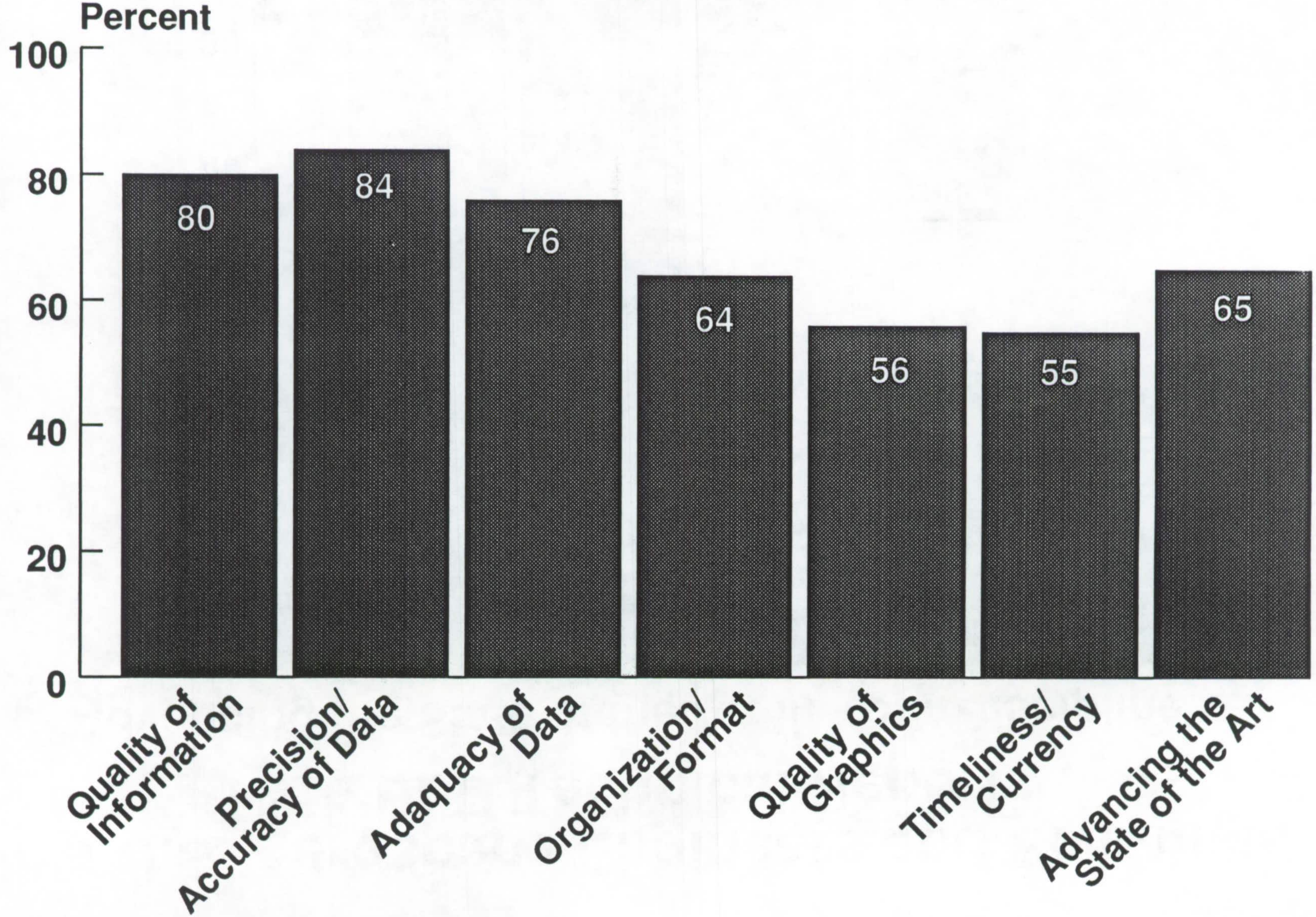
"Advancing the State of the Art in Your Discipline"



G/Rate - Advancing|91-926

How U.S. Aerospace Engineers and Scientists Rate DoD Technical Reports

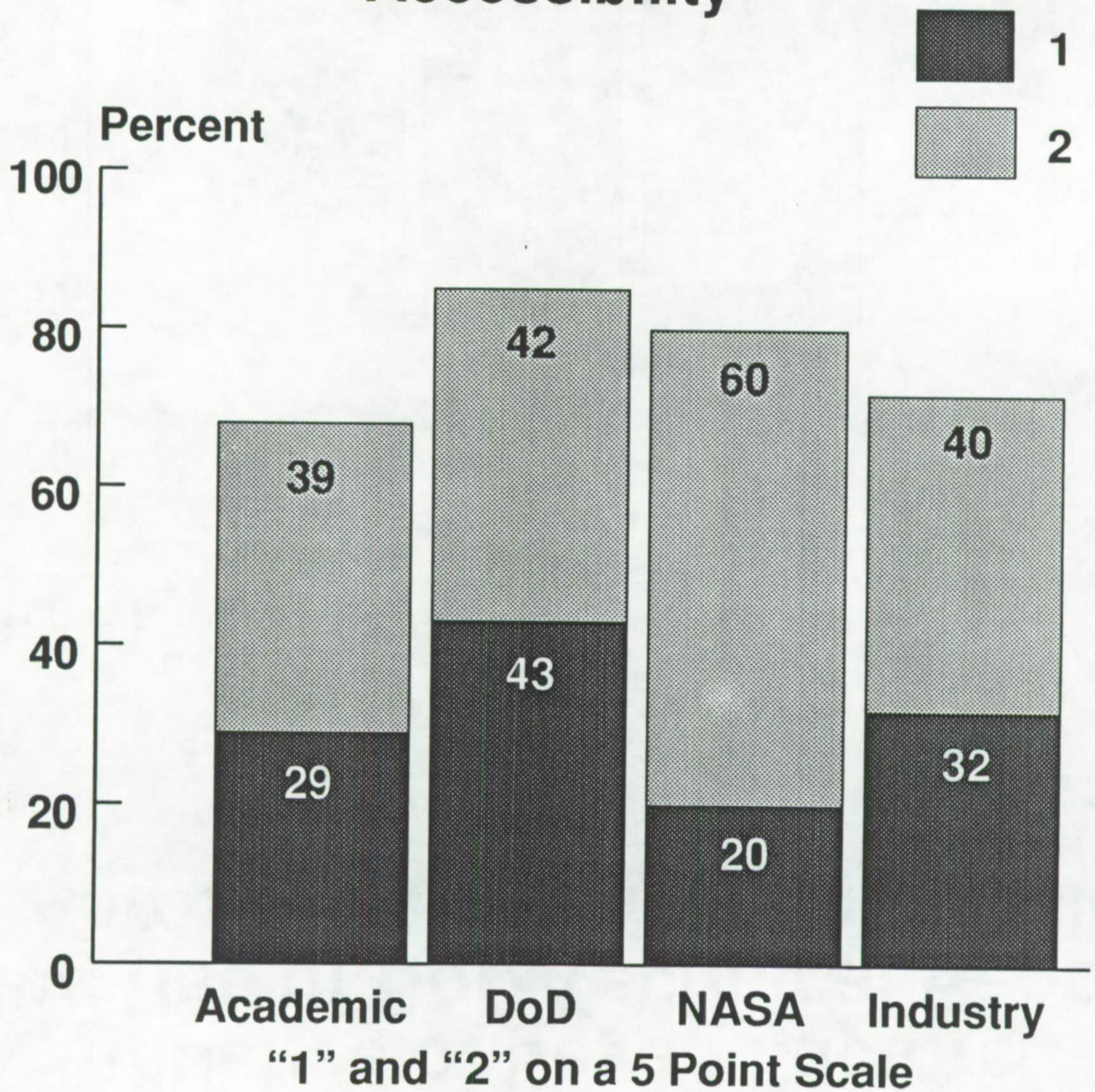
"DoD Respondents"



G/Rate- DoD Respon|91-926

Influence of Seven Factors on the Use of DoD Technical Reports by U.S. Aerospace Engineers and Scientists

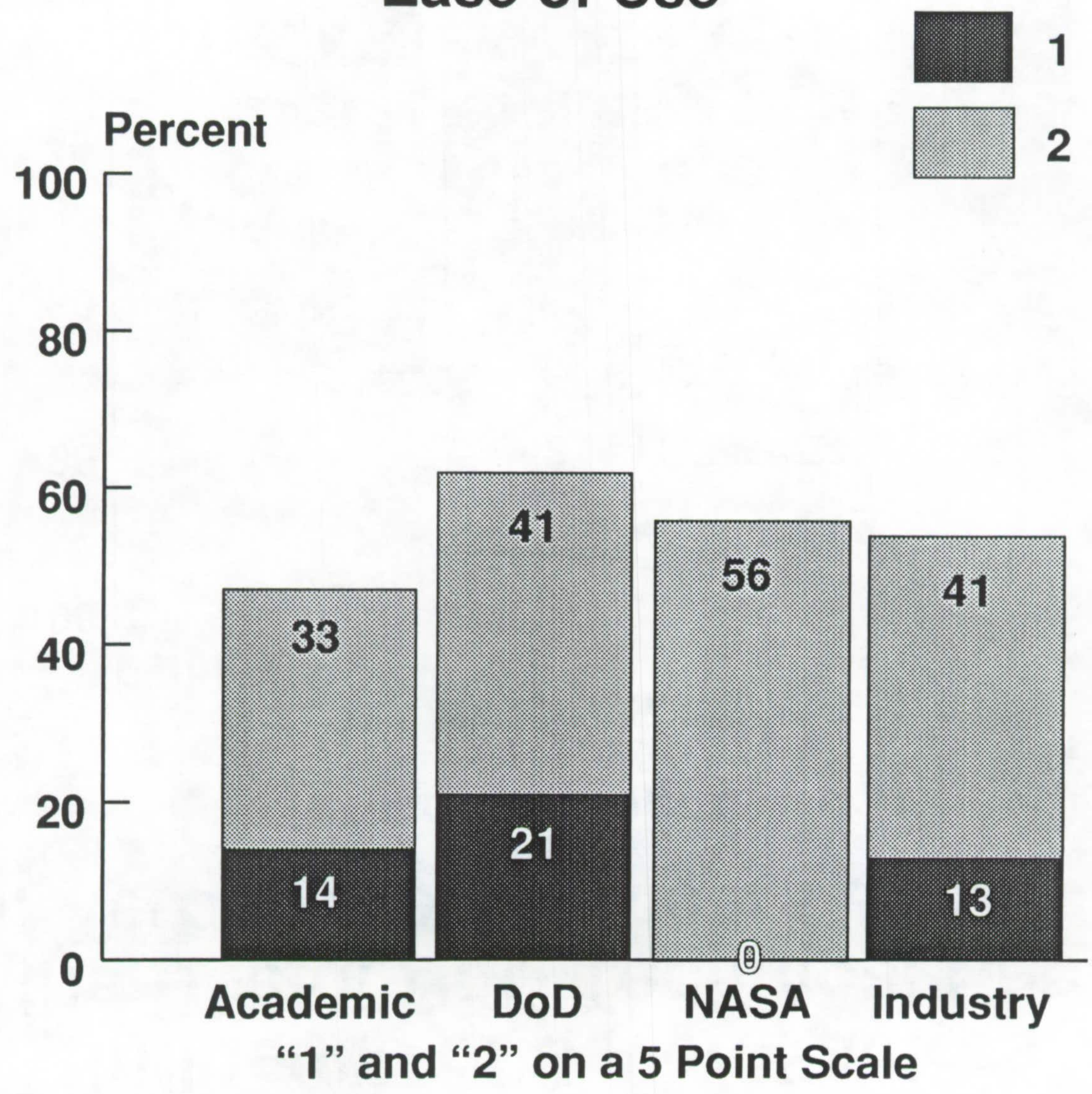
"Accessibility"



G/Influence- Accessibility|91-926

Influence of Seven Factors on the Use of DoD Technical Reports by U.S. Aerospace Engineers and Scientists

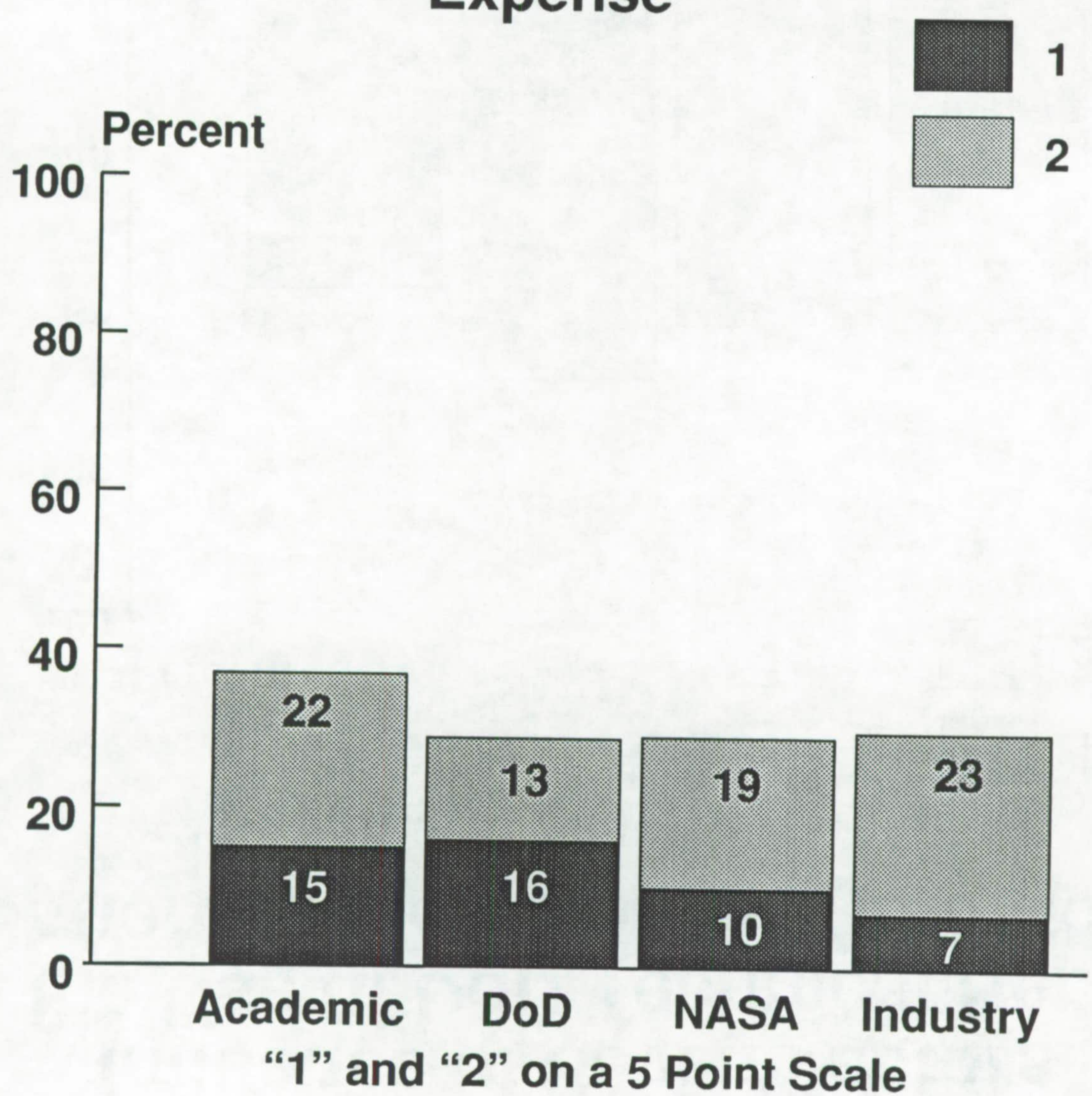
"Ease of Use"



G/Influence- Ease of Use|91-926

Influence of Seven Factors on the Use of DoD Technical Reports by U.S. Aerospace Engineers and Scientists

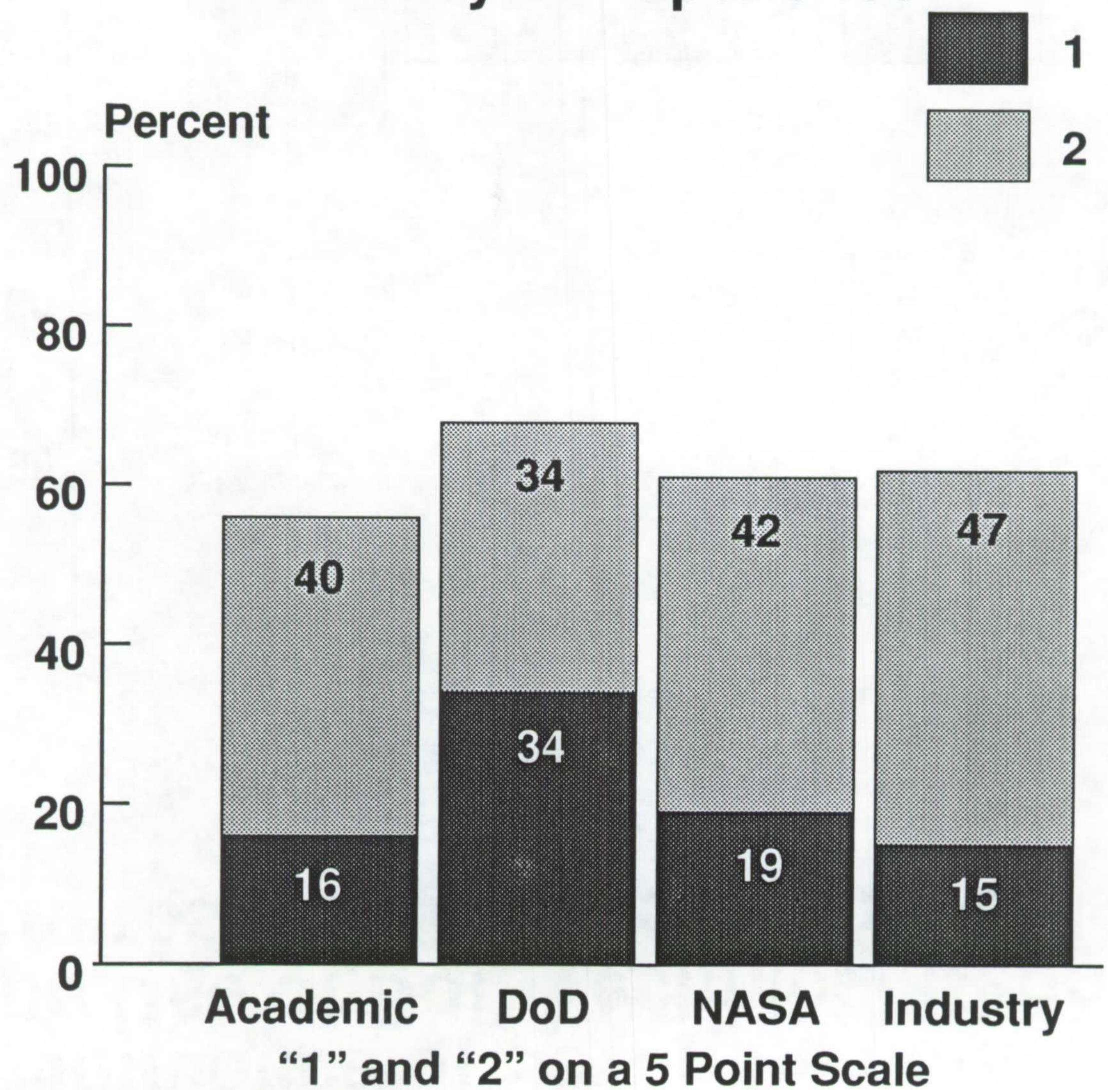
"Expense"



G/Influence- Expense|91-926

Influence of Seven Factors on the Use of DoD Technical Reports by U.S. Aerospace Engineers and Scientists

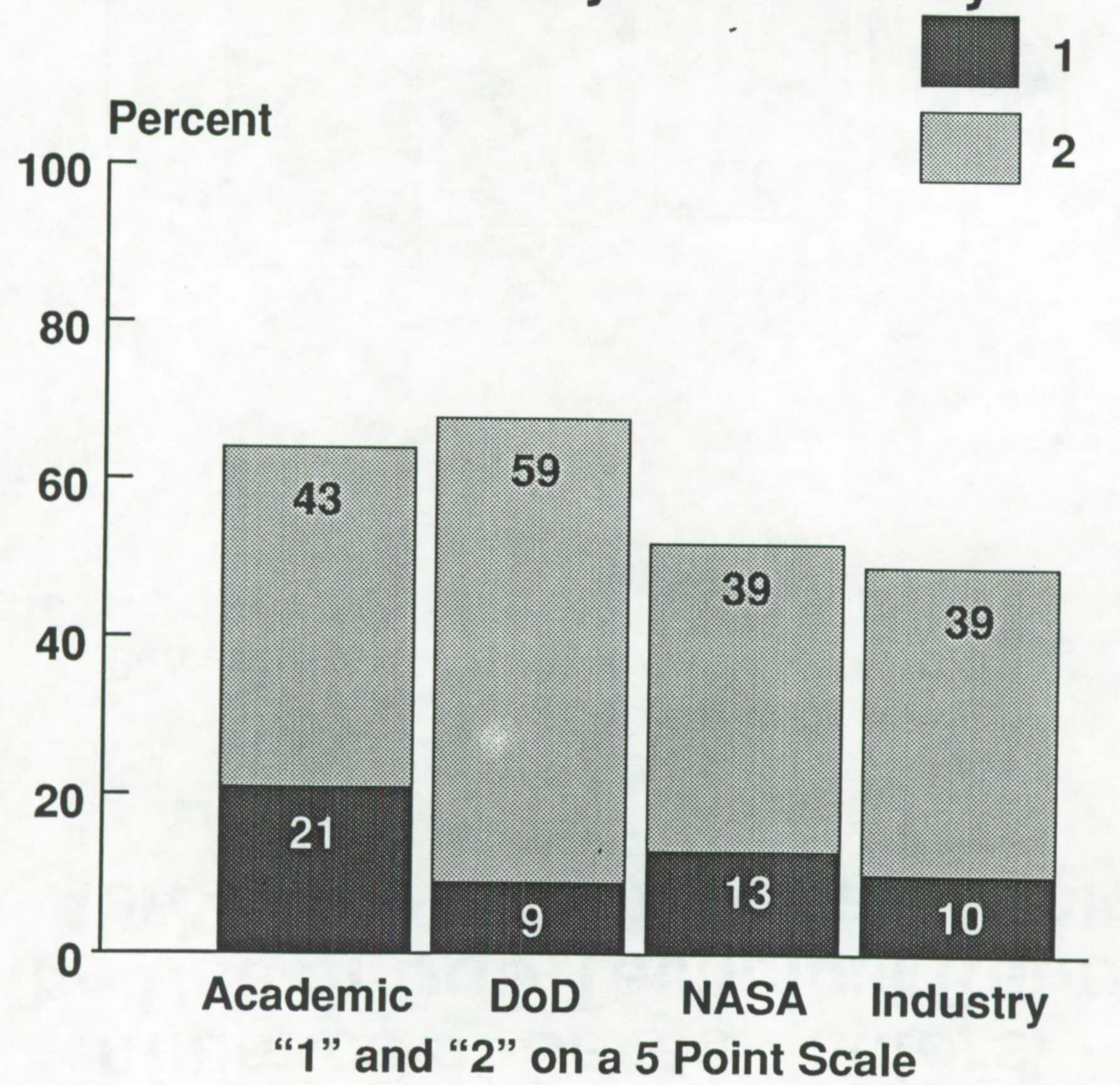
"Familiarity or Experience"



G/Influence- Famaliarity|91-926

Influence of Seven Factors on the Use of DoD Technical Reports by U.S. Aerospace Engineers and Scientists

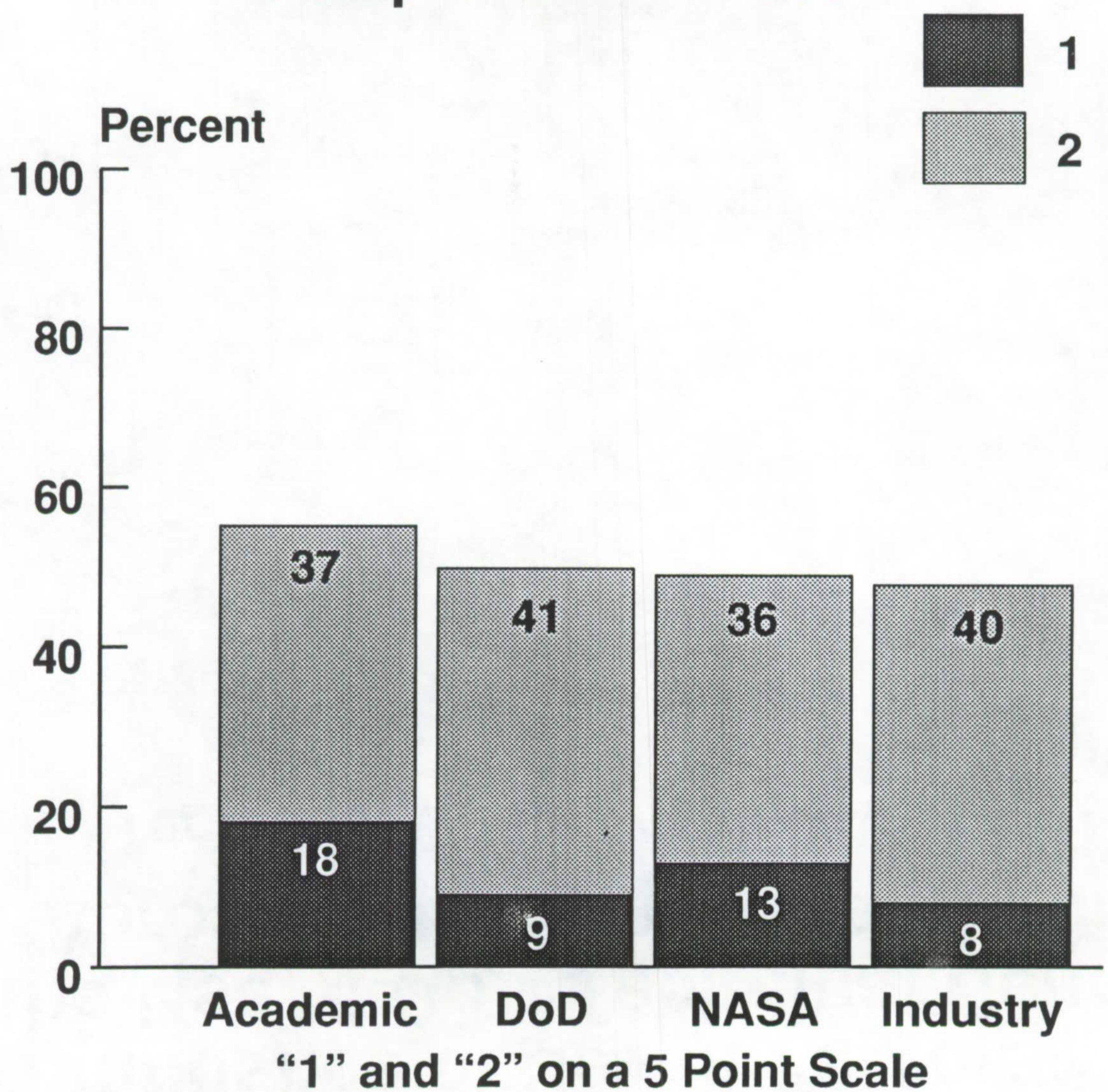
"Technical Quality or Reliability"



G/Influence- Tech Quality|91-926

Influence of Seven Factors on the Use of DoD Technical Reports by U.S. Aerospace Engineers and Scientists

"Comprehensiveness"



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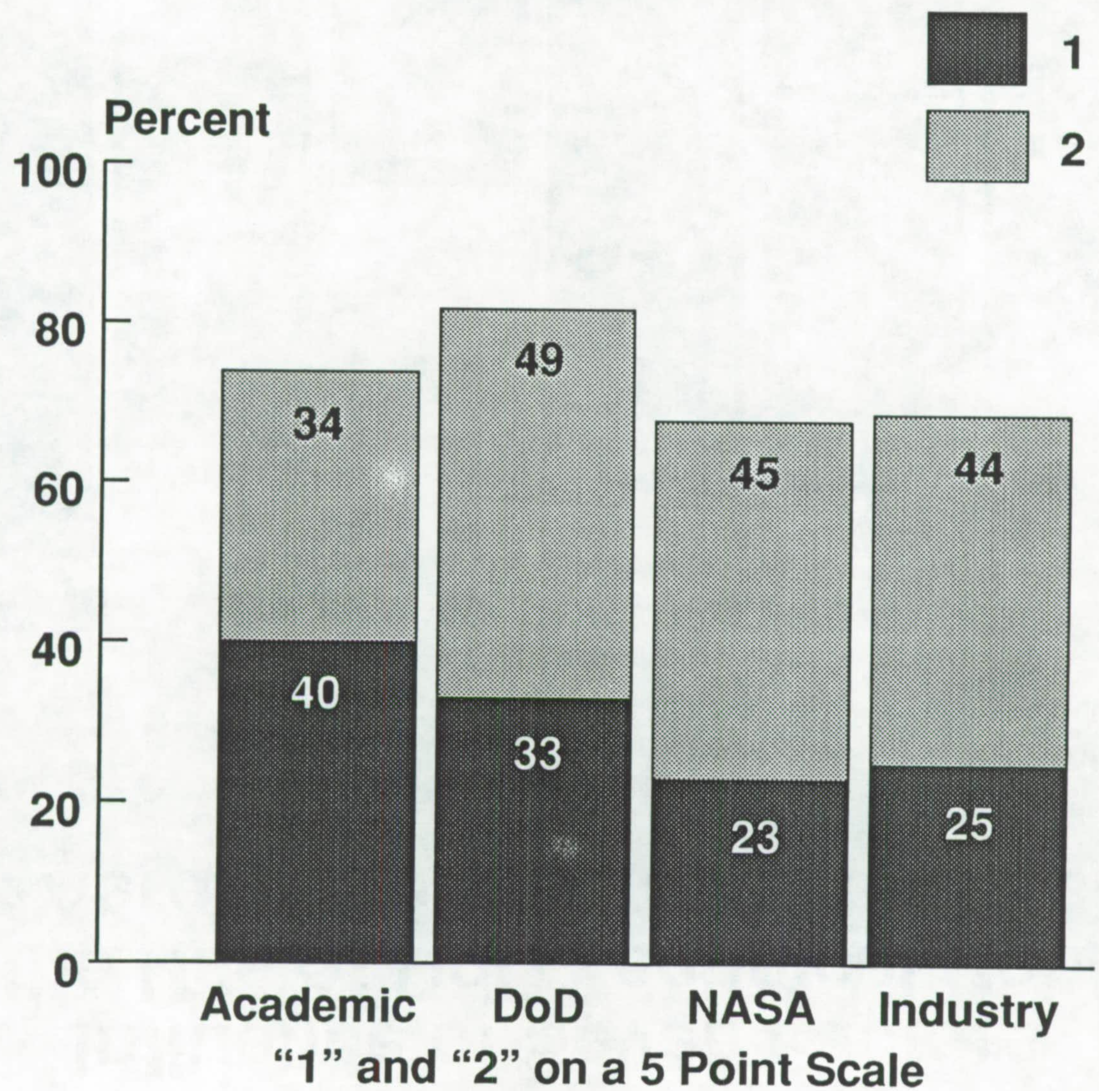
"Relevance"



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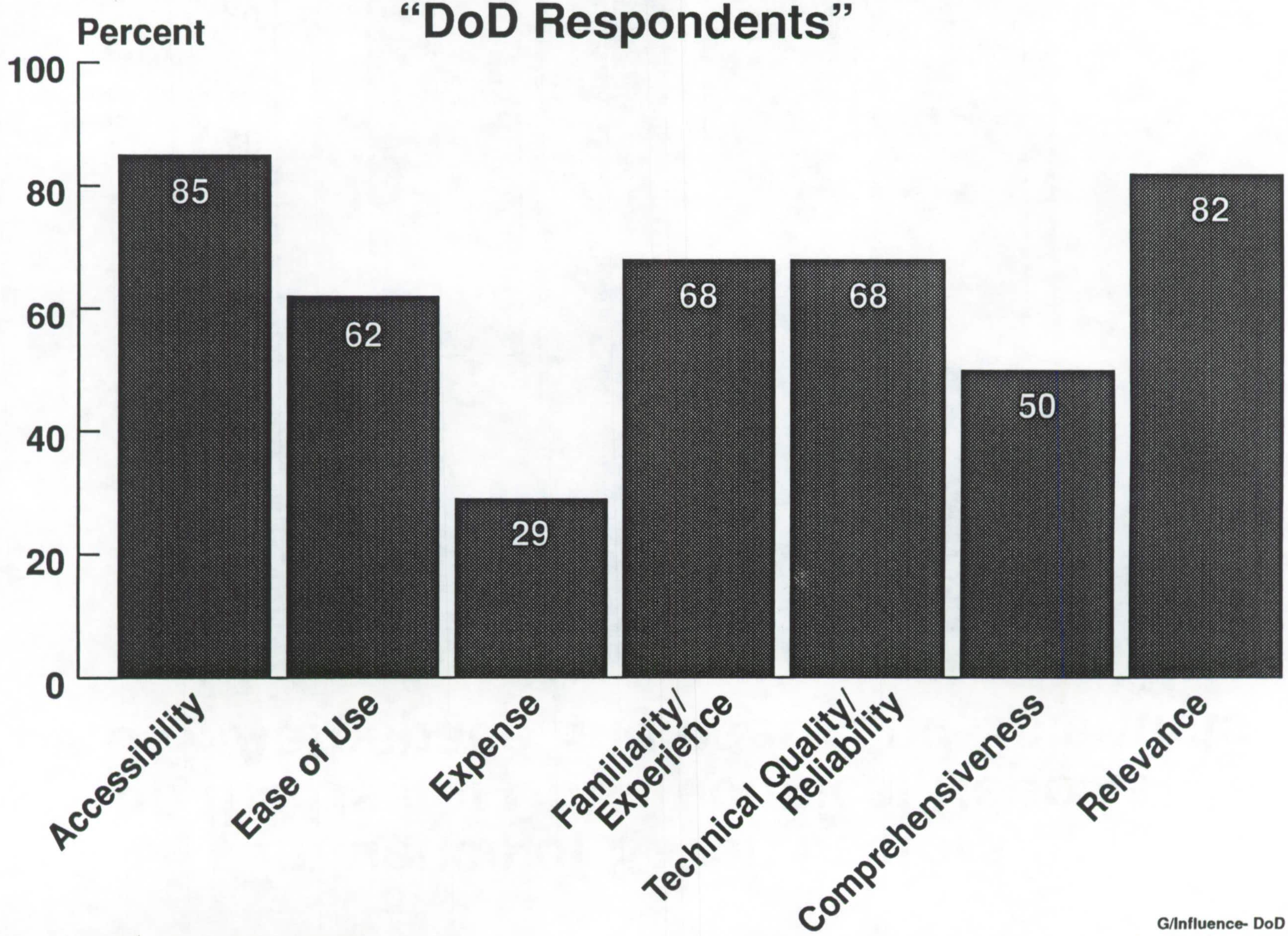
"DoD Respondents"



G/Influence- DoD Respon|91-926

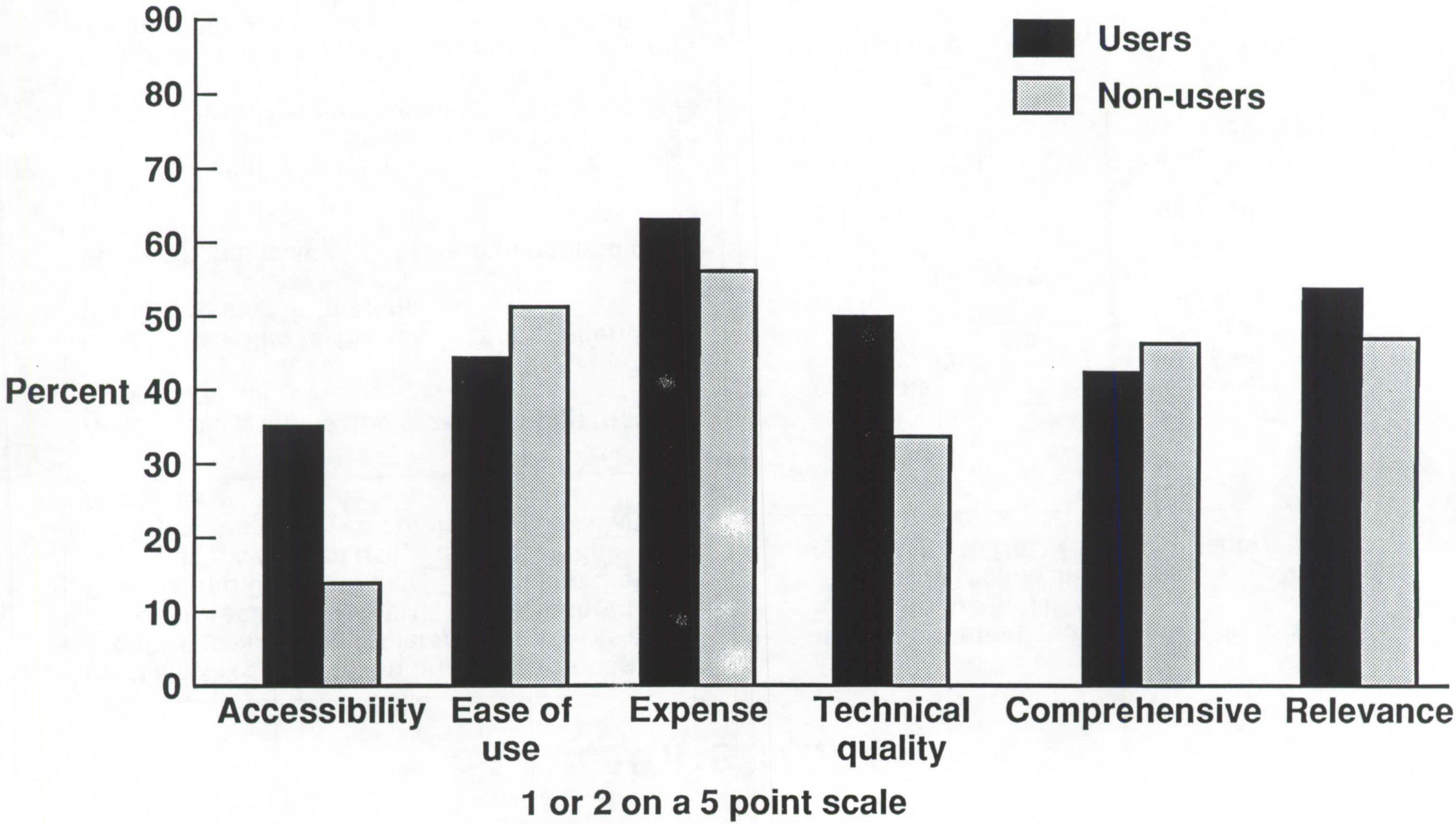
Survey Instrument

Please rate each of the information sources (Conference/Meeting Papers, Journal Articles, In-House Technical Reports, NASA Technical Reports and DoD Technical Reports) on their accessibility, ease of use, expense, technical quality or reliability, comprehensiveness, and relevance

Rate each information source on the factors on the far left panel
NASA Technical Reports
(if not used, go to DoD Technical Reports

Factor	1	2	3	4	5
Accessibility, that is, the ease of getting to the information source.	Very accessible				Not at all accessible
	1	2	3	4	5
Ease of use, that is, the ease of comprehending of utilizing the information.	Very easy to use				Not at all easy to use
	1	2	3	4	5
Expense, that is, low cost in comparison to other sources.	Reasonably priced				Too expensive
	1	2	3	4	5
Technical quality or reliability, that is, the information sources were expected to be the best in terms of quality, accuracy, and reliability.	Excellent technical quality or reliability				Poor technical quality or reliability
	1	2	3	4	5
Comprehensiveness, that is, the expectation that the information source would provide broad coverage of the available knowledge.	Comprehensive				Not comprehensive
	1	2	3	4	5
Relevance, that is, the expectation that a high percentage of the information retrieves from the source would be used.	Very relevant				Not at all relevant
	1	2	3	4	5

RATING OF DoD TECHNICAL REPORTS BY U.S. AEROSPACE ENGINEERS AND SCIENTISTS

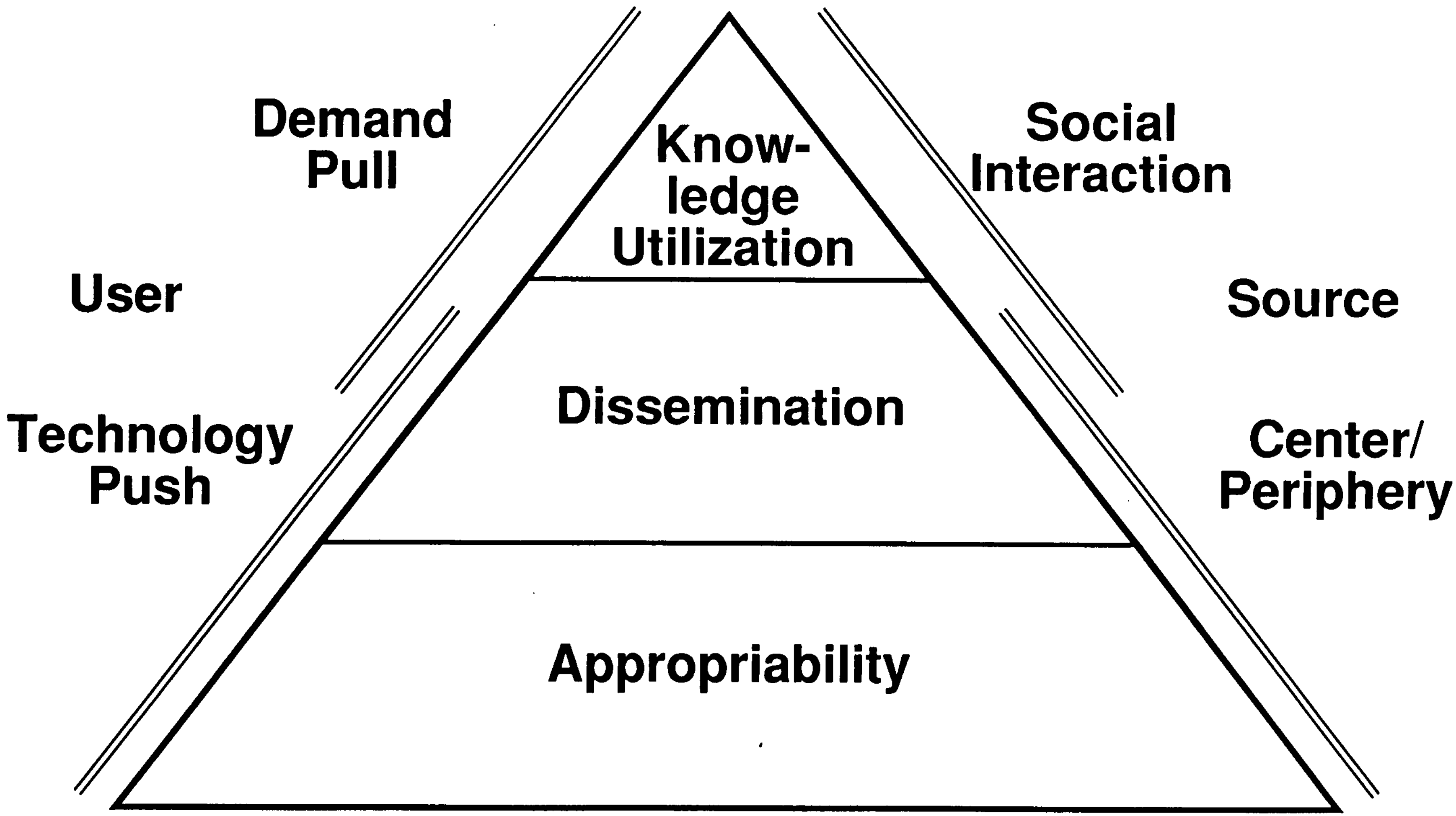


G-DOD TECH REPORTS/90-215

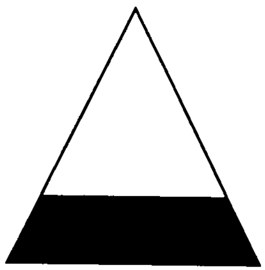
Information Sources Used by DoD and all other Respondents to Complete Most Important Technical Project, Task, or Problem

Source	Precentage who used	
	DoD	all others
Used my personal store of information including sources kept in my office	90	88
I discussed the problem informally with a colleague(s)	87	78
Consulted library sources such as conference/ meeting papers, books, journals, and technical reports	73	68
Spoke with a key person outside my organization to whom I usually look for new information	66	54
Spoke with a key person inside my organization to whom I usually look for new information	65	59
Discussed the problem with my supervisor	60	49
Searched a database or had a data base searched for me	56	53
Checked with a librarian/technical information specialist in my organization	39	36
Checked with a librarian/technical information specialist outside of my organization	28	24

Models for Interaction



Comparison of Three Levels of Knowledge Diffusion



Appropriability

Description

Stresses the federal role in supplying information (R&D) which would not otherwise be produced by the private sector. Basic research is viewed to be the driving force behind technological development and economic growth.

Manifestation/Examples

- Large, continuous federal support of basic research since 1945;
- Supports universities as the primary performer of basic research

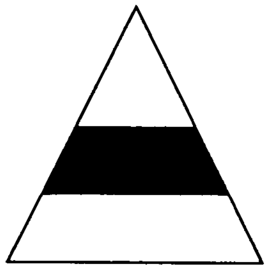
Strengths

- Clear policy recommendations regarding federal priorities for improving technology development

Weaknesses

- Incorrectly assumes that high quality research will be acquired and used by the private sector;
- Ignores user-oriented R&D; thus much basic research is irrelevant to technology development;
- Ignores the innovation process within the firm

Comparison of Three Levels of Knowledge Diffusion



Dissemination

Description

Stresses the need to disseminate information and technology to potential users. Centralized information programs and centers were emphasized as a federal priority

Manifestation/Examples

- Federal Laboratory Consortium for Technology Transfer
- NASA's Technology Utilization Program
- DoD's DTC & IACs

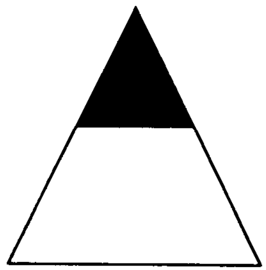
Strengths

- Recognizes the transfer process as a critical element in the technology development process;
- Access to information by potential users is improved

Weaknesses

- Users not involved in the design/ selection of information resources or technologies;
- Users must be aware of and request help in order for such programs to work

Comparison of Three Levels of Knowledge Diffusion



Knowledge Utilization

Description

Stresses relationships between producers (of information and technologies) and users. Two primary barriers which must be overcome for successful technology development are inadequate communication and organizational resistance to change. This model suggests that emphasis must be given to the entire process of development – production, transfer, and use.

Manifestation/Examples

- Industry – university cooperative relationships;
- Engineering research centers;
- Industry – university cooperative research centers;
- Cooperation between federal labs and industry

Strengths

- Attempt to recognize and reduce known barriers to technology development
- Stresses that an active role is required to make users aware of and interested in in information, resources and technology;
- Identifies specific interventions to reduce barriers to transfer and use

Weaknesses

- It is difficult to identify successful programs, given the complexity of the technology development-transfer-user-process;
- Requires a large federal role;
- Is contrary to dominant assumptions of the established R&D policy system