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The Value of STINFO

July 1990

United States Air Force
Scientific and Technical Information Program
Management of STINFO

USAF STINFO MANAGEMENT 90/7

Secretary of the Air Force
Deputy for Scientific and Technical Information (SAF/AQT)
The Pentagon
Washington, DC 20330-1000

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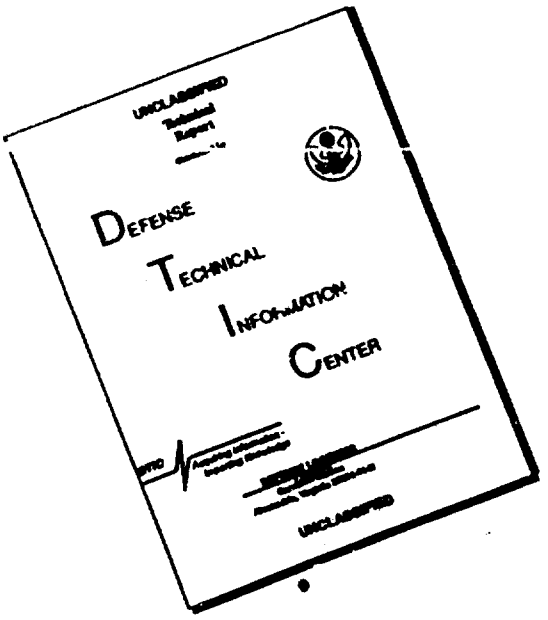

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13. ABSTRACT *(Maximum 200 words)*
This document, prepared for video production, has as its goal to inspire the reader (or viewer of the video) to examine one's attitudes towards Scientific and Technical Information (STINFO). It discusses the value of STINFO and the role it plays in the technical world, briefly mentions some of the past attempts to place a quantitative value on STINFO, and tries to have the reader realize how important STINFO is. The reader should become a supporter and more complete user of STINFO products and services. This document may be used in conjunction with the video, or separately.

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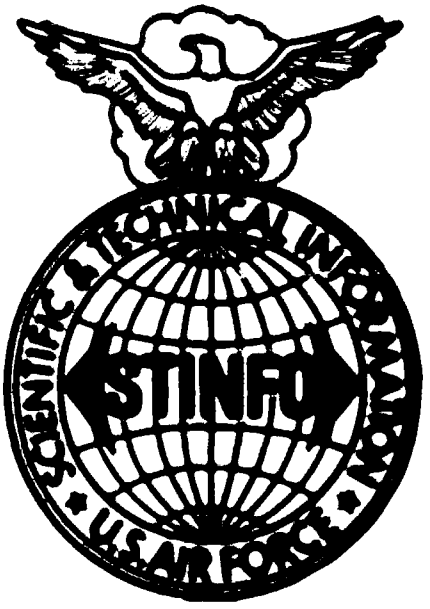

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Purpose of Video

The purpose of this video is to inspire the viewers to examine their attitudes towards Scientific and Technical Information To discuss the value of STINFO and the role it plays in the technical world To briefly mention some of the past attempts to place a quantitative value on STINFO, and hopefully, to make the viewers realize just how important STINFO is and to inspire them to become supporters and more complete users of STINFO products and services

1. Introduction

"The world's economy has shifted from one built on materials to one governed by information. In the past, those who controlled materials like gold and oil governed all. In the information age, those who wield information will shape the world."

- Signal Magazine

Today, we all live in a new information environment. The convergence of computer technologies, the dramatic increase in the availability of information, the increase in demand for information products, the rise of the information industry, and the appearance of information professionals are some of the signposts of this environment.

Unfortunately, although we are in this incredible information environment and everyone uses technical information, a general realization of the importance and value of information has yet to occur. Not everyone realizes when they need information, whether or not it can be obtained, or what value it has to them. *No two people* value information the same.

Scientific and Technical Information, STINFO, is a valuable resource that directly affects the cost of performing a technical task, the quality of your results, and your productivity. If you don't believe in the value of STINFO and the supporting information services, you will have no impetus to use them.

Because of the large amounts of money involved, duplication and waste are, unfortunately, in the headlines almost every day. In 1940, the federal government spent less than $75 million to finance national defense and civilian R&D operations. In the early 1960s, the amount rose to $15 billion, and since then has grown steadily until today the R&D budget is $68 billion dollars. $41.4 billion of this amount is for national defense, of which the Air Force receives $13.2 billion dollars.

The scientific and engineering community has been accused of wasting from 10 to 50% of our resources simply because people are not receiving adequate and timely information. If true, this would mean that the Air Force alone was wasting from $1.3 to $6.6 billion dollars a year.

What is your part in this? Answering the following questions will give you a quick indication of your own attitudes towards some of the fundamental information problems that underlie this situation.

Do you feel that it is a **burden** to prepare and submit materials to information collections and databases?

Do you feel that you **already know** all the relevant information about your specialty as well as all the ongoing work, and therefore do not have to bother searching for information?

Do you actively **want** to search databases in support of your work, or do do feel that it is waste of time that could be better spent doing work?

Do you **resent** paying significant amounts from project funds for information services such as database searches, information analysis center services, library services, or buying documents?

If you feel any of these things, you are not alone. Over half of the people employed in technical jobs use very few of the information support and reference services available to them. And, although it is hard to believe, many people go to great lengths to keep from having to submit materials into the information collections.

2. What Is Information, What is Knowledge, and How Does Information Become Knowledge?

Since we'll be discussing the value of information, we'd all better agree on what it is. **Information** is the collected set of facts existing in a document, another person's mind, an information service, a folder, or some other source. It is the aggregate of all the journals, books, technical reports, manuals, drawings, patents, handbooks, and databases that can be read or referenced in order to perform some task.

STINFO is, of course, only one of the inputs used by technical personnel to perform their work. We apply experience, inputs from co-workers, learned skills, knowledge gained from our education, and many other inputs to solve our technical problems.

For the most part, data collections and databases contain our body of information. Individual items of information have little meaning. It is only when they are put together or processed that they become useful. Access to this information base gives it the potential to become knowledge.

Knowledge is the result of using this information base to increase our awareness. It is the purpose of organized information access. The return on an investment in information is knowledge.

The bridge between information and knowledge is **understanding**. To make the necessary connections between raw information and applied knowledge means making associations with something you already understand. Achieving understanding and having the skills to use the gained knowledge effectively is the main purpose of our educational system.

3. What Is An Information Service and Why Do People Use Them?

An information service collects, catalogs, stores and provides retrieval of information items. This is different from an information analysis function which evaluates the content of a document. It is also different from the management function which is concerned with the operation, promotion, and utilization of the information service.

Individuals, be they program managers, bench scientists, or engineers, use information services if they believe that the knowledge gained will save time or add to the quality of their work. This is true whether the information is for R&D directly relating to the specific job being performed, background research, or for any of the variety of other reasons that people search for information.

4. What Is Information Management?

The information management function is concerned with the operation, promotion, and utilization of the information services. Its main function is to insure that STINFO is made available in a timely manner and in a useable form to those who have a need for it

The promotion of available services is an essential part of this function. The most useful information service in the world is worthless if people don't know about it. Unfortunately, the lack of promotion in the past has led to information ignorance being fairly common in the technical world.

The United States Air Force STINFO program is concerned with this aspect of the information picture. Its main function is to make sure the scientific and technical information that is being generated locally or under contract is being entered into the appropriate information service, and that these same services are being promoted and provided to everyone needing access to them

5. Can a Dollar Value Be Placed On Information?

The world of STINFO exists under two diverse philosophies. One philosophy being that the dollar value of information can be measured; the other being that the dollar value of information is an immeasurable and meaningless quantity.

Both sides agree that information has a high value. The difference being whether the basis of this value is qualitative or quantitative. Whether or not you measure it in terms of increases of quality or in dollars saved.

In fact, no successful real-world quantitative way exists to place a dollar value on STINFO! A large number of success stories exist and have been collected. Most of these quote a specific dollar savings that can be directly attributed to finding a piece of information. But these and other historic attempts to absolutely quantify STINFO have been subject to a great deal of criticism and very large reported savings tend to be viewed with some skepticism.

6. Value Expressed As Willingness To Pay

One easy to understand approach to the value of information is to look at the amount of money that an individual is willing to pay for it. In fact, this is how a value is assigned to information when it is bought and sold. Information brokers and commercial databases both work this way. But, libraries and government collections such as NTIS and DTIC do not charge based on what people are willing to pay, instead their charges are based more on the cost of their operations.

What are people willing to pay for information? People who are less knowledgeable about information tend to be surprised when they learn that the cost for commercial database access can be hundreds of dollars per hour. People that value information consider these charges to be very reasonable.

You might want to ask yourself how much you would be willing to pay for your library and other information support services. If you aren't willing to pay very much for these services, your personal valuation of information is probably inconsistent with its true value to you.

7. The Qualitative Value Of STINFO

Perhaps the better and truer indicators of the value of STINFO are the qualitative measures. Some of these measures are: the timeliness of information, improvements in productivity, and improvements in quality.

Timeliness is two things. It is the response time to the request for service, and it is the extent to which the information is in step with the current wave of technology. If the information contributes to the rapid completion of a job, and if it is up to date, then it is perceived to have high qualitative value.

STINFO increases **productivity** and **effectiveness** of research and engineering programs by avoiding unnecessary overlap and duplication of efforts, and allows users to maximize their time and resources. Using information resources will avoid unproductive lines of work and will provide guidance as to techniques and approaches to perform your primary job. In addition, the time saved by avoiding having to perform work already completed can be converted to productive work.

The use of information resources can directly impact the **quality** of the work being performed. By examining the previous work that has been done, you are able to build on the successes and failures of the projects before yours. Knowledge of the past work will influence the direction of the work effort, and of course, will affect the outcome.

8. The Quantitative Value Of STINFO

The quantitative value of any specific piece of information is very subjective. It may be worthless to me, worth $5 to you, and be worth $5,000 to the next person in line. Also, if a person searches for information and finds nothing of interest, has it been a waste of time and money? No, absolutely not! It's clearly as important as having found something.

There is a constant desire to identify a clear "return on investment" in the STINFO world. The demand for accountability, especially in times of budgetary constraints, forces a quantitative value to be placed on information services. However, quantitative data on the value of information that is universally accepted and believed, will never be available. There is no calculus of quantitative information value.

A number of investigations that relate to the value of technical information have been made in the past and others are still underway. Some of the major efforts that have been carried out were by King Research, by NASA/DoD, and by the Institute for Defense Analysis, among others. This topic is of such high interest that it was the sole subject of a NATO AGARD Lecture series in 1988.

King Research has made studies on the use and value of Defense Technical Information Center products and services, and also performed a parallel study for the Department of Energy. One result of these studies was the determination of a "benefit/cost ratio" for technical information support to be between 8 and 45. This result means that every dollar spent on information support yields between 8 and 45 dollars in value.

An ongoing NASA/DoD study partially funded by the USAF STINFO Program Management Office, is examining in detail the ways in which technical information transfer takes place. This study, which has already yielded interesting results concerning the perceived importance of various technical products, will lead to a deeper understanding of the role and value of technical information.

The Institute for Defense Analysis recent looked at the qualitative and quantitative benefits associated with 50 selected users of DoD Information Analysis Centers. Although all 50 cited benefits, only 13 were quantifiable in terms of reduced test times lower labor costs, cost avoidance, and acceleration of R&D

The aggregate task funding for these 50 tasks was about $15 million dollars, of which about $3 million was for the 13 tasks quantifying their results. The combined quantified information-related benefits for these 13 tasks was in excess of $21 million dollars!

A typical example from this study was a US Air Force Human Systems Division project to evaluate methods used by the Air Force to size gas masks and train personnel in their use. The information support to this project halted the procurement of tools and masks that would not have worked. The quantified information benefit was well over $1 million dollars.

Another example was a US Air Force Space Division project to develop a program for improving the reliability of built-in systems for fault detection. The information support to this project led to reduced spare parts and reduced down time of an essential operational system. The quantified information benefit was over $6 million dollars.

9. The Cost Of Information Support

No aspect of information support is free, every aspect has an inherent cost. The libraries, the librarians, and placing your document in a depository all cost money and are part of the cost of information support. But keep in mind that information that already exists is much, much cheaper than new information that must be gathered, so storing it and retrieving it makes sense.

Do all questions cost the same to answer? No, questions that have been previously addressed, answered, and stored are incredibly cheap compared to new work.

A study has placed the cost of technical information support at about $500 to $1500 per professional employee, whether or not the employee uses these services. This is the total cost of the information collections and the people providing information services. This study also showed that the identical people would be willing to pay about $5000 each for the same level of information support as they were presently receiving.

What about the costs of not having the required information? These costs can only be measured in terms of failures such as duplicated work, lost opportunities, delays, failed experiments, and lower quality work that might result from not having the proper information. Each of these represents a cost just as real as a dollar spent.

Unlike successes, failures from lack of information or not finding the appropriate information are usually hidden. No one wants to admit or advertise that they discovered, after the fact, some information that would have affected the outcome of their work had they known that information beforehand.

The worst case is when potential users do not learn of the existence of needed information and therefore are not able to request the information even when using the existing procedures.

10. The Value of United States STINFO

Unforunately, there is one area in which the value of United States STINFO has been clearly demonstrated. It is estimated that in 1980 alone, the Soviet Union spent over $1 billion dollars on technological intelligence. In two areas of aircraft technology, armor and electro-optics, they avoided more than 100,000 man-years of research and development in one five-year period. Most of these savings were gained from the information in technical documents gathered illegally from the United States. This is an disastrous, but very compelling confirmation of the value of STINFO.

11. Summary

In Summary,

- STINFO has substantial value.
- STINFO is an important resource.
- STINFO can result in large dollar savings in staff time and work.
- STINFO results in higher quality and more timely work.
- STINFO use correlates directly with productivity.

The purpose of the United States Air Force STINFO program is to improve the scope and effectiveness of collecting, processing, disseminating, and applying scientific and technical information. The goal of this program is to ensure that the valuable resource we call STINFO is rapidly and effectively exchanged among our scientists, engineers, managers, and administrators.

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