

## **Tutorial: The Value of Information**

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*Information Literacy Toolkit*

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### **Key Topics**

- Determining the Value of Information
- Return on Investment (ROI) In Information
- Cost (fee) Versus Free Information
- References and Additional Resources

What would the value have been to the United States, if the government had known the exact time and targets of the terrorist attack of September 11, 2001? What would be the value of information identifying the terrorists? What would be the value of knowing the exact location of Osama bin Laden? Most of us would say that kind of information would have been priceless, and is of incalculable value.

Whenever someone tries to develop a process for determining the true value of information, problems occur. Is information ten thousand times more valuable in medical terms if a new vaccine saves ten thousand lives, instead of only one life? Is that cure more valuable to the ten thousand families than to the family of the one? Again, it becomes very difficult to attach a price to that information.

This section of the Information Literacy Toolkit discusses the value of information. Part of the discussion includes how to assess value by determining the return on investment (ROI). Some basic examples and formulas to develop a concept for ROI are illustrated. The final section covers some differences between fee or cost-based, and information that is free. Some myths and assumptions of fees and free information are explained with a mention of why both types persist.

### **True Story**

*"A Case for the Stacks: Could Librarians' Help Have Prevented Hopkins Tragedy?"* Library Journal's Academic Newswire, July 24, 2001

Librarians know too well the misperception that everything is available on the Internet--but has that misperception now proved fatal? Perhaps, say medical librarians, after recent reports in the Baltimore Sun suggested that a Johns Hopkins medical researcher failed to uncover published research suggesting the potentially lethal side effects associated with inhalation of the drug Hexamethonium. According to the Sun, while investigators found that supervising physician Dr. Alkis Togias made "a good faith effort" to research the drug's possible adverse effects, his search apparently focused on online resources, including PubMed, which is searchable only back to 1960. Previous articles published in the 1950s, however, with citations in subsequent publications, warned of lung damage associated with Hexamethonium. Dr. Frederick Wolff, a professor emeritus at the George Washington School of Medicine, told reporters Togias was "foolish" and "lazy" for not finding the articles. "Anyone trained in academic medicine knows how to do this research," Wolff told reporters. "What happened is not just an indictment of one researcher, but of a system in which people don't bother to research the literature anymore."

"These people should have been speaking to a medical librarian," says Edward Morman, College Librarian and Director, Francis C. Wood Institute for the History of Medicine at the College of Physicians of Philadelphia, noting that the tragedy might have been avoided had an information professional been involved. Morman said, "a manual search of pre-1960 medical indexes should have supplemented any database search" on the drug done by physicians. In a case that has garnered worldwide attention, physicians at Johns Hopkins administered Hexamethonium to a healthy 24-year-old woman, Ellen Roche, in an attempt to study how the lungs of healthy people protect against asthma attacks. But Roche died weeks later from complications caused by the drug. Medical librarians say the tragedy is a stark reminder that the Internet should not replace either the stacks or the important work of information professionals. In fact, Morman notes, even if the lion's share of medical research does one day make it online, the stacks must be maintained, as reliable search engines and digital preservation remain dicey propositions. "The point is," said Morman, referring to the tragedy, "that older medical research must be maintained."

This story illustrates the fatal impact not only to the life of one patient but also to the lives of her family and friends as well. It impacts the lives and future academic curricula of the doctors and nurses involved, and it impacts the care and diagnosis of future patients. We can see that the value of information is very high, not just in the presence of the information, but perhaps even more so in the cost of its absence.

### **Determining the Value of Information**

The value of information in the Department of Defense has never been denied. But when does data become information, and when does information become useful knowledge that adds value to our work? Information itself is valueless unless translated into usable knowledge. Many now suggest that general consensus has been reached establishing that "information is now a more important measure of a company's worth than their tangible assets...The truly mission critical processes for every enterprise involve capturing the daily flood of data... Data must be stored and organised (sic) so that employees can access it easily and intuitively, evaluate it...and act upon the findings effortlessly." The value of the computer has been determined only as a storage device for the information. The number and size of computers do not provide the value, only the ease of use and value of their content when shared as information (Strassman 1996).

The difficulty is not in establishing the value of information, but in quantifying that value. Librarians and knowledge workers can determine what it costs to staff a reference desk, to license a database for searching, to borrow or purchase a book, report, or journal article. Determining the value of the use of that product or information by the military, or the civilian scientist or engineer is a different problem. Some studies reported in the literature have attempted to put a value on these individual transactions (Wood 1985).

Others have attempted to define information value by means of mathematical formulas. One formula is related by META Group "Information Value = the price premium the 'infosumer' will pay that exceeds the extra cost of providing the 'infoproduct'." They term their study "Infonomics" and provide three dimensions of value: Reach, Velocity, and Density. The formula then reads  $V=P-C$ . However, they agree that the information value goes beyond the cost, and is dependent upon the use (META Group 2000).

Another approach is to simply estimate the value of the content of a library by looking at its catalog and making assumptions based on numbers of items cataloged (Matthews 2000).

Donald W. King, a noted researcher in this area, has conducted numerous studies on the value of information, including several for DoD components. In 1990, King developed a methodology for determining the value of information provided by libraries to the individuals in an organization.

His rule of thumb indicates that organizations appreciate a value to cost ratio, or return on investment (ROI) of providing information services via a library of 19 to 1 (King and Griffiths 1990).

In 1998, the U.S. Department of Transportation, Federal Highway Administration, prepared a study of the "Value of Information and Information Services." Using an extensive literature search and set of interviews with public and private sector experts, the findings of this study indicated that information value can be measured by 1) reduced costs of agency research, technology development, and operations, 2) quicker implementation of innovations and time savings, and 3) more effective decision making at all levels of the agency (Volpe 1998).

Information does have value; studies have proven it, and experts can agree. The difficulty is then how to evaluate the value. One proven method that is frequently used is to determine a return on investment, or ROI, of information.

### **Return on Investment (ROI) in Information**

Information does provide value, as we have demonstrated above. What then is the return on investment (ROI) when the cost of that raw information is known? There are several significant cost savings and a genuine return on investment seen in experiences due to the existence and use of information in the Department of the Navy, especially via a Naval library.

Among the more noticeable cost savings are those encountered by buying and circulating books, technical reports, and periodicals for the entire workforce. Among the less noticeable, but equally useful services, are the online databases and electronic periodicals which make for a "virtual library," accessible from each employee's desktop.

For this example, we will assume a library book budget of \$40,000 per year or a total \$120,000 for three years. The library book buyer researches each buy with different vendors to get the best price, and ensures that no tax, or excess charges are incurred, and that discount and volume purchases are exercised where possible. The library can save an average of 40% using these methods, for a cost avoidance of \$48,000 during the three years. New books typically circulate an average of five times over a three-year period. If the five library users were to spend their own monies for the books they need they would invest five times \$40,000 or an additional \$200,000 per year. By buying books for all, the library saves \$48,000 plus \$200,000, or \$83,000 per year. The estimated return on investment for library books is therefore, \$248,000 divided by the \$40,000 investment, or 620%. This analysis does not include the possible benefits of new developments or improved products and processes resulting from the technical knowledge gained from each book.

If a library periodical budget averages \$385,000 for three years, the total is \$1,150,000. The vast majority of the periodicals are routed to one to seven users. An average number of routings is three. If each of the three individuals were to purchase their own subscriptions to the periodicals, the total would exceed \$3,450,000. If the library purchases and routes the periodical, the savings is at least \$2,300,000. The return on investment for the use of the library for this function is approximately 200%.

Griffiths and King provide several insights into the return on investment and value of libraries. One is the savings achieved by professional reading. They translated this savings into \$310 per journal article read, \$650 per book read, and \$1,090 per report read. Those figures sound high until you understand the value provided by the items read. Library users in the study admitted that the value of the item read led to avoiding the primary research step, confirming their own research, stopping unproductive efforts, or modifying a plan or analysis. These are all extremely valuable results. Using the number of 1,574 books checked out or used in the library, the savings

was \$1,023 for book use. For journal articles, it was \$1,231, if we assume only a very modest one article read from each of 3,972 periodicals. If we add the use of reports literature, there is an additional \$1,090 per report for 311 reports, or \$339,000. The total annual savings is \$2,593 for an annual cost of only \$425,000 (\$40K + \$385K), or 610% return on investment (Griffiths and King 1993).

The value of information provided via a virtual library is more difficult to calculate. When a user can access information at his or her own desktop, the return on investment is extremely high. Savings can be calculated by determining travel time to and from the library and multiplying it by the proportion of the user's salary per hour that would be entailed. Modest calculations mention \$10-\$20 per item found using an online database. Even greater savings are realized when the concept includes the fact that most users may not seek information they need if it is not readily available. In addition, the need for professional reading and current awareness as it influences better work practice by engineers and scientists is cited in many studies.

Online databases and electronic periodicals are components of the virtual library. A typical library might be able to provide 70% of its periodicals accessible electronically via the library home page or Web site. If only 5% of users at an organization (5% of 2000 = 100) chose to subscribe to only 5% of the journals (5% of \$385K = 19,250) for electronic access, that would still cost (100 X 19,250 = \$1,925,000). In addition, Griffiths (1993) and others point to the value of libraries in cost efficiencies over an individual searching for information on their own without the intermediary librarian. Studies find the average amount of time spent by a professional seeking a specific journal article, locating and making a copy of it was 45.4 minutes. A librarian did the same job in 17.9 minutes. Considering that the librarian costs less than a professional user such as a research scientist, the ROI is calculated at 500%. Traditionally, the cost of providing information from the library staff as opposed to the cost of an employee seeking and buying that information is very cost effective. A 1994 Library Quarterly study indicates a ROI of over 300% when library staff performs research and finds data, as opposed to when the scientists and engineers, for example, acquire it themselves (Cooper and McGregor 1994).

There are other less tangible measures of the value of library information. According to Mattarazzo and Prusak (1995), 86% of managers surveyed believed that the library contributed to the organization. That contribution could be made in four different ways: 1) Providing information for strategic planning; 2) Keeping management current on research and technology; 3) Conducting research; and 4) Aligning the library mission with the organizational mission.

Recent information from the Fortune 500 companies (Higher Ranked 2000) concludes that the higher ranked the company, the more likely it is to have a library, e.g., a source for information. In the same article, the top Fortune 500 firms involved in aerospace, computer software and electronics, all reported having a library. The value of libraries has been established and known in the business sector. Adopting good business practices includes supporting, promoting and using information.

The table below summarizes the ROI for a Naval technical library.

<b>Library Service</b>	<b>Annual Savings</b>	<b>ROI</b>
Book Purchase & Circulation	\$208,000	520 %
Periodicals Purchase & Circulation	\$2,300,000	200 %
Technical Value to Users	\$2,593,410	610 %
Virtual Library	\$1,925,000	Infinite
<b>Total Annual Savings</b>	<b>\$7,026,410</b>	

Total Library Budget	(\$1,500,000)	468 % overall

### Cost (Fee) Versus Free Information

The old adage, "You get what you pay for," has long been used to explain the difference in the value of that which is obtained for a cost versus that which is free. The underlying assumption is that free information has less value than information that has a cost. That assumption has been challenged lately by a new assumption (some would say misconception) that "everything is on the Internet, and it costs nothing." This brief discussion of fee versus free information will explain some differences between the two. The simple explanation is that information has value, whether it is free or it comes with a cost, but it is helpful to understand what value is attached to each type.

What are the differences between information that is free versus information that has a cost? Obviously, the major difference is cost. However, there are several other important distinctions, such as aggregation and organization of information, associated services, currency, reliability, comprehensiveness, and ease of use, that may add value to the information. Those differences may add enough value that paying for fee based information resources is worthwhile. In general, people seem to be willing to pay when they believe they receive a quality product with value. This willingness extends to items formerly free that now may involve charges.

Some examples of what people are willing to pay for, which can otherwise be available for free, include cable television, private schools, or water. In each case, the user of the item perceives added value that exceeds the cost of the item. For cable television, that value is the additional program choices for children, foreign language, movies, news, sports, etc. In education, willingness to pay may be based on parent's values, higher quality instruction, individual attention, safer environment, or smaller class size. Water quality and taste are usually cited as the reason individuals are willing to pay for something that is free out of the tap.

Conversely, what was formerly free information may now cost. Some examples are travel reservations and tickets, which were free to customers using travel agents. Banking services that may have been free in the past may now involve costs. Yet, customers are willing to pay even for "free" items if they get value. Value may be due to more efficient use of time or extra service. The difference between making your own travel arrangements and using a travel agent is one that is often cited. Many airlines and hotels make reservations via the Internet. Although such services were previously available to customers by travel agents for free (the fee was paid to the agent by the airline or hotel), the agent must now charge the customer. Why then do people persist in using travel agents? Agents have access to a great variety of travel databases which allow them to look at a variety of options and choose the best one for their customer. Agents do the research on their time, so the customer does not waste his time. If there are problems, the agent resolves them. The bottom line is convenience and efficiency, which are often worth the fees charged.

Another example is fees for library services such as book rentals, copying, interlibrary loan, and reference queries. Most books are circulated for free in public libraries, but some best sellers now are rented out for small fees of \$.25 to \$1.00 a day. People pay these fees because they would rather read best sellers now, rather than later. The rental fees are usually much smaller than the price of purchasing the best seller. Photocopying materials is a common use of libraries. Although free in some special and academic libraries, fees are commonly charged in other libraries. No one complains. Getting interlibrary loans of materials from other libraries may cost a small fee, but users seem to understand the value and gladly pay for the service.

If people are willing to pay for items which can be obtained free of charge, why then do they persist in the belief that some things should not be paid for, even if that item was formerly only available for a cost. "One of the Web's great accomplishments has been to reinforce the notion that all information ought to be free. The great irony is that the online industry has long dreamed of, and struggled for a mass market. Now that it exists, its members don't expect to pay" (O'Leary 2000). Many producers of fee-based information now believe that they will lose their customer base to free providers if they charge fees. With the prevalent feeling that it is all out there for free, providers believe that customers will not pay for information. It's been shown that some customers will drop some suppliers and choose to use only free sources. But, in times of downsizing and rightsizing, free sources may cost more in terms of labor time and effort, making their true cost higher in actual dollars.

Overall, differences in perceptions of what is appropriate to charge for, and what should be free, will always vary. Beauty is, after all, in the eye of the beholder. The true value of information is accepted. The choice of fee or free will depend upon availability, budget, convenience, cost, efficiency, evaluation and determination of value added, and the perceptions of the user. Information has value, and even more so when it becomes useful knowledge. The determination of its value and the choice of payment or nonpayment is a final decision made by the user.

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