

The Information Resource--- *A Search for its "Real Value"*

A White Paper

Presented by:
Peter S. DeLisi
Organizational Synergies

November, 1994

1. Introduction

Despite the ubiquitous presence of the computer, its real value has yet to be proven. In fact, many studies have ended with the conclusion that, "We can find no evidence that *information technology (IT) has produced improvements in either productivity or productivity."

More recently, two major reports have attempted to correct this perceived lack of value. One report, *"Information Technology in the Service Society,"* details the many ways that information technology has been used in the service sector and concludes that the value of IT is not in question, it is the method of measuring its value that is in question. In fact, so elusive is the question of how to quantify the value of information, and increasingly knowledge, that a recent *Futurist* magazine article by an esteemed futures firm, predicted that in the year 2025 a Nobel Prize in economics would be awarded to a person for quantifying the value of information and knowledge.

A second report from the MIT Sloan School, *"Is Information Systems Spending productive? New Evidence and New Results,"* has the following conclusion.

"Our examination of this data indicates that IS have made a substantial and statistically significant contribution to the output of firms. Our point estimates indicate that, dollar for dollar, spending on computer capital created more value than spending on other types of capital and spending on IS labor created more value than spending on other non-capital expenses....For the firms in our sample, we estimate that the return on investment for computers to be over 50% annually."

Perhaps, these two reports will quiet the debate over the value of the information resource. Then again, perhaps they will fuel a new round of debates. Regardless of the outcome, one thing is clear---the information resource is one of the least understood, yet most powerful, resources a company can bring to bear in pursuit of its corporate goals. But as the service society report points out, "This resource cannot be effective without many other components, including people, management, equipment, facilities, training, support, organizational factors, and even, materials." This paper, therefore, makes the assumption that information technology is only one ingredient of corporate success, but to the extent that we can increase the understanding of its potential value, we will have done our small part in making this company more successful.

*Throughout this paper, the words "information resource," "information technology" and "information systems" are often used interchangeably.

This paper will attempt to put the value of the information resource in a new light. We will attempt to answer the following questions.

- What is intrinsically different about the information resource?
- How can I, therefore, best use this resource?
- What is the future of the information resource?
- What does this suggest about ways I will be able to use it in the future?

2. Information Technology as an Enterprise-Wide Resource

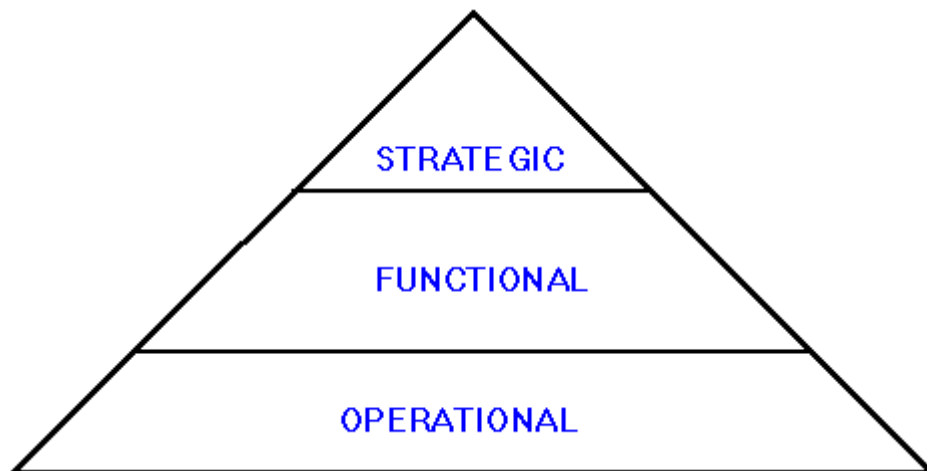
Information systems applications have evolved historically from the back office accounting systems, through the operational applications of the business, to now, the strategic level of the enterprise. It is perhaps at this last level that information technology will truly serve the enterprise-wide priorities of the business.

In its early days, the Data Processing Department, as it was known then, automated the back office applications of the business. These were generally financial applications, such as payroll, general ledger, accounts receivable, accounts payable, etc. In most corporations, therefore, Data Processing reported to the financial department.

In the 70s, as the price performance of the computer improved, computers began to be used to automate the "operations" of the business---the shop floor, airline reservation systems, defense systems, etc. It also moved to other functions within the business, such as marketing, human resources and engineering. The Management Information

Systems Department (MIS), as it was now known, struggled with how to allocate the limited computing resource amongst the various corporate functions, who all competed for their share of this resource. Not surprisingly, MIS became a "dirty word" in many organizations, as the attempt to please everyone, ended up pleasing no one. To make matters worse, MIS walled itself up behind impenetrable glass partitions, giving the illusion of a resource that was visible, but hardly accessible.

As the 90s approached, computer systems began to be used to provide corporations a competitive advantage. American Airlines Saber System and Foremost McKesson's order entry system, are two notable examples from this era. Perhaps, the real value of information technology (as it is now known), will reside at this strategic level of the enterprise. If it does, IT will no longer try to please everyone, but rather, will try to serve a narrow set of enterprise-wide priorities. In Anthony's classic description of the enterprise, we see graphically this historical movement from a wide set of operational and functional applications, to a narrow set of strategic applications.



Of course, this does not imply that computers will no longer be important at the functional and operational levels of the business. Rather, it suggests that departments will increasingly take on responsibility for their own set of applications, as the corporate-wide information resource gets focused at the strategic level. This will result in a smaller, centralized, IS resource, but hopefully, a more effective one.

There are other benefits to the enterprise-wide perspective of the information systems function. One benefit is barely perceptible now, but will become increasingly important over time. "Systems thinking," and the accompanying shift toward greater interdependence at all levels of society, is rapidly changing the way we perceive the

world. Newtonian physics has been the primary influence on our society, and indeed our industrial model, for the past two hundred years. This model has resulted in the functional specialization and insular "stovepipes" that characterize our modern corporations.

The twentieth century discoveries of Quantum Physics, tell us that the world is not exactly as Newton perceived it. A major discovery is that the world is a dynamic, interdependent whole---not a set of independent, atomistic pieces. Not surprisingly, this discovery is having a profound impact on our industrial model. Leading thinkers are beginning to describe the enterprise in interdependent terms. In a recent book by Russell Ackoff, *The Democratic Corporation*, he makes the point that we have tended to believe that the best way to manage corporations is by making the pieces as good as we can---resulting in suboptimal performance at the enterprise-wide level. Rather, he argues, effective management means to manage the interactions between the pieces.

"The performance of a system obviously depends on the performance of its parts, but an important, if not the most important, aspect of a part's performance is how it interacts with other parts to affect the performance of the whole. How part of a system performs when considered independently of the system of which it is a part is irrelevant to its performance in the system of which it is a part. A part that works well when considered separately may not work well when interacting with other parts of a system; the parts may not fit together well....For these reasons, effective corporate management must focus on the interactions of its parts rather than on their actions taken separately. However, current organizational designs and modes of management focus on the actions of corporate parts rather than their interactions. It is assumed that if each part works well when considered separately, the corporation as a whole will, but this is not true. Supervision and command are the management of actions; coordination and integration are the management of interactions, and this requires leadership."

As the enterprise moves toward greater interdependence and adopts a "systems thinking" perspective, there is much that the IS organization can contribute. Indeed, the information systems function has historically been the only function to be called a "systems function"---the implication being that IS is concerned with the interactions of the parts with some whole. Even in the early days of computing, the "systems analyst" would often be the individual who would see the broad, systemic need---for example, the need for the order information to be made available to other parts of the organization, in addition to manufacturing.

As organizations become more interdependent, there will be a need many authors say, to develop more of a general management perspective amongst senior leaders. Future leaders will need to become much broader and understand the interrelationship of their function with the rest of the functions in the organization. Because of IS's ability to see the enterprise from this latter perspective, IS could very well become a training ground for future general management thinking. Rotating people through IS on their way up the corporate ladder, might be an effective way to develop these leaders.

3. Information technology facilitates the creation and accelerates the dissemination of information and knowledge within the enterprise.

The role of the information systems organization in the creation and dissemination of information has been well known. This has been its traditional role---to collect data, aggregate it, convert it into useable information, and then, somehow distribute it to those who need and want it. Not so well known is the role that the information systems function will play in the creation and dissemination of knowledge.

First of all, is there a fundamental difference between data, information and knowledge, and if so, what is it? Philosophers could debate this issue endlessly, but for our purposes, we could use a simple example to illustrate the difference. Imagine a barometer of mercury, measuring the atmospheric pressure. A reading of 29.90 inches of mercury would constitute a data reading. By itself, we cannot tell much about the weather. Information, on the other hand, might be a report telling us the pattern of pressure readings over some past period of time. Knowledge, in our example, might be the pattern of falling pressure readings over the past 12 hours, coupled with our experience and other past, empirical evidence, to suggest that we can expect to have poor weather coming our way.

It is said by leading thinkers that knowledge is the new source of wealth in our current information economy. In the industrial economy, the source of wealth was the means of production, and in the agricultural economy, it was land. These thinkers go on further to say that in the future the only sustainable competitive advantage will be to learn faster than your competitors. And so, the concept of "organizational learning" has become very popular---the notion of the whole organization learning, not just the individuals in it.

Very little is known as yet about this "organizational learning." Questions such as, "What is it really?" and "How do we create it?" We have had some experience with it, however. For years, the electronic network has not only distributed data and information, but has also served to facilitate the exchange of knowledge. The existing Internet, and before that, the research networks that connected scientists from university labs and defense establishments, have tapped into the human repositories of

knowledge to solve problems, design products and generally advance the knowledge of the whole human race.

There is a lot more to be learned about the concepts of knowledge and organizational learning. But as they did with data and information, IS people will next tackle the questions of how to create, distribute and maintain knowledge. Only this time, if the experts are right, the competitive survival of many businesses will hang in the balance.

4. Information Technology facilitates cooperation, coordination and collaboration between people, groups and corporations.

We have discussed the movement toward greater interdependence in corporations. We have also discussed that, since interdependence is really a "systems" concept, and IS is a systems function, IS can contribute much to our understanding of this interdependence in corporations. This is a benefit derived from the **perspective** of the IS function.

There is another more direct benefit, however, that IT can provide. It is the enabling potential of the electronic network. Just as the physical wire now stretches between people, groups and corporations, allowing them to exchange data, information and knowledge, there is the added potential for people and groups to work together to solve problems, do collaborative work and build a stronger sense of community. It is this last community-building benefit that is only now beginning to be understood, as millions dialogue together on electronic bulletin boards and become part of "virtual communities." If corporations are to truly become interdependent, they must learn how to tap this potential of the electronic network.

There are a number of specific areas where this coordinative and collaborative potential of IT can be of significant value to the corporation. One of these is high performance work teams. As this concept becomes even more widespread, the need to communicate and do collaborative work with members of this team, become very important. And this team need no longer be in the same physical place and time. The knowledge work, which will be the predominant mode of future work, can take place "anytime, anywhere." Members of this electronic team can be at home, at the office, or in another country, and still work together collaboratively.

A second area of potential is cross-functional integration. We have some experience with this already. Concurrent engineering is an example of cross-functional integration---one in which individuals from design engineering, manufacturing engineering, service, and sometimes marketing, work together collaboratively to design new products. There have been significant benefits from the application of IT

in this manner. Companies report significant reductions in the time to bring new products to market, the cost to do so is also dramatically reduced and the resulting quality of the products is measurably improved.

A third area is business process reengineering (BPR). The biggest gains from BPR come from processes that are cross functional. Unfortunately, these are also the hardest to implement, because our historical power base has resided in the functions, and any attempt to reconfigure how work gets done in these functions, is met with resistance. The potential of IT to bring groups together collaboratively, therefore, becomes a natural way to deal with this problem. By itself, it won't solve the problem, but it certainly can enable groups to do their work in creative ways that were not possible before, and hopefully, in ways that will allow groups to work together for the overall good of the corporation.

Outside the enterprise, the electronic network allows us to exchange information and documents with other corporations and agencies. Not as well exploited is the potential to use the electronic network to enhance interdependence between companies, and in the process, to help these companies build a competitive advantage in their respective industry. This is an example of what the MIT Sloan School refers to as "the external business network."

In the automobile industry, manufacturers exchange order information with their key suppliers. Initially, this started out as an electronic exchange in which the manufacturer would send an order for parts to the supplier. More recently, in some companies, this has evolved to the next step, which is to eliminate document exchange completely and have the supplier proactively anticipate what the manufacturer needs and when. Further, the paper invoice has been eliminated, and instead, payment is made upon receipt of goods. This elimination of complete steps and the associated document reductions, results in cost savings to the respective parties, and therefore, a potential competitive advantage in their marketplace.

5. Information Technology enhances corporate competitiveness.

If IT can contribute to "systems thinking," foster greater interdependence between people, groups and corporations, and facilitate the creation and rapid dissemination of information and knowledge, then IT should, at least indirectly, contribute to corporate competitiveness. There are other more direct ways, however, to capture how these unique attributes of IT result in competitive benefits to the corporation. Just some of these ways are as follows.

- Cost reduction

- Reduced time to market of new products and services
- Enhanced customer satisfaction (convenience of ATM, for example)
- Improvements in quality of products and processes
- Creation of new products and services
- Strategic innovations (such as Saber)
- Use by the salesforce to increase sales
- Use by executives to enhance decision-making
- Access to market intelligence and market segmentation information
- Responsiveness to changing market conditions
- Competitive differentiation through value-added information
- Facilitation of more responsive organizational structures
- Mass customization of products and services

It is not the purpose of this paper to elaborate on the above uses of IT. There are well-documented examples of these in practically every industry.

6. Conclusion

This paper began with a discussion of the value of the information resource. We then followed with recent evidence showing that the value is not only quantifiable, but indeed, far exceeds other forms of capital investment. Our main purpose in this paper, however, has been to highlight the reasons why information technology is such a valuable resource, and therefore, to suggest ways in which it might be used more effectively. It was also our intent to communicate some of the changes that are going on in society, within corporations and within the field of information technology. It is our hope that armed with this knowledge, we might all work together to make our company more competitive.

References

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2. Erik Brynjolfsson and Lorin Hitt, "Is Information Systems Spending Productive? New Evidence and New Results," MIT Sloan School Report.
3. The description of the enterprise as a pyramid is attributed to Robert Anthony.
4. Russell L. Ackoff, *The Democratic Corporation*, Oxford University Press, 1994.