

INFORMATION, VALUE & THE INTERNAL MARKETPLACE

by

Murray Turoff

New Jersey Institute of Technology
323 High St.
Newark, N.J., 07102
201-232-7829

September 1983

Copyrighted (C) 1983 by Murray Turoff

INTRODUCTION

This paper was written in support of one of the recommendations made by a group of 175 private sector leaders in a report presented to the White House Conference on Productivity by the American Productivity Center. The recommendation read as follows:

"In the absence of market-driven options, information workers should be subject to an internal marketplace for stimulating a competitive environment. The flexible allocation of resources should be regulated by means of competitively priced payments for services and by means of competitive benchmarking of the quality of the service." (American Productivity Center, 1982, page 15)

This paper intends to support the premises of this recommendation and the auxiliary premise that not only is this desirable but that it is practical and feasible as a result of currently available information and computer technology. An operational system of the type necessary to carrying on this sort of operation has already been demonstrated on the Electronic Information Exchange System in operation at the New Jersey Institute of Technology (Turoff, 1981; Turoff & Chinai, 1983).

The work of the Computerized Conferencing and Communications Center at NJIT is dedicated to the study of the utilization of the computer to support human communications. The integration of human communications into information technology allows us to completely rethink the nature of how groups and organizations operates. Many of the economic factors that forced us into current modes of operation no longer apply. We have the opportunity to design organizations as we would wish them to operate. However, to understand why internal marketplaces might be more desirable and even practical, we have to go back and re-examine why we do things the way we currently do them in organizations.

THE PAST

It is an interesting behavioral exercise to walk backwards. One, after initial steps of hesitancy, can with some practice develop a form of boldness and style in this undertaking. However, no matter what degree of skill and accomplishment one obtains at this pastime, it is still the process of moving forward by observing where you have been. There is always the nagging concern that something will occur in your path that is unexpected and unforeseen from the rear. The result, of course, is that we as humans rarely engage in walking backwards behavior. However, it would seem that our behavior as organizations is very different. Especially in the area of information systems and our treatment of information in the organization, we seem to have adapted a common policy of walking backwards into the future. The way we handle information and configure computers to carry out the process seems to largely reflect the way we have always done it. Somehow we neglect to ask the question as to whether the introduction of modern information technology would allow us to accomplish tasks in completely new and possibly better ways.

The very words we use reflect a preoccupation with the past. We strive to "automate" data handling and information processing. The bases upon which we justify putting an information process on the computer is one of being able to carry out the same process we have always done, but do it faster and/or cheaper. Even when we introduce applications that have unique and new qualities, we try to disguise it to sound like something we have always done: e.g. "electronic mail" sounds like a simulation of the post office and offers no indication that we are talking about a new way for people to communicate. The term "office automation" implies we are going to carry out office work the way we have always done it but merely through a computer. Many organizations have exhibited an image of boldness and swiftness in the introduction of these technologies, but when examined carefully it is often a clear cut process of walking backwards.

Before computers, data in organizations was handled in largely manual operations. This was a costly process and the vast bulk of data treated was that data that was "absolutely necessary" to running the business. If one did not know the address of the customer, what they had ordered, what was due Uncle Sam, then the consequences were enough to ruin the business. The "necessary" information had "infinite" value. As a result, there was only one operational principle that could be instituted to handle information. This was the general objective of "cost minimization". Clearly if the data to be handled had infinite value than the only thing that could be controlled and improved upon was the subject of costs. The majority of processes and procedures evolved in organizations to handle data were the result of trying to minimize cost. Given the high cost, relative to people, of computer technology, when it was first introduced, the same principle of cost minimization, is the guiding light that was used to translate data handling to the computer environment.

The history of computerization has largely been to take a manual process; search out the segments that can be put on the computer. Then in order to get the volume necessary to reduce costs, take what is left and create more specialized jobs. A clerk who handled an order manually through all its phases is replaced by a series of more specialized jobs such as data entry. Salesman used to phone the sales clerk or inventory clerk to get the latest info on questions to clinch a deal. No one, today, phones a data entry operator. The clerk had a certain pride in the data that he knew he was responsible for. He was sure to keep it accurate. He could read all the different scrawls of the salesman or their unique wordings. The data entry operators could care less if there were errors in the data they received. As long as it was in the proper form to key in, errors were not their concern even if obvious to them. It would slow down their productivity if they took time to make some phone calls and straighten it out.

Now we have reached a point where we supposedly have learned how to handle all the "necessary" data with information technology. At least, we have automated most of the straightforward raw data handling. Most of what is new and different today is the attempt to deal with the information that is not "absolutely necessary". The information needed to make new decisions, to develop a new product, to make an investment, to estimate a new budget, to develop a plan. The information that is not necessary to the day to day survival of the business but may determine the long term development and success of the enterprise. We supposedly have learned how to deal with the battles and seem to now be looking at the war itself. However, we are still applying the same strategy we have applied to the necessary data. Our bases for productivity still seems to be "cost minimization" because we do not know the "value" of information used for decisions. At best the typical decision science approaches gives us things like how much we can afford to spend for information, but not the value of the information. Limits on what we should spend are an easier thing to determine than what we should actually spend. If we want to apply productivity concepts to treating information and to improve productivity by increasing value rather than reducing costs than we must look at approaches to establishing true value. Information technology does make this possible, but it will require a break with our traditional approaches.

Not only do we have to look to the future rather than the past, but we have to also realize that many of the assumptions that led to current management practices and policies governing the introduction and use of computer and information technology are no longer valid. The present is a very different game than the past and we have to rethink why we have done the things we have done and do we really want to continue to behave that way. It is far more likely today that walking backward is going to carry us over a cliff.

THE PRESENT

The present is characterized by dramatic change in many of the major factors that have driven the management practices and policies governing the use of computers and the handling of information.

First and foremost is a complete reversal in the relative costs between a single computer and a single employee. The early days of this technology where 80% of the costs of a computer operation was tied up in hardware led to the centralization of the technology and information system operations. It also led the idea of systems analyses as a process of reductionism. One sought to take each task and break it up into small simple components or least extract out of a single task those items that could be put in large quantity on a computer. In turn this led to increased specialization of information workers as they took over those very specific things that the computer could not accomplish. Hence we had our data entry operators and word processing operators. Assembly lining of the information process was in a very real sense a consequence of the relative cost between computers and people.

Today, costs have reversed them selves and a single computer can be had for a fraction of the cost of an employee. In fact, the cost of single computer is cheaper today than the investment we make in supporting a single employee when we consider the cost of space, furnishings and environmental services for the information worker. What this means is that it is economically viable to consider a single computer or a network of computers to support every individual information worker in an organization. It is no longer a necessary assumption that for the efficient operation of computers we have to increasingly specialize information workers or centralize computer resources. It is now possible, with the worker having a computer as a tool, for the worker to be come a more versatile and generalized worker who can efficiently perform a variety of tasks and can as a single individual take more responsibility for carrying a single job out through all its individual steps.

The concepts of the "programmers workbench", the "writers workbench" and the "executive workstation" are really blurring into the realization that it is "electronic workstations" for potentially every information worker at any level from executive to clerk in every organization. This is the emerging trend of the present. What we see now is the introduction of this concept for particular jobs where there is either high payoff or high status involved. This is the usually way new technology gets introduced. In some organizations slow to realize what is happening, employees are investing in their own personal computers to support their job.

The second element that is key to our foundation is the emerging use of computers for the direct facilitating of human communications. Many companies have already realized the efficiencies possible from electronic mail to replace internal memos and cut down phone calls. The savings of shadow time, the more timely delivery of material and some inroads into travel costs have all been highlighted in a number of assessment studies. Electronic mail is, without a doubt, faster

and cheaper for the organization than current communication alternatives. However, the recognition that the computer can allow humans to communicate with different communication processes, protocols or structures than a mere replication of the post office process is not yet widely recognized. The possibilities that new ways of communicating may well enhance the quality or actual effectiveness of group processes in organizations is not well understood. A simple example is computerized voting procedures to allow the computer to provide members of a communicating group to quickly determine the degree of consensus they have on various items they must deal with. Another example is tailored mixes of data bases and communication structures that can be used in such areas as doing plans and budget estimation. Processes where subjective views from many different sources can be estimated and structured for the group as a whole. This is really the process of integrating "classical" information system application with human communication systems. In many group processes that take place in the organization it is not clear, and probably wrong, that communication processes designed to optimize individual communications, such as an "electronic mail" system, would be anywhere as effective for a communicating group carrying out a specific objective. As an example, a computerized conferencing structure can be used very effectively to deliver a "virtual classroom" course but this would be almost impossible in an "electronic mail" system without losing the class atmosphere and reducing the course to a correspondence course.

It is possible, once humans in an organization are using the computer as a communication device, to merge those communications with existing and new information systems so that the organization process can be integrated with the other data and organization functions that take place.

Many students of organizational behavior have observed that if you cut off the knowledge of lore in the organization and inhibit the informal communication channels, that most organizations would cease to be able to function. The process of people able to carry out their informal communications through a computer allows each individual to increase their informal communication channels by a magnitude increase. If one could count on regular day to day communication with 10 to 20 other individuals, it becomes more like 50 to 100 in the computer based environment. In terms of the organizations this a tremendous increase in human channel capacity and it greatly increases the ability of people to find and synthesize the information they need as a result of the greater connectivity now possible in the organization.

The large central computer utilized in a mere data base type of operation tended to have impacts of information pollution in terms of overloading people with data, making the important signals too difficult to recognize because of all the noise data thrown in. The paradox of introducing human communications into this same information system environment is that people will have a greater ability to use their peers and fellow employees to interface to information sources in the organization. My vastly increasing the number of people one can information with on a regular base one vastly increases the ability to find the individuals that can provide them directions to timely and pertinent information to the problems they have to deal with. No longer does each employee have to learn

all the different information systems; nor do those information systems have to be integrated into one single immense system. Using micro-computers and networks, individuals can become the transponders between the particular systems they know well, or have created, and the people seeking data from those systems. To know a system well, one must use it regularly and this applies to all sorts of systems. Employees should not expect to learn information systems they have to utilize only infrequently.

If one can institute the management practices that encourage lateral cooperation, the existence of computer based human communication facilities will make those informal communication channels far more effective and actually provide a capability to put them on level where they can be managed for the increased productivity of the organization.

The long term consequences of such an undertaking will be a new type of organizational structure: the "networked" organization. It will make concepts such as matrix management far more practical and far less costly to implement. The characteristics in a "networked" organizational will be to far more geographically dispersed project groups working as day to day teams; more delegation of authority and accompanying management by exception; better accountability and increasing productivity of the information worker.

Ultimately the productivity benefits of this are higher quality of the work and increased worker motivation and satisfaction. In studies of white collar workers the key parameters that lead to worker motivation and satisfaction have been identified as: "task identity", "increased variety", "self-authority", and "feedback". The "big machine" trend of the past has had the impact of reducing motivation of information workers. If we continue to walk backwards into the future and move toward greater and greater "assembly lining" of the office worker, we are going to end up with all the moral and quality control problems that face the assembly line production process. Instead we must decide look where we are going and set our sights on a new objective and move forward in the direction we desire to take.

The rest of this paper is concerned with one process that would allow organization to evolve toward a "networked" structure and to the potential benefits that would accrue from that form of organization. This is the establishment of an "Internal Information Marketplace (IMP)" to govern the flow of information in the organization.

IMP: a small demon or a mischievous child

Yes, one could take the view that an IMP would work magic and/or create a great deal of mischief for any organization that adapts it. A few organizations with extensive internal computer based human communication systems are already finding this to be true as a shadow marketplace based upon favor trading begins to occur.

THE FREE MARKET

The basic concept is a deceptively simple one on the surface: why not treat information transfer in an organization as a free market good. Let employees negotiate and exchange information based upon the agreed market value of the information.

One very major justification for this is that there is no other process which would allow us to determine the true value of specific information in an organization. Without establishing value, it becomes impossible to look at productivity improvements based upon quality or value added concepts. Information value is a function of such things as needs of the particular purchaser as reflected through such parameters as timeliness, quality of the data and associated analyses.

In a manual environment the overhead to carry on a marketplace operation is prohibitive. In a computerized environment already carrying on the flow of the data and communications among individuals in the organization, it is a trivial cost to add the marketplace structuring and accounting software.

There are a number of very necessary conditions that must exist to allow a truly free market to operate. These are:

- 1) Prices must be free to float and be independent of costs. Only in this manner will transaction prices reflect value. In particular obsolete information will show up by selling below the costs of production. The difference between costs and sales price will be the value added by the individual or group selling the information. Also this will allow a truer reflection in value of the talents of the seller or synthesizer of the the information. How data is interpreted, organized, processed and presented all influence the value of the resulting purchaser to the information. All this can vary greatly with the talents of the individual information worker or provider.

- 2) Real money must be used within the marketplace. The purchaser must be free to spend funds for the information anywhere within or without the organization. If internal sources are too costly the purchaser must be free to go outside the organization to get the information. This feature prevents monopoly pricing. Also the seller must be free to utilize the income. The seller can invest the income in increasing his or her ability to gather and supply information. The seller can also invest the income in paying off some portion of their salary. In essence this allows the seller to justify the time and effort they wish to spend in supplying information to anyone anywhere in the organization. In principle a motivated and talented information worker could become their own boss by fully paying off their salary and devoting their full time activities to being an information provider. While this may upset some concepts of management it is the ultimate incentive in worker motivation--being your own boss. In fact, the worker could ultimately contract others as their employees through the

marketplace mechanism and raise themselves to management level. In practice only the ones that are real good (i.e. worth the money) will obtain this level of performance and the resulting operation requires very little management overhead.

3) Social welfare costs must be institutionalized. If one owns a house and a neighbor decides to turn his property into a junk yard that is going to do something to the homeowner's value. We have complicated set of zoning regulations in most areas to prevent just this sort of occurrence. One of the social welfare costs in organizations and one which can become more damaging in a free market environment is the pollution of information through excessive advertising. Junk mail is one form of information pollution that we are all familiar with. The mechanism to handle this in the electronic environment is very straightforward. If someone sends a memo, message, advertisement to another person a basic cost to the sender which would reflect the costs to the receiver should be built into the electronic system. One way to do this is use the size (e.g. number of words) of the communication, times an average reading speed, times the time unit value of the receivers time based upon that individuals salary. Any sender of an unsolicited item must pay the value of the receivers time in reading it. Clearly a memo sent to the president of the company will be more expensive than one sent to a clerk in the company. Also, the costs of supplying solicited data from those under the management of the given person has to be incorporated in the costs to the manager for obtaining the data. If this is not done individuals having management control of others can undercut the marketplace structure. In other words, any one able to command the generation of data or information by others must have the cost of that effort incorporated in the cost bases for the data. Only then will any resale of the data by the manager will determine if his decision actions in demanding that information was a value added decision.

4) Open entry into the marketplace must be maintained. Essentially this is just the observation that any information worker in the organization must be free to enter the marketplace as a provider. Having a public data base set up specifically to hold advertisements in an easily searchable form by various appropriate keys is a relatively inexpensive way to to assure open entry.

5) Feedback on buyer satisfaction must be made available. There are many ways this can be accomplished. But in essence this means that perspective purchasers should be able to get information on how satisfied others were in dealing with the particular information provider or the information supplied. For information that is widely sold, purchasers might be allowed to vote on some satisfaction scale and the results of such a polling process be made available to other perspective purchasers. For more tailored and selective tasks the purchaser might file a qualitative report on their satisfaction openly retrievable by any perspective buyer and indexed to existing advertisements.

6) The marketplace must contain a float or capital fund

independent of the agricultural budget cycle. There has to be an existing money supply to allow the operation to exist on a continuous bases. The organization might charge a regular interest fee for money that individuals hold in the marketplace; but in order to function properly it should be divorced from the yearly reallocation process that drives so much of most internal activity. Setting the interest rate and the total supply of funds for the marketplace is really the only formal controls that the organization should exercise.

Given the above conditions we would have in any organizations a truly free marketplace. It would incorporate the profit incentive as the motivating force for information providers and allow any individual or cooperating group within the organization to become an entrepreneurial operation.

There is no real reason, with the technology available today, to not incorporate the free enterprise system directly into the organization to deal with the transfer of information within the organization. It is no longer a matter of manual processing costs that prevent the change. In fact, our belief in the free enterprise system would almost seem to dictate that if we follow those beliefs we would move ahead as rapidly as possible down this path with our eyes fixed on the future of a complete marketplace operation within our organizations. It would allow any individual or group to become a profit center with respect to information transfer. It is the obvious way to treat highly skilled information specialists such as lawyers, scientists, reference librarians and others who specialized knowledge is often needed across formal organizational boundaries. However, it is also the ideal way to treat any information transfer not involving the absolutely necessary raw data that must flow to meet the legal and financial requirements.

So with the above why is it that managers and organizations will not jump to incorporate this concept in their organization? That can be answered in many ways; however, they all amount in one way or another to the fact that it would require a complete reversal in the trends in organizations that have gone on for decades: increased centralization, more management control and the reduction in risk taking behavior. We would have to re-condition the past few generation of business school graduates. However, there are many ways an internal information marketplace can be introduced in small scale trials with particular classes of employees which provide the pilots to convince others of its workability. Such efforts should be undertaken now.

MECHANICS

There are a tremendous variety of specific features, procedures and protocols that could be used to implement a marketplace structure within a modern information-communication system. The example we provide here is only meant to illustrate the concept and not be a definitive design for a such a system. The beauty of communications and information flowing through a computer is that the organization may tailor the design of of the information exchange structures to fit characteristics of the organization and its behavior.

The mechanics illustrated here are based upon a prototype developed and implemented on the Electronic Information Exchange System (EIES pronounced "eyes"), a computerized conferencing utility operated by the New Jersey Institute of Technology. We start with a system that allows individual users to exchange message and to hold asynchronous conferences. This particular system also allows communications to be collected into data base structures that allow for quick retrieval of the whole history of a a message exchange or conference by things like key words, time of creation or change of the text and authors or receivers. Such a system must also allow indirect or virtual referencing of material so someone can incorporate material existing anywhere on the system into his or her own communications.

The above means that all the data flowing through the organizations, all the reports, transcripts of project management conferences are available for information workers to tap and work with in preparing new items of information.

Given this bases, the first addition that is needed is to allow anyone to fill out a standard advertisement form which allows the person to describe what they are selling or seeking to purchase. They may also indicate the price and provide a detailed abstract as well as keys appropriate to the item. This advertisement is then filed in to some sort of data base. If it is an offer to sell information the data base also contains a reference to where that information is stored on the computer. If someone finds that advertisement and seeks to purchase the information, he or she executes a command that causes the computer to get the information and deliver it to the purchaser. At the same time the accounts on the computer for the buyer and purchaser, tracking their financial resources in the marketplace are appropriately debited and credited. If the buyer wants to they can also communicate directly with the seller attempting to offer a lower price by using the standard message capabilities. If it is a request for information, obviously it will require a negotiation process to take place.

The marketplace on EIES also offers a number of special selling mechanisms. For example, a person can offer to perform some information service but only to the highest bidder, and in this case the service offerer sets a date at which time the bids will be opened by the computer and the announcement made of who has won the bid and the offered service. An employee might feel that with other commitments he or she can only devote so much time the next few months doing a particular task and wishes to put their time out for

bid. They may in this case set a minimum entry bid as well. If others in the organization know the individual to be valuable worker than the offer will get appropriate high value bids for their service. An interesting question: How much is two weeks of my time worth to anyone? It would take an accomplished and confident employee to enter such a process.

In principle, any project to be undertaken for the organization can be handled by intrusting the job to a single individual and then providing him with a budget but no employees. That individual would then buy the human resources needed for the task in the marketplace. This can work very nicely if the marketplace contains a pool of human resources who must cover their salaries by fulfilling services requested through the marketplace.

Another feature of the EIES marketplace is that anyone who has made a purchase can attach to the advertisement a review (i.e. qualitative text statement) that is available to anyone looking at the advertisement as a perspective purchaser. This is a very dynamic way of bringing feedback into the system. Such reviews cannot be removed by the author of the advertisement. However, the author can dynamically raise or lower the price (as a response to the reviews) or add their own comment. The seller can also decide to add to or modify the information so as to improve upon it.

One very efficient mechanism for distributing advertisements to only interested parties is the use of a feature on EIES called the "interest" list. This is merely a long list of keys. Any user of the system may associate or dis-associate themselves with a particular interests key at any time. If there is not a key phrase that expresses one of the interests of a person, than that person can add a new key to the list. Any member of a particular interest group can send a message to that "key" which intern causes the computer to deliver the message to everyone who has associated themselves with the key. This is a very dynamic way for groups of common interest to form up or to change their mind on an individual bases as to what they wish to receive. A virtual copy of any advertisement may be distributed through this capability.

The EIES prototype marketplace was set up so that 5% of any transaction was taken out for support of the marketplace. When one compares the cost of paper and pencil distribution systems, one realizes that like 80% of the costs go into the distribution process. In the electronic form, the costs of the distribution process is more like 5-10% given that the terminals and information network is already in place to handle other needs of the organization. Another way of viewing this is that intensive lateral communication becomes a lot less costly in the electronic environment than it ever was when limited to phone and travel (whether walking or flying).

It also means that a lot more of the value of information will be reflected in the creators activity than in the costs of the distribution process. This is a very fundamental change that also implies, for the long term, that the value of static information will decrease significantly relative to the value of to changing or new information. With everyone having their own personal computer and be able to develop, over the long term, their own selective data bases and also regularly exchange data with peers, there will be less of a

marketplace for large centralized data bases. What people will need centrally will be indexes to who has the data and who is the creator or source of the information. The creators will be able to exercise greater influence on the value of information. Most of the cost of production will rest with the sources of the information and the resulting motivation will be for fully distributed data systems rather than large centralized ones. The Generalized data base approach where all data is captured in a single massive consistent system, that is the current rage in the industry today, will become increasingly harder to justify.

The specific features of a marketplace are not important. One really can design any marketplace structure one wants to operate through a computer. What is important is that data and communications co-exist in an integrated and easy to use manner on a single network available to all information workers. It is not necessary that every information worker be able to use every data base or model within the organizational network. In fact, the person who has the skills to use a complex planning or forecasting model will in essence add his or her value by utilizing the model to service the requests of others. In fact, the phobia in the industry that everyone should learn enough to be able to use every utility available is something the computer industry would like to sell but represents a fairly costly practice for the user organizations. The key is the ability of users to merge and reorganize data and text from many different sources. This is what allows humans to create information out of data extracted from data bases and models operating on the data and the communications prepared by other humans.

Unfortunately, many managers still view information systems as big data base systems which might have a separate message system available as an added utility. The meaningful view in the context of the future is exactly the opposite perspective. The "grand" concept will be the computer based human communication system or human networking system which has data bases and models as utilities to the human communication process. Once again it is a matter of looking forward rather than backward or at least from a very different direction.

CONSEQUENCES

The individuals most likely to be able to take immediate advantage of an internal marketplace operation are those who have specialized and valuable expertise. Essentially IMP allows such individuals to set up a consulting practice--the person who understands a special software system better than anyone else, the lawyers, the accounts, the engineers, etc. In a large company the R&D components of the operation are likely to be the first to benefit. For the organization, the long term consequence of this is that valuable expertise will be shared and the sharing will be accounted for. Separate operations in the company no longer have to duplicate a very specialized expertise that might not be able to completely utilize on a full time bases. Getting the use of an expert elsewhere in the company will no longer be a haphazardous process depending sometimes on the relationships between various parts of the organization and potentially complex negotiation for exchanging favors. Moreover, the value of experts laterally in the organization will be clearly visible and accountable.

Even more interesting will be the impact on management. The manager will not have to spend as much time in negotiation processes concerned with the use of people under them and receive more credit and recognition for their ability to have gathered under them valuable experts whose services are sought throughout the organization. This means a shift in the weightings of the factors that make a good manager in the typical organization. Managers that are able to attract and hold talented people will stand out more clearly than they sometimes do in current organizational operations.

Another significant consequence is the ability to clearly assess what has become obsolete information gathering and distribution practices. It is far easier in organizations today to create a new information producing process than it is to terminate it. Many reports seem to perpetuate themselves long after anyone can remember why they were created in the first place. Clearly when the value of a report falls below its cost of production it is a candidate for termination.

A significant number of clearly lateral process such as planning and new product development will be greatly facilitated by the internal information marketplace. The planning process must gather information laterally and the product development process must involve the coordination and cooperation across most segments of the typical corporation. The cost of doing a plan will now clearly reflect the value of the information gathered across the organization. There will be adequate incentive for individuals to supply the information needed, rather than feeling they are being imposed upon to do tasks not related to their regular day to day activities. The costs of computer based information systems will more clearly reflect the costs of the people who must gather the data for such systems. There are probably a significant number of such systems that never would have been built if such costs had been included, rather than just the associated hardware and software development costs. In essence, IMP will provide a true accounting of projects requiring the use of people laterally in the organization.

Something that is almost impossible in current accounting practices.

It is sometimes said that there is the formal organization chart, and then there is the real organizational structure that makes the organization work and that most of that structure is exhibited in the informal communication channels. IMP would make that informal structure visible and it would intelligent decisions when decisions on restructuring the organization are needed. Another view of IMP is that it calls for placing the informal structure on a structure par with the formal organizational. In a very real sense it gives the informal processes access to funds it can spend and puts it more on a par with the formal information flow. In some organizations it could operationally turn out to be the organizational real structure.

In terms of the individual employee it will highten motivation because of a number of factors. The employee becomes clearly identified with a task they have performed in the marketplace. It is not merely a piece of information that has been provided, but one that has been provided by a particular individual, who now takes the responsibility and accountability for it. There is the opportunity for employees to engage in a greater variety of tasks. If they have the ability they can make there work more varied and therefore more interesting. The employee is his or her own boss for marketplace activity. For those that seek the ability to undertake independent action and make there own decisions, take their own risks, this is a most satisfying situation. Finally there is clear feedback on performance in terms of the actual demand for the information products the employee produces. The existence of a real measure of their value is both rewarding and sobering. One can argue that even a majority of the employees will not contribute to an information marketplace. In fact, it might be only 5 or 10 per cent of the information workers who have the confidence and are willing to undertake the risks of such an environment. However, it is probably that same 5 or 10 per cent that are the movers in the organization and most likely to bring about productivity gains and significant improvements. The marketplace frees those employees from the constraints that might very well be needed for the rest of the employees but which tend to hold down and prevent the motivated ones from accomplishing anything.

The final area of consequences is on the nature of the organization itself. First and foremost is increased decentralization in the organization due to the increased connectivity of information workers laterally. Vastly increasing the number of people and projects they can stay in touch with. As a result management can observer the occurrence of more decisions and largely follow a greater "management by exception" process. The connectivity provides a greater accountability and clarity of who has done what and when. It is really a corollary that improving the lateral communication process promotes decentralization; but in this case it is with the greater ability of management to monitor and identify what is taking place and step in quickly if needed. In these systems it is quite common to see messages pass from a lower level to a higher level that read: "I plan to . . ., If I do not hear differently from you by the . . ."

The idea of "matrix management" has received a lot of lip service in many organizations, sometimes under other names such as functional

management. However, in practice it has been a very disruptive process. It has almost often greatly increased the need to move people physically from place to place for significant periods of time so that project teams could be co-located for the duration of the project. The technology of computer based human communications (networking) allows geographically dispersed groups to function as day to day project groups. Increasing lateral communications will in fact lead to the greater formation of geographically dispersed teams and allowing people to sell their time as members of such teams will in effect be a form of promoting matrix management. If a project manager has a special project to accomplish they or she can just advertise for the talents needed. The more attractive or interesting the project, the less employees will bid as their costs to participate; the less interesting the project the greater will be the cost to the project of employees participation. Also, of course, the relative talent of those bidding to participate will be reflected in sizable cost differences. If the project manager cannot get a team within the allocation of his or her budget than immediately we can see the estimated budget to carry out the project was under estimated. There will be a gradual shift from the concept of handing a project to a given organizational group, to putting a project out to bid and letting a group form up to handle the project made up of individuals scattered throughout the organization. This is the ultimate in implementation of matrix management.

The result of this will be a completely new organizational structure that we refer to as the "networked organization" (Hiltz & Turoff, 1978). It will have many interesting properties carried to a much further extreme than exists in most organizations today: flatter organizations, heightened management by exception, much wider span of control, work at home and flextime, greater decentralization, an orientation to goals rather than process, greater delegation of authority, multitasking and multiproject involvement at most levels and multiple reporting lines. It may also result in possible abuses as well such as massive use of part-time employees with out fringe and security benefits. It will not come easily, those that hold power in organizations by controlling information channels will be quick to resist change of this nature. Many others will find it difficult to conceive systems as the one described here until they have actually had a chance o experience it (Hiltz & Turoff, 1982); which presents a major chicken and egg paradox.

However, the potentials of economies, quality improvements in productivity and placing organizations in more competitive postures will all serve as the long term driving forces that will overcome short term obstacles.

CONCLUSION

Obviously the creation of internal marketplaces will not come about overnight. It is far more likely, that aside from some limited prototypes in the more adventurous companies, that the computer based information marketplace will first begin to emerge on a large scale in the public arena. The signals of this and the beginnings of the resulting struggles is already evident.

It has been pointed out that we do not currently have the social structures that would allow a true marketplace in information or ethereal goods (Thompson, 1980). The purest marketplace is a direct bid and barter exchange between the buyer and seller. With respect to information this translates to the creator and user of the information. Our current institutions introduce many intermediaries between the sources and sinks of information exchange. In fact, most of the cost of the information in our society is usually associated with carrying out the exchange and distribution process and only a small proportion ever returns to the creator. The communications and computer technology emerging today will ultimately allow the reversal of the proportions of the value of the information that goes to the creators and to the exchange process. However, the inertia created by the existing institutional structures are unlikely to be easily overturned and as a result our current models for new systems (e.g. VIDEOTEXT) are often mere extrapolations of the current models. In these systems it is presumed that the IP's (Information Providers) are current institutions like publishers. There is no thought that any individual citizen can be an IP for singularly small items of information like a recipe. With emerging technology a single person can sell a single recipe to thousands at a quarter a shot and make money. There is no need for a single person to have to put together a book of recipes as is needed to make paper distribution systems economical.

What we need is more normatively oriented examinations of how we would like information to behave in our society and to begin to experiment with the models derived from this perspective (Tuoff, 1981).

Rather than this occurring, we can probably look forward to a decade of chaos in the area of information exchange. The fine lines between publishing, newspapers, banking, broadcasting, computers, communications and information services have become murky and will continue to fade into an indistinguishable continuum (Hiltz & Tuoff, 1978). One fortunate aspect is that the resulting competition across current institutions will make any early monopoly very unlikely and will leave room for a significant number of small entrepreneurial enterprises. Given this situation there will be a reasonable chance for the basic economic forces of the advancing technology in this area to dominate the outcome. These forces are evident in three observations. One is the rapidly declining costs of capital necessary to start up an information exchange service and of storing large fixed files on line. Secondly one can now observe that existence of the many thousands of free bulletin board systems spread around the country on micro-computers. The third is the capacity of

digital storage on a video disk. The latter is important because it implies that the value of information for transaction purposes will increasingly shift, to transitory and changing information, as opposed to the fixed type of information we find in print media and many current data base operations. As a result, the creators of data will exercise far more direct influence on determining available distribution alternatives than is now the case. While total costs of information will go down (Turoff, 1972), the percentage of reward to the creator of information in the free economy should shift from the current 10-20%, as represented in book royalties, to 70-90% as the costs of distribution flow the other way in moving from the paper to the electronic environment. This shift in the public sector will also cause organizations to rethink the role and function of information creators in their organizations.

There are already limited signals of steps toward an electronic marketplace where buyers and sellers are one and the same. The SOURCE in 1982 instituted a policy whereby a person owning a file that is made public is paid a commission from the user charges for anyone who has read the files. This is not a true marketplace since everything has the same cost per unit and the seller cannot regulate the asking price. However, it is a significant first step in the right direction. Some university computer centers (e.g. the University of Wisconsin) have begun to pay royalties to users who make available software they have developed. The willingness of many of the personal computer companies to actively seek and market user developed software perhaps means that the cottage industry springing up in software will extend to information, data bases and text material.

In about two decades every middle class home is going to be able to afford the equivalent of the computer system that runs EIES today. From the point of view of the flow and exchange of information and how it is valued, that world is going to be very different than the one we know today.

REFERENCES

- American Productivity Center, "Computer Conferences on Productivity: A report for the White House Conference on Productivity", September 1983, published by APC, Houston, Texas.
- Hiltz, Starr Roxanne and Murray Turoff; "The Network Nation: Human Communication via Computer", Addison-Wesley Advanced Book Program, Reading Mass., 1978.
- Hiltz, Starr Roxanne & Murray Turoff; "The Evolution of User Behavior in Computerized Conferencing Systems", Communications of the ACM, November 1981.
- Thompson, Gordon; "Some Potential Socio-Economic Implications of Videotext Systems", Proceedings of the Fifth International Conference on Computer Communication, October, 1980.
- Turoff, Murray; "Partyline and Discussion: Computerized Conference Systems", Proceedings. 1st International Conference on Computer Communications, 1972.
- Turoff, Murray; "On the Design of an Information Marketplace", Proceedings of the 1981 annual meeting of the American Society for Information Science.
- Turoff, Murray; "Management Issues in Utilizing the Computer for Human Communications", in Emerging Office Systems, Editors: Landau, Robert, et. al. Apex Publishers, 1981.
- Turoff, Murray and Sanjit Chinai; "An Electronic Information Marketplace", Accepted for publication in Computer Networks, forthcoming 1983.