Information is a fundamental resource that can be leveraged to meet the demands of the imperative for productivity improvements in our offices.

Information is the primary element of ideas and creativity. New ideas, analyses, creativity, and synergy are the cornerstones of improved planning and problem solving. They are the foundations of consideration of more and unique alternatives, and they are the prerequisites for better decisions.

More accurate, more complete, more comprehensive information, developed and delivered more expeditiously and more efficiently to the real users of it, is the highest pay-off ingredient for better management.

Better management ... of time, people, money, facilities, tools, energy ... is our hope for improving productivity in our offices during the eighties.

The office worker has finally gained the majority of the total United States labor force. Secretaries, executives, professionals, managers, administrators, all create, use and communicate information. These workers make more than 100 billion telephone calls, and they produce 72 billion documents, while maintaining another 300 billion, each year. And, these volumes are growing at a rate of 20 percent annually. The problem of productivity in our offices is not caused by insufficient production of information. Indeed, you and I are usually overwhelmed by the volume of it.

The forty-five million or so American workers who use information are constrained not by the amount of it, but either by the timely availability of it, the facility for delivering it to the right users of it, and by the prioritization of it so that it can be useful within the limits of our human abilities to manage it as a valuable resource.

How frequently have you and I said the following ... .

"If I had only known those numbers when I made that decision"

or

"Why didn't you bring those facts to my attention when I needed them"

and

"Gosh, I remember now that you told me that, but I had other things on my mind and I just didn't remember what you'd said." . . .

The information explosion in our country has become so much a part of our lives that managers now spend 95 percent, and professionals 63 percent, of their time communicating it in written and oral form.¹

But what are we doing to support these people who represent one of the greatest opportunities to improve the vital productivity problem in our country?

Productivity in the office has risen just four percent over the past decade, compared to a 90 percent improvement in industrial productivity. Increases in farm productivity are legend.

However, the average American farmer is supported by $54,000 worth of capital equipment and the average factory worker by $31,000. On the other hand, the office worker . . . remember, now in the majority of our work force . . . is supported by only $2,300 worth of capital equipment.²

I'm sure some of you have heard these kinds of numbers before, and since it's not new news, you may be saying, "So what?"

My point is simple;

Our country has an economic problem called productivity. It can be measured in our expense budgets and tracked by the escalating inflation rate. Our big target for improving productivity is the office. Once inside the office, our bullseye is the manager and the professional . . . not the secretary or the clerk. Our real target is the decision maker, the influencer and the creator. Our goal must be to supply these people with their most important tools. Certainly, their single most important tool is information. They cannot manage without it.

As the facsimile industry leader and spokesperson, we at QWIP Systems believe facsimile communications offers a significant solution to the productivity problem. We believe that facsimile communications is the most efficient way to move information to its real point of need so that it can be utilized by people to make more informed, more timely, hence, better, decisions. In this country alone, almost a quarter million workers have discovered facsimile to be a prerequisite of the management process.³ And they represent only the tip of the iceberg.
Facsimile communications has been around for over 135 years. However, the real market, and the one with the greatest promise for improving information utilization, did not begin to develop until the 1960's.

The first users of facsimile products during the modern era generally had a highly applications oriented need for transmitting graphic information like charts, photographs, advertising copy and the like. It was obvious that since facsimile re-created the image of an original document, it was inherently the most accurate way to communicate information. Also, since it produced a hard copy reproduction of the original document, the information that was communicated had lasting value. It could be filed, copied, manipulated, recalled and annotated.

This inherent value was perceived by entrepreneurs and major businesses alike, and in the late 1960's firms such as Xerox, and new companies, like Graphic Sciences, entered the market.

By 1974, several firms were in the market, including 3M, with the Japanese giant Matsushita for a partner, and a new venture of Exxon Enterprises Inc., called QWIP Systems. A new term had emerged as a descriptor of a market subset, termed convenience facsimile.

Indeed, by the mid-70's, it was obvious that facsimile communications had gained industry stature, and that customer usage, while still applications driven, was becoming less specialized. Facsimile products were being used to communicate textual information as well as graphical, and had the capacity for doing both on the same document. No other communications medium could cost effectively do this for convenience use. Facsimile products were being moved out of the laboratory and specialty areas and mailrooms, and into the offices. Thousands of users began locating the equipment on desks and credenzas when they could obtain products that were attractive enough to fit into their "human space."

By the late 1970's, three distinct market segments had established themselves within the facsimile industry. QWIP Systems had taken possession of the low end of the market with its 4.6 minute highly portable products, while racing with Xerox, Graphic Sciences, now a division of Burroughs, and 3M in the medium speed, 2.3 minute market segment.

In addition, several companies had created a third, high speed, market segment with the launch of several new products capable of transmitting documents in a minute or less.

Today, buyers can purchase the low speed machines for $500 to $2,000, the medium speed machines range in price from just under $2,000 to $8,000. And the new high speed, one minute and subminute machines are the very expensive darlings of our industry, cost as much as $15,000.

It is our belief, at QWIP Systems, that the low speed market has matured, with a domestic population of just over 160,000 units installed. The medium speed segment of our market appears to be the one with the greatest growth potential during the next five to ten years. Vendor congestion and competition in the high speed segment, the high price of the units, and the significant problem of general lack of communications compatibility between different brands, appear to be limiting factors to us in this segment during the next few years.

In order for facsimile products to meet the information needs of today's business managers, they must communicate. Different vendors must adhere to the international facsimile standards established by the International Telegraph and Telephone Consultative Committee (CCITT), such as those published for the Group II machines, which we at QWIP Systems have adopted for our medium speed products. The adoption of these standards in product design is a fundamental responsibility that is shared by all manufacturers of facsimile products in order to satisfy the needs, in fact, the demands, of our customers. In our opinion, the utilization of dissimilar protocols in some facsimile products has limited the natural, even more rapid expansion of our market, that could have otherwise been experienced.

Our market projections in the various segments I have described lead us to expect the installed base of the low speed units will grow from 160,000 at the beginning of this year, to about 175,000 at the beginning of 1985. The medium speed unit base will grow from about 25,000 units to well over 300,000 during the same time period, and we expect the high speed machines to grow from just under 10,000 units to about 30,000. We at QWIP Systems also feel, however, that these are very conservative projections.

Indeed, the advent of new lower cost technology, new intelligent communications networks, and more human engineered facsimile products, coupled with government and industry's dramatic requirement for white collar productivity improvement, could literally explode these projections.

Our industry's challenge, then, will continue to be the effective management of our growth, the delivery of reliable products and the provision of excellent service to our customers.

Before I leave this area of the market, I do want to briefly mention two very important facsimile aftermarket that are occasionally overlooked. In our business, the common carriers and the specialized common carriers find facsimile network services to be lucrative. Our rule of thumb is to project that each installed facsimile machine will generate its value in communications services revenue each year. The after-market for consumable materials, supplies and service is the second most significant area for revenue, mostly accruing to the facsimile manufacturers. In fact, we estimate that by 1985, industry revenues from materials, supplies and service will approximate twenty percent of the annual machine revenues from outright sales and rentals.

Now, let's spend the rest of our time together discussing the probable evolution of our industry, and its impact on electronic mail.

Facsimile in the next four to five years will take advantage of new technology as well as enhancements that are developed in the convenience facsimile machines similar to those in existence today. The convenience facsimile market will continue its rapid growth and, in addition, there will be an emergence of multi-functional products which will merge facsimile with other automated office functions.

Let us now examine the basic technologies involved in facsimile and some of the general trends occurring in these

* Estimates based on Market Projections, QWIP Systems, Division Exxon Enterprises Inc.

** Estimates based upon projections of QWIP Systems, Division of Exxon Enterprises Inc.
areas:

Scanning is the process of analyzing the copy into a serial stream of light intensity variations, which in turn are converted into voltage variations.

Traditionally, the process has used electromechanical and electrooptical devices; however, the trend is toward solid state, laser and fiber optics. Recent developments such as photodiode arrays and charge coupled devices (CCD's) will pave the way for high speed scanning, improved reliability and lower production costs while being compact, stable and quick to respond.6

Printing is the process in which the transmitted image is reconstructed by converting the receive voltage variations into marks on the paper. Some of the more recent developments in non-impact printing include laser printing, precision matrix printing, ink jet, and improved thermal printing, which will enable high quality images on bond-like paper. These processes offer speed capabilities that range from 10 characters per minute to 45,000 lines per minute.7 Advanced machines will be capable of making multiple copies upon receiving remote commands. Many transmitted documents are business forms which consist of fixed formats and variable information. Future machines will make use of an electronic overlay technique which will enable users to transmit the variable information only, thus reducing communications time and cost.8

Storage: The storage requirement for a typical page with a resolution of 96×96 lines per inch requires a capacity of one million bits. Data compression can reduce this requirement to approximately 140,000 bits. Typical storage costs have ranged from approximately 0.001 cent per bit to 0.7 cent per bit, depending upon technologies employed, and are expected to drop. This trend in cost reduction will enable practical store and forward systems. New solid-state memories, such as magnetic bubble memories, are beginning to become attractive in some office product applications as a result of their ability to store large amounts of information in a non-volatile mode.

Optical/Laser memories are capable of very high storage densities but are still only capable of intermediate speeds and they are somewhat limited to permanent archival-type storage applications.

Electronic Controls: The constant effort of electronic component manufacturers toward the design of standardized off-the-shelf building blocks such as LSI chips, memories, microprocessors, interface chips, peripheral chips, etc., has permitted lower product design and development costs.

Electron beam or x-ray lithography will improve the manufacturing process, thus permitting a further increase in gate density per chip. This will result in more powerful localized processors, thus permitting more functions at the terminal at lower costs.8

Communications: The public switched network has been the prime communication link for facsimile and electronic mail. Analog transmission in two minutes is now commonplace. Improvements in modem technology have enabled digital transmission at 4,800 bits per second. Up to 9,600 bits per second on the switched network is now possible; however, the cost of these modems has been substantial. LSI technology as well as a recently announced analog microprocessor is expected to drastically reduce the cost of signal processing and the equalization functions of these modems.9 The cost of digital facsimile products will drop, making digital devices practical at the point of need.

In addition, specialized common carriers and value added networks such as ITT's FAXPAK, Xerox' X-Ten and SBS, utilizing different technologies such as satellite communications and packet switching, will make higher speeds available at competitive costs. The advent of CCITT standards, such as the recently approved Group III facsimile standard in Kyoto, Japan, will insure compatibility on an international basis among various vendors' equipment.

The above technological trends coupled with a market demand for more office automation will result in the existence of two families of products; the convenience facsimile terminal and the multi-functional office terminal. The convenience fax terminal will continue to offer more and improved features and yet will remain within a price range which permits cost effective applications.

According to certain market analysts, in addition to the convenience facsimile device, the multi-functional terminal, which is compatible with existing machines, will emerge. This terminal will be capable of resolution in excess of 300 lines per inch, producing correspondence quality copy. The unit will also interface with other communicating office products such as word processors, TWX/Telex, and electronic date processing devices; thus making this a shared scanner-printer with both text and graphic capability. The terminal will provide local photocopying and will have storage and retrieval capabilities, as well.10 Some of today's products such as the IBM 6670, Xerox 9700, Wang IP41L and Toshiba L2017 already have the capability to perform several of these functions. For example, the IBM 6670 utilizes a laser printer, has multiple copy capability, can transmit and receive over ordinary phone lines, and will interface to the IBM 370 EDP system and the IBM Mag Card II typewriter. Although the 6670 does not currently perform graphics nor can it accept facsimile input,11 it is apparent due to its laser scan type printing that graphic capability could be easily added.

When evaluating products, this new breed of facsimile device (multi-functional terminal) could become a key component in the electronic office. Facsimile is the only product having the ability to communicate both graphics and text, making possible the transmission and hard copy generation of an infinite variety of data. This data can originate from original documents, EDP systems, word processors or other facsimile terminals. The device will minimize communication cost by permitting after hours transmission of data through the use of an autodialer and a store and forward option, as well as allowing for the utilization of value added networks which also permit communication with non-compatible equipment. In addition, the unit will provide convenience copying from a hard copy original.

The system, of course, will include the use of remote low cost portable facsimile terminals. This integrated system should begin to find market acceptance later during the 80's.

I've already characterized our industry's history and provided an overview of what is to come.

We have seen the change, and expansion, from highly
specialized products and customer applications to this new era of so-called convenience facsimile. We’ve watched the transition of products from low speed to faster speeds, and we’ve touched on the customer demand, and subsequent supply, of products that are designed to provide more communications compatibility with dissimilar brands.

I believe the next few years will be no different from what has now become commonplace . . . more changes . . . at a faster rate. We call it industry metamorphosis.

To illustrate my point, let’s evaluate buyer motives that should find expression in new products and services during the next few years. The first, and most obvious, that I’ve already introduced to you, is the imperative for improved office productivity.

New facsimile products must then be provided that offer convenience, ease of use, automated paper handling, microprocessor machine control, and automated telephone management and utilization. These new products must be designed to solve the real productivity problem . . . they must target the information they communicate to the real point of need—the manager and the professional. These new products must be so cleverly designed that they fit within the price parameters of the purchasing decision makers, so they can be demonstrated to be cost justifiable for the white collar worker’s personal use. And they must be attractive enough to fit into the personal work space of the people who use them.

Facsimile products, then, will be friendly and easy to use. They will be transparent to the user and they will be cost justifiable to the buyer. In many cases, they will expedite information delivery to the real user, rather than to the mailroom attendant or the clerk who is often positioned between the communicators . . . who, because of their positioning, tend to delay an reprioritize the delivery of time critical messages.

The next few years of our business will be characterized by more general customer use. Our studies at QWIP Systems have indicated that in the past about 90 percent of all facsimile use was applications specific and a like percentage of use was for intra-company communication. Our customers are now beginning to tell us that they need to communicate with their customers, their business associates and their suppliers. And they want products that can be used to send letters, order entry documents and graphs, without as much emphasis on special uses. Communications compatibility with a wide variety of competitive products is now an essential rather than an added feature.

Now, what role does facsimile play in the emerging electronic mail—electronic office—marketplace? I feel we need to revisit the fundamental reason for the emergence of this new market, and the basis of this report . . . The prerequisite for white collar productivity improvement . . . to complete our perspective and to answer the question. Here-tofore, the most attention for instituting office automation to improve productivity has been in the product areas of “word processing” and “machine dictation.” Studies show that typing productivity can be improved by orders of magnitude from 200 to 500 percent by word processing systems, and author composition can be improved by 30 to 50 percent through the use of machine dictation, although user resistance has retarded the exploitation of dictation as a real productivity improver.

When evaluating the overall distribution of labor costs in American businesses, the secretary-typist represents only about 6 percent of the total. On the other hand, non-clerical labor costs are about 66 percent of the total.

I am not belittling the development of word processing products as productivity problem solvers—their outstanding results in the typing area speak for themselves. The real opportunity for leverage, though, according to the noted analyst, James Bair, and we agree, is in the support of the manager and professional. To illustrate, United States business costs for secretary-typist labor exceeds $4.4 billion, contrasted to non-clerical labor costs of about $250 billion. The leverage then can be demonstrated on the basis of labor costs alone.

As I stated in my opening remarks, most of what managers and professionals do each day is communicate information. Bair has estimated that electronic mail has the potential of saving managers and professionals about 2 hours a day by improving the way they communicate, by making communications more efficient, and he has projected that the resulting increase in productivity could save U.S. business up to $62 billion a year. His treatment, while academic and perhaps optimistic, is nevertheless interesting . . . and appears to be valid.

We believe that facsimile products, as ubiquitous electronic mail communicators, offer outstanding benefits to the electronic mail customer. First, original documents, whether graphic or text based, can be transmitted. Second, once transmitted their messages have lasting value and can be copied, filed, annotated and redistributed with ease. Next, original documents can be communicated without the need for expensive reformating. And, last, facsimile products can be inexpensive. Ours are, and they fit into the work station without intrusion.

Yes, we are all a part of the metamorphosis of our industries, the office environment and the evolution toward a more productive place in which to work. Those who succeed in this changing market will demonstrate flexibility, awareness of the importance of communications and will recognize the real targets for their products. They will have developed products that are responsive to market needs, yet they will boldly drive their markets with a keen sense of leadership. They will have assembled marketing and engineering organizations that are capable of customizing systems and networks of their products, even including those of their competitors, if necessary, to meet customer demands.

They will have made the connection between information and those who must have it, use it, and make decisions based on it.

REFERENCES


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3. QWIP Systems, Division of Exxon Enterprises Inc., Proprietary Data.