A panel session—On-line business applications

On-line business applications

by JOHN T. GILMORE, JR., Chairman of Session

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For purposes of background and personal introduction, I would like to begin by stating a few facts about Keydata and its services.

Keydata Corporation was founded in 1959 by Charles Adams and myself and was originally called Adams Associates. Until 1965, when we became the first to offer time-shared business data processing services, our main activity was the design and implementation of real-time, graphic display, and on-line process control systems. That activity is now being carried on by our Keydata Associates Division.

The Keydata system, centered in Watertown, Massachusetts, consists of a private dedicated teletype network that extends as far west as Missouri and south to Delaware. The primary concentration, however, is in New England and Metropolitan New York. Three kinds of computers are used. The UNIVAC 494, utilizing Fastrand and high-speed fixed-head drums, is the time-shared processor and will be duplexed with another 494 before the end of this year. Honeywell DDP-516 computers, used as teletype line monitors and message concentrators, are strategically located geographically within the network to minimize communication costs. An IBM 360 Model 40 is the batch-oriented off-line processor.

Based on the kinds of service we are now providing, the system has a capacity of 800 to 1,000 lines with a response time of less than two seconds. Our present load is about 175 lines with access to more than 630,000 records or 92 million characters. Our basic services are distribution accounting and accounts payable. Certain services are used by a small number of subscribers and other services are under development.

We call our system a “business computer utility” because it provides the businessman with computer power and programs that serve as an efficient tool in operating his company. Like the telephone and electrical utilities, we provide our services through on-line terminals located at his place of business and operated by his employees who are trained in his company’s activities and who are not—and need not be—specialists in the service provided by the utility.

Right now, the average businessman would be satisfied to have his conventional data processing needs fulfilled without costing him an arm and a leg and confusing the hell out of his employees. However, once this is accomplished and he realizes what else is possible, he’ll roar like a lion. Will we in the computer field be ready for him?

The businessman has as tough a problem to solve as the scientist—perhaps even tougher if one counts his variables and unstable conditions. His basic problem is his data base. He cannot watch it or experiment with it as easily as his brother scientist or engineer can. More often than not, his access to “current” information in his data base is measured in several days to weeks—by which time it is far from being current. However, modern computer technology and on-line communication techniques will enable him to keep his data base current and available in milliseconds. With this kind of luxury he could rapidly become as sophisticated a computer user as his scientific friend. When he does, and when there are many like him, the impact on the business community will probably cause the operations research textbooks to be rewritten and the economists to take a second look at their crystal ball!

What it boils down to is this. On-line business applications, whether on-line to one’s own computer or to a computer utility, will provide a dynamically updated
data base. Once that occurs, the businessman will be in a position to request the initiation of various operations either at will or automatically. This will provide him and his employees with the timely information essential to the efficient operation of his company. Changes in a data base will automatically cause reactions to other parts of the same data base and, through the use of communications, changes to other data bases, etc.

For example, in performing its invoicing and inventory control function, our system signals the terminal operator when a re-order point is reached based on the quantity just processed in the invoice being prepared. The re-ordering of the item is now being done in the conventional manual way. But the time will soon come when the computer will communicate directly with vendors of the item, compare prices and delivery dates, and order a specific forecast-calculated quantity of the item from the vendor selected. The same re-order example might instead trigger a production order message to another terminal in the plant or perhaps directly to a process control computer. The examples could go on and on, but the main theme assumes a data base that is being dynamically processed.

Among the questions I feel the panel should discuss are:

- What are some of the problems in dynamic data base systems? What protection must be provided to safeguard information? What kind of reliability and availability criteria should there be? What kind of back-up procedures should be employed?
- To the businessman, each successive stage of developing what for him will be the optimum system has to be economically justified. What are some of the major impasses? What are the intermediate payoffs? What kind of time period are we talking about for a sophisticated computer-oriented business community?
- What industries or job groups may suffer from a drastic increase in on-line processing? What government intervention, if any, can be anticipated or perhaps urged?
- Most of us in the computer field see the computer and its power as a valuable tool to the business community. Are we missing anything? For example, will it cause a major cleavage between the unskilled or semiskilled and the bright workers and managers who will use the computer tool to run the plants and offices? Will the leisure class ironically consist of the rich and the unemployed even more so than it does today?

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**by CHARLES T. CASALE**

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If we look at business applications which are truly on-line today, we see far fewer than were predicted four or five years ago when time-sharing and on-line systems were promised as ultimate solutions. Why is this so? I believe there are several reason, intertwined, which have in turn caused secondary effects. I would like to review some of these briefly.

**On-line as a philosophy**

To some, on-line reaches the proportions of a religious belief: it is good for everyone, there are ceremonies, there are the articles of faith, and there are the missionaries and prophets. In fact, there are large numbers of people who simply reject onlinism or say that they simply don’t need it. At least not now.

Much of the reason for apparent slippage in implementing on-line systems comes from the earlier prophetic statements of dire need. If dire need is assumed, then it can be reasoned that an economic solution is not far behind.

**The degree of need**

There is real need for on-line, “instant verification” of credit cards at gasoline filling stations to capture voided or stolen cards. So far, we have no systems filling this need since we don’t need the systems badly enough to pay the current price. The technology is there. On the other hand, the benefits of having quick retrieval of airline seat availability are worth the cost to the airline. So we have large airline seat reservation systems.

How loud are the demands for on-line inquiry of the weekly payroll file? Or accounts payable? Or for change in status of major sales prospects? The promise of “instant data” in management information systems is proving illusory in many cases; the information just doesn’t change that frequently, or to that degree, to warrant the expense and complexity of an on-line system.

**The transition period**

The transition from an “old style” manual system to a fully on-line automated system is an undertaking as
enjoyable as crossing the Italian Alps by elephant in the winter. It can be done, but the participants and bystanders are loath to ever repeat the experience, at least in the foreseeable future. Hardly an issue of the popularized computer magazine goes by without at least one glamour or horror story of the transition period. These periods take time, rub nerves raw, chew up valuable resources that others think could be used elsewhere, and are full of surprises. When finished, the accomplishment is indeed impressive... so much so that we are reluctant to make any changes to the new system. This brings us to some other matters:

Who is going to do the system?

First, there is the jurisdictional problem. Secondly, there is the resources problem. Where do we find skilled people to plan and implement the system, who will maintain it, how will they explain it to its users? The shortage of skilled practitioners need not be restated. The shortage is responsible for delays in putting business systems on-line. Once installed, how do we keep it current? With what tools? Can the system grow gracefully, or must it be abandoned when it gets modestly larger?

Profits and returns

After the fact, what are the real bottom-line profits that the system gives me? Can I show a return on this sizeable investment comparable to my other business investments? Are the marginal benefits being used to justify more than their proportionate costs?

Where do we go from here? What are the trends?

It would be useful to look at the major influencing factors that will accelerate or impede progress towards more and better on-line business systems. Some of these are in conflict, others are synergetic.

Data transportation costs

For a given quantity of data, rates decrease slowly. For the same costs, the quantity of data that can be pumped over common carriers increases much faster. Consequently, the threshold of economics for cost justification remains relatively constant; but once justified, the marginal costs of transmitting additional data are small. This will be changed when the full impact of the Carterfone decision is implemented. The result will be a lower threshold caused by reduced termination costs.

Central storage costs and central computer hardware costs

These continue to decrease relatively, and each year sees a lower threshold of economic entry. However, logic and electronic costs are decreasing at a faster rate than storage costs. Consequently, main frame manufacturers are adding more logic to a given storage size to do a more sophisticated job. We are beginning to see parts of software systems being hardwired into computers as a cheaper way to get the job done. This same phenomenon of rapidly declining logic costs has given rebirth to the mini-computer.

The mini-computer

What it lacks in capacity it makes up in muscle. With storage being the majority hardware expense and more logic being condensed onto one semi-conductor chip, the present types of mini-computers will tend to become off-the-shelf components marketed by distributors and produced by the memory houses. What this means to on-line business systems is smaller subsystems operated relatively independent of the parent data base. We are already seeing specialized subsystems based on “standard” mini-computers.

Specialized subsystems

Data acquisition, data distribution and highly structured repetitive tasks can be performed more cheaply with specialized subsystems than by a general-purpose system. This is true only because of the continued decreasing cost of logic and storage. We have seen the success of this in the keypunch replacement area, where no loss of system capability is experienced in using key-to-tape devices instead of the more generalized and flexible keypunches.

The programmer gap

Much has been said, and much is being done about it. Meanwhile, there just aren’t enough of them around to get done all of the jobs that are on the drawing boards. And it seems that the gap doesn’t close as fast as many expect.

Programming costs

These are increasing because of personnel shortages and because there is a Parkinson effect about any productivity increase made in programming. While today’s programmer can produce (via higher-level languages) ten times what he could ten years ago, the job is enlarged to an even greater multiple. Documentation demands are considerably greater and productivity increases have been significant.
Consequences of these trends for on-line business systems.

Large data bases will continue to prosper and flourish, as will their extensions, the time-shared terminals. In addition to this, an entire sub-industry will mushroom based on successful exploitation of the disparity in trends among decreasing hardware costs, rising software costs, and relatively level transportation costs. The results will be specialized subsystems, ranging from a few thousand dollars to several hundred thousand dollars. They will be application-oriented, limited-purpose and highly cost-justifiable.

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by MARTIN GREENBERGER

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The federal government is destined to play a key role in the future development of on-line business systems and the structure of the new industry growing up around them. Six points of contact already are evident:

1. Anti-trust action (real and implied) as in the current cases against IBM and AT&T.
2. Inquiries on the practices and policies of the communications common carriers as in the recent FCC inquiry on the relationship between computers and communications, and the now discharged Task Force on Telecommunications appointed by Lyndon Baines Johnson.
3. Hearings on privacy and associated rights of the individual as conducted last year by Congressman Gallagher and Senator Long.
4. Legislation on copyrights and other possible mechanisms for protecting computer software.
5. Encouragement of standardization and economy measures as in the Brooks Bill and intended activities by the National Bureau of Standards, the General Services Administration, and the Bureau of the Budget.
6. Direct and indirect subsidies of development through research grants, purchase of services and equipment, and support of education.

A great deal of government participation and involvement has gone on in the past year, and every indication is that its pace and scope will intensify in the years ahead. It is helpful to review the main issues and examine the actions taken to date as a basis for distinguishing trends and anticipating future policy and legislation. The intelligent businessman today cannot afford to become fully preoccupied with his own plans and problems in a framework shaped solely by competitive forces. The role and influence of the federal government should be studied and understood.

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by WILLIAM M. ZANI

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On-line computing systems are a relatively recent development in commercial computer technology. Most of the experience to date with the use of such systems has been gained at universities, large governmental organizations and a few pioneering businesses like American Airlines, Westinghouse and Keydata Corporation. Today, from the literature and recent announcements of computer plans, it appears that on-line systems are ready to be implemented in many organizations to perform a large variety of tasks. There are experts predicting that by 1970 the majority of computer systems sold will be performing some on-line functions. Huge growth is expected to occur in computers capable of operating on an on-line or time-shared basis.

Much of the growth in usage of on-line systems will be economically justified. The on-line systems have the potential to dramatically change business data processing and the manner in which business will be conducted. On-line business systems can be used to improve decision making, the operations of a business and customer service. Certain aspects of decision making can be improved with on-line systems because a problem solver is able to test on-line to the computer several alternatives and get immediate feedback of results. The interaction of a problem solver with a computer may provide an understanding of a problem and its solution that is not possible to achieve with the long delays in the computer-generated answer cycle of systems without on-line capabilities.

Operations of a business improve with on-line computer systems because the reduction in data processing delays can be used to reduce inventories, provide more
efficient distribution systems and more effective production schedules. Westinghouse has implemented an on-line inventory control system for its distribution network, and was able to close seven warehouses and dramatically reduce the level of inventory required. On-line systems have the potential of improving customer service by insuring a complete stock of goods and enabling faster response to customer requests. American Airlines was the first to use an on-line passenger seat reservation system. The company expected increased passenger sales to result from its ability to process customer requests more speedily and accurately.

While much of the growth of on-line computer use will be justified, a significant portion of on-line use will not and cannot possibly be economically justified. Many companies will repeat the same mistakes in switching to on-line computers that were made when computers were first introduced into their organizations. Many companies could not economically justify their original computers, but they purchased them because:

- their competition had a computer and they felt they could not compete successfully without one;
- the companies wanted to keep up-to-date with the latest management techniques, and
- the computer offered many subjective advantages, such as quicker and more information.

Companies, because of the potential advantages of on-line systems, are in danger of being caught up in a whirlwind of unnecessary and uneconomical change. While on-line business systems can be extremely valuable, this value is not automatically achieved nor is it applicable to every business situation. Before any company decides to implement an on-line system, it must examine the economics of the specific applications; otherwise, expensive mistakes can be made. The reasons for this follow.

On-line computing systems do not automatically improve operating performance. They generally increase the speed of information flow in an organization, but if this speed is not used or needed it has no economic value. On-line systems will generate operating savings only if the reduction in information delays are meaningfully integrated into a management process, and if the reduced information delays can improve a company's operations.

On-line systems do not necessarily provide a marketing advantage vis-a-vis competition which does not use such systems. The nature of the industry, the competition and business may not provide an opportunity to gain a competitive advantage. It would be erroneous to impute the competitive advantage gained in the airline industry by American Airlines to companies that use on-line systems in all industries. The generalizations of competitive advantage from on-line systems must be made carefully and only after considering whether: (1) on-line systems can improve customer service, and (2) the improved service will result in increased sales. It is therefore not necessary to use on-line systems simply because competition is doing so. Depending on the nature of the industry, a company using traditional data processing equipment can satisfactorily compete with a company using on-line systems.

In an evaluation of whether or not to implement an on-line system, it is not sufficient to state that on-line systems are better simply because they provide more rapid information flow. It must be shown how and why the quicker information can be used, and the potential savings that can be related to the faster availability of information. If a company does not have a clear idea of the specific benefits an on-line system will provide and how these benefits are to be achieved, on-line systems should be evaluated on a cost displacement basis; that is, the method of data processing that performs the required functions at the lowest cost should be selected.