COMPUTER
USAGE

WINTER ISSUE 1968 VOL. 3—NO. 1

COMPUTERS AND THE CITY

by Marvin Heit

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Mention a city's name and you conjure up vivid images of a Nation, its people and a period of history. Bagdad, Cairo, New York, Jerusalem, Moscow, Bologna, Paris, Athens, all have their unique culture and way of life. In fact, to study civilization is to study cities.

But all cities have one thing in common. The same forces that drew people to cities — the cross-fertilization of ideas, economic advancement, social and financial security — combined to breed many of the problems that have faced city managers from the city god of Egypt to the Mayor of Newark, New Jersey.

Cities old and new are plagued with the same kinds of problems: communications, housing, transportation, health, law and its enforcement. Early cities — even up through the early nineteenth century—were more or less moderate sized groupings of people, radiating out from the center city where the most influential people lived and worked, where the religious and cultural "hardware" of the city was located.

The advent of industrialization and technology spurred the development of colossal cities. New materials, electricity, indoor plumbing, and the new opportunities for economic gain, free of the land, permitted closer and closer living systems. Housing could be stacked up — instead of out. Businessmen and laborers could live close to factories and shops.

And that trend has become a clearly defined, persistent pattern. Per capita income and industrial development are directly linked to urbanization. Today every industrialized nation is predominately urban; yet, 100 years ago only Great Britain was in that class.

The United States—now over 70% urbanized—is undergoing further development of city life. We are now witnessing the creation of Super-Cities like the Megalopolis stretching from Boston along the East Coast to Washington, D.C. According to the U.S. Bureau of Census, nearly 53% of the total population is concentrated in less than 1% of our Nation's land. As a result, today we are faced with solving the worsening "Crisis of the Cities."

THE UBIQUITIOUS COMPUTER—"Just in Time"

Computer usage in municipal operations has become a matter of utmost concern in recent years. Recently speaking in New York City at the Third Annual Conference on Data Processing Systems in Local Government, Representative Jack Brooks (D-Texas) declared, "Electronic data processing techniques offer great potential in helping government meet the demands of modern society. In fact, data processing came along just in time to make efficient, effective government possible."

A recent study CUC completed for the city of Hartford will give you some idea of the scope of computer usage in city government. In the course of developing data to study the city's present and future data processing needs, CUC analysts had to analyze such diverse functions as the Finance Department, Board of Education, Police Department, Health Department, Assessor, Registrar, Welfare Department, City Planning, and Tax Collection. As a result of the study, CUC submitted a comprehensive plan specifying the requirements for third generation computer applications in all of the above areas.

Harry O'Donnell, Mayor Lindsay's press secretary announced early this month that there were about 51 computers scattered throughout various agencies of New York City's government operations.

Among the agencies using computers are The Bureau of the Budget, The Department of Finance, The Controller's Office, Personnel, Department of Welfare, The Buildings Department and Hospitals.

SHELTER—"Utilizing Space"

Of course, one of the major problems facing our cities is people. They must have adequate living conditions at work and home. Many experts feel that in the future, computers must play a vital role in the design of apartment houses, office buildings, hotels, etc. In this way, improved utilization of space would become a reality.

W. Donald Calomiris, President of the Institute of Real Estate Management, discussed the growing use of EDP in construction at the annual convention of the California Real Estate Association in Los Angeles a few months ago. He said computers are already being used in making market analyses and economic projections for income in many major cities. The primary problem in building design is relatively simple in theory — taller buildings spread high land costs over more rentable floor area of construction; whereas lower buildings cost less per square foot as building efficiency is usually greater.

Calomiris cited a project involving an office building in Houston which was carried out with the aid of a computer. After the information was fed into the computer, the machine showed that the most efficient and economical structure, under the Houston conditions, would be 32 floors high.

He predicted computers will be used more and more to design the total structure. (In fact, such a project is already being developed by an architectural engineering firm in Memphis.)

TRAFFIC—"Back to the Horse and Buggy"

There is no need to emphasize the critical state of our cities as far as transportation is concerned. Traveling crosstown during business hours can be more than frustrating. In fact, it was probably easier, faster and safer in the "horse and buggy" days.

But many cities are turning to the computer to uncork the bottlenecks that choke business and pleasure alike. New York, Chicago, Detroit, and Toronto are all either planning or actually experimenting with computers for regulating traffic flow. In Toronto today, the traffic light network in the downtown area is completely controlled by a computer. The system also detects defective signals and pinpoints the nature of the trouble.

Just last month the Port of New York Authority appropriated $3.4 million dollars to install a system of computers and closed circuit television to control the spacing of vehicles in the Lincoln and Holland Tunnels. Sixty-four electronic detectors placed in the roadway and the TV cameras will provide the data which will be fed into computers. Using this information the computers will then activate traffic control devices at the tunnel entrances. Port of Authority officials hope to have the computer system in operation in 1970.

One of the pioneering efforts to ease transportation problems is now underway in the San Francisco area — Bay Area Rapid Transit District (BARTD). The BARTD transit system will consist of fully automatic commuter trains, operating at top speeds of 80 miles per hour over some 150 miles of track. A central computer will supervise the trains in their 50 mph average speed (including station stops.) The system will cost over $1 billion dollars.

LAW—"Crime—A National Disgrace"

There is no doubt that one of the most crucial responsibilities of the city leaders is to protect its citizens. In most of our cities, crime in the street has reached the crisis point. Recently President Johnson's Commission on Law Enforcement and Administration called the current crime rate a "national disgrace." (Joseph Vierra, "Computers and the Law" USAGE, Vol. 2 No. 1).

To meet the challenge posed by organized crime, many cities have developed advanced computer-controlled communications systems, data banks and simulation techniques. Chicago, for example, has developed a computerized system that makes daily crime statistics available to all policemen — including a daily printout of plate numbers on all reported stolen cars.

Using computer simulation models, various police approaches can be tested artificially without any risk to public safety. To gather this information by traditional measures, through trial and error, would take years. Using the computer enables the experts to vary police force size, change personnel, change the ratio of patrolmen to squad car coverage and shift patrol routes — all without actually hampering the current police protection system.

New York's Police Department is currently developing a crime-fighting, computer system called SPRINT. At an estimated $5 million dollar investment, SPRINT, Special Police Radio Inquiry Network, is designed to show, immediately, the exact location of the force's 1,000 patrol cars. It may also reduce the average dispatch time by 75 per cent — from 90 seconds to 20 seconds.

Parking violators in New York are also feeling the pressure of computer usage. Last May, Mayor John V. Lindsay signed a contract with CUC to help in the city's continual war on the traffic-ticket scofflaw. CUC personnel are presently assisting and instructing the staff of the Criminal Court on their computer system. According to Mayor Lindsay the system is giving the city fast access to accurate records on those who persistently ignore summonses for parking and jaywalking violations. Mayor Lindsay says that these fines accounted for $14.3 million dollars in 1966.

Even petty violators are having a rough go of it these days. When Los Angeles inaugurated a computerized registration system in its library, they got more than they bargained for. According to Library Commission president Albert A. LeVine, approximately $2 million dollars was owed to the Los Angeles Public Library by delinquent borrowers.

And that's not all the computer turned up. More than 134,000 books were taken out and never returned. If every delinquent paid his debt, it would mean enough cash to buy 400,000 books — equal to the combined collections of the five largest branch libraries in Los Angeles.

NOT ALL ROSES

Unfortunately computers aren't everything for everybody — yet. While most computer applications are now technically possible, not all are economically feasible. CUC consulted with the Los Angeles County Board of Supervisors on a project that is a case in point.

The Sheriff's Department of Los Angeles faced mammoth information retrieval problems. CUC, working with Los Angeles County officials, developed a set of applications for a fully automated and integrated electronic data processing

system that would conform to minimum standards set by manufacturers bidding on the system and prepared recommendations for the Sheriff's office.

The result? CUC recommended no award be made to any of the bidders. Those systems judged to be technically sound were simply not feasible economically. According to the CUC analysis, it would take 11 years after installation for the County to recover the original investment.

PREVENTING DISASTERS: "Bridge Out"

The headlines were stark and horrifying — BRIDGE COLLAPSES ACROSS OHIO RIVER. On a Friday night last month, as a line of vehicles carrying Christmas shoppers and commuters inched across the so called "Silver Bridge" it collapsed into the icy waters of the Ohio River.

With the increase in traffic becoming a vital concern, the West Virginia bridge disaster brought home the point that many existing structures, such as tunnels and bridges, are fast becoming antiquated. To cope with this problem many cities have inaugurated extensive evaluation and rehabilitation programs. But evaluation studies that must consider thousands of tabulations concerning soundness and safety factors would be impossible without computers.

Recently, the city of Providence, Rhode Island, was faced with this problem. Over the years a series of bridges crossing the Providence River in the downtown area have been connected to form what today is called, "The Widest Bridge in the World." Increased traffic in the area—to over 43,000 vehicles a day—and the age of the original structures left city officials no choice but to have the structure thoroughly inspected.

This was no easy task because the original structures were built at different times. It would involve the evaluation of at least 2,000 structural components. It was evident from the beginning that the data manipulation to do the job had to be handled by a computer. Each structural component was inspected, labeled according to its condition—good, heavy rust, near failure etc. This information was tabulated and fed into a computer. As a result, an accurate decision was made to replace or repair each individual component. In the cases where beams had to be replaced the computer printed out specifications including the weight of the steel which would replace the defective part.

Another city's name burned in the Nation's headlines this summer — Detroit. Riots, looting, burning and bombing. By the time military and civilian forces brought order to the city, several sections lay in ruins, rubble obstructed traffic, remnants of buildings and stores were smoking.

The assessment of damage and the development of community renewal plans required hard data. What was actually lost? Why did it happen? Unlike most major cities, Detroit had a headstart in developing its renewal plans—a computerized ally called the Data Bank.

Actually, there are two data banks in Detroit—a "physical" data bank (including data on such city "hardware" as buildings, property, and plant) and a "social" data bank (covering "software" like demographic breakdowns of city sections, disease, income levels, etc.)

Both data banks have been used extensively by planning groups at city, State, and Federal levels in what may become a prototype for city planning and redevelopment.

HEALTH—"An Attack on Pollution"

One of the most talked about and certainly most publicized health hazards facing our Nation's cities is air pollution. According to Dr. William Bollhaus, President of Beckman Instruments Inc., air and water pollution abatement programs in the next 20 years are expected to cost as much as $100 billion.

Whether that bill will be paid by Federal, State or Municipal Government is not yet certain. What is certain is that any feasible attack on the pollution problem must use computers.

The Los Angeles County Air Pollution Control District started recording and data processing projects as early as 1954 to measure pollutant variables and plant damage. Processing this data on a weekly basis enables experts to keep a detailed account on pollution concentration to the day and hour it occurred.

In 1962 the Public Health Service launched project CAMP, Continuous Air Monitoring Program. This data processing system monitors pollutants including hydrocarbons, carbon monoxide, nitric oxide, nitrogen dioxide, and sulfur dioxide. The project involves six cities — Chicago, Cincinnati, Los Angeles, Philadelphia, San Francisco and Washington. The resulting data from the air sampling gathered by the CAMP project is fed into a computer, which determines pollutant concentration and stores it on tape. The CAMP network is capable of storing 10,000 pollutant concentration measurements per day.

The Nation's first real-time network for this purpose is being operated in Chicago—Telemetered Air Monitoring (TAM). Made up of eight stations strategically placed throughout the city the network senses sulfur dioxide concentration, wind speed and direction. Using computers to analyze such air pollutant concentration might result in decisions that would affect the health of citizens in high concentration areas.

TAXES—"As Old as Wheat and Barley"

Taxes aren't a problem of the space age. In ancient times when a city leader was both King and high priest, the peasants' tax or "tribute" to the city god was stored in the temple granaries in form of wheat and barley. But today's taxes and their collection pose complex problems that would make the ancient city gods forsake the temple.

When New York felt the pinch of heavy financial pressure, its new Mayor took the route city leaders have followed since dawn of urban civilization — he taxed the city's citizens. The initiation of city income tax in 1966 required large scale data processing support. CUC was retained to design and implement an automated income tax system. This task required: studying tax law, coordinating with banks handling receipts, converting tax returns, and writing programs to check returns as well as produce bills, refunds, and audit histories.

FUTURE—"The Total System"

Recently, President Johnson addressed the nation as the Census Bureau's Population Clock counted the 200 million mark behind him. Barring major disaster, we will be 300 million by the end of this century and 4 out of 5 Americans will live in cities.

What will it be like? Without attempting to dream up the kinds of materials and technologies and shapes that will be the American City, it is worthwhile looking at some of the approaches that are being taken.

Architect John P. Eberhard looks at the new cities in light of the total system approach—hardware and software, enclosures, communications, transportation, physical and social needs. America is being rebuilt—most major cities will be substantially rebuilt in the next 33 years, and an equal number of new cities will spring up.

The Demonstration Cities Program, the creation of a new Cabinet position—the Department of Housing and Urban Development—and the influx of new technologically oriented professionals to the problem of rebuilding our cities virtually assures new total-system approaches to city planning and city building.

The computer's role in the new cities will be critical—the heart of the system. Computers are designing and testing models for cities; calculating human stresses; coordinating shipment of materials for maintenance of city living; aiding in the collection of taxes; the dispatching of police and firemen. In short they are monitoring the giant system that is a city.

Roy L. Ash, President of Litton Industries, said, "The systems management work involved in building a new city with a population of a million is probably more sophisticated—and requires more professional disciplines—than the work required to get to the moon."

If the historians are correct in saying that the study of civilization is the study of cities, we must remember that many of the cities they now study are graveyards. The American city—with all its problems—faces new opportunities for renewed life through computer usage.

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COMPUTER USAGE is a publication of Computer Usage Company, Inc., 344 Main Street, Mt. Kisco, N.Y. 10549.