BUSINESS SYSTEMS FOR MICRO-COMPUTERS

CONCEPT, DESIGN, AND IMPLEMENTATION

WILLIAM D. HAUEISEN
JAMES L. CAMP

PRENTICE-HALL SERIES IN DATA PROCESSING MANAGEMENT
Leonard Krauss, *Editor*

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Foreword

It is with pleasure that I write a few words as an introduction for this book. This work represents a significant departure from many traditions and deserves special attention. Noteworthy is that it synthesizes in one place not only new technology and operational data processing, but in addition, sound business and distribution know how—all packaged within an umbrella called Management Information Systems.

The approach used here is timely and important because distribution is a rapidly expanding curriculum for many universities; also, it represents a mainstream of American enterprise epitomized by literally hundreds of thousands of small businesses, with countless more around the world. Because of the exigencies of our late twentieth century environment, this book is more than appropriate since many of those small businesses are doomed to insolvency unless automation (among other things) can help improve productivity. For many of these businesses, automation as detailed in the pages that follow may be the difference between viability and insolvency. The technology to attack some of these productivity problems has arrived, and is available on a scale appropriate to even very small businesses.

I am especially pleased that many of the ideas developed in these pages represent the best of the management principles and techniques which have been developed or expounded upon by Management Horizons over the last fifteen years. As such, they are not only the consensus of some of the best consulting theoricians, but also the interactive feedback of professional marketers and managers drawn from the executive suites of most of the major retailing and distribution firms in the United States; many of whom, as corporate clients of Management Horizons, have been exposed to the test by fire.

As one who has devoted a career to education in the distribution industry, I recommend that both student and practitioner alike explore this text—whether they be seriously considering the development or purchase of an MIS. It is a synthesis of technology and management drawn from a framework of practical experience and theory.

William R. Davidson, Chairman
Management Horizons, Inc.

Preface

Microcomputers are emerging in homes, offices, and shops all over the world. Information processing is no longer just for the corporate giants—it is being utilized by individuals, small businesses and is being distributed throughout large corporations. The technology to provide high powered information processing capability on a massive scale has occurred so quickly that few truly understand how to take advantage of its potential. The opportunities are that now for the first time a powerful tool is available to even very small businesses to provide owners/managers with information to manage their businesses more efficiently and more effectively than ever before.

The student now has the opportunity to grasp the total business concept through the hands-on application of the theories learned in business courses and those in computer science, accounting, and systems. The many very capable and knowledgeable data processing and MIS professionals who have experience with large computers now have a guide to assist with the development of cost effective and efficient microcomputer systems for their distributed networks.

But the advent of the business microcomputer creates a host of new issues. First, because of the cost scale, the owner of the small business cannot cost justify custom software and may be forced to rely on prewritten (off the shelf) software. Second, again because of the scale involved, the business owner may also be the data processing manager (as well as the buyer, merchandiser and sales manager). Consequently, we have need for wide expertise in a single individual or at best a couple of individuals. These people will be primarily merchants and not technicians so they will require extremely "friendly" systems simply to be able to use them. Third, due to the speed with which mircocomputer technology has been developed, there is a need to train students of the business sciences in the use of business microcomputers. This educational process, unlike traditionally related fields, needs to integrate the business functions so that the student gains the breadth of understanding to assure a competent role in the modern small business world—a world which may be every bit as exacting in the future as the world of a narrowly focused and highly trained business specialist is today. It is to these ends that this book is directed.

Microcomputers afford new opportunities for the academic world too. Many of us were trained in computer science in a 'key-batch' world. We punched out card decks, deposited them in a slot, and sometime later retrieved our deck and printout. Such a hands-off approach is still common today in the large mainframe environments and necessarily so because of the complexity of the big systems. Microcomputers are a whole new ball game. Now laboratories with one or a few "micros" can be set up for a few thousand dollars and students can have the opportunity to interact with the system at all levels.

This text has four types of potential users or situations in which it would be appropriate:

* as a text for use in an advanced course in business management or distribution
* as a supplementary text for a course in systems design
* as a resource for the small businessman who intends to purchase and install a system
* as a pragmatic guide to the systems designer developing a general business, integrated systems software product.

Since this book is positioned to serve the common needs of these somewhat dissimilar audiences, not all sections of the book will be equally applicable to all audiences. But, because of the integrated nature of the real world environment in which the business microcomputer is likely to find itself, the complete text stands as a method to integrate the conceptual, the hardware, the software and the business needs into a unified whole.

AS A TEXT FOR AN ADVANCED COURSE IN BUSINESS MANAGEMENT OR DISTRIBUTION

Historically (and practically) business management has been taught from the focus of the instructor's specialty field—if accounting, then in the management of the bookkeeping and audit functions; if marketing, then from the perspective of the sales/marketing opportunity, etc.

With the advent of the microcomputer comes the opportunity to bridge the traditional approach with a wholistic approach under the umbrella of the *information* needed to satisfy all special interests within the business. We feel the strength of this approach is that it clearly demonstrates that no function within the firm stands alone or in isolation, whether it be marketing, accounting, finance, purchasing or warehousing. Each component subsystem provides information to the database essential for company survival and the effective operation of the other subsystems. Likewise, each system extracts information it needs from the common pool. Thus, the student gains insight and sensitivity into how the various skills in the management of a small business interact.

For this audience, the text, in the order it is written, makes a logical progression through the integration process. Lighter attention might be given to the earlier chapters and somewhat more to the later part of the book.

As an advanced course, its case study approach has the benefit for the student of affording the opportunity to test his ability to merge theory and practical application.

AS A SUPPLEMENTARY TEXT FOR A COURSE IN SYSTEMS DESIGN

Since the text takes a single hypothetical company and builds a detailed case study around the information needs of the company, the book provides the student in systems design with an opportunity to work through the various component parts of an integrated information system.

Because of the level of detail in the book regarding screens and reports, the student can proceed either under tutorial guidance in a laboratory situation or in independent study to develop the framework and fabric of the system.

Designing a full system would be too great a project for even a team in a normal academic term, but because the repetitive and time-consuming work of screen and report layout is done, the maximum benefit can be realized while minimizing the busywork which has limited learning payback. An approach might be to provide students with 'files' of all input and output screens and reports—these files could be prepared as an independent study project.

The secondary benefit of the structure of the book for the systems designer student is that the case study represents the essential parameters of literally hundreds of thousands of small businesses in the world. The resulting case study is fully complex (in a real world context) yet simple in its application.

For the student of systems design, the entire text, in the order it is written, again, presents a logical sequence for the classroom application to systems design. That is, it represents, in the correct order, the logical thought/research sequence.

AS A RESOURCE TO THE BUSINESSMAN

The marketing of microcomputers to the businessman represents a challenge to both suppliers and buyers of systems. To the supplier, it represents a small unit sale (dollar volume) when compared to a mainframe computer. Consequently, the supplier realizes very few gross margin dollars in each machine or system. As a result he can afford to spend less time with each sale—and the traditional marketing system of spending long hours courting the customer and studying, on the potential user's site, his application opportunity, is no longer feasible. As a result, few microcomputer systems are being sold door to door by manufacturer representatives; instead, a new generation of retail stores is emerging: the small business computer store.

This challenge to the seller becomes a greater challenge to the buyer—since the time spent by the manufacturer's representative on the premises represented an opportunity to learn, ask questions and develop a knowledge about systems. The new challenge to the buyer is to do the learning, evaluation and preparation for purchase of both hardware and software on his own without the manufacturer's representative's tutilage and security blanket presence.

As a result, the buyer needs to understand both the opportunity and the challenge in as much detail as he can on his own.

This book provides a framework drawn from a generalized business context for the prospective systems buyer to understand the system opportunities, features, benefits and liabilities. By working through the case study to the end, the reader begins to understand how a system might impact his business as he is now doing it,

but also as he might do it to more nearly optimize his opportunity and fully exploit his new machine.

At the same time, the book describes a nominal benchmark for what a software package should be capable of doing. It is very unlikely the small businessman could afford to have custom software developed since a system as described in this book could cost up to a half million dollars to design, program and install. But, by studying the features outlined in each subsystem as well as the techniques used to integrate the component subsystems, the eager student can make feature by feature comparisons and contracts to determine the optimum trade-offs.

Without such a benchmark, the electronic marvels of the microcomputer, CRTs, blinking cursors, fast disk accesses to millions of bits of information, and the like, could prove to be a dazzling argument for purchase without a full appreciation of latent shortcomings or system liabilities. As such, the book forms a reference to help the potential buyer understand what the steak tastes like, so he won't be overwhelmed by the sizzle alone. As more and more software is made available, the buyer will need such a reference for evaluation purposes.

AS A TOOL FOR THE SYSTEMS DESIGNER

Just as the construction of a building is made easier and faster, in a more organized fashion and with fewer mistakes when a blueprint is used, so the systems developer can produce better systems when a blueprint or plan is developed first.

For many of the subsystems in this book, there is little reason to research needs and requirements from scratch. More than likely, for systems like payroll, general ledger and accounts payable, what is needed is a variation of a general theme. Thus, the book can be an invaluable guide to the systems designer since it presents in a logical way the essential considerations of each subsystem.

Obviously, it can only serve as an overview or introduction for the more advanced topics like forecasting, batch picking and electronic communications. The designer should be directed to the plethora of texts in each of these (and other) areas when the actual system requirements are decided.

Since the case study in this text has been developed with the aid of many wholesalers in a variety of lines of trade, the applications work; the information and reports developed have been texted and do the job. Consequently, the systems designer can use the book not only as a guide but also, as the consensus of many practitioners—a second opinion.

CHAPTER DESIGN

Each chapter begins with Chapter Highlights in 'bullet' form. These highlights are main points that will be emphasized in the chapter that follows.

We attempt in each subsystem chapter (Part II) to establish the business reason for the particular subsystem. By understanding what the system is intended to do, the essential parameters can be defined in a context. Under the headings that follow, the inputs to the system and outputs from the system are described.

In an effort to bridge the gap between theory and practice, we have included

headings in each design chapter called Systems Flows and Screens and Procedures. These topics relate the 'what' of a system with the hands-on 'how'.
All screens have been developed to show, by example, how the flow of the system might occur in an actual application of the principles developed in the chapter.

The set of reports developed in Part II represents an example of a set of management reports needed to effectively manage and control a company. We have attempted to interrelate the data on these reports in two ways: first, all reports are those of the model company described in the case study chapter in Part I. Thus, all reports focus on the management issues of the same hypothetical company. Secondly, the data interrelate, in so far as possible, to each other. That is, the reports make 'business sense' with each other. Naturally, time-based reports representing end of day, end of month and end of year cannot maintain this strict continuity; but the data do represent logical extrapolation.

Finally, each chapter is summarized in a concise manner to restate the key point. Study questions are also included which help the reader focus on how the information in the chapter might be utilized. The first three questions focus on business concerns, the last three questions on systems design issues.

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Thanks go to Joan Borg, Anne Jensen, Donna Hastilow, and Gary Hoffman, for assistance in the preparation of the manuscript. The authors are also indebted to all of the manufacturers who supplied photographs and technical materials for use in the text.

Finally, both authors wish to thank their respective families not only for their patience especially during the weekends and late hours when work continued, but also for permitting bedrooms and basements to be turned into makeshift laboratories.

Contents

part I

PREPARATION AND PREREQUISITES

chapter 1

Introduction and Background

HIGHLIGHTS

- The pace of technological change is presenting us with many new opportunities that affect our daily lives
- The management of information will be a key business activity in the future
- Automation will continue to be an important technique to reduce the expense of doing business
- The automating of information is an exciting frontier with many potential paybacks
- The microcomputer presents us with the opportunity to manage information economically even in very small businesses

"Dad was a merchant in a country store in eastern North Carolina in the 20's and 30's. He always wore a starched white apron, had a big smile on his face for everyone, knew all of his customers and their children by name and their family history for several generations.

"The store was a long, unpainted wooden building with shelves on each wall and a counter down each side of the room. A potbelly stove stood in a sandbox in the middle of the floor with chairs and spittoons circled around the stove. The chairs seemed always to be filled with old men, chewing tobacco, spitting, and talking about how good the old days had been. Out in front of the store was a hand-operated gasoline pump for the few automobiles that came by; out back was an ice house filled with ice that had been cut from a pond in the winter and packed in sawdust to last through the summer. On the front porch there were benches for more old men and a cooler to keep soft drinks cool. Rails were placed on each side of the porch to tie up the horses while the family came in to do their shopping.

"As you walked through the front door of the store into a cool darkened interior, a medley of aromas heightened your awareness of the many wonderful things

Figure 1.1 Courtesy Conna Corp.

that were waiting for selection. Leather brogans and harnesses were the predominant odor, followed by the salted herring, the cotton used to make bib overalls and the bolts of cloth which the ladies bought to make dresses, aprons and bonnets. Sights also stimulated the senses. Rows of colorful boxes and cans neatly arranged on the shelves, hundred pound sacks of flour with print covers, huge canisters of cookies (and every kid knew that dad would offer one before the trip to the store was complete), and the bright orange hogsheads of cheese sitting on the counter waiting to be cut into nickel hunks.

"Next to church on Sunday, a trip to this place of plenty was the most important event in the lives of the people for miles around.

"Mom kept the accounts and the books. Not quite the extrovert that Dad was; she was very serious about the money. Since farmers received money only when their crops were sold, the store in turn, received most of its income in the fall from the sales of merchandise. Keeping a current record of the charges was quite a big job. No signatures were needed, no receipts given, and no statements were ever mailed—just a notation in a ledger book. The books were single entry, home-grown style, but the bank never questioned the figures.

"Dad's younger brothers often helped out in the store. Their pay came straight from Mom's cash box and there were no taxes to be deducted or reported.

"Drummers from as far away as Raleigh came through periodically to take orders for merchandise and occasionally to show off a new product. The drummers were flashy dressers and always had terrible stories to tell Dad and the old men.

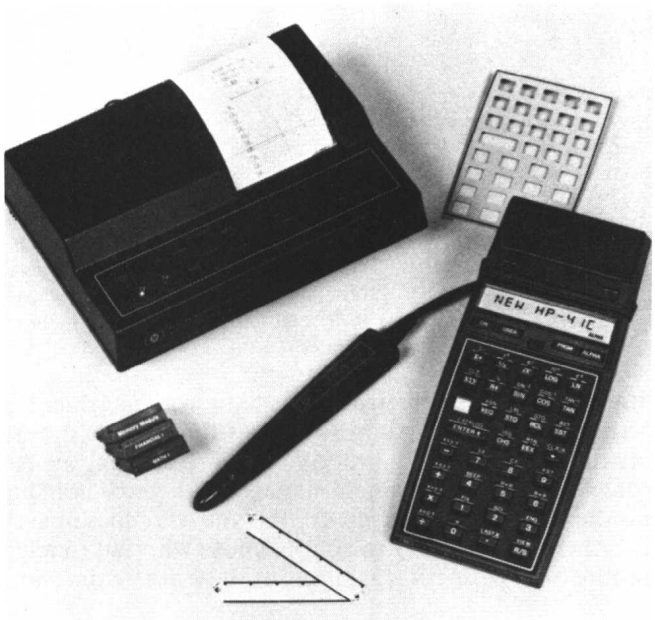

Figure 1.2 A state of the art calculator. This unit features memory modules, a remote printer, and a wand capable of reading bar codes. (Courtesy Hewlett Packard Company)

"The walk, look, and guess method was used to determine what items should be ordered. Gut feel substituted for item level sales and demand history and the old men were the review board for new product selection. Accounts payable was made from Mom's cash box for small orders and by a bank draft on larger orders.

"After the farmers sold their crops in the fall, they would settle up with Miss Lizzy, as Mom was called, and Mom would settle up with the bank. If there was money left over, the store had made a profit; if there was no money left over, next year would be better."

This romantic vignette from the boyhood of author Camp describes a past era—an era that has given way to a new dimension of time and space that is radically different from that bygone period. Comparison between then and now is difficult. The magnitude of the change and velocity of the change suggest that factors other than evolution are driving the process. It is not by accident that some characteristics of this new era have been dubbed "the electronic explosion," the "technology boom," and "the information explosion." The analogy of an explosion, the nearly instant release of great quantities of energy, is proper for this age. The results leave us with mixed emotions: we are in awe of digital microwave ovens, talking and spelling toys, calculators the size of a credit card or included with a clock on a wristwatch. And we stand at the brink of more radical breakthroughs that promise significant changes in our lifetime—television as a multipurpose information terminal (QUBE cable in Columbus already offers the opportunity to talk back and has introduced bill paying by television), "live catalogs" on video disk, and electronic and instant mail. Books such as Adam Osborne's *Running Wild* and Alvin Toffler's *The Third Wave* whet our imagination for the marvels we will experience tomorrow.

We must not mourn for the simplicities of yesterday—we cannot return; we must face and deal with the present and prepare for the future. This book is a sampling of the opportunities that lie in one small segment of the present and merely alludes to the wonders of tomorrow.