
currency forum

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David brings to *Interface* a rich and varied background in both academia and industry. After receiving a BS in Economics from the Air Force Academy, he received a MS in Quantitative Analysis from the University of Southern California and a PhD in Industrial Engineering from Colorado State. David has taught in the School of Business at Colorado State University and Seattle University. Until last year, he was Vice President of Marketing and Development at Microrim, and played a major role in the development of Rbase 5000. After authoring two successful books, *Business Computer Systems: An Introduction*, Third Edition (Mitchell Publishing, 1987) and *Database Processing*, Fourth Edition (SRA, 1988), David currently is working as an independent consultant to industry, and authoring *Management Information Systems* (Mitchell Publishing, 1989).

I like to write my lectures early in the morning. It's quiet then and sometimes I imagine, as I write, the expressions on the faces of the students. I think about the presentation and sometimes I get excited about the coming class period. "They're really going to like this one," I think. Or, "Finally, I'll be able to show how all of THIS relates to all of THAT." Sometimes I see the eager faces in my mind's eye, hear the students' questions, and imagine the laughter at one of my favorite stories. Not that it always turns out that way. Sometimes it does, but not always by a long shot. I probably bat about .250, but, by the time I leave my office, I usually expect to have a hit or two.

Then, there's that anxious moment as I walk in to the classroom. The silence gradually comes over the room. I feel a little nervous, even after all of these years, as I close the door. The crack of the door stop as it comes unstuck, the swoosh of the pneumatic door hinge, the silence in the room as we all look at each other—all of these announce the start of another 50-minute period to be spent, I hope, in the pursuit of knowledge.

The MIS Course: Remaking the Widow Maker

How long does it take to know how it's going? Five minutes? Three? Ten? Who knows, but sometime in that range it becomes clear: "They're with me. Ah, whew." Or, "What's going on? They look confused. No, God forbid, they look bored. Bored? Bored?? In my class?? Oh, no. Now, what? Maybe an overhead? Hmmm. This stuff is interesting, how could they be bored? Good heavens—how does that young lady yawn and blow bubbles at the same time? This just isn't working. Shall I stop?? Tough it out? Jam it down their throats? Threaten with the exam?? Ugh."

When I first taught the MIS course, I had more of those anxious moments than I can remember in any period since the first quarter I taught. Time and time again I entered the classroom, full of hope and enthusiasm, only to drag myself through the door at the end of the hour, defeated. Finally, in desperation, I started calling seasoned MIS teachers around the nation. I was astounded. Nobody, but nobody, was claiming reliable success in this course.

People decisions may also fail because a job has become what New England ship captains 150 years ago called a "widow maker."... Whenever a job defeats two people in a row, who in their earlier assignments had performed well, a company has a widow maker on its hands. When this happens, a responsible executive should not ask the headhunter for a universal genius. Instead abolish the job [1].

I began to think that the MIS course, at least as I envisioned it at the time, is a widow maker.

I do not think the course has to be a widow maker. But I think we need to define, limit, change, and shape it before anyone other than Drucker's universal genius can teach it successfully.

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WHY NOT JUST GIVE UP?

I asked myself this question many times when I first taught this course. Surely somebody else can teach it. I came to dread it. I'd wake up and think, "Oh, no, it's Tuesday, I've got to teach the MIS course today." And then, later, "Thank goodness, only three more weeks to go," etc.

Indeed, why not just give up? As I talked with professors around the country, the answer was clear: BECAUSE IT'S SO IMPORTANT. (That, coupled with the undying optimism of good teachers everywhere. "Well, I didn't get it completely last semester, but it was better. I'm thinking if I move the management unit up, add more class exercises, try another guest speaker, then... But thank goodness I only teach it once a year.")

It is a critically important course. For many business students, this course offers the only chance they will have to learn how to use information systems to improve their professional productivity. It's our only chance to teach them, what systems can do, what problems can be solved, what systems are made of, what roles users have in bringing systems into existence, and how systems impact organizations and vice versa. It's also our only chance to teach them that a personal computer is NOT an information system.

"The MIS course holds out the opportunity of teaching important fundamentals such as critical thinking, conceptual modeling, problem analysis, business decision making, and so forth."

Furthermore, and this is the clincher for many with whom I spoke, the MIS course holds out the opportunity of teaching important fundamentals such as critical thinking, conceptual modeling, problem analysis, business decision making, and so forth. It offers a chance of engaging the students' minds around realistic and difficult business problems instead of focusing on the syntax of this language or the keystrokes of that product. In short, it offers a chance to educate minds and not just teach skills.

THE NEED FOR THE MIS COURSE

While teaching the course I often ask myself, "What is it that I want the students to take away from the class? What kind of learning do I hope for?" As I was pondering these questions one day, I recalled a consulting job I had had a number of years ago.

This particular client was an appliance retailer; the company had a centralized warehouse with about ten or twelve retail stores. They had a number of severe problems, one of which was that they seldom knew, for certain, which items were available in the warehouse. Often, salespeople would promise a customer "I can get it from the warehouse" only to find out a day or two later that the warehouse was out of stock.

To solve this (and other problems), the company had been sold on the necessity of purchasing a minicomputer with an online order entry system, but senior management wanted an outside opinion before going ahead with the purchase. To make a long story short, a new computer was about the last thing this company needed. The information flows in this company were a contorted mess! Eventually, they developed a dataflow diagram which revealed that their Customer Order Form was processed in 21 different stations (bubbles)! Their office procedures, which had been allowed to evolve in a very permissive, committee-driven process, were a shambles.

I do not think that the MIS class should teach someone how to fix this situation, but I sincerely hope that a graduate of my class would at least think about information and information flows *before* thinking about a computer. I would hope that he or she would be able to identify some of the real sources of the problem, and know that a computer would simply amplify this mess.

Or, consider a more positive example. I once managed a product marketing group for a microcomputer software publisher. At that time, we sold tutorial versions of the product, which we hoped would generate sales for the actual product. During one budget review period, a senior manager challenged the effectiveness of this program.

Without any request or advice from anyone, one of the senior product managers developed a proposal for a MIS application that would compare data from tutorial sales against product registration data and compute the number of converted sales. This product manager was not a technical person, but she understood how to develop information from data and effectively challenge the senior manager's skepticism. (Her process, by the way, closely followed the Information Theory Flow Analysis discussed in the Manning article in the last issue of *Interface*[2].)

Her proposal was approved and she was able to combine data from several different sources and develop a number of reports that demonstrated the overwhelming effectiveness of the tutorial program. She, by the way, begged and borrowed expertise from a number of technically-oriented people to cause her system to be developed.

This is the sort of confident, proactive information-generating behavior that I very much hope the graduates of my class would learn.

WHAT STUDENTS EXPECT VS WHAT I EXPECT

Yes, the MIS course is very important, and there are tremendous opportunities to educate students in important matters for their careers. So, what happens? What is it about this course that causes it to act like a widow maker? What characteristics of this course lead to foundering?

One of the difficulties is that there is a wide gulf between the expectations of the students and the expectations of the faculty. First, many of the students *think* they know more than they do. Some have taken BASIC programming, and some can successfully operate word

processing and spreadsheet applications. Many think they need no more knowledge, while others of this group want exposure to more advanced applications software.

In addition to these students, there is another group who enter this class with the belief that the terms "personal computing" and "business computer systems" are synonyms. Few understand the need for attention to system components other than hardware and programs. Most of these students want to learn how to run word processing, spreadsheet, and any other applications that are not too difficult. Furthermore, almost none of these students understand the relevance of studying the relationship of information systems and organizations.

Rounding out the class are students who are petrified of computing. They avoid this class until the last semester possible, and they approach it with the enthusiasm with which they might approach a strong case of the flu.

So, as we close that door to start our lecture, we engage a class that is a mixture of students who think they already know the material (and don't), who think they need to learn more about what they already know (and don't), who think they need to know what the first two groups already know (and don't), and who wish they didn't have to take the class at all (but do). Peppering this stew here and there are students who sincerely want to learn what information systems can do for them as future business professionals.

IT'S NOT A "MANAGEMENT INFORMATION SYSTEMS" COURSE

In fairness to the students, the water is not exactly crystal clear on our side of the lectern, either. Supposedly, we are teaching an *MIS* class, but I think we have been slow to face up to a number of problems with this statement.

First, the term MIS has been terribly confounded. What is it? sometimes we use the term to refer to any generic *computer-based information system* (the broad interpretation) and sometimes we use it to mean a particular type of information system useful for regular and recurring reporting in corporate management control applications (the narrow interpretation).

If we take the narrow interpretation of MIS, we would not discuss transaction processing, decision support systems, office automation systems, and the like. Clearly, none of us are willing to exclude those topics from our course. This situation has led me to the following classroom dialogue:

- ME: "Well, class, that about wraps up the difference between TPS, MIS, DSS, OAS, and strategic information systems. Any questions?"
- STUDENT: "So do you mean that we don't have to worry about systems other than MIS?"
- ME: "Oh, no, those other systems are very important. We'll talk about them quite a bit."

STUDENT: "Oh. Then why do they call this an MIS course?"

ME: "Ahem...well,... two meanings... evolving nature of terms, industry,... typical of real world... just need to get used to it.... Surely your other courses have confusing terminology."

STUDENT: "Yeah, they do. But not in the COURSE TITLE!"

An additional problem with the title "MIS" is that few of the students in the course will be managers, at least not in the early stages of their careers. Many will be accountants, salespeople, product managers, staff analysts, and so forth. In fairness, some will take entry level management positions, but not many. Consequently, few of us want or feel it is appropriate to devote the entire class to pure *management* applications of even the broad interpretation of MIS.

"An additional problem with the title "MIS" is that few of the students in the course will be managers, at least not in the early stages of their careers."

Further, I think we have been slow to recognize the impact of the microcomputer on this course. As I will argue later, I believe the microcomputer has caused the evolution of three categories of MIS (the broad interpretation): personal information systems, workgroup information systems, and corporate information systems. I believe that business professionals need to know how to utilize all three types of information systems, and not just corporate MIS (broad or narrow interpretation) applications, to facilitate their professional productivity.

Actually, there are now, and have been for some time, definitions of MIS that allow for consideration of nonmanagerial, non-narrow-MIS information systems. In 1980, Peter Keen defined MIS as "the effective design, delivery and use of information systems in organizations [3]." Observe there is nothing in this definition about managers, nor is there any restriction to the narrow interpretation of MIS, nor any reason to suppose that this definition excludes personal, workgroup, and corporate systems. Apparently, MIS has been separated from pure management for a long time.

(As an aside, I do not think we should try to change the name of the course. We have, I think, bigger fish to fry. I've learned, however, not to restrict myself to pure managerial applications, and also to make the problems inherent in the term "MIS" clear to my students on the first day of the class.)

THE STUDENTS HAVE NO REAL-WORLD BUSINESS EXPERIENCE

The first time I taught this course, I armed myself with the latest thinking I could find on the theory of information, the role of information in human communication, the impact of information systems on business organizations, and so forth. I found the information fascinating, and I thought the students would find it that way too. I planned to teach the course using the Socratic method, drawing upon the thoughts and opinions of the students in dialogue.

I was a lamb heading for slaughter.

The problem, as Mary Culnan at Georgetown University would later explain to me, was "most undergraduates have no business experience to draw on. They've been lifeguards, that's all."

Thus, I cannot depend on business experience to shape any classroom discussion. It just will not happen. I can cajole, threaten, scream, run in circles, throw chalk, placate, or patronize (all of which I've tried), but there is simply no experience there to draw from.

"I planned to teach the course using the Socratic method, drawing upon the thoughts and opinions of the students in dialogue. I was a lamb heading for slaughter."

I have since learned that whenever I want the students to apply business experience, I must do one of two things. I can either teach them the experience I want them to have and then turn to the discussion, or I can send them out to discuss the assignment with a business person who does have business experience. Since the former tack becomes a sort of Socratic solitaire, I prefer the latter.

I find the best approach, by the way, is to structure the experience as an interview. I try to write the interview questions so that the student is actually studying assigned material in the context of the interviewee's experience. Once the students have done that, they are then able to respond in dialogue fashion. They can then discuss the lesson concepts by imagining how the business person would respond.

"I THOUGHT THIS WAS A COMPUTER CLASS"

At a recent ISECON meeting I was privileged to hear Professor Gary Dickson's keynote speech [4]. I listened attentively and I think I heard him say that there should be no software literacy in the MIS course, period. I applauded that idea with enthusiasm and went home saying to myself, "OK, no more computers in the MIS class. I'm going to teach a real information systems class." In fairness to Professor Dickson, I think I took his words too much to heart. Anyway, in my next MIS class, I planned no computer projects at all.

So, on the first day of class, I told the students, "No computer projects." The result was pandemonium. The students *expected* it to be a computer class.

At first I did all I could to explain that what I was teaching was far more important than any set of keystrokes they could imagine. My explanations fell of deaf ears. Simply stated, they wanted a computer class, and I wasn't going to get their attention until they had one.

When I did not demonstrate my competency with personal computers, my credibility with the students suffered. They began to wonder "Does this guy know anything about his subject or not?" The students expected a computer course and they needed me to show them my expertise before they could have confidence in me. They wondered if my statement that "teaching you software products is a waste of our time and your money" was an excuse to cover my ignorance.

Peter Keen, in the paper referenced above [3, p. 14], underlined this point when he wrote, "No one should be involved in MIS research who is not a craftsman in some aspect of computer technology and techniques." The students needed me to demonstrate my craft skills before they could believe me when I discussed with them the next point in Professor Keen's paper: "The *mainstream* of MIS seems no longer technical but organizational, managerial, and behavioral."

So I decided to put a computer project in the course. I did it, however, by requiring the students to use the software (a microcomputer DBMS) to develop a report to solve a management problem. At least in this way I hoped to focus their attention on the business problem and not on the keyboard.

"On the first day of class, I told the students, 'No computer projects.' The result was pandemonium."

In the final analysis, I think there are good reasons to require computer projects in the course. Reasons beyond the placebo effect of giving them a computer project because they expect a computer project. Those reasons have to do with the next widow-making characteristic of this course.

COMPUTER LITERACY

I do not think the MIS class should be a computer literacy class. I do not think it should be a microcomputer class. I do not think it should teach the differences between MS/DOS and OS/2, or between extended and expanded memory. Supposedly, it doesn't have to be. Supposedly, the students have learned computer literacy in a prior applications class. Unfortunately, not everyone took the same

class—some learned BASIC, some learned word processing and spreadsheets, some learned something else.

In truth, on entering the classroom the students were, at best, moderately computer literate. And, as I taught my class on corporate information systems, I observed the students were not becoming any more computer literate.

An incident encapsulates the point: After class, one of my students asked what a local area network is. After I had explained it to him, he asked me why we didn't discuss such terms in class. I explained that I was teaching the fundamental concepts of information systems, etc. His response was that his boss was paying for this class, the restaurant where he worked was installing a LAN, and he wanted to know why I didn't know what it was.

While this incident by itself is no reason to alter the fundamental structure of the class, it brought to surface a nagging personal misgiving: Am I serving my students well if they have the broad strategic concepts, but cannot interpret a computer catalog? On balance, I think not.

**"The issue is not computer literacy.
The issue is focus."**

As I reflected on this issue, I decided my perspective was wrong. The issue is not computer literacy. The issue is focus. A course solely devoted to corporate information systems is too narrowly focused. I need to bring in concepts of microcomputers, but in the context of microcomputer-based information systems. If I do this, I will fill some of the literacy holes, but from an information systems perspective. Specific ideas for this are set out below, in the section on Framework.

MODIFYING THE WIDOW MAKER

These, then, are some of the characteristics of the MIS course that make it a widow maker. The question now is, "What should we do about it?" Drucker says abolish the job. While we can abolish the job as we know it, I think the course itself is far too important and has far too much promise to be abolished. I do think I need to change the way I go about it. Here are three conclusions that I've reached:

Conclusion #1: Teach MIS-1

Recently I was helping my son plan his program for college next year. I noticed something liberating in the math department's course offerings: They had courses called Calculus I, Calculus II, and Calculus III. Furthermore, they were very explicit about the content of each.

It seems to me that if I'm teaching the *first* MIS course, then I have every right and, in fact, a professional responsibility to teach a *limited* number of important concepts. It is simply unrealistic for me to cover a 750-page text in a

course that contains a number of class projects and exercises. Neither I nor the students can do it, and I set all of us up for failure by trying to do so.

One way I can reduce the size of this course is to connect to and rely on other courses in the business curricula. For example, I can connect to the management course, the organizational behavior course, and the business communications course. To save time for teaching MIS concepts, I cannot attempt to survey theories of management, or organization, or communications. I have time to connect to one or two theories in each. Where appropriate I can say "There are a number of other ways of viewing this subject. They, however, are beyond the scope of this course." Professors say that in the math department, and frequently.

Similarly, even considering concepts within the boundary of information systems there is not time, nor is there need, to cover many views of the same thing. Consider the user's role in systems development. I believe it is responsible of me to teach one process, with a discussion of excursions from the process (prototyping, for example). There are dozens, even hundreds of different systems development processes, but a survey of them is inappropriate for MIS-1 [5].

So I have concluded that I will attempt to teach a *few* things *well*. I do not have time to teach surveys. I'm going to pick the best I can find about topic X, and teach that. Other views of topic X are beyond the scope of MIS-1.

Conclusion #2: Use a Consistent Framework

"The trouble with this course," according to one student, "is that it's all data and no information. You've given me a thousand concepts, but no way to bring all of them together."

"Where appropriate I can say 'There are a number of other ways of viewing this subject. They, however, are beyond the scope of this course.' Professors say that in the math department, and frequently."

Over the last two years I have developed a framework for teaching the MIS course. It seems to work for the bulk of the material, although sometimes it feels a bit contrived. It does provide a bucket. To present this framework, first consider different types of information systems.

Three Fundamental Types of Information System

Consider Figure I, which is a portion of the organization of a company that fills orders—say, L.L. Bean, or some similar company. Now, horizontally the figure shows a system to support the company's revenue generation function. This corporate information system integrates the activities of the various departments to generate revenue. It enables the

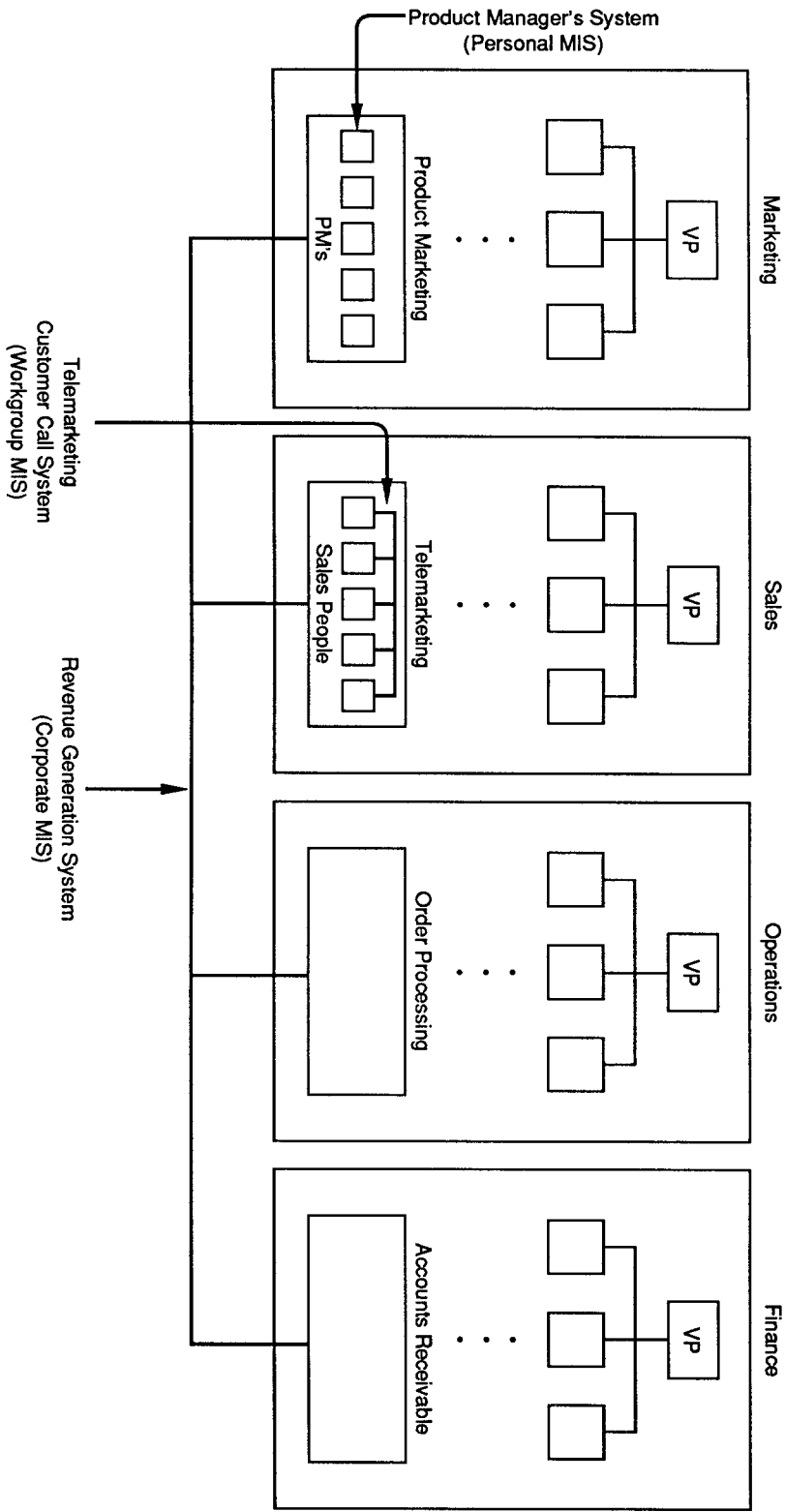


FIGURE 1
Organizational Diagram of a Portion of a Company

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departments to operate as a coordinated unit; with it the sales department does not attempt to close orders with a customer who has been labelled a deadbeat by the accounts receivable department.

This system *can* be used to teach the classical MIS concerns. It supports all three levels of processing in the Anthony framework: operational control, management control, and strategic planning [6]. I can show the students how information in this system is used to support operational decisions like, "Do we have a Gore-tex coat in that style, size and color?"; how it is used to support management-control decisions like, "How does the rate of return on our inventory investment compare to that of a year ago?"; how it is used to support strategic planning decisions like, "Should we add woodworking tools to our product portfolio?" This system can also be used to teach the differences in information needs for decisions along Simon's programmed and nonprogrammed continuum [7] and the Gorry and Scott Morton matrix that combines Anthony and Simon [8].

All of this is important, relevant, accepted in the classical MIS course tradition—and *it does not go far enough*.

Consider Figure I again. The Telemarketing Group has an information system of its own. This information system is used to keep track of customers who have been contacted, what they have been contacted about, what the result was, and to schedule customers for future contact. It is a *workgroup system*. Just as the corporate information system integrated the various departments so they can respond on a consistent basis, so, too, the workgroup system integrates the various employees of the department so that the department responds on a consistent basis.

On a third level, the product managers within the Marketing Department also use information systems to keep track of historical and projected sales, costs, and past, present, and future profit and loss statements. These are *personal information systems*. This system allows the product managers to perform their jobs with greater personal productivity.

I believe that the MIS course should teach all three of these types of system. Organizational theory, by the way, supports this division. Consider a statement from one of the leading organizational theory texts:

As social systems, organizations are composed of systems at different levels.... Organizational scientists generally think of three levels of analysis—the individual, the group or department, and the organization itself [9].

And, if I teach all three of these types of system, I will address many of the holes that may exist in my students' computer literacy backgrounds. I will do it, however, in the context of business and organizational needs, and not simply in the context of microcomputer or local area network technology.

A Framework for MIS-1 The outline I use for MIS-1 is shown in Figure II. As shown, the course is organized

around three major units: personal information systems, workgroup information systems, and corporate information systems. I consider them in that order for two reasons. First, that is the order of increasing complexity, and, second, starting with personal information systems allows me to start with microcomputer projects and exercises. In this way, the students feel like they are getting a "computer class." By the time we get to workgroup and corporate systems, we have developed enough rapport that they will at least taste the idea that business issues, noncomputer systems components, and systems development issues are possibly important. (Equally important, I'm sure, is the fact that they're sick of the computer lab by then.)

"The course is organized around three major units: personal information systems, workgroup information systems, and corporate information systems."

Observe that each of the major topics has the same three sub-topics: Survey of Goals and Business Needs, Five Components, and User's Role in Developing (the system of that type).

Survey of Goals and Business Needs The MIS literature recognizes two fundamental roles for information systems in business. Information systems facilitate the goals of an organization and allow it to gain a competitive advantage by 1) benefiting the organization directly by improving the efficiency of *internal processes* and 2) benefitting the organization's customers through improved products, delivery and support [10]. This second type of benefit is

FIGURE II
Undergraduate MIS Course Outline

Unit I:	Introduction What is MIS? Using Information as a Business Professional Information and Organization Managers and Information
Unit II:	Personal MIS Survey of Goals and Applications Five Components Personal MIS Development Personal Case Application
Unit III:	Workgroup MIS Survey of Goals and Applications Five Components Workgroup MIS Development Workgroup Case Application
Unit IV:	Corporate MIS Survey of Goals and Applications Five Components Corporate MIS Development Corporate Case Application

described, in a very interesting article by Porter and Millar [11], as adding to or improving the information content of the organization's product or services.

With regard to internal processes, the Anthony, Simon, and Gorry and Scott Morton sources referenced previously all model organizational design in a three-tiered fashion. Consider Simon:

An organization can be pictured as a three-layer cake. In the bottom layer, we have the basic work processed... In the middle layer, we have the programmed decision-making processes... In the top layer, we have the nonprogrammed decision-making processes [7, p. 40].

Typically, we teach that transaction processing supports the bottom layer, that MIS (narrow interpretation) support the middle layer, and that decision support and executive information systems support the top layer. Combining these three tiers with the use of information systems as part of the organization's product or service then leads to the framework shown in Figure III.

Now, to be accurate, the references cited here refer only to the roles for corporate information systems. Thus, only the third column is supported by the research literature. However, if we widen the definition of organization to mean organizational *unit*, then what pertains for corporate information systems seems extendible to workgroup and personal information systems.

There is precedent for this. Consider Huber's statement: "For example, the effects of stress on the information processing effectiveness of an organization unit are essentially the same whether the unit is a person, an ad hoc group, or an established organization [12]." See Miller also [13].

In short, the framework in Figure III indicates that organizations, workgroups, and individuals all gain the same types of benefit from an information system. They gain it, however, in a way appropriate to their level in the organization.

The Five Components of an Information System In addition to teaching the benefits to be gained from information systems, we also need to teach, I believe, their composition. What is the fabric of which information systems are made?

One framework [14] considers the five components shown in Figure IV. In this framework, an information system is composed of hardware, programs, data, procedures, and people. This order is used to stress the symmetry in the components: hardware and people are the active agents in the system. Programs are instructions for hardware as procedures are instructions for people. Data serves as the interface between the machine side on the left and the human side on the right.

"In this framework, an information system is composed of hardware, programs, data, procedures, and people."

This framework can be used to teach the major components of personal, workgroup, and corporate systems. Microcomputers and related software can be taught for personal systems, along with basic concepts about data and fundamental procedures. The user's role in the operation and use of such a system can also be discussed.

**FIGURE III
Uses of Information by MIS Type**

	Personal MIS	Workgroup MIS	Corporate MIS	
Strategic Planning	Should I spend more time on the XYZ product?	Is telemarketing worthwhile?	Should we sell woodworking tools?	Internal
Management Control	How many sales people attended my product demo? Results?	Do we have enough people to handle the calls?	Return on inventory investment?	
Operational Control	Can I meet with Jones at 3 on Friday?	Have we called Rex Baker lately?	Do we have a gore-tex parka?	
Service or Product	Send product to reluctant sales people	Publish telemarketing catalog	Mail memo to XYZ purchasers in care of XYZ	External

For workgroup systems, LANs and minicomputers with related software can be discussed along with the nature of multi-access databases. More comprehensive procedures are described, along with the introduction of professional operators. Finally, mainframes, their software, corporate databases, data administration, and the full gamut of computer personnel can be covered in the discussion of the components of a corporate information system.

Developing Information Systems Considering the development of MIS, my goal is to teach students how to instigate appropriate information systems as business professionals. The keyword here is *instigate*. In some cases,

this means that the future professional will develop the system him- or herself. In other cases, it means that the professional will contract with an outside vendor. In still other cases it means the professional will take the traditional, more passive role of consumer of the MIS department's services.

In general, I would hope that the graduates of my class would know how to develop many types of personal information system themselves. I would hope they would be able to analyze their need for a spreadsheet system, for example, and procure the needed hardware and programs. I would hope they would know how to establish appropriate procedures for their use of this system. To that

FIGURE IV
Components of Information Systems

	Hardware	Programs	Data	Procedures	People
Personal MIS					
Workgroup MIS					
Corporate MIS					

FIGURE V
Systems Development and MIS Type

	Personal MIS	Workgroup MIS	Corporate MIS
Define	↑	↑	↑
Requirements	Primarily User	Primarily User	Primarily Professional
Evaluation	↓	↑ ↓	↓
Design		Primarily Professional	
Implementation	↓	↓	↓

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objective, I introduce a five-stage development process shown in Figure V as part of the personal information systems unit.

Considering workgroup information systems, I do not expect my students to learn how to develop such systems on their own. I do think it is important, however, for them to learn how to analyze their needs and to develop a statement of requirements. From there, I want them to know how to work with a VAR or other vendor to cause the system to be finished.

In this unit, I teach the rudiments of dataflow modeling. I do this because I think this is an important skill for any business person to have—quite apart from the need to develop information systems. Recent industry experience also indicates that some end users can facilitate the development process by doing their own dataflow modeling using CASE tools [15]. I do not go that far in this course, however.

Finally, in the corporate information systems unit, I discuss the user's role in cooperating with the MIS department in the development of systems. Here, I teach the roles and responsibilities of users. I teach means of expressing requirements, what kinds of behavior to expect from the MIS professionals, and the user's role in preparing for systems implementation. I also introduce the idea of prototyping and when to use it, and expose the students to some CASE methodology.

The Four Dimensions of the MIS Framework To summarize this framework, I attempt to organize the concepts of this course into four dimensions:

1. Type (personal, workgroup, corporate)
2. Benefit (operational, management, strategic, product)
3. Component (hardware, programs, data, procedures, people)
4. Development (development processes, prototyping, CASE)

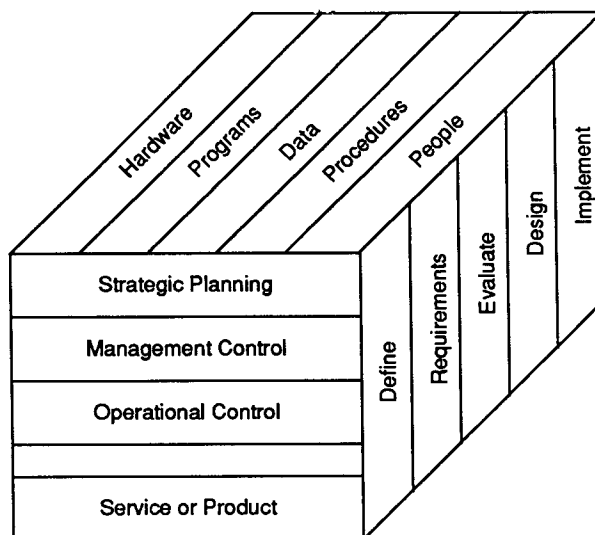
As stated, I break the course into three major units according to type of MIS, and then teach each of the remaining dimensions for each one of those types.

Figure VI shows a cube that I use as a framework with the students. I suggest that they may want to organize their learning along these dimensions. I expect them to know something about each of the labelled faces on this cube.

Conclusion #3: The Need for Projects

In my opinion, the graduate of an MIS course should be able to know *when* to instigate the development of an information system, should know *how* to proceed, and should have the confidence *to* proceed. The when and how of this objective can be accomplished via lectures. It may not be the best approach, but it is feasible. The confidence objective, however, cannot be so obtained. I believe the only means of creating confidence is through cases, labs,

FIGURE VI
Three Dimensions of Personal, Workgroup,
and Corporate MIS



and hands-on assignments. The students need to do it now to believe they can do it later.

An example may clarify this point. I had one of my classes interview me, in class, in the role of Manager of Customer Support at a software publisher. I had had incredible turnover in my department, everyone was working very long hours, and I had asked my boss to double the size of my staff. His response was, "Prove it to me."

The customer support department had considerable data available from the telephone system and from customer call reports to substantiate this claim. The students were required to ferret these facts out, to develop a database to keep the data, and to construct reports that would enable the manager to argue successfully for more people. They then needed to use these reports to write a memo in support of this argument. In this process, the manager was to look for better ways to use the people that he did have.

"Many of the students complained that I hadn't shown them how to use the software. I agreed that I hadn't, and sent them off to the lab, anyway."

While this project had a number of problems, I think it was more successful in accomplishing the when/how/to objectives than anything else. At least I felt like I was on the right track.

Most of the problems I encountered in this project were problems that, by and large, I want to encounter. Many of the students complained that I hadn't shown

them how to use the software. I agreed that I hadn't, and sent them off to the lab, anyway. While the lab personnel were not particularly enamored with me, I do believe that the frustrations the students encountered were appropriate ones.

Many of the students were frustrated about the goals of the assignment. "It's too vague." "I don't know what to do." "What do you want me to show?" "What information am I supposed to have?" These, it seems to me, are real and important questions. When I encounter these questions, I feel I have become an educator of future business professionals, instead of a trainer of microcomputer users.

As much as possible, I attempted to reflect the questions back to the students. I hoped to help the students to answer their own questions. Along this line, I have found William Perry's article, "Cognitive and Ethical Growth," to be both inspiring and informative [16].

I conclude from these experiences that I want to teach a project-oriented course. In general, I would like to have a lecture/exercise/recap format. First, I present material about some aspect of information technologies and their role in business. Then I give the students a project to apply those concepts. Finally, we recap: How did the concepts apply, how did they not apply, what worked, what didn't, how would you do it differently, and so forth.

THE NEXT STEP

Frankly, I am not completely satisfied with the course as I have described it here. For one, I'm hampered by my background (systems and database). I probably need to spend more time on organizations than I do. Further, the framework in Figure II does not explicitly call out the communications role of information systems, and it probably should. See Culnan and Markus for an interesting survey of features of electronic media and their role in organizations [17].

"Finally, we recap: How did the concepts apply, how did they not apply, what worked, what didn't, how would you do it differently, and so forth."

Also, I've thought about splitting the corporate information systems unit into two sub-units—one for structured (Simon's programmed) systems and one for unstructured (nonprogrammed) systems. The unstructured unit would then have more material on decision support and expert systems. All of this is again adding more and more, however; and is it appropriate for MIS-1?

SUMMARY

The MIS course as I have known it is a widow maker. The course does not handle well when it is overloaded; I believe

I have to be careful to place only as much content in MIS-1 as it can comfortably bear. Further, packaging is critical. I believe I must present a sturdy framework for the students to manage all of the content I do teach. Finally, the course must include projects and class exercises. In the final analysis, I want the students to be able to sail by themselves. That objective is not to be gained solely by lecture. Projects are essential for the development of the students' interest, motivation, and confidence.

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