Can MS/OR Evolve Fast Enough?

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As President of TIMS, it was my privilege to present the opening plenary address at the EURO V — TIMS XXV International Meeting in Lausanne, Switzerland on July 12, 1982. This article is an expanded version of that address.

There have been many discussions in recent years on the proper conduct of MS/OR and how it can best achieve its full potential in the years ahead (for example, Ackoff [1979a, 1979b]; Axelrod [1978]; Bonder [1979]; Dando and Bennett [1981]; Edelman [1977]; Eilon [1980]; Grayson [1973]; Hall and Hess [1978]; Little [1970]). Some think that the present state of affairs is satisfactory. Others feel that, unless there is a major reorientation, our field has had its day, and that the future belongs to other more recently developed approaches to the problems of management. My view is that the destiny of our field depends on the rate at which it evolves within its competitive and rapidly changing environment. If the pace of evolution is fast enough, then — but only then — am I confident that MS/OR will flourish and reach its full potential. Accelerating the rate of evolution therefore is a task of vital importance. This is the main topic that I have chosen to address on this occasion.

My remarks are divided into four parts. I begin with a personal view of our field and its need for evolutionary vigor. Second, I discuss one of the important evolutionary opportunities presented by the ongoing revolution in microelectronics, namely personal computing. Third, attention is turned to some of the viable and, in fact, thriving alternatives to the traditional MS/OR approach which have emerged in recent years. Among these I single out the Decision Support Systems (DSS) movement for special attention. Finally, and perhaps most important over the long term, I make the case for profes-

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sional societies as a means of strengthening the operation of essential evolutionary processes. Particular attention is given to some of the steps TIMS is taking.

A View of MS/OR

MS/OR consists of two opposite domains: the world of action and affairs and the world of ideas and study (Figure 1). Line managers epitomize one domain and academics the other. Of course, a single individual (such as an MS/OR practitioner) can move back and forth and can be a mixture of these polar extremes.

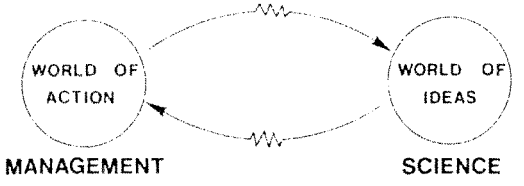

Figure 1. The world of action and affairs and the world of ideas and study, two opposite domains, provide assistance to each other. The greater the mutual assistance the greater the vitality of management science. Resistance to this flow of assistance is represented by the "sawteeth" on the arrows.

Each domain provides assistance to the other. The world of management practice provides

- raw phenomena and problems for study;
- practical insights and viewpoints;
- informed direction as to the truly important issues and questions;
- sponsorship, encouragement, and other resources.

In return, the world of management practice receives

- application-specific findings, conclusions, and insights;
- a broadened perspective with respect to managerial alternatives and the likely consequences of particular decisions;
- improved management tools;
- an accumulating store of MS/OR knowledge that makes it an ever more powerful service to management.

The greater the exchange, the greater the true "vitality" of management science.

There is a natural resistance to flow in either direction because of such factors as

- physical separation of the parties;
- "cultural" differences in cognitive style, values, etc. (for example, Hammond [1974]; McKenney and Keen [1974]);
- communication difficulties arising from the complexity of business institutions and from the complexity of the computational and mathematical apparatus of MS/OR;
- organizational incentive structures which often fail to reward intercourse between the two worlds.

Learning to cope with this resistance is one of the great challenges of our profession.

The "circuit" character of Figure 1 bears emphasis. Assistance must flow in BOTH directions in order for there to be a flow in EITHER direction. Diminishing the flow in one direction diminishes it in the other.

All of this takes place in a highly dynamic environment. Three particularly influential components are: the business climate, technological change, and the community of competing approaches to the problems of management. Let's look briefly at each of these.

The turbulence of our economic environment is chronicled on every newsstand — rollercoaster inflation, international battles for market dominance, crises of debt and liquidity, regulatory vicissitudes, and so on. In such a climate existing ways of doing things must be reevaluated constantly and management priorities require continual adjustment. Thus were born such contemporary concerns in the United States as

- productivity improvement;
- proper evaluation procedures for investments and strategic alternatives;
- managing in an era of capital scarcity.

Management science has a lot to say about issues like these. *The more difficult economic conditions become, the greater the potential demand for MS/OR.*

Technological change is epitomized by the well-publicized advances in microelectronics. The cost of computation continues to drop by more than an order of magnitude each decade [Branscomb 1982]. Communications technology and computing technology are coalescing, and networks are proliferating and decreasing in cost; communication satellite channel costs, for example, are decreasing about 40% per year [Branscomb 1982]. The markets for Computer-Aided Design (CAD), Computer-Aided Manufacturing (CAM), and robotics are growing at a compound annual rate of about 35% [*Automotive Industries* 1982; Myers 1982]. Computer graphics, office automation, and industrial process control are also growing rapidly. *These developments provide two kinds of major opportunities for MS/OR: sources of improved tools and fertile new domains for application.*

The third environmental component I want to mention is the highly competitive arena in which MS/OR operates. From the manager's viewpoint, there are many sources of assistance other than MS/OR, and new options are emerging all the time. Among the more popular recent approaches are

- MRP (Material Requirements Planning);
- Social Systems Analysis and Policy Science;
- End-User Computing;
- DSS (Decision Support Systems).

Such approaches are a mixed blessing for MS/OR. They are beneficial to the extent that they form cooperative mutual assistance circuits with MS/OR, but threatening to the extent that they develop competitive circuits with management.

. . . many central MS/OR groups have been decentralized . . .

The impact of these approaches on the destiny of MS/OR is already substantial.

The inescapable implication of the foregoing observations concerning our rapidly changing environment is that MS/OR needs to evolve as vigorously as possible. We would need to do this anyway to achieve our full potential even if the environment were static and noncompetitive. If we don't, we may face stagnation and decline.

Stagnation? Decline? Is that possible for the self-confident growth field of but a few decades ago? Perhaps so. Consider:

(1) In industry many central MS/OR groups have been decentralized into a variety of functional areas, traded in for more fashionable types of staff groups, or they are being disbanded entirely [Daniel 1982; Smith 1982].

(2) Many critical introspective articles have appeared in MS/OR publications over the last decade (for example, Ackoff [1979a, 1979b]; Axelrod [1978]; Bonder [1979]; Dando and Bennett [1981]; Edelman [1977]; Eilon [1980]; Hall and Hess [1978]; Little [1970]); the professional self-doubts expressed are in striking contrast to the unbridled optimism that prevailed during the 1950s and most of the 1960s.

(3) Apparently some of the major MS/OR societies have stopped growing. TIMS membership peaked in 1970 and has stayed at about the same level since (Figure 2), and the graph looks much the same for ORSA. What fragmentary statistics I have for other MS/OR societies around the world suggest that this pattern and stagnating growth over the last five years or so are the most common ones.

Each of these observations can be interpreted as evidence of success or maturity rather than decline. For example, it is often suggested that the dispersion of MS/OR into the functional areas of management reflects a widespread acceptance of our field. On balance, however, I do not find such interpretations comforting.

What I do find comforting, and what compels me to remain optimistic about the future of our field, is a conviction that model-based analysis and synthesis constitutes one of the most powerful weapons in civilization's assault on the problems of managing complex organizations. I also derive a measure of optimism from certain long-term trends that can only increase the need for MS/OR and that present us with splendid opportunities to improve our craft; for example, the turbulent economic scene and the progess in microelectronics. In addition, I find comfort in my own experience, and that of colleagues, that opportunities for well-conceived MS/OR applications have never been greater.

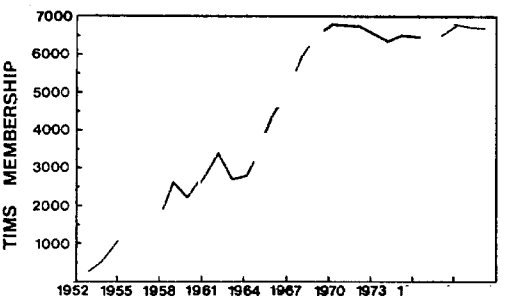

Figure 2. TIMS membership growth. TIMS membership levelled off between 6500 and 7000 in 1970. Few management science societies world-wide have experienced much growth in recent years.

Nevertheless, the worldly fortunes of MS/OR are fragile. A bright future depends on our doing a lot of things right. We will have to pay closer attention to the practical needs of managers in order to strengthen the vital circuit between the world of action and the world of ideas. We will have to make the most of technological opportunities to become more effective and achieve our full scope. We will have to assimilate what can be learned from alternative approaches to the problems of management. That is to say, our field must evolve vigorously to thrive

in this era of rapid change. The remainder of my remarks elaborate on these points.

Microelectronics-Based Opportunities: The Case of Personal Computers

Microelectronics is a rapidly changing component of the technological environment of MS/OR, and it presents important opportunities. One facet of this technology is the explosive development of personal computing. Let me begin with a few words on my own experience in this area.

After several years of observing the personal computing scene, I finally made my choice: An Apple II+ with 64 kilobytes of main memory, two disk drives, video display, and printer. I expected to have fun, but the usefulness of the system was a pleasant surprise. The UCSD Pascal language system makes it easy for me to work out numerical examples for a research monograph I am writing on model aggregation theory. APPLE-NET is a great convenience for solving network optimization problems; it includes the well-known GNET code for capacitated transshipment problems, and has extensions for elastic range constraints and gains on the arc flows [Duff 1981; Finley 1982]. In the personal finance area, I use Tax Beater and Tax Preparer for tax work; rely on home brew programs for record-keeping, expense analysis, and calculating depreciation schedules for investment properties; and I maintain various financial statements using VisiCalc. Word processing was not among my reasons for purchasing a personal computer, but it quickly became an indispensable application (I am using it to write these very words). My daughters enjoy playing games, and with a little persuasion they improve their typing skills using Typing Tutor II and prepare for the Scholastic Aptitude Test using Computer SAT. One relies on a program we developed together to keep track of her coin collection. My current project is establishing communications at 1200 baud with UCLA's mainframe (which supports an Apple interface), another remote machine, and with a very successful information service called The Source.

As time permits, a vast world of literally thousands of available software packages beckons exploration for accounting, business analysis and planning, communications, database, education, finance and investments, graphics, inventory control, mathematics and statistics, music composition and synthesis, project management, and so forth.

A rich variety of hardware extensions is available to serve my growing needs for additional processing capacity and memory. This can prolong the useful life of the venerable Apple II, especially for personal applications at home, but in a year or two I will undoubtedly require a more contemporary machine for professional applications at the office.

Two portrayals of the evolution of personal computers are provided by Figures 3 and 4. The first shows, for example, how the IBM 650 of the mid 1950s became the minicomputer of the mid 1960s, which in turn became available as a handheld programmable calculator a decade later (the TI-59 which I bought in 1977 is far superior in nearly every respect to the IBM 650 — for example, it adds 10 times

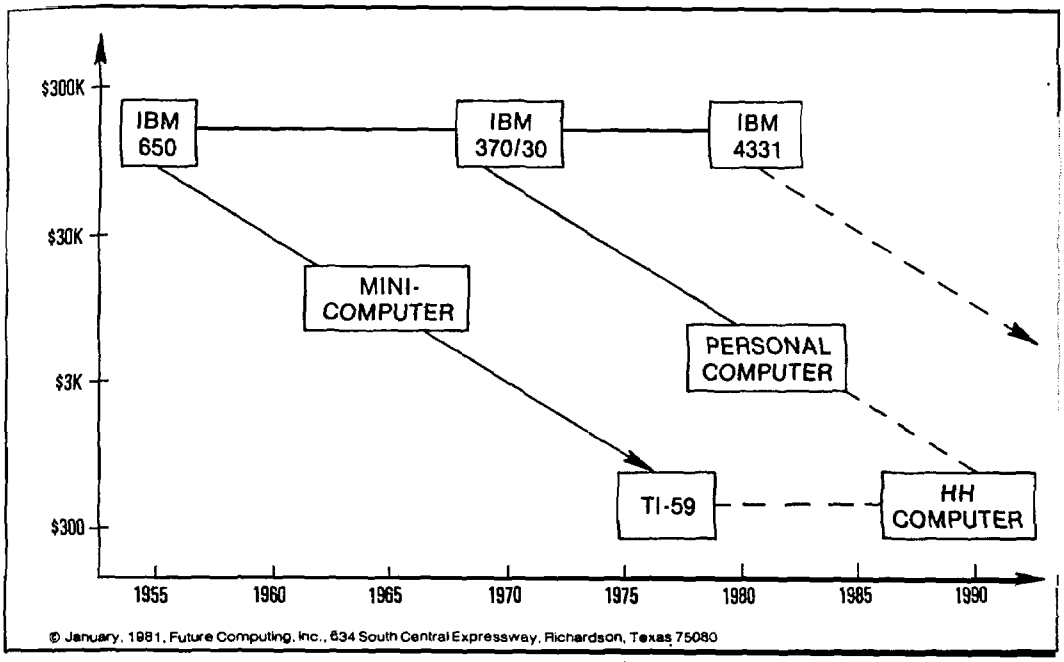

Figure 3. Evolution of computing capabilities. Selected computer products are portrayed by price and year of introduction. Those on the same diagonal have approximately the same capability. By 1990 a handheld computer should have the power of an IBM 370/30 mainframe.

as fast, has more than twice the primary memory, and consumes five orders of magnitude less electricity). Today's personal computers have roughly the power of an IBM 370/30, and by the end of the decade this same power will cost perhaps one tenth as much and fit in your pocket. Figure 4 projects the evolution of capabilities for personal computers in the $3,000 price range. In the $10,000 range today you can have 16 bits, 256 kilobytes RAM, 5 megabytes of disk storage, and a letter quality printer; by the end of the decade the projection is for 32 bits, 16 megabytes of RAM, 20 megabytes of removable disk, 100 megabytes of fixed disk, and a color graphics display.

Personal computer sales are expected to increase dramatically in the years ahead (Figure 5). For example, sales of $3,000 and $10,000 systems are projected to sustain a compound annual growth rate of 40%. Software sales are projected to grow commensurately. There are about 2,200 retail stores specializing in the personal computer market in the United States at present and the number is increasing rapidly.

In considering the implications of all this for MS/OR, at least six aspects are worthy of consideration.

First, and most obvious, MS/OR stands to benefit from the rapidly improving economics and portability of desktop machines as an alternative to batch and time-shared computing. The economics of computing used to favor large machines, but this is no longer true. (The reason is

that machine size is now negatively correlated with integrated circuit density; "As a result, one now obtains the best cost/performance from the smallest computer that can perform one's application in an acceptable time" [Agnew and Kellerman 1982].) Personal computer owners enjoy 24-hour access and negligible marginal computing costs. MS/OR projects become more cost effective with each passing year, and it becomes more feasible to do projects in small organizations and in relatively remote locations that lack convenient access to mainframe computers.

An important corollary of improving economics and portability is escape from the organizational, political, and technical constraints that so often frustrate mainframe users and those who must otherwise rely on heavily backlogged data processing departments. The resulting increase in individual autonomy could have a profound influence in the long run.

Second, personal computing can provide an improved environment to MS/OR analysts for some kinds of currently performed work, and it can render new kinds of work feasible for the first time. The advantages of the first effect are, of course, diminished by the time required to learn new computer-related skills, although the ready availability of personal tutors and good reference materials can make a big difference in this regard. In any case, it is the second effect — which took me quite by surprise — that may well prove to be of far greater significance to our profession over the long run. The wide selection of program development and application software opens up possibilities that would

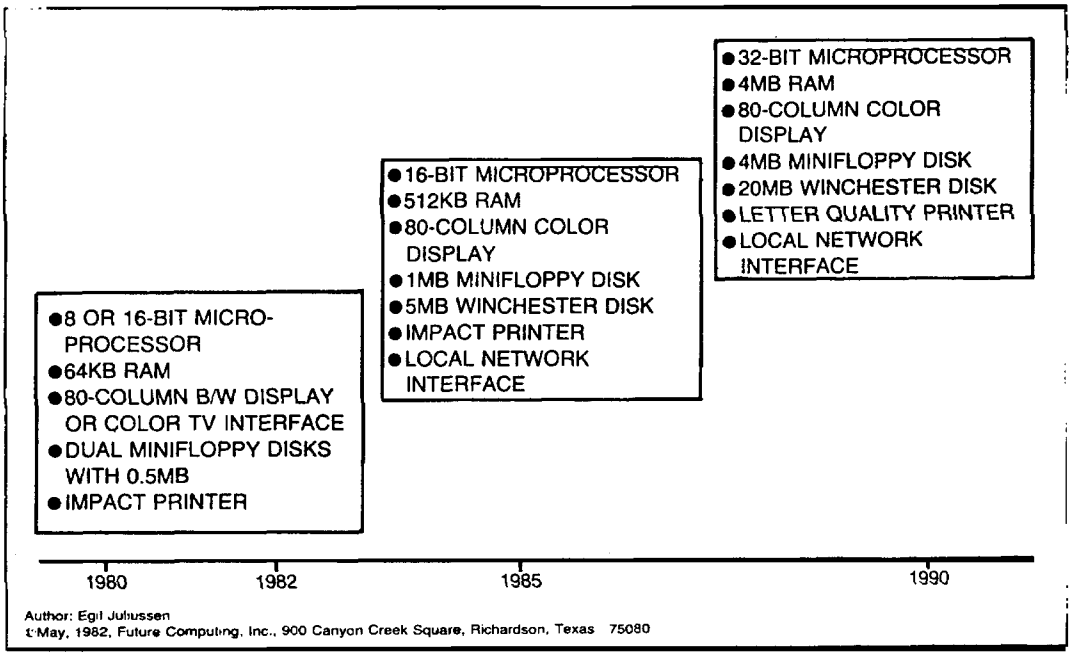

Figure 4. Professional personal computer capabilities for $3,000; what is available now and what is projected for the future.

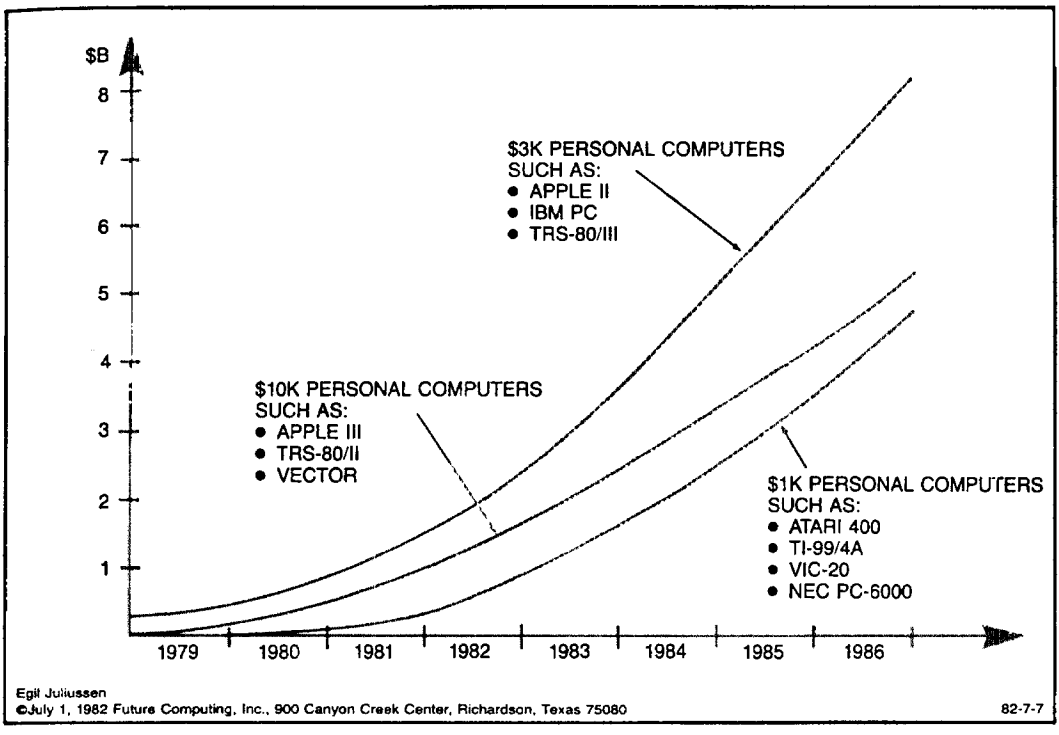

Figure 5. Worldwide personal computer market forecast; a projection of the growth in personal computer sales over the next few years. The projection for $3,000 computers translates to an annual rate of 2/3 million units in mid-1982 going to more than 2½ million units in 1986.

otherwise be impractical even, and perhaps especially, on a mainframe.

Third, the mass market in electronic spreadsheet and other "modeling" software is creating a rapidly growing pool (already in the hundreds of thousands) of potential users of MS/OR technology. Many will become sophisticated enough to want to do things that require modeling or solution capability greater than available mass-marketed software permits. This presents a potentially historic opportunity to our field.

Software vendors will, of course, strive to meet the expanding needs of their customers with new offerings that will likely incorporate some MS/OR technology. This is already happening in such areas as inventory, project management, and linear programming. To a degree this is a healthy development, but it would be tragic for our field to remain aloof from this vastly expanded market and be content merely to point with pride to the massive assimilation and propagation of our technology that will take place. Such a "victory" would be a hollow one not unlike the dispersion of core MS/OR groups during the 1970s. Leaving the initiative to others does little to nourish our vital circuit with management and carries with it all the risks usually associated with lack of quality control.

Fourth, the personal computer can pro-

vide a splendid learning environment and serve as a demonstration device. Universities are recognizing its classroom potential and are beginning to acquire them in large numbers. (For example, Carnegie-Mellon University is working toward a goal set forth by President Richard Cyert that every student should have a personal computer by mid-decade [Newell et al., 1982]). Self-instruction can take place at the student's convenience and pace, mistakes are neither embarrassing nor expensive, and the medium encourages an active rather than passive learning posture. A related use of personal computers is in demonstrating MS/OR techniques to managers. Whether or not a proposed application is slated to run on a micro, a (possibly simplified) version could be implemented for explanatory purposes. Such possibilities for more vivid communication deserve active exploration.

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My fifth point is really an extension of the last one: personal computers can serve as a new and promising kind of "delivery vehicle" for MS/OR. Instead of delivering a briefing and written report as the climax of a project, or instead of delivering a software package to be run by staff on a mainframe, we can create a problem-solving environment that can be used directly by the manager on a personal computer. It can be tailored to the manager's personal needs — even, to some extent, to his cognitive style; it can improve communication between manager and management scientist by eliminating intermediaries; and it can secure greater involvement on the part of the manager. This style of delivery will be especially welcome to the increasing number of managers who are becoming accustomed to small computers at home or in the office. More generally, one should not underestimate the amount of psychological comfort a manager can derive from a feeling of total control.

The personal computer also holds promise as a convenient medium for building a model, and subsequently for maintaining its data and structural content. Communication with a mainframe, if necessary, would enable even very large models to be projected to user-friendly individual work stations.

My last point concerns the attitudinal, almost cultural, shifts which appear to be inevitable with the proliferation of small computers, the incorporation of microprocessors into all manner of familiar products, and the dawn of a multi-billion dollar entertainment industry (it is estimated, for example, that home video games will have penetrated 20% of all US households by the end of 1982 [*Time* 1982]). Computers are becoming commonplace and much less threatening. Consequently, tomorrow's managers should be more receptive to computer-based approaches to their problems.

A likely side effect is a substantial increase in expectations for MS/OR software to be user-friendly. Many prospective users will be familiar with mass market software for entertainment or personal

computing or office automation, much of it outstanding in terms of user interface design. Comparisons are inevitable. If popular packages offer natural language commands within a hierarchical menu structure, are easy to learn, forgiving of mistakes, and make effective use of color graphics and voice output, then that will be the de facto standard against which MS/OR packages will be judged.

From these six points I conclude that the advent of personal computing offers major opportunities for MS/OR to evolve in useful directions. Such evolution is not only a desirable end in itself, but may even be imperative.

Personal computing has been my example, but each of the other fast-moving microelectronic-based fields mentioned earlier also offers important opportunities for MS/OR to become more effective or to widen its scope of application.

Alternatives to the MS/OR Approach

Management science has no patent on the best approach to the problems of management. Other approaches continually arise, including: MRP, Social Systems Analysis/Policy Science, End-User Computing, and DSS. Such approaches deserve our careful scrutiny. I will remark briefly on the first three and at slightly greater length on the last.

MRP (Material Requirements Planning) and, more recently, MRP II (Manufacturing Resource Planning) offer a comprehensive, heuristic approach to fundamental planning and operating problems in production management [Orlicky 1975; Plossl 1980; Wallace 1980]. This approach has grown phenomenally since its inception in the mid-1960s. The American Production and Inventory Control Society (APICS) has been closely associated with the MRP movement since about 1970; at that time APICS was the same size and nearly as old as TIMS. Since then, it has grown seven-fold to a membership of about 50,000.

The MRP approach has been or is being extended to the distribution, engineering, financial, purchasing, and marketing functions. Some aspects of this movement of particular interest to the MS/OR community are: its overlap with problems that have been treated for many years by MS/OR, the excellent data resources developed by most companies that have adopted MRP, the remarkably elaborate education and training programs that accompany many installations of MRP, and the gradually awakening recognition of the need to make use of what amounts to MS/OR technology.

The emerging disciplines of social systems analysis and policy science also have substantial overlap with MS/OR. The approach is usually interdisciplinary, holistic, strongly contextual, and focused on issues dominated by social and public policy considerations. Several successful academic programs have been developed, including the "Social Systems Sciences" program of Russell Ackoff and his associates at the University of Pennsylvania [Ackoff 1979b; Axelrod 1978] that deliberately departs from current MS/OR tradition. The design of these programs and the approaches they foster are worthy of serious consideration by us all.

"End-User Computing" aims to put

flexible computer-based tools directly at the disposal of managers with a minimum of staff assistance (see, for example, McLean 1979). An archetypal example is the spate of nonprocedural interactive financial planning languages which emerged in the early 1970s. These have enjoyed wide commercial success because, among other attributes, they enable people with virtually no prior computer training to use computers productively. Another archetype is the VisiCalc electronic spreadsheet program developed in 1978 for personal computers. VisiCalc has sold over 300,000 copies to date, making it the single most successful application program ever developed for small computers. I use it myself for a variety of applications and find it indispensable. It can be viewed as a highly specialized facility for setting up and solving lower diagonal systems of equations in doubly subscripted variables. This seemingly trivial class of models turns out to have an immense scope of application. The user interface is quite clever and has been proclaimed a milestone in the history of computer software [Sojka and Dorn 1981].

Further evolution of these two archetypes has produced elaborate software packages for personal computers with spreadsheet or more general modeling capability fully integrated with word processing, database, graphics, statistical manipulation, and telecommunication functions. Such systems present an appealing alternative to delegated MS/OR analysis in many problem settings.

The Decision Support Systems (DSS) approach [Gorry and Scott Morton 1971; Hackathorn and Keen 1981; Keen 1981; Sprague and Carlson 1982] was born in the mid-1970s from roots in both Management Information Systems (MIS) and MS/OR. The field has developed with great vigor. DSS may already have eclipsed MS/OR in its visibility in the general and trade press. Recruiting firms specializing in MS/OR tell me that perhaps 20-30% of their listings are now specifically designated DSS [Kubiak 1982; Smith 1982]; some were formerly designated MS/OR.

The turbulence of our economic environment is chronicled on every newsstand . . .

The stated definitions and objectives of DSS are very similar to those of MS/OR. Here is a typical definition: "Decision Support Systems are interactive computer-based aids designed to assist managers in complex tasks requiring human judgment. The aim of such systems is to support and improve a decision process." [Hackathorn and Keen 1981] Frequently cited benefits from DSS applications include: an increase in the number of alternatives examined, a better understanding of the business, fast response to unexpected situations, the ability to carry out ad hoc analysis, new insights and learning, improved communication, improved control, cost savings, better decisions, more effective teamwork, time savings, and better use of data resources [Keen 1981]. This definition of DSS would serve as well for a large part of MS/OR, and all of the benefits listed are commonly

claimed for applications of MS/OR.

Is DSS just MS/OR by a different name? I believe not. DSS has a style of its own, although some of the most successful MS/OR practitioners work in much the same mode. Some of the principal characteristics of this style are:

(1) It often adopts a multiple-pass approach to system development rather than the more traditional serial approach of requirements specification, detailed design, programming, testing, and implementation.

(2) It places a high value on flexibility of system use and adaptability to changing user needs.

(3) It is willing to tackle ill-structured situations. An inability of management to give a fully coherent account of either the problem or the objectives does not preclude building a decision support system.

(4) It strives for a genuine integration of data sources and models, including appropriate interfaces to transaction processing and database management systems.

. . . the destiny of our field depends on the rate at which it evolves . . .

(5) It puts the user first and the underlying technology second, with particularly careful attention to the user interface. Often the system is designed to be used directly by managers rather than by technical intermediaries, and frequently on a personal computer.

The DSS leaders with whom I talked at the DSS-82 conference advocate closer relations with MS/OR, but only if the DSS paradigm prevails over the popular stereotype of MS/OR. (MS/OR is thought to be techno-centric, ponderous, product rather than process oriented, and unrealistic in its assessment of what needs to be done to be truly useful to management.)

This is only a brief excursion through some alternatives to traditional MS/OR. In the spirit of a familiar adage, one might say that there are three kinds of professional specialties: those that make things happen, those that watch things happen, and those that wonder what happened. We do not want MS/OR to be in the third category. The second is not terribly attractive either. To prevent either of these fates, we would be wise to study alternative approaches closely for what they can teach us.

Professional Societies as an Instrument of MS/OR Evolution

The best way I know of to promote the evolutionary vigor which MS/OR needs is to make better use of our professional societies; they are charged with the long-term nurturing of our profession in a way that no other institutions are. Here are some of the ways professional societies provide mechanisms for evolution, and some of the things TIMS is doing.

(1) *Opportunities for Personal Interaction.* Biological evolution requires both gene pool mixing and the formation of subpools for genetic variety and (allopatric) speciation. Similarly, individuals from all walks of MS/OR life need to mingle in order to exchange views and to form special interest groups. Meetings and the activities of chapters and colleges can help

to fill this need.

(2) *A Critical Forum for Ideas.* Natural selection can operate for ideas as well as for biology. To promote the survival of good ideas and to hasten the extinction of bad, dominated, or impractical ideas, ideas should be exposed to vigorous debate, competition, and the harsh light of reality. Both the refereeing process of journals and the audience reaction at meetings provide such exposure. Regrettably, our meetings usually are too politely permissive to provide the critical activity necessary to ensure that only the "fittest" ideas survive. For that it appears necessary to make much greater use of discussants, debate, and dialectic.

(3) *A Critical Forum for Software.* Computer software is as important an embodiment of our intellectual labors as the written and spoken word. It is important that the forces of "natural selection" operate on software just as they do on other intellectual products. Yet few mechanisms exist for bringing about the informed debate and comparison necessary to propagate good software and to eliminate the bad. Two steps are being taken to lay the groundwork for such mechanisms at future TIMS/ORSA meetings beginning with the October 1982 meeting in San Diego. A special room will be equipped for live software demonstrations (with phone lines, modems, terminals, and a large-screen projector), and a cluster chairperson will be charged with arranging the sessions to take place in this room. In addition, a two-day exhibition will be staged for a representative selection of up-to-date commercially available MS/OR-related software packages.

(4) *Study MS/OR as a Profession.* The ecological standing of any species can be enhanced by increasing its birthrate or by promoting its migration to hospitable niches. The same is true of MS/OR as a professional species. TIMS has two efforts in this direction: an Employment Assessment Project which involves extensive field interviews and a mail survey, and a Career-Related Materials Assessment Project which focuses on available written materials. The detailed charters of these projects were published in the January-February 1982 issue of *OR/MS Today.* The aim of both projects is to attract excellent people to our field, to improve the career management process for people already in the field, and to provide basic information for the TIMS Council's efforts to plan improved services for the membership.

(5) *To Help Exploit Technological Opportunities.* Aggressive exploitation of technological opportunities is one of the evolutionary imperatives of MS/OR, and professional societies can play a valuable role by sensing technological developments, informing members of associated opportunities, and facilitating appropriate initiatives. One effort of this sort is TIMS' Microcomputer Applications Project. An example of the project's activities is the microcomputer fair it organized for the October 1982 meeting. The detailed charter and a progress report were published in the January-February and May-June 1982 issues of *OR/MS Today.* In a similar effort, Great Britain's Operational Research Society designated 1981 as the "Year of the Micro" and staged several

events with this theme. A very nice collection of papers on microcomputers in operational research appears in the April 1981 issue of *The Journal of the Operational Research Society*. Other technological opportunities invite similar efforts.

... the worldly fortunes of MS/OR are fragile.

(6) *To Monitor Alternatives to the MS/OR Approach.* The emergence of alternatives to the MS/OR approach is similar to the emergence of new species competing for the same food supply. There are mutual benefits to be gained by "interbreeding" MS/OR with the more promising of these emerging "species" before the differences become prohibitively great. Failing that, "coevolution" should be our goal. Journals like *Interfaces* offer a natural opportunity for a society to monitor, evaluate, and explain emerging approaches. In this spirit, *Interfaces* Editor-In-Chief Gary Lilien has appointed Peter Keen and Jeffrey Hoffer to cover the DSS scene on a regular basis.

These are some of the ways in which a professional society can create or strengthen evolutionary mechanisms for the survival and growth of MS/OR.

What we must now address is how professional societies can generate the wisdom and energy to actually do these things and do them well year after year. It is not easy for any professional society to sustain a high level of effort and innovation over an extended period of time, particularly when the routine administration of existing programs absorbs most of the available time of the society officers.

Partly in response to this need TIMS has made a basic structural change: it created the Management Science Roundtable to replace the old Institutional Membership program.

The Roundtable will provide much-needed support to practitioners in member organizations, strengthen the vital circuit depicted in Figure 1, and encourage innovation in all aspects of TIMS' activities by providing advice to TIMS Council and in other ways. Further details can be found in the July-August 1982 issue of *OR/MS Today*.

Conclusion

MS/OR must change to keep up with our fast-changing world. I believe that evolutionary mechanisms can guide the appropriate changes, and that professional societies can strengthen the mechanisms of evolution. I have explained something of the steps by which TIMS is attempting to function more effectively in this role. The question on which I must end is this:

> *Will TIMS and other societies actually succeed in their efforts to accelerate the evolution of MS/OR?*

The answer depends on how much cooperation programs and initiatives like those I have mentioned receive from individuals. A professional society can accomplish nothing of consequence without individuals working in cooperation with one another. It is individuals who support their local chapters, individuals who agree to serve as discussants at meetings, who fill out questionnaires received from special projects, who encourage their firms to

join the Management Science Roundtable, and so on.

In other words, the answer ultimately depends on YOU.

Acknowledgments

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Roving Reporter: In the *New York Times Magazine* section, October 10, 1982, an article, "Going Their Own Way" by Andrew M. Greeley, described the turbulence in the American Catholic Church. The article was based on five major surveys by the National Opinion Research Center (affiliated with the University of Chicago). The article stated that, "Sophisticated mathematical models developed by the National Opinion Research Center to sort out the "Council effect" from that of the "encyclical" showed that the latter cancelled out the positive results of Vatican II and sent the church into a sudden and dramatic decline: priests refused to endorse the teaching in the confessional; Sunday church attendance dropped off sharply; . . ." The mathematical model used is reported in Greeley's book with William C. McCready and Kathleen McCourt, *Catholic Schools in a Declining Church*, Sheed and Ward, Kansas City, 1976.