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Development of managers and executives in today's competitive and changing enviroment.

F.G. Awalt Jr

CENTER FOR APPLIED RESEARCH

Development of Managers and Executives in Today's Competitive and Changing Environment

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Director of Management Development
Finance and Planning
IBM Corporation

Presented on the occasion of the
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DEVELOPMENT OF MANAGERS AND EXECUTIVES IN TODAY'S COMPETITIVE AND CHANGING ENVIRONMENT

When Dr. Bonaparte asked me to speak to you today, I asked what he wanted me to say; He told me to just get up and talk. While flattered by his confidence in me, I found myself in a position similar to Chief Justice Oliver Wendel Holmes, who when riding a train one day, could not find his ticket. The conductor recognized the Chief Justice and assured him that he could be trusted and that when he found the ticket, he could send it in to the railroad. However, the Chief Justice became more agitated--not less--and began to search frantically. Noticing this increased agitation and trying to be helpful, the conductor once more assured the Chief Justice he should not worry--that the ticket would be found. The Chief Justice turned to the conductor and said, "Young man, you just don't understand. You see, I need that ticket to tell me where I'm going."

I wish to share with you some of my thoughts and musings relative to the development of managers and executives in today's competitive and changing environment. The assignment is somewhat frustrating, for it is difficult to cover the areas I'd like in the limited time I have with you.

I would like to discuss, for instance, the significance of missile development plans, the impact of our exploring microbiological technology, the effects of changing social mores on business, and a number of other topics I believe are relevant to today's world.

Regretfully, I shall limit the discussion of my topic to the telecommunication world or, if you prefer, the "information society," an area which I am equally interested and far more qualified to discuss.

My message is (and one which you have heard over and over): business and academia must work together to educate and continually re-educate our people, your students and our employees, one and the same, so that they will be allowed to compete in what is being called the "Information Age." (Business Week, March 14, 1983)

The environment of the Information Age is simple as it is complex--as promising as it is dangerous--as any our civilization has heretofore experienced. Moreover, it is full of innovation and excitement. Let me set the stage by reminding you of the technology which has driven the information explosion. In 1947, three scientists of AT&T's Bell Laboratory revolutionized electronics by the invention of the transistor, a compact device which can switch and amplify electronic signals at high speeds. It is durable, reliable and uses little power. The coupling of several of these solid state devices into circuits was inevitable, and in the late 1950's Jack Kilby and Robert Noyce almost simutaneously realized that any number of transistors and their interconnections could be etched directly on a single piece

of silicon. Integrated circuits and the silicon chip were born. The rate of advance in this technology has been awesome. During the past 25 years, the operating speed of computers has approximately doubled each year. A super computer will perform at peak speeds greater than 20 million operations per second. The best models now available will, for short bursts, perform 100 million operations per second, and the Japanese have set their sights on 10 billion.

By comparison, ENIAC, the first electronic digital computer in the United States, performed only 5,000 operations per second. In terms of size, ENIAC with its array of 18,000 vacuum tubes, 70,000 resistors, 10,000 capacitors, and 6,000 switches occupied a space equivalent to a two-car garage, weighed as much as 15 mack trucks and caused the lights of West Philadelphia to dim whenever it was switched on. Today, those functions can be performed on chips small enough to pass through the eye of a needle, which weigh less than a fingernail and which can operate 200 times faster and on a fraction of the power needs of their ancestor.

ENIAC costs approximately half a million dollars; today's equivalent computing power--that of a personal computer--cost approximately $4,000. Ongoing development efforts in this area will continue to drive down costs, while simutaneously increasing the capacity and speed of these machines. Bernard Murphy, head of the Bell Lab Microprocessor Design Department, predicts a ten-fold increase in the current performance/cost ratio within the next seven years. (Forbes, February 28, 1983)

As a result of the plummeting cost, great flexibility and reliability and miniscule size, the silicon chip is entering almost every area where control, processing of information, computing or communications is involved. While utilization of the chip has been largely limited to the information industry, it is estimated that the average household now has 8-10 chips in it (U.S. News & World Report), and growth in the home will likely parallel that in the information industry.

In an industry notorious for underestimating its potential markets, one source (Time, January 3, 1983) estimates that by the end of the century as many as 80 million personal computers will be in use. In addition, there is a virtually limitless market for supporting software and various associated industries. The 1982 IBM Annual Report forecasts a compound revenue growth rate of from 15% to 20% over the next decade. Using this figure and a rough estimate of the revenue for the information industry, 1992 should see revenues just short of 1 trillion dollars. Perhaps even more important, is that there is simply no way to feed, supply and communicate with the 4 billion people on this modest sized planet without an extraordinary increase in technical systems and devices. Small wonder, then, that Time Magazine's Man of the Year for 1982 was, for the first time, not a person, but a computer. Small wonder, also, that Japan, through its Ministry of International Trade and Industry not only has a

strategy to capture the lion's share of the market, but has committed $300 million and pooled the resources of its laboratories and 8 of Japan's largest electronic firms to form the Institute for New Generation Computer Technology. That institute's highly ambitious goal is to develop, within 10 years, a radically new breed of computer, utilizing artificial intelligence. A computer that will learn, reason, make inferences, decide what to remember or ignore, communicate in various human languages, and perform other functions once thought unique to the human species (Popular Science, April 1983). France also has a national policy aimed at a leadership position in the information processing industry. By 1990 it will have distributed 30 million black and white terminals--1 million by 1985--as a replacement for the phone box. By entering the name of the person one wishes to call, the number is obtained from a computer data base. With a terminal installed for each phone, the potential for other information uses is enormous. To capture this market, the required investment, both in technology and in human resources, is beginning to dwarf the resources of even the largest U.S. companies. Forbes reports that 15 companies, including Intel, Hewlett-Packard and IBM have joined in a semicondutor research cooperative which will fund university research in such areas as process technology (Forbes, February 28, 1983).

Even the most casual observer would agree that competition in the information processing industry has become intense, both within and between nations. This is both good news and bad news. It indicates a dynamic and rewarding market. However, such immense opportunities generate major pressures, conflicts and problems.

First, it would appear that any product lacking microprocessor efficiencies--be it in the controlling or instructing of a machine or process, or the operation of a car or home appliance--will be forced out of the market.

Second, while it is essential to have the latest technology, entry into the manufacture of chips is expensive. Charles Sporak, President of National Semiconductor, says that one should not plan on anything less than $60 million for a production line and another $150 million for the plant. In an environment of increasing change, obsolescence of such factories is a major concern. The machine purchased today becomes obsolete in 5 years (Forbes, February 28, 1983).

Third, the world's appetite for specialized knowledge has become voracious. The combined technologies of telephone, television, computer and facsimile have merged into an integrated system permitting instantaneous interaction between two persons and computing. This has not merely facilitated the growth of knowledge but has greatly accelerated it. It has been estimated that the amount of scientific and technical information now increases 13% each year. Thus, doubling every 5.5 years. The magnitude of this explosion can be appreciated when one finds that the IEEE journals alone published in 1981 totalled some

200,000 pages (Report on Lifetime Cooperative Education, MIT, October 2, 1982). Yet, it is the general opinion of the engineering community that even 200,000 pages are not enough writing to reflect the technical advances taking place in industry.

Up to this point I have been talking generally of trends in development--the outlook. It is equally important, however, to review for a moment today's application of technology. The coupling of computers with communications has increased applications exponentially. That coupling has been facilitated by the digitizing of information so that voice, video and data may be switched, recorded, transmitted and displayed together by one system.

For instance, last Christmas, by use of my personal computer I sat in my office in New York and shopped at Harrods, a famous London department store. I was able to select my gift from an array of various products displayed on the screen, to enter my I.D. and the name and address of the recipient of my largess. By a push of the "execute" key, my purchase was made. Harrods, or rather the computer, rejected one item because it was determined that it could not be delivered by Christmas. Through the U.K. Videotex system, called "Prestel," I was also able to receive the joke of the day, check the departure time of a flight from Heathrow Airport, and to price Eurodollars. That information was displayed on my screen, in color, with the appropriate instructions together with a menu of other available services.

In Germany, the Videotex system is called "Bildschirmtext." The current six thousand users can access 1,400 information suppliers (Think Magazine, 1983). The system permits a traveller to obtain cash when away from home, or to pay a bill, simply by credit card. One need only inquire to learn one's bank balance.

In the U.S., Chemical Bank's "Pronto" home banking system is scheduled to go into operation in May. Videfinancial services and Viewtron, two similar services, are planned to debut this year as well. CBS and AT&T have just announced the test phase of a U.S. Videotex service.

IBM, like many companies, uses information systems to improve productivity. Much of the data needed from the 128 countries in which we operate, is furnished via these internal systems. Messages or mail is addressed and forwarded to electronic mailboxes where it is picked up by terminal. Bulk mail, such as an operating plan--a volume about 4 inches thick--can be transmitted from, say, our laboratory at Fujisawa, Japan, and printed by laser at a division headquarters in White Plains in a matter of seconds.

You may be interested to know that despite all this magnificant technology, the human being is still very much involved. A few weeks ago, our company announced a new Chairman of the Board and a new President. The announcement came after

the normal working hours in Belgium due to the six-hour difference in time. Our international school there, which prides itself on being up-to-date, only learned of this significant event the next afternoon from a speaker who had flown over from the U.S. on the night of the announcement.

Embarrassed by the lack of knowledge, the usual inquiries began, only to discover that no one in Brussels had gone to the electronic mailbox. The message had been sitting there all night awaiting someone to pick up the mail.

The FCC has disclosed that IBM (AP Financial Wire Service, March 17, 1983) will soon supply its service people with a pocket-size portable terminal linked via radio to a computer system. It is a two-way communication device which permits service representatives to learn of their next service calls, report work accomplished, and request needed parts. The users will be able to communicate with other personnel as well.

Innovations in the information systems area are not limited to large industrial firms. Joe Harvey of Orange County, California, is one of a growing company of personal computing enthusiasts. Joe personally maintained a computer data base containing charts on more than 100 suppliers, together with the names, credit card numbers, and payment records of several thousand customers. Joe has had a problem, however. His computer and its software were seized by the local vice squad. It seems that Joe was operating call girl business. He has been convicted on two counts of pimping and one of conspiracy (Time, March 28, 1983).

John Naisbitt, in his recent book "Megatrends," (Megatrends: Ten New Directions Transforming Our Lives, Warner Books, 1982) says that we have been moving from an industrial society to an economy based on the creation and distribution of information; that we are caught between these eras, and as a result, experience turbulence and uncertainty. Tofler, noted for his books, Future Shock and The Third Wave, in a speech to the IBM Information Symposium last January, declared that we are in the midst of a revolution. "So great is the possible impact that . the use of these new technologies, they will be able to accelerate the development process, even skipping the early industrial phase altogether." (Teresa Evert, Towards and Information Policy, The AIESEC Link, March 1983)

It is into this painful and uncertain environment that our educational system has thrust its budding managers and executives. In recent years, there has been a plethora of articles addressing the decline in SAT scores, the avoidance of math and science courses, the permissiveness of our schools and, in general, on the dismal state of education in the United States. However, for better or worse, those who will be managing our industries in 10 years are products of that educational system. They have already been hired and the shortcomings of their formal preparation must be carefully considered in any

management development program.

The problem is how to overcome any past deficiencies and keep these professional employees up-to-date and progressing toward managerial and executive positions.

How deficient are they? My observations, which are largely limited to business school graduates and computer science graduates, are that today's students are bright but not very resourceful; expectant, but cynical. Most cannot write (certainly cannot spell), do not listen well and are unable to make an effective stand-up presentation. Their skills vary significantly, and while they are somewhat flexible, their perspective is very narrow. Historically, business has depended on on-the-job training to develop its managers and executives. Formal education, largely in-house, has been used to supplement that training. The theory has been "give me a smart person, and I'll create an executive." That approach can be successful in practice provided that willing and qualified mentors are available; that the mentor is able to control the person's career; that there is a very strong and up-to-date professional supporting staff; and that the requirements of the position do not require a high degree of specialized knowledge. In today's complex, changing world, it is unlikely that those conditions prevail in many organizations. In fact, one study indicates that (unpublished study by W.A. Thompson, 1982, IBM) the successful executive has had at least three different cross-functional assignments--for example, a staff versus a line responsibility, and/or a financial, in contrast to, say, a manufacturing responsibility. In addition, these changes in career path have subjected the potential executive to a variety of career managers having entirely different perspectives.

Battered by competition, confronted by merging markets, experiencing fantastic technological changes, required to implement the social programs of a highly expectant society, supporting professionals and their managers have a difficult enough time in prioritizing their own work and personally staying up to date. It is unlikely, then, that they will be able to devote significant attention to the nurturing of fledging managers.

For the professional employee, the issue of technical obsolescence is a formidable education problem. For example, the development cycle of a new system or component is about 5 years. A qualified, state-of-the-art engineer assigned to such a project most likely will be outdated--obsolete--by the time the project is completed. My colleagues estimate the half-life of an engineer to be about 4 years. What's more, the demand for highly creative and up-to-date engineers is intensifying. This demand cannot be possible met by merely attempting to replace obsolete engineering with new ones. What does one do with obsolete engineers--discard them? Fortunately, the engineer's fundamental ability to learn has probably not eroded. Continuous career education is the only real solution.

Furthermore, the trend toward specialization is likely to increase. Even in social sciences, specialization has become a serious concern. The American Psychological Association, for example, is broken down into almost 40 divisions based on interest areas covering specialties as diverse as psychopharmacology, industrial and organizational pychology, rehabilitation psychology, physiological and comparative psychology and others.

In the physical sciences, the areas of specialization may be even narrower and the obsolescence curve sharper.

In addition, the roles of professionals will change. The accountant, I believe, will find that his role will be to continue what will become massive data bases, to see that they are current, properly structured, relevant and provide the requisite data to run the business. Those data bases will be the ledgers of the future. Information system professionals will design and operate massive distributed processing utilities, and it will be the user who will operate the up and downstream systems tied into these utilities via high order languages.

The late Christopher Evans said, "The erosion of the power of the established professions will be a striking feature of the computer revolution. The vulnerability of the professions is the result of their special strength--the fact that they act as exclusive repositories and dissemination points for specialized knowledge . . . . the raw material of a modern profession is nothing more than information, and the professional's expertise lies, simply, in knowing the rules for dealing with it." (Science Digest, June 1981)

The role of the professional will depend more and more on his or her ability to provide added value to a system which will contain much more information than any individual professional can personally store.

Managers and executives are beset by the same problems. The areas they control are becoming increasingly complicated, their schedules much less predictable, and their environments much less forgiving of incorrect judgments and actions. In addition to the day-to-day "people management" challenges, business students and professional employees with long-term aspirations for executive positions must maintain at least general awareness in a number of technical areas. At the same time, they will need to thread their way through the tangle of regulatory pronouncements from various levels of government as well as snowballing information, and accompanying multi-national competition. Is it any wonder that stress among executives and managers has become a key concern in industry?

I believe that any career development program in the environment I've described must provide a minimum:

A) An individualized program to address basic educational deficiencies,

B) Business environment updates,

C) Technical updates,

D) Continuous professional retraining,

E) Change, stress and information management techniques

F) At least 3 cross-functional job experiences

While ambitious, this fundamental development program may not, of itself, train management to adapt fast enough to stay competitive. Dean Joel Goldhar of the Illinois Institute of Technology School of Management says that the demands of the new era actually run counter to all the past teachings and instincts of American executives. "What was safe and sound in the past will be counterproductive tommorrow." At the current rate, it may take twenty years for current managers to adjust (UPI Wire Service, March 25, 1983).

Yet, Robert Rehder, President of NCR, notes that "American business and industry currently allocate more than $30 billion a year to educate and train their employees. This sum rivals the nation's annual public expenditure for colleges and universities. Despite these expenditures, we appear to be falling behind in crucial scientific technological areas." What to do? I agree with a conclusion of a study committee at MIT looking at the obsolescence of engineers. The committee says that "the future vitality and competitiveness of the U.S. high technology industry depends upon a wide-spread acceptance of life-long formal educational activities as an integral component of productive engineering work." It goes on to say that to do so requires close collaboration among engineering schools, industry and professional societies . . . . "Universities acting alone have neither the human nor the financial resources to carry out such a program on the scale required." (Report of the Centinnial Study Committee, MIT, October 2, 1982)

Although focused on engineering, that conclusion succinctly states a need which exists for all aspects of business. If one accepts that thesis, the question is how to develop, nurture and maintain such a collaboration when business and education have such disparate goals, objectives and measurements. A more pressing question is how to begin.

I would like very much to be able to offer a few sure fixes, some guaranteed solutions. With unaccustomed modesty, however, I am sorry to say that I cannot. The occasional classroom lecture by a visiting corporate executive, the somewhat haphazard, part-time employment of university faculty in industry, the no-strings-attached contribution from business to universities must give way to more thoughtful, planned approach to education; that

we need a strategic view of education rather than a knee-jerk reaction.

Yet, we do not have the time to sit around and study this problem to death. Let me suggest that, to begin with, it will be necessary that there be a mass infusion of business people into academia and corresponding infusion of teachers into the business world. Such an interchange is necessary not only to start the education process but to break down the artificial barriers of distrust and misunderstanding of one another's environment and motives. Perhaps such mix-'em-up sessions should take place at some geographically nearby and neutral site where an atmosphere for constructive dialogue can be established. But in putting these groups together, it should be clearly understood that there will, and should be, a transfer of some of the values and attributes of the academic world to the industrial environment. Conversely, the academic community will become familiar with business, its problems of survival, and at the same time, keep up to date on emerging technologies. There should be no confusion over roles--industry is interested in applying knowledge and skills for professional success; universities in teaching basic knowledge. It is inevitable, however, as the volume of data increases and changes accelerate, that new ideas will be developed, stimulated and organized into new basic knowledge which, in turn, will fuel further technological development. What is certain, however, is that one can no longer do without the other--there must be a merging of interests. Pace University and IBM have embarked on such a program through the facilities of the IBM Finance, Planning and Administration School (IFPA) located at the Pace Briarcliff campus. In 1983 as students of Pace, 2500 IBM professionals, managers and executives are learning new skills, updating their professional knowledge and earning credit for graduate and undergraduate degrees. Pace faculty members are joining others from 16 colleges and universities to teach and to consult with us. Beginning this fall we will have a full-time Pace faculty member on our staff to help in the development and maintenance of our courses and to teach.

While we've been working together for less than six months, there is no doubt from IBM's point of view that we're progressing very well (we're actually amazed at our progress) and are delighted with our partners. There is a sense of frustration from time to time as we try to work within one another's systems, but we have been able to accommodate. It has been, for example, particularly hard for us who believe that time is money to adjust to the rather unstructured approach to problem solving. It is equally difficult, I am sure, for the University's faculty and administration to conform to our formal, and frequently, rigid approach. Let there be no doubt, however, that we've been successful and will continue to do so because of our determination to make this small but significant endeavor work. Dr. Mortola and his staff's innovative and forward thinking which has created and developed this relationship must be replicated again and again throughout this country.

I believe that in this environment of rapid change, of intense competitive pressures, of a veritable explosion in the availability of knowledge, the professional, the manager and the executive can only be developed and updated through a continuing process of formal education. Neither industry nor universities can go it alone.

My remarks have been about the present generation of employees. I cannot leave you without briefly commenting on the next generation.

The cover on the current IBM Annual Report shows a six-year old at the keyboard of a computer, learning to read and write. She is one of thousands who are doing so. One of my associates has a three-year old son who composes music on a personal computer. There are four-year olds creating computer programs. The press is currently carrying stories of fourteen-year-old students who are literally earning fortunes developing software. This is an exciting but alarming development. The time is at hand when industry and the university have no choice but to close ranks and prepare for this new breed of high-tech freshman.

Thank you for allowing me to share some of my musings with you.

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