A treatment—Professional development

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"There's something going on here
but you don't know what it is ..."
Bob Dylan

PREFACE

In the mid-1940's, the most advanced technology around was the Hydra-Matic transmission. The conventional wisdom among us kids was that the Hydra-Matic was so complex that no single person understood it all. A look at its valve body, which directed hydraulic pressure along various paths to effect gear changes, seemed to prove this. But the logical complexity of this valve was roughly the same as today's single-bit binary adder circuit. And such a circuit is an inconsequential component of today's most advanced technology—as exemplified by the Intel 8085 microprocessor, which has 6,200 transistors, can execute 770,000 instructions per second, and is housed on a chip .164 inch by .222 inch—smaller than Lincoln's head on a penny! In only 30 years the frontier of technology has surpassed anything we kids could have imagined. Most of us in this room will be alive in 30 more years. Where can the leading edge possibly be then?

Next, let us consider the career of Albert M. Diederich at the Ridge Tool Company. Mr. Diederich assembles wrenches. He has been assembling wrenches for 45 years. In that time, Mr. Diederich estimates that he has built 25,000,000 wrenches! He is, by all odds, the world's ranking expert at his trade; there is no problem beyond his knowledge or ability; no one can teach Mr. Diederich "a thing or two." Can anyone in this audience claim such expertise? Not likely! This is the nature of a career in information sciences: ours is a field in which experts disagree, where terms are ambiguous, but in which our achievements have been profound. We have used computers, in the Viking space program, to design and build a radio antenna so sensitive that it can perceive the energy radiated by a lighted match held on the surface of Mars. We have designed a computer program that plays world-class chess and has beaten David Levy, an international chess master, at the computer's forte—speed chess—but not yet in regulation tournament chess. Mr. Levy described this program at ACM 77 in Seattle. "Chess 4.6 is fantastic. Nine years ago I wouldn't have believed it possible. It doesn't make tactical oversights. You can't fool it. But it can't make a long-term strategic plan. If it could, it would be a grandmaster."

Meanwhile, back in retail sales, a clerk waves a wand and the cash register prints the item description and price while inventory control systems a thousand miles away are notified of the transaction. In the classical sense, this is a magic wand. But for us, the data processors of today, the technology of such an application is well within our understanding. Or ought to be. Unlike Albert Diederich, we have chosen a profession that will leave each of us hopelessly behind if we do not search aggressively and persistently to stay with our art.

INTRODUCTION

It is my intention to suggest a program of self-development, aimed both at remedying known personal deficiencies and at keeping abreast of new applications of computing technology. There are many opportunities for self-development and I will point these out. But it remains for the individual computing professional to take the initiative to set up a program for himself or herself and to follow thru. It will require a commitment of time, and in some cases, money. But how could personal resources be better expended than as an investment in one's future?

One's career may be affected profoundly, as follows: employee appraisal forms usually have a section labelled "Job Competence". Other sections relate to personal traits such as "Leadership Skills" or "Interpersonal Relations". It is difficult for adults to change basic personality attributes such as leadership skills. So there is not a great deal that we can do about low ratings in non-technical areas. But we have no excuse for continuing to earn low ratings in technical knowledge.

When a computer professional takes a new job, his first performance appraisal may be lower than usual because of the new skill requirements. But having identified these deficiencies and established a program to remedy them, subsequent appraisals should improve. So there is little excuse for one's career progress being limited by technical inadequacy.

One large corporation strives to channel five percent of everyone's time into technical training. This comes to two
and one-half weeks a year, or two hours a week for formalized training apart from reading journals. If your organization is similarly enlightened, so much the better. If not, your five percent will have to come from personal time. Surely no one in this audience surrounds himself with TV and beer in free time. I suggest that you do not reduce the time spent with family—that is more important than career. Rather, you should defer some leisure time activities and substitute the pursuit of your own professional development goals. If this is too much of a burden, you may be in the wrong profession. The one resource each of us has in equal measure is time. Other facilities are not so evenly distributed. Personal wealth is not, nor is intelligence or good looks. But each of us has exactly 24 hours each day to be allocated as he sees fit. A major factor in success is one's ability to manage time to best advantage. The old cliche is: "If you need something done, ask a busy person to do it." You should not schedule yourself to be constantly busy. Relaxation is important to physical and mental health. But you should schedule your relaxation—not just let it happen. Do not drop in unexpectedly on a busy friend and expect a warm welcome.

Make a list of things to do and the priority of each. The first item on your list should be "make a list;" then when you finish the list you can immediately scratch off the first task and you have made progress.

OBJECTIVE

Perhaps an overall objective for self-development would be to help us distinguish good ideas from marginal ones. Not all ideas work; not all products are successful. Remember Corfam? Du Pont invested a king's ransom in this synthetic substitute for shoe leather. They ultimately wrote off this investment as a total loss. Does Viatron ring a bell? Ten years ago this company set about building a full-function terminal to rent for $21 per month. A good friend of mine, a computer professional, used pencil and slide rule (remember those?) to show that it could not be done. Viatron ultimately went into receivership. It takes years for the marketplace to render these judgments. A computer professional may be able to use intuition and analysis to render an informed appraisal. As of this writing the Commodore PET computer is described by its Project Manager as selling for under $600, with volume projections of 5,000 per month. Service is to be handled by the retailer. Is this "viable"? What about conferencing by computer? Will this happen? Here is Dolotta on the subject:

"We believe that over the next ten years the potential market for applications aimed at such 'offices of the future' may well equal the value of all of today's business data processing applications."*4

Structured programming and distributed processing are current buzzwords. The computing professional ought to be well enough informed to have an understanding, and perhaps an opinion of these concepts. It is not sufficient to have written the world's tightest routine for converting 1401 five-digit operand addresses to properly zoned three-digit machine addresses. We're not doing this any more. So broaden and deepen your understanding so you can distinguish between good work and bad work in your sub-specialty of computing.

DEFINITIONS

Let's define our terms. We are talking about training, not education. Education is the business of elementary schools, secondary schools, and undergraduate liberal arts programs. In my opinion, the goal of education is to broaden the whole person, to develop logical thought processes, mental and physical discipline, communications skills, self confidence, broad awareness, and appreciation. In short, education prepares one for training. Without education, training can be self-limiting. Pre-med is education, medical school is training. Medical school prepares a doctor to diagnose illness or perform surgery; but pre-med enables him to grapple with concepts such as "health care delivery systems."

There is a growing trend in the lower schools that troubles me—the introduction of "computer labs" in secondary schools, and even in primary schools. Teachers are proud of turning their students on to computing at such tender years. No wonder the kids are excited and involved, and have to be peeled away from the terminals when the lab session is over. Programming and game playing are fun. Education is not. I was recently a guest lecturer to such a group of bright twelve-year-olds. They listened politely as I discussed how computers are used in banking—but when the compulsory lecture was done, they bowled me over to show them that learning can be fun. It hooked lots more kids and blurred the distinction between learning and fun; teaching them, by inference, that if it isn't fun, don't bother learning it. Not so. Education can be drudgery. Tedious hours of studying the classics. Is this why today's Johnnie can't read?

What is professionalism? The answer, as Tevya said, is very simple. I don't know. But the main components are: defined body of knowledge of high intellectual content, defined standards of competence, examinations, code of ethics, and disciplinary capability. These are present to a greater or lesser extent in the field of information systems. But to be a professional, you must first consider yourself a professional.

Then what is professional development? It is the continuing technical training necessary to attain or maintain professionalism. At present, podiatrists in New York State are required by law to take 35 hours of training and be recertified biennially. There is quite a stir among the legal profession in the same regard. The state is now considering whether to require periodic refresher courses in four profes-
sional fields: those of physician, dentist, and optometrist, in addition to podiatrist.

I do not believe that training in managerial skills falls within the boundaries of professional development. The former is very important for those in management or aspiring to it but it is a different sort of problem and will not be addressed here.

OPPORTUNITIES FOR PROFESSIONAL DEVELOPMENT

So much for defining terms. Now to investigate opportunities for professional development. Let us consider degree programs, employer-provided training, and self-development efforts.

Degree programs

Technical degree programs may be considered the highest form of professional development. On the other hand, graduate business programs are aimed more at personal or managerial development, and are not within the framework of this discussion as defined earlier.

In passing, it is interesting to note the proliferation of new degree programs in Information Systems. Nunamaker found in a recent survey that 77 institutions are offering a bachelor’s or master’s degree in IS, MIS, MS, or some variant. Apparently universities are finding wisdom in the excellent report by Bob Ashenhurst. The content of these programs is positioned between business and computer science, and in my opinion, within five years will surpass both the MBA and MCS in importance. One department head I lunched with recently is so besieged by inquiries from industry for his graduates that he is considering retaining a telephone answering service.

Degree programs in computer science provide a lot of theory and analysis, and a little skills training. They are at the leading edge of such disciplines such as systems software for minicomputers, but they lag the user community in others, for example manipulating large data files. Thus an evening degree program in Computer Science may be undertaken as professional development by an applications programmer whoaspres to work in systems software, rather than in systems analysis or management.

University Computer Science programs, while theoretical, provide the student the basis for understanding (and rendering value judgments) on technological advances. So a few evening university courses from the Computer Science curriculum may be a useful means of professional development even for someone not wishing to pursue the degree. Many colleges and universities offer Computer Science extension courses in non-campus locations for the convenience of computing professionals who are employed full time. As just one example, the New School for Social Research in New York offers a wide selection of evening certificate courses in computer science with a practical orientation—such as OS Debugging and Advanced Systems Analysis.

Most employers pay or reimburse tuition for job-related courses if good grades are attained. Bell Laboratories and other enlightened companies, as well as universities, may grant sabbaticals to staff members to pursue advanced degrees or research projects. There are a wide variety of computer-related professional development programs available thru colleges. The student must anticipate a major investment of time to attend class and to study—time away from home and family—but as with a financial investment, the return is proportional to the risk.

Employer-provided training

The employer benefits in many ways from offering good technical training to its computing staff. Obviously, technically proficient people work smarter instead of just harder. But also, turnover is reduced because professionals want to stay with an organization that offers technical growth. Recruiting is easier for the same reason.

The mere availability of in-house training facilities is not enough. It remains for each individual to take advantage of the opportunities afforded him. Indeed, the company should adopt an active rather than passive role by scheduling and monitoring attendance.

Technical training takes many forms depending upon size of company, rate of change in its computer installation, and degree of enlightenment. In a very large company or one with rapid growth or high turnover, classroom training is the mainstay. In a medium-sized or more stable installation, self-study courses on videotape are appropriate. And smaller or less advanced shops may rely strictly on sending people to external courses when and where they are offered. There is a place for all these modes of professional development in the typical company. If yours does not offer formal training, lobby for its adoption. Here are basic guidelines for an internal Professional Development program.

Establishing in-house training

It is best that job descriptions and responsibilities be formalized. If written job descriptions do not exist it could take many months until they are constructed to everyone’s satisfaction. In any event, knowledge requirements must be defined for each position whether from job descriptions or from hearsay. “Before you prepare instruction, before you choose material, machine or method, it is important to be able to state clearly what your goals are.” Must Project Managers use Critical Path Scheduling Techniques? Are Senior Analysts responsible for discounted cash flow, or for statistical sampling methods? Do Lead Programmers prepare Warnier charts?

Next, sources for each level of knowledge are identified by reviewing multimedia courses or evaluating vendor courses. Alternatively, specific courses can be developed in-house—but there are three disadvantages to such courses. First, they are very expensive. For an experienced teacher to develop course material can require ten hours of prepa-
ration time for each hour of classroom time. For an inexperienced teacher working on new material the ratio can jump to 100 hours to one! Second is the effect of obsolescence. Consider a course in direct-access file design. For the course to be useful for programmers and technical analysts, it should be quite detailed and relevant to the facilities available. Student exercises should be directed toward the present installation. But when the direct-access devices or the installation access methods change, such training is instantly rendered out of date. The paradox is—the more specific the in-house course, the shorter its useful life. And a third disadvantage is the difficulty of assembling enough students and a qualified instructor in one place at one time.

Whatever the source of recommended courses, each job should have a list of recommended knowledge associated with it. Then present skills are rated and inventoried. Each member of the professional staff is asked to judge his proficiency in the technical skills important to this job—for training purposes only. New hires are asked to rate themselves similarly. Now, with skills required and skills available known, the training required by each individual can be planned in a cooperative effort between staff member and his supervisor. Another valuable resource in such a meeting is the systems project plan, which identifies the assignments each person will work on. These meetings to plan training should be held at least once a year. It is during such a meeting that the staff member should communicate his own goals for specific technical training. And it is very important that training be scheduled for specific times and should be considered just as important as project work. Training must not be allowed to slip because of problems on another assignment. Progress and performance in training must be measured and reported to management. It is not fill-in work and is not so treated by far-sighted organizations.

As stated previously, about five percent of available time should be spent in training. And about two percent of the department's salary budget should be allocated to out-of-pocket training costs. This sum will typically cover the cost of purchasing one or two multi-media courses as well as sending a number of people to external courses. Of course, the larger part of in-house training should use existing classroom or video courses at no out-of-pocket cost. The organization that is just launching in-house training should consider a rental agreement rather than purchasing courses outright. A more elaborate discussion of the entire in-house training process is available and will not be repeated here.

**Employer-provided external training**

External training takes many forms. Obviously each vendor offers courses in use of its hardware and software. Unfortunately, some of the mini-computer vendors are suffering from growing pains as their marketing success surpasses their training capability.

Many private training firms offer good courses in systems methodology. Brandon Systems Institute, Ware Associates of Hudson Massachusetts, and Control Data Corporation's Institute for Advanced Technology come to mind.

One may measure the state of the economy by counting the number of such brochures that fill the in-basket. In lean times, external training is the first budget item cut by most user companies, so the provider companies go into suspended animation.

Even employers who make extensive use of in-house training facilities will continue to send selected people to external seminars. There is value in having Project Managers, for example, meet and socialize with their peers from other companies. They may pick up much of value from the successes and failures of other companies. And they may find out that things aren't so bad in their own shop after all.

The alert installation will collect, study, and file, written evaluations of all external (and internal) courses to be used in future planning. And the progressive installation will write the training firm to convey negative or positive views by attendees. This is appreciated by the vendor and helps to improve the breed.

Another form of external training that must be mentioned to this audience is the Professional Development Seminars offered by ACM, IEEE, DPMA, ASM, and other computer-related professional societies. Such seminars are offered both at the national and local chapter level. They are usually aimed more at benefiting members than at making money, and are usually less expensive and may be less formal than for-profit courses conducted by nationwide firms. Earlier in this paper, an annual training plan was discussed. Professional Development Seminars are rarely announced that far in advance. So the burden is on you to bring to the attention of your management any external PD seminar that supports your personal professional development plan. If no funds are available to pay the fee, ask for time off and pay it yourself. It will probably be tax-deductible. Under a liberalization of regulations, costs of training required to maintain or improve skills on the present job are a deductible expense (but training for a new job is not).

**SELF-DEVELOPMENT EFFORTS**

We have touched on the professional development offerings of universities, and have seen what employers can and should provide. Now let us consider what the individual can do for himself.

*Establish a self-development plan*

Consider your circumstances to the following questions:

1. Training taken in the last year
2. Books read in the last year
3. Current periodicals I read
4. Tasks that I perform on my present job
5. Personal qualities important on my job
6. Changes that I can see in the future
7. My strengths and weaknesses
8. Goals within one year
9. Goals beyond one year
10. Specific plans to accomplish these goals
Such plans might resemble the following:

(a) **Read Weinberg’s An Introduction to General Systems Thinking** before September.
(b) Subscribe to *Computerworld* and EDP Analyzer; cancel subscriptions to *Sports Illustrated* and Gourmet.
(c) Begin a word list of all unfamiliar terms and their meanings. Carry this list and refer to it.
(d) Discuss ideas found in technical publications with coworkers. Practice active listening by restating your associate’s view, in your own words, to his satisfaction.
(e) Find a professional development seminar on distributed data base.
(f) Seek an opportunity to give a short guest lecture on minicomputer applications in process control.

You should monitor progress on this plan and renew it periodically, at least annually. It is up to you; no one can do it for you.

**Sources of professional self-development**

Learning preferences and abilities differ. In our profession are found scholarly people and those who have come “thru the ranks.” We differ in age, in temperament, and in experience. Thus training methods should differ. Some students respond favorably to video courses while others find them boring and would prefer to learn by studying reference manuals. Sources of the latter are well-known, and fortunately the former have also been documented. The IEEE offers a wide variety of self-development opportunities to members, although not all in computers. For example there are self-study courses in engineering, on such subjects as Field Effect Transistors, and Digital Instrumentation; self-study courses in management, for example How to Start Your Own Consulting Business; approximately 100 field courses (to be held by your company); correspondence courses; and speed reading.

Many people learn by doing. “What I hear, I forget; what I see, I remember; what I do, I know.” How to better learn about microcomputers than to build one? An IMSAI 8080 1K kit currently sells for $650, a saving of $350 over the assembled price. An expensive and time-consuming lesson, but one guaranteed to produce expertise and build a foundation for the future. (The 8080 chip, by the way, came out in 1974 priced at $300 in OEM quantities—at this writing, Radio Shack sells it over the counter for $18!)

Microcomputers may very well provide the at-home professional development wave of the future. Computer-assisted instruction has not yet become cost-effective except in special situations. But the Video Disk technology has prospects of providing huge quantities of read-only software, including course material, to microcomputer users—eliminating the traditional CAI requirement for large CPU connect time. The ACM Professional Development Committee is watching developments carefully.

Establish a reading program

Beyond any questions, the computing literature is overwhelming. The *ACM Computing Reviews* subscribes to 240 periodicals! Only a small fraction of their articles, and only a limited number of textbooks can be reviewed by *Computing Reviews*. But their staff of editors and reviewers does an admirable job—and the publication can be of great benefit to the reader. Clip or copy reviews of importance to you. File them and track them down when you have time or when your need is more urgent. Become a source of resource material to your associates. How can anyone be considered a professional who does not stay conversant with the literature of the field?

Each of the professional computing societies has a lead journal, most also have many special interest journals. They are far too numerous to list. Everyone ought to pick a few favorites and set aside time to scan them, marking or clipping articles to be read. Mine are *Datamation*, *Computerworld*, EDP Analyzer, *ACM Computing Surveys*, *IEEE Computer*, the *IBM Systems Journal*, and *Scientific American*. The September, 1977, issue of *Scientific American*, devoted to microelectronics, was a revelation to me. If sufficiently enlarged and studied, the Boolean logic of SLT circuits can be seen!

The *Honeywell Journal*, edited by Bob Bemer, had a fine format. It included microfiche in the inside cover, was multilingual in part, was printed on fine paper of the European standard size, and published significant articles with high quality graphics. Unfortunately it perished in the economic crunch a few years ago.

Take a rapid reading course and practice what you learn. One MBA student, overwhelmed with reading assignments, sat under the clock in the library and turned a page every time the clock’s minute hand clunked. Even if he had not quite finished both sheets, he had the sense of the material. And 60 pages an hour is not a bad pace. Technical material may require more time, particularly if you own your books and write comments in the margin. There are several book clubs for computing professionals. Membership will force you to set a reading schedule. However, many people believe in selecting their own books based on published reviews and personal recommendations, rather than reading books selected by committee. Discuss your reading and your opinion of it with your friends.

Other individual approaches

Your attendance here suggests two things: that you are a member of one of the AFIPS constituent societies, and that you are interested in professional development. If so, attend your evening chapter meetings. Practice your active listening skills on the speaker. Take notes (“what I do, I remember”) and ask questions. Use the coffee or cocktail session to learn more, not to tell how you blasted out of a sand trap.

It is difficult, but useful, to find out what your coffee partner knows that may be interesting to you. Recently I learned, from a stranger, that the IRS master file consists of...
1300 reels of tape! Such hearsay may not be totally reliable, but as a computing professional you have learned to render value judgments on incoming data.

Keep an audio cassette player in your car. Listen to speeches you were unable to attend. Note-taking is a little more difficult here.

CONCLUSION

This paper has presented a variety of approaches to professional development. They range from formal university programs, to the semi-formal company courses, and the informal, personal endeavors in technical training. It should be apparent that there is enough variety and quantity of options that no one need to suffer from the malaise of creeping technical obsolescence. But it is an individual decision to construct an action plan and to persevere. No one can do it for you. Good luck!

DISCLAIMER

The citations given in the text and reference list were selected by the author. No attempt has been made to exhaustively list all training vendors, publishers, etc. The reader may use his resources to locate others, or is invited to contact the author for further information.

REFERENCES