Orchestrating A Career

by Peter Bates

A Texas company contacted the consulting firm of Arthur D. Little. The company had a problem with its central computer. The computer's "batch-update cycle" was too long, ending one hour before the new day began. That margin was too close — the company needed more time for mistakes such as broken tapes, "bombed" jobs, etc.

Arthur D. Little sent a team of its best people in resource management. One member of the team was Valerie Brown-Awkward. She met with eight of the Texas company's top operations people for two days, off site, so there would be no interruptions, and helped them solve the problem. Like an orchestra conductor, she directed their ideas in a symphony of software reorientation. The result was that they had chopped two hours from the batch-update cycle.

Brown-Awkward hadn't orginally planned on being a computer engineer. In fact, she told a recent conference of guidance counselors at Smith College, that she did not enter the field through traditional channels. She came to engineering, through the side door, so to speak. She actually started out in pure math.

"I had a terrific math teacher in eighth grade," Brown-Awkward said. "She really encouraged me and later became my guidance counselor in high school." Brown-Awkward went

on to study chemistry, physics, and calculus, but didn't really gravitate towards the practical applications of her curriculum. "I just liked proving theorems and reading texts on pure math. College steered me in the direction of practical applications."

At Northeastern University, Boston, Brown-Awkward entered a co-op program, a unique approach to education that allows students to work for a company and then return to school. That way students not only get practical, hands-on experience in what interests them, but they are also paid, which helps defray education costs.

"It wasn't long before my co-ops were starting to influence the courses I decided to take. My first co-op job was at NASA in Maryland, working on the Nimbus G satellite inertia compensation problem," Brown-Awkward said. She worked on an analogue computer (used mostly in science), which only takes on transient solutions; it is unable to do steady-state programming the way a digital computer (used more in the corporate world) does. However, this particular co-op did get her more interested in physics, leading her to take more courses in that area.

Another advantage of co-ops is that they can also make a student aware of what he or she doesn't want to do. Brown-Awkward's second co-op was a bust. "I was working in Polaroid's optics department and soon decided that I didn't like that branch of physics at all." So in her next series of classes she enrolled in computer science courses.

After graduation, Brown-Awkward decided to gain experience in a more marketable field. She began to work in a software house designing programs for the global positioning system (gps) for the Air Force. "Now that was really something," she said. "It was math, physics, computers — everything I liked."

At the same time, she decided to take her master's degree in engineering. Her last bout with pure math was a galois theory course, one that she found interesting, but impractical. "What good was it? Sure I could understand it, I was even good at it. But nobody else had any use for it."

The turning point came when she took an operations research course at Northeastern's graduate school of engineering. It was then that she decided that she wanted to be a consultant in resource management.

What is resource management? Put simply, it is one of the most

important fields in computer engineering. "I go into a data-processing shop of a large company where the managers are doing a lot of number crunching. They want to know how to better allocate what equipment they have, and they want me to help them plan for the future," she explains.

A typical data-processing manager will ask her: "All I know is that my costs keep going up, my operations people tell me I need a new computer, and my users aren't happy with what the computer is spitting out at the other end. What can you do for me?"

"I try to look at things from a capacity point of view," continues Brown-Awkward. "I help plan for when the company will need a bigger machine based on volume, workloads, and business growth." A particular machine a company is using may not be operating at peak efficiency; sometimes it may not operate at all. "Sometimes computers die because a board gives out, sometimes people just throw the wrong switch," she laughs.

Sometimes industrial firms call Brown-Awkward's company, Arthur D. Little, to design an entire architecture for them. "What that involves is saying, 'This is where you are now; this is what you've got to do to get back on course.' I tell them their mistakes, evaluate how things are being done in a particular department, and recommend software."

Sometimes it gets more involved. Clients often ask Brown-Awkward how to rearrange the software, and inquire when they are going to run out of power on their machines. The company has to be very specific about its market-expansion plans. "Then we give them the range. We tell them that there's a family of machines out there that run certain types of operations. We give them the pros and cons of switching to a new machine," Brown-Awkward explains.

For example, a company with two subsidiaries was receiving requests from one of its operations departments for more money. The department needed a bigger machine. Management wasn't sure of the request, so it contacted Arthur D. Little. "What we did was look at its data beyond the short-term, adding, say, five years of extrapolation to it." Brown-Awkward claims that it is necessary to go beyond the original parameters. "If you give the firm the machine it's asking for now, one year later it'll be asking you for a bigger machine."

After looking at the data, Brown-Awkward showed management graphs and slides of number crunchings, and then gave the company a list of a family of computers that would meet the bill. "We never recommend a specific computer," she adds. "We let the company make the ultimate choosing. We also don't get involved in budgets. We just advise what will work technically and what won't."

"Oddly enough, there are still a lot of small firms out there who don't realize potential of the microcomputer." For example, the space management department of a retail firm needed to expand. It wanted to find out from Arthur D. Little which construction companies performed what in the immediate areas. "All we did was tell them about the construction data base and give them a list of personal computers they could buy."

Brown-Awkward's job isn't all resource management. Last year she participated in a software survey. Normally, research for user software (like floppy discs) follows certain patterns. A company will list its requirements to the developers who then design the programs, encode the discs, and implement them through a wide barrage of tests. Brown-Awkward's survey wanted to find out whether the same procedure followed on imbedded-product software, the kind that's on microchips the user never sees, how the chips are put together, and how long each phase takes. Brown-Awkward queried 12 high-tech companies nationwide to find the answers. What she found out was that if these three factors are present during project development — lack of published standards, lack of clearly stated requirements, and poor internal communications — then the project would most likely fail. If only one, or even two, are missing, it may succeed.

Quite often Brown-Awkward's job involves researching and recommending a wide variety of that newest addition to the typical office, the personal computer. How does she feel the microcomputer revolution has affected the average small company?

Brown-Awkward finds a lot of conservatism among some of the older executives. A lot of new people in financial departments are requesting personal computers so that they can get the day's data immediately through the use of a modem. Top management calls ADL, who refers them to Brown-Awkward. "We tell them, 'Hey, your new guy is right! He can make his computer connect to these data bases, fill everything in, put all the pieces together, and give you whatever parts of the information you want — probably in half the time, too.'"

Quite often when consultants deal with corporate executives, they find their style is almost as important as the information they possess. "Val helps them organize their thoughts," says Paula Loring, who used to work with Brown-Awkward at ADL and was national president of the Society of Women Engineers (SWE) from 1978-1979. "And if there's something she doesn't completely understand, she inquires." Among the questions Loring has heard Brown-Awkward ask clients are: "When did you start this project? When did you finish? How long did it take? What went wrong? Who did you tell about this problem?"

Where does Brown-Awkward see the industry going? Is there still as

much need for computer programmers and engineers as there was in the seventies?

"The market is moving towards software," she explains. "There's a physical limit on how compact you can make the hardware. Quantum physics — how close you can put the electrons without interference — has forced us to put the conductive materials very close together. Software is the growing field — how to make the personal computer more 'user friendly.'"

According to Brown-Awkward, cost effectiveness is on everyone's mind now. Companies are most concerned about efficiency, compactness, speed, and program memory. However, the biggest worry is cost, but program generators have taken a big step in solving that.

"Prior to program generators, a force of programmers sat at large banks and insurance companies creating code. Now the generators can do that. All the user has to do is give the machine instructions in an outline form and it will put out a program." By 1990, Brown-Awkward expects most large firms to have these handy devices which will greatly enhance accounting and billing procedures.

"There will always be a need for programmers at software houses. There are many programs that generators just can't create. Scientific programming is one field that you must program manually because of the algorithms needed for radar equations, etc. But those students considering working as programmers for large banks and financial firms... I'd advise them to take a hard look elsewhere."

Brown-Awkward first became involved with the Society of Women Engineers while she was working at Mitre Corporation, the job she held prior to her present one at Arthur D. Little. She enjoyed the physics, math, and computer work at Mitre, but craved interaction beyond problem definition and solving. "I felt there had to be something else I could do, something I wanted to do all along. That was work with people."

"Then I met Paula Loring, who was national president of SWE at the time. She wanted me to get involved." Unfortunately, working full time during the day and going to school at night (she was still working on her master's degree at Northeastern) sapped up her free time. "I didn't even have time for a personal life," she says. "I can remember romantic evenings studying at the library with my husband."

Her involvement in SWE — giving speeches to undergraduates, working on mailing lists and all other organizational details — had to wait until she got her degree.

"After graduation," remembers Brown-Awkward, "one of the first things I did was to tell Paula, 'Okay, I'm ready.'" Her first task involved sending certificates of merit to high school students for outstanding achievements in math and science. "I remember sending those letters of congratulations and calligraphing each award individually."

In her second year with SWE, Brown-Awkward was elected recording secretary. She found the job interesting, but sometimes incon venient. She had just taken her job with Arthur D. Little, which, to date, has involved travel to Houston, Cincinnati, Chicago, Los Angeles, even London. "It made it very difficult to do everything I was supposed to, like recording all the business meetings, sending the notes to the national office, etc."

One of the SWE activities Brown-Awkward enjoys most is talking to college freshmen about the organization. "They're always either asking or thinking, 'What can this do for me?'" Foremost, she maintains, SWE can dispel the notion that anyone who studies hard at math and physics is somehow abnormal. "You don't have horns," she is fond of telling them, "because you happen to understand those equations. You're simply a normal person who happens to be good at this particular skill."

She urges the young people to join SWE not only because it puts them in touch with others who share the same goals, but because it brings them closer to those goals. Through meeting and talking to other engineers face-to-face, students can see the type of person the field creates, listen to their beliefs, and perhaps even dispel a few romantic notions of engineers as superhumans.

"Val is a superb role-model for the students she works with in SWE," says Loring. "She's the most honest person that I know. She's really down to earth; she doesn't pull any punches. I guess that's what SWE's really about." Loring added that Brown-Awkward not only has a sense of priorities about what should be done, but also backs up her opinions. "If you disagree about something, you'd better be prepared to defend your position, or you're going to hear about it!," Loring added.

What advice does Brown-Awkward give students who have decided to become engineers? One would expect her to emphasize studying hard, developing a good memory, or do outside reading in science and math. She does say these things, but what she emphasizes is quite different.

"You've got to pay your dues; you can't be 'top dog' right off. There are a lot of people out there with degrees which doesn't mean a thing. You've got to know how to apply what you know."

Like a true engineer, Brown-Awkward is goal-oriented. She solved her career dilemma in the same way she finds a bug in a software program. "I laid out my life, figured out what I wanted to do, and found out for myself what worked and what didn't." EO