

The Human Side of
Statistical Consulting
by Boen/Zahn (1982)

CHAPTER 4

The Ideal Consultant

The committee of nine on training the industrial statistician chaired by Snee et al. (1980, p. 67) includes five members who are industrial statisticians. It offers a list of twelve attributes of an effective industrial statistician. "Effective" is much too modest, in our opinion. Anybody who can do all twelve well is ideal. Let's take a look at the list. The effective (or ideal) industrial statistician

1. Is well trained in the theory and practice of statistics
2. Is an effective problem solver
3. Has good oral and written communication skills
4. Can work within the constraints of the real world
5. Knows how to use computers to solve problems
6. Is familiar with the statistical literature

7. Understands the realities of statistical practice
8. Has a pleasing personality and is able to work with others
9. Gets highly involved in the solution of company problems
10. Is able to extend and develop statistical methodology
11. Can adapt quickly to new problems and challenges
12. Produces high-quality work in a timely fashion

We agree that all these attributes are relevant. It's a fine set. Nothing is left out. But it raises one giant question: "What are you going to do with this list?" It probably intimidates you. It intimidates us. (By the way, we are not industrial statisticians. We are professors in universities in departments of biometry and statistics. However, our identities in our universities are largely as consultants. We do consulting, teach it, give talks about it, and publish papers about it. Boen directs the Biometry Consulting Laboratory at the University of Minnesota. It's self-supporting and is a source of education and support for graduate students. All clients pay for service; no free work is done for any students and very little for faculty. Clients have to be satisfied or the Biometry Consulting Laboratory will fail. He also has a small extramural consulting practice. Zahn works in the Statistical Consulting Center at Florida State University and has a much larger private consulting practice.)

APPLYING THE LIST

Let's go over the list, item by item. Boen will grade himself on each.

Training

(1) Is well trained in the theory and practice of statistics. I know *about* most of the areas of applied statistics, but some of my knowledge is terribly skimpy. I've tried a few times to learn about time series and factor analysis, but

never got around to it. I certainly can't do them. The fact is, I just avoid those areas. I refer a client who needs time series help to another statistician. As for clients who demand factor analysis, I first try to talk them out of it. If I can't do that, I refer. As to how *well trained* I am in the theory and practice of statistics, I don't know how to answer.

Solving Problems

(2) Is an effective problem solver. I'm definitely in favor of being an effective problem solver. I hope I am one. I know I'm not effective for every client, having messed up a few, making them worse instead of better. Sometimes I've told my colleagues what I did for such and such a client and been told my solutions were dumb. Sometimes they were praised. Most of my clients thank me and pay their bill. Many times I think I've been clever and made a silk purse out of a sow's ear (this is much easier if you start with a silk sow), and the client has been absolutely rescued from a disaster, whether he knows it or not. Frankly, I think I'm pretty good at problem solving, depending on how you define the problem. Maybe everybody thinks they're good at problem solving.

If there's anything hard to get straight, it's what the problem really is. You could say about a client's problem that the *problem* is one of getting *something* done. You could also say that the *problem* is one of fitting a good model. It must be like the blind men feeling an elephant, with distinctly different perceptions of the men feeling different parts. Everybody thinks they're logical, too.

Communicating

(3) Has good oral and written communication skills. How are you at these? I enjoy oral more than written communication. Oral is less work; I can watch people's reaction and listen to their tone of voice. It's much more sociable, which I like.

One of the big questions in consulting is what should be put in writing? We'll deal with that later. The question here is how good do you have to be to get high marks as a consul-

tant. We rate communication skills as being very important in consulting, particularly with respect to the emphasis given it in most master's programs in statistics. It's even become a new motherhood, with everybody saying that we need more communication around here. Communications is one of the skills at which everybody thinks they're good, particularly if others would just pay attention.

The question for you is whether you should work on your communication skills, which implicitly requires you to ask if you are good enough already, and, if you're not, what are the costs and benefits of trying to improve.

Facing Reality

(4) Can work within the constraints of the real world. This is a vital competency. We all have *some* difficulty with harsh realities (for example, the imminence of our own death), but one problem certain to break the most gifted statistician-scientist who wants to consult is the stark reality of the consultant's real world. These realities include constraints of time, money, personalities, and company politics.

Using Computers

(5) Knows how to use computers to solve problems. This depends on your situation and whether you do the computing or you get someone else to do it. It's vital that it be done, and done well. I don't know how to program, but I get it done by people who work for me. We'll talk later about arranging for coding, keypunching, and programming.

Keeping Current

(6) Is familiar with the statistical literature. This is an area of guilt and anxiety for me. I'm just not keeping up. It seems hopeless, with all the new statistics papers being published. I read the tables of contents in *Biometrics*, *Journal of the ASA*, and the *American Statistician*. I usually read some book reviews, a couple of letters to the editors, and some

nontechnical papers in the *American Statistician*. I try to understand the essence of one paper a month, but I don't actually *study* technical papers anymore. Maybe I will again someday, but right now I'm burned out.

Understanding Reality

(7) Understands the realities of statistical practice. I think I do. Otherwise, where would I get the gall to write this book?

Congeniality

(8) Has a pleasing personality and is able to work with others. My answer is no and yes. There are people who like my personality, but they are either of high ego strength or insensitive. I do well in some long-term relationships, but my personality is not pleasing. I really turn some people off, particularly those who need continual reassurance. As for working with people, I am so-so. There are several people I intimidate. If I *work at it*, I can reassure even the most frightened person in the short run. It's amazing how well some of the new psychology techniques work, even when I'm in a bad mood and have to get along with a client, a peer, or my family.

Getting Involved

(9) Gets highly involved in the solution of company problems. I occasionally get very involved, but generally not. Most of my consultation is "quick and dirty." I prefer it as a life-style, with a wide variety of people and situations. Some of my colleagues give me a hard time for being a shallow consultant, though, and I have attacks of guilt on this point. I get defensive and tell them that if I got "very involved" with every client, there'd be many potential clients who would never see a statistician. I think people are either deep or broad, depending on their personality. I won't change unless put under great pressure.

Contributions to the Field

(10) Is able to extend and develop statistical methodology. I've done some of it. Professors are under the gun to do it, as it should be. Maybe I did just enough to get promoted and tenured. I'm not that interested in it anymore. I've fallen behind in the journals so badly that most of my ideas turn out to be already known, published about forty years ago. As for new statistical methodology for clients, I've been terribly burned. I used to cook up some new analyses for their data, but I scared the clients to death. They were very honest. They wanted tried and true methods that they wouldn't have to defend.

I tried it again last year, using a "better" analysis. The client had a funny look on his face, but went along with it even though it cost him more money. He even came around to liking it, until he sent his results to a journal and got them soundly rejected. The editor and referees had never heard of the method. They insisted that a straight line be fit, instead of my fancy, monotonic, bounded curve with maximum likelihood estimates. The client forgave me, but I pouted for a few days and resolved again to use only standard procedures on clients.

Adaptability

(11) Can adapt quickly to new problems and challenges. It depends on what is meant. I think I'm pretty good at this and actually thrive on it. I get bored easily and like new ideas and situations, given that the latter aren't too traumatic.

Promptness and Quality

(12) Produces high-quality work in a timely fashion. I think it's on time for the most part. Being on time is something I take pride in. Now for the high-quality part. It's not bad, overall, but it certainly could be of higher quality. I usually avoid writing a report for the client when I can. The real reason is a combination of laziness and trying to do too many things.

APPLYING THE LIST TO YOU

How were your grades? I give myself four As, three Cs, and the rest Bs, and I've been consulting for eighteen years. I expect to remain inadequate in several areas, partly due to lack of ability, lack of ambition, and some deep-seated character and personality shortcomings.

Everyone is uneven in their strengths. By now, your character and personality are pretty well set. They are subject to change with major life events, but in the short run you are what you are, and that's it. The problem is somehow to maximize the use of the raw material—you—to become the best statistical consultant you can.

It's up to you to choose your goals. The twelve competencies compiled by the Snee committee make a fine, comprehensive list. The consulting bibliography of Woodward and Schucany (1977) contains thirty-seven papers, many written by active, well-respected consultants. Each of them wrote his or her own views of what's important in consultation. There is definitely some difference of opinion among those authors. Daniel (1969) puts mathematical statistical knowledge as the fourth most important competence for a consultant, preceded by scientific background of *the consultant*, attitude and general manner toward technical people, and experience with real data and real experiments, in that order. Daniel says the better consultant enjoys cooperative enterprise and has little need to be dominant. He particularly cautions against brashness, arrogance, and imperiousness. Another consultant, Marquardt (1979) emphasizes the importance of total project involvement to statisticians who want recognition in their company.

After reading all we could find of the statistical consulting literature, we arrived at the following conclusions:

1. The more mathematics, statistics, computing, and science you know, the better.
2. Academic knowledge of the four subjects is not enough. There is a separate skill of *applying* that knowledge. Every author says experience is necessary to develop it.

3. There is more to consulting than having and applying knowledge. Attitudes toward client and self are important. Business matters enter in.

Of the three broad categories—technical knowledge, skill in its application, and people and business problems—you already know how to achieve the first. It comes from academic activity like studying books, talking, attending courses, reading journals, and publishing papers. In other words, it's what colleges and universities do. At your graduation ceremony, somebody gave a stirring commencement address telling you, among other things, to keep studying. You already have several books and can buy more. You can subscribe to more journals, too. Everybody who's gone through college knows what this is and how to do it. *Whether* you do it, as a graduate, is up to you.

The second category, applying that knowledge, is learned by experience. Most beginning statisticians need supervision under a seasoned practitioner. What we mean by application skill is things like choosing an analysis for a messy problem. (When you didn't design it yourself, the problem is always messy.) You can think of three ways to do it, each with various strengths and weaknesses, including robustness, explainability to the client, and acceptability to the statistical community. Except for getting a lot of experience, there's no agreed-upon way to learn it. There certainly is such a thing as talent for doing it. We're convinced temperament plays a key role. To *enjoy* doing it requires a *modified* perfectionism; it's doing your best in the face of many restrictions, without an anxiety attack. The good applier is clever at making do with the tools at hand. In this book, we shall touch on the skill of application, but we shall not tackle directly the problem of precisely what analysis to use for particular consulting problems. We avoid advising you just what analysis to perform for what messy problems because we have no particular wisdom to offer and, by its very nature, the "just what to do" for real problems will always be the central topic of applied statistics, one destined for endless debate. There will always be the conflict of philosophical differences of parametric versus nonparametric, questions of

the utility of hypothesis testing, whether to use decision theory, and so on. These issues are going to stay hot and unsettled for the foreseeable future. In illustrating points by examples from our practices, we shall roughly describe what analysis we did. We know full well that our having done it does not make it "correct." As a matter of fact, one of our main points is that there is never a unique correct solution to a real problem. The effective consultant has to face that fact.

The focus of this book is the third part of consulting—the business and people problems. We do stick our necks out, in a directive manner, and offer some specific principles for consultation. They are *extremely* practical.

SUMMARY

- There are plenty of jobs for statistical consultants who fall short of the ideal.
- You can't know everything.
- You're going to make mistakes.
- Hang in there and keep plugging.