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PROFESSIONALISM & BUSINESS

“We’ve got a great profession to practice but a lousy business to be in.”

I used to teach a graduate course entitled “Issues in Engineering Management and Practice.” Now I teach it as a seminar series in Engineering Management, which is attended primarily by practitioners. In both cases the preceding quote is the first thing I discuss with students. Why? Because most young engineers and surveyors are optimistic idealists who derive self-satisfaction from solving complex technical problems. Yet they are naïve when it comes to the business aspects of a successful firm, earning a client’s respect, and effectively working with others. Overall, surveying and engineering schools have done a great job of turning out excellent technicians who have had little training in seeing the “big picture,” solving people problems. A high level of idealism and optimism is certainly healthy. It is required to create innovative solutions for our clients and successful projects. Understanding who we are as professionals, how the business of professional practice interacts with idealism and our client’s problems, and where we fit in within our firm (or should we risk going out on our own?) are all very important parts of being a professional surveyor or engineer. My personal, and possibly over simplified, definition of a professional versus a technician is: a technician solves technical problems and a professional solves people’s problems. This chapter will explore various characteristics of being a professional, the difference between a technician and a professional and how a professional interacts with the business of professional practice.

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WHAT IS A PROFESSIONAL SURVEYOR OR ENGINEER?

How do professionals compare with a nonprofessional? It is generally understood that professionals, whether doctors, dentists, attorneys, accountants, architects, engineers, or surveyors, has advanced education and experience and is licensed to practice by the state where they reside and other states where they may also practice. For engineers and surveyors, an advanced education is not required by most state licensing laws, although many have obtained additional education beyond their primary degree. The National Council of Examiners for Engineers and Surveyors (NCEES) has developed model laws for both professions, which are used by most states as the basis of state statutes that regulate practice and assure the public that minimum standards have been met in order to ensure the public health and safety. These laws state that professional practice is based on a “three-legged stool.” The first leg is an ABET-EAC (Accreditation Board for Engineering and Technology—Engineering Accreditation Commission) accredited bachelor degree for engineers and for surveyors an ABET-TAC (Technical Accreditation Commission) associate’s degree or an ABET-EAC bachelor degree. The second “leg” is examinations. Both engineers and surveyors are required to take two levels of examinations. Engineers generally take the Fundamentals of Engineering Exam, or FE, exam near the end of their junior year in college, fall of senior year, or shortly after graduation. Passing this exam gives the graduate the right to use the title “Engineer-in-Training,” designated by “EIT” after their name or, in some states, “Intern Engineer” with the designation “IE.” Surveyors take the Surveyor in Training exam upon graduation or shortly thereafter. Surveyors who pass the exam may use the designation “SIT” after their name. Neither the engineer nor surveyor has the legal right to individual practice after passing the initial exam. They still must continue to gain experience by working under a licensed professional. Members of both professions take a second exam upon obtaining additional experience “satisfactory to the board.” Experience is the third “leg” of the stool. For an engineer, this means a minimum of four years of experience “of progressively increasing levels of complexity and responsibility,” while being overseen by a licensed engineer supervisor. In some cases, a state board of licensure may require one year or more of additional experience if they deem that the engineer’s initial year of experience to be not at a professional level or increased level of complexity. This may happen to a young engineer employed in government or construction but rarely happens to those employed by consulting firms. Surveyors are required to have either two or four years of experience, depending upon whether they possess an associate’s or bachelor degree. Once either professional has the required experience, they may sit for the professional part of their exam. The engineer’s exam is known as the Principals and

Practice exam and the surveyor's exam is known as the Professional Practice and Legal Exam. After successfully passing the exam, engineers become professional engineers and may use the designation "P.E." Surveyors upon passing their exam become licensed land surveyors with the designation of "LS" or "LLS," depending on the state where they practice.

The previous paragraphs explain the technical and legal requirements for becoming a professional, but how does the public determine who is a professional and who isn't? First, most professionals refer to those who purchase their services as "clients" not "customers." A subtle difference, but client implies personal service and attention given to individuals. Customers are all generally understood to be all the same and receive only minimal personal service. Clients may be individuals, companies, or government agencies. The term client implies a higher level of respect, understanding, and concern for the problem that needs to be solved. It also implies a high level of service and attention to the client's needs, since the professional possesses a high level of technical skill and knowledge that the client generally doesn't have or, in many cases, doesn't even understand. The term client also implies a level of trust that customers generally don't have with the provider of goods and services.

The attributes of a profession have evolved over the years. In the July 1957 issue of *Social Work*, Ernest Greenwood, Professor Emeritus, UC Berkeley, published a paper describing the five attributes of a profession as:

- Systematic theory
- Authority
- Community sanction
- Ethical codes
- A culture

While Greenwood's paper is over 50 years old, it is my opinion that his five attributes remain the foundation for describing a profession. More recent writing has only built upon and amplified these basics.

- *Systematic theory.* Each profession has a systematic theory as its basis, upon which the profession is defined. The engineering and surveying professions define themselves as being based upon theories of mathematics and science. Educational accrediting agencies such as ABET prescribe specific criteria as the educational foundation for practice of the profession. More recently, the American Society of Civil Engineers, in 2005, published the first draft of the Body of Knowledge, which, in addition to ABET criteria, prescribes 15 criteria as the basis for professional practice in civil engineering.

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- *Authority.* Greenwood states that “In a professional relationship, the professional dictates what is good or evil for the client, who has no choice but to accede to professional judgment.” While much has changed since 1957, including an increase in public skepticism of professionals, nonetheless professionals do have advanced and specialized knowledge upon which their clients depend in order to resolve their problems.
- *Community sanction.* This is the right, some say the obligation, of the profession to govern itself. This is evidenced in all states through professional licensing laws and licensing boards. The premises of the law being to “protect the public health and safety.” In recent times, the public skepticism of professions effectively regulating themselves has been shown in licensing boards being required to have “public members” on the boards in order to represent the public interest.
- *Ethical codes.* Surveyors and engineers have codes of ethics that were adopted by their respective professional societies. These govern professional-client relationships and professional-professional relationships. Provisions in codes of ethics that restricted professional business practices and fees were struck down in the 1978 Supreme Court decision *National Society of Professional Engineers v. United States* as violations of the Sherman Antitrust Act. Many state licensing laws have incorporated codes of ethics into their licensing law in an effort to improve the ethical behavior of engineers and surveyors. Overall, professionals and the public believe that codes of ethics are not uniformly enforced and have little effect on unprofessional behavior.
- *A culture.* Greenwood also states that a “profession culture” exists. It consists of social values, norms for professional behavior and symbols of practice. He says that social values are shown in the effort of the professions to regulate themselves for the public good. Norms of professional behavior now are largely defined by court decisions as to what does or does not constitute a “standard of professional practice.” Professionalism is also defined by symbols that constitute history, professional dress, insignias or emblems, and profession jargon or buzzwords. Engineering symbols, generally known to the public are a slide rule, drafting scales, triangles, and more recently computers. The most common surveying symbols are the compass, transit and steel tape, and drafting equipment. Each engineering and surveying society also has its own logo or insignia.

Dealing with Clients in Trust and Business

Who are the clients that professional surveyors and engineers provide services to? Both professions have many clients. These can be private

individuals who engage the professional on a one-time basis to provide a boundary survey of their home lot or it may be an engineer to design a septic system or investigate a leaky roof or cracked foundation. The owner is truly in the position of needing to trust the professional, since it is unlikely that he/she will have detailed knowledge of the service being provided and sometimes even of the problem to be solved. Clients also can be developers who engage engineers and surveyors regularly and often engage the firm in a position of trust for project after project. These clients are knowledgeable and sophisticated regarding the professions and the services needed. Clients also can be large corporations or government agencies, where the professional is engaged after the evaluation of qualifications or submission of a competitive fee. In this instance, the board or committee that hires the professional may not be the client contact or the direct recipient of the professional's services. The ultimate recipient of the services may be a sophisticated professional such as a staff engineer or surveyor or an experienced maintenance director who understands the scope of work and the complexity of the problem and empathizes with the engineer or surveyor. The client also may be a manager or director who has little interest in the details and only wants to know that the problem is solved or the project is complete. There may be little or no opportunity here for establishing a long-term relationship, and the type of agreement may make it difficult for the engineer or surveyor to establish a high level of trust with the client. I've also found, through my years of practice, that professional engineers and surveyors deal with their clients very differently from the way companies deal with customers. Many engineers and surveyors, especially sole practitioners or those in small firms, are so interested in the technical challenge of the problem to be solved or the social benefits of the project that they begin and sometimes even complete an assignment before they even discuss the business arrangements or fee with their client. In fact, the New Hampshire Board of Licensure for Land Surveyors states that one of the major complaints against surveyors is not technical competency but a lack of clear business communication by the surveyor in terms of fee for services for a particular project. Until I'd been in private practice for 10 years I also thought that doing the project and discussing payment sometime later, often after the work was done, was the way the entire business world did business. When I decided to return to school to obtain an MBA, I learned that the rest of the business world did things quite differently. I was surrounded by business professionals from many other industries and practices and quickly learned that businesses outside of the practice of engineering and surveying work out the details of the business arrangement in terms of what will be done, when it will be done, and how much it will cost *before* they begin the work. If the fee or product cost is too high, the customer goes elsewhere. John Bachner, a noted author on engineering professional

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practice says “It is the design professional’s lack of business acumen, not greed that creates so many of their problems.” Bachner also states, “It is not unprofessional to lack business skills. It is however unprofessional to recognize a shortcoming but then do nothing to correct it.” How true that is!

Professional Practice Is Not 8:00 to 5:00

How else are professionals distinguished from nonprofessionals? There is little discussion regarding the work ethic of professional surveyors and engineers in professional literature and even less discussion during our professional education. When I graduated from university many years ago I went to work for a state department of transportation. The standard work hours were 8:00 AM to 5:00 PM with an hour for lunch. I never quite caught on to the 8 to 5 routine, since often I’d be working on a challenging design problem, which I was compelled to finish before I went home, or I found it more efficient to check the work of technicians working on my project in the quiet evening or early morning when no one else was around. I also felt that deadlines were important and my boss expected them to be met. If it required a little more time to meet a submission deadline, I’d put in the time necessary to make it. I was a salaried employee, not hourly so my employer received the direct benefit of my extra effort. Some of my fellow engineers didn’t see it that way. They’d begin winding down, clearing their desks, and rolling up their plans at ten minutes of five, and you didn’t want to be coming in the drafting room door as the clock struck five and the masses were exiting. Now most of these fellows (in those days there weren’t any women engineers) were good engineers, but were they really professionals? Does the surgeon leave his patient on the operating room table when it’s time for lunch or does an attorney stop his cross-examination when the clock strikes five o’clock? Needless to say, I didn’t find the DOT atmosphere conducive to my definition of professionalism and after a few years I moved into private practice.

It is my contention that you can’t teach professionalism or a professional work ethic in surveying or engineering schools. Many programs now do a much better job trying to simulate real-world problems, issues, and clients now than when I was in school. Most programs require students to do at least one group project per semester. Usually these projects are closely tied to real-world projects, and the student groups are required to define different roles and responsibilities for each member of the group. Generally, they also are required to make presentations to faculty and sometimes practitioners or interested members of the public. This is fine, but I recently had to remind a summer intern that wearing his baseball cap and blue jeans to a client presentation wasn’t up to the level of professionalism that our clients expect. Young engineers and surveyors in our firm quickly learn that clients pay their salary,

and close attention to personal appearance, client projects, schedules, and first class client service are always required. Project managers in our firm, who are licensed professionals, often take young engineers to evening meetings where their projects are presented to regulatory boards and the public. At these meetings, the personal appearance of a professional, appropriate to the local custom, is required if you want to earn the respect of the approval board or agency and effectively represent your client. Surveyors in our firm also understand that if they are working on a survey that is almost done at 4:00 PM, they need to stay in the field a little longer and finish the assignment rather than spend an additional trip the next day for an hour and a half of field work. *Professional practice in the engineering and surveying profession is not an 8 to 5 job!*

THE DUAL CAREER PATH

Does a dual career path really exist? One for those who are only interested in the technical side of their profession and one for those who find the challenges of managing people and projects to be just as interesting as the technical side of the project? Can you be a real professional and only interested in the technical aspects of a project? I often hear young surveyors and engineers say that they chose their career because of their preference for mathematics, science, wanting to work outdoors, and the self-satisfaction received from solving technical problems. In other words, "I'm not interested in sitting at a desk eight hours a day, or I really love CAD drawings and solutions I can produce at my new work station but don't bother me with schedules, budgets, and all that client stuff." Louis Berger, former chairman of Louis Berger International and recipient of the ASCE, Parcel-Sverdrup Award in engineering management in 1995, stated in his acceptance speech that engineering managers currently make up 22 percent of the 2500 people employed by Louis Berger in 80 countries throughout the world. These include 2 percent of their staff who run independent offices, 4 percent who are capable of managing large projects, 6 percent who manage small projects, and 8 percent who run small design teams of 5–10 people. He believes that firms of the future, both small and large, will require an increasing number of engineers who have excellent management skills. He uses the example that many clients now insist that presentations at interviews where the firm is selected be given by the team who actually will work on the project. This requires that project managers and senior engineers have excellent communications skills both written and verbal. Berger stated that "regretfully, it also eliminates some civil engineers who can not present themselves well verbally." The answer to the dual career question is a definite yes, but it also becoming clear that those

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engineers and surveyors who bring work into the firm and successfully manage people and projects will progress higher up the corporate ladder and receive larger salaries over their lifetime. Since surveying and engineering curricula put very little emphasis on the soft skills required of management, surveyors and engineers must learn these on the job, through self-teaching or through additional formal education in management such as an MBA or master of engineering management degree. Those who elect to stay in the technical area of the profession must also continue to increase their technical expertise if they are going to move upward in their career. This also will require additional education and training, often via a formal master of engineering or surveying program. Typical job titles on both career paths in our firm are as follows:

Technical Career Path

- *Entry level.* Junior engineer (EIT) or survey instrument person (SIT)
- *First step/promotion.* Project engineer (EIT) or survey part chief (SIT)
- *Second step/promotion.* Senior project engineer (PE) or project surveyor (LS)
- *Third step/promotion.* Chief engineer/technical leader (PE) or survey department leader (LS)

Management Career Path

- *Entry level.* Junior engineer (EIT) or survey instrument person (SIT)
- *First step/promotion.* Project engineer (EIT) or survey party chief (SIT)
- *Second step/promotion.* Senior engineer/project manager, small projects (PE) or senior surveyor/project manager, small projects (LS)
- *Third step/promotion.* Senior engineer/project manager, large projects (PE) or senior surveyor, large projects (LS)
- *Fourth step/promotion.* Senior engineer/department head (PE) or senior surveyor/department head (LS)
- *Fifth step/promotion.* Principal engineer (PE) or principal surveyor (LS)

We also hire young engineers and surveyors to work as summer interns (usually the summer between junior and senior year). This gives us an opportunity to evaluate young professionals and determine if we'd like to offer them a job upon graduation. It also allows the interns to "try out" the profession to see if this is really what they want to do for the rest of their career. We've had some interns who have determined that consulting engineer and the engineering profession is not for them. It is much better for

them to find out before their senior year and graduation than after they've graduated.

As you can see, the technical career path maybe somewhat limited in a small consulting firm, and the management career path can lead to a higher-level position. It is not that consulting firms reward those on the management path more than those on the technical path, both are needed for a firm to be successful. Those who provide a high level of client service and bring in new work are essential to survival of the firm. Either career path can lead to ownership within a firm that recognizes the important contribution of both paths. Ownership will be discussed in a later chapter.

BEING AN ENTREPRENEUR VERSUS CLIMBING THE CORPORATE LADDER

Trying It on Your Own

Some surveyors and engineers feel that they are working hard for the benefit of their clients but their efforts are not being recognized by their boss or the firm's principals. Some feel that if they are putting in 50–60 hours per week and they should reap some of the benefits and profit themselves. Some feel that coworkers are doing less than their "fair share" and are causing a drain of the firm's profits by constantly finishing projects over budget and behind schedule. Others feel that they have technical and leadership expertise, and others recognize them as the "go to" guy when the going gets tough. No matter how you put it, some of these individuals feel as though they are getting a raw deal and may consider starting their own firm. What are the key characteristics necessary to head out into the uncharted waters on your own? The first is that you need to be a risktaker, an optimist, and have a mission. When I started my firm 35 years ago my mission was to control my own future and to create a small consulting firm that would provide basic civil engineering services in a rural community where none had existed in the past. I believed I had the technical expertise, being both a licensed surveyor and engineer, as well as the desire to make a difference in the community where I lived. I didn't have a business plan, any clients, office space, or equipment and had only a crude market survey that showed a reasonable chance of success if I worked hard. Was I a risktaker or just idealistic and naïve? The answer didn't come for many years and, to be honest, I don't think it made any difference. What really counted though was the desire and ability to work hard 24/7 three hundred sixty-five days a year for the first few years, along with incredible optimism, shared by my family, our staff, and clients that the firm was having an impact in the community. Good people and communication skills,

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both written and verbal, also helped. I also took the opportunity to learn as much as I could from other successful engineers whenever I had a chance.

Another important consideration for starting your own firm is how do you finance a start-up firm? Lack of start-up capital is an almost universal problem with all small businesses. It causes most firms to grow at a rate much slower than market forces may allow. It was much easier when I started than it is today. We had no mortgage payment, since we rented our house. My first office was also rented space, so capital outlay for real estate was the security deposit. In the “old days,” the only significant investments were a drafting table, survey instrument, steel tape, book of trig tables, and a calculator. The family car doubled as a survey vehicle, and there was no expensive investment in copiers, CAD workstations, networks, or sophisticated software. My first professional liability insurance policy cost \$200! I started working mostly by myself without health insurance for our young family and contracted help when I needed a survey crew. Things have changed, and if you are planning to try going out on your own, develop a simple business plan, including where the work will come from and your expected start-up cash flow and have significant savings (preferably enough to last a year without any income) or a rich uncle. I have heard of the owner of a recent start-up firm applying for as many credit cards as he could get and then maxing them out in order to fund his start-up firm. Obviously, this was very risky, but it probably was the only way he could manage, since bankers and investors seldom lend money to start-up firms based on the owner’s mission and commitment to hard work. Also, it doesn’t hurt to have a spouse who has a fairly secure job with a good salary and health benefits.

Climbing the Corporate Ladder

If risktaking and incredibly hard work with no pay and no benefits aren’t for you, consider what it takes to climb the corporate ladder within your present firm. What are your personal goals? Can you not stand to be without income for significant periods of time? Do you want to work 40–50 hours per week, have most weekends to spend with your family, and attend only an occasional evening meeting? Do you want to be a principal, leader, and owner of your current firm? Who is your competition and do you have what it takes? If the answer to many of these questions is yes, and you want to advance up the corporate ladder in your current firm, you may be in for almost as much hard work as you would if you started your own firm but with a salary and benefits and at considerably less risk. The most important way of advancing in your firm is to distinguish yourself from the rest of the pack. Become known as the “go to” guy or gal that the boss can depend on in any situation. A friend

once said, “If you’re not well educated, it pays to be versatile.” Some other key characteristics may include:

- Develop a leadership style that earns the respect of your clients and coworkers.
- Find a high-level mentor in your firm and emulate the behavior that brought him/her success.
- Communicate frequently with your boss and coworkers regarding client, firm, personal, and project goals.
- Take on unpopular or difficult assignments joyfully and accomplish them successfully.
- Learn how to delegate and accomplish much more than you can alone by utilizing the skills of others on your team.
- Establish a work ethic that gets assignments done with minimum follow-up required by your boss.
- Insist that your team only provide a high-quality work product.
- Provide first-rate client service on time and within budget.
- Bring in new work from existing clients, and play a key role in marketing new clients.
- Obtain an advanced degree in surveying, engineering, or business.
- Be a leader in your community outside of the firm. Serving on non-profit boards, coaching the little league teams, being a scout troop leader, and/or volunteering in the church or local soup kitchen will enhance your personal reputation and could even bring work into your firm.
- Give back to the profession through participation in professional societies and organizations. Start as a committee member, progress to chairperson, and go on to become an officer.

Does all of this sound like hard work? It is, but the reward can be prestige, financial success, and advancement to a high level in your firm with minimal risk compared to heading out on your own.

TYPES OF BUSINESS ORGANIZATIONS AND THEIR STRUCTURE

Legal Forms of Business

What legal types of business organizations are most common for surveying and engineering firms? How simple or complicated are they to set up? What

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are the advantages and disadvantages of each form of organization? A number of types of engineering and surveying firms exist, the simplest being a sole proprietorship and the most complicated being the corporate form. The different forms are:

- *Sole proprietorship.* There is no formal legal process to set up a sole proprietorship. It is one of the most common forms used when individuals start a new business. Taxes for a proprietorship are paid as part of one's individual tax return using IRS Schedule "C," which shows profit or loss from a business. Obviously, the proprietor is the owner and boss and keeps all of the profits as well as taking any losses. This can create difficulty with employees, promotions, and future ownership transition.
- *Partnerships.* Partnerships are made up of two to hundreds of people. Many older firms, particularly law firms, started as partnerships and some continue that form of business today. Partnerships can be risky, since in an equal partnership all partners share, risk liability, profit, and loss equally. This can mean both inside and outside of the business. A partner's individual financial problems could become a problem for the rest of the partners. For this reason, partnerships are no longer a popular form of business, and partnerships that are set up generally are limited partnerships, which limit the responsibility of each partner for the liability of other partners. Partnerships also pay taxes through an individual tax return. They do, however, have to file a tax form that notifies the IRS of the partnership income, assets, and liabilities. Each partner, in turn, receives a K-1 form, which reports their share of the partnership income or loss, and it is attached to their tax return. Partnerships also can create difficulties for employees. An employee who doesn't progress to the position of "partner" in a prescribed number of years often is considered to be a lower-level achiever and may leave the firm. Ownership transition is also difficult in a partnership, since there is no stock to transfer.
- *Corporations.* Corporations are created as legal entities to limit liability and to create stock, which, theoretically, is a liquid asset that makes transfer of ownership easier. Corporations also can borrow money and own assets in the name of the corporation. There are many types of corporations and some types are controlled by the laws of the state where they are set up.
- "C" corporations are the traditional form of corporation that most people are familiar with. They can be privately owned or the public can own them by trading stock on the market. The corporation files a tax return and pays corporate income tax on its profits or takes related

losses. Many surveying and engineering firms are organized as “C” corporations. Most firms make an effort to pay out most of their profits at year end by giving bonuses to principals and employees in order to avoid double taxation and minimize overall tax liability of the corporation. Ownership in a “C” corporation is available to anyone who purchases stock, so ownership transition is easy with a “C” corporation.

- “S” corporations are similar to partnerships in that they pay no corporate income tax and the profits flow to the stockholders where they are taxed at the individual level. They have the advantage of limiting liability to the corporation itself. “S” corps have a limit on the number of stockholders which may present an issue at the time of ownership transition. Many small surveying and engineering firms are organized as “S” corps.
- LLCs, or limited liability corporations, can be similar to “C” or “S” corporations in structure. The principal reason for setting them up is to specifically limit liability to the assets of the corporation itself. They may not be very effective for surveying and engineering firms, since laws governing professional practice in many states allow “piercing the corporate veil” in order for liability to flow directly to the licensed professional who is ultimately responsible for the work.
- “PAs” or “PCs” are professional associations or professional corporations organized under the specific business provisions of the professional licensing laws of many states. The licensing laws usually require the principals and/or stockholders of the corporation to be licensed professionals. For tax purposes, they can be “C” or “S” corporations. This may present some problems when a transfer of ownership to stockholders who are not licensed professionals is proposed.

Before deciding which form of business is appropriate for your firm, consult an attorney and tax consultant.

Business Structure

The operational structure of a business is independent of the legal form of business and generally relates to the type of client or service a firm offers. The structure often changes as a business grows, in order to take advantage of unique capabilities and interests of individuals. It also often changes when ownership changes. The traditional form of operational structure for a medium-sized engineering firm of 20 to 50 employees includes a president and various vice presidents, as shown in Figure 1.1.

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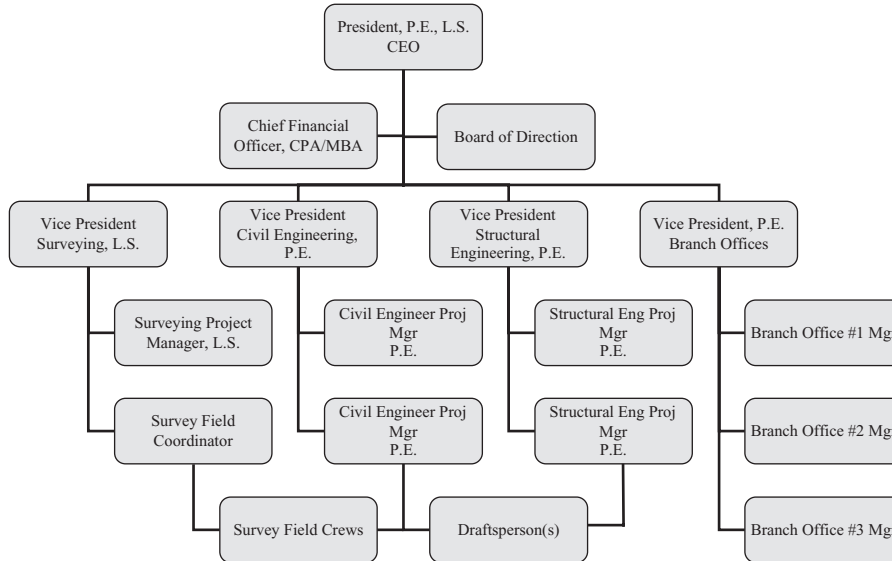


Figure 1.1 Organizational chart for a traditional medium-sized firm.

A simpler organization for smaller firms of 5 to 15 employees also follows. Note that in a small firm the same person may serve in more than one position, as shown on the organization chart in Figure 1.2.

Many firms today are organized as a type of organization that functions according to the needs of their clients. These organizations may offer services similar to those of a traditional form of business, but they are primarily

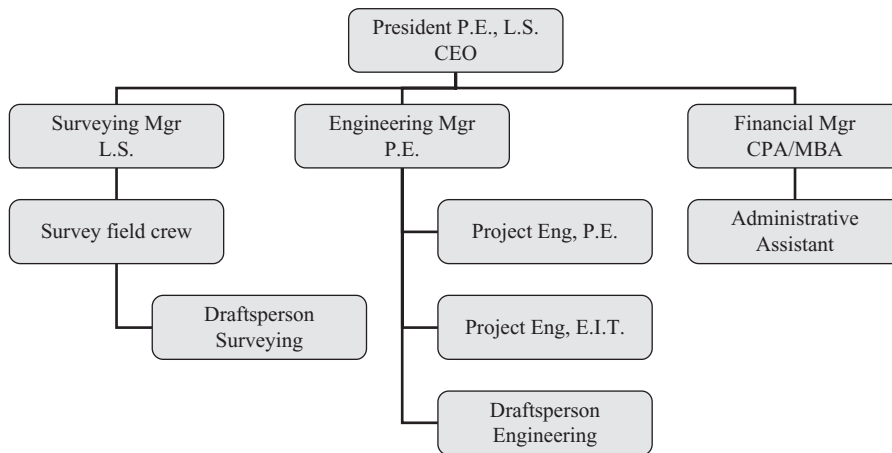


Figure 1.2 Organization chart for a traditional small firm.

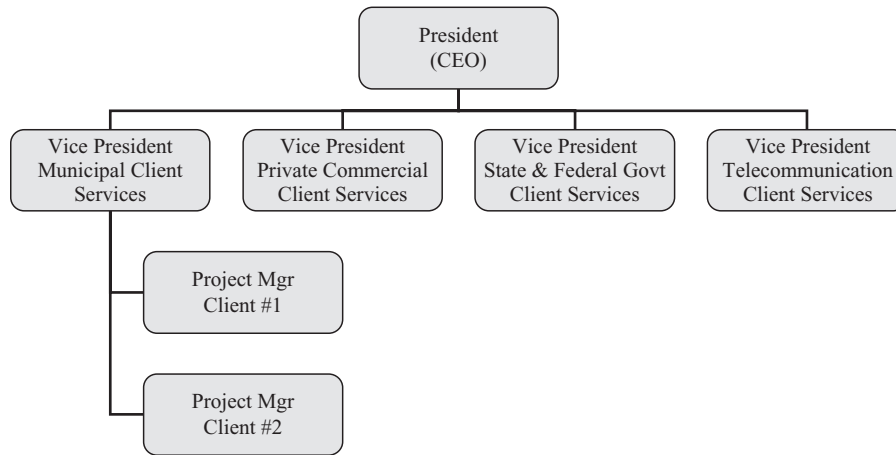


Figure 1.3 Client service-based organization.

Table 1.1 Structure of Organizational Matrix

Projects Resources	Project #1	Project #2	Project #3
Survey	•	•	
Geotechnical	•		
Wetlands	•	•	•
Environmental	•		•
Civil staff	•	•	
Drafting staff	•	•	
Administration	•	•	•
Construction insp.		•	
Owner	•	•	•

organized to serve specific types of markets or niches, as shown in Figure 1.3. Table 1.1 illustrates the breakdown of responsibility for three projects in a matrix organization. Engineering and surveying organizations are one of the last types of service organizations to change to client service organizations, which focus on client markets or niches.

Communication technology today allows firms to organize using a virtual organizational matrix for a single client or a specific project. In this arrangement, individuals contribute their expertise for a single project or client and then may move on to another organization for the next project or client.

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