

CONSULTING ENGINEERING IN THE 1980's: CHANGES, CHALLENGES, OPPORTUNITIES¹

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My topic today is intentionally broad. Engineers, involved in the challenging day-to-day work of our professional lives, sometimes find it difficult to take the time to stand back a moment and examine the broader view of where we are and, more important, where we are going.

As chief executive officer of one of the nation's leading consulting engineering firms, I can verify that the tendency, even at my level, is to become immersed in pressing short-term concerns. However, it is important for all of us to take time once in a while for a broader look at the business of consulting engineering and our roles in it. Today, I'd like to speak of what I see as the coming changes and challenges for the consulting engineering industry in the 1980's, in the context of my organization - Metcalf & Eddy.

In order to set the stage for the issues that I shall be discussing, let me begin by giving you a brief history of the firm. Metcalf & Eddy was formed in 1907 when Harrison P. Eddy and Leonard Metcalf set up practice at 14 Beacon Street in Boston. By 1927, the partnership had expanded and had outgrown its Beacon Street headquarters, so the firm moved to the Statler Office Building where it remained until the move to our current location on Staniford Street in 1975.

Leonard Metcalf & Harrison Eddy were men of exceptional talent and vision, and their practice, one of the first in America specializing in water supply and sanitary engineering, grew and eventually broadened into other fields of expertise. Both men, by the way, were presidents of the Boston Society of Civil Engineers.

In 1967, Metcalf & Eddy was acquired by Bangor Punta, which in turn sold it to Research-Cottrell in November, 1970. Research-Cottrell has its own 70-year history in the environmental field, primarily as an environmental management company. More recently the company has begun a program of diversification into the energy field to complement its leadership position in environmental management as described in the cover story for the September 4, 1980 edition of *Engineering News Record*.

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At the time of the acquisition Metcalf & Eddy was essentially a Boston firm with a New York office and a smaller operation on the West Coast. Today, the firm works throughout the world. Domestically, it operates through seven regional organizations including one in Hawaii, and 13 domestic offices. Internationally, it has project offices in five nations: Egypt, Saudi Arabia, Qatar, Thailand and Brazil. Billings have grown from about \$17 million to over \$45 million. The staff has increased from about 550 to around 1,000 today worldwide.

Metcalf & Eddy environmental engineering work has continued to be the firm's major area of activity since its inception in the early 1900's. Today, approximately 65 percent of our work is in the water and water management fields. The mix of other fields shows the firm's diversity: 20 percent of our business is in civil projects; 10 percent in the fields of transportation, land development, architecture and planning; and about 5 percent of our projects relate to the growing energy field.

With that introduction and background, let me turn to a discussion of the changes, opportunities and challenges which I feel consulting firms will face in the 80's. It will become apparent as we go through this review that the greatest single challenge before us is to recognize and adapt to change.

For example, it is doubtful that either Mr. Metcalf or Mr. Eddy would recognize the business environment in which today's engineer works, particularly the changed traditional engineer-client relationship which now is involved with many other parties such as federal and state authorities. The resulting forces, as well as other forces brought to bear on consulting firms, are bringing about change, whether we like it or not. I believe that recognizing and adapting to present and future conditions is something we must do, and do well, in order to succeed in the 1980's.

In taking you through my assessment of the important factors impacting our business, I will, in order, discuss changes, opportunities and challenges. Recognizing that it will be impossible to cover each category in detail, I plan to give you an overview of each with examples, where appropriate, to give you a better feel for the issues.

Change: External Factors

Let us begin with the subject of change in the environment within which we operate: I will discuss changes arising from external sources beyond the control of the firm, and those internal to the firm over which the management has control and responsibility. It is obvious that

external events to a large degree influence and dictate the need for internal change, so there is an interrelationship between the two. Some of the key external factors which I will touch upon are shifting national priorities, increasing competition between consulting firms, and the shortage of engineering talent.

One of the important external influences on our business is the shift taking place in our national priorities which has in turn brought about changes in many of the traditional consulting engineering markets. Whereas in the 1970's environmental issues and achievement of a better quality of life received the highest priority, today the emphasis has been and is being shifted to energy, inflation, and national defense.

- In the energy field, a major need exists to move more toward self-sufficiency by extending our present energy supply through conservation and through development of alternate energy sources. We are the only industrialized nation in the world which truly has the opportunity to move toward self-sufficiency.
- On the economic front, the issue is how inflation, which has run in double digits in 1979 and the beginning of 1980, compared to about 6-1/2 percent in the prior nine years, can be controlled while addressing the priorities of the 1980's.
- In national defense, the perceived need is to enhance our capabilities, not only in equipment but also in facilities, through an expanded and more cost-effective national defense program.

As a result of the shifting priorities, considerable uncertainty has developed in our key markets, many of which form the foundation for our consulting business.

The markets of interest to M&E include those related to the Clean Water Act, where the construction grants program is being questioned by the public and Congress as to its value and future role.

In addition to the prospect of changes in Clean Water Act, an air of uncertainty also pervades the transportation and international markets.

Transportation — In transportation which includes highway, bridges, and street, federal expenditures are being cut back and delayed as costs rise and availability of highway funds on the present basis of accrual is being reduced. The question is: will Congress and the administration come up with a workable solution to put the Highway Trust Fund on a sound financial basis?

International — The international market does not have the same uncertainty of funding or demand and still provides a growth opportunity to U.S. firms. The uncertainty here is one of constraints because of a competitive disadvantage imposed upon us by our own government in the form of personal income taxes. The volatile socio-political conditions with changing governments and the threat of war also represent an uncertainty.

As markets have changed and as the business environment in which we operate has become more difficult, competition between consulting engineers has increased dramatically.

There is a shortage of engineering talent today which is likely to become more severe in the 1980's. Major new programs such as the new synthetic fuels industry and the massive MX missile project will further tax an already short supply of talent. The major design-construct firms are predicting that their technical staff needs will swell from 38,000 in 1980 to over 55,000 in just the next five years. The MX missile project will create 1,200 new engineering positions in the Corps of Engineers alone by that same year. The growth in demand for engineers is exceeding the supply of experienced talent.

Consultants will be faced with competition from industries offering higher salaries, better growth opportunities and greater security.

Change: Internal Factors

Turning to internal factors: a major one which must be faced is the higher cost of doing business. I will touch here on a few of the interrelated factors contributing to higher costs.

- Inflation has an impact on all our costs. Salary costs are escalating, particularly since the wage and price guidelines have, for all practical purposes, been abandoned. Inflation also contributes to the sharp rise in non-salary costs such as travel, insurance, recruiting and relocation, all of which are increasing at more than 20 percent a year.
- Increased government regulations translate into higher costs; for example in project delays, where it is not unusual for an entire year to elapse between the time of selection and project start-up. Regulations on profit guidelines may also be unrealistic; and there is sometimes a lack of full understanding of cost plus fixed fee contracts on the part of the consultant or client.

- Productivity or staff utilization has shown a significant decrease since 1975. At M&E, staff utilization has decreased two points since 1977. This has added over a half million dollars to overhead costs at our level of operation. The higher costs resulting from increased competition, delays, etc., are reflected in higher time commitments by staff to administration, business development, and non-billable time. The result: the rate of increase in overhead costs has doubled in the 1975-80 period compared to the prior five years.
- And the last element, which I have labeled technology, consists of two facets. First, on the project side, there has been pressure to force on clients the use of innovative technologies without fully considering the orientation and needs of those clients. Such projects, which often have not worked, place a burden on the community in construction cost over-runs and higher operating costs. Second, the consulting profession has not adopted new technologies which continually become available and could extend our staff capabilities.

Finally, consulting engineers have been incorrectly lumped together in the public's eyes with the "beltway bandit" consultants in Washington, D.C. who were associated with excessive profits, scandals including payoffs, etc. We are being painted as the guys in the black hats - an image we must change.

Opportunities

Turning to the future, I see the decade of the 80's as one full of opportunities for consulting engineers. In the environmental field, these opportunities range from M&E's present major market, under the Clean Water Program, to integrated waste management, with due regard to hazardous and toxic substances, water and groundwater contamination. Other opportunities will arise from the growing energy field; from the redevelopment of cities and the upgrading and growth of our industrial capacity, from the expansion of defense facilities in addition to military equipment; and from the large and ever changing international market. Let us look at just a few of these opportunities.

Clean Water Program — First and foremost is the Clean Water Program. It is true that if the program does not survive, then Metcalf & Eddy as well as a large number of other firms will be in serious difficulty. The need for clean water has not diminished. It is the results achieved to date which must be improved upon.

Recognizing the major investment that M&E has made in this area, we took the initiative to bring together 17 of the larger consulting firms to discuss and address this matter. This program was not intended to replace and has not replaced the work underway by professional societies including ASCE and the American Consulting Engineers Council. It has supplemented these efforts and involved the leaders of those firms in working more to improve the situation. The program has moved along; the group met with EPA administrator Douglas Costle and his top staff in July 1980. What came out of that meeting in terms of the future market is that the program needs to show progress: it needs to show results. We, the consulting engineers, can and must help make these results happen.

We can strive to design plants which relate directly, possibly more directly than in the past, to the unique requirements of the client. This involves not only meeting effluent guidelines, but making technical design decisions taking into consideration capital and operating costs and their impact on the community.

International ---- The international field is one which represents a market for our existing expertise, as well as an opportunity to participate more broadly in the future. The international market for A/E services is approaching a billion dollars per year and growing at a rate in excess of 15 percent a year. The exporting of services, including consulting engineering, represents the fastest growing element of U.S. trade.

However, poorly conceived government policies, particularly in the area of personal income taxes, have been weakening our position. The U.S. is the only major nation that taxes the earnings of its citizens working in foreign countries. Other nations encourage and support such efforts as a lead-in to further development of their international trade potential. The impact of U.S. tax policy on engineering and construction companies has been dramatic. Whereas in 1976, the U.S. held 10 percent of the Middle East market, we have only about 1½ percent of that market today. This impact as I see it is mainly in the construction end, but the same could develop for A/E services.

M&E is active in attempting to restore the competitive position of American firms through our participation in the Tax Fairness Committee. We have also testified before Congressional committees on this issue. The outlook for substantive change in the tax situation in 1981 is encouraging.

The 1980's will open up new, expanded opportunities for consultants,

particularly in the areas of energy, national defense, and construction management.

Energy — Energy is without a doubt one of the key developing markets for the 1980's. Ours is an energy-based economy which, until recently, was stimulated by the relatively low cost of energy. With the four-fold increase in energy costs, the oil we import has become significant not only as to availability, but also because the cost is a major contributor to inflation.

For some time now Congress and the country have struggled, largely unsuccessfully, to develop a comprehensive energy policy, to promote energy conservation and development of new sources of supply. Legislation has emerged from this Congress, primarily the Energy Security Act of 1980 (synthetic fuels legislation) which addresses parts of the problem. For example, the development of oil shale reserves calls for 40 super projects with production of two million barrels per day by 1991. Estimated cost of that program alone is pegged at over \$20 billion. The opportunity for consulting engineers is that this effort will involve work in water and water management; and management programs to assure little or no degradation of the environment.

The 1980's should see major programs designed not only to conserve energy but also to develop alternative energy sources. Both approaches, and I emphasize the word "both", represent significant opportunities for consulting engineers.

National Defense — In the area of national defense, the civil and environmental work associated with the increased expenditures the Administration and Congress have targeted for facilities represent sizable markets for consulting engineers. For example, the MX program which I referred to earlier, is projected as a 10-year \$13 billion opportunity.

Construction Management — Another opportunity for the 1980's is the inflation-fueled concept of total project management, which is often identified as construction management. This market, which is estimated at a billion dollars per year, will continue to grow, fueled by the economics of total project cost which favors a fast track approach versus the present segmented approach.

Challenges

Finally and briefly, the challenges we face.

In looking back at those issues I've touched upon today; namely, changing national priorities, uncertainty of present large markets, internal operational factors, and opportunity areas, it becomes apparent that there are key challenges which the consulting engineering profession must address to assure not only its continued viability, but also its growth.

- First, we must become more assertive in the protection and improvement of present markets like the Clean Water Program and the international field.

In other words, we must get more involved. To do so, the profession must move away from its present position of fragmentation to one of unity. We must speak with a single voice on issues of importance.

- Second, we must develop a management focus which complements and is equal in emphasis to our technical orientation so that we can, in fact, identify with and address the needs of our clients. By doing so we will ensure that they receive the technology which best meets their needs and the economic realities of their situation. Also, improving our management focus will put us in a better position to address the issues of rising costs, increasing competition, and the shortage of engineering talent.
- Third, our staff must be encouraged to identify and respond to changes in the marketplace. Flexibility, particularly in broadening our technical base and adjusting our technical approach to meet varied and broad market opportunities, will be a key to success in the 1980's.
- Fourth, we must invest in the training and development of our staffs, not only in the technological and business aspects of our business but in people management as well, in order to better meet the challenges of the 1980's and create an environment which will permit us to compete with other industries for the engineering talent we will need.

Successfully meeting these challenges, both from a technological and a business point of view, will open up vast opportunities for consulting engineers. At Metcalf & Eddy we are enthusiastic about the 1980's, but we are not underestimating the effort and dedication required to meet those challenges and thereby take advantage of expanding opportunities.