
Proactive Engineering: A Perspective

The engineering profession needs to meet the challenges of a world where widespread and fast-paced technological, social and political change is the norm.

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Before any project becomes difficult, those working in the engineering/construction industry must remember that they are professionals working with other professionals. In bidding, organizing and developing a project, all parties must remember they have standards to uphold. In particular, the engineering profession has a substantial history of achievement built on a tradition of building the best it can with the available resources. In achieving this, it has balanced its obligations to its clients with its professional standards to build the best project possible.

The engineering profession must always remember that one of its chief duties is to defend the engineering profession from forces — both within and without the profession — that would distort or circumvent its mission to deliver a timely and cost-effective engineering/construction product that is of the highest

quality — one which both the owner and the contractor can be proud. We must uphold our professional standards and we must communicate them both to our profession and to those who use our services — and we must communicate effectively if we are to remain credible.

Professionalism & Credibility

Currently, the engineering/construction industry exists in a climate of technological, social and political change that is unprecedented in its professional history.

In turn, this pervasive condition of change has led — for those who are not able to adapt — to a state of disorientation. This vertigo can be accompanied by a sense of unreality. We must accept that the social and political climate in which our work necessarily exists is real. We cannot live in some imagined past or within the belief that current conditions are just a passing phenomenon. As irrelevant, distasteful or confusing as they may appear at first, the social and political aspects of a project are real, and we must bring to them the same professional standards that we apply to the physical reality of the work. We must not succumb to the philosophy that *when anything is possible, everything is permitted*.

For the engineering/construction industry, the inability to recognize, understand and respond to this new environment of change has resulted in a steady erosion of public confidence in the profession, a communication fail-

ure that will increasingly tear at the fabric of engineering's professional credibility.

The professional credibility of the engineering/construction industry is being challenged by:

- A gap in the public's perception about the way engineers secure and execute their work. This perception is fed by a growing number of projects that seem to exist in a continual state of redefinition, resulting in what appears to be uncontrolled growth — a cancerous, self-generating growth that devours the public purse in the process.
- Unprecedented competitive pressures that affect how engineers are perceived in the global marketplace. The profession faces the challenge of how to retain the image — as well as the reality — of being the most productive, knowledgeable and cost-effective providers of well engineered and well managed projects — projects that are superior in technology and quality.
- A human resources gap in terms of how engineers provide and nurture the human and technological skills through which their work is performed. How do we train and empower the new worker in the changing workplace?

Professionalism In the Workplace

In these confused and often troubled times, it is sometimes difficult to maintain a professional attitude and approach toward the process of securing and executing work. An air of unreality seems to pervade our nation's political centers and to affect the officials, elected or otherwise, who inhabit them. Because of this, some in our industry have gotten into the habit of second-guessing public policy and of taking for granted the public trust implied in public works. An air of ambiguity infuses the interpretation of bidding methods as well as building regulations and procedures (all of which can be subject to litigation). Gone, too, are the notions of social and political commitments (and agreements) toward a particular action.

The solid ground that builders need as a conceptual framework for our work has been severely eroded. To replace it or shore it up, some in our profession have fallen into the habit of creating a substitute reality — an alternate universe — based on fears and wishes instead of reasoned actualities. Within this substitute universe of values, second-guessing public policy and taking for granted obligations implied by the public trust has frequently been an unfortunate result when bidding and building public works.

Some in our profession find it easy to believe that the rules can — and even should — be bent either because they feel it is useless even to attempt to determine what is actually required or because "things aren't quite right anyway." In such an atmosphere, the usual way we do business can easily be structured so as to bend the rules and to hide behind the assumption that "everyone is doing it." The orderly process of designing a project, doing the engineering, bidding the work and building the project has, at times, become a shell game not always played to the benefit of the public — and, ultimately, not to the benefit of the profession.

The abandonment of this orderly process is particularly the case when the process of acquiring work focuses on outline designs, designs which are built on minimal research and with little thought for cost or utility. Such designs are put forward as credible and proven to the public when they are at best provisional. This scenario often occurs when projects are hastily begun to obtain public funding — "to get something started" — with the thought, implied or otherwise, that the money will be found somewhere and that the public will eventually "buy it." Such designs lead to endless rounds of second-guessing and recriminations in which the engineer and the builder are ultimately seen as responsible.

Public projects are built with limited public funds and, as we are perhaps currently more aware, public funds have value, just as any other source of capital. This seems like a simple thing to state, but sometimes the self-evident must be stated. People — you and I — pay for public projects, and we are entitled to "the best that money can buy" — not perfection, but the

best that our money, spent carefully and with an eye to the clock, can buy.

In an era wherein bending the rules is almost accepted, those projects which are not well conceived will lack the accountability that is usually evidenced in public works.

Projects without such accountability do not foster open communication, a part of the process which is necessary to create a public/private partnership. Instead, a succession of such poorly founded projects wear down the public spirit with a seemingly endless series of adjustments to cost and schedule that eventually erode public credibility for the engineering profession and for the construction industry as a whole.

Engineers must not flag in adopting a rigorously professional approach to building enough value into concept designs so that the best engineering solution — in terms of cost, schedule and utility — is available. Although such an approach is always incumbent, it is even more so when the situation begs for a less rigorous and orderly approach.

Professionalism & The Global Marketplace

Today, the engineering/construction industry in the United States is still able to compete for work on a global basis. Our nation continues to effectively export engineering technology and construction management services to the rest of the world. In the international arena, the U.S. engineering/construction community remains credible. While our technology and services are still a first choice, they are by no means the only choice. To ensure our continued credibility — a credibility which makes us competitive globally — the profession must remain forward-looking in terms of developing new technologies and services and aggressive in our adherence to professional standards and in finding and developing new opportunities.

Given that many projects in the global marketplace are transnational and transfrontier in nature (the Chunnel Tunnel rail transportation project between France and England is a prime example), the U.S. industry cannot ignore the demand for developing innovative and competitive policies. A bright future in the interna-

tional arena depends on having our house in order. If we produce no regularly outstanding examples of work at home, no one from abroad will buy. Nor will they seek us out to cooperate on projects if there is little evidence of being a "good partner" at home.

There are many dynamic and progressive developments occurring in our profession across the globe. Our future in the global marketplace will be one of steadily diminishing returns if we lose sight of that. Hardened by the increasingly competitive international work environment, foreign engineers are diligently fueling their professionalism by building on innovation and quality.

Nationally, the engineering profession does not lack for the personnel, material and technological resources to be a solid international player. Even in a time when our educational establishment appears unfocused and without broad-based support, our workforce in general is better educated and more technologically competent than we currently utilize. At this time, we should examine whether our professional skills and project management capabilities have kept pace with our workforce and its potential since management is also an area undergoing technological and social change.

Technology, Management & Workforce

Key to remaining competitive is acquiring and using the technology and management skills that underpin our ability "to get the job done." Primarily, this translates into the skills required to manage change — to manage the technological and human abilities needed to meet the challenges of a world where change is the norm.

Technology and the work engineers perform have become very complex. Our technological and human resources needs are continually changing, and we must continually develop the skills to manage these changes. In order to not drown in this sea of change, we must ensure that our educational institutions will meet future research and teaching requirements. In addition, we must advocate that all of our public institutions develop and make available the tools, materials and technology necessary to

keep our increasingly crowded planet livable, workable and environmentally sound.

We can achieve these goals by undertaking the following activities:

- Funding and managing research — including human resources as well as technology. We must focus on how we learn, how we work in teams and how we acquire new skills, as well as on continuing scientific and technological engineering research.
- Making the products of all research — the skills, software and hardware — readily and inexpensively available to those who will make use of it.

These efforts must be undertaken on a continuing basis.

Image Management

Engineers must pay attention in promoting the image of our profession. This image should be rooted directly in terms of our work and must be constantly monitored to ensure that it matches reality.

For good or ill, the management of a project's image — how it is perceived by the public — is at least as important as the management of the physical project. Public perception may result in actions that damage or stop a project as surely as bad ground or a shortage of labor and materials.

The engineering/construction industry must plan for the realistic management of how projects are viewed by their various publics. Public relations efforts must be accepted as a legitimate cost in successfully completing a job. Many projects require a public relations plan similar in scale and scope to the plans developed and executed by large corporations, businesses that understand from bitter experience how the management of image affects the bottom line.

The public must be made aware that a construction project can be viewed as a living entity that changes and grows. As such, like any other living organism, it must adapt to its environment or sicken and die.

In large transportation projects, for example, there are always significant unknowns

such as the nature of the ground, the degree to which the government will participate in construction decisions and changing public concerns about such issues as access, the environment and safety. Large projects often undergo drastic changes in scope that are not easily foreseen or accepted by the public. Because of their sensitive and often controversial nature, the effects of these changes and the efforts made to account for them are often delayed until project funds have been committed. In such projects — particularly design/build, fast-track projects — any aspect of the work can change rapidly. All too often the original project program will be almost unrecognizable at project completion.

In the final analysis, the success of any project demands that all aspects of its image given to the public reflect as accurately as possible the project's reality even though that reality is constantly shifting throughout the duration of the project.

How can project image be shaped so that it will complement the reality and utility of the project through design, construction and completion? That is a great challenge — one that requires the creation of a *proactive* communications environment.

Proactive: A Definition

Proactive means that the engineer, project manager and other owner representatives take the initiative to ensure that the public's perception matches the project's reality. This means taking action — action based on an on-going assessment of the so-called "soft" aspects of the project — before a crisis occurs. A negative approach helps no one.

Proactive Communications

A positive, forward-looking and energetically established project climate is the foundation needed to communicate the reality of the project in a light that stresses its positive aspects. In this way, it makes it easier to honestly and accurately handle the temporary but inevitable disruptions that accompany major construction in a manner that minimizes the negative aspects of these disruptions.

The term *image management* can almost instantly produce feelings of manipulation and duplicity in the mind of the public. However, these negative feelings are usually the result of a reactive, non-positive communications climate. Such an environment constitutes image management *after the fact*. Its hallmarks are such predictable and transparent public statements as: "We are sorry for the problem and we will try to not let it happen again." Such efforts are a sure sign of failure on the part of project management.

A recent article in the *Engineering News-Record* details what is required to establish and maintain an effective proactive communications environment.¹ As stated in the article, attention must be given to the project's soft, or non-construction, elements — which include such issues as community relations, marketing and conflict management. Some specific areas that must be considered in creating a sound, proactive communications plan are:

- Media relations
- Government relations
- Marketing communications
- Publications
- Employee communications and organizational relationships
- Public speaking opportunities
- Issues management
- Economic, political and legislative analysis

These areas, and other similar ones, must be managed in a manner that anticipates and prepares for possible problems as well as for probable public reaction to these problems. In contrast, a reactive communications environment operates "in more or less of an ongoing crisis mode, promptly responding to public or governmental inquiries only when they become complaints and talking to the media only when there is damage control to be done."¹

On the other hand, a successful, proactive environment "involves creating ongoing community outreach and marketing programs and building partnerships within audience groups [such as] the business community and the media so the exchange of information becomes a two-way street and issues can be addressed

before they become problems."¹ Such an effective program takes solid, committed action from top management on down.

Conclusions

Proactive communications — in its best sense — is the "heart" of proactive engineering. It is the way to ensure that image matches reality. The "mind" of proactive engineering is that engineering professionals ensure that the reality on which the communicated image is based is the best reality that can be made.

In summary, the engineering profession is experiencing a growing perceptual gap that can only be effectively managed in a proactive fashion:

- Credibility is being undercut by the public's perception about the way engineers secure and execute work (*i.e.*, concern about projects that seemingly define themselves as they grow and consume the public purse in the process).
- Credibility is being undermined by how engineers operate and are perceived in the global marketplace. Engineers must project the image and reality of being the most reliable, productive, knowledgeable and cost-effective providers of projects that are well engineered and managed.
- Credibility is being eroded by how engineers provide and nurture the human and technological skills by which our work is performed, and by how we train and empower workers in a changing workplace.

Proactive engineering methods will help the profession tackle the challenge of eliminating the credibility gap and making the image of engineering match the reality of the great works we accomplish.

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REFERENCE

1. Brooks, G., "Before You Cut That Ribbon!" *Engineering News-Record* supplement on Intelligent Highway Systems, November 28, 1994, pp. 8-11.