It takes judgment and thought to balance the ethical engineer and capable project manager.

By Brian E. Porter

Serving

We've all been there: an executive, manager, or client pressures the engineer to make decisions based on business economics rather than technical merit. Last year was filled with stories of missteps: BP's loss of *Deepwater Horizon*, and Toyota's problems with brakes and accelerators.

Earlier this year, on Jan. 28, we remembered the explosion 25 years ago of the Space Shuttle *Challenger*. The Rogers Commission, appointed to investigate the incident, attributed the accident to "failure in the O-rings sealing a joint on the right solid rocket booster."

The House Committee on Science and Technology, however, published its own finding: "that the underlying problem which led to the *Challenger* accident was not poor communication or underlying procedures .... Rather, the fundamental problem was poor technical decision-making over a period of several years by top NASA and contractor personnel, who

Two Masters

failed to act decisively to solve the increasingly serious anomalies in the solid rocket booster joints."

Michael Roberto, Trustee Professor of Management at Bryant University, is a recognized authority on decision-making. When he was a Harvard Business School professor, he wrote a book on the subject, *Why Great Leaders Don't Take Yes for an Answer*. In that book, Roberto drew parallels between the culture of NASA in 1986 and that of the 2003 *Columbia* Shuttle disaster. In both circumstances, there was sufficient data to indicate the dangers, but flight managers pressed forward.

Deepwater Horizon, *Challenger*, and other disasters were overseen by managers who were also trained engineers. How did they miss critical details or make decisions with such disastrous results?

Many individuals in engineering firms—many reading this article, in fact—carry credentials for two jobs. They are licensed Professional Engineers and certified Project

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Management Professionals. Whether you have the P.E. initials behind your name or PMP, the titles are less important than the responsibilities they bring.

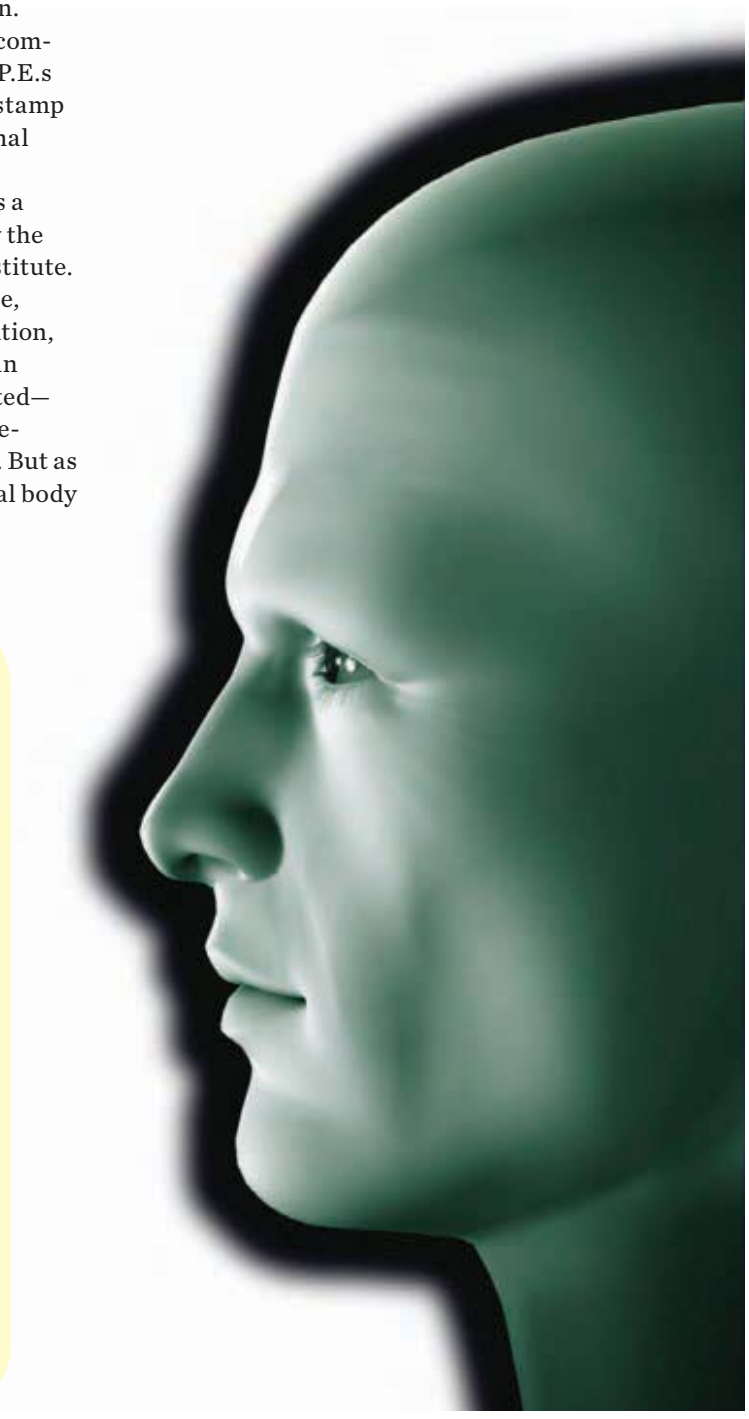
There is not supposed to be a conflict in combining the engineer's role with that of project manager because they are supposed to complement each other. The engineer and the manager share responsibility on a project for "getting it right."

However, over the past 50 years, with the flattening of management, engineers also must balance budgets and meet business demands. The challenge remains for each engineer to balance the P.E. and PMP responsibilities. The requirements to meet technical needs (functional specifications, public safety, reliability, etc.) and business (such as budget and schedule management) are frequently conflicting in nature, even when they theoretically serve one another.

The Professional Engineer holds a license. Just as a doctor, attorney, or architect, one must be licensed to legally perform certain critical services. The requirement is intended to protect individuals and society. "Professional Engineer" is a legal designation in the United States and is enforced by each of the states according to their specialized requirements often involving local issues such as hurricanes, tornadoes, earthquakes, killer bees, etc. Licensure requires education, experience, good character, and the passing of a rigorous examination. Many engineers may be competent to do so, but only P.E.s are legally permitted to stamp drawings and approve final designs, for instance.

The PMP designation is a certification provided by the Project Management Institute. It requires job experience, references, formal education, ongoing education, and an exam to become accredited—many of the same requirements of the P.E. license. But as of today, no governmental body or territory requires project management licensure.

The benefit is usually hiring or promotion-related, but enough research has been done to demonstrate much better on-time and on-budget performance from those that have the PMP certification. It also unifies terminology so that PMPs in the U.S., Brazil, China, India, or elsewhere are speaking the same "language."



Engineer's Creed

As a Professional Engineer, I dedicate my professional knowledge and skill to the advancement and betterment of human welfare.

I PLEDGE:

- To give the utmost of performance.
- To participate in none but honest enterprise.
- To live and work according to the laws of man and the highest standards of professional conduct.
- To place service before profit, the honor of standing of the profession before personal advantage, and the public welfare above all other considerations.

In humility and with need of Divine Guidance, I make this pledge.

The licensed engineer and the certified project manager both have codes of conduct that set high moral and ethical standards such as honest enterprise and doing what is best for the client. The conflict often arises with the question of what "best for the client" really means.

Meeting the schedule and budget is critical for a customer. So is the quality of the product.

In practice, deciding the technical and business goals will require judgment of what is "best" for the client.

Ethical Considerations

The greatest challenge to both engineers and managers is that many corporate leaders feel pressure from stockholders and other stakeholders more immediately than they do the urgency of safety or engineering obligations. Sometimes managers will ask for actions that cross the line of reasonable risk. These circumstances require an engineer to oppose business drivers. In situations of safety and health, there is no choice. Deciding where that line is—well that's the challenge.

Consider a few real-life examples.

Young engineer vs. senior business manager: Early in his career, an engineer was tasked with testing a new prototype device. The equipment would recycle water-based fluids on site to reduce transportation and labor costs. A single alpha prototype proved promising, and three more units were built for beta testing in a controlled test facility. After the first day's testing, a senior business manager called the engineer and announced that he was going to take the beta prototypes out to several customers.

The young engineer refused to remove the equipment from the test facility because the units needed a few more weeks' evaluation of their safety and performance. The business manager got upset and demanded, "You *will* package them up, and

Project Management's Code of Ethics and Professional Conduct

(Excerpt)

As practitioners of project management, we are committed to doing what is right and honorable. We set high standards for ourselves and we aspire to meet these standards in all aspects of our lives—at work, at home, and in service to our profession.

This Code of Ethics and Professional Conduct describes the expectations that we have of ourselves and our fellow practitioners in the global project management community. It articulates the ideals to which we aspire as well as the behaviors that are mandatory in our professional and volunteer roles.

The purpose of this Code is to instill confidence in the project management profession and to help an individual become a better practitioner. We do this by establishing a profession-wide understanding of appropriate behavior. We believe that the credibility and reputation of the project management profession is shaped by the collective conduct of individual practitioners.

I'm taking them to customers."

During the first night's testing, two of the three units failed to meet performance metrics and a safety component on each one failed. Their primary containment vessels, full of liquid, collapsed and leaked into the facility's containment area. This information was relayed to the business manager.

You might think that the story is over, but instead, the manager demanded that the third unit be packaged and delivered to a customer. The engineer refused and called the vice president and directors of both departments to the see the failed equipment. The business manager was escorted out of the R&D facility and told that he had no further say as to when the units would be shipped for field evaluation.

Demands to sacrifice safety are out of the question. Demands to sacrifice performance must be evaluated.

Three engineers vs. marketing:

During the design of a new electromechanical product, a company with revenues greater than $1 billion decided to hire an outside engineering firm and assigned an engineer on its payroll as the project manager to oversee the effort. After six months of design, testing, redesign, and retesting, the product was proposed to marketing. The engineering firm, one of its third-party engineering consultants, and the engineer acting as project manager all agreed to the design.

The marketing director determined that the cost was too high for the overall product and suggested removing one of the safety features. All three engineers recommended keeping the device and recorded their opinions in writing. The three engineers consulted a nationally recognized testing laboratory, which noted that, while no standard *mandated* the safety device, if the three engineers felt it important to include, then it should be included. The marketing director decided against the engineers stating that they were too risk-averse, and ordered the removal of the device, since it was not mandatory under the standard.

Six months after this decision, several thousand machines were recalled from the field because of a fire risk. The safety device would have prevented the fire risk. The cost? Several million dollars in recall promotion, equipment rework, and labor versus $30,000 to have installed the components initially.

Engineer vs. self:

Sometimes the worst enemy to quality is not business or fiscal demands, but engineers themselves. There was an engineer in the middle of his career, working for a company that set a reasonable deadline. Unforeseeable circumstances forced several delays. None of the management team required the engineer to make up the time, but the engineer was focused on meeting a self-imposed deadline to prove his worth.

When it came time to deliver the final product, it was on time, on budget—and not very good. It had been rushed and details were missing. Performance was marginalized to meet schedule and budget. It was the engineer's own doing. After the product report was first delivered, the manager offered some advice, "Remember this: people will remember good work (or bad work) a lot longer than they will remember if you were a week late or over budget." The engineer went back to work and delivered the product late and over budget. There was short-lived chiding from some in management over the failure to meet the deadline, but when the product was successful, ultimately the engineer was rewarded.

Your Call

As engineers, we have obligations to be conscious of the budget and schedule, but it is far more important to prevent oil well blow-outs, braking problems, or O-ring failures on a rocket booster. When in doubt, get a team of other individuals to help evaluate decisions. Those within the company and external resources may be helpful.

Demands to sacrifice safety are out of the question. Demands to sacrifice performance must be evaluated diligently and sensitively. Take some time to consider decisions you've made: Learn from the past; use it today, for a successful future. ■

To Read More

PMI. *Project Management Institute Code of Ethics and Professional Conduct.* Retrieved Jan. 13, 2011, from http://www.pmi.org/About-Us/Ethics/~/media/PDF/Ethics/ap_pmicodeofethics.ashx.

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Rogers Commission report, "Report of the Presidential Commission on the Space Shuttle *Challenger* Accident" (1986). http://history.nasa.gov/rogersrep/v1ch4.htm.

U.S. House Committee on Science and Technology, "Investigation of the *Challenger* Accident: Report of the Committee on Science and Technology, House of Representatives" (Government Printing Office, 1986). http://www.gpoaccess.gov/challenger/64_420.pdf.