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Our U.S. Engineering Model In the Global Economy

Neil A. Norman, P.E., CENG, FZEZ, President of NSPE, recently addressed the National Council of Examiners for Engineering and Surveying (NCEES) on the above topic. His talk, based on the NSPE 2000 Task Force report and the debate at the recent Winter Meeting of NSPE, lays out the inadequacies and fragmentation of the current U.S. engineering model and urges significant change to adjust to new institutional, environmental, and world competitive realities as well as to meet the NSPE founders' "end objective of 'lifting all engineering into the realm of the professions', which has in practice eluded us for nearly a century," quoting the report. Here is a summary of actions he recommends. A full copy of this important presentation may be obtained by calling the NSPE Information Center at telephone number (703) 684-2810.

What forces are urging us toward any changes in the U.S. engineering model? There are several, including the changing nature of engineering practice, our need to attract more women and minorities into engineering, global economics, international standards, new technology leadership, and need for greater influence by engineers on U.S. technical public policy.

We are all stakeholders in this debate on the engineering model. Students, deans, professors, government, industry, NCEES, ABET, our association members, nonmember engineers, and the public should all be heard on these issues. . . . If we agree that some change is needed, however, the lead roles we have assumed in our profession place the responsibility to act on our shoulders. . . .

Our intention here is to facilitate the change process and not to dictate the outcome.

- Ensure that the public is adequately protected by:
 - Strengthening the accreditation process to ensure that graduates of ABET-accredited programs have received quality preparation for practice, and
 - Making a comprehensive, nationally coordinated but university-based exit examination(s) an integral part of the educational experience.
- Consider all ABET engineering graduates qualified to enter the practice of engineering. They would not have to take the Fundamentals of Engineering (FE) exam to enter the registration process.
- After a suitable period of qualified practice experience,

grant registered status to all graduates of ABET-accredited engineering programs without taking the Professional Engineering (PE) exam.

- Let NCEES continue to administer the FE and PE examinations for those seeking engineering registration who are not graduates of ABET-accredited engineering programs but have acceptable education and experience.
- Have NCEES establish and administer a system to validate the practice experience and continuing qualification for practice of registered engineers.

Many of us share membership in several of the stakeholder organizations. I hope we can be facilitators in this project and come together on common ground. The engineering profession needs a few good people willing to sublimate personal gain for the public good. I hope we prove to be qualified.

Unethical Behavior and Stress Appear Linked

What makes an ethical executive tick? Nobody knows for sure, according to a report in the April 11 issue of the *Wall Street Journal*. But, *London House* thinks they may be happier, less tense, and more responsible than people who are more willing to tolerate unethical behavior.

The consulting company tested 111 executives, middle managers, and professionals attending seminars the past two summers at the University of Chicago.

The most striking finding: The more emotionally healthy the executives, as measured on a battery of tests, the more likely they were to score high on the ethics test. High-ethics executives were also less likely to feel hostility, anxiety, and fear.

What's missing, however, is an understanding of cause and effect. Are stressed-out individuals a threat to a normally ethical firm? Or, as Barbara Ley Toffler, a consultant on corporate ethics, suggests, do unspoken corporate pressures to behave unethically cause otherwise happy executives to become stressed? The matter needs further study, says *London House* researcher Alan Nerd.

Scenarios for Teaching Engineering Ethics

*Rachelle D. Hollander, Ph.D., is Program Director for Ethics and Values Studies of the National Science Foundation (Room 312, Washington DC, 20550) and a member of the Board of Governors of NIEE. She wrote this article for **Engineering Ethics Update** as a result of her experiences on sabbatical at Rensselaer Polytechnic Institute (RPI) teaching engineering ethics. She would appreciate hearing from people who use these scenarios. She writes as follows:*

Colleagues might be interested to know about three scenarios I have used quite successfully in the engineering ethics course I taught at RPI this year. Each was assigned to a team of students who had to decide what ethical issues were involved, interview people in relevant positions to find out their opinions about the issues and how they would handle each situation, and then report their findings to the class.

Class discussion expanded on Billy Koen's idea about engineering heuristics to include the idea of ethical heuristics. B.V. Koen explained his idea of engineering heuristics in "Toward a Definition of the Engineering Method," published in *Engineering Education*, December 1984. He states as follows:

"The engineering method is the use of engineering heuristics to cause the best change in a poorly understood situation within the available resources."

The moral agent uses ethical heuristics to cause the best change in a poorly understood situation within available resources. An example of an engineering heuristic might be: "Make small changes in the state of the art."

Examples of ethical heuristics are: "Give credit where credit is due," and "A fair day's pay for a fair day's work."

And now, on to the scenarios.

1st Scenario-Did Jack Fake It?

The first scenario is a hypothetical case in **1 Research Technology Management**, May-June 1988, written by W. Gale Cutler.

The Problem:

The case concerns a co-op student who, rushing to complete an assignment, may not have exercised adequate care in the tests he ran before returning to the university.

Teaching Results:

This case was of sufficient interest to the Cooperative Education Program staff at RPI that they have assigned some time and space to ethical questions in the workshops and materials they prepare for co-op students. Also, several electronic bulletin board conferences on issues of engineering ethics and of academic integrity are being developed.

2nd Scenario-Publication Ethics

Lara Tenthoff, a student in the engineering ethics class, developed this scenario.

The Problem:

Jeff Hopewell is currently a graduate student working on his master's degree at Prestige Institute (PI). As an undergraduate, he began working on a research project with Professor Strick. Jeff enjoyed the project and decided to continue the research as part of the thesis required for his master's degree.

Unfortunately, Professor Strick left PI last year, before Jeff began his thesis work. However, Strick decided to continue working with Jeff even though he was no longer teaching at PI. Since Strick isn't always available when a problem arises, Jeff has also been receiving help from Professor Willin.

Recently, Professor Strick and Jeff decided to publish a paper on their research. When Jeff suggested including Willin's name on the paper, since he also contributed to the research, Strick absolutely refused to consider it. It is commonly known that Professor's Strick and Willin have a long-standing rivalry and do not like each other personally.

Jeff is caught in the middle. It is his opinion that Willin has contributed to the research sufficiently to warrant including his name on the paper. Jeff is afraid that Willin will think that he, Jeff, is siding with Strick, who refuses to have his name on the same paper as Willin. Jeff also feels that he should not take a stand opposite to that of Strick, his mentor and instructor, even if Strick's viewpoint is not truly profes-



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sional. Jeff feels that Strick may even refuse to continue support of the research if Willin's name is included on the proposed paper.

Teaching Results:

The student team developed a class presentation that included a discussion of the ethical issues in the case as well as the options available to the student and the institutions involved.

The team sought out relevant readings and discussion concerning ethical issues and also interviewed faculty members and graduate students from engineering departments as well as the RPI Department of Science and Technology Studies. The RPI student ombudsman was also interviewed. Finally, the team members contacted Jonathan Knight of the American Association of University Professors (tel:202-737-5900) since that organization has issued the following (excerpted) statement on the issue of multiple authorship:

"Scholars who take part in a collaborative project should explain forthrightly. . .the respective contributions of those who put their names to the finished work. . .(Such) a candid statement would do much to establish degrees of responsibility and authority, to assure fair credit to junior or student colleagues, and to avoid unseemly later disputes about priority, real or alleged errors, and plagiarism."

3rd Scenario-The Engineer and the Gulf War

This scenario is based on a similar situation found in the monograph by Marcia Baron entitled *The Moral Status of Loyalty*, Kendall/Hunt, 1984. The scenario was further developed through discussions among RPI students, staff, and faculty.

The Problem:

Patience Turner is an engineer working for a company that manufactures weaponry. Opposed to the possibility of a "War in the Gulf," she writes letters to her senators and to local newspapers. She is also interviewed on a radio station. In her letters and interviews she brings her engineering expertise to bear on the issues and mentions that she is an engineer.

One of her colleagues at the company, Earl Fence, listens to her views and also begins to question whether adequate justification for the war exists. However, her supervisor objects to her behavior and lowers her performance appraisal.

A letter is circulated through the company that expresses support for the war. All employees are encouraged to sign the letter. Ms. Turner indicates that she will not sign. Her supervisor is not surprised at this but tells Mr. Fence that he will give Patience a "hard time" for her views and bring her behavior to the attention of the local engineering society in which they all are members. When Mr. Fence tells the supervisor that he also does not think he wants to sign the letter, the supervisor retorts by saying that Mr. Fence does not seem to be making the contribution to the company he hoped for. Mr. Fence and Ms. Turner then

decide to make an appointment with the company ombudsman to discuss the situation.

Teaching Results:

The student team developed a presentation that included review of the ethical issues and options open to the engineers and the organizations involved. They also interviewed engineers and managers in companies that work in the defense industry seeking their views on the important ethical issues as well as their recommendations for engineers, businesses, and professional societies that might become involved in such a situation. Finally, they spoke with faculty members in the RPI Management School to seek advice on how a corporate ombudsman might handle such a situation. The team then provided recommendations, with reasons, for appropriate disposition of the case.

Recession Puts a Strain on Ethics

Temptation to cut corners is especially severe in times of economic deprivation such as the U.S. is experiencing at this time. Two recent reports highlight this temptation against which managers and professionals must be on guard.

"Maybe economy in recession can't take added strain of being ethical," is the headline in the February 22 edition of *Business* in the Orlando Sentinel. Dick Marlowe comments that a "Business Ethics for the '90s" seminar had just been canceled for lack of interest in spite of a good lineup of speakers. He speculates that the lack of interest might be "because ethical business operators don't feel they need advice, and those who aren't ethical don't want advice. Or, maybe some people felt that showing up would brand as unethical business operators who were trying to reform. Or, maybe the economy is so bad that businesses don't think this is the time to take on the added handicap of being ethical!"

The first article in the *Ethics Journal* of the Ethics Resource Center for March/April 1991 is titled "Reinforcing Business Ethics in a Recession." The article goes on to state that recessionary pressures can manifest themselves in many areas: corner-cutting in production; "creative" accounting; no-holds-barred marketing and sales practices; and high-pressure purchasing techniques. Another place where a recession poses threats to the health of a company's ethics is in the conduct of layoffs and RIFs (reductions *in force*). An RIF implemented even in the fairest possible manner will still probably generate employee grievances and resentment. Whom to lay off is probably the most agonizing decision a manager can face. But an RIF is also one of the strongest tests of whether ethics has truly become imbedded in the corporate culture. The

article makes the following recommendations to managements undergoing severe economic impacts:

1. Assess the risks and vulnerabilities faced by the organization including the existing ethics program. Determine what's working and what's not working.
- Interviews and focus groups with employees can provide some of the needed assessment information. Questionnaires may be helpful for larger groups of employees.
- Incentives and pressures of a management-by-objective performance evaluation system should be checked to see if recessionary pressures are putting undue job fears and pressures on employees.
2. Management may wish to refocus on the company's traditional core values, perhaps through a short statement or "credo" of those values. This can send an important signal to employees that the company doesn't intend to sacrifice its basic principles.
- A more detailed code of ethical conduct may also be desirable to help guide employee actions in "gray" areas. For example, under what circumstances can employees gather and use competitor intelligence. The best corporate codes don't simply specify prohibited actions in dry, legalistic fashion; they provide explanations or rationales of important rules of conduct.
3. Companies need to reinforce ethics standards in formal training and informal discussions within departments and work groups. Since cases arise where a supervisor is the cause of an employee's concern, companies need to provide alternative channels for employees to obtain advice and raise questions on matters of corporate ethics. U.S. firms are increasingly creating a separate channel for matters of corporate misconduct, variously titled "ethics ombudsman," "business conduct officer," etc. Individuals chosen to fill this role need to be highly regarded within the company for their integrity, confidentiality, and counseling skills.

Unfortunately, corporate initiatives in ethics may suffer in tough economic times if executives regard such efforts as "extras," as investments that don't show immediate returns and that can be postponed until the company can better "afford to be ethical."

This way of thinking is shortsighted. Ethics is not a box that can be checked after every employee has been through an ethics training program or has acknowledged reading the code of conduct. Ethics has to do with the basic culture and operating values of an organization—the pride and satisfaction employees find in their work, the attention to quality in production, the degree to which suppliers and customers are treated fairly and honestly—all of which impinge on the company's overall reputation and success. These matters are too vital to be ignored in the best of economic times, but especially when a recession threatens to expose the darker side of a company's culture.

North Dakota Opts for Ethics Course in Censure Cases

The North Dakota Engineering Board has instituted a program, including a questionnaire, to familiarize engineering licensure applicants with the state's code and canons of professional ethics.

It has also adopted a policy whereby engineers disciplined by the Board will be required to complete a course in professional ethics similar to the course offered by the University of Texas at its Murdough Center, including an exam supervised by the Board.

For more information, contact Laveme Zink, the Board's Executive Secretary, at (701) 258-0786. NIEE Board member Jimmy Smith, P.E. (tel: (806) 742-0162/3525), is Director of the Murdough Center and could advise on their engineering ethics course.