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FOR ENGINEERING AND SCIENCE

Engineers in the Workplace Bibliography

Author(s)

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Description

An annotated list of relevant references for engineers in a variety of settings. Includes subsections on Academia, Corporate Environments, Government Agencies, Military, Non-Profit Organizations, International Organizations, Consulting and Bidding, Engineer/Client Relationships and Whistleblowing.

Body

Academia

Anderson, Melissa S. Normative orientations of university faculty and doctoral students. *Science and Engineering Ethics* 6(4)L 443-461.
The article summarizes the results from two national surveys of 4,000 faculty and doctoral students in chemistry, civil engineering, microbiology and sociology. The results of the survey indicate that both faculty and students subscribe strongly to traditional norms but are more likely to see alternative counternorms enacted in their departments. They also show significant effects of departmental climate on normative orientations and suggest that many researchers express some degree of ambivalence about traditional norms.

Barbolla, Ana M Bernados and Jose R. Casar Corredera. 2009. Critical factors for success in university-industry research projects. *Technology Analysis and Strategic Management.* 21(5): 599-618.
This study provides insight into the reality of university-industry technology transfer through the assessment of some of the most influential factors for success or failure in research contracts. Through a series of interviews, the researchers gathered bet practices and advice from over 30 individuals with qualified university researchers who have been directly involved in collaborative projects with industry partners.

Daudt, Joanna and Paquita Perez Salgado. 2005. Creating a woman friendly culture in institutes of higher engineering education. *European Journal of Engineering Education.* 30(4):463-468.
This article describes the results of a workshop that was held in Valencia where attendants discussed and answered the following questions. Which factors indicate that an institute of higher engineering education is woman friendly? How can we rank these factors and what is the weight of the factors? What initiatives did your institute or other institutions of your country make to increase the percentage of female academic staff and to attract and retain more female students?

Frankel, Mark. 2009. Private interests count too. *Science and Engineering Ethics* 15(3): 367-373.
Discusses the general unpreparedness of scientists for the challenges posed by private interests seeking to advance their economic, political, or ideological agendas, at the cost of scientific integrity and intellectual freedom. They must educate and prepare themselves for assaults on scientific freedom, not because it is a legal right, but rather because social progress depends on it.

Hansson, Mats G. 2000. Protecting research integrity. *Science and Engineering Ethics* 6(1):79-90.
The article argues that academia should focus on developing internal structures to minimize fraudulent behavior in the academic world. The article discusses the difference between fraud and carelessness in academic research, and then offers four steps that he sees as necessary for limiting scientific misconduct. This includes inviting students to the academic world not for personal gain but to attain knowledge of the world and for bettering society, providing solid education in research methodology and ethics, the implementation of a good documentation procedure, and the implementation of procedures to investigate cases of misconduct in an impartial and competent manner.

Organization for Economic Cooperation and Development. 2007. *Best Practices for Ensuring Scientific Integrity and Preventing Misconduct*. Paris: Organization for Economic Co-operation and Development.
This report from a workshop discusses the variety of behaviors classified as scientific misconduct, its consequences on scientists, colleagues, and scientific integrity as a whole. It also looks at the underlying causes of misconduct, methods for investigating allegations of misconduct, and international considerations in promoting integrity in research.

Prigge, George W. 2005. University- industry partnerships: what do they mean to universities? A review of the literature. *Industry & Higher Education.* 19(3): 221-229.
This paper provides a review of existing literature on university–industry partnerships and develops, from the university's perspective, a set of generally agreed-upon benefits, risks and techniques to facilitate successful collaboration with industry.

See also:

European Journal of Engineering Education

Journal of Professional Issues in Engineering Education and Practice published by the American Society of Civil Engineers.

Corporate Environments

Broome, Taft Jr. The concrete sumo. *Science and Engineering Ethics* 5: 542-547.
In practice, engineers often encounter decision-making situations said to be exigent. Such situations are so complex as to deny engineers the reflection required to invoke ethical theories, and so novel as to discourage engineers from appealing to case studies. What theory would enable systematic means of deciding morally exigent situations? Borrowing an African perspective, the rule "Do what a person of good character would do" is used to transcend Western ethics. What that person would do in a given exigent situation is expeditiously revealed via literary methods of story construction.

Conlon, E. 2008. The new engineer: between employability and social responsibility. *European Journal of Engineering Education.* 33(2):152-159.
This article looks at the concept of the "New Engineer" and argues that a focus on employability alone is not sufficient to prepare socially responsible engineers for the workplace, engineers must also understand the wider social context in which they work. The author calls for ethics education to broaden its focus on the social structure and the way it both enables and constrains socially responsible conduct. Educators should be seeking to help engineers see systems of regulations not only as constraints but also as enablers supporting socially responsible engineering.

Davis, Michael. 1997. Better communication between engineers and managers: some ways to prevent many ethically hard choices. *Science and Engineering Ethics.* 3: 171-212.
Using the Challenger disaster as an example, the author looks at some ways to improve communication between engineers. Frequent, two-way conversation, can often help prevent some of the ethical issues faced by professional engineers. The article concludes with empirical evidence on the ways in which technical

communication can break down, and nine recommendations for organizational change to help prevent this kind of breakdown from occurring.

Geistauts George, Elisha Baker and Ted Eschenbach. 2008. Engineering ethics: a system dynamics approach. *Engineering Management Journal.* 20(3): 21-28.

This article discusses how engineering practice takes place within the complex social, cultural, legal, economic, technological, and organizational system, and how within this system engineers are often asked to not only solve technical problems but also satisfy broader norms and expectations, which may not be consistent with each other or with the highest standards of design. The pressure of these expectations may push the engineer toward unethical or even illegal behavior. The forces or factors at play may be from the individual engineer, the organization he works in, or be held by the engineering profession as a whole, and are often under constant change. Thus, engineering ethics, both on the individual and profession-as-a-whole scale, can usefully be understood and modeled as systems phenomena.

Hui, Andrew M. 1996. Moonlighting: ethical issues for professional engineers. *Journal of Professional Issues in Engineering Education and Practice.122(39): 39-40.*

Discusses some of the ethical implications of "moonlighting" for engineers, or providing professional services to individuals other than your primary employer, and the role the American Society of Civil Engineers' code of ethics play in addressing the issue of moonlighting.

Ladd, John. 1982. Collective and Individual Moral Responsibility in Engineering: Some Questions. *IEEE Technology and Society Magazine* 1:3-10.

The author looks at some of the unique ethical responsibilities of engineers, discuses the nature of engineering as a profession, and the responsibilities of engineers to organizations they work for and collaborate with. Ladd also discusses some of the distinctions that can be drawn between individual and collective responsibilities.

Ladenson, Robert. *Ethics in the American Workplace.* Horsham, PN: LRP Publishers.

This book explores a wide array of contemporary workplace ethical issues including issues of discrimination, drug testing, workforce reductions, health issues and issues regarding free speech in the workplace. The author attempts to increase the general awareness and sensitivity of employees to ethical issues they are likely to

encounter in the workplace, and introduces the reader to some basic ethical concepts from the standpoint of a philosophical analysis that clearly identifies the aspects of issues in employment relations that make them ethical issues, and uses this framework to clearly analyze major workplace ethics issues in the following chapters.

Meyers, Christopher. 2004. Institutional culture and individual behavior: creating an ethical environment. *Science and Engineering Ethics.* 10(2): 269-276.

The author argues that institutional culture, along with the irresponsible conduct of individuals, contributes to the way in which research is conducted. To help improve institutional ethical culture, it helps to define what are viable action options, what is the organization's genuine mission, and what behaviors will be rewarded or criticized.

Schlossberger, Eugene. 1995. Technology and civil disobedience: why engineers have a special duty to obey the law. *Science and Engineering Ethics.* 1(2): 163-168.

The paper argues that, in the performance of their engineering duties, engineers are generally less free to engage in civil disobedience than are many other professionals. Given the complexity of modern technology, engineers have a special institutional duty to obey the law and so engineers can justify civil disobedience only in the most extreme of cases.

Stainer, Alan and Lorice Stainer. 2003. Management decision-making: an ethical perspective. *Municipal Engineer. 156(4): 223-227.*

This article argues that engineering organizations can improve their management decisions in the competitive global arena by taking into account not only economic metrics but also technological, environmental and ethical challenges. The authors argue that there is a definite synergy between business excellence and good ethical practice where the later becomes a fundamental purpose rather than just an add on.

Weil, Vivian. 1994. Is engineering ethics just business ethics? What can empirical findings tell us? *The International Journal of Applied Philosophy.* 8(2):9-13.

A careful analysis of "business" reveals that engineering ethics must differ from business ethics because they belong to distinct conceptual categories. Business is an "institution" (an organized place where members of many occupations can work together) while engineering is a "profession" (an organization of members of a

single occupation for a purpose distinct from business). Professional ethics thus differs from institutional ethics in principle. In practice, engineering ethics differs from business ethics in: a) the people to whom it is supposed to apply, b) the questions treated, and c) the standards it applies.

Government Agencies

Acevedo, Jorge, Ricardo Barros, Catalina Ramirez and Natalia Realpe. 2009. Engineers and their role in public policy: an active learning experience for enhancing the understanding of the state. *European Journal of Engineering Education.* 34(2): 171-182.
This article describes an active learning workshop used by faculty of the Universidad de los Andes to help engineering students develop skills to comprehend their ethical and professional responsibility, and to help them understand the possible impact of engineering solutions in a global and social context. In the workshop, students simulate a democratic republic with a parliamentary system in a way that allows the students to compare their experience with some of the problems of Columbian public management.

Berrios, Ruben. 2006. Government Contracts and Contractor Behavior. *Journal of Business Ethics.* 63(2): 119-130.
The U.S. government embraces the concepts of privatization and market competition, but the realm of contracting shows that it has not always been able to put its principles into practice. Although the contracting system is supposed to be open and competitive, in recent years the government has often awarded contracts with little or no competitive bidding, has chosen to award mostly cost-plus type contracts that force the government to assume more of the risk, and lacked efficiency in monitoring and overseeing private contractors.

Brown, Mark and David Guston. 2009. Science, democracy and the right to research. *Science and Engineering Ethics.* 15(3): 351-366.
Debates over the politicization of science have led some to claim that scientists have or should have a "right to research." This article examines the political meaning and implications of the right to research with respect to different historical conceptions of rights. The authors conceive the right to research as embedding science more firmly and explicitly within society, rather than sheltering science from society. From this perspective, all citizens should enjoy a general right to free

inquiry, but this right to inquiry does not necessarily encompass all scientific research.

Emison, Gerald Andrews. 2006. The complex challenges of ethical choices by engineers in public service. *Science and Engineering Ethics.* 12(2): 233-244.
Engineers in public service are daily faced with extremely complex ethical choices, often made simultaneously at the individual, professional, organizational and societal levels. These ethical domains often conflict. The paper proposes that the reflective learning approach of pragmatism can help with these challenging situations. This approach depends upon employing Dewey's five stage process of inquiry to engage the ethical complexity inherent in the practice of engineering in the public service.

Ross, Allison, and Nafsika Athanassoulis. 2010. The social nature of engineering and its implications for risk taking. *Science and Engineering Ethics.* 16(1): 147-188.
This article looks at the risk assessment often done by engineers when making decisions about a project. Whether it be decisions about the design of products, manufacturing processes, public works, or developing technological solutions to environmental, social and global problems, risk taking seems inherent to the profession. The authors discuss how our understanding of engineering as a distinctive profession might affect how we should make decisions under risk.

Military

Cummings, M.L. Integrating ethics in design through the value-sensitive design approach. *Science and Engineering Ethics.* 12(4): 701-705.
Many engineering professors struggle to integrate the required ethics instruction in technical classes and projects because of the lack of a formalized ethics-in-design approach. This article describes a methodology developed in human-computer interaction research, the value-sensitive design approach that can serve as an engineering education tool which bridges the gap between design and ethics for many engineering disciplines. The author uses a case study focusing on the development of a control system for a cruise missile to show how this approach works.

Fichtelberg, Aaron. 2006. Applying the rules of just war theory to engineers in the arms industry. *Science and Engineering Ethics.* 12(4): 685-700.
Given the close relationship between the modern arms industry and the military, the author argues that engineers and other professions who work in the arms industry should be held up to the principles of just war theory, and that they are morally responsible for choosing the companies who employ them (and to whome these companies sell arms) as well as what types of arms they develop.

Kemper, Bart. 2004. Evil intent and design responsibility. *Science and Engineering Ethics*. 10(2): 303-309.
With the proliferation of weapons of mass destruction being manufactured from benign objects, the author of this article calls for additions to be made to existing codes and standards to make clear what objects are designed and not designed for. In the absences of specific design guidance, professionals with appropriate expertise can assess potential for "evil intent" and provide recommendations to design out or warn against this potential harm to public safety.

Sparrow, Robert. 2006. Building a better WarBot: Ethical issues in the design of unmanned systems for military applications. *Science and Engineering Ethics.* 15(2): 169-187.
This article explores the ethics of the building and use of unmanned systems in military applications, and the considerations designers must face in the construction of this kind of weaponry.

Wallach, Wendell and Colin Allen. 2009. *Moral Machines: Teaching Robots Right from Wrong.* New York: Oxford University Press.

As computers and technology play a larger and larger role in the smooth functioning of our society, the authors of this volume argue that robots must be programmed with moral decision-making abilities, for our own safety. Taking a fast paced tour through the latest thinking about philosophical ethics and artificial intelligence, the authors argue that even if full moral agency for machines is a long way off, it is already necessary to start building a kind of functional morality, in which artificial moral agents have some basic ethical sensitivity. But the standard ethical theories don't seem adequate and more socially engaged and engaging robots will be needed.

Non-Profit Organizations

Amadei, B. and W.A. Wallace. 2009. Engineering for humanitarian development. *IEEE Technology and Society Magazine.* 28(4): 6-15.
The authors discuss how engineers' work is delivered predominantly to the developed world, often leaving developed nations without the adequate facilities and infrastructure to build sustainable facilities. The authors suggest a new form of engineering project delivery that meets the technical and social challenges involved in working with underdeveloped communities, but also delivers appropriate and sustainable solutions.

Amadei, Bernard, Robyn Sandekian and Evan Thomas. 2009. A model for sustainable humanitarian engineering projects. *Sustainability.* 1(4): 1087-1105.
The authors discuss how engineers' work is delivered predominantly to the developed world, often leaving developed nations without the adequate facilities and infrastructure to build sustainable facilities. The authors discuss a new form of engineering project delivery that meets the technical and social challenges involved in working with underdeveloped communities, but also delivers appropriate and sustainable solutions.

Lucena, Juan C, Jennifer J. Schneider and Jon A. Leydens. 2010 *Engineering and Sustainable Community Development.* San Rafael, CA: Morgan and Claypool.
This book presents an overview of engineering for sustainable community development. It provides a history of engineers involved in development, the problem of using industry-based practices when designing for communities, how

engineers can prepare to work with communities, and the importance of listening when involved in community development projects. The volume also includes two case studies and student perspectives on one curricular model dealing with community development.

Nieusma, Dean and Donna Riley. 2010. Designs on development: engineering, globalization, and social justice. *Engineering Studies.* 2(1):29-59.

This article critically appraises engineering for development initiatives that are currently receiving a lot of attention within engineering communities in the U.S. and elsewhere in the world. The authors discuss how many of these programs share problematic assumptions about technology's role in community development and fail to grapple with the economic and cultural structures that influence most development interventions. The authors use a case study approach to highlight these assumptions, first by looking at a project involving a collaboration between universities in Nicaragua working on educational capacity building for product design with an eye to local economic empowerment, and the second involving the work of a non-governmental organization working in Sri Lanka and its approach to community development using renewable technologies.

Parsons, L.B. 1996. Engineering in Context: Engineering in Developing Countries. *Journal of Professional Issues in Engineering Education and Practice.* 122(4): 170-176.

This paper discusses some issues that engineering students should consider who wish work in developing countries in a socially responsible manner. The paper discusses socially responsible engineering in the field of development assistance. It suggests that actual contributions to the development process of a country happen when the engineer truly listens to the desires of those he/she is attempting to serve. The author also discusses some examples of successful collaborations between professional engineers and the local populations of developing nations.

Singleton David and Nicole Hahn. 2004. Sustainable poverty alleviation – changing role for engineers. *Proceedings of the Institution of Civil Engineers.* 157: 37-42.

Discusses the importance for engineers who are involved with poverty alleviation in the developing world to work in collaboration with other professionals if long-lasting solutions are to be achieved. Includes a collection of case studies.

International Organizations

Davis, Michael. 2009. Defining engineering from Chicago to Shantou. *The Monist.* 92(3) 325-338.
This article explores the definition of the term “engineer” in different cultures and the controversy behind this definition. It uses a short case study discussing a civil engineer working in China to help illustrate how “engineer” is both an honorific and a historically defined concept, and the issues this can raise for engineers working in outside their home country.

Downey, G.L., J. Lucena, B. Moskal, R. Parkhurst, T. Bigley, C. Hays, B. Jesiek, L. Kelly, J. Miller, and S. Ruff. 2006. "The Globally Competent Engineer: Working Effectively with People Who Define Problems Differently," Journal of Engineering Education. 95(2): 107-122
This paper addresses the concept of global competency for engineers and shows that key achievement in the often-stated goal of working effectively with different cultures is learning to work effectively with people who define problems differently than oneself. The authors also offer a minim set of learning criterion for the global competency of engineers and a set of three learning outcomes whose achievement can help engineers fullfil this criterion.

Harris, C.E. 1998. Engineering responsibilities in lesser-developed nations: the welfare requirement. *Science and Engineering Ethics.* 4(3):321-331.
The author explores the role professional codes of ethics should play in governing professional engineers' conduct in lesser-developed nations.

Reader, John. 2006. *Globalization Engineering and Creativity.* San Rafael, CA:Morgan and Claypool Publishers.
This short volume addresses the importance of globalization within engineering, particularly on working practices and prospects for creativity, and provides an introduction to the social and political context that is currently setting new challenges for engineers today.

Unger, Stephen. 1998. Ethical aspects of bribing people in other countries. *Science and Engineering Ethics* 4(3): 287-290.

The author argues against assumption that individuals and organizations doing business in countries where corruption is prevalent should not be expected to adhere to strict standards of ethical practice. The author looks at the universal basis of ethics, and the long-range advantages for avoiding unethical conduct such as the giving of bribes for businesses and engineering employees. This article does not focus on laws governing the practice of businesses operating internationally.

Bidding Process & Consulting

Berrios, Ruben. 2006. Government contracts and contractor behavior. *Journal of Business Ethics.* 63(2): 119-130. Part II.
Although the contracting system is supposed to be open and competitive, in recent years the U.S. government has often awarded contracts with little or no competitive bidding. The author discusses the problems with this practice, and discusses ways in which the contracting system as practiced currently could be improved and made more transparent.

Strand, Margaret N. Consulting scientist and engineer liability: a survey of relevant law. *Science and Engineering Ethics* 3(4): 357-394.
Provides a survey of laws in the United States which are applicable to consulting scientist and engineers. The author reviews professional responsibilities in the area of Common law Torts, Common Law Contracts, certain U.S. Federal and State Statues and the protection of sensitive information.

Schwartz, Andrew. 2004. Ethics in competitive bidding and contracting. *Science and Engineering Ethics.* 10(2): 277-282.
Today the concept of ethics in connection with competitive bidding and contracting may seem like a contradiction in terms. In recent times, ethics has generally been viewed as being concerned almost exclusively with fundamental principles relating to obligations to protect the public and safety, high standards of honesty, integrity, impartiality, fairness, and equity. In contrast, competitive bidding and contracting generally have been considered exclusively "market driven" concepts based solely on financial and commercial considerations without serious regard to ethical principles, except to the extent that some business practices may have legal or regulatory compliance ramifications.

Engineer/Client Relationships

Anderson, Jim. 1994. Is it necessary to compromise engineering ethics to remain competitive? *Journal of Professional Issues in Engineering Education and Practice.* 120(4): 379-383.
Discusses the importance of engineers' remaining sensitive to clients' concerns about cost while also helping clients to understand what is necessary to protect the safety, health and welfare of the public in the design of a project or product. By doing so, an engineer is likely to feel less pressure to compromise his or her ethics to remain competitive.

Bayles, Michael. 1991. Obligations between professionals and clients. From Johnson, Deborah. *Ethical Issues in Engineering.* Englewood Cliffs, NJ: Prentice-Hall Inc. 305-316.
This chapter of Johnson's "Ethical Issues in Engineering" discusses central ethical issues inherent in the relationship between professional engineers and clients.

Fellows, Richard, Anita Liu and Colin Storey. 2004. Ethics in construction project briefing. *Science and Engineering Ethics.* 10(2): 289-301.
This article reports on a project looking at the ethical issues that emerge in the initial stages of discussion for large construction projects The article discusses how different participants in the project pursue individual objectives to varying degrees as well as possessing different perspectives and perceptions and operating/behaving in different ways. Since these initial decisions are often some of

the most important made during a project of this kind, ethical considerations invariably ensue.

Vallero, Daniel A. and P. Aarne Vesilind. Preventing disputes with empathy. *Journal of Professional Issues in Engineering Education & Practice.* 132(3): 272-278.
The engineer can prevent future disputes and failed engineering projects by employing a design strategy that incorporates empathy in all professional matters. The authors discuss how empathy can be included as part of the design process and use a case study to show how the lack of empathy can result in a failed engineering design.

Whistleblowing

National Whistleblower Center
Includes resources such as Whistleblower Law Library, pending legislation, model laws, and Whistleblower Protections.

Office of Research Integrity Guidelines for Institutions and Whistleblowers: Responding to Possible Retaliation Against Whistleblowers in Extramural Research
Published in 1995, these guidelines lay out the protections that should be given to whistleblowers who make good faith allegations of scientific misconduct to ORI or appropriate institutional authorities.

Bouville, Mathieu. 2008. Whistleblowing and morality. *Journal of Business Ethics.* 81(3): 579-585 Part I.
The author discusses why blowing the whistle is indeed a choice and not a matter of objective duty. In view of the dreadful retaliations that whistleblowers often face, the author argues that it is necessary for morality to leave a way out of whistleblowing. He argues that if blowing the whistle fails to achieve anything then doing so might be the wrong decision, and discusses some of the factors that must be weighed in cases such as this.

Davis, Michael. 1996. Some paradoxes of whistleblowing. *Business and Profession Ethics Journal* . 15: 3-19.
The paper first describes the "standard theory of whistle-blowing" that seeks to justify whistleblowing by its ability to prevent harm. The paper then argues that the

standard theory is paradoxical, i.e., that it is inconsistent with what we know about whistle-blowers, f

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Bibliography

Topics

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Discipline(s)

Engineering
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Computer, Math, and Physical Sciences
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