



ETHICS ADVISORY COUNCIL WORKSHOP

April 3, 2018

PURDUE
UNIVERSITY

ENGINEERING EDUCATION

AGENDA

- | | |
|--------------------|--|
| 11:30-12:30 | Lunch, Workshop Overview & Goals, Introductions |
| 12:30-1:30 | Activity #1: Storytelling |
| 1:30-1:45 | Break |
| 1:45-2:45 | Activity #2: SWOT Analysis |
| 2:45-3:45 | Activity #3: Strategic Planning |
| 3:45-4:00 | Workshop Evaluation, Reimbursement Procedures |

(SPEAKING OF ETHICS) A NOTE ON CONFIDENTIALITY...

Our team will audio record and take notes during select workshop activities. We will consult with this group before reporting any specific observations or outcomes from this workshop. However, please also feel free to make comments “off the record” or strike comments from the record (immediately or after the fact) should the need arise.



ACKNOWLEDGMENTS

National-Level Support:

Purdue team selected as one of 12 participating teams in national workshop organized in 2017 by *Center for Ethics in Engineering and Science* (CEES) at *National Academy of Engineering* (NAE).

National Science Foundation (NSF) Funding Awards:

SES-1045412, EESE-1237868, CCE STEM-1449479, EEC-1429114, DUE-1123274, and CCE STEM-1737303

College-Level Support:

Engineer of 2020 Seed Grant - \$40K for 2017-2019.



WE WANT TO ADDRESS CHALLENGES TO INFUSING ETHICS INTO ALL OUR ENGINEERING PROGRAMS

- “It should be the responsibility of the engineering faculty to infuse professional concepts into all engineering coursework.”
– ABET (1986)



A BRIEF HISTORY OF ENGINEERING ETHICS IN THE U.S.

Andrew Katz

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HISTORY HIGHLIGHTS

- Changes in definitions (formal and informal)
- Role of disasters (cluster in 1970s and 1980s)
- Role of professional societies (professional codes of ethics and legal advocacy)
- Role of national organizations (federal or private) via funding and workshops

Goal: Workshops participants will have a better picture of historical developments in engineering ethics and engineering ethics education

CHANGING DEFINITIONS

- Definitions of ethics
 - Implicit ethics
 - Engineering as a profession and ethics as loyalty
 - Public health, safety, and welfare as paramount
- Codes of ethics and their underlying motivations – the profession, the company, and society
- Engineering ethics education
 - 1955: no kickbacks, no commissions for contracts, no price bidding, no slandering fellow engineers
 - Late-1970s: social responsibility becomes more debated
 - ABET EC2000: student outcome 3.f – understanding of professional and ethical responsibility

Roles of Disasters

Public Events

1908: Boston
molasses spill

1940: Tacoma
Narrows bridge

1968: BF Goodrich airbrakes

1972/73: Ford Pinto

1972/73: BART

1974: DC-10

1979: Three Mile Island

1981: Hyatt Regency walkway

1984: Bhopal gas release

1986: Chernobyl

1986: Challenger

1900

1920

1940

1960

1980

2000

Codes Adoption

1912: AIEE

1913: ASME

1913: AIChE

1914: ASCE

1946: ECPD

1947: NSPE

1974: IEEE

1974:
Paramountcy
clause

Topical Issues

Loyalty to employer

Professionalism

Public health,
safety, and welfare

Whistleblowing

Public confidence

Micro and macro ethical issues

ROLE OF NATIONAL ORGANIZATIONS

- National Science Foundation
 - National Endowment for the Humanities
 - National Academy of Engineering
 - American Association for the Advancement of Science
 - Association for Practical and Professional Ethics
 - Engineers' Council for Professional Development
 - Accreditation Board for Engineering and Technology
 - American Society for Engineering Education
- Workshops
 - Interdisciplinary Workshop on the Interrelationships Between Science and Technology, and Ethics and Values (1975)
 - Professional Ethics in Science and Engineering Project (1979)
 - Workshop on ethical issues in science and engineering (1979)
 - Programs
 - Ethics and Values in Science and Technology (Started in 1972)
 - Publications
 - *Ethical Problems in Engineering* by Baum and Flores (1978)
 - *Ethics in Engineering* by Martin and Schinzinger (1983)

SOME IMPORTANT PERIODS

- Implicit ethics – pre-1900s
- Loyalty as paramount – pre-1950s
- 1912: AIEE (now IEEE) adopts code of ethics
- 1947: Engineers' Council for Professional Development suggests code
- Post 1950s: Public safety, health, and welfare as paramount
- 1970s-1980s: Engineering disasters in
 - Engineering and philosophy workshops foster collaborations
- 1980s: Numerous engineering ethics textbooks published
- 1997: ABET adopts EC2000
- 2017: ABET changes outcomes a-k to 1-7

ABET ACCREDITATION CRITERIA (EC 2000)

GENERAL CRITERION 3. STUDENT OUTCOMES

- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (f) an understanding of professional and ethical responsibility

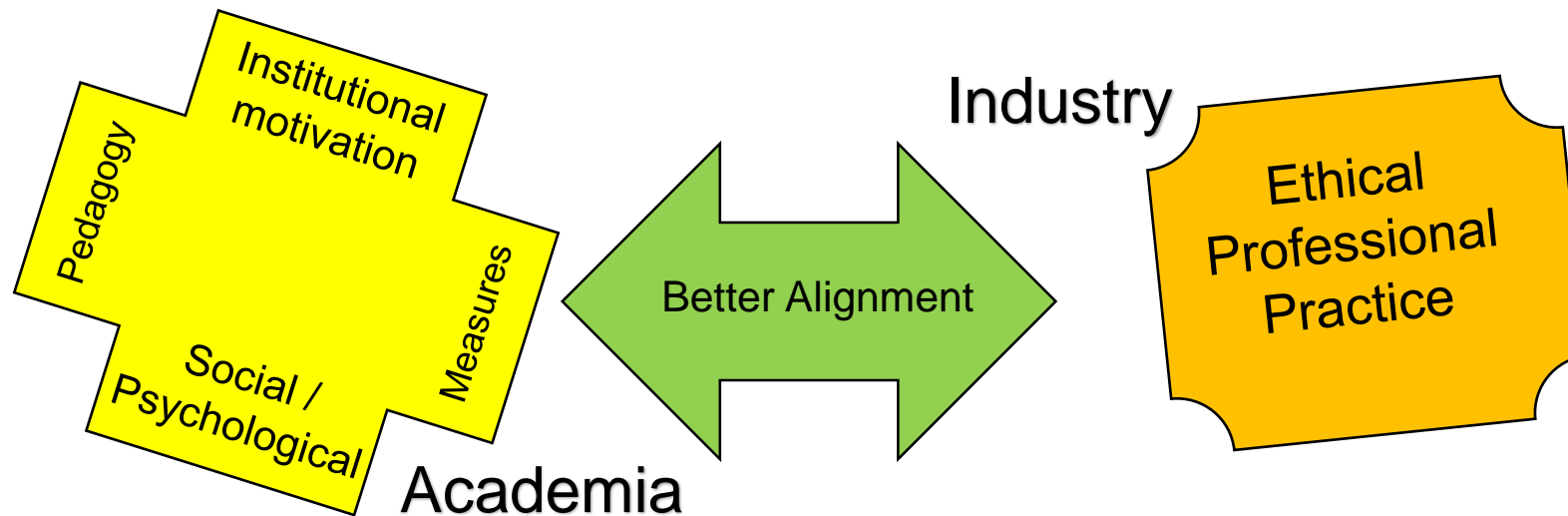
ABET ACCREDITATION CRITERIA (NEW)

GENERAL CRITERION 3. STUDENT OUTCOMES

- 5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

AN IMPORTANT PROBLEM TO BE SOLVED

Academic engineering ethics education is not aligned with the needs of professional practice in all fields



YOUR GOALS AND OBJECTIVES

What do you hope to gain, contribute, and/or achieve through this workshop? (Please be as specific as possible, including timing.)



A TENTATIVE LIST OF OUR GOALS AND OBJECTIVES

- Develop case studies and/or other instructional materials
- Contribute to development of college-wide ethics course
- Contribute to study and/or development of ethics training in industry
- Perform systematic comparison of training in industry vs. university
- Identify opportunities for follow-up meetings or other interactions

ACTIVITY #1: STORYTELLING

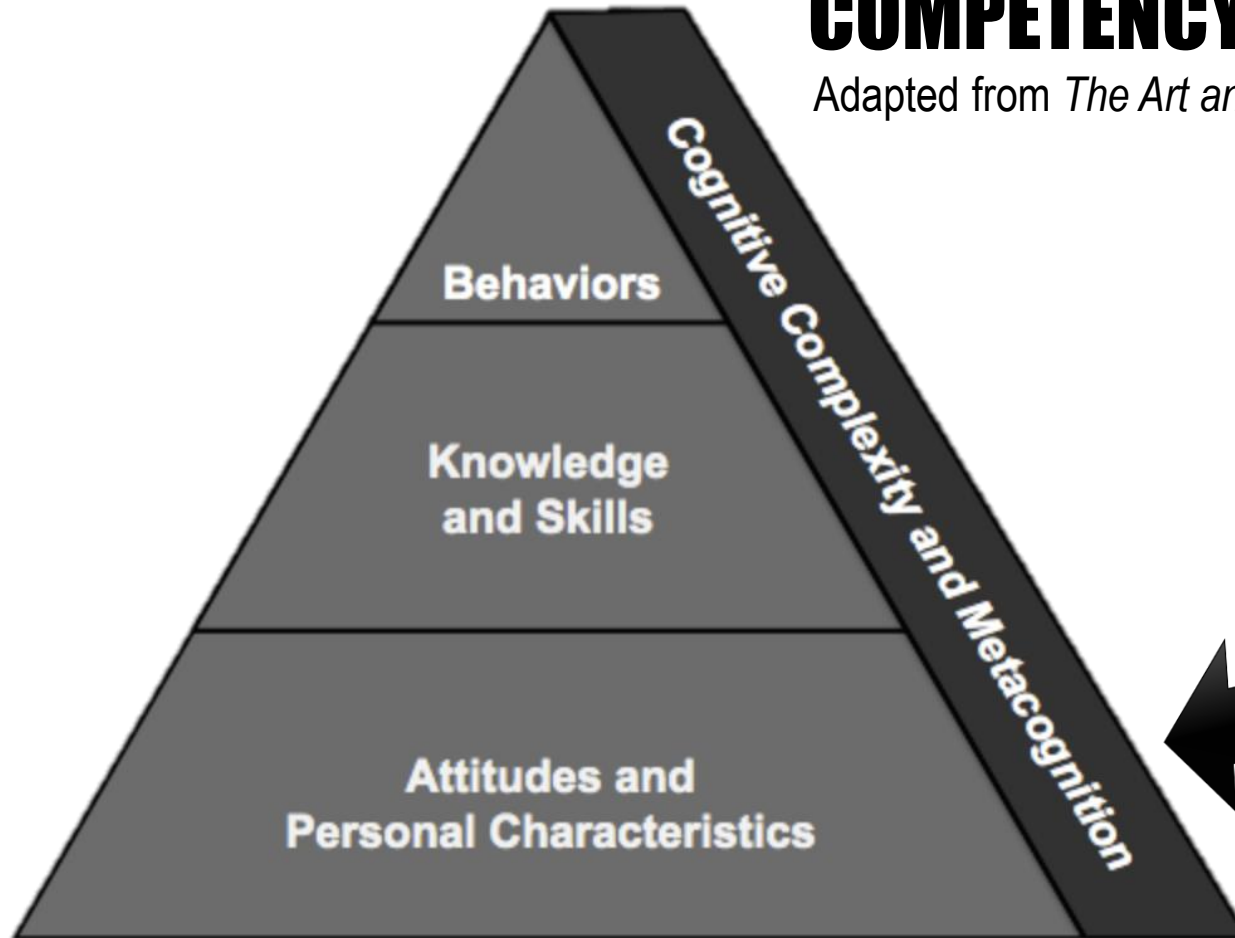
Storytelling roundtable: What ethical situations have you encountered (and/or been aware of) during your professional career?

GOALS:

- Identify workplace situations typically or often faced by engineers which involve ethics, morality, social responsibility, and related considerations.
- Explore specific competencies needed for engineers to effectively navigate ethical situations in the workplace.
- Explore opportunities for developing instructional materials and strategies (e.g., case study content) to enhance ethics training for engineers.
- Reveal motivations and passions underlying efforts to enhance ethics education for engineering students and practicing professionals.

COMPETENCY PYRAMID

Adapted from *The Art and Science of Competency Models* (Lucia & Lepsinger, 1999)



developmental



ACTIVITY #2.1: IDENTIFY

1. Self-organize into “like” groups (industry representatives together, and university staff together), each comprised of ~3-5 individuals.
2. Identify (one competency or activity per post-it note)
 - *What specific competencies (attitudes, knowledge, skills, etc.) are most critically important for engineers facing ethical issues in their work?*
 - *How are your organizations/programs preparing (or not preparing) engineers to identify and effectively navigate ethical issues in their work?*





ACTIVITY #2.2: SWOT ANALYSIS

As a group, perform a SWOT analysis on the competencies and preparation efforts related to ethics:

- **STRENGTHS:** What do your organizations/programs do well (in the ethics arena)?
- **WEAKNESSES:** What do your organizations/programs lack or under deliver?
- **OPPORTUNITIES:** What are some obvious gaps which could be addressed?
- **THREATS:** What risks, dangers, or other trends might be important to consider?

What broader issues must be considered?

ACTIVITY #3: STRATEGIC PLANNING

Group by School/Discipline

1. Discuss competencies and SWOT analysis
2. Revisit initial objectives/goals
3. Each person: Identify one goal/ action item that you are willing to commit to and the timeline
4. Find connections/opportunities for collaboration
5. Accountability? How can we be accountable to each other?

THANK YOU!

Profs. Brightman, Jesiek, Loui, & Zoltowski