

Ethics in Software Engineering

Outline

- What is Ethics?
- Why Ethics?
- What is Professional Ethics?
- Professional vs. General Ethics
- SE Code of Ethics
- Ethical Issues in SE – Examples



What is Ethics?

- The Merriam-Webster online dictionary defines ethics as:
 - the discipline dealing with what is good and bad and with moral duty and obligation
 - a set of moral principles
- Ethics is the study of what it means to “do the right thing.”
- It helps to restate an ethical issue, question or dilemma in the form:
 - “Is it right to ...?”

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Why Ethics?

- As professionals in science and engineering disciplines, we make technical judgments frequently.
- When what we do in our profession affects other people, our ethical judgment must come into play as well as our technical judgment.

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Why Ethics? – Three Good Reasons

- “Good ethical behavior usually leads to good consequences, both for ourselves and for society at large.”
- “Happiness comes from reasoning through a complex moral puzzle, choosing a good course of action, and following through.”
- “Scientists and engineers make decisions crucial to society at large, and therefore shoulder an enormous burden of public trust.”

Source: “Fundamentals of Ethics for Scientists and Engineers” by Seebauer & Barry

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What is Professional Ethics?

- Professional ethics – ethical issues a person might face as a computer professional on the job.
- Actions and decisions of individuals who create and use computer systems.
- Includes relationships with and responsibilities toward
 - Customers and clients
 - Coworkers
 - Employees and employers
 - Others who use one’s products and services
 - Others whom you affect

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Professional vs. General Ethics

- Two ways professional ethics differ from general ethics
 - Professional is an expert in a field and therefore has special responsibilities.
 - Products of many professionals profoundly affect large number of people.
- A professional can cause great harm through dishonesty, carelessness, or incompetence.

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SE Code of Ethics and Professional Practice

- Developed by IEEE-CS and ACM Joint Task Force
- Eight principles (with several clauses for each principle)
 - Public
 - Client and Employer
 - Product
 - Judgment
 - Management
 - Profession
 - Colleagues
 - Self
- The SE Code should not be viewed as a simple ethical algorithm for generating ethical decisions.
- Software engineers should strive to act in a manner that is consistent with the spirit of the SE code.

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Ethical Issues in SE

Example 1:

Suppose that your manager asks you to join a team at work and assumes you are sufficiently skilled in Java. However, you don't know Java, but really want to work on the project. Do you mention your lack of Java knowledge to your manager and risk being pulled from the project, or do you say nothing, even though your inexperience could jeopardize the success of the project?

Source: "Software Engineering – Modern Approaches" by Eric Braude and Michael Bernstein

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Example 2:

A software engineer working on several government contracts is "encouraged" by management to charge time against the contract with the highest number of available hours. What do you do?

Source: "Software Engineering – Modern Approaches" by Eric Braude and Michael Bernstein

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Example 3:

You are asked to develop a complex, critical piece of software for a commercial product you're working on. You discover a public domain version of the source code. You're tempted to use the source code as it will save much time and effort and allow you to move onto the development of another important part of the system sooner than expected. However, it's not licensed to be used for commercial purposes. What do you do?

Source: "Software Engineering – Modern Approaches" by Eric Braude and Michael Bernstein

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Ethical Issues in SE

Example 4: Software Requirements

Developers work together with customers and users to define requirements and specify what the proposed system will do.

If, once it is built, the system works according to specification but harms someone physically or financially, who is responsible?

Source: "Software Engineering" by Shari Pfleeger, 1998.

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Example 5:

What are the legal and ethical implications of using COTS software? For example, who is responsible for fixing the problem when the major system fails as a result of a fault in COTS software?

What checks and balances are needed to ensure the quality of COTS software before it is integrated into a larger system?

Source: "Software Engineering" by Shari Pfleeger, 1998.

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Ethical Issues in SE

Example 6:

What are the legal and ethical implications of using a subcontractor? For example, who is responsible for fixing the problem when the major system fails as a result of a fault in the subcontractor's software?

What checks and balances are needed to ensure the quality of subcontractor software before it is integrated into a larger system?

Source: "Software Engineering" by Shari Pfleeger, 1998.

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Example 7:

Suppose Amalgamated, Inc. requires you to use a given process model when it contracts with you to build a system. After the software is delivered and installed, your system experiences a catastrophic failure.

When Amalgamated investigates, you are accused of not having done code reviews that would have found the source of the problem before delivery. You respond that code reviews were not in the required process.

What are the legal and ethical issues involved in this dispute?

Source: "Software Engineering" by Shari Pfleeger, 1998.



Ethical Issues in SE

Example 8:

If one person has written a component but others have revised it, who is responsible if the component fails?

Source: "Software Engineering" by Shari Pfleeger, 1998.



Ethical Issues in SE

Example 9: Testing

If an independent test team does integration testing and a critical fault remains in the code after testing is complete, who is legally and ethically responsible for the damage caused by the fault?

Source: "Software Engineering" by Shari Pfleeger, 1998.

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Example 10: Testing

A safety-critical system fails and several lives are lost. When the cause of the failure is investigated, the inquiry commission discovers that the test plan neglected to consider the case that caused the system failure.

Who is responsible?

- The testers for not noticing the missing case?
- The test planners for not writing a complete test plan?
- The managers for not having checked the test plan?
- The customer for not having done a thorough acceptance test?

Source: "Software Engineering" by Shari Pfleeger, 1998.

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Example 11: Maintenance

Suppose you are maintaining a large, safety-critical system. You use a model to predict which components are most likely to fail. Then you examine those identified components carefully and perform perfective and preventive maintenance on each one.

Soon after, the system undergoes a catastrophic failure. The source of the failure turns out to be a component that was not identified by your model.

Are you at fault for neglecting to look at the other components?

Source: "Software Engineering" by Shari Pfleeger, 1998.

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Example 12: Impossible Requirement

Sometimes a customer requests a requirement that you know is impossible to implement. Should you agree to put the requirement in the requirements specification document anyway, thinking that you might come up with a novel way of meeting it, or thinking that you will ask that the requirement be dropped later?

What are the ethical implications of promising what you know you cannot deliver?

Source: "Software Engineering" by Shari Pfleeger, 1998.

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Example 13: Impossible Test

If a system's ultrahigh reliability requirement means that the reliability can never be verified, should the system be used anyway?

Source: "Software Engineering" by Shari Pfleeger, 1998.