POLITECNICO DI MILANO





Computer Ethics

Codes of conduct and professional ethics

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Overview

- Case: Bay Area Rapid Transport Project
- The role of codes of conduct in engineering (van de Poel and Royakkers 2011)
- Why professional ethics?
- The paradigm of professions in ITC context (Johnson 2009)

Case: BART

- *1972: **3 engineers** responsible for the creation of an **automatic guided train system** are **dismissed***
  - *They have been expressing their **doubts** about the **safety** of the system via internal memos since 1969 and the response is "**don't make trouble**"*
  - *In 1971 they bring their concerns in confidence to the members of the **board of directors**, thus **bypassing** their immediate **superiors***
  - *Despite the confidentiality promised by their superiors, two days after their encounter the **full story** is **published** in **Contra Costa Times***
  - *The **three engineers**, once their involvement is confirmed, are **fired** without any appeal*
  - *They subsequently take the matter to **court***

BART

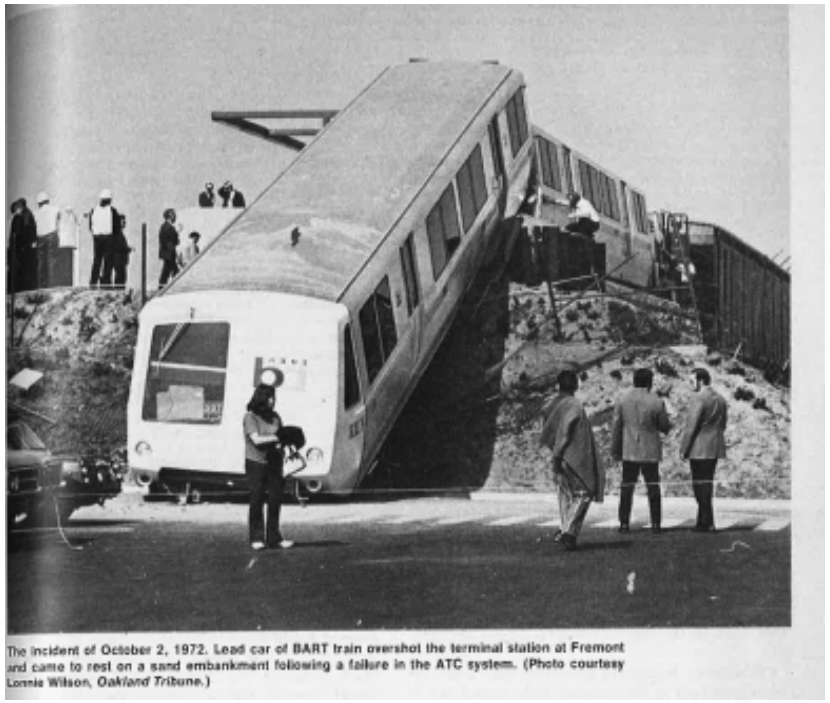
- Bay Area Rapid Transport Project (BART)

The involvement of IEEE

- *IEEE (Institute of Electrical and Electronic Engineers) decides to send to the law courts an '**amicus curiae letter**'*
  - *According to the **IEEE**'s professional code, engineers are responsible for the "**safety, health and welfare of the public**"*
  - *The **professional code** is an **implicit aspect** of the employment contract*
- *If this argument has been accepted by the judge then it would have meant that employees acting in accordance with the professional code may not be simply dismissed*

Despite the accident

- *October 2, **1972** a **train system accident** occurs and several passengers are injured*
- *Despite this, the **3 engineers** accept an **out-of-court settlement** reported to be $25,000 per person*
  - *The presumed reason is that **they have lied in the first instance about their involvement in the matte**r which has weakened their case*
- *The dismissals have been very **detrimental** for the **careers** of all 3 engineers*



The incident of October 2, 1972. Lead car of BART train overshot the terminal station at Fremont and came to rest on a sand embankment following a failure in the ATC system. (Photo courtesy Lonnie Wilson, *Oakland Tribune*.)

A clear conflict

- The 3 engineers acted out of a sense of **professional responsibility** (codified in the IEEE code of conduct)
- Although their professional organization (IEEE) supported their behavior, it could not prevent them from being dismissed
- What is hence the **role** of **codes of conduct** in engineering?

Whistle-blowing

- The **disclosure** of **certain abuses** in a company by an employee, **without the consent of his/her superiors**, and in order to remedy these abuses and /or to warn the public about these abuses

Whistle-blowing: when?

- But when does whistle-blowing is **morally required**?
  - Harm to the public
  - After reporting, superiors have not done anything effective
  - Internal procedures have been already attempted
  - Evidence to convince an impartial observer that the view of the threat is correct
  - Revealing the threat as preventing the harm at reasonable cost

Codes of conduct

- A code in which organizations (like companies or professional associations) lay down **guidelines** for **responsible behavior** of their members
  - **Professional code** is a code of conduct formulated by a professional association
  - **Corporate code** is code of conduct formulated by a company
- Codes of conduct are formulated for a **variety of reasons**
  - Increasing moral awareness, identifying and interpreting the moral norms and values of a profession or a company, increasing accountability to the outside world, improving the image of a profession or a company,...

What is a profession?

- A profession is an **occupation** with **specific characteristics**; although there is no agreement on what characteristics are exactly required, often mentioned characteristics include
  - Use of **specialized knowledge** and skills
  - A **monopoly** on the carrying out of the occupation
  - **Assessment** only possible by **peers**
- In addition the following two requirements are also sometimes mentioned
  - **Service orientation** to society
  - **Ethical standards**

Core of professional codes

- **Integrity**: living by one's own (moral) values, norms and commitments
- **Honesty**: telling what one has good reasons to believe to be true and disclosing all relevant information
- **Avoidance of conflicts of interest**
  - Conflict of interest is a situation in which one has an interest (personal or professional) that, when pursued, can conflict with meeting one's professional obligations to an employer or to (other) clients

Corporate codes

- Corporate social responsibility of companies towards **stakeholders** and to **society** at large that extends beyond meeting the law and serving stakeholder's interests

Corporate codes - Examples

- **Mission statement**

*"At Microsoft, we work **to help people** and **businesses** throughout the world realize their **full potential**. This is our mission. Everything we do reflects this **mission** and the **values** and make it possible."*

Corporate codes - Examples

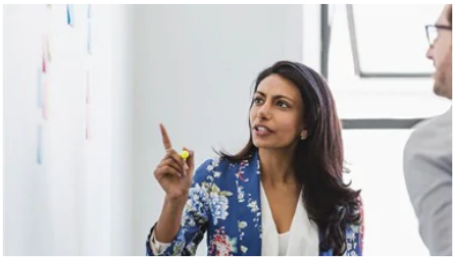
- **Core values**

"As a company, and as individuals, we value: ***integrity*** *and* ***honesty****;* ***passion for*** *customers, for our* ***partners****, and for* ***technology****;* ***openness*** *and* ***respectfulness****"*

(Microsoft)

Overview of Microsoft's Compliance and Ethics Program

Microsoft has built its compliance and ethics program on three pillars: Prevention, Detection, and Remediation. We continually evolve our programs to meet these goals.



Prevention

To prevent compliance issues from arising in the first place, we focus on promoting a culture of ethics and integrity. We do this through creating a culture of compliance throughout our company, and through our Standards of Business Conduct, policies, and training, while also using data analytics, risk assessment, proactive investigations, third party vetting, and other compliance efforts to minimize potential risks.

Detection

We detect potential compliance issues in several ways, including testing by our Internal Audit group, monitoring through our compliance analytics program and by our Controls & Compliance teams, investigating concerns reported by employees and others, and analyzing trends through our Office of Legal Compliance. Compliance is a team effort at Microsoft. Every employee is responsible for upholding our standards, fostering the culture of compliance in their Microsoft team and partners, and reporting concerns.

Remediation

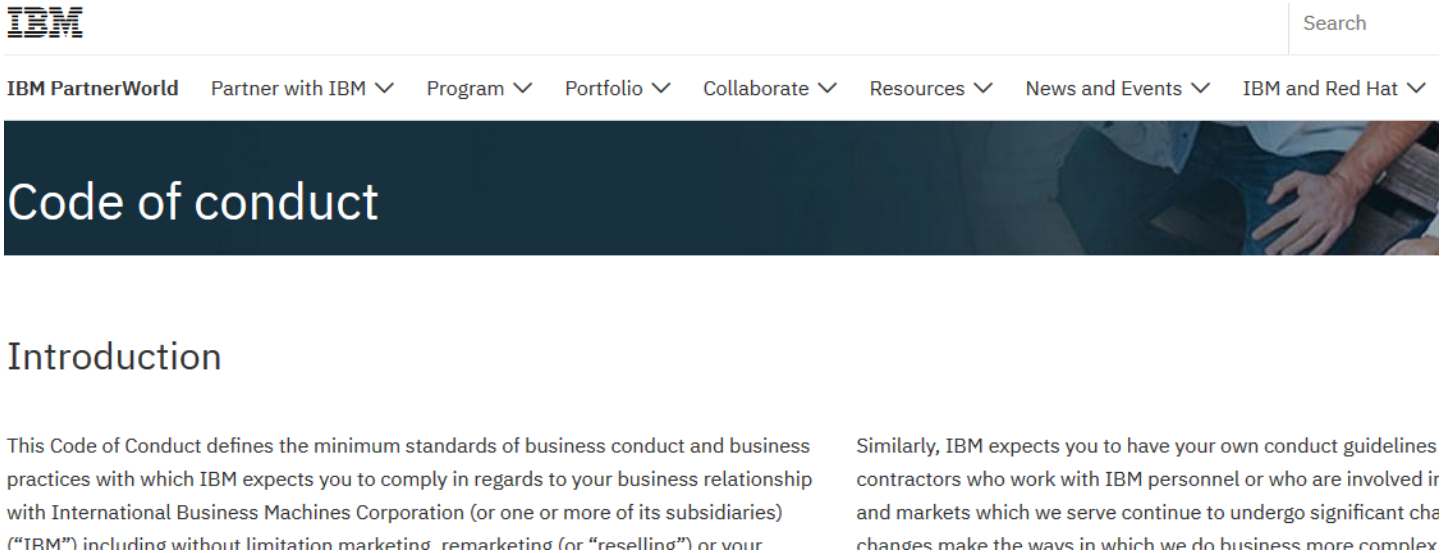
We assess the root cause of problems, and continually enhance our controls and processes to minimize the risk of recurrence. This process is a core component of Microsoft's compliance program and growth mindset culture. We discipline employees who violate our policies and standards, regardless of their level, and we stop doing business with partners and suppliers who don't meet our ethical standards.

Corporate codes - Examples

- **Norms and rules**

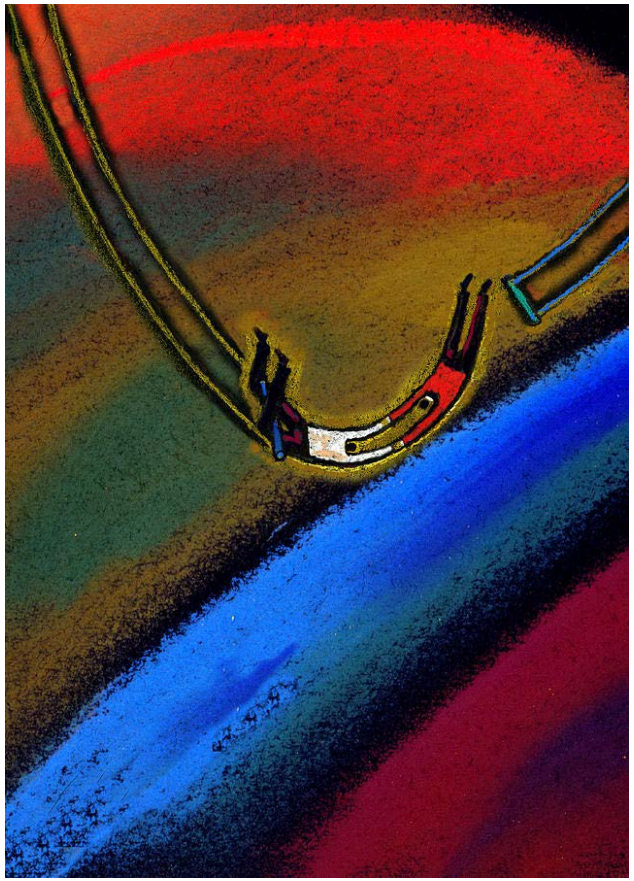
*"Generally**, it is not appropriate** for an employee to accept a supplier's invitation to attend an entertainment or sporting event at the supplier's expense. An invitation to an entertainment or sporting event **may be appropriate** if it demonstrably helps to build or maintain a business relationship"*

(IBM document Ethics and Compliance)



Possibilities

- Codes of conduct help to **express** the **responsibility** of **engineers** and are a useful point of departure for discussions about these responsibilities



Limitations

- A number of **objections** have been leveled
  - Sometimes codes of conduct are formulated only for reasons of **self-interest** (**window-dressing** is to present a favorable impression that is not based on actual facts)
  - Sometimes they result in **contradictory recommendations** about what to do in a specific situation (**uncritical loyalty** is to place the interests of the employer above any other considerations)
  - Some argue that drafting a code of conduct is misperceived because **ethics cannot be codified**
  - Sometimes codes of conduct contain **provisions** that are **difficult to follow in practice**

From engineering to computer engineering

- The case of **Therac-25** as "**software killing people**"
  - Therac-25: radiation therapy machine and cases of **overdoses of radiation** (1985-1987)
  - **Synchronization problem** to occur when an operator made a particular sequence of screen editing changes that resulted in large, high-powered beams of x-rays to be released into patients

Therac-25: issues

- Detailed analysis of the case reveals **a complex set** of **interacting problems** including design, testing, government regulation, medical accident reporting, and safety analysis techniques
- The **work of IT professionals** is enmeshed in **social relationships** – with clients, employers, employees of client, and with others who are affected by the computer systems the professional has helped to create

The paradigm of professions

- Characteristics of professions
  - **Mastery of an esoteric body of knowledge**: typically the body of knowledge is abstract and has been systematized such that it can be mastered only through disciplined study (higher education)
  - **Autonomy**: good deal of personal autonomy in daily work (compared to employees who take orders) and also as professional groups
  - **Formal organization**: recognized by regional and/or national governments and controlling admission to profession, standards for practice, accreditation standards for educational degrees
  - **Code of ethics**: public statement committing the profession to standards of behavior that benefit the public
  - **Culture of practice**: that arises from the conditions in which individuals work and from the values and purposes of the profession

Computing and its professional status

- Not to decide whether or not computing is a profession and computer experts professionals
- But to identify the **characteristics** of **computing** as an **occupational field**
  - What **sort of responsibility** come with (or should come with) **being a computer expert**?
  - In the **future** how are those responsibilities likely to change?
- Delineating the field of computing in relation to the paradigm of professions is challenging because **computer experts** occupy so **many different roles**
  - Programmers, system designers, database managers, software engineers, computer security specialists, researchers, system managers, documentation specialists, network administrators

Mastery of knowledge

- Is there a **core body of knowledge** that unifies all computer professionals?
- A **degree** is required for many computing jobs
  - ACM and IEEE and their curricular guidelines
- **Certification** is another means by which computer experts acquire credentials in an aspect of computing
  - Certifications are often closely tied to a particular company's product

Formal organization

- **No single professional organization** encompassing all computing experts exists
  - Variety of professional associations (ACM and IEEE-CS)
- **No approval** by a **professional organization** is commonly required **to be employed** (as it would in the case of certain medical positions)

Autonomy

- Computer experts are not **legally** permitted to do anything others cannot do, nor are they required to do anything more
  - Such as doctors that can prescribe drugs or police officers can use force
- Computer experts have **varying degrees of autonomy** depending on where they work and what positions they have in an organizational hierarchy
  - **Autonomy** does not **depend** by being a computer professional, but by the **position** occupied in the organization
- **Power of code** allows a computer expert to make decisions that are relatively free from outside review
  - They often can exercise this power on behalf of others who don't understand and cannot read code

Codes of ethics

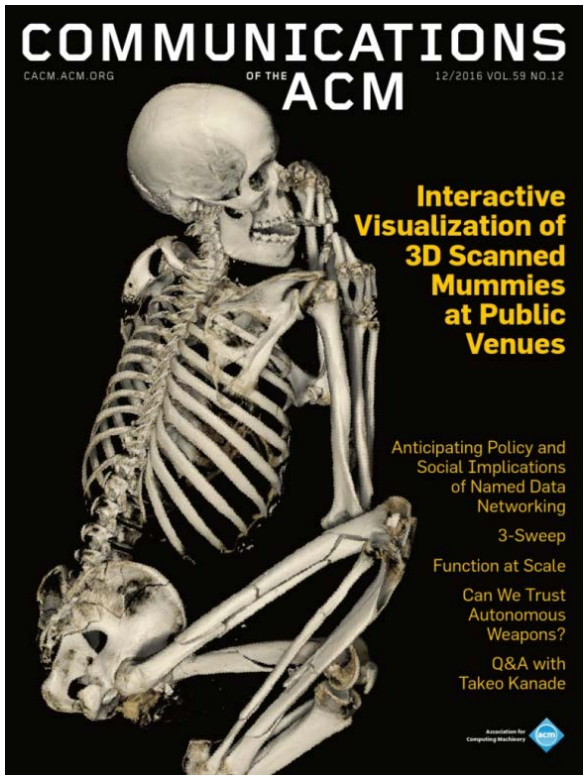
- Codes of ethics are part of a **strategy**
  - For establishing **relationships** with various constituents, including the public
  - For articulating **shared values**
  - For setting **social expectations**
- To be effective they must be part of a larger strategy that addresses all of the characteristics of profession
  - Formal organization, a culture of practice, identifying the body of knowledge, accrediting educational institutions
- Codes are intended not only for members of the profession, but can be seen also as **statements** to the **public** about what to expect

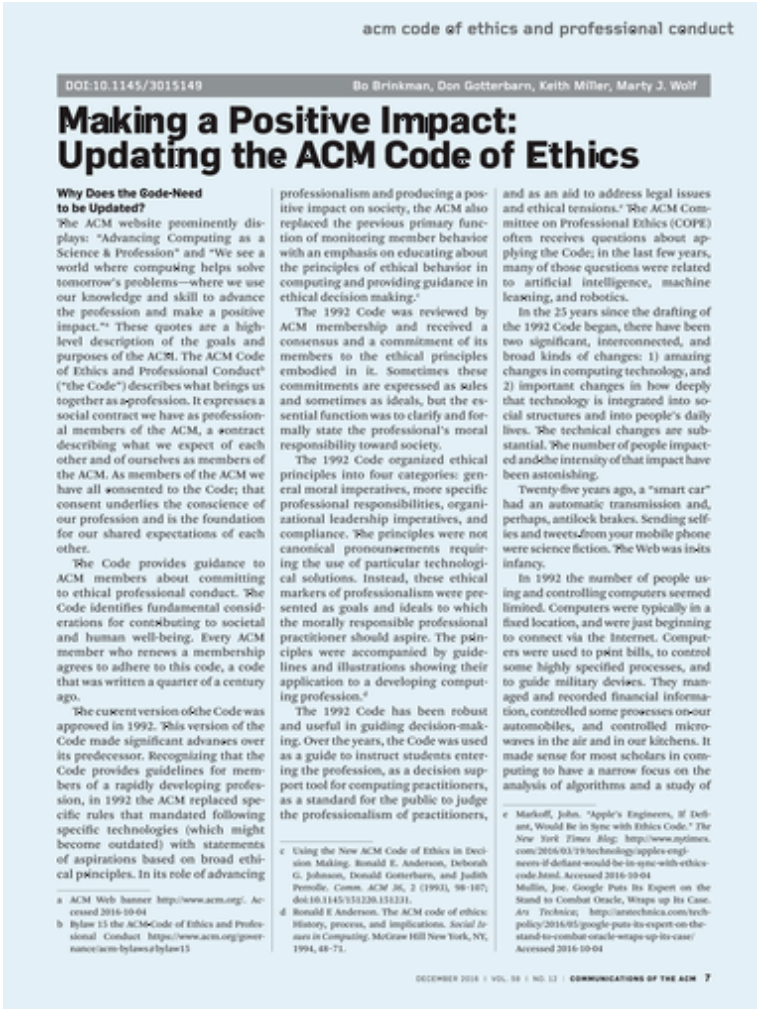
The culture of computing

- Because computer professional covers so many different types of jobs, it is **difficult to generalize** cultural aspects
  - Many **stereotypes** (male culture, culture of hacking)

A lively example

- ACM Code of Ethics and Professional Conduct
  - Adopted in 1992
  - Revision process started in 2016





acm code of ethics and professional conduct

DOI:10.1145/3015149 Bo Brinkman, Don Gotterbarn, Keith Miller, Marty J. Wolf

Making a Positive Impact: Updating the ACM Code of Ethics

Why Does the Code Need to be Updated?

The ACM website prominently displays: "Advancing Computing as a Science & Profession" and "We see a world where computing helps solve tomorrow's problems—where we use our knowledge and skill to advance the profession and make a positive impact."[a] These quotes are a high-level description of the goals and purposes of the ACM. The ACM Code of Ethics and Professional Conduct[b] ("the Code") describes what brings us together as a profession. It expresses a social contract we have as professional members of the ACM, a contract describing what we expect of each other and of ourselves as members of the ACM. As members of the ACM we have all consented to the Code; that consent underlies the conscience of our profession and is the foundation for our shared expectations of each other.

The Code provides guidance to ACM members about committing to ethical professional conduct. The Code identifies fundamental considerations for contributing to societal and human well-being. Every ACM member who renews a membership agrees to adhere to this code, a code that was written a quarter of a century ago.

The current version of the Code was approved in 1992. This version of the Code made significant advances over its predecessor. Recognizing that the Code provides guidelines for members of a rapidly developing profession, in 1992 the ACM replaced specific rules that mandated following specific technologies (which might become outdated) with statements of aspirations based on broad ethical principles. In its role of advancing professionalism and producing a positive impact on society, the ACM also replaced the previous primary function of monitoring member behavior with an emphasis on educating about the principles of ethical behavior in computing and providing guidance in ethical decision making.[c]

The 1992 Code was reviewed by ACM membership and received a consensus and a commitment of its members to the ethical principles embodied in it. Sometimes these commitments are expressed as rules and sometimes as ideals, but the essential function was to clarify and formally state the professional's moral responsibility toward society.

The 1992 Code organized ethical principles into four categories: general moral imperatives, more specific professional responsibilities, organizational leadership imperatives, and compliance. The principles were not canonical pronouncements requiring the use of particular technological solutions. Instead, these ethical markers of professionalism were presented as goals and ideals to which the morally responsible professional practitioner should aspire. The principles were accompanied by guidelines and illustrations showing their application to a developing computing profession.[d]

The 1992 Code has been robust and useful in guiding decision-making. Over the years, the Code was used as a guide to instruct students entering the profession, as a decision support tool for computing practitioners, as a standard for the public to judge the professionalism of practitioners, and as an aid to address legal issues and ethical tensions.[e] The ACM Committee on Professional Ethics (COPE) often receives questions about applying the Code; in the last few years, many of those questions were related to artificial intelligence, machine learning, and robotics.

In the 25 years since the drafting of the 1992 Code began, there have been two significant, interconnected, and broad kinds of changes: 1) amazing changes in computing technology, and 2) important changes in how deeply that technology is integrated into social structures and into people's daily lives. The technical changes are substantial. The number of people impacted and the intensity of that impact have been astonishing.

Twenty-five years ago, a "smart car" had an automatic transmission and, perhaps, antilock brakes. Sending selfies and tweets from your mobile phone were science fiction. The Web was in its infancy.

In 1992 the number of people using and controlling computers seemed limited. Computers were typically in a fixed location, and were just beginning to connect via the Internet. Computers were used to print bills, to control some highly specified processes, and to guide military devices. They managed and recorded financial information, controlled some processes on our automobiles, and controlled microwaves in the air and in our kitchens. It made sense for most scholars in computing to have a narrow focus on the analysis of algorithms and a study of

a ACM Web banner http://www.acm.org/. Accessed 2016-10-04

b Bylaw 15 the ACM Code of Ethics and Professional Conduct https://www.acm.org/governance/acm-bylaws#bylaw15

c Using the New ACM Code of Ethics in Decision Making. Ronald E. Anderson, Deborah G. Johnson, Donald Gotterbarn, and Judith Perrolle. *Comm. ACM 36*, 2 (1993), 98–107; doi:10.1145/151220.151231.

d Ronald E Anderson. The ACM code of ethics: History, process, and implications. *Social Issues in Computing*. McGraw Hill New York, NY, 1994, 48–71.

e Markoff, John. "Apple's Engineers, If Defiant, Would Be in Sync with Ethics Code." *The New York Times Blog*; http://www.nytimes.com/2016/03/19/technology/apples-engineers-if-defiant-would-be-in-sync-with-ethics-code.html. Accessed 2016-10-04
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1. General ethical principles

1.1 Contribute to society and to human well-being, acknowledging that all people are stakeholders in computing

1.2 Avoid harm

1.3 Be honest and trustworthy

1.4 Be fair and take action not to discriminate

1.5 Respect the work required to produce new ideas, inventions, creative works, and computing artifacts

1.6 Respect privacy

1.7 Honor confidentiality

2. Professional responsibilities

2.1 Strive to achieve high quality in both the processes and products of professional work

2.2 Maintain high standards of professional competence, conduct, and ethical practice

2.3 Know and respect existing rules pertaining to professional work.

2.4 Accept and provide appropriate professional review

2.5 Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks

2.6 Perform work only in areas of competence

2.7 Foster public awareness and understanding of computing, related technologies, and their consequences

2.8 Access computing and communication resources only when authorized or when compelled by the public good

2.9 Design and implement systems that are robustly and usably secure

3. Professional leadership principles

3.1 Ensure that the public good is the central concern during all professional computing work

3.2 Articulate, encourage acceptance of, and evaluate fulfillment of social responsibilities by members of the organization or group

3.3 Manage personnel and resources to enhance the quality of working life

3.4 Articulate, apply, and support policies and processes that reflect the principles of the Code

3.5 Create opportunities for members of the organization or group to grow as professionals

3.6 Use care when modifying or retiring systems

3.7 Recognize and take special care of systems that become integrated into the infrastructure of society

4. General ethical principles

4.1 Uphold, promote, and respect the principles of the Code

4.2 Treat violations of the Code as inconsistent with membership in the ACM

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