

A STUDY AND COMPARISON OF ETHICAL CODES FOR INFORMATION TECHNOLOGY PROFESSIONALS

Kristi Berg, Minot State University, kristi.berg@ndus.edu

Brian Bartz, Minot State University, brian.bartz@ndus.edu

ABSTRACT

Ethics for information technology professionals is a concern for many in our society. Even though many unethical activities occur with the use of technology, technology is a driving force in our nation and world economy. From data stewardship, secure commerce to providing informed consent, technology professionals are faced with a multitude of ethical dilemmas in their work. Other professions, such as physicians, accountants and engineers have codes of ethics which have been in place longer than the rise of technology professionals. By comparing these codes and professions with information technology organization codes, a discussion around possible improvements for technology professionals can take place. Furthermore, everyone in society has a stake in improving the uses of technology for ethical purposes. There needs to be exploration into how educators and employers can leverage their tools for assisting societal improvement through the use of technology.

Keywords: Information Technology (IT), Ethics, IT and Ethics

INTRODUCTION

Doctors, accountants and engineers have professional certifications which contain ethical standards. When fraudulent behavior happens by individuals with these certifications, there are ramifications from the certifying group which makes it difficult, if not illegal, for them to continue practicing their trade. Can ethics be regulated by standards or certifications? Can people regulate themselves when it comes to adhering to ethical behavior? Do technology professionals have a chance to align themselves with ethics outside of a company which sponsors certifications?

Society can only change from within one person at a time. As our children are choosing their vocational skill sets, we need to provide a way to show them the ethical use of technology is admirable and compensated accordingly. There is unethical and fraudulent behavior by technology professionals. Some are from insider threats; some are not. The 'black hat' technologist network creates havoc with e-commerce through credit card fraud and identity theft.

Technical professionals do not have an opportunity to take ethical oaths as other professionals. If they do, the organization's brand is not as strong as other professions with longer histories and licensing requirements. As information has become the currency of today and the future, it makes sense to look back and see who the keepers of the information were prior to computer and digital records. Accountants seem to be the logical choice as have they been around since the development of the double entry system by Luca Pacioli in 1494. Certified Public Accountants, now Certified Professional Accountants (CPAs), were first licensed in 1896.

With the control of information moving under the control of technology professionals, should some consideration be given to the legal and ethical structure of other professional vocations. Doctors have the longest history of professional accreditation. Engineers seem to be professions that can be compared closely to technology professionals as building software and information systems are done in projec

Before society can move technology forward, an understanding of how other professional associations address ethics and licensing is needed. From other professional ethical standards and enforcement insight may be provided for addressing ethics and the technology professional.

The other professions studied for comparison purposes were physicians, accountants and engineers. As the project progressed, the definition of ethics was found to be defined differently for the various professions. As these definitions came to light, the scope of the project turned along similar avenues.

Definition of Terms

- Ethics – A study of moral standards and how they affect conduct or a system of moral principles governing the appropriate conduct for an individual or group (Bloomsbury, 2001). Dealing with the right and wrong of human behavior (Oz, 1994). From a standpoint of business and recordkeeping processes, ethics includes the study of human conduct and actions which on part comes from the agent's intention (Iacovino, 2006).
- Fraud Triangle (Albrecht, 2014) – The Fraud Triangle represents three factors which, in combination, can produce a fraudulent act. The Fraud Triangle can be extended to all compromises such as not being inconsistent with one's code of conduct.

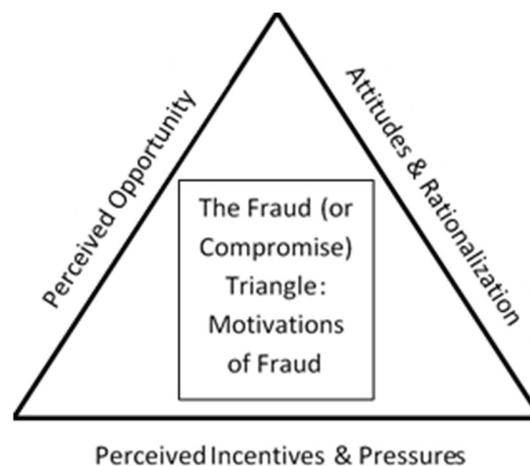


Figure 1. The Fraud Triangle. (Source: Albrecht, Fraud Magazine July/August 2014)

- Association of International Certified Public Accountants (AICPA) Ethic Sanctions/Dispositions (Association of International Certified Public Accountants, 2018). Expelled or Suspended – An AICPA member can be expelled or suspended for up to two years. During this period, the member cannot identify as an AICPA member. A member can be expelled or suspended without a hearing. Publication of expulsions and suspensions is mandatory. Admonishment – The AICPA Joint Trial Board can publicly admonish a member who violated the Code of Professional Conduct, but the gravity does not warrant suspension from membership. Publication of admonishments is mandatory.
- AICPA IMTA – Information Management and Technology Assurance Section. CITPs are automatically members of IMTA. Members will have access to resources helping them understand how the use of data and systems lead to improved business decisions. By gaining an understanding about technical skills and financial acumen, the evaluation of technology risks can be made to support business objectives.
- CITP – AICPA Certified Information Technology Professional. A designation for CPAs with the ability to provide business insight by leveraging IT knowledge.

A review of associations for doctors, engineers and accountants as well as the Association of Computing Machines (ACM) is the starting point for this research. The ACM seems to be the most logical choice for computing professionals as they are the oldest educational and scientific computing society (Oz, 1994, p. 127). A review of literature from academia on ethics in the information age is the next step toward understanding ethics and its application by the information technology profession. Finally, a comparison of codes of ethics is done to identify some differences which may help the computing profession and society for the future.

REVIEW OF RELATED ETHICAL CODES

American Medical Association (AMA)

The AMA, established in 1847, set goals to advance science, create standards for medical education, implement a program of medical ethics and improve public health. The AMA medical ethics program includes a Code of Medical Ethics and a Journal of Ethics. From these resources, physicians can get answers to real-life questions, access education, and join a discussion forum. The AMA has nine principles of medical ethics in their code which was last revised in 2001 (American Medical Association, 2018):

1. Be dedicated to competent medical care, with compassion and respect for human dignity and rights.
2. Be professional, honest and strive to report physicians deficient in character or competence or engaging in fraud.
3. Be respectful of the law and recognize responsibility to seek changes in those requirements which are contrary to the best interests of the patient.
4. Be respectful of the rights of patients, colleagues and health professionals and safeguard patient confidences and privacy within the constraints of law.
5. Be committed to study, apply and advance scientific knowledge through medical education. Make information available to patients, colleagues and the public. Obtain consultation and use the talents of health professionals when indicated.
6. Be free to choose whom to serve, with whom to associate and the environment to provide medical care (in the application of patient care with the except of emergencies).
7. Be a participant in activities contributing to the improvement of the community and betterment of public health.
8. Regard responsibility to the patient as paramount while caring for a patient.
9. Support access to medical care for all people.

State medical boards license physicians; therefore, when a patient feels a physician is behaving unethically or unprofessionally, the grievance is filed with the licensing board. The AMA states that professional conduct is set by each state medical licensing board, however, the Federation of State Medical Boards defines unprofessional conduct to include patient abuse, inadequate record keeping, failure to meet a standard of care, prescribing drugs in excess or without legitimate reason, failing to meet continuing education requirements, dishonesty, conviction of a felony and delegating a practice to an unlicensed individual.

Association of International Certified Professional Accountants (AICPA)

The AICPA, founded in 1887, represents the accountancy profession as the rule-making and standard-setting body nationally and in the global marketplace. The AICPA distinguishes itself by having rigorous educational requirements, a strict code of professional ethics, a licensing status and a commitment to serving the public interest.

State boards regulate accountancy in the United States. The AICPA revised their Code of Professional Conduct effective December 15, 2014. The AICPA hopes to see state boards of accountancy adopt these new, more robust, ethical standards. There are six principles of professional conduct for all CPAs in the new Code of Professional Conduct. They are (Association of International Certified Public Accountants, 2016):

1. The Responsibilities Principle. Members should exercise sensitive professional and moral judgements in all their activities.
2. The Public Interest Principle. Members should accept obligations to act in a way which will serve the public interest, honor the public trust and demonstrate a commitment to professionalism.
3. The Integrity Principle. Integrity is the quality of members which leads to having public trust. Integrity requires a member to be honest and candid within the constraints of confidentiality. Integrity can accommodate an error or a difference of opinion; it cannot accommodate deceit. Integrity requires a member's service and the public trust are above personal gain and advantage.
4. The Objectivity and Independence Principle. Members have an obligation to be impartial, intellectually honest and free of conflicts of interest. Being independent means not having a relationship which may appear to impair a member's objectivity.
5. The Due Care Principle. Members should observe the professional technical and ethical standards and continually strive to improve their competence and quality of services to the best of their ability.
6. Scope and Nature of Services Principle. The other five principles need to be observed when determining the scope and nature of services members should provide.

The AICPA has a Professional Ethics Division which investigates potential disciplinary matters and works with state CPA societies in the Joint Ethics Enforcement Program (JEEP). An AICPA member can be expelled or suspended without a hearing if their state license to practice is suspended or revoked, the member is convicted of a crime punishable by more than one year in prison, the willful failure to file a tax return, filing a false or fraudulent tax return, or willfully aiding in the preparation of a fraudulent tax return for a client. When expulsions or suspensions occur, the publication of notice is mandatory.

National Society of Professional Engineers (NSPE)

In 1934, the NSPE was established as an organization dedicated to the non-technical concerns of licensed professional engineers. The NSPE statement of principles has been overwhelmingly endorsed by the professional engineer (PE) members. The statement of principles state:

Being a licensed professional engineer means more than just holding a certificate and possessing technical competence. It is a commitment to hold the public health, safety, and welfare above all other considerations. NSPE's more than 80-year history has focused on this core principle, which professional engineers in all disciplines and practice areas hold in common. NSPE works to improve the lives of both the public and the PEs that serve it through efforts to: Define the PE license as the highest measure of professionalism and qualification to protect the public health, safety, and welfare; Promote awareness and recognition of the value and meaning of the PE license; and Protect the integrity of the profession and the welfare of the public by vigorously opposing the practice of engineering by unqualified persons; and advocating the highest standards of licensure, ethics, and professional practice.

The NSPE Code of Ethics for engineers, revised in 2007, breaks six fundamental canons into five rules of practice and nine professional obligations (National Society of Professional Engineers, 2007). The rules of practice state, engineers shall:

1. Hold paramount the safety, health and welfare of the public.
2. Perform services only in their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.

The NSPE publishes an Ethics Reference Guide, where a table of contents to the opinions of the Board of Ethical Review (BER) and a case index are presented. However, names of violators are not readily available.

Institute of Electrical and Electronic Engineers (IEEE)

The IEEE has a Code of Ethics has members commit and agree to a list of ten statements which was adopted by the IEEE Board of Directors in August 1990 (IEEE Board of Directors, 1990). The IEEE also has a Code of Conduct approved in June 2014 (IEEE Board of Directors, 2014). The Code of Conduct has five major sections (National Society of Professional Engineers, 2018):

1. Be respectful of others; including being respectful of the privacy of others and the protection of personal information and data.
2. Treat people fairly; including not engaging in harassment (whether in person or via cybertechnology) and not discriminating against a person based on characteristics protected by law.
3. Avoid injuring others, their property, reputation or employment; including by false or malicious action or spreading of malicious rumors, defamation or verbal or physical abuses on the Internet or otherwise.
4. Refrain from retaliation; including those who report a violation of the IEEE Code of Ethics or Code of Conduct and those who make IEEE aware of a violation of laws, rules or regulations in connection with IEEE activities.
5. Comply with laws in all countries where IEEE does business and with IEEE policies and procedures.

When complaints pertaining to ethical behavior of members are received by the IEEE Board of Directors, a review is completed (The Institute of Electrical and Electronic Engineers, 2017). If the findings of the Ethics and Member Conduct Committee provide a reasonable basis, if proven, for a cause for expulsion, suspension or censure, a hearing will be scheduled. A Hearing Board will be created and will determine if the conduct constitutes cause for sanctions. The Hearing Board will report to the Board of Directors, who will determine the penalty and if notification is to be made to the IEEE membership.

Association for Computing Machinery (ACM)

In 1947, ACM was established; soon after the first stored-program digital computer, ENIAC was created (Association of Computing Machinery, 2018). The ACM code of ethics and professional conduct was adopted by the ACM Council in 1992. The code consists of 24 imperatives formed as statements of personal responsibility broken into four sections. The sections and statements are:

1. General Moral Imperatives: As an ACM member I will...Contribute to society and human well-being. Avoid harm to others. Be honest and trustworthy. Be fair and take action not to discriminate. Honor property rights including copyrights and patents. Give proper credit for intellectual property Respect the privacy of others. Honor confidentiality.
2. More specific Professional Responsibilities: As an ACM computing professional I will...Strive to achieve the highest quality in both the process and products of professional work. Acquire and maintain professional competence. Know and respect existing laws pertaining to professional work. Accept and provide appropriate professional review. Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks. Honor contracts, agreements, and assigned responsibilities. Improve public understanding of computing and its consequences. Access computing and communication resources only when authorized to do so.
3. Organizational Leadership Imperatives: As an ACM member and an organizational leader, I will...Articulate social responsibilities of members of an organizational unit and encourage full acceptance of those responsibilities. Manage personnel and resources to design and build information systems that enhance the quality, effectiveness and dignity of working life. Acknowledge and support proper and authorized uses of an organization's computing and communication resources. Ensure that users and those who will be affected by a computing system have their needs clearly articulated during the assessment and design of requirements; later the system must be validated to meet requirements. Articulate and support policies that protect the dignity of users and others affected by a computing system. Create opportunities for members of the organization to learn the principles and limitations of computer systems.
4. Compliance with the Code: As an ACM member, I will...Uphold and promote the principles of this Code. Treat violations of this Code as inconsistent with membership in the ACM.

When complaints are received by the Executive Director of the ACM, a meeting will be attempted to be arranged between the complainant and the charged member. If a resolution between all parties cannot be reached, the ACM Council will hear the complaint in executive session. If expulsion, suspension or admonishment is approved, the name of the charged member will not be included in the minutes. Confidentiality of the ACM Council proceeding is specifically stated in the enforcement procedures for the code of ethics and professional conduct with a violation of that confidentiality being grounds for proceedings for a violation of the ethics code.

The ACM partnered with the IEEE-Computer Society (CS) and published a software engineering code of ethics and professional practice (Gotterbarn, Miller, & Rogerson, 1999). The software engineering code is for all those in the software engineering profession, regardless of whether they are a member of ACM. The software engineering code (version 5.2, approved in 1999) identifies eight principles software engineers shall follow:

1. Public – Software engineers shall act consistently with the public interest.
2. Client and employer – Software engineers shall act in a manner that is in the best interests of their client and employer consistent with the public interest.
3. Product – Software engineers shall ensure that their products and related modifications meet the highest professional standards possible.
4. Judgement – Software engineers shall maintain integrity and independence in their professional judgment.
5. Management – Software engineering managers and leaders shall subscribe to and promote an ethical approach to the management of software development and maintenance.
6. Profession – Software engineers shall advance the integrity and reputation of the profession consistent with the public interest.
7. Colleagues – Software engineers shall be fair to and supportive of their colleagues.
8. Self – Software engineers shall participate in lifelong learning regarding the practice of their profession and shall promote an ethical approach to the practice of the profession.

The ACM has adopted a project called Code 2018. This project is in response to concern in the membership that the code of ethics and professional conduct created in 1992 has blinds spots from changes in the technology and the

profession since then (Association of Computing Machinery, 2018). The timeline has a final draft being presented to the ACM Council in June 2018. The ACM Committee on Professional Ethics (COPE) has created three drafts; with the last draft being published in January 2018.

Review of Academic Research Relating to Information and Computer Ethics

The use of technology changes the way we conduct many aspects of our lives (Oz, 1994, p. xi). Privacy, free speech and protection of intellectual property have different ethical implications today. The concern that higher education produces technical professionals who are ill-prepared to deal with ethical situations is not new. Effy Oz, a professor of management science and information systems at Wayne State University and Penn State, identified two purposes for ethical education in the information age. To train students to behave ethically in their professional careers, and to equip students with enough ethical knowledge for their participation in the public debate of and contribution to formulating new codes and laws. Marc Rotenberg, former director of Computer Professionals for Social Responsibility (CPSR) stated in 1989 that individual accountability should be the cornerstone of computer ethics (Oz, 1994, p. 249-250). He equated computer networks to libraries.

Readers have access to some books in libraries while other books can only be borrowed after submitting a request with the library manager. If a reader tried to look at the circulation records of a book, they would be breaking a rule. This compares to the information system user needing to know there is a difference between what is public and what is private. With the Internet, it is perfectly ok to look through another person's computer files that are publicly accessible, but not ethical to look at another person's private files.

A library relies on the trust and goodwill of its users. A person who steals a book or tears a page from a magazine article deprives others from a resource. Computer users need to understand the consequences of their actions. It is worth noting there are laws against theft and destruction of library materials, but the threat of prosecution is not likely to cause a change in habits of those library patrons. The likelihood of prosecution is remote. When sanctions are imposed, they come from the library and not the federal government.

A study in 1997 sought to identify factors which impact the decision to behave in an ethical or unethical manner (Bay, 1997). This focused on the accounting profession and identified three factors: incentives, behavioral control and personal ethics. Incentives are forces which can cause choosing one action over another; like those in the fraud triangle. Behavior control is when attempts are made by a third party to control the behavior of the decision maker. Personal ethics are the internal beliefs of the decision maker.

Two experiments were done by D. Bay in 1997. The first was a laboratory experiment where the behavior of the subjects was observed without their knowledge. The first experiment did not show any of the three factors to be significant. The second experiment was a questionnaire for the subjects to report their use of ethics. The second experiment did show incentives to be a significant factor for a decision maker when making an ethical choice.

When discussing the need of a social context and ethics in undergraduate computing curricula, three sets of guidelines can be compared (Bohy, 2003). From 1979, recommendations from the ACM noted common objections to teaching ethics in a separate course. One objection was that ethics is a social science, not a computer science. Another objection was that if ethics is so important, why make it a separate course; incorporate it throughout the curriculum.

From 1991, a recommendation from the ACM.IEEE-CS Joint Curriculum Task Force asserted undergraduates should understand where the ethics discipline has been, where it is and where it is headed. The understanding was not just about the history of ethics, but a way of applying ethics using computing. They also departed from trying to define particular courses around ethics but specified specific units of knowledge to be parts of courses.

During the process where the current version of the software engineering code of ethics was approved, 1999, there were considerable changes made in the order of the principles as well as deepened detail to provide clear guidance (Gotterbarn, Miller, & Rogerson, 1999). For example, the principles were reordered to reflect the order software engineers should use when considering their ethical behavior. In earlier versions the first principle aimed at the product, in the approved version the first principle is to the public. In fact, the public interest is a central theme in the approved code. In section six of the code, whistle-blowing clauses describe the obligations for protecting the public's wellbeing when threatened by defective software development and provides steps to take to meet those obligations. Specific language highlighting the maintenance activities of software development made it clear the same level of

professionalism is necessary in software development and software maintenance activities. The code intended to educate and inspire software engineers and inform the public of the responsibilities important in the computing profession.

From 2001, a report from the ACM expanded the number of units of knowledge pertaining to computing ethics from four to ten. There was a feeling that an opportunity to incorporate professional practice into the curriculum of computer science was present. The need to incorporate professional practice into curriculum is also evidenced by companies creating certification programs; like Microsoft and Cisco. Maybe these certification programs from companies came about as the high-tech companies were desperate to gain employees.

Some companies hired individuals out of high school with the promise of training. The training would be focused on their new position tasks, and if promoted or transferred, more training would be made available. Even Bill Gates is quoted around this time as saying the best way to prepare for a career in programming is to write programs. He recounted going to garbage cans of the computer science center and fishing out listings of operating system code.

If computing is considered a technical vocation with training coming on-the-job, ethics will not likely be addressed. When computer science education is reactive as opposed to proactive, ethics will have a hard time being recognized as a need in a curriculum.

A pre-post study of research scientists in engineering and computer science was published in 2007 (Kligyte, 2008). Here scientists were exposed to sensemaking training to show improved integrity in the scientific research field. The sensemaking training included a curriculum focusing on broad reasoning strategies when making sense of day-to-day social and professional practices having ethical implications.

With team processes being a part of software engineering, the ethics of groups was studied in 2011 (Sanyal, 2011). The factors included in this study were: the team leader's ethics, the software development process used and the team size. The study was done through a survey of students having completed projects in software engineering. The resulting paper also looked at the extent of the ACM/IEEE Software Engineering Code of Ethics ability to drive ethical behavior.

A more recent study around the use of Big Data and its ethical, legal and social issues included studying the disciplines of computer science and statistics (Tractenberg, 2015). The study provided syllabi from two courses pertaining to ethical reasoning and Big Data scientists. The study found that up to that time most of the discussion of ethics in Big Data related to the collection of the data, not its use. With the idea that the ability to reason ethically can be learned and improved, engaging a professional code of conduct to introduce ethical reasoning can bring professionalism, and possibly relevance to computing sciences.

The current updating of the ACM Code of Ethics started in 2016 Brinkman, et.al., 2016). There are multiple reasons why this 25-year old code needed an update to the ethical guidance provided to ACM members. Questions related to artificial intelligence, machine learning and robotics were being received by the ACM Committee on Professional Ethics (COPE). In 1992 a "smart car" was one that had an automatic transmission and antilock brakes. The web was in its infancy as well. Sending selfies and tweets from a mobile phone was science fiction!

The number of people using and controlling computers seemed limited in 1992. Computers were used to print bills while managing and recording financial information. Granted, some computers controlled and guided military devices, along with some processes in automobiles and microwaves in our kitchens. Now computers control our transportation and communications as well as facilitating human interactions. Computers are in our bodies; i.e. pacemakers and insulin pumps. Computers are also integrated into the ways societies wage wars.

Principles guiding ACM and COPE in the Code 2018 project are:

- Continue documenting the ethical and professional responsibilities and obligations of computing professionals.
- Express a consensus of the computing profession on ethical issues.
- Be a guide to decision making.
- Educate the public and aspiring professionals to the ethical and professional obligations to all in the computing profession.

Comments received after the first draft of Code 2018 included social media bullying, cyber security and autonomous machines making ethical decisions (Brinkman, et.al, 2017). There were also requests for including a compliance policy in the code. As the code is something which can be used by all computing professionals, and not just members of the ACM, compliance procedures were determined to be addressed in the bylaws of the ACM and not the code. However, the COPE plans to work with the ACM Council to develop new due process procedures and multiple levels of sanctions to match the seriousness of any ethical violations.

After the second draft of Code 2018, some new principles and concepts were added (Gotterbarn, et.al, 2018). They are:

- 2.9 – Security: Design and implement systems that are robust and secure.
- 3.6 – Legacy Systems Retirement: Retire legacy systems with care.
- 3.4 – Leadership principle changes: Leaders should not only protect dignity, but also create policies and processes reflecting all the principles of the code.

CONCLUSION

The state of ethics in the computing profession is written between the lines of the current media reports. How many breaches of entities containing personal or financial information does it take before attempts are made to make an improvement through professional organizations and companies? Where does one start trying to make a difference? Education? Ethical Codes? Designation?

A logical place to begin addressing ethics is during the education of technology professionals. When and how are good questions which can be addressed with further research. One idea would be to start in undergraduate computer science curricula. This could happen with courses at the 300- or 400-level or incorporated into all courses.

Master's degrees in computing fields are another place for ethics training. Without a designation for computing professionals outside of vendor specific training, having continuing education requirements where ethical issues can be discussed among peers does not seem to be valid in today's environment.

Employers incorporating ethical codes into their hiring practices of technology professionals is another place for education to occur. The ACM code could be a source for employers to mirror or even use. The programming field would be a good place to start for employers as they are likely to have obtained their positions by experience and writing programs. Programmers may not see the need to further their computer science education; especially if they did not graduate with a bachelors' degree.

Designations can have a positive effect for the applicant at hiring time, however, the current designations for technology professionals seem to come from vendors wanting to ensure they understand and support their products. Accounting and engineering associations seem to have methods to incorporate technology professionals, however, these groups may be only wanting to expand their membership.

As the technology field makes inroads to all industries and professions, companies may be the logical point for addressing ethical behavior. This will mean dealing with regulations and laws with enforcement coming only with criminal activity.

Raising the ethical brand of technology professionals is full of potential as well. Currently there is no industry-wide ethical designation for our society to hear about or aspire to follow. Doctors, accountants and engineers either need to be licensed or have aspired to become licensed and seen as ethical leaders in their professions. Being self-regulated as a profession seems to be the better choice than relying on government laws to do the regulating.

Doctors have been around the longest as professionals which are licensed. When violators are identified, the public is made aware and they lose their ability to practice medicine. Accountants also publicly identify offenders of their ethical standards while engineers may give the impression of naming violators but reveal them only on request and approval.

Computing professionals have neither a professional designation or licensure requirement. Without either, public disclosure of ethical violations only occurs when criminal acts are committed, or the news media makes the actor known.

These suggestions come from the review of codes and literature which delve into the facets surrounding the current state of information technology and ethical behavior solutions. Only time will tell if such suggestions gain traction and become accepted norms.

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