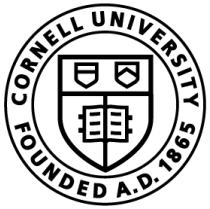

Cornell Bowers C·IS
College of Computing
and Information Science

"We have met the enemy and it is us":

Debating the ethics of computing in the pages of *CACM*

A. Feder Cooper, Solon Barocas, Karen Levy, and Gili Vidan

"We have met the enemy and it is us"

Communications of the ACM, June 1989

"We have met the enemy and it is us"

Looking at how a field of ethics can come about
in response to a particular event…

…through the response to the Morris Worm (in the *CACM* issue)

A (very) brief history of the ~~Cornell~~ Morris Worm

Cornell CHRONICLE

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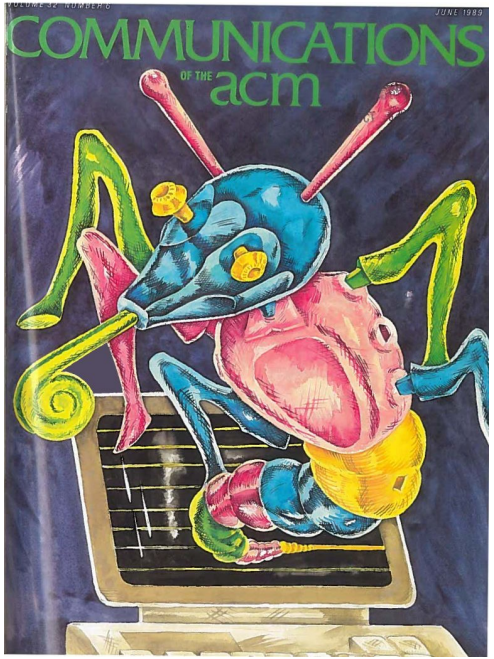

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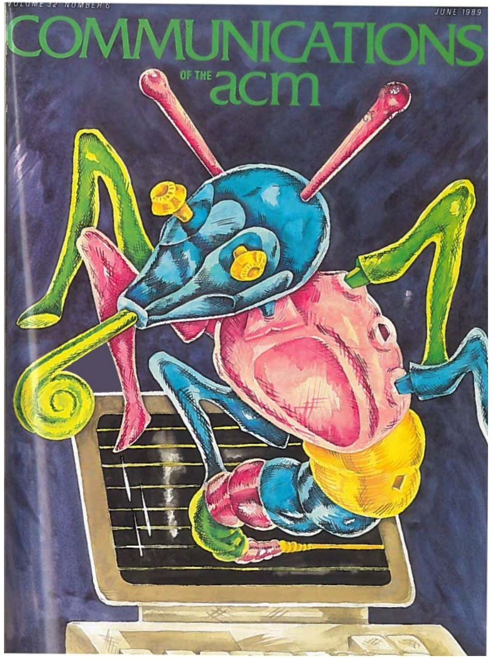

Ethics and the Internet

At great human and economic cost, resources drawn from the U.S. government, industry and the academic community have been assembled into a collection of interconnected networks called the Internet. Begun as a vehicle for experimental network research in the mid-1970s, the Internet has become an important national infrastructure supporting an increasingly widespread, multi-disciplinary community of researchers ranging, inter alia, from computer scientists and electrical engineers to mathematicians, physicists, medical researchers, chemists, astronomers and space scientists.

STATEMENT OF ETHICS

As is true of other common infrastructures (e.g., roads, water reservoirs and delivery systems, and the power generation and distribution network), there is widespread dependence on the Internet by its users for the support of day-to-day research activities.

The reliable operation of the Internet and the responsible use of its resources is of common interest and concern for its users, operators, and sponsors. Recent events involving the hosts on the Internet and in similar network infrastructures underscore the need to reiterate the professional responsibility every Internet user bears to colleagues and to the sponsors of the system. Many of the Internet resources are provided by the U.S. Government. Abuse of the system thus becomes a federal matter above and beyond simple professional ethics.

Statement of Policy

The Internet is a national facility whose utility is largely a consequence of its wide availability and accessibility. Irresponsible use of this critical resource poses an enormous threat to its continued availability to the technical community.

The U.S. government—sponsors of this system—suffers when highly disruptive abuses occur. Access to and use of the Internet is a privilege and should be treated as such by all users of this system.

The Internet Activities Board (IAB) strongly endorses the view of the Division Advisory Panel of the National Science Foundation Division of Network, Communications Research and Infrastructure which, in paraphrase, characterized as unethical and unacceptable any activity which purposely:

a. seeks to gain unauthorized access to the resources of the Internet,
b. disrupts the intended use of the Internet,
c. wastes resources (people, capacity, computer) through such actions,
d. destroys the integrity of computer-based information, and/or
e. compromises the privacy of users.

The Internet exists in the general research milieu. Portions of it continue to be used to support research and experimentation on networking. Because experimentation on the Internet has the potential to affect all of its components and users, researchers have the responsibility to exercise great caution in the conduct of their work. Negligence in the conduct on Internet-wide experiments is both irresponsible and unacceptable.

The IAB plans to take whatever actions it can, in concert with Fed-

CPSR Statement on the Computer Virus

The so-called computer virus that swept through a national computer network, the Internet, in early November (1988) is a dramatic example of the vulnerability of complex computer systems. It temporarily denied service to thousands of computer users at academic, business, and military sites. An estimated 6,000 computers across the country were affected in only a few hours. Fortunately, the program was not designed to delete or alter data—the impact of a malicious virus would have been immeasurable.

This was an irresponsible act that cannot be condoned. The Internet should not be treated as a laboratory for uncontrolled experiments in computer security. Networked software is intrinsically risky, and no programmer can guarantee that a self-replicating program will not have unintended consequences.

STATEMENT OF ETHICS

The value of open networks depends upon the good will and good sense of computer users. Computer professionals should take upon themselves the responsibility to ensure that systems are not misused. Individual accountability is all the more important when people work together through a network of shared resources. Computer professionals should establish and encourage ethics based on the shared needs of network users. We also encourage educators to teach these ethics.

The questions of legal responsibility in this instance are ultimately for our legal system to resolve. The questions confronting computer professionals and others concerned about the future of our technology policy go well beyond this particular case. The incident underscores our society's increasing dependence on complex computer networks. Security flaws in networks, in computer operating systems, and in management practices have been amply demonstrated by break-ins at Stanford University, by the penetration of national research networks, and by the "Christmas virus" that clogged the IBM internal network last December.

Computer Professionals for Social Responsibility (CPSR) believes that this incident should prompt critical review of our dependence on complex computer networks, particularly for military and defense-related

widely accessible.

An effective way to correct known security flaws is to publish descriptions of the flaws so that they can be corrected. We therefore view the efforts to conceal technical descriptions of the recent virus as short-sighted.

CPSR believes that innovation, creativity and the open exchange of ideas are the ingredients of scientific advancement and technological achievement. Computer networks, such as the Internet, facilitate this exchange. We cannot afford policies that might restrict the ability of computer researchers to exchange their ideas with one another. More secure networks, such as military and financial networks, sharply restrict access and offer limited functionality. Government, industry, and the university community should support the continued development of network technology that provides open access to many users.

The computer virus has sent a clear warning to the computing community and to society at large. We hope it will provoke a long overdue public discussion about the vul-

Teaching Students About Responsible Use of

There has been some discussion in *Risks Forum* recently about what action universities might appropriately take to instill a sense of ethics in the use of computers by their students. M.I.T.'s Project Athena provides some 800 networked engineering workstations for undergraduates to use in any way they find helpful to their education. Accordingly, Project Athena has assumed that one of its responsibilities is to open a discussion of ethical use with its user community. The primary action that Project Athena has taken is the publication of a set of principles.

These principles are general, for the most part, following M.I.T.'s usual approach of appealing to basic concepts rather than spelling out many detailed rules. There is no claim that publicizing these principles completely solves any problem nor that it completely answers any question, but it does represent one organization's attempt to take a step in the right direction. Some version of these principles have been posted for about four years, and whenever we have an incident serious enough to ask a student to talk to the director, these principles have provided a useful starting point for the conversation.

STATEMENT OF ETHICS

Principles of Responsible Use of Project Athena

Project Athena is M.I.T.'s computing facility for education. It consists of a networked system of workstations and services, and includes communication features that offer many opportunities for members of the M.I.T. community to share information.

With that ability to share comes the responsibility to use the system in accordance with M.I.T.'s standards of honesty and personal conduct. Those standards, outlined in the M.I.T. Bulletin under academic procedures, call for all members of the community to act in a responsible, ethical and professional way. What follows are guidelines in applying those standards to use of Project Athena facilities.

Intended Use

The hardware granted to Project Athena, and the software licensed for that hardware, are intended for educational use, broadly construed, by members of the M.I.T. community. Use of Athena resources by anyone outside M.I.T. requires approval of the provost, and the sale of such use is improper. The use of Project Athena's facilities for sponsored research activities that normally would make use of other M.I.T. facilities requires specific authorization of the director.

Privacy and Security

The operating systems used by Project Athena encourage sharing of information. Security mechanisms for protecting information from unintended access, from within the system or from the outside, are minimal. These mechanisms, by themselves, are not sufficient for a large community in which protection of individual privacy is as important as sharing. Users must supplement the system's security mechanisms by using the system in a manner that preserves the privacy of others.

For example, users should not attempt to gain access to the files or directories of another user without clear authorization from the other user (typically that authorization is

tions, attempts to capture or crack passwords or encryption, and destruction or alteration of data or programs belonging to other users. Equally unacceptable are intentional efforts to restrict or deny access by legitimate users to the system.

Intellectual Property Rights

Some software and data that reside on the system are owned by users or third parties, and are protected by copyright and other laws, together with licenses and other contractual agreements. Users must abide by these restrictions. Such restrictions may include prohibitions against copying programs or data for use on non-Athena systems or for distribution outside M.I.T., against the resale of data or programs or the use of them for noneducational purposes or for financial gain, and against public disclosure of information about programs (e.g., source code) without the owner's authorization. It is the responsibility of the owner of protected software or data to make any such restrictions known to the user. □

Jerome H. Saltzer
Athena Project, M.I.T.

NSF Poses Code of Networking Ethics

The network worm (sometimes called virus) affair raises issues that are very important to our field. Both the BITNET Board of Trustees and the CSNET Executive Committee have been struck by the fact that many public comments on the event have contained statements such as:

"We learned from it."

"We will make sure technically it will not happen again."

"He did us a favor by showing…" unaccompanied by expressions of ethical concern.

As a profession we have succeeded technically in creating facilities—the BITNET, CSNET and other components of the national research network—which are now critical to the conduct of science and engineering in our nation's academic, industrial, and government research laboratories. Further, this technology has spread within our nation's commercial research and development organizations and even into their manufacturing and marketing.

STATEMENT OF ETHICS

Just as medical malpractice can have a serious effect on an individual's health, one of the costs of our success is that we are now in a position where misuse of our national and private computer networks can have as serious an effect on the nation's economic, defense, and social health. Yet while almost every medical college has at least one course on medical ethics and insists on the observance of ethical guidelines during practice, computer scientists seem to avoid such non-scientific issues.

The worm *experiment* caused a major disruption in the research community. Among other points of attack, the worm exploited a trapdoor that has been distributed as a software *feature*. Many hours of talent were wasted finding and curing the problems raised by this *game*. Many additional hours were lost when researchers were unable to access supercomputers and mail systems due to system overload and network shutdown.

We condemn the perpetration of such experiments, games, or features by workers in our field, be they students, faculty, researchers or providers. We are especially worried about widespread tendencies to justify, ignore, or perpetuate such breaches. We must behave as do our fellow scientists who have organized around comparable issues to enforce strong ethical practices in the conduct of experiments.

We propose to join with the relevant professional societies and the national research networks to form a Joint Ethics Committee charged with examining existing statements of professional ethics and modifying them as necessary in order to create a strong statement of networking ethics and recommendations for appropriate enforcement procedures.

In its biannual meeting last December the Division Advisory Panel (DAP) of the National Science Foundation (NSF) Division of Networking and Communications Research and Infrastructure (DNCRI) resolved to unanimously support the statement of BITNET/CSNET on the breach of ethics implied by the worm. The group also unanimously endorsed the following statement:

Ethical Network Use Statement

The DAP of the NSF DNCRI deplores lapses of ethical behavior which cause disruption to our national network resources. Industry, government and academe have established computer networks in support of research and scholarship. Recent events have accentuated the importance of establishing community standards for the ethical use of networks. In this regard, the DNCRI DAP defines as unethical any activity which purposefully or through negligence:

a. disrupts the intended use of the networks
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David J. Farber
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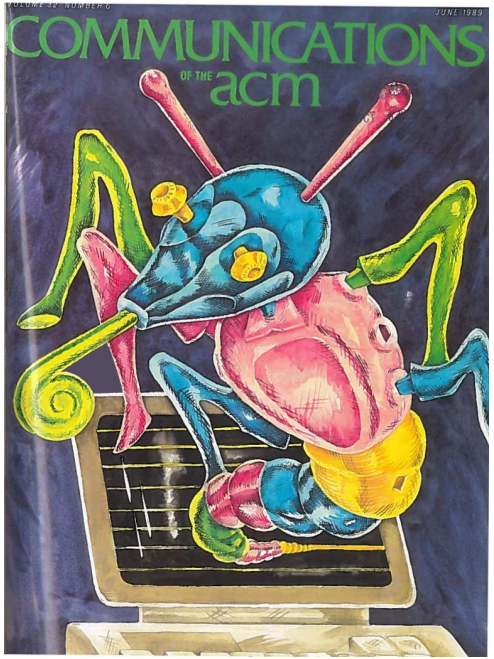
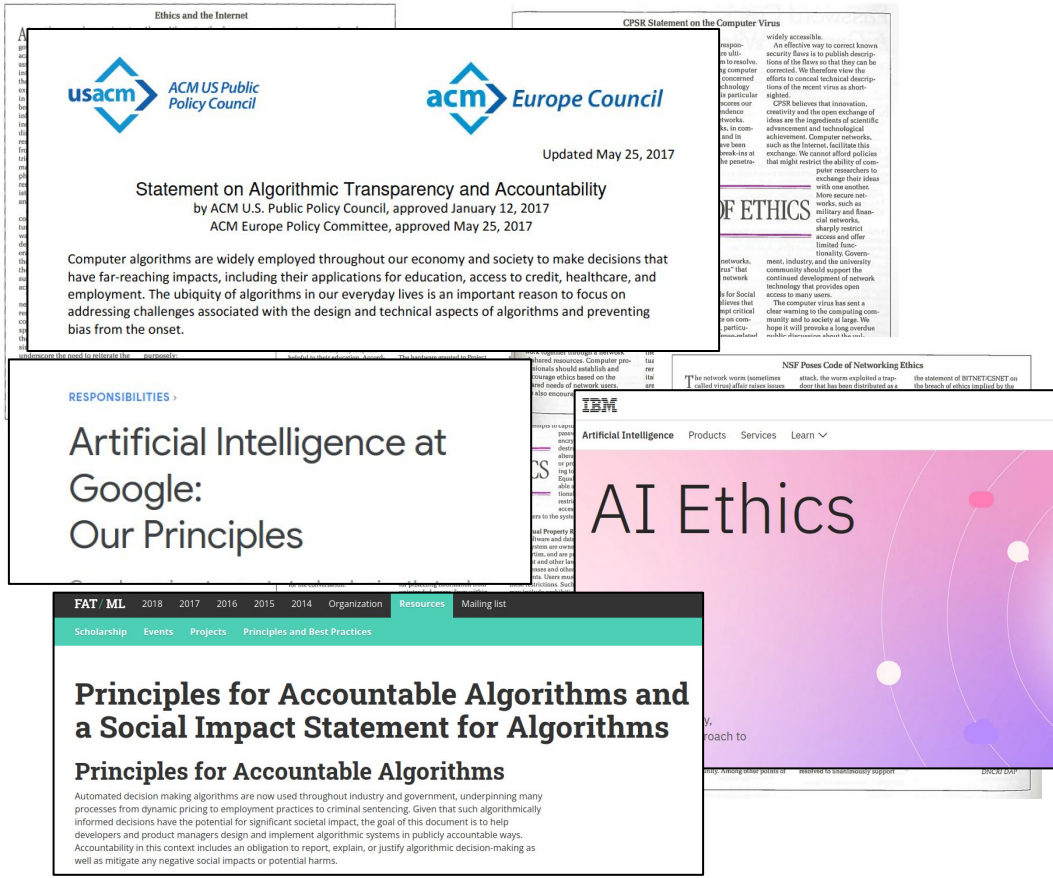
DNCRI DAP

The *CACM* Special Issue





The *CACM* Issue Ethics Statements

Ethics and the Internet

STATEMENT OF ETHICS

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As is true of other common infrastructures (e.g., roads, water reservoirs and delivery systems, and the power generation and distribution network), there is widespread dependence on the Internet by its users for the support of day-to-day research activities.

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Vint Cerf
Internet Activities Board

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This was an irresponsible act that cannot be condoned. The Internet should not be treated as a laboratory for uncontrolled experiments in computer security. Networked software is intrinsically risky, and no programmer can guarantee that a self-replicating program will not have unintended consequences.

The value of open networks depends upon the good will and good sense of computer users. Computer professionals should take upon themselves the responsibility to ensure that systems are not misused. Individual accountability is all the more important when people work together through a network of shared resources. Computer professionals should establish and encourage ethics based on the shared needs of network users. We also encourage educators to teach these ethics.

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Vint Cerf
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(RFC 1087)
January, 1989

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(Student handbook)
1985-1986

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NSF

(DAP Panel minutes)
November 29-30, 1988

Themes in the Ethics Statements

- Tensions between research and professionalization
- Individual responsibility and the end user
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- Computers as (potentially wasted) capital
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Principles of Responsible Use

- Intended Use
- Privacy and Security
- System Integrity
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MIT Ethics Statement, June 1989 *CACM* Issue, p. 704

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Individual responsibility and the end user

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(b) disrupts the intended use of the Internet,

(c) wastes resources (people, capacity, computer) through such actions,

(d) destroys the integrity of computer-based information, and/or

(e) compromises the privacy of users."

IAB Ethics Statement, June 1989 *CACM* Issue, p. 710

Principles of Responsible Use

- Intended Use
- Privacy and Security
- System Integrity
- Intellectual Property Rights

MIT Ethics Statement, June 1989 *CACM* Issue, p. 704

Individual responsibility and the end user

"Choosing the **proper boundaries between functions** is perhaps the primary activity of the computer system designer. … The [end-to-end principle] appeals to application requirements and provides a rationale for moving a function upward … **closer to the application that uses the function**."

Salzer, Reed, and Clark, End-To-End Arguments in System Design, 1984, p. 277

(And see Cooper and Vidan, Making the Unaccountable Internet, 2022)

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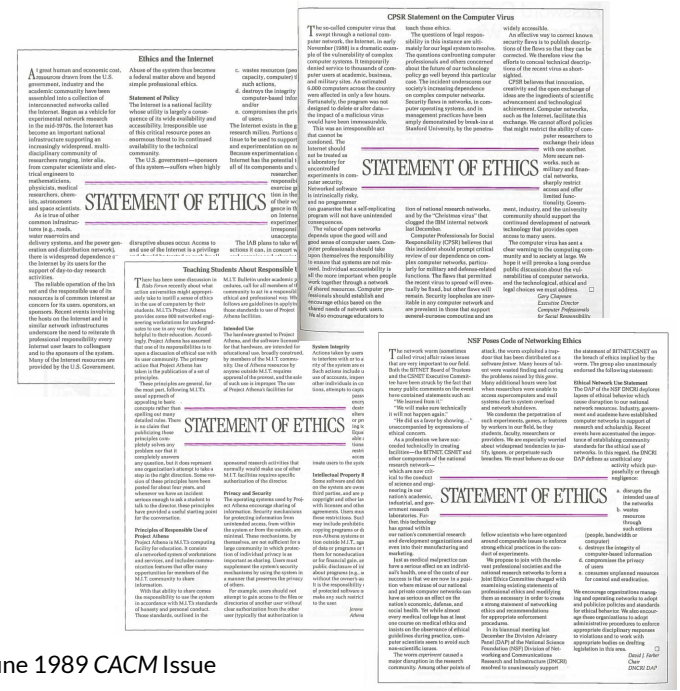
Resonance with AI ethics today



Ethics and the Internet

STATEMENT OF ETHICS

Teaching Students About Responsible I

STATEMENT OF ETHICS

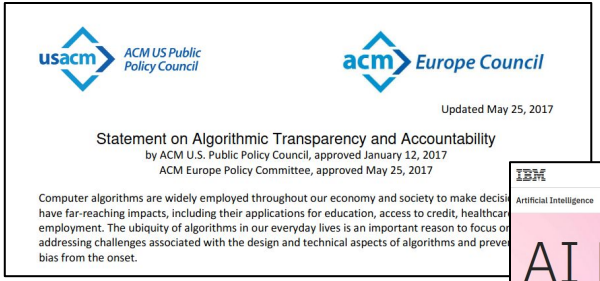
CPSR Statement on the Computer Virus

STATEMENT OF ETHICS

NSF Poses Code of Networking Ethics

STATEMENT OF ETHICS

June 1989 *CACM* Issue



usacm ACM US Public Policy Council

acm Europe Council

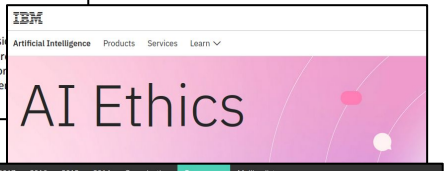
Updated May 25, 2017

Statement on Algorithmic Transparency and Accountability

by ACM U.S. Public Policy Council, approved January 12, 2017

ACM Europe Policy Committee, approved May 25, 2017

Computer algorithms are widely employed throughout our economy and society to make decisi
have far-reaching impacts, including their applications for education, access to credit, healthcar
employment. The ubiquity of algorithms in our everyday lives is an important reason to focus or
addressing challenges associated with the design and technical aspects of algorithms and preve
bias from the onset.



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AI Ethics

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Artificial Intelligence at Google: Our Principles

FAT/ML 2018 2017 2016 2015 2014 Organization Resources Mailing list

Scholarship Events Projects Principles and Best Practices

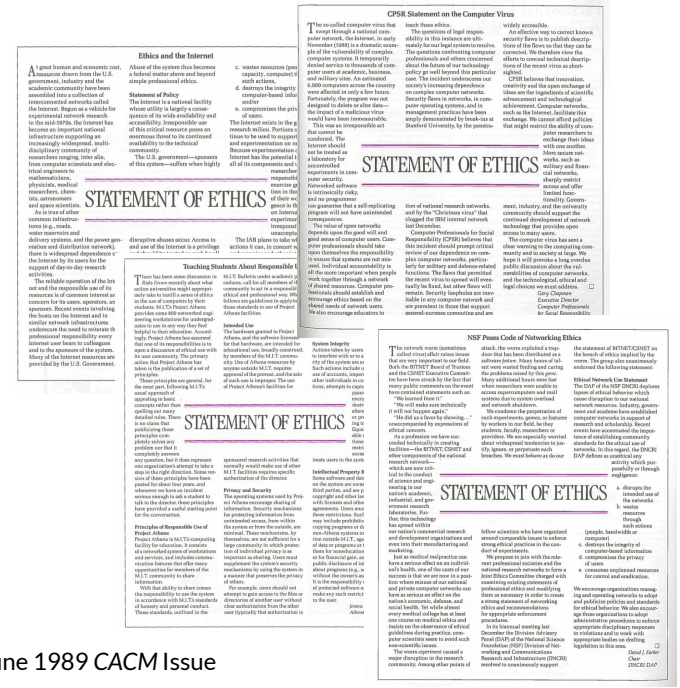
Principles for Accountable Algorithms and a Social Impact Statement for Algorithms

Principles for Accountable Algorithms

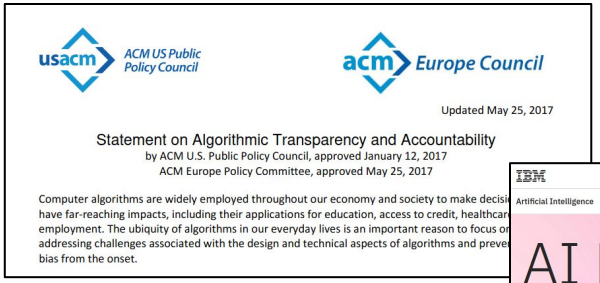
Automated decision making algorithms are now used throughout industry and government, underpinning many processes from dynamic pricing to employment practices to criminal sentencing. Given that such algorithmically informed decisions have the potential for significant societal impact, the goal of this document is to help developers and product managers design and implement algorithmic systems in publicly accountable ways. Accountability in this context includes an obligation to report, explain, or justify algorithmic decision-making as well as mitigate any negative social impacts or potential harms.

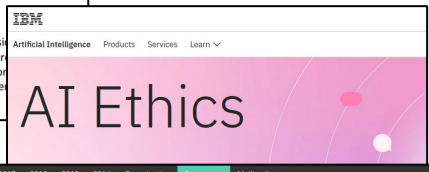
Statements of AI Ethics, Algorithmic Transparency and Accountability, and AI Principles, Today

Resonance with AI ethics today



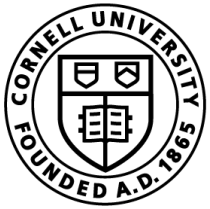
June 1989 *CACM* Issue





Statements of AI Ethics, Algorithmic Transparency and Accountability, and AI Principles, Today

"The American public and its leaders are beginning to be concerned about computing...Clearly, we can no longer ignore public concerns about our profession. We must take control of professional computing or others will control it for us" Bryan Kocher, ACM President, June 1989 *CACM* Issue, p. 660



Cornell Bowers C·IS
College of Computing
and Information Science

"We have met the enemy and it is us":

Debating the ethics of computing in the pages of *CACM*

A. Feder Cooper, Solon Barocas, Karen Levy, and Gili Vidan

Thank you!