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Scientific Information in the Electronic Era

By R. Stephen Berry

Scientific information moved from person to person by two means through most of the history of science: by word of mouth, whether in seminars, at conferences or in conversation, and by traditional post, whether as printed matter or personal letters. In some fields of science, the standard, most common method for most scientists was, and remains, the journals. In a few fields, such as high-energy physics where there are relatively few participants, the common practice for many years—since photocopying machines, in essence—has been to mail preprints to a long list of colleagues, well before publication in an archival journal.

Motivated by a distaste for the high cost of reproducing and mailing the preprints, and by the recognition that people not privileged to be on the mailing list were deprived of the rapid access of those who were, Paul Ginsparg created an automatic, electronic means to distribute the preprints via a small computer at Los Alamos National Laboratory, where he worked (and works still). This system, now called an "e-print server" or "xxx," short for "xxx.lanl.gov," demonstrated by example the power of the electronic network to enable the broad sharing of information, even in complex graphic or symbolic form.

In about the same period, remote sensing and automatic transmission of vast quantities of data, for example climatic and astronomical data, moved to new levels, allowing studies of global change to probe deeper and with far greater reliability than ever before. Again, electronic collection, storage, and transmission of data were made possible because of linked networks of computer systems.

The result of these and related advances has been something of a shock, as the longer-term implications of electronic information-sharing are more clearly comprehended by scientists and people in tangential fields that serve and live from scientific research. Scientists, professional societies, publishers, all see electronic media as opportunity and threat. In some fields of science, review by referees is seen as the only guarantee of the sanctity of a paper. In others, particularly in fields in which preprints circulate regularly, such review is considered very important for the work of junior faculty being considered for permanent positions, but is far less important for recognized, senior scientists. Very few scientists, of any disciplinary persuasion, would want (or expect) to see all forms of reviewing and refereeing disappear. However, almost all scientists now expect that virtually all the new scientific literature—and much of the archival as well—will be available electronically, on the Internet. This expectation is fast coming to fulfillment, as the major professional societies and commercial publishers make their journals available in this way. A few new, all-electronic, refereed journals have appeared or been announced. Conferences by computer are not yet common but can be found, and some have been institutionalized.

The reasons for electronic handling of scientific information to be an opportunity are clear; in what ways is it a threat? The most widespread fears are associated with the ease of transmission, of downloading and copying information available on the Internet or via other electronic modes, and of using that information in ways unintended by its generators or "owners." Plagiarism is probably the greatest fear; this includes a range of possibilities, such as: simple

copying and republication, whether under the real authors' names or not; unauthorized extraction of information for compilation in other marketable forms. Beyond plagiarism, there is fear that people may compile individual papers and reconstruct entire journals without paying for subscription.

Plagiarism in its crudest form is already a problem in the classroom, because it is apparently relatively easy for a student to buy a text for a term paper on almost any subject—and some do. This is an old problem much exacerbated by electronic communication, which could be solved by legal-technological means, if there were a will to do so. It is possible to locate and identify Internet vendors; they are not really anonymous and hidden.

Extraction (for commercial purpose) at low cost, of information collected and prepared at high cost by someone else, is the fear that motivates much of the activity now stirring. Databases available electronically could be downloaded, reformatted, and sold at prices well below those charged by the compilers of those prior databases. Books available electronically could be copied far more easily than those that became available in very cheap pirated editions fifty years ago. Authors and editors as well as publishers are concerned that the rights of individual intellectual property are protected, and that they continue to receive fair compensation for their creative works.

Scientific information, particularly that of the basic sciences, has a fascinating niche in this pattern. Most *basic* scientific research is now supported by governmental funds, not only in the U.S. but everywhere. The rationale for such expenditures is that the results of the research constitute a public good, something that benefits society more than it costs, but in a form that cannot be captured by an individual investor. The long-term, unpredictable character of the consequences of basic research is of course the justification for this. If there is a point at which the benefits can be captured, that is the point for the shift to private support. The implicit source of conflict over Federal policy toward industrially-oriented research is the question of whether there is, needs to be, or ought to be a gradual transition from the basic to the applied stage, as opposed to a sharp transition. But insofar as the basic sector of scientific research generates public goods, we can think of basic science as a progressive, cyclic engine, in which research generates data, which are distributed, assimilated, and interpreted in order to move on to new research to generate new knowledge and new data. A necessary (but not sufficient) fuel for this engine is funding, meaning essentially Federal funding. And a small part of that Federal funding pays for the collection, storage, and distribution of the information generated in the cycle.

Some scientific data have traditionally been put into added-value forms, such as handbooks, evaluated data bases, and encyclopedias. Scientists have been quite willing to pay reasonable costs for these added-value forms. *The Handbook of Chemistry and Physics* is a clear example of an extremely useful compilation. Scientists may use funds from federal grants to buy specialized databases for particular projects, or may pay from their own pockets for compilations of general use. However, there is a threat that now looms in this context that has been anathema for free-market economists forever: monopoly. Scientists now face the possibility that data heretofore available to them at low cost—on a basis of "full and open availability"—may be marketed under monopolistic conditions, in which the monopolist has no vested interest in the public-good aspect of the scientific information.

One disastrous experiment in this regard was the privatization of Landsat. The data from Landsat satellites are essential for research in global change. The generators of the data are essentially the same as the researchers who need the data for that purpose; there are other consumers of Landsat data as well. When Landsat was privatized, the cost of the data went up so high that the scientists who needed the data for public-good purposes could no longer afford them. This incident is documented in the National Academy of Sciences/National Research Council report *Bits of Power: Issues in Global Access to Scientific Data* (National Academy Press, Washington, DC, 1997).

Some private publishers have looked upon electronic media as means to new modes of communication that inevitably will come and which they must assimilate and adapt into new modes of publishing. Others have looked on electronic media as threats to the ways they know how to publish and therefore as modes that need to be kept hobbled, so that they pose only the minimum kind of competition to traditional publishing. Professional societies have reacted in as wide a range of ways, from quickly using and encouraging as extensive and open use of the Internet as possible, to putting heavy restrictions on how material in their journals may be distributed. The AAAS's own *Science* is one of the more restrictive of the publications.

In late 1996, the U.S. Patent and Trademark Office put forth proposals for treaties on Copyright and on Databases, at the Geneva Meeting of the World Intellectual Property Organization (WIPO), which would protect publishers by instituting highly restrictive controls over information on the Internet. Among other things, these controls would have removed the doctrine of fair use, which, under present copyright laws, allows a scientist, teacher or student to copy (read "download") material for personal research, study, or other not-for-profit scholarly use. Other restrictions were built into the proposed treaties as well; these are described in the *Bits of Power* report. These treaty proposals, and an even more restrictive Bill (H.R. 3531) in the House of Representatives to implement the treaties in the USA, were developed and put forward with no input from or consultation with any potentially adversely-affected parties, notably the scientific, scholarly, and educational communities. Fortunately, the Copyright treaty was heavily modified at that Geneva Meeting last December, and is perhaps tolerable now, and the Database treaty was dropped—for the time being. (A third treaty dealing with artistic works was accepted; it seems to have none of the problems of the other two.)

What now? Nothing is visible to the scientists. Nobody, including the Commissioner of the Patent and Trademark Office, has approached the National Academy of Sciences or the National Science Board, inviting their views on how our legal system should deal with the new issue. But what is that issue? It is easily put: What legal structure would be appropriate to provide a balanced protection of the public good and private intellectual property in the environment of the new electronic technology of online journals, e-print archives, and massive, automatically-garnered databases? *Balance* should be the keyword. Thus far, it seems not to be a part of the vocabulary of the Patent and Trademark Office.

Special Contribution

Ethics Activities At The National Institutes Of Health
Joan P. Schwartz, Ph.D., Chair, NIH Committee on Scientific Conduct and Ethics

[As the leading single funder of biomedical research in the U.S., the National Institutes of Health is well known for its policies on the conduct of research applicable to extramural researchers. It also supports an active intramural research program and has adopted several initiatives intended to promote responsible research practices by NIH scientists. PER invited Dr. Joan P. Schwartz, Chair of the NIH Committee on Scientific Conduct and Ethics, to describe several of those initiatives for our readers. Anyone with questions or reactions to the range of activities described by Dr. Schwartz are welcome to contact her at NIH by phone, (301) 496-4049, or by e-mail, jps@helix.nih.gov - Ed.]

The National Institutes of Health Intramural Research Program, as the largest single biomedical research institution in the world, with more than 2500 postdoctoral fellows in training, has good reasons to establish guidelines for the ethical conduct of science. The first step taken to centralize these efforts was the establishment of the NIH Committee on Scientific Conduct and Ethics by Dr. Michael Gottesman, the Deputy Director for Intramural Research, in August 1995. It consists of 32 members representing the various Institutes and scientific professions within the Intramural Research Program at the NIH. The Committee is based on the principle that institutions bear the responsibility to define, encourage, and reward good conduct among their scientists.

The Committee was given three specific charges. The first was to develop and/or refine the existing NIH Guidelines for the Conduct of Research, which were first published in 1990. These Guidelines are given to all new scientists when they come to NIH and have been used as the primary reference for ethics guidance and training on campus.

Specifically, the committee was asked to add guidelines for issues not previously covered, such as mentoring. Dialog on this particular issue was opened through an Ethics Forum article on mentoring, written by Drs. Schwartz and Richard Asofsky and published in the March-April 1996 issue of *The NIH Catalyst*, a newsletter published bi-monthly for scientists at NIH. This article led to a posting by the NIH Fellows Committee on their Web site of "A Dialog on Mentorship and Supervision" in June 1996, to which NIH fellows were able to submit comments and questions. Both Drs. Schwartz and Asofsky then submitted replies. The Ethics Committee has finished its revisions of the NIH

Guidelines, with an expanded section on the responsibilities of research supervisors and trainees, and a new version should be published this spring.

The second charge was to develop effective mechanisms for scientific ethics training for the NIH intramural scientific community. The initial efforts have included an on-going series of Ethics Forums in *The NIH Catalyst* on such topics as authorship, peer review, data management, and mentoring, written by various committee members. In addition, since the Ethics Committee read and prepared the response for the NIH Intramural Program to the Ryan Commission on Research Integrity report on *Integrity and Misconduct in Research* (1995), one column was written to solicit comments from the NIH scientific community on the Report.

As part of its training mandate, the Committee requested a presentation in June 1996 by Dr. Michael Zigmond, University of Pittsburgh, describing a Survival Skills Course for students and postdoctoral fellows in which appropriate ethics training is incorporated into each general subject area covered by the course.

A modified version of this course is being presented this fiscal year for NIH fellows, as a series of workshops covering topics such as Life as a Professional, Oral Presentations, Writing and Publishing Research Articles, Grantspersonship, and Teaching. Several members of the Committee met with representatives from the AAAS to preview and critique their videos on Integrity in Scientific Research. The Committee has since viewed all five videos to determine how they might be incorporated into an ethics training course. Most recently, the Committee has had a presentation by Drs. Ronald Green and Mathew Thomas of the Office of Genome Ethics, National Center for Human Genome Research, on the Science Research Ethics Course which they have developed. This is a case-based course that involves discussion among small groups of scientists. A recommendation for pilot projects for ethics training NIH-wide based on these various alternative mechanisms is being prepared. The intramural programs of each institute will be free to experiment with different formats to determine which works best for each.

The third charge to the Ethics Committee was to develop mechanisms that would deal promptly and fairly with allegations of scientific misconduct and that would simultaneously protect both whistleblowers and scientists accused of scientific misconduct. Work on this charge is proceeding as we await the new guidelines from DHHS and the Office of Research Integrity. Equally important was to develop procedures to deal with interpersonal issues, such as authorship or mentoring disputes, which do not fall under the rubric of scientific misconduct. The Committee has been actively working with the Office of Intramural Research, the Office of Equal Opportunity, and the Office of Human Resources Management to launch a pilot project to deal with the interpersonal issues through an NIH Ombudsman heading a Cooperative Resolution Center. The Center will serve as a neutral site for resolving work-related conflicts. The ombudsman will be a senior NIH scientist and thus familiar with the culture of science and community standards. The ombudsman will function as a facilitator rather than a decision-maker, and will recommend one of several forms of alternative dispute resolution, dependent on the facts of the case. The Cooperative Resolution Center will initially offer mediation, early neutral evaluation, and peer panel evaluation. We believe that this system will offer a fast confidential process for resolving disputes at an early stage and will be a significant benefit to the NIH. Our hope is that by establishing training in ethics, and thereby an understanding of the responsible conduct of science, and by providing a neutral process for resolution of interpersonal scientific disputes, the NIH will become a place where people work well together, deal ethically with one another, and advance the scientific frontier.

IN THE NEWS

Federal Task Force Recommends "Stringent Scrutiny" of Genetic Tests

A government panel has proposed several recommendations related to the safety and efficacy of genetic tests. A Task Force on Genetic Testing, jointly established by the National Institutes of Health and the Department of Energy, acknowledged that "organizations have on occasion developed and offered genetic tests without always collecting data on test validity and utility and without external review. Consequently, the public is not being adequately protected.." To offer more immediate protection, the Task Force recommended that protocols for developing new, predictive genetic tests must be approved by an institutional review board (IRB) "when subject identifiers are retained and when the intention is to make the test readily available for clinical use." A central recommendation is the establishment of "a

system for determining which genetic tests require stringent scrutiny." The Task Force stipulates that "stringent scrutiny" is warranted when the test has the potential to predict future inherited diseases in healthy people, is likely to be used for that purpose, and when there is an absence of a confirmatory test. The Task Force also encouraged the incorporation of "genetics curricula in medical school and residency training" and noted that "schools of nursing, public health, and social work need to strengthen and expand their training programs." For the long-term, the Task Force recommended the establishment of an advisory committee on genetic testing in the Department of Health and Human Services to coordinate genetic testing policies throughout the department. The recommendations may be found on the WWW at http://ww2.med.jhu.edu/tfgtelsi.

National Call to Ban Human Cloning

On June 9th, the National Bioethics Advisory Committee (NBAC) submitted to President Clinton its recommendation for the enactment of Congressional legislation to prohibit the creation of human beings by cloning, concluding that at this time such an act is "morally unacceptable" for both public and private research. President Clinton endorsed such a national law stating that, "Attempting to clone a human being is unacceptably dangerous to the child and morally unacceptable to our society," and sent proposed legislation titled the "Cloning Prohibition Act of 1997" to Congress that would ban all research on the cloning of human beings. The Commission's recommendations stopped short of calling for a legislative ban on the use of cloned human embryos for research, a practice which is currently prohibited within federally funded research but is relatively unregulated in private industry. The report stressed that such embryos should not be implanted into a woman's womb in attempt to create a baby, but critics, many of whom are pro-life groups, say that it does not go far enough with its recommendations. The Commission did not review and purposely did not recommend the banning of all human embryo cloning for fear that restrictive language would interfere with other types of clone-related research. "I want to make clear," the President said of the omission, "that there is nothing inherently immoral or wrong with these new techniques - used for proper purposes." Clinton said he wants to find a middle ground, where people can take advantage of the "new medical treatments and life-saving cures to diseases" that cloning research can provide without offending moral concerns. The President also agreed with the Commission's recommendation of a "sunset clause" setting a five-year limit for his bill during which time NBAC will continue to review the issue and eventually make a further recommendation concerning the continuation of the law. The Commission recommended that the moratorium imposed by the President in February on the use of federal funding for human cloning research continue until Congressional legislation was in place and urged the private sector to comply with the temporary ban. The 18 member commission did not include suggested language for legislation in its report, nor did it suggest penalties for violators, but when questioned by the House Subcommittee on Technology at a June 12 hearing about possible criminal sanctions for violators, Dr. Harold Shapiro, chairman of NBAC, testified "I would be very cautious - very cautious," concerning such measures. This far three bills relating to cloning have been introduced in Congress, one to prohibit and two to restrict federal funding for human cloning. Representative Vernon Ehlers (MI-R) pledged to push for legislation more restrictive than proposed by the President, disagreeing with the latter's failure to prohibit human embryo cloning and its inclusion of a sunset clause.

International Organizations Review Human Cloning

On the international front, other countries and organizations are also debating the merits of cloning. Although many countries differ on the use of cloned embryos in research, Great Britain, Denmark, Germany, Australia, and Spain have all banned human cloning. French President Jacques Chirac, in response to the recommendations of his bioethics advisory committee, called for an international ban on human cloning. The World Health Organization (WHO) has adopted a resolution affirming that the use of cloning for the reproduction of humans is ethically and morally unacceptable. This matter remains under review, however, as the director of WHO, Dr. Hiroshi Nakajima, will lead an assessment of the ethical, social, and scientific implications of cloning in the area of human health and will report the findings to WHO's Executive Board at the World Health Assembly next May. "At this stage," Dr. Nakajima said in March, "WHO considers that it is necessary to try and clarify the issue so that a reasonable assessment can be made of the implications of this research." The resolution contrasts with the recommendations made by a WHO working group on cloning. The group's report, published in May, warned against a ban or moratorium on human cloning, stating that the issue must be discussed in detail and that any international ban would be "unwise and counterproductive" and could result in a loss of scientific benefits. The International Bioethics Committee of the United Nations Educational, Scientific and Cultural Organization (UNESCO) is also divided on a ban on human cloning. Though Federico Mayor,

UNESCO's Director General, stated that a "human being should not be cloned under any circumstances," not all members agree. "Initial repugnance has given way to the recognition that there may be some benefits to infertile couples and others from human cloning," John Robertson, professor of law at the University of Texas in Austin, told UNESCO's International Bioethics Committee in May. In Europe, the European Commission's bioethics advisory panel has declared that human cloning "is ethically unacceptable, not only because of the high potential risks, but on the grounds of instrumentalization and eugenics" and called for it to be prohibited by law, although actual legislation must be left to member nations.

IN THE SOCIETIES

IEEE To Develop New Ethics Guidelines

The Ethics Committee of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) has begun work to develop an Ethics Guidelines document. This is intended to complement the existing 10 statements that comprise IEEE's Code of Ethics and "serve to educate, assist in its application and ultimately in interpreting the Code." The Committee has announced the creation of an electronic discussion group or listserv to open the process to anyone interested in contributing material for each Code element so that it might be considered when drafting the Guidelines. To subscribe to the "Ethics-Guidelines" discussion mailing list, send an e-mail message, without any subject, to majordomo@majordomo.ieee.org, and in the body of the message include: subscribe ethics-guidelines (Your E-Mail address is optional). Further information is available by accessing IEEE's website at http://www.ieee.org/committee/ethics/.

ETHICS, LAW & PUBLIC POLICY

Safety Review Commission Sends Mixed Message to Engineers and Architects

In two extremely significant and long-awaited decisions, the Occupational Safety Health Review Commission attempted to draw a contrast between two different roles performed by design professionals during the design and construction process. The Commission affirmed the long-standing rule that engineers and architects performing the customary services are not generally subject to the construction standards prescribed by the Occupational Safety and Health Act (OSHA)—*Secretary of Labor v. Foit Albert Associates, Architects & Engineers, P.C*. However, it also determined that the OSHA construction standard may apply where it is determined that a design professional firm has a "global set of responsibilities" over the construction process—*Secretary of Labor v. CH2MHill Central, Inc.*

The *Foit Albert* case involved a July 21, 1991 concrete collapse during a university construction project in Amherst, New York. Foit-Albert, an engineering company having a contract with an architect to provide inspection services at the project, was charged with two alleged serious violations of 29 C.F.R. Section 1926.703, which governs cast-in-place concrete construction. An administrative law judge vacated the citations on the grounds that Foit-Albert was not performing construction work within the scope of the Secretary's construction standards. The CH2MHill case arose from a methane gas explosion in which three construction workers were killed during the construction of a tunnel for the Milwaukee Metropolitan Sewerage District. The district retained CH2MHill to provide "program management services" for the project. The National Society of Professional Engineers (NSPE) filed a brief as a "friend of the court" in support of the Foit-Albert position before the Commission.

In affirming the judge's decision in the *Foit-Albert* case, the Commission focused on each employer's relationship to the construction work, paying particular attention to the contractual responsibilities and the nature of the activities which Foit-Albert actually performed at the site. The Commission noted that it had no contractual or actual authority to direct the activities of the trade contractors, although during the course of its assigned work duties it notified them of safety hazards of which it became aware. With respect to the accident that resulted in serious injuries to workers, the Commission noted that the concrete pour was commenced without Foit-Albert's knowledge. This was consistent with the contractual evidence that Foit-Albert's role in the project included little if any actual responsibility to control or

direct the manner or the performance of that work. Although Foit-Albert did at times make known its concerns about safety issues beyond mere compliance with design specifications, the Commission concluded that the engineering firm did not manifest the ability to control or direct matters of safety to bring it within the coverage of the OSHA construction safety standards.

However, in the *CH2MHill* case, the Commission concluded that where an engineering or architectural firm (1) possesses broad responsibilities in relation to construction activities, including contractual and de facto authority relating directly to the work of the trade contractors, and (2) is directly and substantially engaged in activities that are integrally connected with safety issues, the construction standards will apply notwithstanding contractual language expressly disclaiming safety responsibility.

Citing a series of previous rulings, the Commission reviewed the extent of CH2MHill's role on the project, its authority over contractors, and its involvement in safety, and concluded that the engineering firm possessed the "broad, global set of responsibilities for project characteristics of those employers whom (the Commission) have previously held subject to the construction standards." The Commission cited CH2MHill's administrative responsibilities, which included scheduling, coordination of construction activities, preparation and interpretation of contract documents and modifications including negotiating directly with trade contractors, claims processing, and dispute resolution. The Commission rejected an assertion that the firm's lack of "stop the work" authority precluded the Commission from evaluating CH2MHill under the Commission's line of construction management cases noting that those cases apply where a firm possesses "broad administrative and coordination responsibilities at the worksite." The Commission also determined that, although project contracts contained express language providing that the contractor and not CH2MHill would have "sole responsibility for safety precautions and programs," CH2MHill effectively was the "nerve center" through which means were developed and implemented for allowing the work to be conducted in the light of a major safety hazard for a tunneling operation.

While the Commission was apparently attempting to draw a contrast between two different roles performed by design professionals during the design and construction process to provide a degree of guidance for practitioners, the two decisions may in fact result in even more questions, particularly as design professionals are increasingly requested by owners to perform a mix of services during the design and construction process. However, the Commission's great reliance on the agreements between the parties clearly heightens the importance of using and understanding well prepared contract documents by design professionals, owners, contractor, and others. It also highlights the importance of understanding the overall nature of the project and the need for consistency between the duties and responsibilities described in the contract documents and the execution and operation of those duties and responsibilities during the design and construction process.

By Arthur Schwartz, General Counsel, National Society of Professional Engineers

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RESOURCES

In Print

Research Ethics: A Reader, edited by Deni Elliott and Judy E. Stern (Hanover, NH: University Press of New England, 1997, $25.00). To order, call (800) 421-1561; fax (603) 643-1540. Offers an overview through essays, case studies, and resource material of ethical issues associated with scientific research, covering such topics as the reporting and funding of research, conflicts of interest and conflicts of commitment, human and animal experimentation, conflicts over data ownership and sharing, authorship and institutional responsibilities in dealing with scientific misconduct.

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The Ethics of Scientific Research: A Guidebook for Course Development, by Judy E. Stern and Deni Elliott (Hanover, NH: University Press of New England, 12997, $15.00). To order, call (800) 421-1561; fax (603) 643-1540. Intended for teachers of research ethics, this volume is based on the author's experience in developing a graduate course in research ethics at Dartmouth. It "details experiences in training faculty and in planning, teaching, and

evaluating" the course and addresses such topics as "the value of teaching ethics, the structure and goals of the course," and methods for evaluating it. The book includes an extensive bibliography and videography of resources for developing and teaching such a course.

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Engineering Licensure Laws: A State-by-State Summary and Analysis, published by the National Society of Professional Engineers (Alexandria, VA: NSPE Product #2015, $170, $70 for members). To order, contact NSPE Customer Service at(703) 684-4811 or Fax (703) 836-4875. The 500-plus-page maunaul reviews engineering licensing provisions for the follwing categories: licensure board composition; board powers and operations; requirements for licensure; licensure by comity and reciprocity; license renewal including continuing professional competency requirements, exemptions, investigative and disciplinary powers; enforcement powers; and business and association practice.

On-line

The World Wide Web Ethics Center for Engineering and Science (http://web.mit.edu/ethics/www/) is a rapidly growing source of reference and instructional materials. Items are classified under these major headings: research ethics; engineering ethics; problems, moral leaders; ethics in a corporate setting; ethical codes and guidelines; ECSEL (containing information, particularly, on the status of women and minorities in engineering); and instructional resources. Material also is indexed by disciplinary field, and the site includes a glossary of ethical terms, a list of acronyms, and a bibliography. The WWW Ethics Center for Engineering and Science was established in Fall 1995 under a grant from the National Science Foundation. Along with many text documents, the site provides graphics, access to audio, video and Adobe Acrobat files in a PDF format, with help for downloading.

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The Web Clearinghouse for Engineering and Computing Ethics (http://www4.ncsu.edu/unity/users/j/jherkert/ethicind.html) is sponsored by the Division of Multidisciplinary Studies, North Carolina State University, to provide a comprehensive, user-friendly index of materials on the Web relating to engineering and computing ethics. The material on the site is indexed according to a number of categories, including: ethics centers; professional societies; codes of ethics; conferences; books and reports; journals and newsletters; mailing lists and newsgroups; and case studies.

ANNOUNCEMENTS

Advances in Peer Review Research, a special issue of the quarterly journal, Science and Engineering Ethics (volume 3(1), 1997) is based on papers originally presented at the 1996 AAAS Annual Meeting. The papers have been modified following a process of double blind peer review and focus on two basic questions: 1) how does current peer review operate, and 2) how can it be improved? For cost and ordering information, contact Opragen Publications, PO Box 54, Guildford, Surrey, GU1 2YF, UK; +44 148 356 0074; E-mail opragen@ cableo1.co.uk; WWW http://www.cableo1.co.uk/opragen.

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The Association for Practical and Professional Ethics is sponsoring a conference on **Ethics in the Professions and Practice** at the University of Montana, August 3-7, 1997. The conference is designed for lay persons concerned about ethical issues in society, professors eager to incorporate ethics in their courses, professionals outside the academy who want to explore and discuss ethical issues they face in their practice, and faculty who teach ethics. Some of the planned seminar topics are: Business Ethics: Practice and Pedagogy; Ethical Issues in Conducting and Reporting Research; Ethics and the Internet: Privacy, Property, Accountability and Democracy; Who Should Set the Election Agenda: People, Polls or Press?; Medical Ethics; Autonomy and Coercion in Public Health; Religion and the Professions; Ethics in the Academy; and Current Research on Teaching Professional Ethics. Plenary lectures on ethics topics cutting across disciplines will also be a part of each day's schedule and participants will have an opportunity to present their own work. Contact Brian Schrag, Association for Practical and Professional Ethics, 410 North Park Avenue, Bloomington, Indiana 47405; (812) 855-6450; Fax: (812) 855-3315; E-mail: appe@indiana.edu; WWW:

http://ezinfo.ucs.indiana.edu/~appe/home.html.

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A conference on the **Ethics of Electronic Information in the 21st Century** will be held at the University of Memphis, Memphis TN, September 26 - 28, 1997. The conference will examine the increase of information available through computers, including concerns on the authorization for access, the protection of privacy, the issue of ownership and copyrights, and the potential profitability from this increase of information. The deadline for registration is August 30, 1997. Contact Tom Mendina, Assistant to the Director, the University of Memphis Libraries; (901) 678-4310; Fax (901) 678-8218; E-mail tmendina@cc.memphis.edu.

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The First World Conference on Ethics Codes in Medicine and Biotechnology, "Health Care Ethics: Nuremberg 50 Years On," will be held October 12 - 15 in Freiburg in Breisgau/ Germany. Promoted by the German Academy for Ethics in Medicine, the program focuses on elaborating on the necessity for new rules in the struggle for the ethical foundation of medicine in the 21st Century. Registration deadline is August 31, 1997. Contact Kongress & Kommunikation, Universitätsklinikum der Albert-Ludwigs-Universität, Hugstetter Str. 55, D - 79106 Freiburg; (+49) (0) 761 270-7315; Fax (+49) (0) 761 270-3398; E-mail kkkri@sun11.ukl.uni-freiburg.de.

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The Engineering Foundation, New York, is presenting a conference on "The Uneven Playing Fields: Ethics for Science and Engineering based International Industries." Topics will focus on the different laws and regulations among nations and the impact these have on the financing of technology-based products and on firms' responses to the discovery of inadequacies or defects. The conference will be held September 14 - 17, 1997 in Durham, North Carolina. For more information, contact Ray Spier via E-mail at r.spier@surrey.ac.uk or visit http://www.cableol.co.uk/opragen/.

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The University of Dusseldorf is hosting the **Tenth International Conference of the Society for Philosophy and Technology**. The conference will be held in Dusseldorf, Germany from September 24 - 26, 1997 and will examine the role technology plays in shaping the future of human beings and human life. Contact Professor Paul Durbin, Philosophy Department, University of Delaware, Newark, DE, 19716; E-mail 18512@udel.edu.

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A European Conference on Clinical Trial and Ethics is being held by the European Forum for Good Clinical Practice in collaboration with the European Organization for Research and Treatment of Cancer, the European Ethical Review Committee, and the Central Scientific-Ethical Committee of Denmark along with support from the European Commission. This meeting, scheduled for September 29-30 at the European Parliament in Brussels, seeks to provide a forum for education on the relationship between science, ethics, and society in the developing areas of clinical research. A central focus will be on the impact of recent developments in the ethical review process on clinical research conducted in the European Union. Contact EORTC Education Office, av. E. Mounier 83/11, 1200 Brussels; +32-2-774.16.54; Fax +32-2-772.35.45; http:/www.eortc.be/.

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The **Akademie für Ethik in der Medizin** is promoting a conference to evaluate the concept of codes of ethical conduct in medicine and healthcare which will be held October 11 - 15, 1997 in Freiburg, Germany. The conference will examine the origins and impacts of certain codes of ethics, including their functions as instruments, their achievements and failures to date, and the need for new codes for particular medical fields. The sessions will include translations in English, French, and German. Contact the Freiburg Project, Zentrum für Ethik und Recht in der Medizin, im Universitätsklinikum, Albert-Ludwigs-Universität, Elsässer Strasse 2m / Haus 1a, D-79110 Freiberg, Germany; ++49-(0)761-270-7265; Fax ++49-(0)761-270-7268; E-mail fproject@sun1.ukl.uni-freiburg.de.

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The European Society for Philosophy of Medicine and Health Care is convening its **Twelfth Annual Conference**, August 20 - 22, 1998 in Marburg, Germany. With the theme "Philosophy of and Philosophy in Healthcare Education," papers are invited that address the philosophical, ethical, and historical dimensions of healthcare education. Abstracts (500 word max) and registration for the conference are due before **November 1, 1997**. Contact Henk ten Have, Secretariat ESPMH, Dept. of Ethics, Philosophy and History of Medicine, Faculty of Medical Sciences, Catholic University of Nijmegen, P.O. Box 9101, 6500 HB Nijmegen, The Netherlands; Fax ++31-24-3540254.

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The Harvard University Program in Ethics and the Professions invites applications for resident Fellowships in Ethics for the academic year 1998-99. The Fellowship extends from September through June and will be awarded to outstanding teachers and scholars holding a professional degree and/or doctorate who wish to develop their

competence to teach and write about ethical issues in business, education, government, law, medicine, public policy and social science. The deadline for receipt of applications is **December 18, 1997**. Contact the Program in Ethics and the Professions, Harvard University, 79 Kennedy Street, Cambridge, MA, 02138; (617) 495-1336/3990; Fax (617) 496-6104; E-mail ethics@fas.harvard.edu.