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The Consortium for Science, Policy and Outcomes at Arizona State University: Advancing S&T Scholarship and Creating a Foundation for Cultural Change

Mark Neff and Ryan Meyer ¹

Science and technology (S&T) have the power to transform society, and taxpayers in this country are regularly told that S&T will secure a better future. Science is expected to lead to better health, a robust economy, and a cleaner environment. Though science has made great strides in these areas, the science-society relationship is more complex than the expectations and benefits initially indicate. The scientific enterprise is insulated from democratic influence, leaving practitioners and their funders to make decisions affecting all of society. Complexities in the relationship between society and science lead to further problems: massive biomedical research expenditures have produced powerful drugs for combating AIDS, yet many of those who need the treatments cannot afford them; technological innovations, seen as the source of economic efficiency, often come at the expense of employees displaced by automated processes; and technological processes repeatedly have detrimental effects on the environment that then require additional investment in remediation technology and research. These failings to provide the promised societal benefit in any unqualified form are not the result of poorly done research; rather, they arise from an incomplete understanding of the relationships among society, technology, and science. Housed at Arizona State University, the Consortium for Science, Policy, and Outcomes (CSPO), is an interdisciplinary research center dedicated to understanding such linkages.

CSPO History

Columbia University hosted a series of conferences in the mid-1990s to reflect on a half century of unprecedented scientific, technological, and societal change that had occurred since the publication of Vannevar Bush's influential 1945 report, *Science: The Endless Frontier*, and to examine contemporary science policy issues. These meetings identified a critical need for improved understanding of the connections among science, technology, and societal outcomes that would aid decision makers in directing S&T policy (S&TP) toward positive societal change. This recognition inspired the 1999 founding of the original incarnation of CSPO (then called the *Center* for Science, Policy and Outcomes) based on three fundamental concerns:

1. The accelerating pace of science and technology outstrips society's capacity to understand and govern that advance for human benefit;
2. The prevailing knowledge and practice of science policy are unequal to the task of governance; and that
3. A new approach to science policy is therefore necessary if society is to deal adequately with the implications of its own ingenuity.

CSPO's vision is to develop an integrated, informed, and self-correcting analytical capability that recognizes and responds to the inextricable links between S&T and societal evolution.

Michael Crow, then the Executive Vice Provost of Columbia University and Professor of Science and Technology Policy, played a pivotal role in the founding of CSPO. He hired Daniel Sarewitz, a speechwriter for Congressman George E. Brown with considerable experience with the House Science Committee, as Director, and provided initial funding for the small staff and consultants who would carry out its initial work.

CSPO was originally located in Washington, D.C., and operated under the auspices of Columbia University. By 2001, CSPO consisted of a small full-time staff and a board of advisors, with outside experts consulting on specific projects. Outreach and education were integrated into all programs as a crucial part of CSPO's outcome-focused approach. Its location in the nation's capital facilitated interaction with elected officials, Congressional staffers, and agency bureaucrats to begin a more insightful dialogue about the interactions between society, science, and technology. An important culminating event in CSPO's early years was a conference in March of 2002 entitled "Living with the Genie: Governing the Scientific and Technological Transformation of Society in the 21st Century." The event, which brought together a group of 300 scientists, journalists, policy makers, foundation leaders, and opinion leaders, resulted in publications and online resources that seek to explore some of the ways human values affect and are affected by the goals and processes behind scientific endeavors.

Upon becoming President of Arizona State University in the fall of 2002, Crow began an ambitious transformation of that institution into what he calls a “[New American University](#),” organized around specific design principles that emphasize, among other things, the University’s active and positive role in the community and the world, the University as entrepreneur, solution-based research, and interdisciplinary approaches to problem-solving.² By the spring of 2004, Sarewitz and CSPO, which then officially became the *Consortium* for Science, Policy, and Outcomes, had made the move to Arizona State University as well, in order to take advantage of these sweeping changes.

CSPO today

Crow’s reorganization has already had far-reaching effects through the creation of new schools, new research institutes, and new buildings. Of course, many of the changes are highly controversial, but the University’s rapid movement toward “low disciplinary walls,” highly integrated departments, and interdisciplinary work, constitute an increasingly ideal environment for CSPO. CSPO enjoys a considerable degree of programmatic and financial support under Crow’s administration.

CSPO has grown considerably in the past two years in both the number of scholars and the breadth of its work. Departmental affiliations of CSPO’s students, post-docs, faculty, and other affiliates range as widely as Biochemistry, Engineering, English, Law, Philosophy, and Political Science, to name only a few. This diversity is at once a fascinating opportunity for scholarship as well as an institutional and intellectual challenge to those trying to exist along these many boundaries.

The programmatic portfolio outlined below represents current and planned CSPO activities, all of which take advantage of the unique environment provided by ASU.

Education

While CSPO strives to maintain essential ties to policy practitioner communities, its location at a large research university also affords multiple opportunities to further its goals of education and cultural change. CSPO’s educational attack is threefold: to educate scholars in STS and S&TP; to integrate discussion of society and science into standard university curricula; and to engage active scientists and engineers in reflexive deliberation about potential implications of their work while they do it, rather than after products and knowledge enter society and the marketplace. Traditional educational programs to train STS and S&TP scholars and expose a broad range of students at all levels to the social issues surrounding science and technology will be fulfilled through the development of a number of new programs for students and professionals as summarized in Table 1. Most of these programs are currently in development, though some graduate students have already completed courses toward a graduate certificate, and the nanotechnology learning community will begin in the Spring semester of 2007. This suite of programs will require a considerable effort by CSPO to build capacity and visibility to recruit faculty, staff, and students.

For CSPO, whose essential design elements include mandates for social embeddedness and societal transformation, traditional education is simply not enough, hence the desire to engage scientists and engineers in reflexive discussion of their work. The long-term effort to embed ideals of democratized science and socially robust knowledge into the activities of an entire Research I University is perhaps unprecedented, and it will take bold experiments like those of the Center for Nanotechnology and Society to develop and test new ways of linking STS to the S&T enterprise. CSPO is developing a suite of tools, such as real-time technology assessment, to enhance the reflexivity of the research enterprise.

Table 1: CSPO Goals in Education	
Undergraduate	Lecture courses satisfying new undergraduate requirement in science and society: - Science and Democracy - Technology and Society Learning Communities: - Nanotechnology and Society - Living in a Technological World
Graduate	Graduate Certificate in Science, Technology & Societal Outcomes. Master of Advanced Study in the Science of Science and Technology Policy PhD program in Society, Technology & Science – a joint effort among ASU schools and departments engaged in STS scholarship.
Other	Executive Programs - short workshops for working professionals - targeted at specific fields, e.g. science journalism, research program managers, corporate R&D professionals.

Projects

Work at CSPO cannot easily be separated into categories. However, there are a number of broad themes that can be recognized in most CSPO projects. These are:

- Governing Science and Technology
- S&T in a Globalizing Society
- S&T and Social Change
- S&T and Environmental Decision Making
- S&T and Human Health

In addition to these themes, most CSPO projects emphasize outreach as essential to the success of the work. This is consistent with the dual goal of advancing scholarship on Society, Technology and Science, while nurturing positive cultural change in belief systems about how science works. Project funding comes from a variety of sources, including the National Science Foundation (NSF) and a variety of private foundations that believe strongly in the CSPO mission. A few representative projects are listed below. Far more information about these projects and others can be found on the projects page of the CSPO website.

Science Policy Assessment and Research on Climate (SPARC)

Funded by the NSF's Decision Making Under Uncertainty program, SPARC seeks to better understand, and help to reconcile, the supply and demand of climate science knowledge.

Center for Nanotechnology in Society at ASU (CNS-ASU)

A NSF-funded Nano-scale Science and Engineering Center, CNS-ASU is designed as a boundary organization at the interface of science and society. It provides an operational model for a new way to organize research through improved reflexiveness and social learning that can guide trajectories of knowledge and innovation toward socially desirable outcomes, and away from undesirable ones.

Distributional Impacts of Science and Technology Policies

The purpose of this research project is to develop knowledge about the factors affecting the distributional impacts of S&T. The focus is on factors internal to science and technology knowledge production processes rather than the social factors that mitigate distributional impacts (e.g., income inequities; lack of universal health care).

Science and Public Value

As an overarching planning and tool-building effort, this project will construct Science and Public Value decision-making models as alternatives to criteria rooted in traditional valuation measures such as economic impacts or academic indicators, which have no necessary correlation with desired societal outcomes.

Understanding the Uneven Advance of Knowledge

Better science policy decisions would be facilitated by more insight into why some areas of science (and their applications) advance more rapidly than others. This project will begin with a focus on biomedical research issues including infectious disease, cardiovascular problems, contraception, mental illness, and malaria.

CSPO Outreach

CSPO has become an influential presence in the S&TP landscape of the United States. Ongoing relationships with policy makers at the federal level have helped to create major programs that both support S&T policy research (particularly in climate change and nanotechnology) and inform the making of S&T policy. In addition, CSPO is becoming a highly visible and respected source of expertise on issues of emerging S&T and S&T policy. CSPO scholars are regularly consulted by major media sources, and articles by CSPO personnel have been featured in mainstream publications. CSPO intends to use its voice to encourage critical thought and positive change.

CSPO maintains a substantial and frequently updated web presence at www.cspo.org. This resource serves a wide variety of audiences both internal and external to ASU, including students, researchers, policy makers, NGOs, the media, and the interested public. In addition to information about the aforementioned research and education agendas, a number of regularly updated resources and features are available through the home page:

- [Recent Science and Policy News](#), pulled from national and regional news sources
- [Perspectives](#): a series of thought-provoking articles on current issues in science and society
- A monthly [newsletter](#) keeping an ever-growing community apprised of current CSPO activities and upcoming events in CSPO related fields
- A second newsletter with information specific to the Center for Nanotechnology in Society
- A large and continuously growing library of publications by CSPO and its affiliates, which has become a valuable resource for the broader STS and S&TP communities
- [Syllabi](#) for many of the courses taught by CSPO faculty
- Other [resources](#) relevant to science and technology policy at Arizona State University including a calendar of [events](#), links to other groups affiliated with the [Consortium](#), and other helpful information
- Coming Soon! Links to blog discussions maintained by CSPO faculty and students.

Building The Consortium

A final and very important CSPO goal is to build the Consortium by strengthening ties to other institutions, bridging the STS and S&TP communities where common interests and pursuits can be found, and building reflexive dialogue with scientists and engineers. CSPO already engages in substantial collaboration with groups at the University of Colorado in Boulder and at Georgia Tech. As part of this, we hope you will engage with CSPO by visiting the website, taking advantage of resources it provides, and signing up to receive our newsletter.

¹ Graduate students at the Consortium for Science, Policy, and Outcomes and the School of Life Sciences at Arizona State University.

² For more information on the New American University, visit <http://www.asu.edu/president/newamericanuniversity/>

Technology Policy in Contemporary America
New Jersey Institute of Technology
STS 312 Honors

Phone: 596-3270
E-mail: [katze@njit.edu]

Dr. Eric Katz (Professor of Philosophy)
Department of Humanities

Description: This course presents a multi-disciplinary examination of the operation of technology and technological systems in twentieth-century America. Using the perspectives of history, politics, sociology, and philosophy we will evaluate the ways in which technology is developed and used in the United States. Several detailed case studies will be presented: the polio vaccine, energy consumption, NASA, nuclear weapons systems, and environmental health.

Texts:

Barbara Allen, *Uneasy Alchemy: Citizens and Experts in Louisiana's Chemical Corridor Disputes* (MIT, 2003)
Tony Gould, *A Summer Plague: Polio and its Survivors* (Yale, 1995).
Eric Katz, Andrew Light, and William Thompson, eds., *Controlling Technology* (Prometheus, 2003)
Howard McCurdy, *Inside NASA: High Technology and Organizational Change in the U.S. Space Program* (Johns Hopkins, 1993)
David Nye, *Consuming Power: A Social History of American Energies* (MIT, 1998)
Scott Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, 1993)

Assignments and Grades:

There is **no final exam** in this course. There will be **one in-class exam**--a midterm exam. There will be **two take-home essay assignments**. And there will be a **final group project presentation** and a **term paper** based on the project. The approximate percentage for grades is:

- (1) Mid-term exam: 25%
- (2) Two take-home essays: 30%
- (3) Group project and presentation: 15%
- (4) Final term paper: 25%
- (5) Class participation: 5%

Class and Reading Schedule:

INTRODUCTION: PHILOSOPHICAL PERSPECTIVES ON TECHNOLOGY

August 30: First class---informational meeting.
September 1: READ in KATZ: Schell and Schlosser, pp. 25-48.
September 6: No class. NJIT Holiday. Labor Day.
September 8: READ in KATZ: Pacey and Ellul (chap. 4), pp. 53-73.
September 13: READ in KATZ: Ellul (chap.10) and Winner, pp. 163-174 and 197-207.
September 15: READ in KATZ: Hughes and Balabanian, pp. 287-296 and 313-328.

THE CONQUEST OF POLIO: A POSITIVE CASE STUDY

September 20: READ GOULD, pp. 1-84.
September 22: READ GOULD, pp. 85-158.
September 27: READ GOULD, pp. 159-226. **First Take-home Essay Due**

ACCIDENT THEORY AND NUCLEAR SAFETY

- September 29: READ SAGAN, pp. 3-52.
- October 4: No new reading. Continue discussion.
- October 6: READ SAGAN, pp. 53-116.
- October 11: READ SAGAN, pp. 117-155.
- October 13: READ SAGAN, pp. 204-279.
- October 18: Review. No new reading.
- October 20: **First In-class Exam**

NASA: TECHNOLOGY AND ORGANIZATIONAL CULTURE

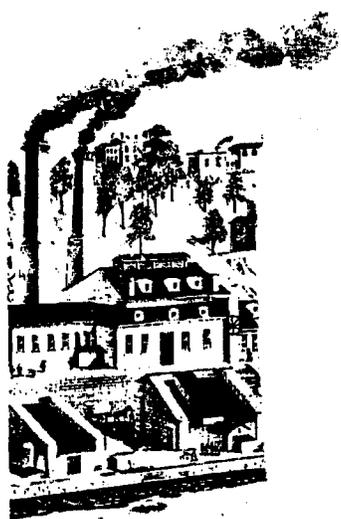
- October 25: READ McCURDY, pp. 1-60.
- October 27: READ McCURDY, pp. 61-132.
- November 1: READ McCURDY, pp. 133-17.
- November 3: Discussion of Challenger and Columbia---handouts.

THE CONSUMPTION OF ENERGY

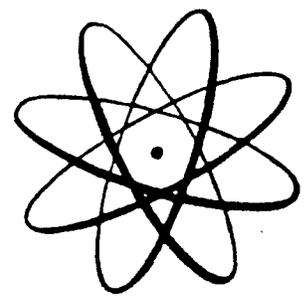
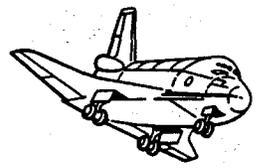
- November 8: READ NYE, pp. 131-186.
- November 10: READ NYE, pp. 187-264. **Second Take-home Essay Due**

CITIZENS AND EXPERTS IN TECHNOLOGY POLICY

- November 15: READ in KATZ: Nelkin and Winner (chap. 25), pp. 351-366 and 383-402.
- November 17: READ ALLEN, pp. 1-49.
- November 22: READ ALLEN, pp. 51-115.
- November 24: No class. Happy Thanksgiving!
- November 29: READ ALLEN, pp. 117-162.
- December 1: PROJECT PRESENTATIONS
- December 6: PROJECT PRESENTATIONS
- December 8: PROJECT PRESENTATIONS **Final Term Papers Due**



THE WORKBOOK/CPF



Readings That Help

This section of the *Newsletter* is meant to guide the reader to books or articles that someone recommended to me because they are useful, provocative, or enjoyable—at best, all three. Suggestions of other materials to be reviewed would be most welcome, with or without comments, but I hope you feel free to comment on my opinions as well.

Barrett Hazeltine

Division of Engineering, Brown University

Black, Maggie. *The No-Nonsense Guide to Water.* Oxford, U.K.: New Internationalist Publications Ltd., 2004. Pp. 144. Illus. Paperback, \$14.95.

The first six chapters are just what the title indicates—a succinct and straightforward account of water policy issues. The last chapter is an impassioned plea to de-commoditize water, to give control of this resource on which all life depends to local families, farmers, fishing people. The first chapter deals with the science of water, the unjust distribution of rainfall, pollution, and hydraulic technology in history. The next chapter discusses drinking water and sanitation. In Amman, Jordan, 54% of wastewater is treated; in Santiago, Chile, 3% is treated. The amount of water used for irrigation far exceeds the amount used for other purposes. Besides soil salinity, irrigation results in other problems, such as “over-dependence on water-guzzling crops.” Privatizing water delivery has not been generally beneficial to low income people. Frequently quoted statistics show the higher price that poor people pay; in Manila people connected to a utility pay \$0.11 for a cubic meter of water, while those buying from vendors pay \$4.74; it has been difficult to get utilities to move into the areas served by vendors. Fresh water ecosystems have been modified e.g., rivers diverted and wetlands drained. The results have been floods—the book was written before Katrina—and displacement of people who had earned their living from the natural river and

wetlands. In India the court ruled against Coca-Cola for drawing unreasonable amounts of water from the aquifer, drying out the land and destroying rice paddies. Traditional systems of water rights have been modified in hopes of reducing waste by granting concessions to corporations, often multinational. These corporations, ineffectively regulated by inexperienced local governments, have sometimes restricted time-honored access to water by local people. Legal issues about water use are compounded, when different nations share a watershed—the Colorado, the Jordan, and the Ganges are examples. The guide is an effective way to get up to speed quickly on local people and local solutions.

Clark, Robin, and Jannet King. *The Water Atlas.* New York: The New Press, 2004. Pp. 127. Paperback, \$24.95.

This volume complements the *No-Nonsense Guide to Water* with very attractive maps and graphs. The text shows the same passion and concern. One of the twenty three world maps shows percentage of land irrigated and highlights land turned salty by irrigation. In Asia and the Middle East at least half the land is irrigated. In Europe, most of Africa, Brazil, and Russia 10% or less of the land is irrigated. On the same page, three maps illustrate how the Aral Sea has shrunk. Also on the page is a satellite view of the Nile River with a note that at times none of the water reaches the sea because of losses to irrigation. Other maps show droughts, floods, and groundwater mining—much underground water under the Sahara and eastern Russia. The number of deaths worldwide from malaria, spread by mosquitoes breeding in stagnant water, in 2001 was 1.134 million, mostly in Africa. In 2003 more than 1000 cases of West Nile virus, also spread by mosquitoes, were reported from Colorado, Nebraska, and from South Dakota. Extensive tables and a disclaimer that the data is inevitably unreliable back up the graphic presentations. The book is appealing to look through and a mine of information. The text is succinct, so the *Guide* may

be better for a comprehensive introduction, but this book is more enjoyable. A complaint is that most of the maps go over two pages; Europe and West Africa are lost in the crack between the pages.

Foerst, Anne. *God in The Machine: What Robots Teach Us About Humanity and God.* New York: Dutton, 2004. Pp. x + 212. Paperback, \$15.00.

Anne Foerst simultaneously did a postdoc at the MIT Artificial Intelligence Lab and at the Harvard Divinity School. Her focus here is on robots and the question “What does it mean to be human?” Is it possible to find criteria that distinguish humans from robots? A secondary theme is that science and theology complement each other incredibly well. Both themes are based on stories and on objective statements, and the insights about humans that science offers are supported by biblical wisdom. The researchers building robots nearly always treat other people as more than machines; science does not offer a complete understanding of humans. Jewish traditions include a golem, created by humans from clay, and made animate by the word of God. Robot building can be spiritual, using God’s creative powers to build a creature better than us. In the Bible the human body plays a major role in the model of what humans are, and an important aspect of robotics is developing motor control and coordination of the various limbs, the analogue of a human body. This emphasis on embodiment is what makes robotics different from other aspects of artificial intelligence. For a robot to be humanlike it must experience the world through a physical body, and a central doctrine of Christianity is that Jesus was God incarnated in a human body. Humans are communal beings, as the Bible makes clear, and one of the robots described was designed to have a variety of expressions so humans bond to it. The abhorrence some people have of robots is analogous to the hatred between different groups—racial, religious, sexual orientation. *God in the Machine* contains much more theology than is noted above. The questions and the insights are certainly provocative. I gained valuable insight by seeing how a theologian approached vital questions and found the arguments compelling. The answer to the question of what makes humans different, however, is still elusive.

Fleddermann, Charles B. *Engineering Ethics.* 2nd ed. Upper Saddle River, N.J.: Pearson Education Inc., 2003. Pp. xvii + 141. Illus. Paperback, \$29.00.

This volume is part of *Esource*, The Prentice Hall Engineering Source, which allows instructors to select chapters from books in the series and combine them into a unique textbook. The series books are aimed at first year engineering students. *Engineering Ethics* is written as a stand-alone textbook, with questions and guidance for students, but it seemed most useful to me as a source of short summaries of ideas and important cases. Some of these ideas are ethical theories, professionalism, and ethical problem solving. The eight-page summary of ethical theories discusses utilitarianism, duty ethics, rights ethics, and virtue ethics. Some of the cases will be familiar to people who have taught ethics to engineers: the Ford Pinto, the Citicorp Center, Bhopol, and Spiro Agnew. Other cases seem less directly ethical: the defective Pentium chip, the Challenger disaster, cellular phones, and driver safety. Codes of ethics from AIChE, ASME, IEEE, and NSPE are included and can be usefully compared. The text is direct, concise, and accessible to first year students; parts of it I questioned. I also thought some important points were left out of some of the cases, for example, the possibly apocryphal Ford Motor Company internal cost/benefit analysis indicating that it would be cheaper to incur the costs of lawsuits than to redesign the Pinto gas tank filter. It may be unfair to carp about missing material; an instructor could spend class time building on the material presented. A colleague teaching an introduction to engineering course with a three-week ethics module had very positive things to say about *Engineering Ethics*. It fits nicely between collections of cases and full semester textbooks.

Lindley, David. *Degrees Kelvin: A Tale of Genius, Invention, and Tragedy.* Washington, D.C.: Joseph Henry Press, 2004. Pp. xxvi + 366. Illus. Hardcover, \$27.95.

Lord Kelvin, born William Thomson in 1824, was, when alive, perhaps the best-known scientist in Great Britain. Today he is hardly known, although his name is attached to the absolute temperature scale. A major part of the reason he was well known

during his lifetime is that he was a successful inventor, entrepreneur, and businessperson, besides being a prominent “natural Philosopher.” (He disliked the label “physicist.”) He was also willing to talk to non-scientists. A major reason he is less known now is that he was not the lead person in an important new technology or in an important scientific approach. He worked on telegraphy and the laying of the Atlantic Cable and on commercial electric power generation, and much else. The commercialized invention that gets the most attention in the book is a marine compass, more accurate and reliable than its predecessor but eventually superseded. His major scientific accomplishment was probably sorting out the various ideas about thermodynamics, especially the second law, and reducing them to equations. Thomson worked in many aspects of classical physics and tended to approach problems through classical mechanics. He contributed to the mathematics of electrostatics and magnetostatics and recognized the equivalence between Fourier’s theory of heat flow and Faraday’s electric forces—both can be thought of as fields. Thomson, although a skilled mathematician, insisted on a mechanical model for fields and, later, waves. Without a physical mechanism that produced “delayed action at a distance,” Thomson was never satisfied with Maxwell’s ideas. An issue of some interest at the time to geologists and evolutionary biologists was the age of the earth—was it old enough for the evolutionary process to have worked or geological processes to have molded the earth’s features? One of Thomson’s approaches was to calculate how much the earth had cooled since the Creation. The discovery of radioactivity, adding heat energy to the earth, showed that approach futile. The difficulty symbolizes the failure of classical physics to explain some fundamental phenomena. The “tragedy” of the subtitle was Thomson’s apparent recognition that his models were insufficient although they had led to useful inventions. Lindley feels Thomson’s prolific capacity for generating new ideas made it difficult for him to stay with a problem long enough to gain a reputation that would last. Beyond Thomson’s story, the reader gains insight into how science was done, and scientists lived, in the formative years during the nineteenth century—individual researchers, all male, reading each other’s papers, and politicking for university

appointments, not writing grant proposals or rushing into print. Thomson was said to be a discursive speaker, discussing in lectures whatever came to mind. The writing here reflects that approach, with many vignettes and excursions. Thomson did not seem exceptional, perhaps because he appears so contemporary, but the picture of science in his age made the book worthwhile.

Lockwood, Jeffrey A. *Locust: The Devastating Rise and Mysterious Disappearance of the Insect that Shaped the American Frontier.* New York: Basic Books, 2004. Pp. xxiii + 294. Illus. Hardcover, \$25.00.

Locust swarms of literally incredible size swept through the Midwest in the nineteenth century when homesteaders were settling, and then, toward the end of the century, they disappeared. The volume of a swarm is hard for us to comprehend; if the swarm were square it would have been 450 miles on a side and a quarter to a half a mile deep—about 3.5 trillion locusts, corresponding to 600 locusts to every human then living on the earth. The destruction created was commensurate. Technological ways of destroying the insects failed, but resourceful farmers turned from wheat to crops that survived the infestation better and to cattle. (Lockwood notes in a footnote the dangerous present return to mono-culture in the prairies.) The response of religious leaders was ambiguous—were these swarms God’s punishment on a sinful people? Government response was equally ambiguous—were the distressed farmers lazy mendicants or victims of a disaster? One compelling argument for giving aid was the threat that the Midwest would be abandoned. Besides the aid finally delivered, a second government response was the establishment of a commission to do research and find a solution to the locust problem. Lockwood identifies this as the first government effort to harness science to the common good. The commission did much good science and built a scientific infrastructure, but the locust swarms ceased on their own. In 1904 a Montana entomologist reported not having collected one in five years. Grasshopper plagues did occur, but they were not nearly as traumatic, partly because farmers and government agencies had learned from the locusts. Theories abounded about what had eliminated the locusts: widespread planting of

alfalfa? the demise of the Bison? climate change? removal of Indians? It would not be fair to the reader to give the secret away. Part of the research leading to the explanation involved digging locust bodies out of glaciers in nearly inaccessible parts of Wyoming. This is certainly one of the most engrossing books I have read in a long time. History, religion, biology, public policy come together in *Locust*; the most important lesson, though, has to do with the fragility of the environment.

Mulder, Karel, ed. *Sustainable Development for Engineers: A Handbook and Resource Guide*. Sheffield, U.K.: Greenleaf Publishing, 2006. Illus. Pp. 288 pages. Hardcover.

The volume begins with a call that engineers pay serious heed to environmental sustainability in their designs—the cautionary example is Easter Island. It goes on to present various approaches to sustainable development. Here, the term “development” is used to mean the whole process of technological design, and is not limited just to less industrialized nations. Some of the issues presented include the following. The main threats to the biosphere that humankind faces today include dangerous concentration of naturally occurring elements—e.g., manure, introduction of non indigenous species, and biotechnological risks—e.g., genetically modified organisms. The development process has transformed a particular village in Spain from a nearly self-sufficient agricultural community to one used by many city-dwellers as a weekend retreat because farm work was mechanized and local agriculture joined the world economy. A national economy can be organized through markets, hierarchy, or networks, but government regulation is essential to maintain each system. The reasons technologies tend to be stable are: the socio-economic environment—a car must be able to transport people, the physical environment—a car must fit roads and use available fuels, and technological knowledge base—a car is almost always designed in ways accepted by the engineering community. A measure of sustainability of a society is the ecological footprint—each person in the USA needs 10.3 hectares to live sustainably, yet the available worldwide bio-capacity is 1.7 hectares per person. The three aspects of sustainable development for a business are Planet, People, and Profit; People

includes reducing poverty and integrating immigrants. Life-cycle analysis is a tool for analyzing the total environmental impact of a product. Positive feedback, users’ choice of the technology that appears to be the most common, is the mechanism for lock-in of a new technology—the book’s example is VHS vs. Betamax; another example is Windows. Backcasting is an approach for sustainable innovation that starts with determining needs and then developing pathways to reach those goals. The concluding chapter describes the design of sustainable technological systems. An example is a sustainable innovation for the plastics cycle which would convert waste plastic directly to the polymer granules used in fabricating new plastic products. The book was prepared as a joint project of Delft University of Technology and the Technical University of Catalonia in Barcelona. Many of the examples and references are European-related—so North American readers benefit from unfamiliar examples and references. Much ground is covered in a relatively short space. The many examples tend to be succinct—one or two paragraphs. Thus the reader will probably come away with an appreciation for the usefulness of an idea rather than any in-depth facility in using it. This volume is a good place to get oriented but probably does not give enough detail to be a complete textbook or an operating guide.

Nye, David E. *Technology Matters: Questions to Live With*. Cambridge, Mass.: MIT Press, 2006. Bibliog. Pp. xiv + 282. Hardcover, \$27.95.

The subtitle describes the book; I suspect every reader will agree that technology does matter. What is technology? It has parallels with story telling, as each tool implies a story—a problem or need. Technology predates literacy but the word emerged from the Latin only in the seventeenth century. Does technology control us? Can we control technology? Is technology inherently deterministic or a creation of local societal forces? Was the present manifestation of the Internet inevitable or the result of many independent choices? Nye notes that some societies, such as the Amish or Mennonites, have rejected specific recent devices and that the Mayas and Aztecs knew about the wheel but never used it except in toys. Is technology predictable?

Consultants make a good living doing technological forecasting, but examples of bad forecasts, like ubiquitous voice recognition devices, are legion. Part of the forecasting difficulty is timing. Acceptance takes longer than expected because people need time to adjust to a new technology; an alternative interpretation is that resisters must die off. How do historians understand technology? Some are “internalists,” looking inside the black box to understand what the engineers actually did. Other historians are “contextualists,” focusing on how the surrounding society shapes what becomes the dominant technology. The example used is the eventual dominance of the internal combustion engine over the Stanley Steamer and electric cars partly because of the conditions of roads at the time. Technological momentum is a useful concept for understanding how a particular machine becomes the standard. Does technology stimulate or smother cultural diversity? Inexpensive musical recording systems have allowed local artists to find an audience but also put them in competition with the whole world. A related example is the Internet making it easier for the music of Trinidad to reach people in the U.S. and elsewhere. Will advances in technology create abundance of food and material things or environmental disaster? One answer is whether people’s wants can be restrained. Does technology increase or reduce the number of jobs or the quality of work? European countries have different policies toward worker benefits and to the consequences of technological unemployment. Why do some people work so hard? Technology should make life easier. Should the government or the “market” make technological choices? Nye points out that local governments have much to say when a homeowner in Levittown wants to remodel but hardly anything when a cat owner in California wants to clone her pet cat. The Office of Technology Assessment was created to advise Congress about technology questions but has been abandoned, perhaps because it recommended against some legislators’ pet projects. Is technology, particularly military technology, making the world more dangerous? The trend seems to be to make life safer for soldiers and much more dangerous for civilians. Does increasing use of technologies widen mental horizons for the individual or encapsulate? Although video games are not the focus of the chapter, they are certainly of concern to some. Why

visit the Grand Canyon if IMAX does it better? How feasible is it now to have an experience with the real world of nature without the mediation of technology? One conclusion from *Technology Matters* is that answers to these important questions are elusive; perhaps Nye has done too good a job at laying out the issues. Another conclusion is that people should think hard about these questions; we do have control over what happens.

Poundstone, William. *Fortune’s Formula: The Untold Story of the Scientific Betting System That Beat the Casinos and Wall Street.* New York: Hill and Wang, 2005. Pp. x + 386. Illus. Hardcover, \$27.00.

A Bell Labs’ colleague of Claude Shannon, John Kelly, built on Shannon’s information theory ideas in order to devise a strategy for winning at race-tracks. Kelly’s strategy works when the bettor has inside information. The strategy is to bet on every horse in a race. The percentage bet on each horse equals “edge/odds”, where “edge” is the expected amount won and “odds” is the profit if the horse does win. Kelly proved that this strategy was optimum, using a reasonable definition of optimum. Kelly also proved that the maximum growth rate of the bettor’s money was equal to the amount of information, in Shannon’s sense, that created the edge. Another student of Shannon’s, Edward Thorpe, realized that Kelly’s strategy applied to picking investments. Thorpe opened a hedge fund, which outperformed all but one of the 400 mutual funds tracked by Standard and Poor’s—“the better one [in 1974] was one of those crazy funds that invested in gold stocks.” The fund closed down when its principal broker, Michael Milken, was indicted; Thorpe was never implicated. Kelly’s criterion is still controversial among academic economists—Paul Samuelson is a major detractor. Bill Miller of the highly successful Legg Mason Value Trust wrote in 2003 that his firm uses it. Long before Thorpe got into investments, he and Shannon were interested in strategies for gambling—roulette and blackjack. The blackjack strategy was based on counting cards; it worked well enough that the casinos changed their rules and Thorpe was banned. He did recoup some money from his book *Beat the Dealer*. The blackjack strategy also made use of the Kelly System so the

bettor was never wiped out. The roulette strategy required finding a wheel that was slightly tilted. Thorpe, Shannon, and their two wives tried the strategy in Las Vegas, but it was too complicated. Besides the Kelly strategy theme and the gambling theme, *Fortune's Formula* contains a lucid primer on modern ideas about investing and engrossing vignettes about organized crime. Thorpe did not know when he was testing the blackjack strategy, that his partner was the biggest bookie in New York City, a benefit because the partner showed how a dealer was cheating. Later Thorpe refused to invest in another fund, Long Term Capital Management, perhaps in part because a noted finance professor on the board was second only to Samuelson in dismissing the Kelly strategy. Long Term Capital Management, of course, went on to lose \$4.4 billion dollars from its peak value—use of Kelly's strategy would have prevented that.

For me, this book was a page-turner; I could not wait to see how the gamblers and investment professionals made out—the gamblers learn sooner. Poundstone's explanations of subtle concepts are convincing. This book is really entertaining, with much content. I understand Morningstar better now.

Simon, Linda. *Dark Light: Electricity and Anxiety from the Telegraph to the X-Ray.* Orlando: Harcourt Trade Publishers, 2004. Pp. xi + 357. Paperback, \$14.00.

“A book about anxieties generated by technological innovation...” One major anxiety, at least for some, was that the electrical innovations described would disprove the existence of God, that is, would show that humans were simply an electric mechanism. A relationship between the soul and the newly harnessed electric fields was sought, and a magazine article asked, “Is electricity life?” Electrotherapy—passing small currents through parts of the body to revitalize nerves or organs—attracted physicians and patients at the same time. Electrotherapy was evidently harmless, but x-rays were not, as experimenters and, one presumes, patients learned. The technology was ahead of the science in high-energy radiation as it was in most of the developments described. Some concerns about the new electrical technologies are familiar: the telegraph and x-rays, even the phonograph, might violate privacy. Technical support for electrical illum-

ination systems was scarce. Electricity could in fact be dangerous, as shown by the state of New York in executing a murderer. Experts could not agree on important issues; an aspect of the criminal execution was a battle between proponents of AC and DC as to which was more dangerous. Thomas Edison, once a lionized inventor in the public's eye, had morphed into an aggressive businessman. Most of the technologies described—the telegraph, domestic use of electricity, the phonograph—took decades to become widely used. Simon contrasts this reluctance to gain acceptance with the rapid embrace of electrotherapy. Perhaps a major cause of the delay, besides the economic causes and system requirements usually cited, was the anxiety created by a force not understood. *Dark Light* describes more than electricity; mesmerism and spiritualism (communicating with the dead) are important parts. Both are predicated on the belief in an invisible life force, perhaps like electricity. *Dark Light* presents a different aspect of the history of technology, an aspect expressed in newspapers and novels. Worthwhile insights and well-told stories, with analogies to our own time.

Singer, Dorothy J. and Jerome L. Singer. *Imagination and Play in the Electronic Age.* Cambridge, Mass.: Harvard University Press, 2005. Pp. xiv + 210. Illus. Hardcover, \$29.95.

Research by the authors and others suggest that guided imaginative play leads to readiness for school. Television and computer games have changed the way children play. Should we be concerned? The effects of the changes appear to be both positive and negative; parental guidance clearly seems to be important. The book reviews the characteristics of imagination and consciousness. It describes play in different stages of a child's life, pertinent gender and cultural differences, and play's restorative effect. It explores the influence of television on the development of the imagination. The possible impact of violent themes on a child's thoughts and behavior is explored—violent themes are certainly present in television, films, and video games. The influence of computer games and Internet virtual worlds on cognitive and social learning is discussed. The authors describe their own research on the benefits for pre-school children of guided play. The stories of several children

interacting with electronic media give life to ideas. The discussion is even-handed, although the authors are not reluctant to point to possible dangers in extensive watching of television and extensive use of video games. The effect of the new ways of communication on the development of children's imagination is, of course, a significant example of the consequences of technological change. I suspect students with an interest in early education and child development will find this book exceptionally compelling. All should find the reading worthwhile.

Weart, Spencer. *The Discovery of Global Warming*. Cambridge: Harvard University Press, Mass., 2004. Pp. 240. Illus. Paperback, \$15.50. An extended digital version is available as a download: <http://www.aip.org/history/climate/DGWsite.zip>

This review deals with the downloadable version, which I put on a disk. The online version seems to be slightly different and offers a search facility.

Weart calls this "A hypertext history of how scientists came to (partly) understand what people are doing to cause climate change." It is a collection of essays, linked together. The main thread is that people had thought for some time that human activity could change climate and that the earth's climate was getting warming. Early settlers in the American West believed "rain follows the plow"—plowed fields attract rain that virgin prairie doesn't. The first serious warning of global warming was in 1930 by an amateur. His work was taken up in the 1950s, partly because Defense Agencies thought the weather could be used as a weapon. Concurrently, measurements of CO₂ in the atmosphere showed an increase. Efforts to model the atmosphere began then but were hampered by limited computing power. One model, restricted to a relatively small geographical area, took about as long to compute as the weather took to change. Climatology was slow to be accepted as a legitimate scientific field, much less as a profession, so progress in understanding climate was slow. The advances in understanding came from many disparate fields—physics, chemistry, oceanography, geology, mathematical modeling and others. In any case, doubts were widely expressed about whether global warming was happening and what role gases played. After all, it was pointed out, aerosols of dust and ash,

created by industry, would block solar radiation and cool the earth. Chaos theories, new at the time, indicated that a major change in climate could occur over a short time, caused by minor perturbations in external influences or even without anything external. In fact, ice cores from the Greenland and Antarctic ice sheets showed major and abrupt changes. In 2001, though, the paradigm shifted, and an intergovernmental panel announced cautiously that "it was much more likely than not" that serious global warming would take place.

The cutoff date for the history in the original book was May 2001, but another online essay describes developments since then. The essays cover a wide range of topics, from mathematical climate models to public opinion and the view from Washington. Weart adds on own opinions; he is worried. The essays are uniformly readable, with a good blend of science, characterizations of the principal actors, and public policy. The illustrations show the scientists, glaciers disappearing, graphs of important data, and complex feedback models of climate change; these are helpful and not obtrusive.

Now I should comment on the hypertext model from the point of view of a reader. The major strength it seems to me is the availability of links to related subjects so the reader can follow a train of thought in the direction of her/his choosing. Weart points out that people learn complex ideas by looking from several perspectives, as we learn about a sculpture or piece of architecture. In a traditional book the author puts structure into the learning simply in the order of the pages. In a hypertext book, the reader can chose the order, although Weart suggests several different starting places, depending on a reader's interest. (The link to the suggestion is a few paragraphs down in the Summary essay; perhaps Weart would really like people to find their own learning strategy.) An advantage of the links for me is that they brought me back to difficult sections from several places, and each time I learned more about that material. The hypertext made the learning slower but probably deeper. Using the links made the book exciting because one feels one is discovering ideas independently. I do wish I had a lighter and faster laptop.

West, Darrell. *Digital Government: Technology and Public Sector Performance.* Princeton, N.J.: Princeton University Press, 2005. Pp. xv + 234. \$29.95.

Is the Internet transforming public sector performance? Darrell West did a content analysis of more than 17,000 government websites—city, state, Federal, and global—from 2000 to 2003. Based on a model of four general stages of e-government development: the billboard stage, the partial service delivery page, the portal stage, and interactive democracy, he found in the U. S. many government websites have moved from being stage 1—bill-boards, to delivering some services—stage 2. Almost none offer interactive democracy—stage 4. Most governments outside of the U.S. have not advanced as far as the U.S. beyond the billboard stage. Change in e-government can be characterized as “incremental” rather than “transformational.” Lack of funds is one reason e-government has not developed faster. Other factors hindering or promoting development include presence of legislative professionalism, political leadership, bureaucratic fragmentation, and citizen demand. It would appear that e-government—being effective, efficient, and transparent—could restore public confidence in the Federal government; such confidence has dramatically waned since the 1960s. Such restoration does seem possible, but scandals about procurement contracts and concerns that the government is controlling e-government content can undermine confidence. For example, the Bush administration changed the language on the National Cancer Institute website from “no association between abortion and breast cancer” to “inconclusive.” The Internet could draw citizens into fuller participation in the democratic process through two-way communication and by enabling more involvement by the disabled and poor, but such has not happened, perhaps because of the relative youth of the Internet. Radio needed decades to become widely used, and even television took fourteen years. In the end, though, the political process was certainly changed by radio and television. Citizens both in the U.S. and abroad, not surprisingly, are concerned about privacy and security but are generally positive about the idea of e-government, desiring accountability, efficiency, and convenient access. Although one would expect e-government to foster democracy, the relationship is weak between

the degree of democracy and the level of e-government—perhaps reflecting the relative ease of making technological change in an authoritarian government. A strength of *Digital Government* is that it combines a great deal of data with insightful models of how government works, and of ongoing interaction between new technology and government functioning.

Other Books Recently Received

Katz, Eric ed. *Death by Design.* New York: Pearson Longman Publishing Group, 2006. Pp. xxiv + 382. Illus. Paperback, \$29.00.

Through a selection of primary and secondary sources, *Death by Design* examines the uses of technology during the Holocaust and the specific ways in which scientists, architects, medical professionals, businessmen, and engineers participated in the planning and operation of the concentration and extermination camps that were the foundation of the “final solution.” The book discusses the overriding intellectual, ethical, and philosophical implications of the Nazis’ use of science and technology in their killing operations.

Fuller, Steve. *The Philosophy of Science and Technology Studies.* New York: Routledge, 2006. Pp. ix + 191. Paperback, \$24.95.

Fuller seeks to refocus attention within STS on the field’s philosophical roots, which he believes are epitomized in the phrase “post modern positivism.” Among the topics he tackles are the Science Wars, The Intelligent Design Theory controversy, and Bruno Latour’s Actor-Network Theory. It is Fuller’s contention that STS, as currently practiced, has lost much of its original normative function. STS has thus departed from its role “as a vocation that is also a vehicle for social transformation” (p. 5).

OPEN FORUM

Calls for Papers/Conference Announcements

Twenty-fifth Annual MEPHISTOS Conference

Los Angeles, California

April 6-8, 2007

The graduate community of the University of California, Los Angeles is proud to host the twenty-fifth annual MEPHISTOS conference on April 6-8, 2007. MEPHISTOS is an international, interdisciplinary conference devoted to the History, Philosophy, Sociology and Anthropology of Science, Technology, and Medicine—organized by graduate students and for graduate students. Graduate students of all levels, working in any field of science studies, are invited to apply. MEPHISTOS is a premier opportunity for young scholars to present papers, participate in discussions, and to develop collaborations with others.

The MEPHISTOS Organizing Committee welcomes proposals for individual papers written by graduate students examining issues related to the History, Philosophy, Sociology, and Anthropology of Science, Technology, and Medicine. Applicants should not, however, feel constrained by the above-listed disciplinary approaches. We welcome paper proposals from all disciplinary fields. Furthermore, applicants should not feel restricted to the modern and contemporary time period only as we strongly encourage paper proposals devoted to early modern, ancient, medieval and renaissance periods as well. MEPHISTOS presentations are expected to be 20 minutes in length. The deadline for submissions is **January 1, 2007**.

Past papers and discussions have addressed the following issues: Health and Normalcy; Measurement, Evidence, and Representation in Science and Medicine; Technology and Society; Narrative and Science; Knowledge-Making, Knowledge-Forgetting; Religion and Science; Science in the Media; Science and Gender; Science and Art; Ancient Studies of Science; Sciences for the Environment; Non-Western Science; Information Technology; Philosophy of the Mind and the Body.

All interested applicants should submit a cover letter, including your department and university affiliation and contact information, and an Abstract (200-300 words, separate attachments in Word, RTF or plain-text format preferred) by email to: mephistos@ucla.edu

Letters of acceptance will be emailed to applicants in February. In accordance with MEPHISTOS traditions, lodging will be provided for all conference speakers and some modest travel grants will also be available.

More information is available at our web site, <http://mephistos.bol.ucla.edu/>, and questions may be directed to Gustavo Garza at mephistos@bol.ucla.edu.

Emerging Models for the Entrepreneurial University: Regional Diversities or Global Convergence

Singapore

May 16-18, 2007

The Sixth Annual International Triple Helix Conference on University, Government, and Industry Relations, organized by National University of Singapore (NUS) Enterprise in Singapore, will be held in Singapore, May 16-18, 2007 with the theme *Emerging Models for the Entrepreneurial University: Regional Diversities or Global Convergence*. Past Triple-Helix conferences have been held in Amsterdam, New York, Rio de Janeiro, Copenhagen/Lund, and Turin.

Organized for the first time in Asia, Triple Helix VI 2007 will provide a global forum for academic scholars from different disciplinary perspectives as well as policy makers, university administrators and private sector leaders from different countries to exchange and share new learning about the diverse emerging models of the entrepreneurial university, the changing dynamics of University-Industry-Government interactions around the world and the complex roles of the university in local, regional and national economic development.

We invite scholarly paper contributions that seek to advance our understanding of the dynamics of University-Industry-Government interactions in general and the emerging entrepreneurial university models in particular. We also welcome practitioner-oriented contributions that provide insights on new policy innovations and share knowledge on practices, as well as proposals for workshops and poster presentations that contribute to promoting exchange and dialogues on how universities in the 21st century can better cope with the challenges of globalizations while serving local and regional goals.

We invite submissions of extended abstracts in the following categories:

- (A) Papers for presentation in Parallel Sessions
- (B) Papers for Workshop Sessions
- (C) Poster presentations

The deadline for online abstract submission is **January 8, 2007**.

Papers and poster presentations will be selected based on abstract submissions which should be of a maximum length of two pages including figures and references. Abstracts should be submitted through our online submission system, available on the conference website.

Authors are invited to submit papers on one or more of the following sub themes:

- Role of Triple Helix Linkages in National Innovation System
- Indicators/M Measurement of Triple Helix Linkages and Dynamics
- Models of Entrepreneurial University
- University Technology Commercialization & Spin-offs
- Technology commercialization from Public Research Organizations
- Economic Impacts of Universities and Public Research Institutions
- Triple Helix Linkages & Dynamics in Emerging Economies
- Managing Triple Helix Relationships and Networks
- Policies for Promoting Triple Helix Linkages
- Organizational and Management Challenges in Triple Helix Nexus
- Triple Helix Linkages in the context of Globalization

Authors of accepted abstracts will be required to submit their full papers/poster abstracts according to the submission guidelines which are available in the conference website. Authors of the best papers presented at the conference will be invited to submit their contributions to a number of special issues of relevant international journals.

For more details, please visit <http://www.triplehelix6.com>

You may direct any logistics-related query you may have about the conference to organizing chair (infotriplehelix6@nus.edu.sg).

Queries related to abstract/paper submissions and the conference theme can be directed to the organizing chair (papertriplehelix6@nus.edu.sg)

**Changing Ecologies of Food and Agriculture:
Building on Twenty Years of Scholarship**
Victoria, British Columbia
May 30-June 3, 2007

In recognition of the twentieth anniversaries of the Agriculture, Food, and Human Values Society (AFHVS) and the Association for the Study of Food and Society (ASFS), a joint meeting will be held May 30-June 3, 2007, with the theme *Changing Ecologies of Food and Agriculture: Building on Twenty Years of Scholarship*. The dialectic between eco-social diversity and economic efficiencies directly or indirectly informs many issues of focus for both societies and is at the heart of the struggle for sustainability. For the complete call for papers, plus more about AFHVS or ASFS, please visit: <http://www.afhvs.org> or <http://food-culture.org>

The two multidisciplinary professional and scholarly societies will meet for the purpose of discussing contemporary research and issues about food and agriculture. The theme for the conference sessions is *Diversity vs. Efficiency: A Fork in the Road of Agro-culinary Evolution*.

Papers, panels, and events are sought on any topic related to agriculture, food, and society, including but not limited to the following: 20 years of changing understanding of agro-food systems; agriculture in the middle; foodways & cultural contexts of food, food preparation, and eating; the origins & social implications of agricultural & food technologies and practices; global, regional, & local food systems as they relate to urban/rural development; agro-food systems as contexts of food production, distribution, and consumption; research practices & issues in agriculture, food, fiber, and nutrition; politics & policies pertaining to agriculture, food, fiber, and nutrition the genesis & roles of scientific & indigenous knowledges in food systems; socio-technical issues & controversies in agriculture & food (e.g., industrialization of livestock production, GMOs/biotechnology, organic food standards); food issues (e.g., access, security, safety, equity, & ethics); food and agriculture-related activism & social movements; nutrition education and community nutrition; food and the media; ethical, epistemological, & other philosophical analyses relating to these themes; pedagogical issues and strategies relating to any of the above.

Papers, panels, or events may be proposed. The deadline for submissions is **January 31, 2007**.

All proposals must include, in this order: (1) type of submission (e.g., one paper, an organized panel of multiple presentations, or event); (2) title; (3) submitter's name, organizational affiliation, and full mailing address; (4) submitter's e-mail address; (5) submitter's telephone number, (6) names and organizational affiliations of co-authors or co-organizers; and (7) abstract of 250 or fewer words that describes the proposed paper, panel, or event; (8) a list of up to six keywords to assist in coordinating papers and presentations. Proposals of panels should also include the name and affiliation of the presider (moderator) and a tentative roster of the panel members in addition to the 250 word abstract. Electronic submissions are preferred.

Submit proposals to Dr. Keith Douglass Warner (kwarnar@scu.edu). Submit as MSWord file attachment if possible; however, submissions can be sent in the body of an e-mail message. Please place Victoria in the subject line of the email. Please label the Word document file with the lead author last name, followed by a period, followed by the first word in the title (example: Warner.Agroecology).

Fashioning Technology: Design from Imagination to Practice
The International Committee for the History of Technology's 34th Symposium
Copenhagen, Denmark
August 14-19, 2007

The theme for The International Committee for the History of Technology's (ICOHTEC) symposium will be *Fashioning Technology: Design from Imagination to Practice*. Special features of the symposium will include the annual Mel Kranzberg Lecture by a distinguished historian of technology, the traditional Jazz Night, several excursions, and a special plenary "Copenhagen Session" of invited scholars.

While open to all proposals dealing with the history of technology, the program committee suggests the following sub themes for the consideration of session organizers and contributors:

- Consequences of design, purposeful and accidental
- National styles in design and technology: myth or fact?
- Embodying design in products
- Social and/or cultural values in the design of products, machines and systems
- Designers: craftsmen, engineers, artists, or something else?
- Female designs: sex and gender in design
- Tweaking technology and products: users as designers
- Imaginary designs: unrealized, utopian and immaterial constructions
- Design history in the context of the history of technology
- Designing consumption from commodities to malls
- Reshaping spaces: landscapes, cityscapes and technoscapes
- The fashioned body: technologies of food, clothing and medicine
- Building technoscience: design in the laboratory

We urge contributors to organize sessions of three or more papers. Individual paper submissions will, of course, be accepted. *Note:* Membership in ICOHTEC is not required to participate in the symposium.

The deadline for individual paper proposals is **January 15, 2007**. Proposals must include: (1) a 250-word (maximum) abstract in English; and (2) a one-page CV. Abstracts should include the author's name and email address, a short descriptive title, a concise statement of the thesis, a brief discussion of the sources, and a summary of the major conclusions. Please indicate if you intend your paper for one of the specified sub themes. In preparing your paper, remember that presentations are not full-length articles. You will have no more than twenty minutes to speak, which is roughly equivalent to eight double-spaced typed pages. Contributors are encouraged to submit full-length versions of their papers after the conference for consideration by ICOHTEC's journal *ICON*. If you are submitting a paper proposal dealing with a particular sub theme, please indicate this in your proposal, and assist the program committee in assigning your paper to a session. Sessions organized by the program committee will not have a formal commentator but a "respondent" may be appointed to attend the session and give the first comment on the presentations. For more suggestions about preparing your symposium presentation, please consult the guidelines at the symposium web site: www.icohtec2007.dk

Session proposals must include, in addition to abstracts and CVs for each paper as described above: (1) an abstract of the session (250 words maximum), listing the proposed papers, and a chair, as well as a respondent (if desired), for each section; (2) and a one-page CV for each contributor, including chair and respondent. Sessions should consist of at least three speakers, and may include several meetings of three speakers each, that might extend over several days.

Proposal submissions for individual papers and sessions can be entered on the website www.icohtec2007.dk under PROPOSALS, after October 1, 2006. You may sign up for an e-mail service which reports back once the Integrated Digital Conference System for ICOHTEC 2007 is activated. If web access is unavailable, proposals may be sent by fax to: The Conference Office, ICOHTEC 2007 at +45 4588 3040. Or, send via regular mail postmarked not later than **January 1, 2007** to: The Conference Office, ICOHTEC 2007, DTV, P.O. 777, DK-2800 Kgs. Lyngby, Denmark.

The program committee, chaired by Barton C. Hacker, will notify all who submitted proposals of their acceptance or rejection by February 1, 2007.

Graduate student members of the Society for the History of Technology (SHOT) are eligible for travel support. Go to: <http://www.shot.jhu.edu/Awards/icohtec2.htm> All questions should be submitted to icohtec07@dtv.dk

Ways of Knowing
Montreal, Canada
October 11-13, 2007

The Annual Meeting for the Society for Social Studies of Science (4S) will be held in Montreal, Canada, October 11-13, 2007. The theme for the conference is *Ways of Knowing*. By this we mean several things: implicitly, that there are many ways of knowing any particular object, process, or event; that some of these ways of knowing have historically been more valued than others; and that processes of adjudicating ways of knowing have usually been neither nice nor neutral. So we are interested in processes of valuation (from the language of debates to acts of censorship) that result in one way of knowing as “the right one” or “the natural one.” We are interested in how people, groups, or cultures hold more than one way of knowing, and whether this is stable, durable, or problematic. When different ways of knowing are triangulated, how is this actually done in practice? What is lost and what is gained in the triangulation process? We are interested in how certain ways of knowing are deemed to be “non-scientific,” (for example, magic, divination, astrology, etc). Several other interesting areas spring from this mixture of questions: historically, what is kept, or what is ignored, in studies of knowledges and paradigm shifts? (including questions of collective memory and collective forgetting) How do new regimes of record keeping, such as the electronic patient record or the full text data base, affect what is remembered and what is forgotten? (This may be true across a large numbers of fields.) All sorts of questions about translation arise in discussing these issues – Who chooses what is to be translated? Who does the translation? Does the quality of the translation impact the nature of knowledge, and if so, how?

In Howard Becker’s famous concept, “hierarchy of credibility,” he claims that information coming from the top of a hierarchy (e.g., a bank president) is more credible than that coming from a disreputable person (e.g. a street person, or a drug addict, or a “seedy character.”) Given that our conference will be in Quebec, one of the sites where language (as a marker) difference are really bitterly disputed (up to the point of a gun), we must examine the idea that language is a powerful source of dispute, even war. Finally, there are different ways of knowing that are formed by gestures, by ways of pronouncing words, or by how names are heard and understood. Sometimes ways of knowing are different with respect to quantitative vs. qualitative; visual vs. textual, or statistical vs. enumerative. These only suggest the ways knowledges may frame findings, thus mirroring a final finding.

A final word about themes: these are suggestions to draw together work and a suggestion of a question or women and work. As always, themes are meant to suggest and encourage, not provide an iron cage. So, the Program Committee welcomes work that is outside the sketches drawn here; submissions are welcome from any of the variety of areas normally addressed by 4S (or even those not normally addressed, but which need to be).

Given the growing size of the 4S conferences and the desire to be as inclusive as possible, the program committee will need to make full use of the available time slots. Therefore, individuals may be listed for a paper presentation and one other activity (such as session chair or discussant but not a second paper) for a maximum of two appearances.

Session proposals should be based on the assumption of two-hour time slots with fifteen minutes per presentation. A typical session may have six papers, one discussant, and a fifteen-minute open discussion slot. Proposals for double and triple sessions on a single topic may receive a request to consolidate the topic into one panel or to break the multiple sessions into different topics. The program committee may need to assign additional papers to sessions in order to accommodate the number of submissions and reduce the rejection rate.

Panels generally consist of research presentations, but alternative formats are available:

- “Working Sessions” Where participants will post their papers prior to the meeting, allowing for more discussion during the sessions. For questions about “Working Sessions,” please contact [Sergio Sismondo](#).
- “New Media” sessions involve screening of video and other media.
- Poster sessions will be an open event on Thursday evening.
- A limited number of roundtable proposals may be accepted for the lunchtime slot. Generally, roundtables are on institutional topics such as mentoring and career development.

The program chair is David Hess. Please address all questions through the program chair assistant, Anne Borrero, at the ssss2007@rpi.edu

For more information and to submit abstracts and session proposals: <http://www.4sonline.org/meeting.htm>

Sound in the Era of Mechanical Reproduction

Hagley Museum and Library

Wilmington, Delaware

November 2-3, 2007

For the conference, *Sound in the Era of Mechanical Reproduction*, the Center for the History of Business, Technology and Society invites proposals for empirically based historical papers that analyze sound in commercial, technological, and legal environments since the late 19th century. The conference will take place November 2-3, 2007 at the Hagley Library in Wilmington, Delaware.

Our principal interest is in papers that explore the integration of sound with the commercial engineering of sound in social environments, such as shopping and the workplace. Proposals can consider the legal and cultural implications of innovations in technology and business practices, such as the impact on the political economy of sound and notions of sound and sound-based products as property. We also encourage papers that explore sources of innovation in sound and music (especially from communities and/or business enterprises defined by ethnicity, race, or region), as well as those focusing on the transnational circulation of sound-related technologies and business practices.

Proposals should be no more than 500 words, and should be accompanied by a short cv. Deadline for submissions is **March 31, 2007**.

The program committee includes: David Suisman, Susan Strasser, Philip Scranton, and Roger Horowitz. Travel support is available for those presenting papers at the conference.

To submit a proposal or to obtain more information, please contact: Carol Lockman, Hagley Museum and Library, P.O. Box 3630, Wilmington, Delaware 19807; phone: (302) 658-2400 ext. 243; fax: (302) 655-3188; e-mail: clockman@Hagley.org

Fellowship Announcements

The Adelle and Erwin Tomash Fellowship in the History of Information Processing 2007-2008

The Charles Babbage Institute is accepting applications for the Adelle and Erwin Tomash Predoctoral Fellowship to be awarded for the 2007-2008 academic year to a graduate student whose dissertation will address a topic in the history of computing, software, or networking. The Fellowship may be held at the recipient's home academic institution, the Charles Babbage Institute, or any other location where there are appropriate research facilities. Priority is given to students who have completed all requirements for the doctoral degree, except the research and writing of the dissertation.

Applicants should send their curriculum vitae and a five-page statement (plus bibliography) and justification of their research problem, a discussion of methods, research materials, and evidence of faculty support for the project. Applicants should also arrange for three letters of reference and certified transcripts of graduate school credits to be sent directly to: Charles Babbage Institute; University of Minnesota; 211 Elmer L. Andersen Library; 222-21st Avenue South; Minneapolis, MN 55455.

All materials must be postmarked by **January 15, 2007**.

For more information, please contact CBI Associate Director Jeffrey Yost at: e-mail yostx003@umn.edu phone (612) 624-5050; or by mail (see address above).

Fellowships in the History of Technology and Industrialization
Hagley Program
University of Delaware

The University of Delaware provides this fellowship for the study of technology, business, consumption, and work in industrial and post-industrial societies.

All Hagley Fellows participate in a weeklong orientation before beginning their first year. The orientation exposes students to the vast array of research opportunities in the Mid-Atlantic region's libraries and archives. Visits to museums and industrial sites help begin a discussion of the materiality of industrialization and the ways it is presented to the public. In recent years these have included the Smithsonian, the National Museum of the American Indian, Knoebel's Grove Amusement Park, the Harley Davidson Assembly Plant, and QVC Studios. Hagley Fellows also organize a biannual conference which brings in scholars from all over the country to present papers on a topic of their choice. The theme of the most recent conference was "The Spectacle of Technology." Fellows also have special privileges at the Hagley Museum and Library.

All Hagley Fellows receive a stipend and tuition remission. M.A. students are supported for two years. Ph.D. students receive four years of funding. In exchange, Fellows work as teaching assistants during half the semesters in which they are funded. Hagley Fellows also receive an allowance of \$600 a year for travel and research expenses. The Program and the History Department also have additional funds which can be used to support internships and Ph.D. research.

For more information, please visit the program website:
<http://www.udel.edu/hagley/prospective/prospective.html>
or contact:

Patricia Orendorf
Delaware-Hagley Program
Department of History
John Munroe Hall
Newark, DE 19716
e-mail: pato@udel.edu

The deadline for applications is **January 15, 2007**.

FORTHCOMING MEETINGS AND CONFERENCES

March 9-10, 2007. *Technological Innovation and the Cold War.* The Center for the History of Business, Technology, and Society. Hagley Museum and Library. Wilmington, Del. Contact: Carol Lockman, Hagley Museum and Library, P.O. Box 3630, Wilmington, Delaware 19807; phone: (302) 658-2400 ext. 243; fax: (302) 655-3188; e-mail: clockman@Hagley.org

March 31, 2007. *Missing Subjects: Bridging the Gaps in the History of Business, Technology, Consumption, and Work.* Hagley Fellow Conference. Hagley Museum and Library. Wilmington, Del. For more information, e-mail: hagley.fellows@gmail.com

April 6-8, 2007. The Twenty-fifth Annual MEPHISTOS Conference. Los Angeles, California. Contact: Gustavo Garza at mephistos@bol.ucla.edu or visit website: <http://mephistos.bol.ucla.edu/>

For details, see page 16.

May 16-18, 2007. *Emerging Models for the Entrepreneurial University: Regional Diversities or Global Convergence.* The Sixth Annual International Triple Helix Conference. Singapore. Contact: Organizing Committee Chairman: Poh Kam Wong, e-mail: pohkam@nus.edu.sg or infotriplehelix6@nus.edu.sg

For details, see page 17.

May 30-June 3, 2007. *Changing Ecologies of Food and Agriculture: Building on Twenty Years of Scholarship.* Joint meeting of the Agriculture, Food, and Human Values Society (AFHVS) and the Association for the Study of Food and Society (ASFS). Victoria, British Columbia. For more information, visit: <http://www.afhvs.org> or <http://food-culture.org>

For details, see page 18.

June 1-2, 2007. *Entrepreneurial Communities.* Business History Conference (BHC). Annual Meeting. Cleveland, Ohio. Contact: Dr. Roger Horowitz, Secretary-Treasurer, Business History Conference, P.O. Box 3630, Wilmington, Del., 19807. Phone:(302) 658-2400; fax: (302) 655-3188; email: rh@udel.edu

For details, see STS Newsletter #142, page 16.

August 14-19, 2007. *Fashioning Technology: Design from Imagination to Practice.* The International Committee for the History of Technology's 34th Symposium. Copenhagen, Denmark. For more information, visit: www.icohtec2007.dk

For details, see page 19.

October 11-13, 2007. *Ways of Knowing.* Annual Meeting of the Society for Social Studies of Science. Montreal, Canada. For more information, visit: <http://www.4sonline.org/meeting.htm> **For details, see page 20.**

November 2-3, 2007. *Sound in the Era of Mechanical Reproduction.* The Center for the History of Business, Technology and Society. Wilmington, Del. Contact: Carol Lockman, Hagley Museum and Library, P.O. Box 3630, Wilmington, Delaware 19807; phone: (302) 658-2400 ext. 243; fax: (302) 655-3188; e-mail: clockman@Hagley.org

For details, see page 21.