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# The Sound Of Innovation Stanford And The Computer

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Remaking the News  
The Sound of Innovation  
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The Handbook of Science and Technology Studies, fourth edition  
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Nature-Made Economy

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## MURRAY SKYLAR

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### **A Woman's Right to Know** MIT Press

Before the era of overpowered PCs and home consoles, there was a time when video-game enthusiasts could only experience the very best and the most challenging in places called "arcades". In these locations, players of all ages and origins gathered to take their passion to a level no consumer grade hardware could. The arcades of the early 90s were a highly competitive environment where publishers only had a few seconds to catch a player's attention, and more importantly their quarters. It was during that time that a young company named Capcom managed to elevate itself above the competition and turn itself into an icon. This book is an engineering love letter to the platform that allowed this metamorphosis. If you have always wanted to learn about the machine behind the legendary CPS-1 titles Street Fighter II, Ghouls 'n Ghosts, and Final Fight, the "Book of CP-System" is for you. Inside, you will find the hardware of the CPS-1 described and explained in excruciating detail. The software is also covered with a fully detailed modern pipeline, turning code and assets into ROMs. Jump in and discover a world of one hundred explanatory illustrations, sprinkled with typos and broken English to remind you this isn't just a dream!

### **Remaking the News** MIT Press

An examination of how technological failures defined nature and national identity in Cold War Canada. Throughout the modern period, nations defined themselves through the relationship between nature and machines. Many cast themselves as a triumph of technology over the forces of climate, geography, and environment. Some, however, crafted a powerful alternative identity: they defined themselves not through the triumph of machines over nature, but through technological failures and the distinctive natural orders that caused them. In *The Unreliable Nation*, Edward Jones-Imhotep examines one instance in this larger history: the Cold War-era project to extend reliable radio communications to the remote and strategically sensitive

Canadian North. He argues that, particularly at moments when countries viewed themselves as marginal or threatened, the identity of the modern nation emerged as a scientifically articulated relationship between distinctive natural phenomena and the problematic behaviors of complex groups of machines. Drawing on previously unpublished archival documents and recently declassified materials, Jones-Imhotep shows how Canadian defense scientists elaborated a distinctive "Northern" natural order of violent ionospheric storms and auroral displays, and linked it to a "machinic order" of severe and widespread radio disruptions throughout the country. Tracking their efforts through scientific images, experimental satellites, clandestine maps, and machine architectures, he argues that these scientists naturalized Canada's technological vulnerabilities as part of a program to reimagine the postwar nation. The real and potential failures of machines came to define Canada, its hostile Northern nature, its cultural anxieties, and its geo-political vulnerabilities during the early Cold War. Jones-Imhotep's study illustrates the surprising role of technological failures in shaping contemporary understandings of both nature and nation.

### *The Sound of Innovation* MIT Press

How the US Environmental Protection Agency designed the governance of risk and forged its legitimacy over the course of four decades. The US Environmental Protection Agency was established in 1970 to protect the public health and environment, administering and enforcing a range of statutes and programs. Over four decades, the EPA has been a risk bureaucracy, formalizing many of the methods of the scientific governance of risk, from quantitative risk assessment to risk ranking. Demortain traces the creation of these methods for the governance of risk, the controversies to which they responded, and the controversies that they aroused in turn. He discusses the professional networks in which they were conceived; how they were used; and how they served to legitimize the EPA. Demortain argues that the EPA is structurally embedded in controversy, resulting in constant reevaluation of its credibility and fueling the evolution of the knowledge and technologies it uses to produce decisions and to create a legitimate image of how and why it acts on the

environment. He describes the emergence and institutionalization of the risk assessment-risk management framework codified in the National Research Council's Red Book, and its subsequent unraveling as the agency's mission evolved toward environmental justice, ecological restoration, and sustainability, and as controversies over determining risk gained vigor in the 1990s. Through its rise and fall at the EPA, risk decision-making enshrines the science of a bureaucracy that learns how to make credible decisions and to reform itself, amid constant conflicts about the environment, risk, and its own legitimacy.

### **The Constitution of Algorithms** MIT Press

The fourth edition of an authoritative overview, with all new chapters that capture the state of the art in a rapidly growing field. Science and Technology Studies (STS) is a flourishing interdisciplinary field that examines the transformative power of science and technology to arrange and rearrange contemporary societies. The Handbook of Science and Technology Studies provides a comprehensive and authoritative overview of the field, reviewing current research and major theoretical and methodological approaches in a way that is accessible to both new and established scholars from a range of disciplines. This new edition, sponsored by the Society for Social Studies of Science, is the fourth in a series of volumes that have defined the field of STS. It features 36 chapters, each written for the fourth edition, that capture the state of the art in a rich and rapidly growing field. One especially notable development is the increasing integration of feminist, gender, and postcolonial studies into the body of STS knowledge. The book covers methods and participatory practices in STS research; mechanisms by which knowledge, people, and societies are coproduced; the design, construction, and use of material devices and infrastructures; the organization and governance of science; and STS and societal challenges including aging, agriculture, security, disasters, environmental justice, and climate change.

### **The Handbook of Science and Technology Studies, fourth edition** MIT Press

The history of pregnancy testing, and how it transformed from an esoteric laboratory tool to a commonplace of everyday life.

Pregnancy testing has never been easier. Waiting on one side or the other of the bathroom door for a “positive” or “negative” result has become a modern ritual and rite of passage. Today, the ubiquitous home pregnancy test is implicated in personal decisions and public debates about all aspects of reproduction, from miscarriage and abortion to the “biological clock” and IVF. Yet, only three generations ago, women typically waited not minutes but months to find out whether they were pregnant. A Woman’s Right to Know tells, for the first time, the story of pregnancy testing—one of the most significant and least studied technologies of reproduction. Focusing on Britain from around 1900 to the present day, Jesse Olszynko-Gryn shows how demand shifted from doctors to women, and then goes further to explain the remarkable transformation of pregnancy testing from an obscure laboratory service to an easily accessible (though fraught) tool for every woman. Lastly, the book reflects on resources the past might contain for the present and future of sexual and reproductive health. Solidly researched and compellingly argued, Olszynko-Gryn demonstrates that the rise of pregnancy testing has had significant—and not always expected—impact and has led to changes in the ways in which we conceive of pregnancy itself.

*Music and Technology* MIT Press

The triple helix of university–industry–government interactions is a universal model for the development of the knowledge-based society, through innovation and entrepreneurship. It draws from the innovative practice of Massachusetts Institute of Technology (MIT) with industry and government in inventing a regional renewal strategy in early 20th-century New England. Parallel experiences were identified in “Silicon Valley,” where Stanford University works together with industry and government. Triple helix is identified as the secret of such innovative regions. It may also be found in statist or laissez-faire societies, globally. The triple helix focuses on “innovation in innovation” and the dynamic to foster an innovation ecosystem, through various hybrid organizations, such as technology transfer offices, venture capital firms, incubators, accelerators, and science parks. This second edition develops the practical and policy implications of the triple helix model with case studies exemplifying the meta-theory, including: • how to make an innovative region through the triple helix approach; • balancing development and sustainability by

“triple helix twins”; • triple helix matrix to analyze regional innovation globally; and • case studies on the Stanford’s StartX accelerator; the Ashland, Oregon Theater Arts Clusters; and Linyi regional innovation in China. The Triple Helix as a universal innovation model can assist students, researchers, managers, entrepreneurs, and policymakers to understand the roles of university, industry, and government in forming and developing “an innovative region,” which has self-renewal and sustainable innovative capacity.

*European Objects* MIT Press

An exploration of the economization of the ocean through the small modifications that enable great transformations of nature. The ocean is the site of an ongoing transformation that is aimed at creating new economic opportunities and prosperity. In *Nature-Made Economy*, Kristin Asdal and Tone Huse explore how the ocean has been harnessed to become a space of capital investment and innovation, and how living nature is wrested into the economy even as nature, in turn, resists, adapts to, or changes the economy. The authors’ innovative methodological and conceptual approaches examine the economy by focusing on surprising and numerous “little tools”—such as maps and policy documents, quality patrols, and dietary requirements for the enhancement of species’ biological propensities—that value, direct, reorder, accomplish, and sometimes fail to serve our ends, but also add up to great change. Throughout *Nature-Made Economy*, Asdal and Huse follow one species, the Atlantic cod, and explore how it is subjected to different versions of economization. Taking this species as a point of departure, they then provide novel analyses of the innovation economy, the architecture of markets, the settling of prices, and more, revealing how the ocean is rendered a space of intense economic exploitation. Through their analysis, the authors develop a distinct theoretical approach and conceptual vocabulary for studying nature–economy relations. *Nature-Made Economy* is a significant contribution to the broad field of STS and social studies of markets, as well as to studies of the Anthropocene, the environment, and human–animal relations.

*The Triple Helix* MIT Press

An unflinching look at the unique challenges posed by complex technologies we cannot afford to let fail—and why the remarkable achievements of civil aviation can help us understand those

challenges. Nuclear reactors, deep-sea drilling platforms, deterrence infrastructures—these are all complex and formidable technologies with the potential to fail catastrophically. In *Rational Accidents*, John Downer outlines a new perspective on technological failure, arguing that undetectable errors can lurk in even the most rigorous and “rational” assessments of these systems due to the inherent limits of engineering tests and models. Downer finds that it should be impossible, from an epistemological viewpoint, to achieve the near-perfect reliability that we require of our most safety-critical technologies. There is, however, one such technology that demonstrably appears to achieve these “impossible” reliabilities: jetliners. Downer looks closely at civil aviation and how it has reckoned with the problem of failure. He finds that the way we conceive of jetliner reliability hides the real practices by which it is achieved. And he shows us why those practices are much less transferrable across technological domains than we are led to believe. Fully understanding why jetliners don’t crash, he concludes, should lead us to doubt the safety of other “ultra-reliable” technologies. A unique and sobering exploration of technological reliability from an STS perspective, *Rational Accidents* is essential reading for understanding why our most safety-critical technologies are even more dangerous than we believe.

*Routledge Handbook of Art, Science, and Technology Studies* Routledge

An examination of the relationship between technical objects and culture in contemporary China, drawing on concepts from science and technology studies. Technical objects constrain what users do with them. They are not neutral entities but embody information, choices, values, assumptions, or even mistakes embedded by designers. What happens when a technology is designed in one culture and used in another? What happens, for example, when a Chinese user is confronted by Roman-alphabet-embedded interfaces? In this book, Basile Zimmermann examines the relationship between technical objects and culture in contemporary China, drawing on concepts from science and technology studies (STS). He presents a new theoretical framework for “culture” based on the notions of waves and forms, which provides a powerful descriptive toolkit for technology and culture. The materials Zimmermann uses to develop and illustrate his theoretical arguments come from three groups of case studies

about the use of technical devices in today's China. The first and most extensive group consists of observations of electronic music devices in Beijing; the second is a study of a Chinese networking site, "Happy Network"; and the third is a collection of personal, small-scale observations on the way Chinese characters behave when located in alphabet-encoded devices such as mobile phones, web pages, or printed documents. Zimmermann discusses well-known frameworks from STS and combines them with propositions and topics from Chinese studies. Each of the case studies advances his theoretical argument. Zimmermann's account shows how cultural differences can be integrated into STS research, and how sinologists can turn their attention from ancient texts and traditional art to everyday things in present-day China.

Fascist Pigs Cambridge University Press

How the regimes governing biological research changed during the genomics revolution, focusing on the Human Genome Project. The rise of genomics engendered intense struggle over the control of knowledge. In *Reordering Life*, Stephen Hilgartner examines the "genomics revolution" and develops a novel approach to studying the dynamics of change in knowledge and control. Hilgartner focuses on the Human Genome Project (HGP)—the symbolic and scientific centerpiece of the emerging field—showing how problems of governance arose in concert with new knowledge and technology. Using a theoretical framework that analyzes "knowledge control regimes," Hilgartner investigates change in how control was secured, contested, allocated, resisted, justified, and reshaped as biological knowledge was transformed. Beyond illuminating genomics, *Reordering Life* sheds new light on broader issues about secrecy and openness in science, data access and ownership, and the politics of research communities. Drawing on real-time interviews and observations made during the HGP, *Reordering Life* describes the sociotechnical challenges and contentious issues that the genomics community faced throughout the project. Hilgartner analyzes how laboratories control access to data, biomaterials, plans, preliminary results, and rumors; compares conflicting visions of how to impose coordinating mechanisms; examines the repeated destabilization and restabilization of the regimes governing genome databases; and examines the fierce competition between the publicly funded HGP and the private

company Celera Genomics. The result is at once a path-breaking study of a self-consciously revolutionary science, and a provocative analysis of how knowledge and control are reconfigured during transformative scientific change.

**Rational Accidents** MIT Press

The Wiley Blackwell Companion to the History of Science is a single volume companion that discusses the history of science as it is done today, providing a survey of the debates and issues that dominate current scholarly discussion, with contributions from leading international scholars. Provides a single-volume overview of current scholarship in the history of science edited by one of the leading figures in the field Features forty essays by leading international scholars providing an overview of the key debates and developments in the history of science Reflects the shift towards deeper historical contextualization within the field Helps communicate and integrate perspectives from the history of science with other areas of historical inquiry Includes discussion of non-Western themes which are integrated throughout the chapters Divided into four sections based on key analytic categories that reflect new approaches in the field

**A Companion to the History of Science** MIT Press

How the asset—anything that can be controlled, traded, and capitalized as a revenue stream—has become the primary basis of technoscientific capitalism. In this book, scholars from a range of disciplines argue that the asset—meaning anything that can be controlled, traded, and capitalized as a revenue stream—has become the primary basis of technoscientific capitalism. An asset can be an object or an experience, a sum of money or a life form, a patent or a bodily function. A process of assetization prevails, imposing investment and return as the key rationale, and overtaking commodification and its speculative logic. Although assets can be bought and sold, the point is to get a durable economic rent from them rather than make a killing on the market.

The Book of CP-System MIT Press

Episodes in the transformation of our understanding of sound and space, from binaural listening in the nineteenth century to contemporary sound art. The relationship between sound and space has become central to both creative practices in music and sound art and contemporary scholarship on sound. Entire subfields have emerged in connection to the spatial aspects of

sound, from spatial audio and sound installation to acoustic ecology and soundscape studies. But how did our understanding of sound become spatial? In *Stereophonica*, Gascia Ouzounian examines a series of historical episodes that transformed ideas of sound and space, from the advent of stereo technologies in the nineteenth century to visual representations of sonic environments today. Developing a uniquely interdisciplinary perspective, Ouzounian draws on both the history of science and technology and the history of music and sound art. She investigates the binaural apparatus that allowed nineteenth-century listeners to observe sound in three dimensions; examines the development of military technologies for sound location during World War I; revisits experiments in stereo sound at Bell Telephone Laboratories in the 1930s; and considers the creation of "optimized acoustical environments" for theaters and factories. She explores the development of multichannel "spatial music" in the 1950s and sound installation art in the 1960s; analyzes the mapping of soundscapes; and investigates contemporary approaches to sonic urbanism, sonic practices that reimagine urban environments through sound. Rich in detail but accessible and engaging, and generously illustrated with photographs, drawings, maps, and diagrams of devices and artworks, *Stereophonica* brings an acute, imaginative, and much-needed historical sensibility to the growing literature around sound and space.

**Waves and Forms** MIT Press

An authoritative guide to the multi-faceted compositional approach that underpinned twentieth-century art music from Schoenberg to Babbitt and beyond.

Assetization Stanford University Press

*Innovation and Scaling for Impact* forces us to reassess how social sector organizations create value. Drawing on a decade of research, Christian Seelos and Johanna Mair transcend widely held misconceptions, getting to the core of what a sound impact strategy entails in the nonprofit world. They reveal an overlooked nexus between investments that might not pan out (innovation) and expansion based on existing strengths (scaling). In the process, it becomes clear that managing this tension is a difficult balancing act that fundamentally defines an organization and its impact. The authors examine innovation pathologies that can derail organizations by thwarting their efforts to juggle these

imperatives. Then, through four rich case studies, they detail innovation archetypes that effectively sidestep these pathologies and blend innovation with scaling. Readers will come away with conceptual models to drive progress in the social sector and tools for defining the future of their organizations.

**Milk and Honey** Routledge

How the breeding of new animals and plants was central to fascist regimes in Italy, Portugal, and Germany and to their imperial expansion. In the fascist regimes of Mussolini's Italy, Salazar's Portugal, and Hitler's Germany, the first mass mobilizations involved wheat engineered to take advantage of chemical fertilizers, potatoes resistant to late blight, and pigs that thrived on national produce. Food independence was an early goal of fascism; indeed, as Tiago Saraiva writes in *Fascist Pigs*, fascists were obsessed with projects to feed the national body from the national soil. Saraiva shows how such technoscientific organisms as specially bred wheat and pigs became important elements in the institutionalization and expansion of fascist regimes. The pigs, the potatoes, and the wheat embodied fascism. In Nazi Germany, only plants and animals conforming to the new national standards would be allowed to reproduce. Pigs that didn't efficiently convert German-grown potatoes into pork and lard were eliminated. Saraiva describes national campaigns that intertwined the work of geneticists with new state bureaucracies; discusses fascist empires, considering forced labor on coffee, rubber, and cotton in Ethiopia, Mozambique, and Eastern Europe; and explores fascist genocides, following Karakul sheep from a laboratory in Germany to Eastern Europe, Libya, Ethiopia, and Angola. Saraiva's highly original account—the first systematic study of the relation between science and fascism—argues that the “back to the land” aspect of fascism should be understood as a modernist experiment involving geneticists and their organisms, mass propaganda, overgrown bureaucracy, and violent colonialism.

**Democratic Experiments** MIT Press

For a decimated post-war West Germany, the electronic music studio at the WDR radio in Cologne was a beacon of hope. Jennifer Iverson's *Electronic Inspirations: Technologies of the Cold War Musical Avant-Garde* traces the reclamation and repurposing of wartime machines, spaces, and discourses into the new sounds of the mid-century studio. In the 1950s, when technologies were plentiful and the need for reconstruction was great, West

Germany began to rebuild its cultural prestige via aesthetic and technical advances. The studio's composers, collaborating with scientists and technicians, coaxed music from sine-tone oscillators, noise generators, band-pass filters, and magnetic tape. Together, they applied core tenets from information theory and phonetics, reclaiming military communication technologies as well as fascist propaganda broadcasting spaces. The electronic studio nurtured a revolutionary synthesis of science, technology, politics, and aesthetics. Its esoteric sounds transformed mid-century music and continue to reverberate today. Electronic music—echoing both cultural anxiety and promise—is a quintessential Cold War innovation.

**Innovation and Scaling for Impact** MIT Press

An examination of how the daily work of NASA's Mars Exploration Rovers was organized across three sites on two planets using local Mars time. In 2004, mission scientists and engineers working with NASA's Mars Exploration Rovers (MER) remotely operated two robots at different sites on Mars for ninety consecutive days. An unusual feature of this successful mission was that it operated on Mars time—the daily work was organized across three sites on two planets according to two Martian time zones. In *Making Time on Mars*, Zara Mirmalek shows that this involved more than a resetting of wristwatches; the team's struggle to synchronize with Mars time involved technological and communication breakdowns, informal workarounds, and extra work to support the technology that was intended to support people. Her account of how NASA created an entirely new temporality for the MER mission offers insights about the assumptions behind the organizational relationship between clock time and work. Mirmalek, herself a member of the mission team, offers an insider's view of the MER workplace and community. She describes the discord among MER's multiple temporalities and examines issues of professional identity that helped shape the experience of working according to Mars time. Considering time and work relationships through a multidisciplinary lens, Mirmalek shows how contemporary and historical human-technology relationships inform assumptions about the unalterability of clock time. She argues that the organizational connection between clock time and work, although still operational, is outdated.

**Sulphuric Utopias** Stanford University Press

An examination of nanotechnology as a lens through which to

study contemporary democracy in both theory and practice. In *Democratic Experiments*, Brice Laurent discusses the challenges that emerging technologies create for democracy today. He focuses on nanotechnology and its attendant problems, proposing nanotechnology as a lens through which to understand contemporary democracy in both theory and practice. Arguing that democracy is at stake where nanotechnology is defined as a problem, Laurent examines the sites where nanotechnology is discussed and debated by scientists, policymakers, and citizens. It is at these sites where the joint production of nanotechnology and the democratic order can be observed. Focusing on the United States, France, and Europe, and various international organizations, Laurent analyzes representations of nanotechnology in science museums, collective discussions in participatory settings, the making of categories such as “nanomaterials” or responsible innovation” in standardization and regulatory arenas, and initiatives undertaken by social movements. He contrasts American debates, in which the concern for public objectivity is central, with the French “state experiment,” the European goal of harmonization, and the international concern with a global market. In France, public debate proceeded in response to public protest and encountered a radical critique of technological development; the United States experimented with an innovative approach to technology assessment. The European regulatory approach results in lengthy debates over political integration; the United States relies on the adversarial functioning of federal agencies. Because nanotechnology is a domain where concerns over anticipation and participation are pervasive, Laurent argues, nanotechnology—and science and technology studies more generally—provides a relevant focus for a renewed analysis of democracy.

**Organizing Creativity in the Innovation Journey** MIT Press

A laboratory study that investigates how algorithms come into existence. Algorithms—often associated with the terms big data, machine learning, or artificial intelligence—underlie the technologies we use every day, and disputes over the consequences, actual or potential, of new algorithms arise regularly. In this book, Florian Jatton offers a new way to study computerized methods, providing an account of where algorithms come from and how they are constituted, investigating the practical activities by which algorithms are progressively

assembled rather than what they may suggest or require once they are assembled.

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