



Mark Your Calendars for the "Hot Spots of Invention" Symposium!

The Lemelson Center's New Perspectives on Invention and Innovation symposium establishes a dialogue between the past and the future. This year's theme, "Hot Spots of Invention," builds on more than a decade of research and public programs at the Lemelson Center exploring the powerful historical interplay of people, places, resources, and ideas in shaping inventors' work.

From individual workshops to large geographical regions, from Edison's Menlo Park laboratory to Silicon Valley, both scholars and the public have long been curious about inventors and the physical spaces and places that seem to foster invention and innovation, what we're calling "hot spots" of invention. There are so many questions to explore:

- Why do particular places or regions become known as centers of invention?
- What are the technological, economic, geographic, political, cultural, and sociological factors that spark the creation of these hot spots?
- Do these factors vary over time and geographic location?
- What is the role of each inventor and why do innovative people gravitate to these places?
- Why does one place succeed where another one fails?

Our "Hot Spots of Invention" symposium speakers will examine this topic from three key perspectives:

- People--Discussing the influence of charismatic individuals on the region in which they live and work.
- Places--Looking at the evolution of innovative regions and the factors that led to their creation and, in some cases, their eventual decline.
- Spaces--Investigating the specific locations, laboratories, and workshops that inventors establish to suit their creative needs.

These featured presentations are complemented by a keynote address by Dr. Bradford Parkinson, co-winner of the 2003 [Draper Prize](#) for the concept and development of the Global Positioning System (GPS); an Innovative Lives public program featuring musician and drum inventor Remo Belli; the *Hot Spots of Invention* showcase exhibition; hands-on invention activities in the Lemelson Center's Spark!Lab; and a celebratory drum circle in which all may participate. Through these many activities, we'll advance our appreciation and understanding of "hot spots" of invention.

[Registration](#) is requested, but **not** required. Seating is on a first come, first served basis. [Visit our website](#) for the full roster of times, speakers, and activities. Please join us!



Notes from the Director

My ears perked up last week at the announcement of this year's Nobel Prize in physics. Not only was it about an invention that revolutionized photography--the so-called CCD sensor, the imaging semiconductor circuit at the heart of digital cameras--but it resulted from work carried out in a historic industrial lab. Two of the three winners, Willard S. Boyle and George E. Smith, had done their pioneering research at AT&T's Bell Labs in the 1960s, still the heyday of the industrial research facility renowned for its basic research. Theirs was just the latest in a string of Nobel Prizes coming out of that lab, including the transistor.

Boyle and Smith did their prize-winning work at the venerable Murray Hill, New Jersey, site, famed for its work in solid-state physics and engineering. At about the same time, Bell Labs opened its magnificent new facility at rural Holmdel, New Jersey, designed in 1962 by Finnish architect Eero Saarinen. A veritable cathedral of technology, the quarter-mile-long glass-and-steel structure (dubbed the "mirror building") was noted for its soaring atrium, large open spaces for social interaction, and the way it blended in with its park-like setting. (The [historical footage on YouTube](#) of the construction of the lab is worth watching.) It was a place designed for innovation.

Visionaries believed then, as many still do now, that it is possible to engineer creative environments that will generate, if not guarantee, Nobel-level innovation. A contemporary example of the same impulse was the stunning Salk Institute in La Jolla, California, designed in the early 1960s by another star architect, Louis Kahn. Such gorgeous, expansive environments, their designers believed, had the power to unleash the creative energies of the scientists and engineers working within.

Can you engineer innovation? It is not clear if coddling scientists and engineers in this fashion actually produces such lofty results. With Bell Labs we may never know, for Holmdel has seen its last days as a laboratory. After a lengthy antitrust lawsuit culminating in the 1982 breakup of AT&T, Bell Labs entered an era of decline. It was eventually spun off to Lucent Technologies. Alcatel-Lucent, the latest owner, abandoned the Holmdel property a couple of years ago. Today, weeds have overgrown the leaking atrium of Saarinen's brilliant building, which once housed more than 6,000 scientists and engineers.

While a plan commissioned by Holmdel Township calls for razing the building to make room for a golf course and other recreational facilities, veterans of the lab, joined by other locals, remain devoted to its memory. Recalls former Bell Labs engineer Bob Lucky, "[Bell Labs was the mecca of research](#), the crossroads of the research world. Everybody came through here.... I always think about those days, in the 1960s and '70s, when we didn't know how good we had it to work in some wonderful place with great people to do great things."

Lucky and others have rallied to try to save the building, which has been purchased by Somerset Development of Lakewood, New Jersey. Though the structure has so far escaped demolition, rescue plans do not include preserving it as a laboratory, but rather as a mixed-use development, a "mini-city" combining retail stores, health clubs, educational facilities, and condominiums. As the Lemelson Center explores the theme of "places of invention," we can only hope that the luster of two more Nobel Prizes for Bell Laboratories will support the cause of preserving this once-mighty laboratory, a major icon of not only American, but also world, innovation.

Best regards till next month,
Arthur Molella
Jerome and Dorothy Lemelson Director



Have You Seen?

The Lemelson Center has been documenting inventors' workplaces for more than a decade. Each time an inventor invites us into his or her space, there is a palpable excitement, a feeling of being let in on a secret. There is something unique about each space, something about the place that excites a creative mind.

To begin to understand what that "something" is, we brought together an interdisciplinary group of scholars and practitioners to examine how place supports, constrains, and influences inventors' work. How do creative people shape the spaces in which they work? Are there combinations of elements that make one place a hotbed of innovation? Find out what we learned in [the Lemelson Institute report](#).

Image: Cover of report on Places of Invention: The First Lemelson Institute.



Trivia Challenge

In each edition of *Prototype*, we offer a question about an invention or inventor that you and your friends and family can try to answer. Sometimes the answer can be found on the Lemelson Center's website, where you can also learn a little more about the subject. Email your answer to us at prototype@si.edu along with your name and mailing address. Each month we'll select winners randomly to receive a small prize from the Center.

Thank you to everyone who entered the September challenge and congratulations to Kristin T. of Needham, Massachusetts, and Dan B. of West Seneca, New York, who, among others, knew that the AcceleGlove was invented by José Hernández-Rebollar to help the hearing and non-hearing worlds communicate by translating sign language into speech. Hernández-Rebollar came to the United States from Mexico on a Fulbright scholarship to undertake graduate study in engineering at [George Washington University](#). For his dissertation project, he came up with the idea of a glove that would convert sign language into words you can hear. Using sensors attached to the glove and the arm of the user, his prototype device mapped the placement and movement of the arms and fingers in three-dimensional space. An attached computer read the data and converted them into words that can be heard on a loudspeaker or read on a computer screen. Hernández-Rebollar received U.S. Patent 7,565,295 on July 21, 2009, for his invention. The AcceleGlove has been developed further and is currently being marketed by AnthroTronix, Inc.

This month's question: During World War II, fighting extended to all types of terrain and all kinds of climates, necessitating a wide range of specialized clothing and equipment. Which office of the army was responsible for these innovations, turning the battlefield into a place of invention?

Image: José Hernández-Rebollar with his AcceleGlove. Photo by Douglas Benton/Fisheye.



From the Archives

Compute this: 289 recorded interviews, discussions, and lectures, plus 149 boxes, equals 43.5 cubic feet of material documenting one of the most visionary oral history projects conceived--the Computer Oral History Collection.

The advent of computing and its integration into the general culture is often described as an information revolution, of the same or greater magnitude as the spread of the printing press. From World War II on,

computers and computing have played a defining role in U.S. history. The Computer Oral History Collection, 1969-1973, 1977, housed at the National Museum of American History's Archives Center, documents a visionary undertaking, both in topic and in technique. It required identifying significant individuals from the first generation of computer specialists, conducting and recording extensive interviews, collecting documentation, and producing transcripts. The majority of interviewees were men affiliated with the development of hardware, but the project also focused on many influential women, including Grace Murray Hopper, Ida Rhodes, Jean Bartik, and others who played key roles in all aspects of early computing, from mathematics and programming to engineering and management.

The American Federation of Information Processing Societies (AFIPS) and the Smithsonian Institution began the project in 1967 and concluded their work in 1973. Interviewing and recording the key players in the development of the computing field gave a highly technological story a human voice. The main objective was to collect, document, house, and make available for research source material surrounding the development of the computer. The project collected both taped oral interviews with individuals and supplemental written documentation--working papers, reports, drawings, and photographs.

In addition to the audiotapes, the collection includes video of John Vincent Atanasoff's depositions in the *Honeywell, Inc. v. Sperry-Rand Corp. and Illinois Scientific Developments, Inc.* case, which began in 1967 about the rights to the patent for the Electronic Numerical Integrator and Computer (ENIAC); business proceedings of the Association for Computing Machinery; and the Fortran IV lecture series. Interviews were conducted by I. Bernard Cohen, A. Dettinger, Bonnie Kaplan, Elizabeth Luebbert, William Luebbert, Robina Mapstone, Richard Mertz, Uta Merzbach, and Henry Tropp. Merzbach, a curator in the Museum's then-Section of Mathematics, served as the original principal investigator for the project; Henry Tropp took over that role in 1971.

Despite the project's promise and the wealth of information it captured, many obstacles had to be overcome before the Computer Oral History Collection was preserved, described, and made available for research use. The problems inherent in processing a 42-year-old oral history collection varied--missing release forms, lack of transcripts, editing questions, and equipment obsolescence to name a few. However, in 1995, I began to reprocess, refine, and reprogram this collection for a wider audience.

During the course of my work I became acquainted with Mort Bernstein (1927-2001). Mort was an early computer pioneer in programming (his interview is part of the collection) and he supported our efforts. Mort and I became fast friends (his wife Maurine still refers to me as Mort's "Smithsonian girlfriend") and without his help--which involved opening doors, providing contact information, and calling and emailing his colleagues--this project would not have been completed. In short, Mort was an advocate for our work, and believed deeply in the project's original goal--to capture the voices associated with the history of computing. With Mort by my side, I was able to get the [finding aid online](#), along with, ultimately, 90 full text transcripts, due in large part to a memorial fund established in Mort's name. While more work on the Computer Oral History Collection remains, our reprogramming efforts have yielded great results--in September 2009 alone, there were 6,743 transcript downloads.

The Computer Oral History Collection is just one of the rich resources for the history of computing at the National Museum of American History. The Museum's artifact collections include digital computing machines, automatic digital computers and electronic calculators, logic devices, card and tape processors, slide rules, integrators and integraphs, harmonic analyzers and synthesizers, differential analyzers, other analog computing devices, space measurement and representation, time measurement, and combination space and time measurement. Additional documentation includes the Electronic Computers History Collection and the Mathematical Devices History Collection. Photographs and video materials can also be found. The Smithsonian Institution Archives holds administrative documentation regarding the Computer History Project.

For more information about the Computer Oral History Collection, contact Alison Oswald at oswalda@si.edu.

Alison Oswald, Lemelson Center Archivist

Image: Lieutenant (jg) Grace Hopper (right) and Seaman White inspecting the Harvard Mark I, 1944. From the Grace Murray Hopper Papers, Archives Center, National Museum of American History.



Inventive Ideas for Schools and Families

Music is universal. People from all over the world invent unique musical instruments as well as unique styles of music. What musical instruments are made from, how they are played, and the sounds they make are all influenced by place--where they were invented. In this activity, we focus on the role of place in determining how inventors just like you design and create a drum. How will your place--where you live or go to school--influence the drum you create? [Download the activity!](#)

Image: Union drum, 1864. Division of Cultural History, National Museum of American History.



Our Podcast--Prototype Online: Inventive Voices

Grace Murray Hopper achieved cult status as the "grandmother of computing" and the first person to use the term "computer bug." In *Grace Hopper and the Invention of the Information Age*, however, author Kurt Beyer strips back the layers of popular rhetoric to uncover a young, vibrant Grace Hopper, whose career closely paralleled the meteoric trajectory of the postwar computer industry.

In this podcast, Beyer talks with us about the young mathematics professor who found herself at the forefront of the embryonic computer revolution. As an inventor, mathematician, teacher, naval officer, programmer, businesswoman, leader, and visionary, Hopper created tools and technologies that broke down the communication barrier between human and machine. Yet she also battled personal challenges, including gender discrimination and alcoholism, reminding us that the path of the pioneer may be dark and lonely at times. [Tune in!](#)

Grace Hopper and the Invention of the Information Age is the newest book in the [Lemelson Center Studies in Invention and Innovation series](#) published with MIT Press.

Image: Author Kurt Beyer.

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Contact us at prototype@si.edu.

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or see more online:

[Lemelson Center website](#)

[National Museum of American History Frequently Asked Questions](#)