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Author(s):	Lewis, Nicholas Dale
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Legacy of Metropolis continues through new materials donated to classified library collections
By Nicholas Lewis, historian, National Security Research Center

"From the very beginning of the Los Alamos project, it was inevitable that the Laboratory would suffer total immersion in computing," said Nicholas Constantine Metropolis in 1976, reflecting his characteristic humor.

Metropolis had succinctly summarized the prominent place of computing in Los Alamos's mission and history. Metropolis himself played no small role in that "total immersion," exemplified by the Lab's supercomputing center, a postdoctoral fellowship, and the world-famous algorithm that carry his name. So does a collection of legacy materials in the National Security Research Center (NSRC). The NSRC, the Lab's classified library, which also houses unclassified artifacts, recently received a new addition to the Metropolis Collections. This donation, 22 years after his death on October 17, 1999, provides tangible evidence of Metropolis's continuing legacy at Los Alamos.

"Much like the Lab's computing center that bears his name, it is a fitting tribute to his significance to the Lab," said Danny Alcazar, an NSRC archivist who accessioned the recently donated materials. "Housed and actively being used in the NSRC, it is a resource to researchers seeking answers about the Lab's evolving mission."

In the midst of building the Lab's computing legacy after World War II, Metropolis also strove to preserve it through conferences and publications, and by archiving the vast collection of papers and artifacts acquired over his long career. These materials and fascinating personal items make up the Metropolis Collections, Alcazar said.

Metropolis and Computing
In the 1940s, its mission-driven need for advanced numerical simulations related to weapons development drove Los Alamos to become a leader in computing. Beginning with human computers and IBM punched-card accounting machines, the Lab transitioned to new electronic computers through the 1950s, with Los Alamos pioneering many of the computer-simulation technologies and methods still used today. Metropolis, known for his stylish bolo ties and quick wit, was an advocate and guiding force for that pioneering effort.

Born in Chicago in 1915 to a Greek-American family, Metropolis earned his Ph.D. in physics in 1941 from the University of Chicago. There, he worked alongside would-be Los Alamos

physicists Enrico Fermi and Edward Teller and was recruited by J. Robert Oppenheimer to join the secret wartime effort to create the world's first atomic bombs.

After helping to assemble and operate the IBM punched-card machines needed for the wartime implosion weapon's design, Metropolis aided in writing the first large program —which filled one-million punched cards — for the ENIAC, the first electronic, general-purpose computer.

"Naturally, we were mesmerized by the prospects," Metropolis recalled about the rapidly advancing field of electronic computing, which quickly gelled into a career-long obsession. In the following years, Metropolis played a vital role in developing the groundbreaking Monte Carlo method of simulation, and led the team that constructed the Lab's first electronic computer, the MANIAC, followed by the MANIAC II.

"Nick seamlessly combined his physics insights with mathematical elegance to make his great contributions," a colleague later explained.

Earning a multitude of awards over his career, and founding a computational-physics scholarship in his name, Metropolis became a senior Lab fellow in 1981, and the first recipient of the emeritus title at Los Alamos in 1987.

Even during retirement, Metropolis remained a vibrant presence at Los Alamos. He enthralled younger staff with stories, such as winning $10 from Lab mathematician John von Neumann in a poker game and claiming that he once dated artist Georgia O'Keeffe, who would have been nearly 30 years his senior.

The Metropolis Collections

Metropolis's legacy includes 211 boxes of documents, photos, artifacts, audio tapes, and videos in the NSRC. The collections include his high school diploma and notes from his college physics courses, though the majority of the materials focus on Metropolis's life and work from WWII through the early 1990s. Some highlights from the Metropolis collections include:

- correspondence with "Johnnie" (von Neumann) over the MANIAC and New Mexican food;
- the groundbreaking development of the Monte Carlo method;
- invaluable audio tapes of talks given by computing pioneers; and
- Metropolis's Rolodex, containing hundreds of phone numbers and personal details, including those of physicists Hans Bethe and Richard Feynman.

"These rich materials provide insights into the development of computing technologies and methods that supported the Lab's mission through the Cold War, and highlight the people whose

choices and hard work made those developments happen," said NSRC Director Riz Ali. "Plus, they're fascinating snapshots of the Lab's illustrious history."

The Lab's New Addition

Jim Louck, the physicist and longtime friend who managed the now-closed Metropolis Foundation that promoted the study of mathematics and computational science, collected papers and personal effects from Metropolis's final years. Louck gave them to Helen Boorman, a distant relative of Metropolis and currently in the Science Resource Office Division. Boorman realized their extraordinary historical value and donated them to the NSRC.

Now accessioned into the NSRC collections, the donation includes his last LANL badge, video-taped lectures, an unpublished memoir, and transcribed talks, perhaps the most remarkable of which is from Metropolis's memorial service, attesting to his at-ease charm, artistic flair, and mathematical brilliance that suffused his life and work.

Louck also collected internal Lab correspondence detailing the decision in 2002 to name Los Alamos's cutting-edge supercomputing facility the Nicholas C. Metropolis Center for Modeling and Simulation, which today contains the Lab's most powerful computer systems — a fitting tribute to name the key center for mission-critical stockpile stewardship simulations after someone so directly involved with inventing and preserving the Lab's computing and simulation legacy.

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Nicholas Constantine Metropolis in his Lab badge photo. Only 27 years old, Metropolis was among the early arrivals in Los Alamos in March 1943. The Lab was opened as part of the Manhattan Project, which was the U.S. government's top secret effort to create the world's first atomic bombs to help end World War II.

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March 21, 1952

Professor E. Teller
Institute for Nuclear Studies
The University of Chicago
5640 Ellis Avenue
Chicago 37, Illinois

Dear Edward:

Had planned to write you before this but then there were rumors again that you would be with us for a bit. I now learn that it will be some time in May before this happens.

There are several things to mention. First and foremost, the day comparable to that of liberation has arrived. The computer has been completed and even shows very encouraging signs of not misbehaving. In fact, we have for several days now been curbing its various idiosyncrasies and even doing some purely mathematical problems that lend themselves to easy checking. Casual observers might even say that we are elated. In the next couple of days we plan to do correctly the standard IBM problem in a non-IBM way. After that we are planning more ambitious undertakings. Consequently, I hope that when you next come out Mici will be with you. If she has a coded problem for your project, we might try it for size at that time. Enclosed is a copy for her of our vocabulary up to date.

How are plans progressing with your own computer group? I am still interested in giving the series of talks to that group, but it would be extremely convenient if I could stay around here for the next month to see that things really get rolling. After that it would be a pleasure to visit you.

We once talked about Jim Richardson. We have tried to prevail upon him to reconsider but it's now quite definite that he shall leave. Earlier I thought that he would do this at the end of the month but perhaps now he will stay until about the middle of April. He has made no commitments, nor will he do so immediately. I think he plans to generally relax for a month or so, which should leave plenty of opportunity for any negotiations that you might have in mind. It would be difficult to praise Jim too highly, but all this you have heard from me before.

The declassification of Ashkin's paper is still up in the air. Do you think it would be worthwhile to chat with Libby again? The only suggestion I have is that I might write Ashkin asking him if he would consider the possibility of computing iron as the example to be used. Unless he has some computing facilities available, I do not have much hope for this suggestion.

Hoping that you will definitely come in May and will stay real long, and with best regards to Mici, Wendy and Paul,

Sincerely yours,

Nicholas Metropolis

NM/mb
Enc.

This letter from Nicholas Metropolis informs his close friend and physicist Edward Teller that the MANIAC computer was operational. Metropolis asked about Mici Teller, who was an adept programmer and Edward's wife, preparing a program to "try out for size" on the MANIAC. He also mentioned the imminent departure of Jim Richardson, chief engineer of the MANIAC, who left to work for Sperry Rand for a short time. He returned to Los Alamos in 1953, where he spent the remainder of his career, helping to design and build the MANIAC II, and providing his electronics expertise to the Los Alamos Meson Physics Facility (LAMPF, now LANSCE).

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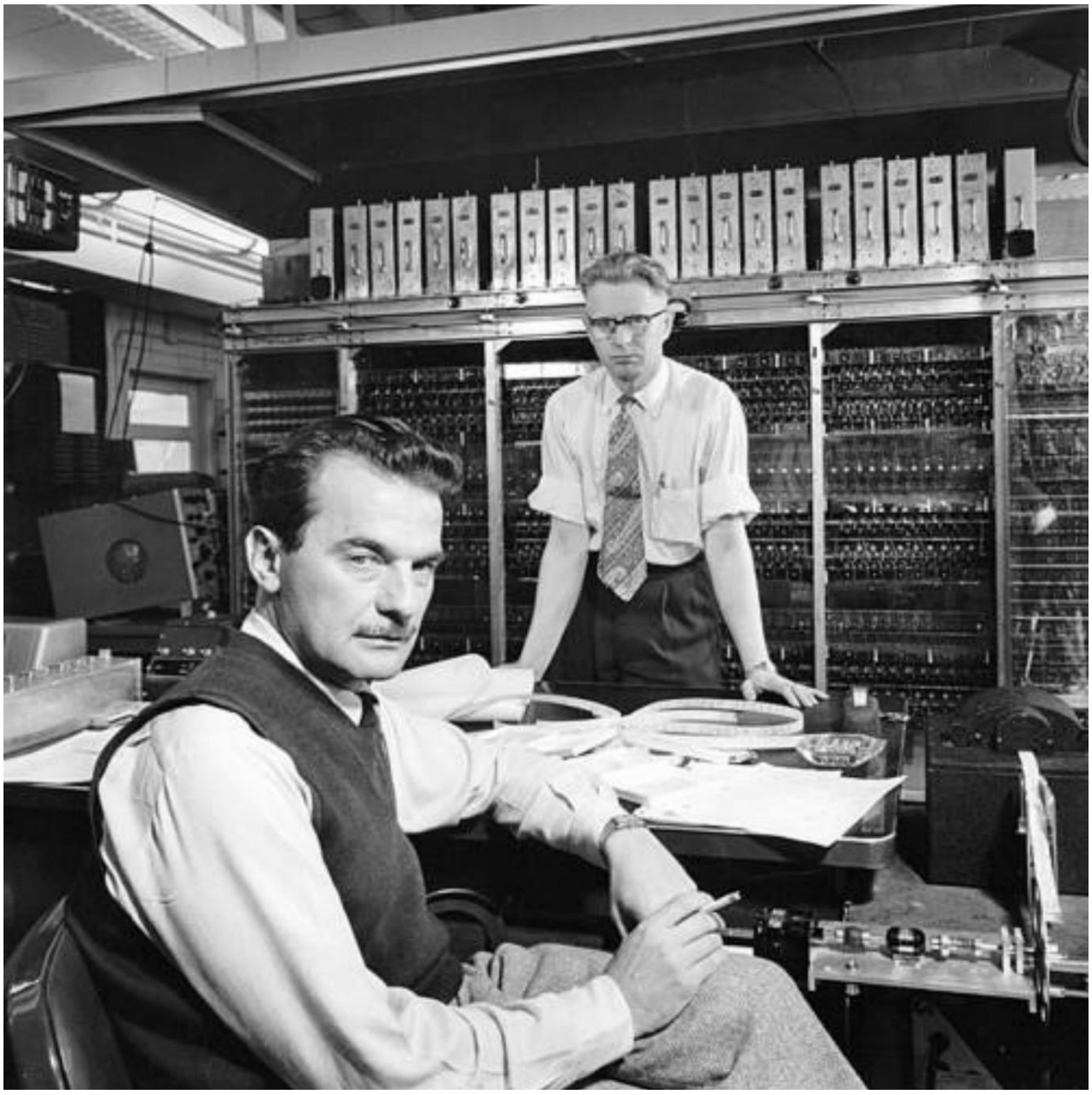

Nicholas Metropolis (MANIAC project lead) and Jim Richardson (MANIAC chief engineer) in front of the MANIAC, November 1953. The MANIAC used punched paper tape (as seen on the table) to load program data using the paper-tape reader to the right of the table.

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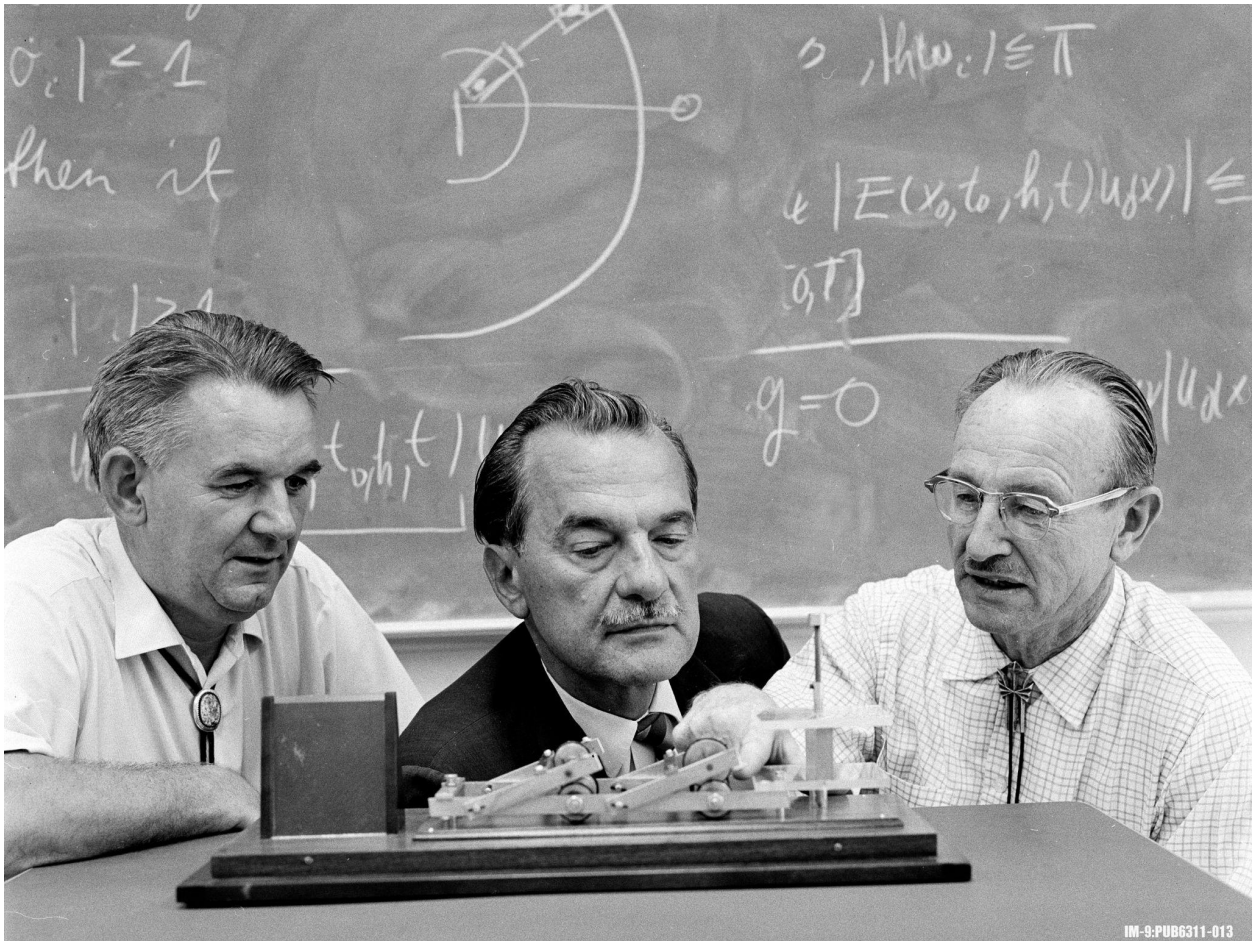

In 1966, Bengt Carlson (T-1 group leader), Nicholas Metropolis, and L. D. P. “Perc” King (physicist and reactor expert) examine the Fermiac trolley, an analog means of conducting Monte Carlo simulations. Physicist Enrico Fermi invented and King built the trolley in 1947.

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The Nicholas C. Metropolis Center for Modeling and Simulation was dedicated in May of 2002. It hosts the Lab's classified high-performance computing resources, which provide simulation and visualization capabilities in support of stockpile stewardship.

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