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USC Dornsife alumnus Neil Siegel receives the National Medal of Technology and Innovation from President Joe Biden at the White House on Oct. 24, 2023. (Photo: Ryan K. Morris.)

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Alumnus parlays USC Dornsife math degrees into society-changing technologies

From GPS to touch screens, Neil Siegel put his USC Dornsife education to work building the technology of tomorrow, earning him one of the nation’s highest prizes.

By **Margaret Crable** January 16, 2024



phone's location via the "Find my iPhone" app, then you've benefited from the ingenuity of [Neil Siegel](#).

Siegel, who received both his bachelor's and master's degrees in [mathematics](#) from the USC Dornsife College of Letters, Art and Sciences, led early efforts to bring digital technology to the United States military, work that drove technological advancements we now use on a regular basis, including wireless internet and GPS-based vehicle tracking.



From left: Robyn Friend; Siegel; President Joe Biden; Kathy Warden, CEO of Northrup Grumman; Yannis Yortsos, dean of the USC Viterbi School of Engineering, at the White House. (Photo: Adam Schultz.)

His innovations recently won him the [National Medal of Technology and Innovation](#), the United States' highest honor for technological achievements. He [accepted his award during a White House ceremony](#) in October 2023.

Siegel, currently on the faculty at the [USC Viterbi School of Engineering](#), says his early study of mathematics helped set a helpful foundation. "Learning the value of rigor and completeness, understanding how to tell if an argument is in fact rigorous (or not), and other types of general principles that we learn in mathematics has been fantastically helpful to everything that I have done in my career," he says.

Mathematics and music

Siegel grew up in Los Angeles. His mother, Judith Love Cohen, completed her bachelor's and master's degrees at USC Viterbi and was an aerospace engineer at Space Technology Laboratories. She worked on projects like the Abort-Guidance System for the Apollo mission lunar lander, which eventually played a crucial role in the safe return of the Apollo 13 crew.

As a teen, Siegel wasn't all that thrilled about academics: "I hated high school — I was bored to tears." His college years at USC would prove to be much different. "University was wonderful, with a lot to learn. I found that I could get as much as I wanted out of my classes, whether large or small," he says.

Math was on Siegel's schedule, but also courses in Russian literature, logic, and communications and media. Siegel was particularly inspired by the late [Gibson Reeves](#), an astronomer who conducted important research



plant. He watched the historic Apollo moon landing while flipping burgers, on a tiny television brought in by a colleague.

He primarily paid for college through his work as a musician (an aptitude he shares with his half-brother, actor Jack Black). Siegel began playing the flute at age 7 and started performing at 12. In his 20s, he became interested in Persian music and studied under the accomplished Iranian musician Morteza Varzi. He learned how to play the târ and the ney, traditional instruments from the region, as well as the Bulgarian kaval.

These talents saw him called upon to add a little “Middle Eastern flavor” for movie soundtracks and records while in college, in addition to his core repertoire of Baroque flute.

His musical ability also introduced him to his wife, Robyn Friend, an expert in Middle Eastern dance. They met backstage after a performance at the Southern California Renaissance Faire, when Siegel was at USC and Friend was at UCLA, studying linguistics. The two have performed together more than 1,000 times, all around the world, Friend singing and dancing and Siegel accompanying her on a variety of instruments.

The next frontier

After completing his degrees at USC Dornsife, Siegel took a job at Thompson Ramo Wooldridge Inc. (TRW), where he was trained in systems engineering. He essentially never left. Northrup Grumman acquired the company in 2002, and Siegel eventually became vice-president and chief technology officer of the mission systems and information systems sectors.



Siegel with his mother, Judith Love Cohen. (Photo: Northrup Grumman.)



own time zones and places with different work weeks. The phone would ring at all hours. My wife used to joke that we had 5,000 children,” he recalls.

Starting in the 1990s, Siegel led development on the U.S. Army’s first “digital battlefield” system, which enables the military to manage troop movements and issue commands via wireless internet and computer display, rather than old-fashioned radio calls and paper maps.

The assignment sparked a number of revolutionary technological advancements. To allow the military to follow the location of troops, he and his engineers were among the first to build large-scale tracking systems that used GPS information. Since tanks and helicopters on the battlefield could not be connected by cables, they developed wireless internet protocols. And because helicopter pilots and tank drivers couldn’t type on keyboards while in motion, his team built them touch screens.

As a result, Siegel and his team hold patents for much of the wireless internet, GPS-based tracking, and touch-screen technology essential to consumer electronics like smartphones and tablets.

Military technology wasn’t Siegel’s only focus. The organization that he led collaborated with Warner Brothers to enable movie distribution via digital means rather than film cans. “When I last checked a few years ago, the system was still in use, serving something like 32,000 of the 35,000 movie screens in the country,” says Siegel.

In the 1980s, Siegel co-founded a start-up that developed a computer system to catch adverse interactions from medications, from which some 100,000 Americans were then dying annually. Systems like Siegel’s enabled pharmacists to cross-check prescriptions for possible interactions and avoid those deaths.

“In the 40 years since then, our solution has, of course, been superseded by newer products, but all prescriptions in the U.S. and Europe are now processed through systems that do what we helped to create in the early 1980’s,” he says.

The next generation

While at TRW in the 1970’s, Siegel met the influential software engineer Barry Boehm, who would later become Siegel’s doctoral advisor. The two were friends until [Boehm’s passing in 2022](#).

Siegel received his PhD in industrial and systems engineering from USC Viterbi. When Siegel retired from Northrup Grumman in 2015, he joined the faculty at USC Viterbi, where he’s now the IBM Professor of Engineering Management.

Siegel says he thinks his mother would be proud of the advancements in parity the school has made, since she was the only woman in her graduating class — now, at least half of the students in his classes are women.

He’s also still at work on larger, systemic problems. Siegel is helping power companies mitigate vulnerabilities in the electrical grid as well as creating protocols to help society rebound from massive power blackouts.

It’s been a career that seems to have satisfied Siegel’s initial impulse for majoring in mathematics. “I always liked math, but I saw it as a tool for other things, rather than an end in itself. I never was serious about the idea of working as a research mathematician. I wanted to build things,” he says.

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