



Indispensable Outsider

Richard Garwin has helped advise U.S. presidents, IBM, and secret agencies on how to make things work

THE FIRST THING ANYBODY SAYS ABOUT THE physicist/inventor/adviser Richard Garwin is that his graduate school adviser 60 years ago, Enrico Fermi, said that he was the only true genius he'd met. The next thing is that Garwin has advised, sometimes impolitically, every administration since Eisenhower's on every possible technical issue. The third thing is the Garwin joke: It's the French Revolution, an aristocrat is placed in the guillotine, the blade won't drop, "God's will," says the guillotiner, and lets the aristocrat go free; next aristocrat, same thing, blade sticks, "God's will," goes free. The next in line is Garwin, who looks up at the blade and says, "Oh, I see the problem."

Garwin himself agrees that the third, an old joke, could have been written for him. He is a compulsive problem-solver—although

his solutions occasionally raise other problems. Prime example: In 1951, Garwin was 23 years old and the hydrogen bomb, which worked only in theory, needed proof. So in a few weeks, Garwin designed an experiment, and a year later Los Alamos National Laboratory in New Mexico had built it and called it Mike, then had taken it to Eniwetok in the South Pacific and set it off. The 11-megaton explosion was 1000 times more powerful than the atomic bomb that flattened two-thirds of Hiroshima. Garwin didn't watch it—he was busy working on more portable H-bombs—and in fact has never seen a nuclear explosion. "I don't need it," he told an interviewer. "I have a good imagination."

Garwin went on to an astonishingly varied career that included fundamental contributions to particle physics, a 41-year career

in industry, 47 patented inventions, and 60 years of advising multiple parts of the U.S. government on multiple technical issues. "He's done so damn many things," says Peter Zimmerman, formerly chief scientist at the U.S. Senate Foreign Relations Committee, "that it's hard to single out any one."

Garwin advised then–Energy Secretary Steven Chu on alternatives for dealing with the Fukushima nuclear plant's meltdown in 2011 and on plugging the BP oil well blow-out in 2010. In 1981, Garwin pioneered gesture recognition for a touch screen, on the IBM color PC monitor. In 1969, he invented the tensioned cables that would hold a deep-water floating airport steady in large waves; floating airports were never built, but the approach was used for oil-drilling platforms. Since 1968, he's been writing about handling data in health care. The upshot: He is one of 13 people in the world who is a member of all three U.S. National Academies: science, engineering, and medicine.

Nothing ties these fields and functions together, no single intellectual thread. Garwin just likes being useful, he says, and helps solve problems as they arise. And if his

the intelligence community, says Robert A. McDonald, director of NRO's Center for the Study of National Reconnaissance in Virginia, is that he pushed them to "stretch their technological limits," and gave them, not the answers they wanted, but "independent, no-holds-barred assessments."

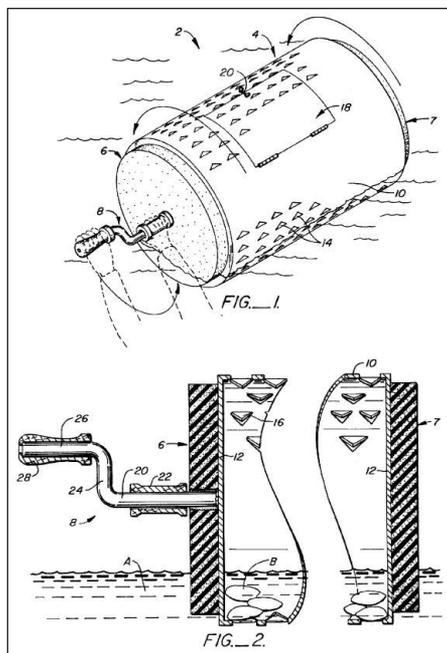
Mass destruction

The issue on which Garwin has worked most intently is arms control—the natural consequence of an involvement with the hydrogen bomb. One way or another, he has helped shape all the treaties to ban nuclear weapons tests since the first treaty talks in 1958. He helped convince President Kennedy to put controls, called Permissive Action Links (PALs), on U.S. nuclear weapons stationed in Europe so that they couldn't be exploded without authority. (Talking later to a Russian scientist at CISAC, the National Academy of Sciences' Committee on International Security and Arms Control, Garwin found out the Russians didn't then have PALs on their bombs in Cuba either.)

Unlike his old friend and colleague Sidney Drell, now retired from the SLAC National Accelerator Laboratory in Menlo Park, California, Garwin isn't trying to take nuclear weapons down to zero: "I don't see the elimination of nuclear weapons," Garwin says, "or even a path in that direction." He's against proliferation of weapons to any countries that don't have them. He's for the immediate reduction in numbers of weapons and further reductions in the future, from the current 5000 in the United States and 17,000 or so worldwide—a point at which, he says, the weapons are more numerous than their targets—down to a few hundred, "enough for any conceivable purpose."

Since 1992, Garwin has worked on nearly every JASON report on the health of nuclear weapons in the U.S. stockpile, most notably the 1995 report certifying that the weapons were a reliable deterrent without having to be tested and that, yes, the country could sign the international Comprehensive Nuclear-Test-Ban Treaty. Noting that he "had a lot to do" with nuclear weapons himself, Garwin said of the JASON report, "I am most pleased to be an author of this document."

Garwin also works on the other half of controlling weapons: missile defense. He's advised, written, and testified on its myriad aspects since 1968, when he and Hans Bethe wrote an article for *Scientific American* outlining the pros and cons that have been debated ever since. He continued arguing through the 1980s debates on Star Wars, the Reagan administration's idea for space-



Scrubber. Garwin's mussel washer is one of his 47 inventions covered by U.S. patents.

based defenses. He helped write the so-called Rumsfeld report in 1998 on the missile threat from "rogue states," which missile defense advocates later used to support their views—to Garwin's annoyance but not astonishment. These days, he's arguing with the National Academies' 2012 report on missile defense. The report recommends new radars, which Garwin says would be inadequate to distinguish incoming missiles from decoys. "If you feel compelled to have a missile defense because you've always said missile defense is necessary," he told an interviewer, "go ahead, have a missile defense. But don't spend very much money on it, and don't lie about its performance."

Category of one

If Garwin's advice has a flaw, some of his peers say, it's a sporadic tone-deafness to human or institutional realities. For example, his proposal to intercept enemy missiles during their more targetable boost phase by basing the missile defenses close to potential attackers, such as North Korea, is probably not going to win Chinese or Russian approval. And testifying in Congress against the Nixon administration's plan for a supersonic transport plane, as Garwin did in 1970 while sitting on PSAC, was never in the playbook for presidential advisers. It has been cited as a reason that Richard Nixon disbanded PSAC.

The occasional tone-deafness, says Raymond Jeanloz, a geophysicist and fellow arms-controller at the University of California, Berkeley, doesn't mean that Garwin loses credibility among his advi-

sees. He's showing politicians what, if politics could be sidestepped, might then be possible—"maybe we should be asking whether we could deploy missiles near Vladivostok," Jeanloz says. "He's saying, 'You policymakers have to realize you're excluding a universe of possible solutions.'" The approach is peculiarly Garwinian, Jeanloz says: "He's one of the few people who can get away with it."

Garwin turned 85 this year. Some days he goes to his emeritus office at IBM and dresses in good khakis; when he's working from home, he dresses in older khakis; he wears a tie to go to Washington. He uses public transportation and carries the routes and schedules in his head. He's moved from his home of 55 years because he could no longer climb out to fix the roof and now lives in a modest apartment with the wife he married when they were teens. For lunch when he's at home, his wife often cuts up a fresh pineapple, which they eat for dessert for several days.

"I've never seen him down in the dumps," says Philip Coyle, who was an associate director at Obama's White House Office of Science and Technology Policy (OSTP) where Garwin is a consultant. "Nothing sets him back." In 2002, he won the National Medal of Science. He gets 40 to 60 e-mails per day—on CISAC, JASON, OSTP, and occasionally intelligence business—and only about 10 per Saturday or Sunday. Garwin says that he could stop doing all he does and devote himself to his hobbies, if he had hobbies; or he could go back to science, "but it is unlikely that I would make any significant contributions at this stage," and so, when he sees any probability of a good outcome, he says, "I prefer to do what I have been doing for a long time."

Maybe that's another result of helping the hydrogen bomb into the world: never being able to give up. Drell says that politics will have so large a part in solving the problem of missile defense that he himself has quit arguing about it—but that, he says, is "a cop-out by Sid Drell. Dick Garwin never cops out." William Press, at the University of Texas, Austin, and current member of the President's Council of Advisors on Science and Technology who has worked with Garwin since 1977, says that whenever he tries to duck out of some issue, "I hear Dick's voice—'Bill, those things don't just happen. It's people like me who make them happen.'"

—ANN FINKBEINER

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