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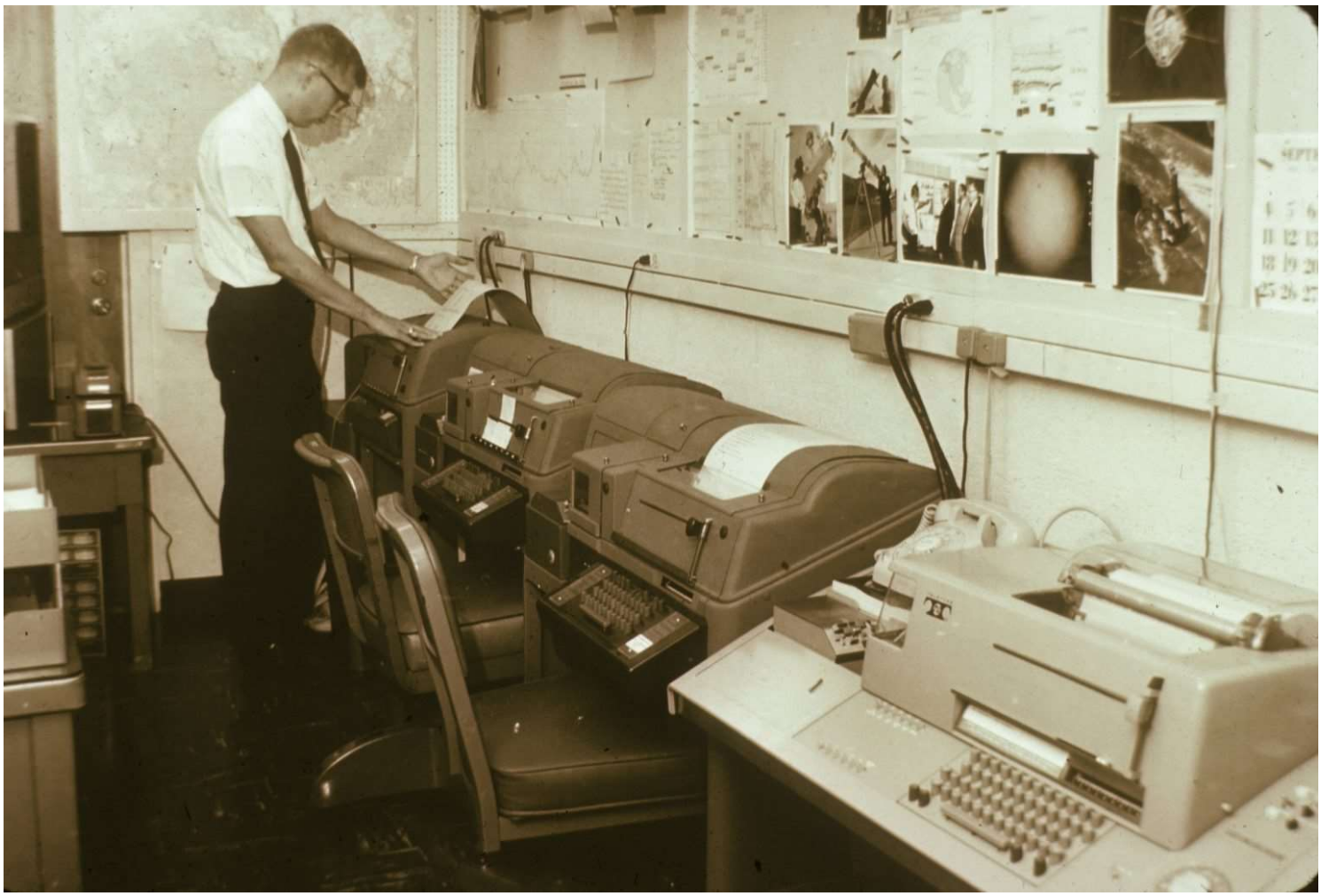
When Elite Physicists Advised Washington



NOAA/Equipment at Coast and Geodetic Survey geophysical observatory

In July 1956, a CIA U-2 spy plane flew 70,000 feet over the Soviet Union, unseen by and untouchable to Soviet air defenses. Intelligence gathered during the flight confirmed the prevailing view of America's technological superiority; the Soviets were nowhere close to matching the

U.S.'s nuclear arsenal. But this view would change a few months later with the launch of Sputnik, the world's first artificial satellite.

Sputnik's success created an overwhelming sense of fear that permeated all levels of U.S. society. This included its scientific establishment. As John Wheeler, a theoretical physicist who popularized the term "black hole" would later tell an interviewer: "It is hard to reconstruct now the sense of doom when we were on the ground and Sputnik was up in the sky."

Back on the ground, the event spurred a mobilization of American scientists unseen since the war. Six weeks after the launch of Sputnik, President Dwight Eisenhower revived the President's Scientific Advisory Council (PSAC). It was a group of 16 scientists who reported directly to him, granting them an unprecedented amount of influence and power. Twelve weeks after Sputnik, the Department of Defense launched the Advanced Research Project Agency (ARPA), which was later responsible for the development of the internet. Fifteen months after Sputnik, the Office of the Director of Defense Research and Engineering (ODDRE) was launched to oversee all defense research. A 36-year-old physicist who worked on the Manhattan Project, Herb York, was named head of the Office of the ODDRE. There, he reported directly to the president and was given total authority over all defense research spending.

It was the beginning of a war for technological supremacy. Everyone involved understood that in the nuclear age, the stakes were existential.

It was not the first time the U.S. government had mobilized the country's leading scientists. World War II had come to be known as "the physicists' war." It was physicists who developed proximity bombs and the radar systems that rendered previously invisible enemy ships and planes visible, enabling them to be targeted and destroyed, and it was physicists who developed the atomic bombs that ended the war. The prestige conferred by their success during the war positioned physicists at the top of the scientific hierarchy. With the members of the Manhattan Project now aging, getting the smartest young physicists to work on military problems was of intense interest to York and the ODDRE.

Physicists saw the post-Sputnik era as an opportunity to do well for themselves. Many academic physicists more than doubled their salaries working on consulting projects for the DOD during the summer. A source of frustration to the physicists was that these consulting projects were

awarded through defense contractors, who were making twice as much as the physicists themselves. A few physicists based at the University of California Berkeley decided to cut out the middleman and form a company they named Theoretical Physics Incorporated.

Word of the nascent company spread quickly. The U.S.'s elite physics community consisted of a small group of people who all went to the same small number of graduate programs and were faculty members at the same small number of universities. These ties were tightened during the war, when many of those physicists worked closely together on the Manhattan Project and at MIT's Rad Lab.

Charles Townes, a Columbia University physics professor who would later win a Nobel Prize for his role in inventing the laser, was working for the Institute for Defense Analysis (IDA) at the time and reached out to York when he learned of the proposed company. York knew many of the physicists personally and immediately approved $250,000 of funding for the group. Townes met with the founders of the company in Los Alamos, where they were working on nuclear-rocket research. Appealing to their patriotism, he convinced them to make their project a department of IDA.

A short while later the group met in Washington D.C., where they fleshed out their new organization. They came up with a list of the top people they would like to work with and invited them to Washington for a presentation. Around 80 percent of the people invited joined the group; they were all friends of the founders, and they were all high-level physicists. Seven of the first members, or roughly one-third of its initial membership, would go on to win the Nobel Prize. Other members, such as Freeman Dyson, who published foundational work on quantum field theory, were some of the most renowned physicists to never receive the Nobel.

The newly formed group was dubbed "Project Sunrise" by ARPA, but the group's members disliked the name. The wife of one of the founders proposed the name JASON, after the Greek mythological hero who led the Argonauts on a quest for the golden fleece. The name stuck and JASON was founded in December 1959, with its members being dubbed "Jasons."

The Golden Age

The key to the JASON program was that it formalized a unique social fabric that already existed among elite U.S. physicists. The group was elitist, but it was also meritocratic. As a small, tight-knit community, many of the scientists who became involved in JASON had worked together before. It was a peer network that maintained strict standards for performance. With permission to select their own members, the Jasons were able to draw from those who they knew were able to meet the expectations of the group.

This expectation superseded existing credentials; Freeman Dyson never earned a PhD, but he possessed an exceptionally creative mind. Dyson became known for his involvement with Project Orion, which aimed to develop a starship design that would be powered through a series of atomic bombs, as well as his Dyson Sphere concept, a hypothetical megastructure that completely envelops a star and captures its energy.

Another Jason was Nick Christofilos, an engineer who developed particle accelerator concepts in his spare time when he wasn't working at an elevator maintenance business in Greece. Christofilos wrote to physicists in the U.S. about his ideas, but was initially ignored. But he was later offered a job at an American research laboratory when physicists found that some of the ideas in his letters pre-dated recent advances in particle accelerator design. Dyson's and Christofilios's lack of formal qualifications would preclude an academic research career today, but the scientific community at the time was far more open-minded.

JASON was founded near the peak of what became known as the military-industrial complex. When President Eisenhower coined this term during his farewell address in 1961, military spending accounted for nine percent of the U.S. economy and 52 percent of the federal budget; 44 percent of the defense budget was being spent on weapons systems.

But the post-Sputnik era entailed a golden age for scientific funding as well. Federal money going into basic research tripled from 1960 to 1968, and research spending more than doubled overall. Meanwhile, the number of doctorates awarded in physics doubled. Again, meritocratic elitism dominated: over half of the funding went to 21 universities, and these universities awarded half of the doctorates.

With a seemingly unlimited budget, the U.S. military leadership had started getting some wild ideas. One general insisted a moon base would be

required to gain the ultimate high ground. Project Iceworm proposed to build a network of mobile nuclear missile launchers under the Greenland ice sheet. The U.S. Air Force sought a nuclear-powered supersonic bomber under Project WS-125 that could take off from U.S. soil and drop hydrogen bombs anywhere in the world. There were many similar ideas and each military branch produced analyses showing that not only were the proposed weapons technically feasible, but they were also essential to winning a war against the Soviet Union.

Prior to joining the Jasons, some of its scientists had made radical political statements that could make them vulnerable to having their analysis discredited. Fortunately, JASON's patrons were willing to take a risk and overlook political offenses in order to ensure that the right people were included in the group. Foreseeing the potential political trap, Townes proposed a group of senior scientific advisers, about 75 percent of whom were well-known conservative hawks. Among this group was Edward Teller, known as the "father of the hydrogen bomb." This senior layer could act as a political shield of sorts in case opponents attempted to politically tarnish JASON members.

Every spring, the Jasons would meet in Washington D.C. to receive classified briefings about the most important problems facing the U.S. military, then decide for themselves what they wanted to study. JASON's mandate was to prevent "technological surprise," but no one at the Pentagon presumed to tell them how to do it.

In July, the group would reconvene for a six-week "study session," initially alternating yearly between the east and west coasts. Members later recalled these as idyllic times for the Jasons, with the group becoming like an extended family. The Jasons rented homes near each other. Wives became friends, children grew up like cousins, and the community put on backyard plays at an annual Fourth of July party. But however idyllic their off hours, the physicists' workday revolved around contemplating the end of the world. Questions concerning fighting and winning a nuclear war were paramount. The ideas the Jasons were studying approached the level of what had previously been science fiction.

Some of the first JASON studies focused on ARPA's Defender missile defense program. Their analysis furthered ideas involving the detection of incoming nuclear attacks through the infrared signature of missiles, applied newly-discovered astronomical techniques to distinguish between

nuclear-armed missiles and decoys, and worked on the concept of shooting what were essentially directed lightning bolts through the atmosphere to destroy incoming nuclear missiles.

The lightning bolt idea, known today as directed energy weapons, came from Christofilos, who was described by an ARPA historian as mesmerizing JASON physicists with the "kind of ideas that nobody else had." Some of his other projects included a fusion machine called Astron, a high-altitude nuclear explosion test codenamed Operation Argus that was dubbed the "greatest scientific experiment ever conducted," and explorations of a potential U.S. "space fleet."

The Jasons' analysis on the effects of nuclear explosions in the upper atmosphere, water, and underground, as well as methods of detecting these explosions, was credited with being critical to the U.S. government's decision to sign the Limited Test Ban Treaty with the Soviet Union. Because of their analysis, the U.S. government felt confident it could verify treaty compliance; the treaty resulted in a large decline in the concentration of radioactive particles in the atmosphere.

The success of JASON over its first five years increased its influence within the U.S. military and spurred attempts by U.S. allies to copy the program. Britain tried for years to create a version of JASON, even enlisting the help of JASON's leadership. But the effort failed: British physicists simply did not seem to desire involvement. Earlier attempts by British leaders like Winston Churchill to create a British MIT had run into the same problems.

The difference was not ability, but culture. American physicists did not have a disdain for the applied sciences, unlike their European peers. They were comfortable working as advisors on military projects and were employed by institutions that were dependent on DOD funding. Over 20 percent of Caltech's budget in 1964 came from the DOD, and it was only the 15th largest recipient of funding; MIT was first and received twelve times as much money. The U.S. military and scientific elite were enmeshed in a way that had no parallel in the rest of the world then or now.

Rolling Thunder

While the Jasons were achieving their early success, the U.S. was deepening its focus on the conflict in Vietnam. By 1964, the U.S. had stationed 23,000 military "advisors" there, up from what had roughly been 800 when JASON

was first formed. These advisors faced an intractable insurgency that was logistically enabled by the centuries-old network of roads and footpaths the Americans dubbed the “Ho Chi Minh Trail.”

Sending American soldiers into the jungles of North Vietnam to fight and die in order to cut off this trail was a politically costly option. President Lyndon Johnson became convinced that technology had fundamentally altered air power and enabled the U.S. to unleash its military might in a more restricted, politically acceptable, and even humane fashion. Victory would have to come through the air. Like many great powers throughout history, the U.S. wanted to fight a war that suited its means rather than what would be required.

The question that dominated the debate in Washington was what amount of force would be required to bend the will of the North Vietnamese. Several influential voices in the U.S. administration thought that former President Eisenhower was correct in his belief that the threat of the use of nuclear weapons is what ultimately enabled a truce in the Korean War. Whispers that the U.S. should threaten the use of or actually deploy tactical nuclear weapons were heard throughout the Pentagon hierarchy. Military insiders were remarkably cavalier about the possibility. During one JASON party, a former Chairman of the Joint Chiefs of Staff with close ties to President Johnson remarked to Freeman Dyson that “it might be a good idea to throw in a nuke once in a while just to keep the other side guessing.”

The situation was a test case for JASON. While critical of the proposals to use nuclear weapons, the group also could not be seen to compromise its political neutrality as an advisory group. Unprompted by the DOD, the Jasons decided to produce a study that, while deliberately limited to technical analysis, was directed at preventing the use of tactical nuclear weapons. Their report raised the prospect of the use of nuclear truck bombs against U.S. bases in South Vietnam and calculated that it would require thousands of nuclear bombs a year to make a barrier continuously radioactive enough that it would keep people from crossing it, among many other deliberately provocative claims.

In the end, the government took a more limited course of action. In March 1965, President Johnson approved Operation Rolling Thunder, an air bombardment campaign designed to scare the North Vietnamese into negotiating by destroying their supply lines.

But even this sparked opposition. A few days after the bombing began, the first antiwar protesters appeared outside the White House gates. With the operation underway, JASON was now along for the ride as the Vietnam War grew increasingly controversial.

Initially restricted in scope, bombing sorties quintupled by the summer of 1965 and tripled by 1966. JASON was tasked with studying the effects of the bombing, which it concluded in multiple studies was futile. The North Vietnamese were repairing the damage inflicted by the U.S. as fast as the Americans were destroying it. Nearly 100,000 North Vietnamese worked full-time repairing damage caused by the U.S. bombs and four to five times that amount worked part-time.

The U.S. Secretary of Defense, Robert McNamara, who was nicknamed a "human IBM machine," was deeply committed to the idea that decisions should be informed through rigorous statistical analysis and data. He became convinced that the Jasons were right and began telling journalists off the record that Operation Rolling Thunder was a failure. A man who had believed he could "scientifically solve" any problem had come to believe the Vietnam War was unsolvable without resorting to a grotesque amount of force that betrayed America's ideals.

To block the Ho Chi Minh Trail, McNamara became interested in a physical barrier as an alternative to bombing. In response, the Jasons spent a summer in Santa Barbara researching historical barriers to see what worked and what didn't. Many in the group alternated their time between surfing and a deep study of the trail based on painstaking reconnaissance done by Americans on the ground in Vietnam, prisoner transcripts, and thousands of historical documents, including some colonial French documents dating back to the 1890s. The Jasons concluded that a physical barrier would be pointless. Richard Garwin, a new Jason who was the author of the first hydrogen bomb design, picked the barrier concept apart by showing over 30 countermeasures the North Vietnamese could employ to defeat it.

In place of a physical barrier, the Jasons proposed a virtual one. JASON's plan entailed dropping noisemaker devices on the trails that, when triggered, would in turn trigger noise detectors placed in the trees beforehand. The noise detectors would send a signal to airplanes that would be circling overhead, which would then relay that signal to a central computer to determine the enemy's position. Computer operators would

determine if hostile forces set off the noisemakers and if so, airstrikes would be called in to destroy the target. The program would cost up to $1 billion dollars.

After reviewing the JASON study, McNamara helicoptered in to meet with the Jasons at a summer house in Cape Cod. After talking with the Jasons, McNamara approved the electronic barriers, overriding military opinions about the idea which ranged from skeptical to hostile. The approval pre-empted the timeline preferred by the Jasons themselves, who didn't believe their proposed system was ready and said it required further study. These concerns were validated in Vietnam where the barrier was plagued by technical issues and limitations, like unreliable sensors and Air Force resistance to being told what to bomb by a computer operator.

With the electronic barrier floundering, McNamara wrote a memo to President Johnson directly lifting lines from a JASON report that made clear Operation Rolling Thunder was failing; the enemy was just waiting U.S. forces out. McNamara became more despondent as time went on, resigning in November 1967 after failing to stop the bombing campaign once again.

Despite their military failure, the Jasons had navigated their advisory role remarkably well. By maintaining a disciplined role as technical advisors rather than political operators in their own right, their advice had been accepted even when it ran contrary to prevailing opinion. This contrasted with other attempts by scientists to influence government; the physicist Leo Szilard, for example, had been pushed aside repeatedly by politicians who saw him as a threat to their decision-making role. The Jasons, on the other hand, left decision-making to the politicians and were willing to integrate into a political structure in exchange for control over what mattered: their own epistemic discipline. The structure of JASON allowed them to do scientific research properly without getting compromised by political interests. In his farewell speech, McNamara drew on analysis provided to him by the Jasons that previous fall.

The bombing continued until November 1968. The U.S. would ultimately drop 864,000 tons of bombs on North Vietnam—364,000 more tons than were dropped during the entirety of the Pacific Theatre campaign during the Second World War. The U.S. government later estimated that 30,000 civilians and 28,000 North Vietnamese military personnel had been killed or wounded. As a JASON report stated, the bombing had not broken the

enemy's will at all; it had "strengthened popular support of the regime by engendering patriotic and nationalistic enthusiasm."

As for the sensors program, it would come back to assist U.S. forces in a future victory at Khe Sanh, a remote Marine Corps base on a mountain plateau near the Laotian border. In January 1968, the base came under siege by North Vietnamese forces. The base held 5,000 Marines and they were surrounded by 20,000 North Vietnamese troops. The only way in or out of the base was through the air amidst anti-aircraft fire. The situation was similar to a 1954 French military disaster where a French base, Dien Bien Phu, was overrun and the French ran out of weapons and supplies. There, around 11,000 French soldiers surrendered, of whom only 3,300 survived imprisonment. The Marines were facing a similar fate.

The U.S. military deployed its new sensor system to Khe Sanh to give the Marines a fighting chance. The Marines started launching artillery attacks and calling in air strikes, using sensor data to predict enemy assembly points. They began wearing portable monitors that beeped when sensors were triggered, enabling them to target enemy forces more rapidly. Instead of being overrun, the Marines inflicted heavy casualties on the North Vietnamese. A Marine officer at Khe Sanh later testified to Congress that without the use of sensors American casualties would have been twice as high.

America's military leadership dubbed the concept "the electronic battlefield." Today, this targeting process is called the "kill chain," and enabling U.S. forces to rapidly cycle through this chain is now central to U.S. military strategy. The future of the U.S. military has been described as creating a "giant, armed nervous system" that represents an endpoint to the first primitive systems employed in Vietnam.

As scientific advisors, the JASON group did their job well. They had voiced empirical objections to military plans, proposed solutions, and even criticized hasty misapplications of those solutions during the war. But ultimately, the U.S. discovered a timeless lesson of war: technical solutions cannot solve political problems.

The Decline and Future of JASON

The Jasons could not avoid the war's controversy forever. With each escalation of the war, popular sentiment—particularly in the academic

world—became more stridently anti-war. Anger that was first directed at the Johnson administration began to be directed at broader targets, including scientists who worked for the government.

The Jasons were singled out by activists, and their activities throughout the war were publicized in both mainstream and underground publications. Members faced direct consequences for their affiliation. One Jason had his garage set on fire; another had “war criminal” painted on the street outside of his house. At Columbia University, 49 faculty members signed a petition demanding that Jasons resign from the program or resign from the university. Demonstrators appeared outside their homes calling them “baby killers,” and Jasons were silenced or ejected from conferences.

So far, JASON had managed to maintain its autonomy from political pressure when that pressure came from decision-makers within an established hierarchy. But when that pressure began to come from professional activists, coworkers or professional rivals, and mass harassment campaigns, members began to crack. Many Jasons started quietly quitting. The group dwindled, as it had added only a few new members since its initial formation. The group’s productivity suffered and it began to lose its vitality.

In the early years of the program, the Jasons thought that both they and the U.S. as a country could work wonders. Many no longer thought that was the case. The social fabric that had enabled the group’s golden age had begun to fray. The U.S. government, in turn, suffered the degradation of one of its most important scientific advisory groups.

The post-Vietnam era also marked a decline in other elements of that social fabric. Congress criticized the National Science Foundation for limiting graduate fellowships to the top students. Instead of research money going to a handful of universities, it was now spread to non-elite schools as well. The PSAC, which continued to advise the president on scientific matters, was originally dominated by a group of Harvard and MIT professors that was dubbed the “River Charles crowd.” This group enjoyed easy access to senior military and political leaders. By the end of the Johnson administration, however, there was only one PSAC member from these elite schools. Members of the group were banned from eating at the White House dining hall.

These trends only accelerated: two of President Nixon's three science advisors quit because they felt marginalized and useless. Upset when members of the PSAC publicly came out against a U.S. government initiative to build a supersonic commercial transport plane, Nixon disbanded the PSAC in 1972. At the time, a White House staffer was quoted as stating "Who in the hell do those science bastards think they are?" ARPA's budget plummeted, and research spending declined overall; the golden age was over.

The result was that JASON had to begin looking for new members beyond the old formal and informal networks of scientists that had generated the group's norms. It began adding new members who were not physicists and were working for other "sponsors" besides the DOD. The group became less cohesive and less elite as it became more diverse. Cliques began forming within the project as its demographics changed. When JASON started it was filled with young prodigies; now its members joked that the name stood for "Junior Achiever, Somewhat Older Now."

Through the 1980s, the group's ability to balance and navigate its political relationships also suffered. Its next important role in the politics of the Cold War began when, to the surprise of his scientific advisors, President Ronald Reagan announced his Strategic Defense Initiative (SDI), an anti-nuclear missile defense system. The project became popularly known as Star Wars. The Jasons were vociferous in their opposition to Star Wars and presented the DOD with a torrent of negative criticism for years, to the dismay of the Pentagon.

In 1989, the Jasons were then asked to review an SDI program called Brilliant Pebbles, which entailed deploying a cloud of satellites that could ram themselves into enemy missiles in Kamikaze-style attacks. Pentagon officials declassified a summary of the JASON report stating that the group had "endorsed the concept" and announced that they intended to triple its budget to $55 billion.

But the group felt that the Pentagon had misrepresented its position. It made an overtly political move in response: contradicting the government in statements to the press. Members of JASON, including its chairman, told journalists that the Pentagon was overstating its support and that the concept would be leaky at best—countermeasures would be cheap and plentiful. The blunt comments enraged the Strategic Defense Initiative's leadership. JASON's chairman attempted to backtrack, but the damage was

already done. The Brilliant Pebbles program was shut down in 1993. The group had managed to save its reputation from government overstep, but it had also burned trust with its political patrons as a result.

When the Cold War ended in 1991, the Jasons were left with a diminished reason for existence. The central scientific problems of the Cold War existed within the realm of physics. In the post-Cold War environment, questions of biology and information technology were of more importance and prestige. In the mid-1990s, JASON began to study biotechnology, including methods for detecting biological weapons.

The shifting winds of political interests also threatened what remained of the original social fabric of the JASON program. Having already expanded to other parts of academia, the government was now pressuring the group to take on members from business as well. In 2002, DARPA finally ended its JASON contract after it refused to add three members from the tech industry with underwhelming academic credentials.

JASON survived, but only by cultivating other government agencies as sponsors. While the original group's work had been the result of a natural convergence between the existing scientific community and government goals, it now had to actively seek and meet demand in order to survive. The scientific working group had become a technical consultancy operation.

Despite this change in its incentives, JASON managed to maintain one vital trait of the group: a refusal to compromise its methods in the face of political pressure. In 2017, U.S. officials in Cuba began experiencing a wide range of strange medical symptoms, including pain and neurological injuries. The condition became known as Havana Syndrome, and in the following years around 200 U.S. officials in China, India, Europe, and elsewhere reported experiencing the same strange debilitating symptoms.

The origins of the syndrome were mysterious, but a CIA investigation pointed the blame at Russia. The National Academies of Science, Engineering, and Medicine (NASEM) eventually validated this assessment in a December 2020 report commissioned by the State Department that concluded microwave energy was the most likely cause of the syndrome. Russia had long experimented with microwave energy weapons and was viewed as the likely culprit.

JASON was tasked by the DOD with producing a classified report that included examining recordings of sounds that were made at the time of some of the attacks. A close analysis of the data came to the opinion that the most likely culprit of the reported noises was a biological source: Indies short-tailed crickets. Instead of a Russian superweapon, JASON believed CIA agents and State Department officials were experiencing a case of mass psychosis.

The conclusion was unwelcome news to the Pentagon; the Havana Syndrome was a useful data point to validate the threat posed by Russia when proposing budgets and U.S. defense strategy. The JASON report would ultimately be declassified in 2019, but not before its funding was cut by Michael Griffith, the Defense Department undersecretary for research and engineering, despite a directive from Congress to engage JASON on "methods to defeat existential and technologically-amplified threats to national security."

Griffith had clashed repeatedly with JASON when he was the CTO of SDI in the 1980s. By cutting its budget he was eliminating the threat of a scientific narrative counter to his own filtering up to the president. In sharp contrast to the Eisenhower administration's PSAC, Trump's de facto science advisor was a 31-year-old former political science major. By controlling the narrative, Griffith could control what threats got prioritized, and what research and development programs got funded.

A cynical way to understand the event is that the NASEM understood the assignment and JASON didn't. What the Pentagon wanted was an elite scientific body to lend its credibility to the view that Russia was behind the Havana Syndrome.

Under these circumstances, it was simply not possible for the JASON project to operate properly. Its foundation had come with a simple understanding: Jasons would do scientific research and give honest answers to officials on questions of interest, while those officials would make the necessary decisions with the information they received. This required a degree of trust and even secrecy.

By the time of the Havana Syndrome affair, the deal was undone. JASON had been able to survive the loss of its original social fabric, but following the breakdown of this political relationship they lost important political patrons as well. For now, the organization continues to exist. JASON

ultimately received a reprieve from the Department of Energy, but its future remains tenuous.

The U.S. has proven willing to spend—including the $52 billion dollar Chips and Science Act and a requested $130 billion in 2023 defense R&D—but enormous government spending does not substitute for a generative intellectual ecology. Research positions are now low-paid compared to modern alternatives. Credentialism is far stronger than it used to be, and recognition is harder to get. What made JASON possible was the convergence of two factors: a competent research community willing to strictly act as advisors, and political officials who wanted that advice to be truthful rather than convenient.

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