

Prestigious intelligence awards

Honoring Two World War II Heroes

R. James Woolsey, Maj. Gen. Doyle Larson, and Linda Zall

At a ceremony at CIA Headquarters on 27 October 1993, renowned British physicist Reginald Victor Jones became the first recipient of the R. V. Jones Intelligence Award. Jones received the medal engraved with his likeness from DCI Woolsey.

Jones headed scientific intelligence for the Air Staff during World War II and subsequently for the British Intelligence Service. His many accomplishments include the development of methods to foil the Germans' radar and their radio-beam targeting of bomb sites in Britain.

Also honored at the ceremony was Jeannie de Clarens, codename AMNIARIX, an interpreter who dodged Gestapo agents while gathering crucial information on the Germans' emerging rocket weapons programs from behind enemy lines.

Madame de Clarens's courage in collecting this intelligence and forwarding it under difficult circumstances led—through R. V. Jones's analysis and persuasive abilities in London—to the British raid on Peenemunde and to delays and disruptions in the V-1 and V-2 programs, saving many thousands of lives in the West.

Madame de Clarens, who was captured twice and spent time in three concentration camps, was awarded the Agency Seal Medallion by the DCI. He said that both Jones and Madame de Clarens are two remarkable individuals symbolizing the best of the intelligence profession.

Following are the remarks made at the ceremony by DCI Woolsey, Maj. Gen. Doyle Larson, USAF (retired), and Dr. Linda Zall:

DCI Woolsey

Professor Jones, Viscomtesse de Clarens, Reg, Jeannie, distinguished guests, friends:

I first heard about R. V. Jones some 12 or 13 years ago. In the aftermath of three-years' service in the Navy Department, I was appointed to an organization called the Chief of Naval Operations Executive Panel. I was the far-most junior and least prestigious member of this fine panel, and in a meeting one day in 1980 or 1981, an extremely clever idea was floated combining technical ingenuity and a truly crafty and nefarious twist of mind for dealing with the Soviet submarine threat. Either Albert Woolstetter or Charlie Hertsfeld, who is here today, muttered, "That sounds like an R. V. Jones idea," and I said, "Who is R. V. Jones?" A hush settled over the room. Either Albert or Charlie—I am not sure to this day which one—said, "I thought you were a reasonably well-read young man. You have not read *The Wizard War*?" I said, "No." He said, "Go read *The Wizard War*." I said, "All right"; I did.

A few months later I had an opportunity through a think tank to invite some people to gather and talk about naval tactics and strategy, and I, now enlightened, invited Reg to come to the United States and join us. He came to be a friend at that point, and what I have learned over the years since then is that Reg Jones is not only one of the central figures in World War II, but also, as an individual, he has much to say to all of us about the way we must approach intelligence in the 21st century.

So, although we are talking today about matters from the past, our focus really is on the future. We are not trying to relive the past, much less to reawaken animosities. The Fascist and Nazi regimes of Italy and Germany are long gone, replaced by democracies which are friends and allies, representatives of their intelligence services and others of our allies who are here today, as is the Ambassador of France. Indeed, in the intervening half century, we have together fought and won another whole war successfully—this time a cold one. The point is not what happened in the past and of itself, but rather what the extraordinary accomplishments we honor today can tell us about what we have to do in the future.

The award we inaugurate today, and of which Reg is the first recipient, the R. V. Jones Award, will be similar in one way and different in several ways from other awards which we give in the Intelligence Community. Like a number of our other awards, the R. V. Jones Award will, in the future, ordinarily—probably exclusively—be given in private. For two reasons intelligence successes must almost always be celebrated only among a handful of people many, many years after they occur. You do not want those from whom you are successfully collecting intelligence to know that the success has occurred, and you also do not want to have the methods of success known because they may well be useful in other circumstances.

But unlike our other awards in intelligence, the R. V. Jones Award, engraved with Reg's likeness, will not be reserved for Americans, although Americans are eligible. It will be given in the future to intelligence officers or organizations in the United States or other countries who demonstrate "Scientific Acumen Applied With Art in the Cause of Freedom."

"Scientific acumen applied with art" is the best way we could think of, in a few words appropriate to a medal, to sum up "behaving as R. V. Jones would have." What do we mean by this and how is it relevant to the intelligence world of the future? As the head of scientific intelligence for both the Air Staff and later the British Intelligence Service, Reg Jones during World War II masterminded a combined effort. He was a sort of one-man, all-source intelligence collection, evaluation, and analysis system, who, in his spare time, designed countermeasures, implemented covert action, and targeted

military forces. Reg would dispute the one-man characterization. He has always been generous to his colleagues even while insisting, sometimes quite stubbornly, on his own views.

What is unique about Reg Jones is not only that he was, and is, an extraordinarily gifted scientist with a great deal of ability to integrate information, form hypotheses and test them, and make sound judgments, it is that he was also an innovator in intelligence collection. In addition, he was an analytical nerve center where a spirit of ingenuity and an ability to combine information from imagery, signals intelligence, and espionage made the whole of his government's and the Allies' understanding of the enemy's mind much greater than the sum of the individual inputs. He was also a source of ideas and plans for covert action to influence the course of the war. As a superb targeter of military forces, he was a most crafty inventor of countermeasures to thwart enemy action.

In short, nothing in intelligence was alien to Reg Jones. In getting his ideas implemented, he trod on many toes, for intelligence is a business in which turf protection reaches heroic proportions and rice bowls multiply geometrically. In treading on those toes, however, he became the sparkplug, the broker, the midwife for many courses of action that substantially altered the course of the war, shortened it, and contributed to victory.

In intelligence collection, for example, Reg Jones himself analyzed the sensitivity of navigation gear from shot-down bombers in the search for the beams. He was instrumental in developing wingtip cameras for certain types of photo missions, substantially improving reconnaissance. He planned the commando raid on Bruneval to obtain a German radar, and, incidentally, a German radar operator. And, as for his understanding and appreciation for the classic and essential craft of espionage, more in a moment.

In evaluation and analysis, Reg Jones's superb gift for using intelligence to understand the mind of the enemy came from his ability to integrate information from many different sources, to use one type to tip off

another, to take one type of clue—for example, the mere order of addresses on a signal intercept—and to see then that it would make an agent report fall entirely into place. It was Reg Jones's ability to integrate the output from the remarkable codebreaking that was going on at Bletchley, from agent reports, from captured equipment, from reconnaissance, and from many other sources that made him such a remarkable puzzle solver—puzzles in which many of the pieces had of course been hidden by his adversaries. He would patiently piece together clues, develop an hypothesis, task those who collected intelligence, manage the collection, form a conclusion, demand to be heard, persuade his superiors of his view, design actions to counter what he had learned about, and then do it all over again.

In the field of countermeasures, Reg invented "window," which we came later to know as "chaff," the principal method for deceiving radar in its time. His gift for putting himself in the shoes of his adversary—a gift that is common to all great chess players, poker players, and intelligence officers—was essential to these deception operations. By coming to understand which beacons, for example, would be finding night fighters on particular evenings, he was able to insert British long-range night fighters into the midst of the German formations, to begin firing, dart away, and thus start fights among the German fighters themselves.

His understanding of the radar wavelengths that receivers on U-boats could detect led him to call for British radars to be developed with different wavelengths to detect the U-boats. He then masked the effectiveness of his new method of detection by putting out false indications that the British were using a wholly fictitious infrared method of submarine detection. This led the Nazis to concentrate, entirely unproductively, on development methods for avoiding detection of their U-boats by his wholly fictitious infrared system.

In all of these efforts, Reg Jones's attitude and approach toward intelligence embodied some timeless principles. The first, and in many ways the most important of these, was his respect for the enemy's abilities. Reg was a resolute foe of a fallacy that is common in the intelligence business—frequently called mirror-imaging—

namely, assuming that one's opponent will act as one does one's self. He was thus able to understand, for example, that the Germans had made a breakthrough in rocket fuels, which had not been thought of by Allied scientists. As he put it in one heated discussion around the Cabinet table in addressing the issue with Churchill, "Just because our experts have not thought of liquid fuels, there was no cause to assume that the rocket was either more or less eminent than it was before our argument had started."

He continually stressed that it was quite possible for the Germans to have succeeded in scientific undertakings, such as the Knockebeam beams, where the British or the Allies had not yet conceived of the approach. His respect for his adversary's abilities, their very great abilities, led him to be able to learn from them, as in the case of the clever German operation that permitted the Scharnhorst and Gneisenau to escape the British blockade. Jones likened the German naval tactics to the principle he call "climatization by slow change"—one of a number of categories of practical jokes which Professor Jones, a lifelong practical joker and designer of humorous hoaxes (you can tell it from the poker face and the twinkle in the eye)—has often analyzed and set forth for admiring and chuckling audiences.

Believing firmly with Thomas Hobbes that "force and fraud in war are the two cardinal virtues," Reg was successful to a remarkable degree in understanding and thwarting his adversary's moves because he was able to put himself in their position. My particular favorite of these involved the defense of Malta.

Holding Malta was an important part of maintaining control of the Mediterranean early during World War II, and the British radar on Malta was an important link in that defense. At one point, the German armed forces had installed powerful new jammers in Sicily. Once they were turned on, they effectively jammed the Malta radar and made defense of the island extremely difficult.

An urgent request arrived on Reg's desk from the signals organization in Malta asking what steps they should take in light of the effective German jamming. Because he had taken care to understand not only German jam-

ming, but also—and this is the key—the way the German military forces made their decisions to see whether or not their jamming was successful, Reg gave a surprising response to Malta: do absolutely nothing different than you had been doing before—continue to scan.

Sure enough, after a few days, the German jammers on Sicily were turned off. At the end of the war General Martini, the Director General of Signals for the Luftwaffe, had been taken prisoner and was being questioned. During the discussion, he asked his former adversary, Reginald Jones, what remarkable antijamming device the British had been able to install in their Malta radar, and the General ruefully learned of Jones's deception—I suppose uttering some equivalent of “Curses, foiled again!”

Although his reputation is that of a man who knew and knows his own mind, Reg Jones was also a team player, a characteristic which is essential for success in intelligence. His tactics in persuading others in his own government to go along with his judgments have often been both kind and deft. For example, his original mentor, Churchill's close adviser, Frederick Lindemann, later Lord Charwell, was on the other side of a number of arguments against Reg on scientific matters during the war.

On the key issue of the development of a V-2 rocket at Peenemunde, Jones worked until he was certain of his facts, then he visited Charwell privately to tell him that, if Charwell continued to deny the existence of the rocket, there was nothing he could do in the interest of the war effort except force a clear confrontation that Charwell would lose. But if Charwell would look at the facts and be persuaded, Reg offered to bring out the new evidence as gently as he could, over the period of a week or so, in order to give Charwell an opportunity to change his ground. Charwell agreed to the second course.

Most delicious, in a sense—two senses—however, occurred when Reg was trying to persuade the group captain who was the head of the photographic branch of the Air Staff, D.D. Laws, nicknamed “Daddy,” of the importance of moving to use wingtip cameras for photo-reconnaissance to improve stereoscopic photography, and for a number of other reasons. As Jones puts it in *The Wizard War*, “By this time I was beginning to get

on personal terms with “Daddy” Laws. Finally, I found his weak point. Of all the improbable hobbies for a group captain, his was the making of jam. If only I could convince him that I, too, was interested in jam-making, he might be more sympathetic to my ideas about cameras. My moment came when I asked him one day whether he had ever made quince jam. ‘No,’ he exclaimed—and then with a wistful look in his eye—‘but, by God, I'd like to.’ I offered to get him quinces, and henceforward, photographic Mosquito aircraft for low-level work were fitted with forward-facing wingtip cameras.”

When it came down to it, however—and in many ways this is the most important aspect of being an intelligence officer—when diplomacy and quince jam did not work, Reg Jones was a man who stuck to his guns and stood his ground. He was careful and deliberate in his analysis, but when the chips were down, he had, in the battles of Whitehall, the one absolutely essential ingredient for intelligence officers: courage. As he put it in the introduction to *The Wizard War*, dedicated to “all those in Nazi-occupied Europe, who in lone obscurity and of their own will risked torture and death for scientific intelligence,” he noted that “courage is the quality that guarantees all others.”

This is no less important when a young 28-year-old analyst, with a theory about some navigation beams that no one else has really heard of or understands, is confronting his mentor together with the prime minister and the entire War Cabinet. It is as important there as it is on the front lines. Time and again—on the beams, on the capabilities of the V-2 (dealt with in another Cabinet confrontation)—the strength of character behind Reg Jones's defense of his judgments was powerful.

This strength was born of devotion to those for whom he spoke—those whose lives were on the line. As he put it—referring to two members of the French Resistance who had been executed—“while men like Giran and Faye, and women, too, suffered torture and death for us alone among their perverted enemies, our squabbles in London went on.” He added, “I knew what devotion was being offered by so many of our sources, and I was

going to see that their sacrifices were turned to as good advantage as possible. This was the only way in which we could keep faith with them.”

This brings us to my last point—Reg Jones’s attitude toward espionage and to those who conduct it, as the medal says, “in the cause of freedom.” Some today try to put the effective use of technology and classic espionage at odds with one another. Nonsense! In Reg Jones’s mind and writings, there is no hint of any such false separation between the role of science and the role of human beings undertaking the dangerous, lonely, and heroic job of espionage “in the cause of freedom.”

For three reasons, espionage was in World War II, always has been, and, in my judgment, always will be, a unique, vital, and central feature of intelligence. This is true, first of all, because much of intelligence involves attempting to understand the intentions and the plans of an adversary. When an adversary is clever and tough, he can limit your ability to learn about his actions from reconnaissance or from intercepting signals. Sometimes on the vital subject of his plans and intentions, there is no means available other than espionage.

Second, espionage is often essential to providing an indication, a tip, a direction for targeting and using technical intelligence assets, such as reconnaissance or signals intelligence.

Finally, espionage in the cause of freedom has one great advantage because the human spirit is the Achilles heel of tyranny. Although democracies labor under some tactical disadvantages in espionage—and they will have their failures—in conducting espionage against regimes under the control of Nazis, Fascists, Communists, and the like, free governments have one great asset in those long twilight struggles. The uglier the regime, the more it will become vulnerable in time to its own people, including those who work for it officially—those who possess secrets. Through disgust, through cynicism sometimes, but often through a quiet, private thirst for freedom, those who are forced to live in and work for tyrannical regimes will come to be willing to reveal those regimes’ plans and activities. When that happens, cracks appear in the regimes’ armor.

Just as brave individuals succeeded in espionage against the Nazis and Fascists a half century ago, today we see these sorts of cracks in the armor of regimes that proliferate weapons of mass destruction and foster terrorism. We and these regimes’ own people will ultimately defeat these regimes as well. When we do, it will be in very important part through espionage because of brave and clever men and women such as those in this building and in the intelligence services of our friends and allies who are here today and who are willing to spend their lives working and supporting those who work in the front lines and the back alleys of the world in the cause of freedom.

A half century ago, it was espionage that led the Allies to understand the rocket and missile programs at Peenemunde, and that brings us to the second person we are honoring today—Jeannie Rousseau, the Viscomtesse de Clarens, codename AMNIARIX. She is listed first by Reg in the dedication of *The Wizard War* as one of those for whom “courage is the quality that guarantees all others.”

As Reg relates it, when he first inquired about the source of the extraordinary report that had originally tipped off the British Government to what was going on at Peenemunde, all he could learn was that it came from “*une jeune fille la plus remarquable de sa generation*,” part of a small espionage network reporting from occupied France. Early in the war she had, because of her gift with languages, served as an interpreter in transactions with the Germans and had begun to report on what she had seen and heard. She was arrested by the Gestapo in 1941 but was later released and prohibited from staying in the coastal area. She returned—if you know her, you would know why—immediately to espionage in Paris. During 1943, she filed two—indeed, many others—but two particularly remarkable intelligence reports about Peenemunde. These reports led Reg, and ultimately, the rest of the British Government and the rest of the Allies, directly to the missile and rocket development work going on there. Her courage in collecting this intelligence and in forwarding it under very difficult circumstances, led, through Reg Jones’s analysis and persuasive abilities in London, to the British



R. V. Jones, DCI Woolsey, and Jeannie de Clarens.

raid on Peenemunde and to delays and disruptions in the V-1 and V-2 programs, saving thousands of lives in the West.

Shortly before D-Day, a plan to evacuate her and two other agents was aborted by the Gestapo. She was the first to be caught. But even as she was being captured, she succeeded in warning her comrades so that one was able to escape. And again, as Reg has put it: "AMNIARIX's reports stand brilliantly in the history of intelligence, and three concentration camps—Ravensbruck, Konigsberg (a punishment camp), and Torgau could not break her."

We thus today present two awards for two remarkable individuals, symbolizing the best of the intelligence profession. Could I ask Reg Jones and the Viscomtesse de Clarens, Reg, AMNIARIX, to join me please?

Jeannie de Clarens is hereby awarded the Agency Seal Medallion for heroic and momentous contribution to Allied efforts during World War II as a member of the French Resistance. At the age of 20, she used her position as an interpreter for the Germans to report what she saw and heard. Arrested and released by the Gestapo in 1941, she devised a new cover and with her language skills as entree used her extraordinary intuition and considerable wiles to provide intelligence on German missile research.

In September 1943 she filed a stunningly accurate report on the German missile order of battle. When captured by the Gestapo in 1944, Madame de Clarens had both the mettle and heart to warn her companions, who successfully escaped. With her place in history secure and

having spent the last year of the war in three German concentration camps, we could understand had she rested on her laurels.

Instead, Madame de Clarens has continued her fight for human dignity and freedom, including her work for Amnesty International. Her wartime exploits remind us that, even in a world of high-technology espionage, the human agent remains indispensable to vital operations beyond the reach of science and that there can be no substitute for human courage “in the defense of freedom.”

Maj. Gen. Doyle Larson

Reg, Mr. Woolsey, Madame. I think DCI Woolsey did a great job in describing a great man. I have a few personal things to contribute. I really cannot say anything that would add much to what you have already seen. This man is a close personal friend, and, as I thought about the remarks I wanted to make, I could not help but go back to some of the original statements that I read from Churchill—that, when World War II broke out in 1939, Reg Jones was a junior employee of the British Air Ministry working on a project to develop infrared detection of aircraft. He had been paid 50 pounds for that project, a princely sum.

In the course of conducting the project, Reg had been reading about the development of new military weapons and techniques, and because at the time there were very few scientists in Britain who had shown similar interest, it was perhaps only natural that he should be introduced to Wing Commander Winterbottom, head of Air Intelligence Branch. Thus began a spectacular career that played a vital role in the defeat of the Axis powers, and I think best described by Winston Churchill in Volume II of his memoirs in which he describes how he summoned Reg to their first meeting:

In June, I received a painful shock. Professor Lindemen reported to me that he believed the Germans were preparing a device by means of which they would now be able to bomb by day or night, whatever the weather. A radio beam like an invisible searchlight would guide the bombers with considerable precision to their target. Lindemen told me also that there was a way of bending the beam, if we

acted at once, but that I must see some of the scientists, particularly the Deputy Director of Intelligence Research at the Air Ministry, Dr. R. V. Jones.

And so it was that Winston summoned Reg Jones, and he reports that he arrived a few minutes late. A youngish man who, as I afterwards learnt, had thought his sudden summons to the Cabinet room must be a practical joke. And, if you know Reg and how many times he pulled practical jokes, you can understand that. At any rate, Churchill continues:

He [Jones] hurried in and took his seat at the bottom of the table. According to plan, I invited him to open the discussion. For 20 minutes or more he spoke in quiet tones, unrolling his chain of circumstantial evidence, the like of which, for its convincing fascination, was never surpassed by tales of Sherlock Holmes or Monsignor Lecoq.

In 1979 I was tasked by Air Force Chief of Staff, Gen. Lou Allen, to proceed to San Antonio, Texas, to establish a new Air Force support command called the Electronic Security Command in a JCS activity called the Joint Electronic Warfare Center. As I began to think about trying to create this new kind of activity employing science and technology and modern warfare, I recalled that chapter from Churchill's book. I pulled the book off my bookshelf and read again that chapter entitled “The Wizard War.” I became obsessed that I could not proceed any further until I had made contact with this man. I called General Allen, and he immediately said, “That's a good idea. I know this man very well. By all means, bring him over.”

And so I made arrangements for Reg Jones to travel to San Antonio, and I instituted a series of seminars for the purpose of government/industry exploration into ways to employ science and technology and modern warfare. I truly believe today that his tutorials and his insights were the seeds that spawned our present strategy for command and control warfare, a strategy recently issued by the JCS that calls for the integrated application of deception, jamming, psychological warfare, opsec, and lethal weapons. Reg did a lecture for me once in one of these seminars, and he referred to this coherent employment as a commander's kit of tools.

One of the things that I did on one of his visits was to practice some of the teachings of Reg Jones. So, a month or so before he left Aberdeen, I called him and asked him if I could call on him to play the Star-Spangled Banner for the banquet on his harmonica. He said, "Well, I believe I can. It's probably just an old Scottish tune." And so at the banquet, at the appropriate time, I called Reg to the podium. He stepped forward, pulled out his harmonica, and played the Star-Spangled Banner.

When he was done, we opened the curtains and, standing behind him on stage, was the Air Force pipe band that began to play a tune for our visiting Scotsman. Then, just to continue this little play with Reg Jones, we brought in on a very special carriage a container carried by an honor guard with great pomp and ceremony. It had a vat in the middle of it, and we presented it to Dr. Jones in the finest traditions of dining in. It was a vat of menudo—a sort of Mexican haggis. It was only appropriate for him to determine if it was fit. He tasted it, and it was.

I believe that Reg Jones's tutorials and lectures were very effective in teaching our military how to employ a kind of brilliant warfare. I also believe that what you saw displayed on CNN during Desert Storm was the direct result of his teachings. The Iraqi command and control system was rendered ineffective in just a few minutes. Reg Jones deserves considerable credit for a stunning victory, and I salute him for that achievement.

Linda Zall

It is a great privilege to speak at this ceremony which recognizes Professor R. V. Jones's contributions to intelligence, and which establishes the R. V. Jones Medal for those who may follow in his footsteps. The concept of the medal is nontraditional, as befits the man after whom it is named. Most awards our society bestows upon its leading scientists honor its great inventors—men and women who invented devices like transistors or lasers. The R. V. Jones Award is different. It is designed to honor those who recognize curious linkages of technology to intelligence and then creatively exploit them.

Before World War II, technology had little impact on intelligence, although technology had repeatedly revolutionized warfare—the stirrup, the long bow, gunpowder, and the tanks and aircraft of World War II are some examples. But due in large measure to R. V. Jones during World War II, science and technology moved into the mainstream of intelligence, where they remain.

That Professor Jones achieved his results despite then conventional wisdom teaches us a valuable lesson. Conventional wisdom, when applied to the future, is compelling, widely accepted, and frequently wrong. For example, the beginning of radio astronomy was delayed over 20 years because few believed we could detect weak radio sources. Another example is Martin Schmidt's discovery of quasars, celestial bodies that according to conventional wisdom could not exist.

With freedom hanging in the balance, Professor Jones used science and technology, unconventionally, in a host of critical areas. Many of these areas have matured into technologies and methods that are the mainstays of today's Intelligence Community. These include his pioneering work in infrared detection, remote sensing, analyses of nuclear technology, and, of course, radar.

With respect to radar, we have seen how Professor Jones understood and overcame German radio-navigation aids and German ground-based, defensive radar systems.

Today, such systems are much more complicated. Modern, ground-based radars use more of the spectrum and employ complex and diverse waveforms; they can measure the shape and characteristics of faraway objects with great precision. Where once a slide rule would have sufficed, we must now use exotic signal-processing techniques, which, in turn, would not be possible without today's computers, advanced digital radio receivers, and associated microelectronics.

Radar has evolved even further, as scientists can now produce images from it. To produce these images, they require extraordinary computational power, more than 10 million times greater than that which was available during World War II.

Recently, scientists have advanced the art still further, exhaustively processing radar returns to detect ground displacements that result from earthquakes—processing which requires another factor of 10 in computer power. But, while the computational accessories needed to understand and use such technology may have changed, the human creativity and insights required remain a constant.

Although Professor Jones is justifiably best known for his work on radar, he was among the first to recognize the potential contribution of infrared technology to intelligence. Today we have sensitive infrared focal plane arrays that are the cornerstone of our global missile warning system.

As an avid consumer of aerial photography, Professor Jones pioneered in what we more broadly refer to today as remote sensing. His success in estimating the German military capability from air photos led to our ability, during the Cold War, to estimate the size of the Soviet military capability. We translated this need into the technology that became our U-2s and SR-71s. These aircraft trace their ancestry to the Spitfires and Mosquito Bombers whose use for reconnaissance he championed. The way in which Kelly Johnson and the Lockheed Skunkworks approached the U-2 design and fabrication is reminiscent of how Professor Jones rejected the large bureaucracy in favor of the small team.

Over the past three decades, “overhead” reconnaissance has moved beyond the atmosphere and into space. Still, the tight link between the exploitation of these new images and the requirements of the analyst remains a tribute to the pioneering efforts of Professor Jones. Were he active in our business today, he would be the consummate tasker of such systems.

Nuclear proliferation is of front page concern today, but it was R. V. Jones, during World War II, who appreciated the threat posed by a German nuclear capability. His analyses of German heavy-water production in Norway led to a daring attack on the facility. He received his intelligence on that facility from agents. At that time, little technology was available to support his analyses. Today, we have access to sophisticated analytical tools—gas chromatography and mass spectrometer techniques that can detect impurities at concentrations as low as a part in a billion.

As we consider the current state of technology, I should note that my generation has access to a key technology that was not available to Professor Jones—the supercomputer. Supercomputers have enabled recent advances in modeling and simulation, where we can marry intelligence and military operations in ways which were once thought to be science fiction. Virtual simulation was introduced in support of the Persian Gulf war, to enable our fighting forces to rehearse their next day’s mission by exposing them to the Intelligence Community’s best estimate of the enemy threat. By merging the technologies of computer modeling and simulation, and also telecommunications, we have developed a real-time capability to exploit intelligence data instantaneously in a way that could revolutionize how we wage future conflicts.

These supercomputers have also advanced the world of cryptography. In fact, these computers trace their lineage to the early computational techniques used to break the German and Japanese codes in World War II. Thanks to cryptography, our government officials have the most secure communications in the world.

We are in an information revolution! Unlike in Professor Jones’s time, with today’s sophisticated satellites and fiber optics, integrated with supercomputers, we have at our fingertips a vast amount of information to support analysts. The future is evolving into a global superhighway that will produce an explosion of data at terabits per second. In fact, we are often overloaded with information on which to make decisions. We must challenge technology to provide us the analytical tools to extract the intelligence nuggets from these vast quantities of data.

Recently, the intelligence and defense communities have been asked to apply our technical capabilities for environmental science. Let me cite an example, using a technology that had its roots in World War II. Then, we used a short-range, undersea acoustic system to help counter the German U-boat threat. As this technology marched forward, scientists can now, by estimating the underwater travel time of acoustic signals, determine if the oceans are warming. This could provide data to settle the ongoing global warming controversy.

As we look to the future, we see a host of challenges to the Intelligence Community posed by new circumstances. Whether these challenges come from ethnic, national, or regional strife that threaten our hope for a new world order, the demands on our technical and HUMINT collection and on our analytical capabilities will be immense. If we are to apply technology creatively to these unconventional intelligence problems, it will require unconventional perspectives. That is the model that R. V. Jones has established, and it is for us, the next generation of intelligence technologists, to appreciate that challenge and to react to it with the skill, creativity, and determination that are the hallmarks of R. V. Jones.