How Viking Changed Science Communication

Abstract

Fleeting public interest in the Viking mission inspired Carl Sagan to devise a new mode of science communication. One result was the *Cosmos* television series. Carl's global success offended many in the scientific community, and he was punished despite his solid research credentials. Almost 50 years later, the importance of public outreach by scientists seems to have reached greater professional acceptance. Key Words: Science communication—Viking—Cosmos—Mars—Public outreach. Astrobiology 00, 000–000.

I remember July 20, 1976, as if in a dream. I am standing in line at the Jet Propulsion Laboratory cafeteria, gathering flatware on my plastic tray, when the chatter and the din suddenly stop and all eyes are drawn upward to the television monitors that have suddenly come to life. A narrow stripe of video from the surface of Mars appears on the right side of the screen and is very slowly joined by another. We hold our breaths as the stripes continue to appear. I think all of us were wondering if the next stripe would reveal something no one on Earth had ever seen before.

Fifty years later, it still amazes me that this achievement came less than two decades after our species had managed to send its very first object into space. If we could advance in a mere 12 years from Sputnik, an uncontrollable 1-watt radio transmitter in near-Earth orbit, to humans walking on the Moon, and to landing our robots on the surface of Mars in only 19 years, the human learning curve must be very steep. We believed then that nothing could stop us now. It felt as if the trajectory we were on would not bend until it carried us all the way to the stars.

The massive broadcast trucks of the media of many nations, with their white dishes pointed skyward, lined the outer perimeter of JPL for quite a distance. The whole world was paying attention. With one glaring exception, all the major news-gathering outlets wanted to talk with Carl Sagan. At that time, I knew him as a friend, and therefore, I was a witness to the global clamoring for 5 minutes with him on camera or a microphone.

To my surprise, NASA's own public outreach entity was the only one that didn't seem to want him on their air. Back then, NASA seemed determined to keep their public outreach as unexciting as possible. Their efforts invariably featured talking heads having a conversation so thick with professional jargon and abbreviations that any member of the public who happened to catch it would find it incomprehensible. Markedly absent from their exchanges was anything that would inspire and engage those outside their small community. Apart from the press conferences by core mission participants, there was a palpable sentiment on NASA's part that Carl was resented and unwelcome. Eyes would roll at the mention of his name. His offers to participate in NASA's own efforts at informing the public were rebuffed.

Carl understood and didn't seem to mind. He had been dealing with this attitude since he was a grad student at the University of Chicago and had the audacity to invite George Gamow to speak at a lecture open to the public about the topic to which this journal is devoted when it was still regarded by the scientific community as unfit for respectable, professional inquiry.

What really upset Carl was that only a day or two after the landing, while Viking still had so much to teach us about Mars, the media fled in droves. These same brief pops of public fascination followed by long periods of utter indifference had tormented him since the first Mariner missions. What, he

wondered, could he possibly do to help instill a deeper and more consistent public interest in science and exploration?

Cosmos: A Personal Voyage was his answer, and he asked me to write it with him. It would be a 13-part television series conceived to convey to the widest possible global audience the values and insights of science. We wanted to tell the heroic stories of this informal community of minds stretching back to antiquity and forward to tomorrow, all of them trying to chip away at the colossal mystery of existence.

The theme of the series would be the methodology of science itself. Whether it was Eratosthenes hiring a guy to count the paces between Alexandria and Syene (modern Aswan) so that he could accurately measure the planet with just a couple of sticks, or Johannes Kepler refusing to fudge the data that told him the planets could not be made to move in perfectly circular orbits, we were celebrating a human imperative to know the way things really are and how they came to be that way.

Cosmos would be our first collaboration since Carl and I had discovered our love for each other during our work on NASA's Voyager Interstellar Message. We were joined in the writing by Carl's esteemed colleague, astronomer Steven Soter, a person whose knowledge of science, history, and culture is as wide-ranging as Carl's was and whose kindness and patience made him the ideal collaborator for us. The three of us worked mostly 7-day weeks for 3 years, and somehow it was a consistently joyful experience, a feast of ideas.

We wanted Cosmos to be a thrilling saga, with state-of-the-art special effects, spectacular terrestrial locations, cinematic production values, and stirring music to amplify the impact of the content.

To make comprehensible the enormous time scales encompassed by the scientific perspective, we envisioned a football field of time, a Cosmic Calendar, which compressed all the most significant events of cosmic evolution into a single terrestrial calendar year. What meaning could ten or a hundred billion years have for mayflies like us who live for a hundred years at most? We reasoned that most of us have a feel for what happened last September, and on the Cosmic Calendar that was when the Earth gave rise to life. The Cosmic Calendar had the additional virtue of decentralizing the importance of humans in the great scheme of things, with all our proudest achievements taking place in only the last seconds of New Year's Eve.

Our Ship of the Imagination could take us anywhere in spacetime, to explore the exquisite universe revealed by science on the scale of the very small and very grand. Our recreation of the Library of Alexandria was our statement of the preciousness and fragility of the search for knowledge.

Cosmos would differ from other science-based programming in another regard. Many another scientist had confused the dispassion that was key to gathering and analyzing data with the most effective way to communicate these insights to the public. The Ship of the Imagination would have equally powerful twin engines of skepticism and wonder. It was our intention that one must never come at the expense of the other.

The prevailing image of the scientist of that time was one of a socially inept misfit, someone who knew a lot but had no ability to connect with other people or even to feel anything. In my opinion, Carl did more than any other single human to fracture that cliché. Vibrant and open-hearted, to him science was not merely a collection of amazing facts meant to be compartmentalized and kept separate from the rest of human experience and feeling. For him, science was a way of thinking about everything and even a means to a fuller experience of being alive. When asked why he devoted so much of his time to public outreach, he would say "when you're in love you want to tell the world."

Together, working with hundreds of others, we tried to create a series that would engage people in every country on Earth. Cosmos had no demographic; it appealed to young and old, male and female, and people embracing or living under every conceivable ideology. Forty-six years later, I still receive messages from people all over the world, telling me that it was Cosmos that set them on their pathway in life—reading, teaching, or doing science.

The ultimate gratification of this kind came when I stood, terrified, in the neurological intensive care unit at Cedars-Sinai Hospital in Los Angeles. I was talking with Dr. Nestor Gonzalez, who had been presented to me as, possibly, one of the very few people on Earth who could save our youngest son, Sam Sagan, then 27, from what I had been told would be a horrendously life-altering, if not fatal, cerebral hemorrhage.

When Dr. Gonzalez discovered his patient's last name and that Carl was his late father, he was visibly moved. He trembled slightly as he told us that Cosmos was why he was standing there with me. He said that "when you come of age in a country like Colombia, and Carl Sagan calls you to science," medicine was the only avenue open to him. Later, when it was clear that Sam would live and emerge unscathed, I couldn't help but feel that Carl and Dr. Gonzalez had saved him together.

In the 10 years that followed the broadcast of the first season of Cosmos in 180 countries, Carl became the most visible scientist on Earth. Some of his scientific colleagues sought to punish him for that. They believed that real scientists only communicated with each other.

Their resentment of Carl's visibility reached crescendo when the US National Academy of Sciences shamefully blackballed Carl in the 1991–1992 membership election cycle. They did this even though his research was deemed more than adequate to qualify him for membership.

As Carl knew, this attitude was far more damaging to our society than it was to him personally. He frequently warned that a civilization utterly dependent on science and high technology, with aspirations to be a democracy, could not long survive if the knowledge of them was confined to a tiny elite. How could we hope that the voting public would make the best decisions if so few of us had the necessary tools of critical thinking and, as a result, could be so easily fooled? For him, communicating what he had learned as a scientist to the wider public was a passionate act of citizenship.

In the decades since then, there has been much change, in my view, some of it for the better. Technology has removed many of the bottlenecks that once prevented more scientists from reaching the public. The opportunities for scientists to share their knowledge have become decentralized because broadcasting, publishing, and corporate executives are no longer the gatekeepers of what gets presented to the public.

My daily Instagram feed includes engaging outreach by scientists in a great variety of disciplines from all over the world. There are now means to produce visually arresting special effects without requiring the hugely expensive apparatus that was once essential. It's my impression that the scientific community has become more appreciative of working scientists who engage in public outreach.

I would propose some additional changes to build on what we have learned since Viking. I think it would be in our best interest if courses in communication were required for those seeking an advanced degree in science. I believe that it would be in our long-term interests if the institutions that employ scientists would continue to actively support science communication. As Viking demonstrated 50 years ago, we humans have a steep learning curve. Our ability to meet even the most

daunting challenges can result in mythic achievement. That candle in the darkness, which science is at its best, is always at risk of being snuffed out if its light is hoarded and not used to kindle others.

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